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Bit by Bit

English for Information and Communications Technology

New Edition

edisco

BIT BY BIT, New Edition

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PRESENTAZIONE

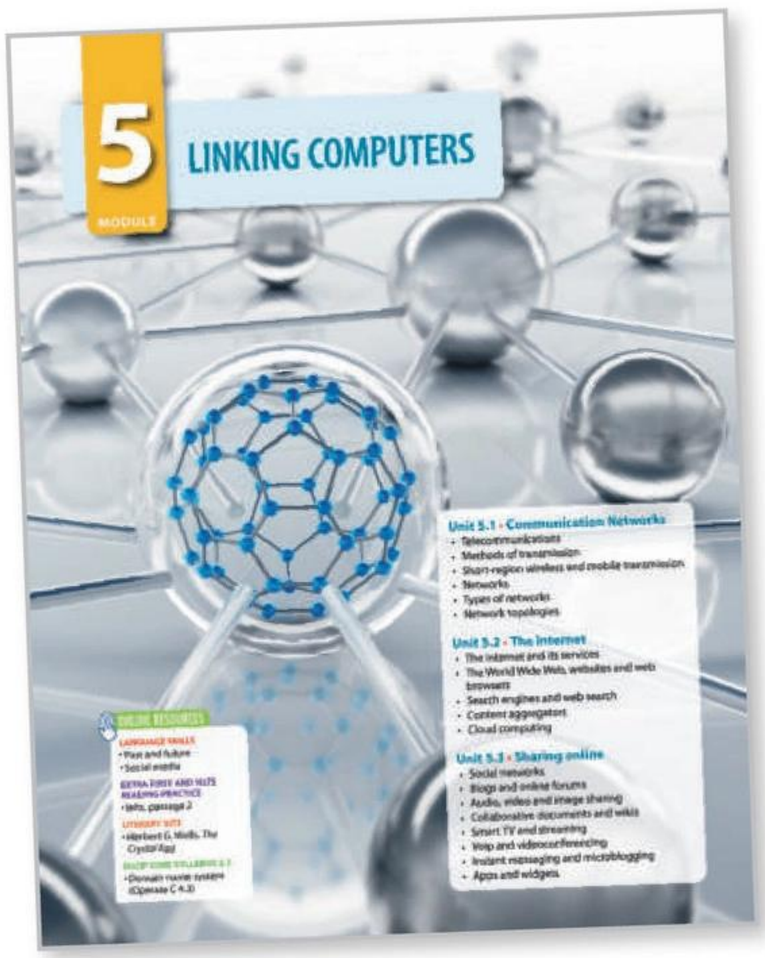
ARGOMENTO

New Bit by Bit è rivolto in particolare agli studenti dei corsi a indirizzo **Informatico** e, più in generale, a coloro che hanno l'esigenza di utilizzare la lingua inglese come strumento di studio e/o di lavoro in questo settore.

Grazie alla ricchezza del materiale proposto, ***New Bit by Bit*** – concepito per promuovere un apprendimento attivo basato sui contenuti *(content-based learning)* – offre la possibilità di scegliere gli argomenti sia in base ai programmi delle materie di indirizzo, sia in base agli interessi e al livello di competenza linguistica degli studenti in modo da garantire l'interdisciplinarità dell'apprendimento lungo tutto il corso di studi.

I contenuti, veicolati attraverso testi di livelli di complessità crescente (B1, B1+, B2), vengono esplorati utilizzando le quattro abilità in modo omogeneo ed integrato. Il testo dà inoltre grande importanza alla pratica linguistica attraverso attività che agevolano la revisione e la ripetizione dei contenuti studiati, favorendone l'apprendimento.

I materiali, scritti e orali, contenuti nel testo, offrono un assortimento di stili, registri e livelli di difficoltà, e sono tratti da fonti diverse: libri e manuali, quotidiani e notiziari on line, siti web (anche specialistici).



OBIETTIVI DEL TESTO

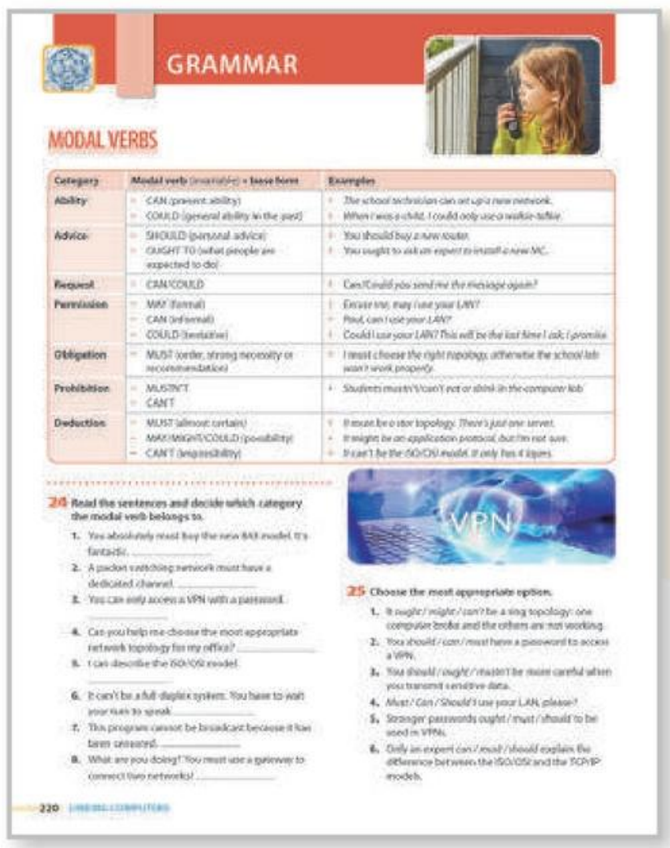
New Bit by Bit si propone di:

- far acquisire le competenze necessarie per comprendere testi che presentano termini, espressioni, strutture sintattiche e modalità discorsive specifiche del linguaggio settoriale;
- migliorare le capacità di ricezione e produzione orale e scritta;
- arricchire il patrimonio lessicale sia con il lessico tecnico che generale;
- consolidare abitudini grammaticali corrette e approfondire alcune strutture;
- stimolare l'interesse e la partecipazione attiva degli studenti, dando spazio alla loro esperienza personale e a problematiche di attualità;
- contribuire a sviluppare sensibilità per un utilizzo corretto e consapevole delle nuove tecnologie negli ambiti specifici.

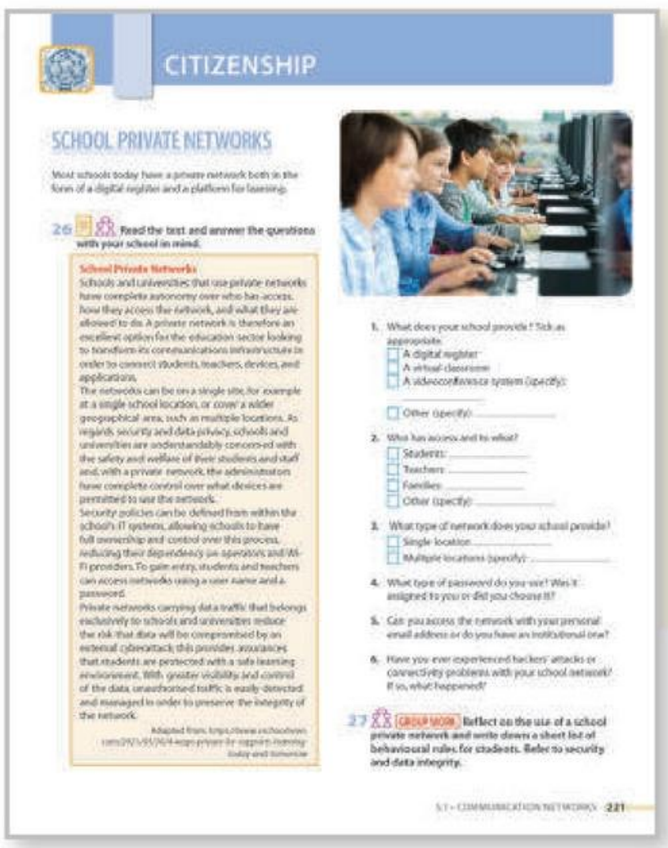
LA STRUTTURA

New Bit by Bit è diviso in sei **Moduli**, ognuno dei quali è ripartito in un numero variabile di unità.

- **UNITÀ**
  Ogni unità è suddivisa in brevi **Capitoli** su due pagine – teoria ed esercizi – per favorire non solo uno studio più parcellizzato, ma anche la scelta dei contenuti antologica da parte dell'insegnante. I contenuti dei capitoli sono divisi in paragrafi titolari per renderne la comprensione più agevole. I testi vengono affrontati in modo graduale, attraverso esercizi di esplorazione del lessico specifico, comprensione scritta e orale, globale e specifica, reimpiego dei termici tecnici e produzione scritta e orale.
  Brevi **link** arricchiscono i brani per consentire una maggiore interattività con l'allievo. Si tratta di curiosità, ampliamenti, rimandi, citazioni, attività o mini-approfondimenti che hanno l'intenzione di favorire una lettura più interessante ed offrire spunti di riflessione o interazione. Sono cromaticamente differenziati: verdi per i link con attività, arancioni per quelli informativi.
  Alcune **rubriche** di approfondimento o curiosità, inoltre, corredano la pagina degli esercizi. Un ricco **apparato iconografico** correda i brani di lettura, per ognuno dei quali è previsto un esauriente **glossario**.
  Al termine di ogni Unità si trovano le seguenti sezioni, ognuna costituita da una pagina:

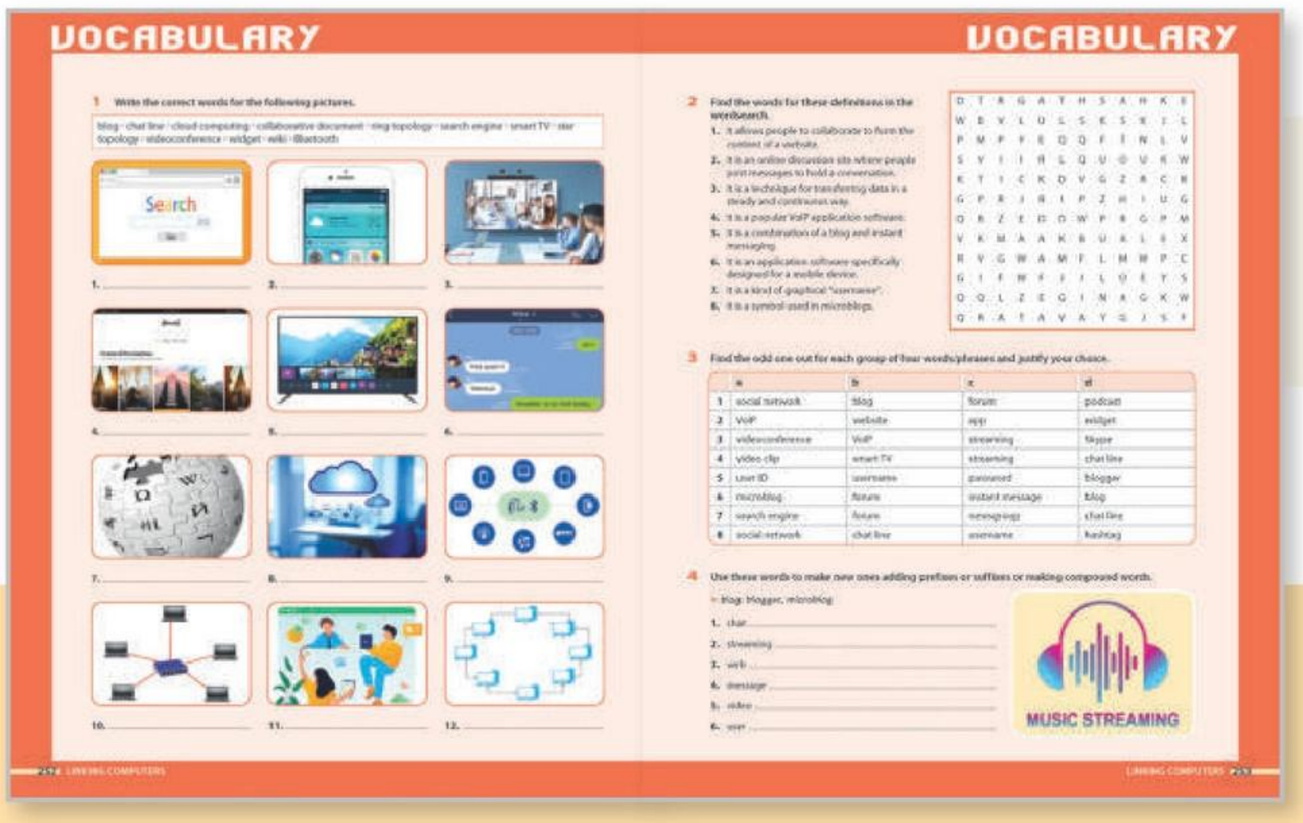


GRAMMAR
Pagina di revisione delle strutture grammaticali più comuni accompagnata da esercizi di rinforzo calati nel contesto.



CITIZENSHIP
Pagina di attività che prende spunto da contenuti dell'unità per agganciarsi a tematiche legate all'educazione civica e alla cittadinanza.

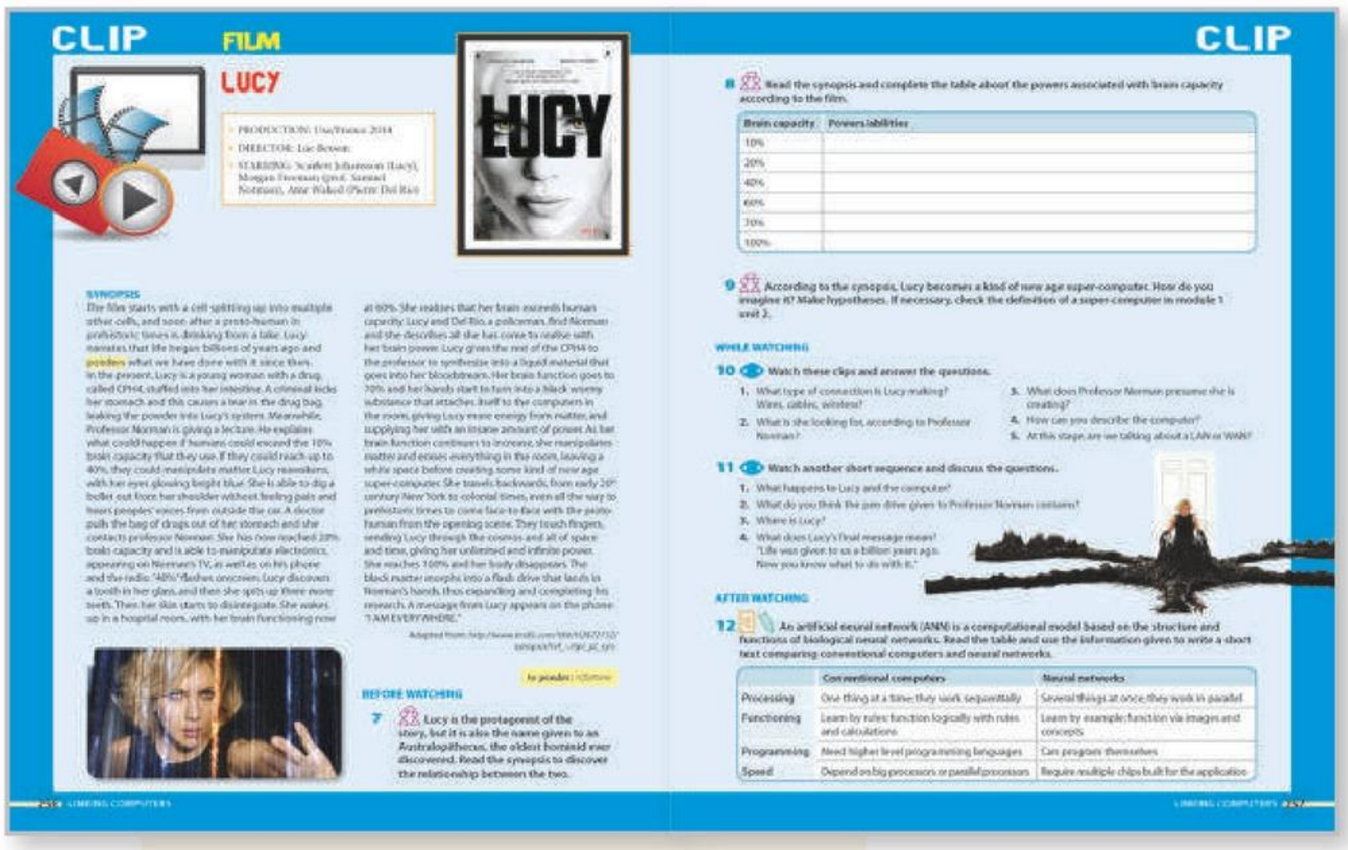
- **FINE MODULO**
  Al termine di ognuno dei sei Moduli, il testo propone delle ulteriori attività, suddivise nelle seguenti parti:



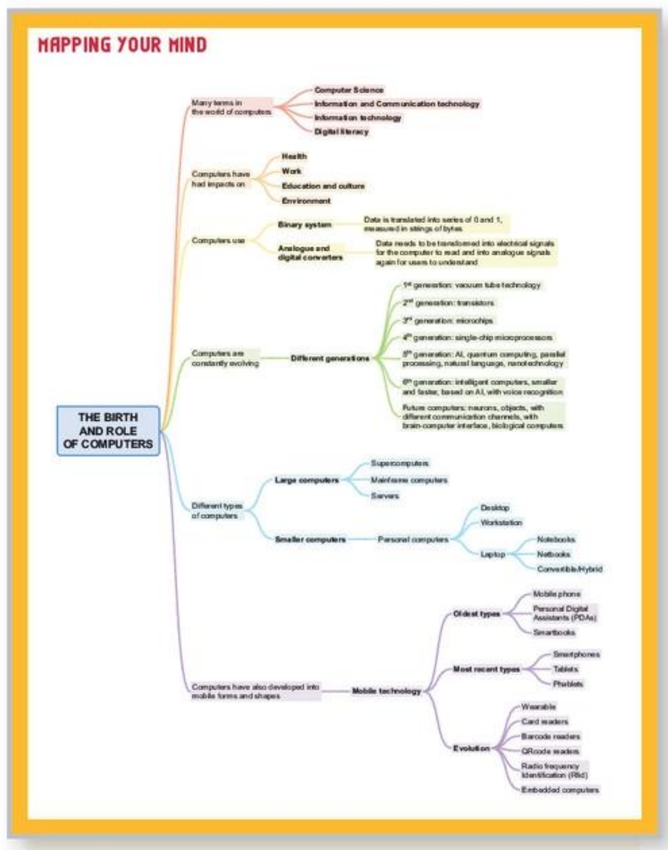
VOCABULARY
Pagina di esercizi di revisione e consolidamento del lessico introdotto nel Modulo.

REAL-LIFE SKILLS
In questa parte gli studenti sono chiamati a mettere in pratica quanto studiato attraverso attività varie, compiti di realtà e collaborativi, lavori di gruppo e a coppie, che, sempre avendo l'apprendimento linguistico come obiettivo principale, hanno un taglio di tipo pratico calato nella realtà.

CASE STUDY
Presentazione di un argomento di attualità collegato ai contenuti introdotti, tratto da fonti autentiche e corredato di esercizi, mirati anche all'approfondimento e alla discussione tra gli studenti dell'argomento presentato.



CLIP
Attività relative a una breve clip tratta da film le cui tematiche sono attinenti ai contenuti presentati nel Modulo.



MAPPING YOUR MIND
Mappa concettuale, strumento utile per rappresentare la rete di relazioni tra i vari argomenti del Modulo.

ONLINE RESOURCES

Disponibili sul sito www.edisco.it:

- file audio formato MP3 con la registrazione delle attività di ascolto
- film clip e video
- approfondimenti relativi alle varie sezioni
- approfondimenti di civiltà
- agganci letterari
- esempio di prova INVALSI
- pratica aggiuntiva per First, Ielts e Eucip Core

TEACHER'S BOOK

- Programmazione didattica / Piano di Lavoro
- Didattica inclusiva e BES
- Test di verifica di tutti i Moduli e le Unità
- Materiali per la preparazione dell'Esame di Stato
- Soluzioni degli esercizi e note didattiche
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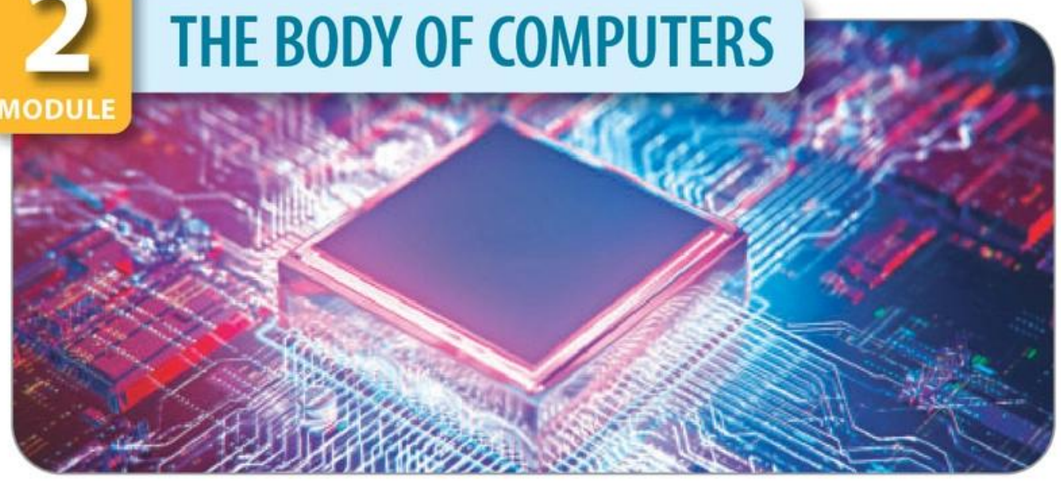

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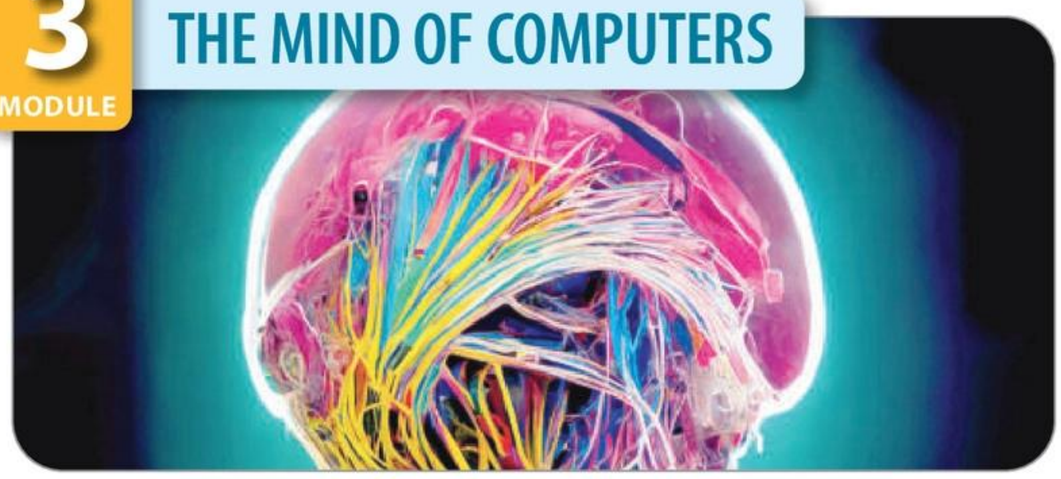

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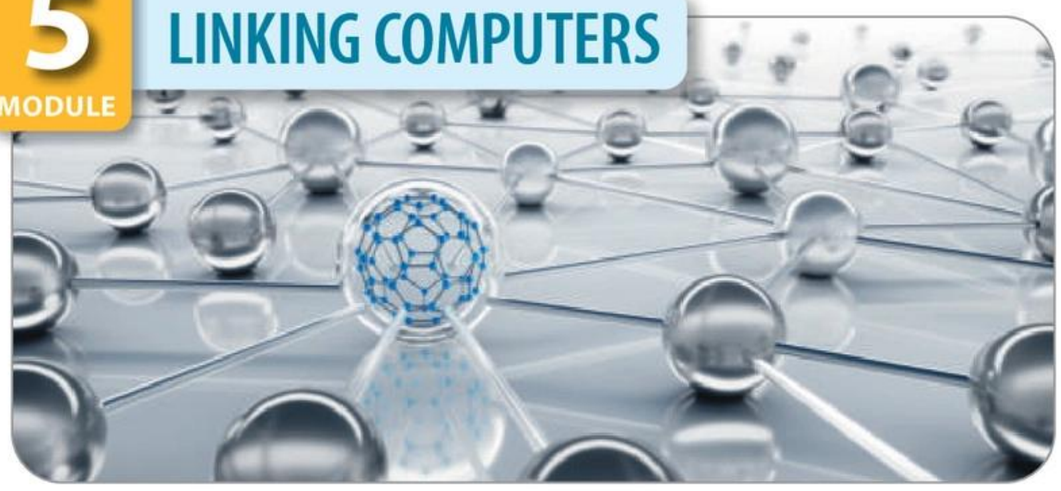

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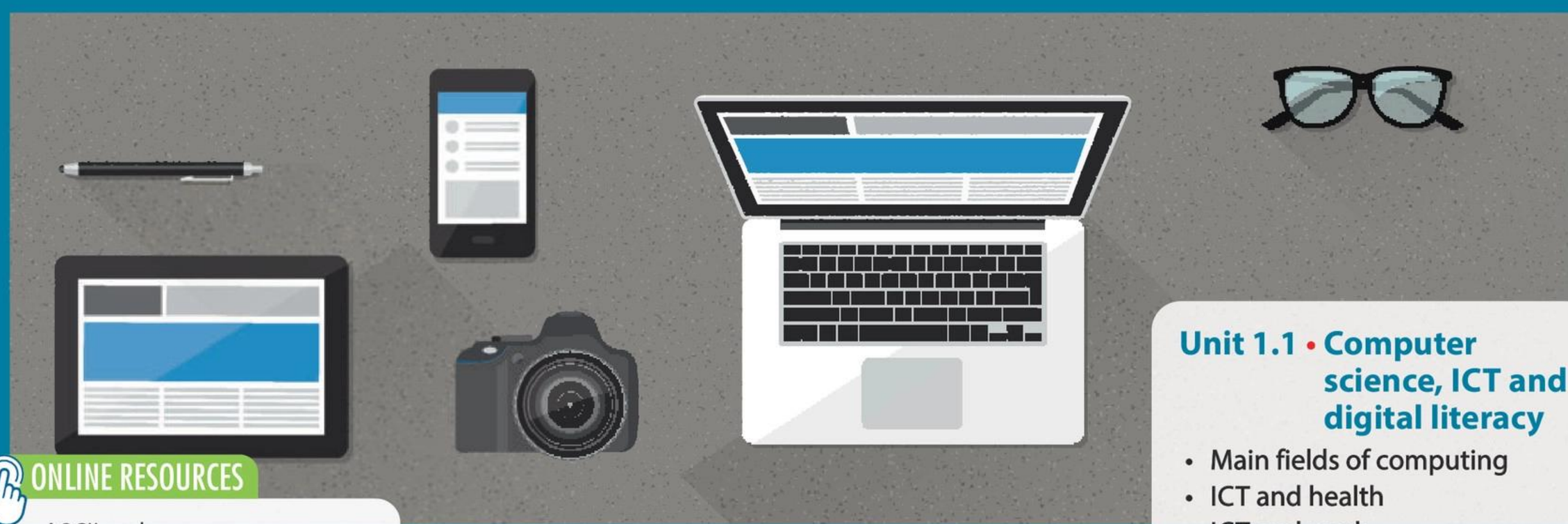
- Didattica inclusiva e BES
- Test di verifica di tutte le Sezioni e le Unità, in formato editabile
- Materiali per la preparazione dell'Esame di Stato
- Soluzioni degli esercizi e note didattiche
- *Audioscript* degli esercizi di ascolto e dei video

1 MODULE

THE BIRTH AND ROLE OF COMPUTERS



Unit 1.1 • Computer science, ICT and digital literacy

- Main fields of computing
- ICT and health
- ICT and work
- ICT, education and culture
- ICT and the environment

Unit 1.2 • Computers

- The binary system and units of measure
- Analogue vs digital
- The history of computers
- Present-day computers and their future evolution
- Large computers
- Smaller computers
- Mobile technology
- Wearable, handheld and embedded computers

ONLINE RESOURCES

- ASCII code
- Charles Babbage's analytical engine
- *The Bicentennial Man*

LANGUAGE SKILLS

- Digital libraries
- New technological trends in teaching and studying
- Learning with technology

EXTRA FIRST AND IELTS READING PRACTICE

- First, part 1

LITERARY BITS

- Kazuo Ishiguro, *Never Let Me Go*

EUCIP CORE SYLLABUS 3.1

- System development life cycle (Bulid B 1.2)

1.1 COMPUTER SCIENCE, ICT AND DIGITAL LITERACY

The new British School Curriculum from September 2014 identifies three core areas of computing: computer science, information technology (IT), and digital literacy.

Do you know the difference between competence and competency? Surf the Internet or look the words up in a dictionary.

The gap between the people who have access or benefit from digital technology and those who do not is called *digital divide*.

to gather: *raccogliere*
to implement: *applicare, eseguire*
literacy: *alfabetismo*
netizen: *cittadino della rete*
to retrieve: *recuperare*

MAIN FIELDS OF COMPUTING

Computing is an umbrella term whose main fields are computer science, ICT, IT and digital literacy.

Sometimes these terms can overlap or may be used in the wrong way.

■ Computer science

The term computer science, or **CS**, was used for the first time in 1961 by the mathematician George Forsythe. However, the most complete definition was provided by the Linux Information Project (LINFO) in 2004. It is the study of the storage, transformation and transfer of information. It includes both the theoretical study of algorithms (design, efficiency and application) and the practical aspects of implementing them for computer hardware and software. In short, computer science studies how computers work and how to write algorithms, solve problems and create computer programs.

■ Information and communications technology

Information and communications technology, or **ICT**, refers to the evolving digital technology and the aspects of gathering, storing, retrieving, processing, analysing and transmitting information and data at the right speed and with accuracy and security. So, it deals with data representation and management by

computers. The acronym has been used worldwide since 1997, although in 2014, in the UK, it was replaced by the word ***computing***.

■ Information technology

Information technology, or **IT,** is sometimes used as a synonym of ICT, but while ICT refers to digital communication (e.g. the Internet, Wi-Fi, smartphones and communication systems), IT deals with the development of hardware and software.

■ Digital literacy

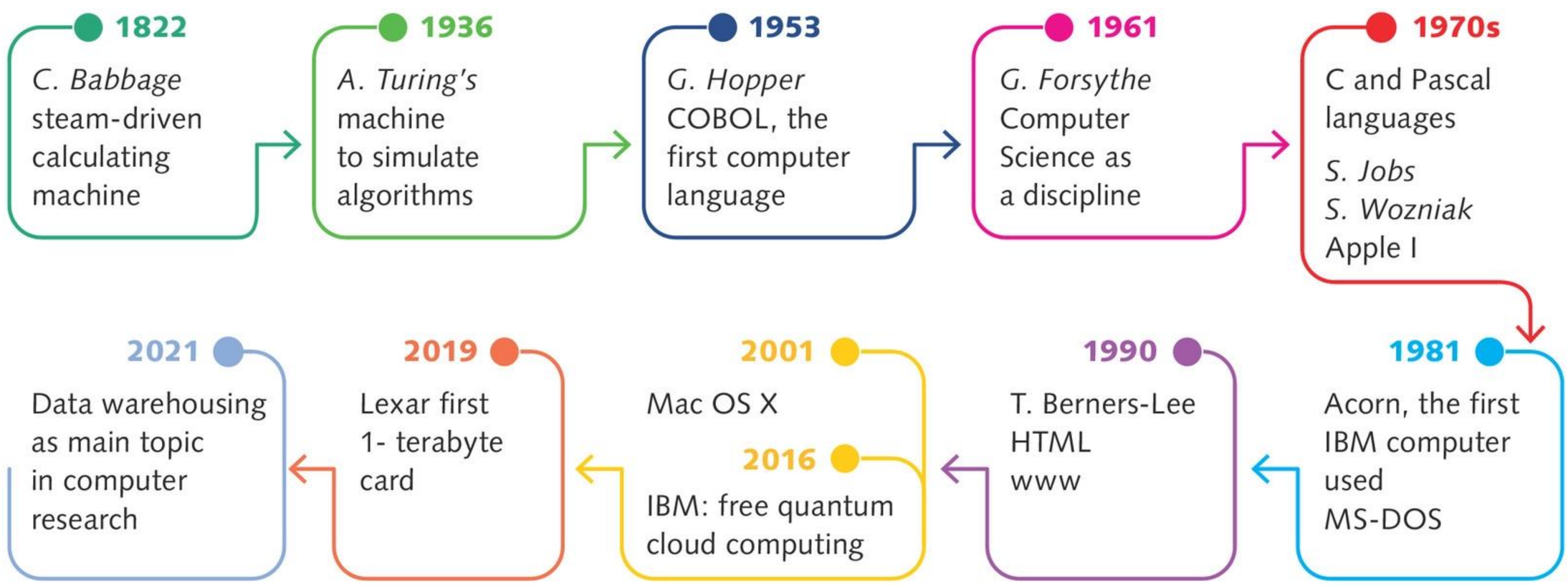
Digital literacy refers to multiple literacy competences and skills recognised as fundamental for lifelong learning. In other words, being digitally literate means being good netizens, i.e responsible citizens of the cyber world. For this reason, new graduate programmes have been designed in order to develop new competences to be able to access, analyse, create, reflect and act using digital tools, texts and technology.

So, digital literacy refers to the way in which people understand digital information and interact with it safely and appropriately.

1 **Decide if these statements describe CS, ICT or digital literacy (DL). Note that in some cases two answers are possible.**

	CS	ICT	DL
1. Implementing algorithms for computer hardware	☐	☐	☐
2. Designing an algorithm	☐	☐	☐
3. Reflecting on the use of digital tools	☐	☐	☐
4. Storing data	☐	☐	☐
5. Being a good netizen	☐	☐	☐
6. Implementing algorithms for computer software	☐	☐	☐
7. Gathering data	☐	☐	☐
8. Dealing with the development of hardware systems	☐	☐	☐
9. Transmitting data	☐	☐	☐
10. Managing data	☐	☐	☐

2 **Look at this brief timeline of computer science and decide if the statements are true or false. Correct the false ones.**



	T	F
1. Tim Berners Lee launched Apple I.	☐	☐
2. Turing's machine simulated computer algorithms.	☐	☐
3. Lexar, the first gigabyte card, was made in 2019.	☐	☐
4. COBOL, Pascal and C are programming languages.	☐	☐
5. In 2001 computer science was recognised as a scientific discipline.	☐	☐
6. Data warehousing was discovered in 2021.	☐	☐
7. IBM launched the OS X system in 2001.	☐	☐
8. IBM free quantum cloud computing was created in 2013.	☐	☐

3 PAIR WORK **What does it mean to be digitally literate? Are you digitally literate?**

ICT AND HEALTH

Does the word *hazard* mean… a. danger, b. risk, or c. both?

If you spend more than two hours in front of a screen without a break, you have a 90% chance of developing digital eye strain.

ICT has many applications and produces many effects on daily life especially as regards health, work, education, culture and the environment.

Impact and benefits on health

ICT can have a massive impact on all aspects of healthcare:

- from delivering the information that people need to lead a healthy lifestyle to providing new tools to design medicines for the future;
- from making healthcare systems more efficient and responsive to providing in-the-home and mobile healthcare technology.

Also, thanks to a range of different technological devices such as smart watches, video chats or biosensors that produce push notifications about calories, pulse rates, blood pressure, workout routines, cholesterol levels, etc., it is possible to track and monitor lifestyles to be able to improve them.

to assess: *valutare*
backache: *mal di schiena*
device: *dispositivo*
to ease: *facilitare*
to fit: *adattare*
to lead: *condurre*
to prevent: *prevenire*
responsive: *reattivo*
strain: *strappo, sforzo*
tendon: *tendine*
workout: *allenamento*

Main hazards for health

The potential hazards when using computers, smartphones and other technological devices mostly come from over-use. They are:

- **repetitive strain injury (RSI)**, caused by typing or using a mouse over a long period of time; it causes painful tendon damage and can get so bad that the sufferers may become unable to use their hands. To avoid this, frequent breaks and a comfortable keyboard are recommended;
- **eye strain**, caused by looking at the screen for too long (back lighting makes it worse): many people who use computer screens for long periods have to wear glasses or contact lenses. To avoid this, comfortable lighting levels and periodic eye checks may help;
- **backache**, caused by bad posture at the computer. To avoid this, it is better to use an ergonomically designed chair, sit at the correct height and take breaks to stretch the muscles frequently;
- **stress**, caused by irritating situations involving the use of computers, such as losing one's work, getting a virus, being unable to connect to the Internet and so on. This may cause headaches, depression and eventual mental illness. Regular breaks and frequent data backups could be beneficial;
- **obesity**: caused by the sedentary lifestyle led by people who spend too much time in front of computers, even during their free time. More outdoor activities are a good alternative.

4 **Read the text, then match the words from the text to their synonyms/definitions.**

Medical Cyber Physical Systems

Cyber-physical systems (CPS) encompass a new generation of smart medical systems that integrate human, cyber, and physical elements. Their aim is to improve patient care by enabling the delivery of advanced therapies and complex surgeries. An example is the artificial pancreas that allows people with diabetes to better manage their condition. Another example is medical robotic systems, which allow doctors to perform minimally invasive surgeries that were not possible before. Such systems may be integrated into the Internet of Medical Things (IoMT), which consists of connected infrastructures of medical devices, mobile and web applications, and other health services. Designing safe and effective medical CPS and IoMT involves the work of a multi-disciplinary team of engineers, medical domain experts, and human factors specialists. Also, this work needs to be supported by rigorous development processes and tools, as substantial evidence needs to be documented and integrated to justify design choices and ease the review process mandated by regulation.

Adapted from: *https://uva-mcps-lab.github.io/mcps-workshop-2021/*

1. Encompass	☐	**a.** Encourage	
2. Improve	☐	**b.** Detailed and careful	
3. Integrated	☐	**c.** Get better	
4. Consist of	☐	**d.** Include	
5. Designing	☐	**e.** Is made of	
6. Support	☐	**f.** Planning	
7. Rigorous	☐	**g.** Great	
8. Substantial	☐	**h.** Combined	

5 **Read the above text again and decide if the statements are true or false. Correct the false ones.**

	T	F
1. The new CPSs are smart medical systems that integrate human, cyber and physical elements.	☐	☐
2. Medical robotic systems perform a minimum of invasive surgeries.	☐	☐
3. The IoMT connects different types of health services.	☐	☐
4. IoMT applications are designed by a team of engineers only.	☐	☐
5. Design choices must be documented.	☐	☐
6. There must be a review process for these systems.	☐	☐

6 GROUP WORK **Split up into groups and answer the question.**

In your opinion – refer to people you know – what are the most serious problems for people who work with computers?
And for students?

ERGONOMICS

Ergonomics is the science of fitting a workplace to the user's needs. Its purpose is to increase efficiency and productivity and reduce discomfort.
A clear understanding of ergonomics can prevent most workplace injuries by adjusting tools to the user and using the appropriate posture to reduce the impact of repetitive movements. For this reason, desks, chairs, monitors, keyboards and lighting, all need to be assessed when creating a workplace.

ICT AND WORK

Are *smart working*, *teleworking* and *remote working* the same thing?

During the Covid-19 pandemic, 90% of large enterprises in Italy introduced or extended smart working. The percentage for medium-sized ones was 73%, while for small businesses it was 37.2%.

As we have said, ICT affects work as well.

Benefits of ICT in the workplace

Advanced technology throughout the world has totally changed the production and distribution of goods: machines and the use of robotics have helped manufacturing companies to produce high quality products at a lower cost and in huge quantities, and the latest software packages have made day-to-day work in all sectors much more efficient and less time-consuming.

The media and entertainment sector has also changed: a lot of radio and television companies have moved to digital broadcasting exploiting new satellite and cable infrastructures. Similarly, new software programs to manage human resources can now help people all over the world to collaborate and build new international partnerships in a faster way.

All in all, in such an increasingly competitive global marketplace, investing in ICT is crucial to:

- improving processes,
- reducing environmental impact,

- making business partnerships more efficient, and
- creating smarter products which can be quickly adapted to changing demand.

Smart working

The nature of work itself has also changed thanks to ICT. With **smart working**, it is possible to work from a remote workstation using ICT tools, reducing stress and anxiety and improving motivation and efficiency because working time and place become irrelevant and work is much more 'flexible'. However, working in isolation without social interaction can make people forget they are part of a team.

More and more business companies adopted smart working during the Covid-19 pandemic because social distancing was necessary to slow down the spread of the virus. Companies chose specific software and applications which allowed workers to work simultaneously from anywhere and communicate faster and more easily in a virtual and limitless workplace with objectives-oriented working timetables. Global collaborations became easier to start and maintain, and customers, managers, employees and every component of the working machine were more connected to one another thanks to dynamic software packages.

as regards: *per quanto riguarda*
to broadcast: *trasmettere*
hot-desking: *uso di postazioni libere*
mood: *atteggiamento*
subscription: *abbonamento*

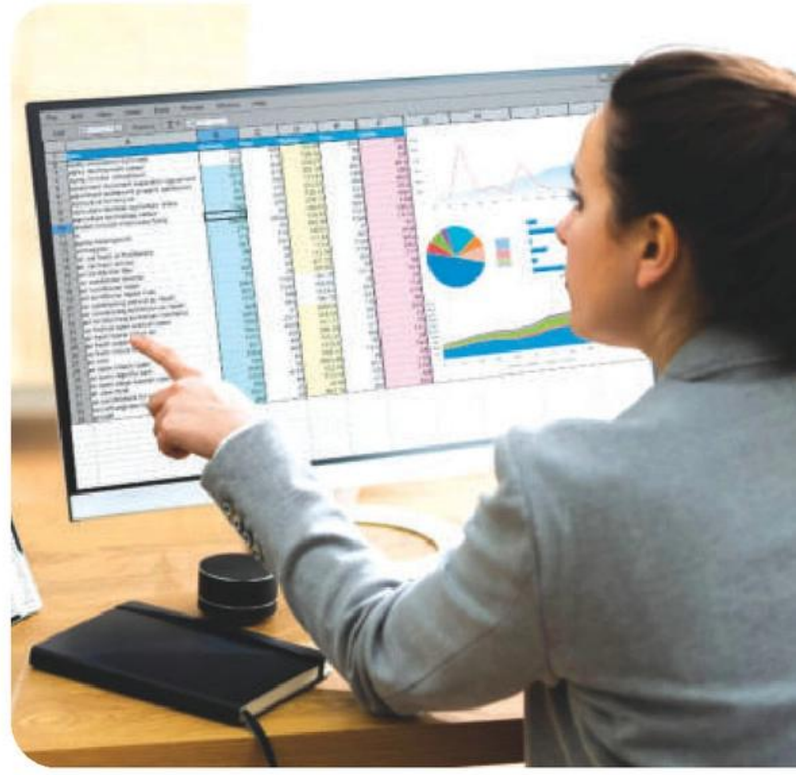
7 (1.1) PET **Listen to this lesson on the pros and cons of using ICT in businesses and complete the notes.**

Advantages:

1. Increased .....
2. Improved .....
3. Quick and easy .....
4. Improved .....
5. ..... at your fingertips

Disadvantages:

6. Jobs .....
7. Loss of .....
8. Data .....
9. Impact on .....
10. System can .....
11. .....



8 PET **Read the text and complete the gaps with the sentences or parts of sentences given below.**

a. by introducing communication policies

b. for example, by providing employees with mobile devices

c. We were afraid of being paid less

d. moving to the hot-desking approach is another key point of smart working.

e. 500 volunteers experimented smart working for three years.

f. where employees can collaborate more easily, with a more relaxed mood.

g. Timetables were re-designed,

h. Workplaces must be rethought.

The Smart Working Revolution

The keywords of smart working are flexibility and smart technology. **1.** ..... If companies want working places where communication and creative ideas are facilitated, then they have to design an open space for a working environment **2.** ..... Also, companies have to offer healthy working places, where there is no fixed office desk: in fact, **3.** ..... As regards smart working time, the use of ICT can make work more fluid, **4.** ..... in order to give more opportunities to work remotely, eliminating desktop phones and computers. Company strategies should also guarantee employees a degree of privacy and protection **5.** ..... to avoid intromission into personal life space at any moment. TIM was one of the first companies in Italy to embrace the smart working revolution. It established a rigid roadmap and **6.** ..... The new business model plan was fully accomplished in 2018. **7.** ..... and now employees work from 8.00 am to 8.00 pm, with breaks varying from 30 to 60 minutes. "Everything we do is uploaded and can be processed automatically," says Carlo, a TIM employee. "**8.** ..... because of the new contract, but it wasn't so." Ultimately, smart working is about continuing to work hard to achieve your goals but reducing stress.

9 (1.2) **Listen to an article on Netflix and say if the statements are true or false.**

	T	F
1. *House of Cards* is a science-fiction TV show.	☐	☐
2. *House of Cards* appeared on a pay television TV channel.	☐	☐
3. The success of online video services is a threat for traditional TV.	☐	☐
4. Netflix may cause a diminishing need for cable subscriptions.	☐	☐
5. Mobile devices and tablets have slowed down the development of Netflix.	☐	☐
6. Online video services are more expensive than cable subscriptions.	☐	☐
7. Netflix subscribers are only American.	☐	☐
8. Pay television still exists.	☐	☐

10 GROUP WORK **Split up into groups. Using the Internet and your own ideas, prepare a table on the advantages and disadvantages of smart working and present it to the class.**

ICT, EDUCATION AND CULTURE

Do you know where the word *wiki* comes from?

The acronym MOOC stands for *Massive Open Online Course*. It is a course available over the Internet without charge to a very large number of people.

ICT has recently had a big impact on education and culture in general.

ICT and education

Educational systems all over the world are studying and implementing new teaching approaches and syllabuses which include the use of ICT and other technologies. ICT has facilitated the spread of learning tools and platforms, Wiki software shared platforms, MOOC courses, digital map-making packages, cloud services of storage, digital online labs, webinar events, and virtual classrooms. ICT is therefore improving classical education and providing new flexible learning solutions.

Moreover, the use of computers in teaching can also make learning more interesting and efficient.

E-learning and online education have made it very simple and systematic for individuals to receive personal attention, so that all their specific needs are fulfilled, and immediate responses to queries and tests have made the whole education process faster. However, students with a lower level of motivation are easily distracted, or, even worse, they may decide to stop attending virtual lessons.

drop-out rate: *tasso di abbandono*
to highlight: *evidenziare*
to interweave: *intrecciare*
outcome: *risultato*
overnight: *da un giorno all'altro*
prior: *precedente*
syllabus: *sillabo (programma scolastico)*
to tackle: *affrontare*
tech-savy: *esperto di tecnologia*

Benefits of ICT in the classroom

ICT in the classroom promotes:

- an **active participation**: when students learn through technology, they themselves look for information on the Internet and become more independent learners, although there is the risk of fake news;
- **in-depth knowledge**: the Internet is a kind of library available with a simple click;
- **real-life work experiences**: in tech-savy classrooms, a teacher acts as a facilitator who sets project goals and provides the necessary resources and guidelines. Moreover, students themselves may sometimes even know more than their teacher. Such an environment prepares students for future jobs;

- **increased motivation**: technology motivates students, making lessons easy and interesting, thus reducing school drop-out rates;
- **technical skills**: constant practice reinforces practical skills.

ICT and culture

Human sciences are evolving and moving more and more towards the digital humanities field, where ICT is winning the challenge of the digitalisation of libraries, museums, etc. Many economic and social plans concern literary, artistic and cultural heritage promotion and preservation thanks to the use of ICT, which has become one of the keys to the necessary lifelong learning required to tackle the world of the future.

11 PAIR WORK **Say whether you agree (A) or disagree (D) with these statements and quotes, then compare your answers with your partner and your class.**

	A	D
1. Computers make learning fun and more exciting.	☐	☐
2. It is possible to gain in-depth knowledge about any subject on the Net.	☐	☐
3. Information technology and business are becoming inextricably interwoven. I don't think anybody can talk meaningfully about one without talking about the other (Bill Gates).	☐	☐
4. Chan Zuckerberg Initiative is a long-term mission and progress won't happen overnight, but if we plant seeds now and let them grow over time, then we can improve complex systems like the way we educate our children. (Mark Zuckerberg)	☐	☐

12 **Fill in the gaps with the given words.**

learners • pedagogical model • learning goals • integrate • blogs • facilitators • digital artifact • self-organise • open registration • high levels

The MOOC Model for Digital Practice

A MOOC is an online course with the option of free and **1.** ....., a publicly shared curriculum, and open-ended outcomes. MOOCs **2.** ..... social networking and accessible online resources, and are facilitated by leading practitioners. Most significantly, MOOCs build on the engagement of learners who **3.** ..... their participation according to **4.** ....., prior knowledge and skills, and common interests. Six important factors that highlight its **5.** ..... are:

- **6.** ..... of learner control over modes and places of interaction;
- weekly synchronous sessions with **7.** ..... and guest speakers;
- the daily newsletter that includes a summary of Moodle forums, course participants **8.** ....., Twitter discussions, etc.;
- emphasis on learner autonomy in selecting learning resources;
- emphasis on social systems as effective means for **9.** ..... to self-organise;
- the criticality of creation - i.e. learners create and share their understanding of the course topics through blogs, concept maps, images, and podcasts. Creating a **10.** ..... helps learners to re-centre the course discussion to a more personal basis.

Adapted from: *McAuley*, Alexander, et al., *The MOOC model for digital practice*

13 PAIR WORK **Discuss these questions.**

1. Have you ever taken part in a MOOC or any other online course? If so, what did you like about it? If not, would you like to try one?
2. What are the advantages and disadvantages of virtual online classrooms and remote learning?
3. What technological devices have you used or are you using for learning?

THE LARGEST AND THE OLDEST DIGITAL LIBRARY

Questia is the world's largest online library which offers high quality books, journals and literature. It was the first 24/7 online library with writing tools and note taking options. **Project Gutenberg** is a digital archive of literature mostly from the Western traditional culture and it is the oldest running online library.

ICT AND THE ENVIRONMENT

What can you do as an individual to reduce the negative impact of ICT on the environment?

Fossil fuels in the form of coal and oil provide a primary proportion of the energy consumed by electronics and their networks because these continue to be the main sources of energy worldwide.

The environment has also been impacted by the use of ICT.

Sustainable development

Sustainable development is critical to quality of life, and our information society may play an important role in reducing the environmental impact of industry and society and help us understand our environment so that we can better protect it for future generations.

However, the use of digital devices does not only have a positive environmental impact, but also a negative one.

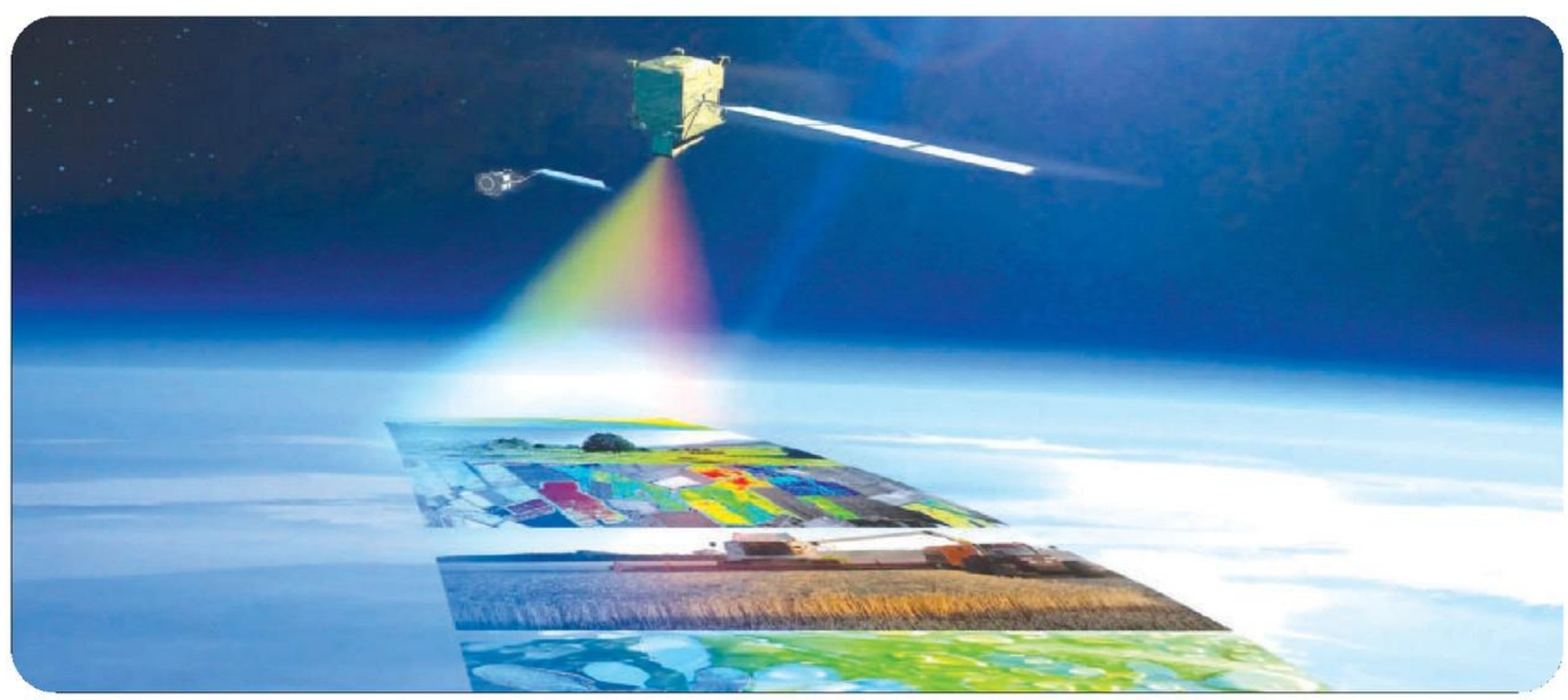
Positive impact

- **Mobility reduction**: ICT can reduce the number of journeys to work, shops or meetings, Also, traffic management systems in towns keep traffic moving and so reduce pollution.
- **Massive reduction of packaging and physical supports**: the digital media industry no longer produces big quantities of CDs, videos, packaging, etc. thus contributing to the reduction of waste.
- **Monitoring Earth changes**: satellite digital systems of monitoring allow scientists to follow and monitor polar ice caps, ocean currents and temperatures, the ozone layer and endangered species, in order to prevent natural disasters.
- **Smart water or smart energy management**: the application of smart sensor networks can improve the management of resources, supply and waste of water and energy.

Negative impact

- **High consumption of electric energy**: electronic and digital devices use huge amounts of electricity.
- **E-waste**: people tend to replace technology very quickly, thus creating a huge amount of waste, which adds up to the equally huge amount of space junk from discarded satellites.
- **Tourism pollution**: the development of tourism has enlarged the volumes of transport pollution and has increased municipal energy consumption and waste production everywhere.
- **Global warming**: huge amounts of fuel and raw materials are needed to manufacture digital devices and, as a consequence, a lot of carbon dioxide is released into the atmosphere.
- **Paper waste**: easy accessibility to printers causes the waste of huge quantities of paper.

carbon dioxide: *anidride carbonica*
to discard: *gettare via*
fuel: *carburante*
goods: *merci*
junk: *immondizia*
layer: *strato*
packaging: *imballaggio*
raw material: *materia prima*
to release: *rilasciare*
supply: *fornitura*



14 Match the terms to their definitions.

1. E-waste ☐
2. Packaging ☐
3. Sustainable development ☐
4. Ozone layer ☐
5. Space junk ☐
6. Raw materials ☐
7. Safeguard ☐
8. Awareness ☐

a. To protect.
b. Natural, unprocessed resources, often used in the production of goods.
c. Collection of useless man-made objects in space.
d. The region of the stratosphere with the maximum ozone concentration.
e. Knowing that something exists and is important.
f. The box, wrapping, container in which something is packed.
g. Improvement that can be managed without damaging the environment.
h. Discarded electronic devices and components, it stands for *electronic waste*.

15 PET Watch the video and complete the summary.

▸ Future cities: Your life in the city in 2050 *posted by* Siemens

1. Everyone is an ..... part of the city.
2. People use up but also ..... electricity.
3. The city will adapt to everything with the help of ..... .
4. The city will be efficient and ..... .
5. Every building will have its ..... grid.
6. You will move ..... free.
7. Even today, technology is the ..... of change.
8. We create the outlines today, tomorrow we will ..... them with crayons.

16 Watch the video again and look at the words that appear on the screen. Complete the following list with the missing words.

1. Energy efficient .....
2. Flexible .....
3. Accessible .....
4. Easy .....
5. Digital .....
6. Infinite .....
7. Truly flexible .....
8. Net zero .....
9. Sharing .....
10. AI-based .....

WHAT IS SMART WATER MANAGEMENT?

Smart Water Management uses ICT and real-time data and responses through the use of sensors, smart meters, monitors, satellite mapping and other data sharing tools. The potential application of such system in water management is wide and includes solutions for water quantity and quality, efficient irrigation, pressure and flow, and much more.

GRAMMAR

PLURALS

Singular	Plural	Examples
General rule	+ *-s*	*file → files, computer → computers*
Words ending in *-ch, -s, -ss, -x, -z, -o*	+ *-es*	*box → boxes, virus → viruses*
Abbreviations ending in *-o* or words with a vowel before the final *-o*	+ *-s*	*video → videos*
Words with a consonant before the final *-y*	+ *-ies*	*copy → copies*
Most words ending in *-f* and *-fe*	+ *-ves*	*half → halves,* but *proof → proofs*
Some irregular plurals	+ *-en* *-oo → -ee* *-a → -e* *-ouse → -ice*	*ox → oxen; child → children* *foot → feet; goose → geese* *man, woman → men, women* *mouse → mice, louse → lice*
Words with a Greek origin ending in *-on* or a Latin origin ending in *-um*	*-a*	*phenomenon → phenomena, medium → media*
Words with a Greek origin ending in *-ma*	*-mata*	*schema → schemata*
Words with a Latin origin ending in *-a*	*-ae*	*formula → formulae*
Words with a Latin origin ending in *-us*	*-i*	*fungus → fungi*
Words with a Latin origin ending in *-is*	*-es*	*axis → axes*
Word with a Latin origin ending in *-x*	*-ces/-ges*	*matrix → matrices*
Invariable plurals	-	*sheep → sheep, fish → fish*

For some words there are sometimes two forms, but the English plural is generally used only for a narrow definition of the term. A typical example is mouse → *mice* (= the animal) and → *mouses* (= a pointing device for a computer).

17 Write the plural of the given words.

1. Process .....
2. Phenomenon .....
3. Stimulus .....
4. Datum .....
5. Matrix .....
6. Disc .....
7. Compendium .....
8. Formula .....
9. Mouse .....
10. Wiki .....
11. Analysis .....
12. Virus .....
13. Mainframe .....
14. Motherboard .....
15. Input .....
16. Code .....
17. Schema .....
18. Axis .....
19. Database .....
20. Network .....
21. Screen .....

18 Make the plurals of these sentences.

1. I bought an infrared mouse for my computer. .....
2. The value on the X-axis generally indicate time. .....
3. My maths teacher made me learn a difficult formula. .....
4. I am working on a new database. .....
5. I'm interested in a natural phenomenon. .....

CITIZENSHIP

MANAGING E-WASTE

Given the huge amount of e-waste produced every year it is absolutely necessary to reduce its production and find ways to recycle it. However, this is possible only if industries and governments, as well as individuals, are aware of the problem.

19 FIRST **Watch the video and complete the summary with the missing words.**

▸ How e-waste is harming our world *posted by* Interesting Engineering

A. What is e-waste?

It is **1.** ..... waste, i.e. all discarded electric or electronic devices.

B. What are the dangers produced by e-waste?

- Direct contact with harmful materials and heavy **2.** ..... such as lead, **3.** ..... and chromium.
- Inhalation of **4.** ..... fumes.
- Leaching of toxic materials and their accumulation in soil, water and **5.** .....
- Severe damage to human blood and the **6.** ..... and to the central and **7.** ..... nervous systems.
- Risks of **8.** ..... related to recycling activities.
- Valuable e-waste elements are copper and **9.** ..... but primitive methods of extraction expose people to toxic **10.** .....
- Harmful substances can affect child development.

C. How can we combat e-waste?

- Sell or **11.** ..... electronics.
- Maintain electronics properly, so they last **12.** .....
- Recycle.
- Buy energy **13.** ..... rated electronics.
- Recover metals to reduce the amount of **14.** .....

D. Why is it difficult to follow these simple rules?

- Electronics today are made to be replaced, i.e. planned **15.** .....
- It is **16.** ..... to buy something new than to fix something old.

E. What are the consequences?

- Dangerous increase of mining.
- Large amounts of electronics in **17.** ..... leaking toxicity.

F. Waste could be reduced by:

- Reuse
- **18.** .....
- **19.** .....

G. Possible solutions:

- Buy-backs or **20.** ..... systems for used equipment.
- Set export limits: i.e. the quantity of new electronics should equal recycled or reused electronics.

20 GROUP WORK **Re-read the summary from the previous activity and discuss the questions. Then, report to the class.**

1. Can you suggest other ways to combat e-waste? (ref. paragraph C)
2. Why is it difficult to follow simple rules? Give reasons (ref. paragraph D)
3. Do you agree on what is said in paragraph F?
4. Can you suggest other possible solutions? (ref. paragraph G)

1.2 COMPUTERS

THE BINARY SYSTEM AND UNITS OF MEASURE

Some less common terms are *nibble*, which corresponds to 4 bits, and *octet*, which is a synonym of byte.

How do you translate the word *string* in the following expressions? 1. A ball of string; 2. Guitar strings.

ONLINE RESOURCES

- ASCII code

codon: *codone*
frame: *struttura*
to occur: *capitare*
to overlap: *sovrapporre*
remainder: *resto*
string: *stringa, sequenza*

■ The binary system

Storing, processing and transmitting data through electronic devices is possible because of the binary system, but what exactly is it? As the word 'binary' suggests, only two digits, 0 (zero) and 1 (one), are combined to express a number in a binary system, while the common decimal system is built on the combinations of 10 possible digits (0, 1, 2, 3, 4, 5, 6, 7, 8, 9). The decimal system uses the power of 10, whereas the binary system uses the power of 2.

■ Converting decimal numbers into binary ones

Electronic devices can only understand the binary system, so it is necessary to convert decimal numbers (or instructions) into binary numbers.
To perform such a conversion, we have to repeat the process of division by 2 till the quotient is 0 or less than 1.
The binary number arises from the reading of the remainders from the bottom to the top. Here is the conversion, for example, of the number 81:

	Result	Remainder
81 : 2 =	40	1
40 : 2 =	20	0
20 : 2 =	10	0
10 : 2 =	5	0
5 : 2 =	2	1
2 : 2 =	1	0
1 : 2 =	0,5	1

Number $81_{10} = 1010001_2$

■ Bits and bytes

When working with any kind of processor, each digit (0 or 1) corresponds to a bit•. Every string• of 8 bits is called a byte. In ASCII code (American Standard Code for Information Interchange) any character you type on your keyboard is interpreted by the computer as a byte.

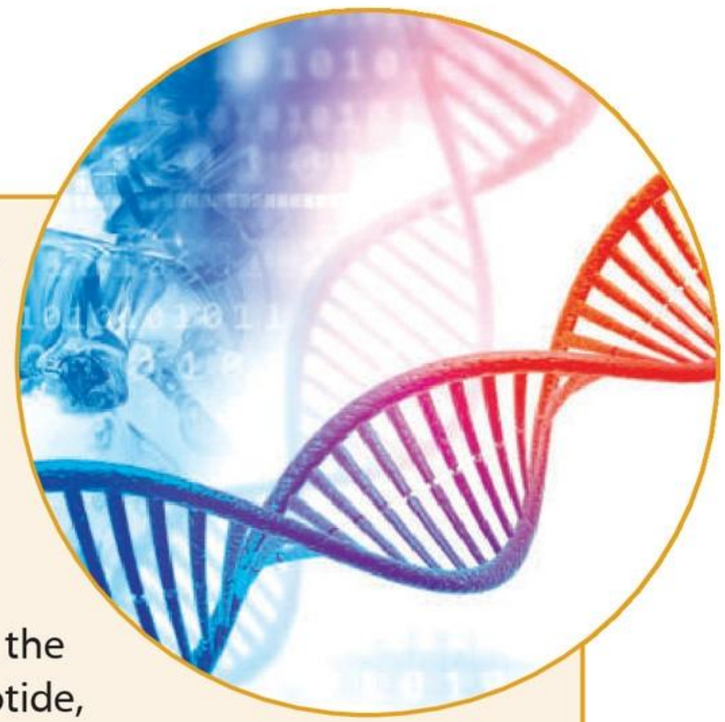
When writing, you can identify bits and bytes by their spelling: upper case "B" is used for bytes and lower case "b" for bits.

Here is a table showing the most common multiples of bits.

Term	Memory units
Bit	1/8 (= 1 single binary digit)
Byte	1 (= 8 bits)
Kilobyte (KB)	1,024 bytes
Megabyte (MB)	1,024 KB (about 1 million bytes)
Gigabyte (GB)	1,024 MB (about 1 billion bytes)
Terabyte (TB)	1,024 GB (about 1 trillion bytes)
Petabyte (PB)	1,024 TB (about 10^{15} bytes)
Exabyte (EB)	1,024 PB (about 10^{18} bytes)
Zettabyte (ZB)	1,024 EB (about 10^{21} bytes)
Yottabyte (YB)	1,024 ZB (about 10^{24} bytes)

1 **Read these paragraphs, put them in the correct order and choose the appropriate heading for each one.**

Protecting data • Starting and stopping • Byte sizes • Counting digits



Binary Code vs Genetic Code

Title: ....., Paragraph n. ☐

Both binary and genetic codes contain signals that indicate where to begin and end the reading of their messages. Computers use start and stop bits for this purpose, while the genetic code contains one start codon and three stop codons. However, DNA often exhibits greater flexibility in starting and stopping, as certain parts of the genetic code can be read in different, overlapping segments. These different interpretations are called open reading frames, and often each frame codes for an entirely different but still useful, final product.

Title: ....., Paragraph n. ☐

In digital code, a single inaccurate bit causes its byte to have a different value, which can introduce significant errors into a computer program. DNA is considerably more resilient in comparison, as many nucleotide changes do not result in changes to the value of the amino acid coded by a codon. Although 64 codons are possible, biological machinery uses only 20 amino acids in the construction of proteins. Many codons that differ by one nucleotide therefore code for the same amino acid, a property known as redundancy. Redundancy protects genetic data from some of the inevitable errors that occur in the replication and reading of DNA.

Title: ....., Paragraph n. ☐

The simplest unit of binary code is the binary digit, or "bit," which can have one of two values: 0 or 1. The simplest unit of DNA, on the other hand, is the nucleotide, which can have one of four bases: adenine, cytosine, thymine or guanine (A, C, T or G). This increased variation means that each nucleotide of DNA can hold twice as much information as each digit of a binary program.

Title: ....., Paragraph n. ☐

Computers and biological systems both read their respective codes in blocks of several units instead of analysing each bit or nucleotide individually. Binary information is grouped into sets of eight bits, called bytes; each byte thus has one of 256 possible configurations of zeros and ones. Genetic information, on the other hand, comes in triplets of nucleotides, known as codons, which represent different amino acids, meaning that each DNA "byte" has only 64 possibilities.

Adapted from: *http://oureverydaylife.com/binary-code-vs-genetic-code-40378.html*

2 **Look at these words from the text above. Identify and underline their prefixes or suffixes and then write down another word that uses that prefix/suffix with the same function.**

	Prefix/suffix	Function	Examples
Overlap	*over-*	*Above, too much*	*Overcrowded, overtime*
Useful			
Inaccurate			
Respective			
Possibility			
Biological			
Binary			
Computer			

ANALOGUE vs DIGITAL

Analogue is British English and *analog* is American English. The same as *dialogue* and *dialog*.

Use the Internet and find examples of analogue technology.

ASCII is the most common format for text files in digital devices, and it is used by UNIX and DOS systems, but it is not the only one. Unicode, for example, is another standard for texts and emojis.

In order to be transmitted, stored and processed, information needs to be transformed into electric signals.

Analogue and digital technology

The transformation of information into electric signals can take place through analogue or digital technology.
The main difference between the two systems is that **analogue technology** translates any information into electric pulses of variable amplitude and frequency, whereas **digital technology** translates information into binary digits (zero or one) and every bit can correspond only to two distinct states, either ON (1) or OFF (0), TRUE or FALSE, 0 Volts or 5 Volts.

State 1	State 2
Logic '0'	Logic '1'
True	False
Low level voltage – 0 v	High level voltage + 5 volts

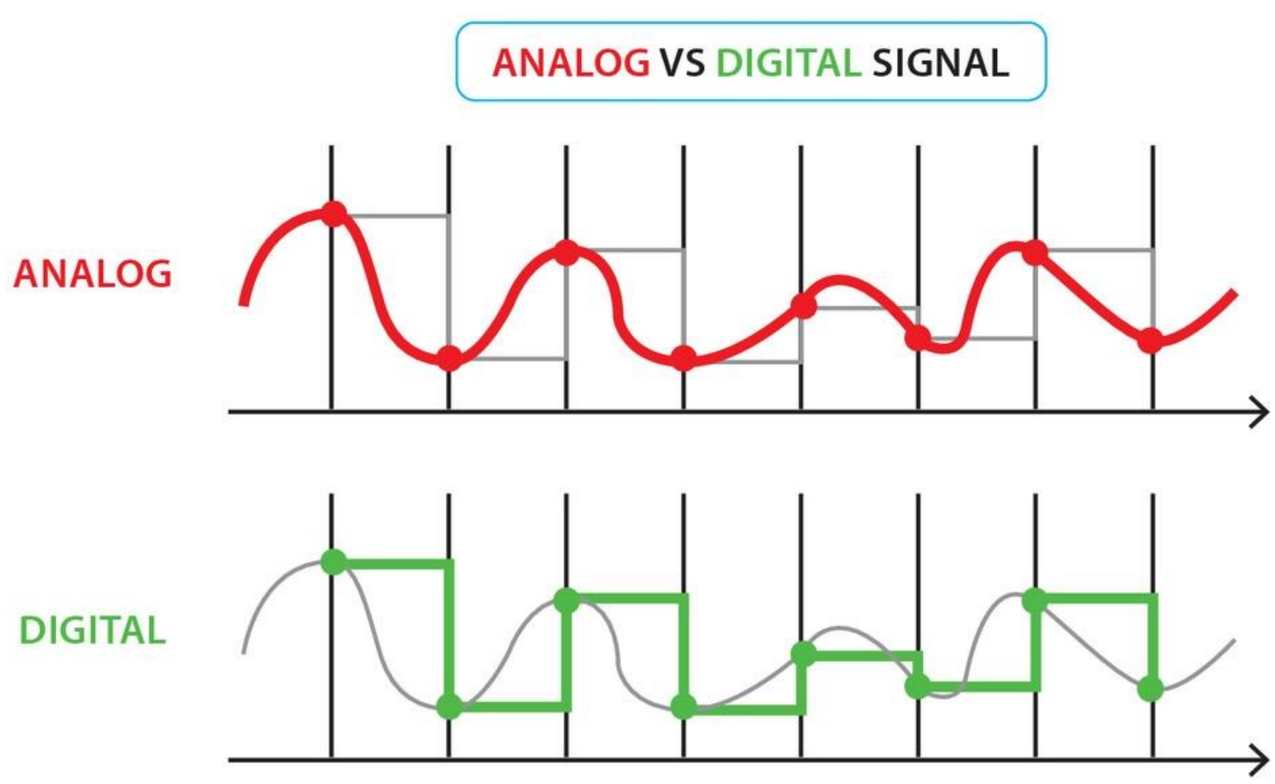
Analogue signals are continuous and variable, therefore more susceptible to deterioration when transmitted. They are best for audio and video transmissions because they can express more depth and richness of details, but it is digital signals which are more suited for computers and digital electronics since the binary impulses which are sent in this case are discrete – that is separate and definite –, therefore less subject to deterioration and allowing for a more efficient and clearer communication.

Analogue and digital converters

Since computers cannot understand analogue data input (audio, photo, etc.), there is the need for a special tool, called **analogue to digital converter** (ADC), to convert this kind of input into a digital data form they can understand. Vice versa, for us to be able to understand the output of a computer, we need it to be equipped with a **digital to analogue converter** (DAC) to perform the opposite operation.

Texts, photos, audios, etc. are encoded as numbers or values thanks to the ASCII or a similar system, and then transformed into binary digits for the computer to read in digital form. Through converting software, it is also possible to transmit from one code to another, thus allowing different systems to communicate.

array: *varietà*
to be wound: *essere avvolto*
cross-talk: *interferenza*
depth: *profondità*
muddled: *infangato*
equipped: *dotato*
to mess about with: *armeggiare, trafficare*
misconception: *luogo comune errato*
noise floor: *rumore di fondo*
pits and lands: *valori binari di 0 e 1 su disco ottico*
to be suited: *essere adatto*
tedious: *seccante*



3 Read these sentences. Do they refer to analogue features (A) or digital features (D)?

	A	D
1. Measuring devices whose displays show instant, quick and easy readings.	☐	☐
2. Devices that handle information without processing data electronically.	☐	☐
3. No degradation over time.	☐	☐
4. More depth and details in audio and video transmission.	☐	☐
5. No noise filtering.	☐	☐
6. Discontinuity.	☐	☐
7. Subject to deterioration.	☐	☐

4 Read the text and answer the questions.

Advantages & Disadvantages of Analogue & Digital Audio

There are many opinions on the relative merits of analogue and digital audio, often muddled by misconceptions and myth. Here is some objective technical information. Analogue audio is so called because the "shape" or pattern of an electrical or magnetic pressure audio signal is analogous to (looks like) the original pattern of changing air pressure. Audio in nature is analogue until it is converted by our inner ears into an electro-chemical signal that we perceive. Digital audio is a mathematical description of the pattern of pressure. Once transmitted, it is stored as a series of on/off switches (transistors), magnetic pulses, or optical pits and lands etc., and looks nothing like the original pattern of changing air pressure.

	Advantages	Disadvantages
Analogue	• Once recorded on tape, audio is stored/archived. • Analogue tape has a theoretically better audio bandwidth. • Analogue tape and disc-based audio is more difficult for record company executives to mess about with.	• Good analogue is expensive while cheap analogue tape recorders suffer from distortion, cross-talk, and high levels of tape noise. • Tape is expensive, vulnerable to deterioration and needs constant maintenance. • Linear format: tape must be wound/rewound to the location of the recording to be heard. • Advanced editing of audio is difficult if not impossible • High noise floor. • Hard to synchronise. • Copying deteriorates sound.
Digital	• Better sound for cheaper equipment • Potential for very low distortion and noise and for wider dynamic range. • Non-linear format (random access). • Massive range of editing and processing tools. • Non-destructive editing. • Highly portable. • Data can be cloned, transmitted over networks and easily integrated into multimedia.	• Computers crash. • Software compatibility issues. • Latency. • Data can become corrupted. • Data must be archived when hard drives become full. • Confusing array of formats and systems. • Sound quality can be too clinical/cold. • Digital systems can have poor multi-user interfaces. • Editing parameters is tedious with a mouse.

Adapted from: *http://www.planetoftunes.com/digital-audio/pros-and-cons-of-analogue-and-digital-audio.html#.WFT-hebhA2w*

1. What is the negative feature of the sound quality of digital audio?
2. Is it possible to go directly to a specific point in a digital audio recording?
3. Which is more affordable, analogue or digital audio?
4. Is digital audio more portable than analogue?
5. Which is more affected by sound degradation, analogue or digital audio?
6. What problem does the wide range of digital audio formats create?

THE HISTORY OF COMPUTERS

Go online and look for a computer history timeline.

In 1957 Spencer Tracy and Katharine Hepburn were the protagonists of a romantic film, *Desk Set*, in which Tracy was the inventor of an ENIAC-like computer called EMERAC.

ONLINE RESOURCES

- Charles Babbage's analytical engine

to be taken into account: *essere preso in considerazione*
to boast: *vantare*
loom: *telaio*
punched card: *scheda perforata*
scholar: *studioso, esperto*
to skip: *saltare*
vacuum tube: *valvola termoionica (tubo a vuoto)*
veritable: *vero*

Computer generations

Computers have been changing since the beginning of the computer era, and the steps of their evolution can be classified into generations. Each of these generations has been marked by an important technological development which has changed the way computers operate. The trend has been, and still is, that of developing smaller, cheaper and more powerful and efficient devices, though at the beginning the changes which were taken into account were simply related to hardware.

The first computer

Skipping the analysis of the first mechanisms for computations, such as the **abacus**, **Napier's bones**, **Pascal's calculator**, **Leibniz's binary system engine** or **Jacquard's loom** with punched cards, the machine that some scholars define as the first computer was Charles Babbage's **Analytical Engine** (1830s). It was as large as a house and it boasted the innovative key function of the conditional statement, that is the possibility to determine or change a specific program of the machine automatically (the formula being: if x, then y).

From the first to the third generation

The **first generation** of computers (1940-1956) was based on **vacuum tube** technology. Its main examples were ENIAC and UNIVAC. While ENIAC was designed to calculate artillery firing tables for the US Army's Ballistic Research Laboratory and then used for a study on thermonuclear weapons, UNIVAC was designed as a commercial data-processing computer to replace the old punched-card accounting machines.

The **second generation** (1956-63) used **transistors** instead of vacuum tubes, and assembly language instead of machine language. Computers were of a smaller size and had magnetic memories; some examples were IBM 7094 and CDC 164.

The **third generation** (1964-1971) saw the introduction of a new electronic component: **integrated circuits,** or microchips. Dimensions were enormously reduced, but computers were still very large and cost-prohibitive, therefore computer-terminal based architectures, owned only by large institutions, required large rooms.

From the fourth to the fifth generation

Computers of the **fourth generation** (1972-2010) were much smaller, faster, less expensive, and generally simpler to operate. Computers were based on the development of the first **single-chip microprocessor** at INTEL Corporation, were pre-assembled and required little technical knowledge to operate.

The **fifth generation** (2010-) hasn't introduced any new electronic components, but has made advances with **parallel processing**, software package development, research into **AI** (artificial intelligence), nanotechnology, natural language and quantum computation.

5 Create a map for the previous page.

6 Fill in the gaps with the words given below.

programming language • workstations • occurred • market leader • had come out • spreadsheet • graphical user interface • mainframe

The History of Computers

The IBM Mainframe Computer of the 60s

The 1960s saw large **1.** ..... computers become much more common in large industries and the US military and space programmes. IBM became the **2.** ..... in selling these large, expensive and very hard-to-use machines.

The PCs of the 70s

A veritable explosion of personal computers **3.** ..... in the early 70s, starting with Steve Jobs and Steve Wozniak exhibiting the first Apple II at the first West Coast Computer Faire in San Francisco. The Apple II was designed to be used with BASIC **4.** ....., colour graphics, and a 4100 character memory. Programs and data could be stored on a common audio-cassette recorder.

The Apple Macintosh

By 1984, Apple and IBM **5.** ..... with new models. Apple released the first generation Macintosh, which was the first computer to come with a **6.** ..... (GUI) and a mouse. The GUI made the machine much more attractive to home computer users because it was easy to use. IBM released the 286-AT, which, with applications like Lotus 1-2-3, a **7.** ..... and Microsoft Word, quickly became very popular all over the world.

Today's powerful home computers

Nowadays people have their own personal graphics **8.** ..... and powerful home computers. The average computer a person has at home is dramatically more powerful than a machine-like ENIAC. The computer revolution has been the fastest growing technology in human history.

7 GROUP WORK **How do you imagine 2050 generation computers? Will they be very different from current ones? In what ways? Create a mind map with your ideas, then do some research on the Internet and verify some of your hypotheses.**

8 **Watch a video on the early history of computers and complete the table.**

▶ The History of Computers *posted by* I Know how IT Works

Year	Inventor	Invention	Characteristics of the invention
1642			Mechanical adding machine
1822			
1837			
//	Konrad Zuse		
1941		Z3	

PRESENT-DAY COMPUTERS AND THEIR FUTURE EVOLUTION

With some voice recognition apps, it is possible to type long documents or emails without touching the keyboard.

What is a biological computer made of?

■ The present generation

The present fifth generation computers rely on ULSI technology, that is Ultra Large-Scale Integration, which involves placing more than one million circuit elements on a single chip, thus allowing for faster processing. Further improvements of current computers concern the development and simplification of storage devices and memories, the development of parallel processing, i.e. the division of tasks across multiple processing units operating simultaneously, and the development of easier and wider networking capabilities. All these features, combined with the development of artificial intelligence and quantum computing, are leading computers into their sixth generation.

■ The sixth generation

The sixth generation is distinguishing itself from the other generations in terms of size, speed and tasks. These computers are called intelligent, are based on artificial intelligence or artificial brains and include voice recognition•. With them, complex problem solving is possible in an easier and more efficient way.

to allow for: *consentire*
bondage: *prigionia*
constraint: *limite*
goal: *obiettivo*
magnified: *amplificato*
to predict: *prevedere*
to project: *proiettare*
to rely on: *fare affidamento su*
reminder: *promemoria*

■ Future generations

There are many hypotheses as to how future computers will be and what they will look like. For example:

- they might be neurons rather than physical objects, with a level of intelligence similar to that of a human being;
- they might become the same objects we use today: nowadays, we can communicate with a light bulb through our smartphone, but, in the future, the light bulb itself might become a computer, perform operations and project data and not only light;
- they may develop from present biological computers• and will start to perform operations using DNA or RNA;
- they might communicate with users in different ways:
  - by voice recognition;
  - by emotion sensing, i.e. the computer will predict what the user wants depending on his/her feelings;
  - by image recognition, i.e. the computer will recognise body motions far from the screen.
- they might have a brain-computer interface (BCI), a computer-based system that acquires brain signals, analyses and translates them into commands.

9 **Decide whether these statements are true or false and correct the false ones.**

	T	F
1. ULSI technology allows for faster processing thanks to the higher number of integrated circuits or microchips.	☐	☐
2. Parallel processing involves multiple units sharing the same tasks.	☐	☐
3. There is a clear separation between the fifth and the sixth generation of computers.	☐	☐
4. The sixth generation computers differ from the previous ones only in terms of tasks.	☐	☐
5. In the future, computers will be able to read the user's emotions and predict what they want.	☐	☐
6. Future computers will use a computer-brain interface.	☐	☐

10 PAIR WORK **Read these three quotations about AI and summarise the opinion of the three thinkers in one sentence. Then, add your own ideas and comments.**

1. "If an AI possessed any one of these skills – social abilities, technological development, economic ability – at a superhuman level, it is quite likely that it would quickly come to dominate our world in one way or another. And as we've seen, if it ever developed these abilities to the human level, then it would likely soon develop them to a superhuman level. So, we can assume that if even one of these skills gets programmed into a computer, then our world will come to be dominated by AIs or AI-empowered humans."

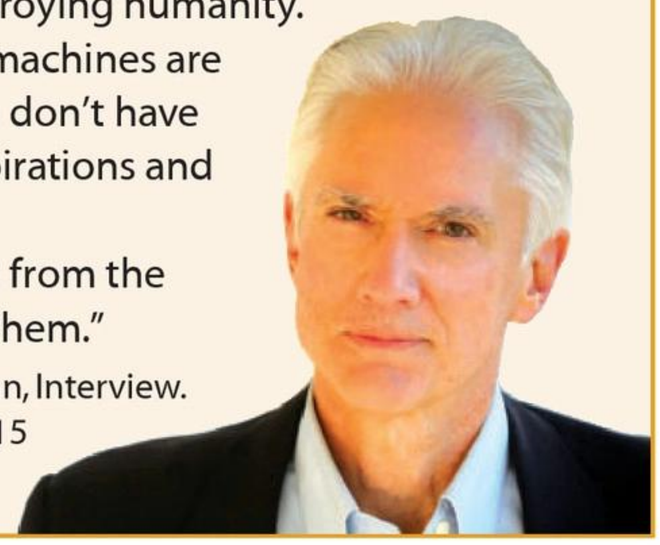
Stuart Armstrong, Smarter Than Us: *The Rise of Machine Intelligence*, 2014

2. "Everything that civilisation has to offer is a product of human intelligence; we cannot predict what we might achieve when this intelligence is magnified by the tools that AI may provide, but the eradication of war, disease, and poverty would be high on anyone's list. Success in creating AI would be the biggest event in human history. Unfortunately, it might also be the last."

Stephen Hawking, *The Independent*, May 1, 2014

3. "I see no evidence that AI systems are going to rise up one day in some sort of artificial cultural awakening, only to break free from the cruel and immoral constraints of human bondage by attacking or destroying humanity. My point is that machines are not people. They don't have independent aspirations and desires, only those that derive from the goals we set for them."

Jerry Kaplan, Interview. Lin P., in *Forbes* 2015



11 (1.3) **Listen to these comments on digital assistants, then match each statement with the correct digital assistant and say who their producer is. Siri (S), Google Now (G), Cortana (C), or Alexa (A).**

1. It uses a microphone to receive human commands from anywhere in a room. ☐

2. It uses your personal data to predict your questions. ☐

3. It is not necessary to use exact phrases or instructions. ☐

4. It is the best as regards location-based reminders. ☐

5. It accomplishes fewer tasks than the other digital assistants. ☐

6. It is still the leader in natural language comprehension. ☐

Siri: .....

Google Now: .....

Cortana: .....

Alexa: .....

LARGE COMPUTERS

A single-core processor, i.e. a single processor with a clock at 2,5 GHz has a capability of 10 billion FLOPS, whereas a supercomputer can perform a thousand trillion FLOPS.

While a mainframe computer is used to process large amounts of data, a server is generally used for web applications and data storage.

The term 'computer' can apply to virtually any device that has a microprocessor in it. There are therefore a lot of terms used to describe computers and most of these words regard their size, expected performances or capability.

Supercomputers

Supercomputers

Supercomputers are very expensive computers whose high computational performances allow for the analysis and processing of complex calculations such as those needed for weather forecasting or nuclear energy research. They run at the highest speed possible, which is measured in FLOPS•, the common benchmark measurement for rating the speed of microprocessors (Floating Point Operation Per Second).

Mainframe

Mainframe computers

Mainframe computers are very expensive, fast and capable of supporting thousands of users simultaneously. They are mainly used by big companies and organisations such as banks, airline companies, big hotel chains, hospitals or federal agencies because they are able to process big amounts of data. Their time processing is measured in nano- or pico-seconds and they are equipped with multi-programming capacity and the ability to work on different operating systems simultaneously.

In the 1960s, medium-sized companies replaced mainframe computers with **minicomputers**, smaller and more affordable computers, since they could be as good as mainframes. However, in the 1970s, those minicomputers were soon replaced by very small, affordable and reliable **microcomputers**, which exploited the new microchip technology and which later became known simply as personal computers.

Servers••

Servers are usually the largest and most powerful computers in a network. They offer services or provide data to other computers, for example by managing network resources, providing access to websites over the Internet, sharing files or printers, processing database queries and storing files.

Server

benchmark: *standard, riferimento*
capability: *capacità*
to rank: *posizionarsi, classificarsi*

12 Read the article and answer the questions.

Japan's Fugaku Keeps Position as World's Fastest Supercomputer

Fujitsu-Riken model also ranks highest in AI performance and big data processing

TOKYO, 29 June, 2021 - The Fugaku supercomputer, developed by Fujitsu and Japan's national research institute Riken, has defended its title as the world's fastest supercomputer, beating competitors from China and the US.

Fugaku has held the top spot on the TOP500 list by achieving a score of 442 petaflops, or quadrillions of floating point operations per second. In second place was IBM's Summit supercomputer, which scored just 148 petaflops. Fugaku has also topped three other categories including performance in artificial intelligence and big data processing capacity.

The next-generation supercomputer is the successor to Japan's K supercomputer, which ranked No. 1 in 2011. The 130-billion-yen ($1.22 billion) system became fully operational in March. Its high computing power has made it an ideal choice for pharmaceutical development, as well as a way to analyse big data.

The Japan Automobile Manufacturers Association plans to use Fugaku to help automakers develop vehicle structures that are more resilient by using AI to study collision impacts.

This month, Fujitsu Japan started studying chemicals that can be used to treat COVID-19 by using Fugaku's high simulation capabilities.

Although Fugaku came out on top again, the development of supercomputers has become a two-way race between the US and China in recent years. The two countries intend to use them not only for industrial purposes but also military research, including in the development of nuclear weapons.

The US is working on next-generation machines capable of exascale computing – 1 exaflops equals 1,000 petaflops – that will be at least twice as fast as Fugaku. Oak Ridge National Laboratory's Frontier and Argonne National Laboratory's Aurora are said to be in a race to begin operations this year.

Chinese development efforts remain secret, but there have been rumours that China is developing a successor to what was once the world's fastest supercomputer, the Sunway Taihu Light, and that it could launch its own exascale machine this year.

The US and China are also locked in a development race in quantum computers. Such a race has become a matter of national prestige for the two countries as it affects industrial competitiveness and national security.

Adapted from: *https://asia.nikkei.com/Business/Technology/Japan-s-Fugaku-keeps-position-as-world-s-fastest-supercomputer*

1. Who developed the Fugaku supercomputer?
2. Which supercomputer was No. 1 in 2011?
3. How does the Japan Automobile Manufactures Association plan to use Fugaku?
4. Which two countries are involved in a race for the development of supercomputers? What do they want to use supercomputers for?

13 Read the text again. What do these numbers refer to?

1.22	
130	
148	
442	
1,000	
2011	

SMALLER COMPUTERS

While a Mac is a PC, too, most people relate the term PC to systems that run the Windows operating system.

The term *notebook* was originally a brand name associated with a small Apple laptop, now it is a general term for a laptop with a screen size of 15 inches or less, while a normal laptop can vary greatly in size, from 10 to 18 inches.

The size of a netbook is usually between 8 and 11.6 inches.

Smaller-sized computers are more common in everyday life and correspond to our collective imagination of computers.

■ Personal computers

A **personal computer (PC)**• is a computer designed for general use by a single person. PCs were first known as microcomputers because they were complete computers but built on a smaller scale than the huge systems in use by most businesses. PCs can be either desktop or laptop.

■ Desktop computers

A **desktop computer** is a PC that is not designed for portability, i.e. one which is usually kept in a permanent location. Most desktops offer more power, storage and versatility at a lower cost than portables. Early desktop computers were designed to lie flat on the desk or with towers which stood upright. Most desktop computers have separate screens and keyboards.

■ Workstations

A **workstation** is a desktop computer that has a more powerful processor, additional memory and enhanced capabilities for performing a special group of tasks, such as 3D graphics or game development. They are especially used by game developers or professionals.

brand name: *marchio*
detachable: *rimovibile, staccabile*
flat: *piatto*
huge: *enorme*
own: *proprio*
power cut: *mancanza di corrente*
task: *attività, compito*

■ Laptops and notebooks

Laptop computers and **notebooks**•• are portable computers that integrate the display, keyboard, a pointing device or trackball, processor, memory and hard drive all in a battery-operated package. The special feature of the laptop computer is that it is far lighter than a desktop PC. Also, thanks to their own power supply, it is possible to use them even when there is a power cut or electricity is not available. On the downside, internal parts cannot be easily updated or replaced.

■ Netbooks

A **netbook**••• is an ultra-portable computer that is even smaller and cheaper than traditional laptops. However, its internal components are less powerful than those in regular laptops.

■ Convertible or hybrid computers

Convertible or **hybrid computers** are ultra-light notebooks characterised by a rotating/detachable touchscreen. They normally have limited performing features when used as notebooks, but their touchscreen makes them as user-friendly as tablets when it comes to surfing the web, sending e-mails and using social networks.

14 PAIR WORK **Complete the table below with notes. Refer to the previous text and to your own direct experience.**

Desktops		Laptops/Notebooks/Netbooks		Hybrids	
Advantages	Disadvantages	Advantages	Disadvantages	Advantages	Disadvantages

15 1.4 **Listen to some shop assistants describing two products and write notes with the relevant information. Then, write down four sentences in which you compare the two products.**

16 PAIR WORK **Controversy between Mac users and PC users is still alive. Read this table and role play. Act out a brief dialogue comparing the features of each.**

	Mac	PC
Security	Less vulnerable to viruses and other malware.	Very susceptible to viruses and malware, especially if not protected by an antivirus program.
Price	Computers, peripherals, upgrades, and repairs are often quite expensive (though well-built and with quality components).	PCs and peripherals are cheap and affordable.
Operating system	Fast and stable.	Can be slow in performance and a little unstable.
Software	The available options are increasing.	Large selection of software available.
Quality and options	High quality materials, few options available to choose from.	To help keep the overall costs low, some PCs often use cheap materials, but almost any imaginable configuration, colour, size, etc. is available.
Boot time	Fast.	Not very fast.
Upgrades	With difficulty, not always possible.	Just about every part can be upgraded.

Adapted from: *http://www.computerhope.com/issues/ch001238.htm*

THE WORLD'S SMALLEST COMPUTER

The Michigan Micro Mote (M^3) is the smallest autonomous computer in the world, just 1 mm^3, and, for over a decade, the students of the Computer Science Department of the University of Michigan have been working on it. Despite its tiny size, the M^3 can take pictures, read temperatures and record pressure readings. Researchers hope to implement it into a variety of applications ranging from medical to industrial purposes. In fact, due to its small size, the M^3 can actually be injected into the body for medical purposes. As for industrial applications, oil companies are interested in inserting it into oil wells to detect pockets of oil.

MOBILE TECHNOLOGY

Today, the word *smartbook* is used to refer to the digital version of a textbook, which, unlike a typical ebook, can adapt its content to the individual needs of the students.

A simple rule of thumb is that anything lower that 5.5 inches is a smartphone, phablets are between 5.5 and 7 inches, and anything bigger than 7 inches is a tablet. However, there are exceptions.

Phablet is a portmanteau, i.e. a word created from two other words, in this case *phone* and *tablet*.

handheld: *palmare*
handwriting: *calligrafia*
to sync: *sincronizzare*

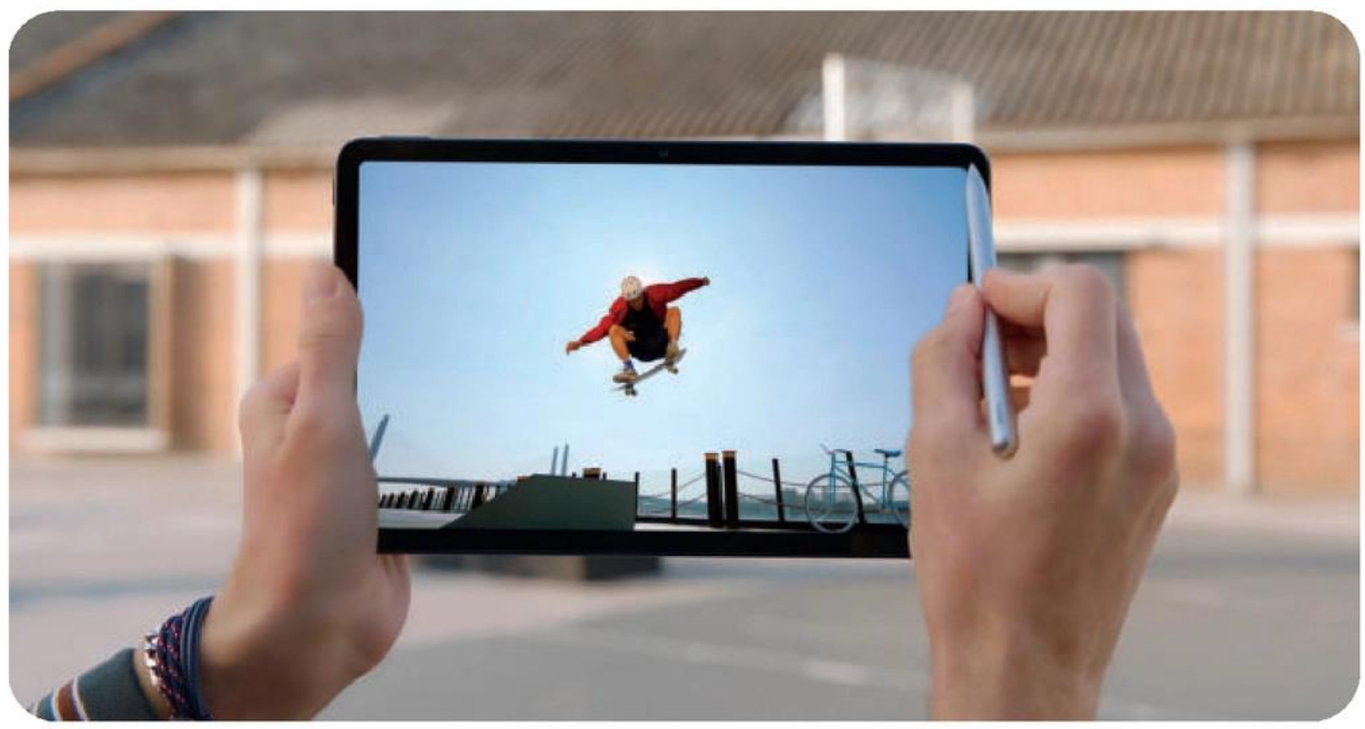
Mobile technology is constantly evolving. "Older" examples include mobile phones, PDAs and smartbooks; more recent examples are smartphones, tablets and phablets.

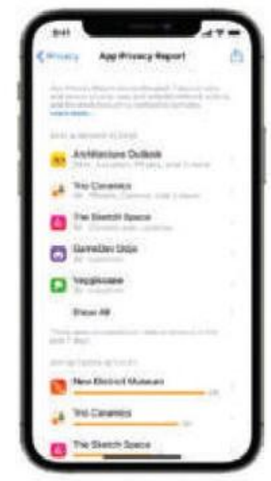
Mobile phones

Original **mobile** or **cell phones** did not have an operating system or an Internet connection and were just used to make calls. Since their invention, mobile technology has evolved and now they look more like small computers than telephones. However, traditional mobile phones are still produced and are popular among the elderly.

PDAs

Personal Digital Assistants (PDAs) are handheld mobile computers that combine computing, telephone/fax, Internet, networking, voice and handwriting recognition features. A digital stylus is their main input device on a multi-touch screen. Created at the beginning of the 90s, they immediately found a wide application. However, they are rapidly disappearing due to the difficulties to sync or back up data, software incompatibility, and the new generation of smartphones which can carry out most of their functions. Today, they are still used in hospitals and healthcare structures where smartphones are not allowed.





Smartbooks

Smartbooks• are devices which combine features of both a smartphone and a netbook in a body with a larger screen and extended battery life. They were intended mainly for entertainment purposes when they were launched in 2009/2010 but were soon replaced by bigger and more powerful tablets.

Smartphones

Smartphones•• are mobile phones which include e-mail and Web services, music and movie players, a camera and camcorder, GPS navigation, voice dictation, a virtual assistant and the more common features of a PDA. They have an operating system, integrated memory, a QWERTY keyboard, and can run multiple applications simultaneously. They make use of touch-sensitive screens.

Tablets

Tablets are wireless, portable personal computers with a touchscreen interface. They are typically smaller than a notebook computer but larger than a smartphone and they allow you to write directly on the screen, using natural handwriting with a stylus or digital pen or by typing on a screen-based software keyboard.

Phablets

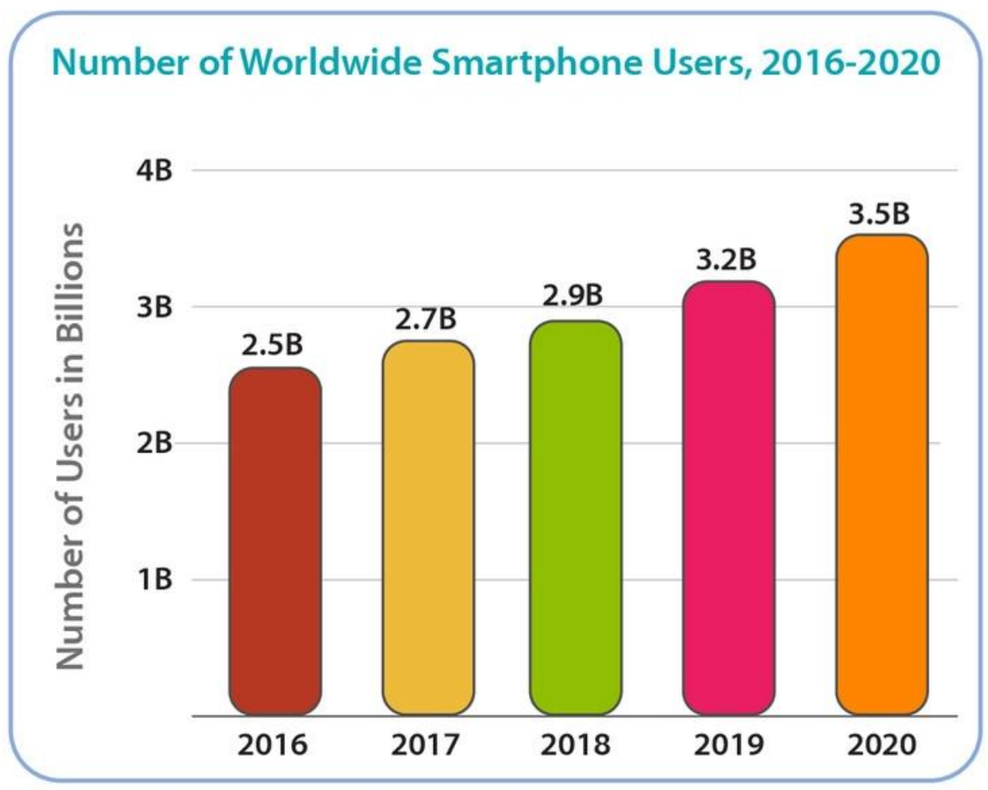
Phablets••• are hybrid devices that combine features of smartphones and tablets to meet the desires of those customers dissatisfied by the large size of tablets and the small screens of smartphones. They offer the same portability of a smartphone and are equipped with spectacular graphics performance.

17 GROUP WORK **Discuss the following questions.**

1. How many smartphones have you had up until now?
2. What is the average age of a smartphone?
3. What materials is a smartphone made of?

18 GROUP WORK **Look at the chart and describe it with your group. Use the words given below to help you.**

bar chart • increase/grow/rise • growth • constant/steady

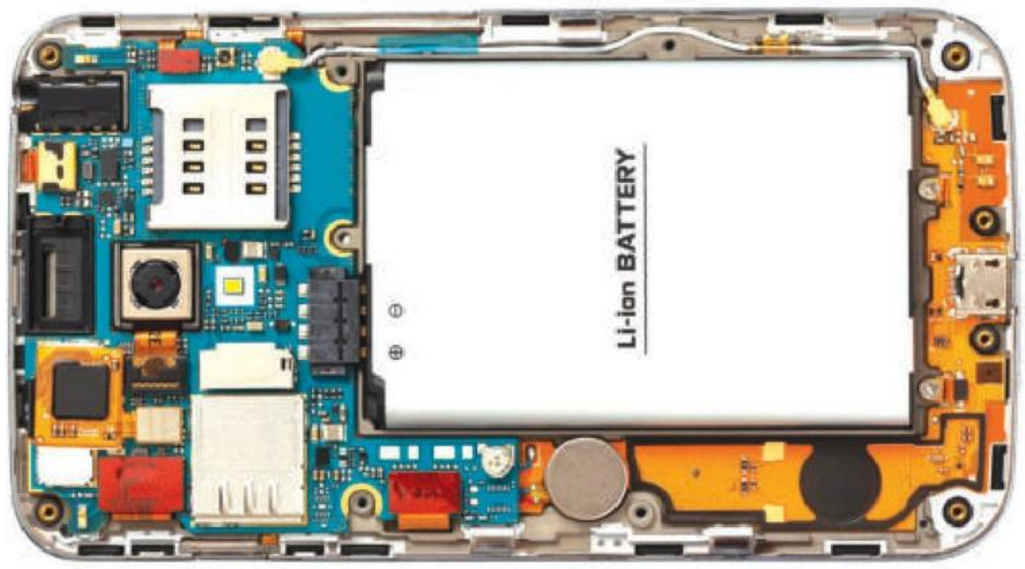


19 PET **Watch the video to check your answers to questions 2 and 3 of the previous activity and complete the summary with the missing words.**

▸ What Is E-Waste? *posted by* OPB

What is E-waste?

Every year the world produces **1.** ..... billion new phones. Stacked up, they reach the International **2.** ..... Station. Phones are a threat to people and the **3.** ..... E-waste is the fastest growing source of waste on the **4.** ..... and the biggest source of **5.** ..... metals in landfills. In the US there are no laws to **6.** ..... what happens to e-waste. E-waste is often shipped to other **7.** ..... with fewer health and safety **8.** .....



20 **Translate the following words into Italian. You'll need them to understand the next activity.**

1. Current .....
2. Wrist .....
3. Dimly .....
4. Carry out .....
5. To retain .....
6. Bunch .....
7. Sibling .....
8. Dozing off .....

21 1.5 **Listen to a CNN article to find out if you are addicted to your smartphone. Tick yes or no for each number. Then comment on the results of your test with your class.**

		YES	NO
1.	.....	☐	☐
2.	.....	☐	☐
3.	.....	☐	☐
4.	.....	☐	☐
5.	.....	☐	☐
6.	.....	☐	☐
7.	.....	☐	☐
8.	.....	☐	☐
9.	.....	☐	☐
10.	.....	☐	☐

WEARABLE, HANDHELD AND EMBEDDED COMPUTERS

What are the most common types of wearable computers? Do you have any?

QR stands for Quick Response.

Current debit and credit cards have both a magnetic band for ATM machines and a chip for the new types of card readers used in shops.

Mobile technology has so evolved that it has become capable of becoming smaller and much more flexible so as to assume different shapes and functions.

■ Wearable computers•

Wearable computers are computer-powered devices or equipment that can be worn by a user, including clothing, watches, glasses, shoes and similar items. The basic idea is that of positioning the computer in such a way that the user and the computer are inextricably intertwined so that the computer uses the human's mind and body as one of its peripherals. Some features of this technology are its constancy of interaction and ability to multi-task. The most common example is provided by **smartwatches**, smartphone-like devices worn on the wrist.

■ Card readers

A card reader is a device that can read plastic cards embedded with either a barcode, magnetic strip, computer chip or another storage medium. One of the oldest examples of a magnetic card reader is an **automated teller machine**, or **cash machine**, a computing machine which stores, encrypts and processes data related to banking services and allows customers to perform many operations. ATMCs (ATM controllers) are larger host systems that check and authorise the terminal operations, trying to guarantee customers' security.

batch: *gruppo, serie*
embedded: *incorporato*
fingerprint: *impronta digitale*
inextricably: *inestricabilmente*
interwined: *intrecciato*
landing system: *sistema di atterraggio*
to shrink: *restringersi*
sprinkler: *irrigatore*
stock: *azione (di borsa)*
warehouse: *magazzino*

■ Barcode readers

Barcode readers are multi-use devices with barcode scanning capabilities. They respond to mobility necessity and allow batch, i.e. groups of data, and wireless data capture. They are commonly used in hand-held scanning guns in supermarkets, shops and warehouses.

■ QRcode• readers

QRcode readers are devices used to read information from one media and pass it on to another device such as a smartphone. They can store more information than barcodes – for example URLs –, and, what is more, they are available as easy mobile phone apps to download.

■ Radio frequency identification

Radio Frequency Identification (RFID) is a system of readers and tags of electromagnetic fields exploiting radio-frequency tracking. They can have different sizes, shapes and uses, for example they can be found as anti-theft tags for products in any kind of shop, as animal tracking tags or as chips in credit cards••.

■ Embedded computers

Embedded computers are integrated into other machinery and technological devices to follow specific tasks and instructions as in DVDs players, thermostats, washing machines, car navigators and so on. Being computers, they have got CPU, RAM, ROM, I/O devices and a clock, but they do not need any additional space because their software is not modifiable.

22 (1.6) **Listen to an article about a new student attendance system and say if the statements are true or false.**

	T	F
1. RFID systems are used in a lot of fields such as healthcare and transportation.	☐	☐
2. The RFID card contains information such as the student's personal data.	☐	☐
3. All students would use fingerprint and face scanners to monitor their attendance.	☐	☐
4. An SMS alert system sends the students' parents a message at the end of the lessons.	☐	☐
5. Rival technology barcoding is cheaper than RFID system.	☐	☐
6. The RFID student card uses plug and play technology.	☐	☐

23 **Read these examples of embedded systems and match them to their appropriate area of application.**

home appliances • office automation • security • entertainment • aerospace • banking • automobile sector • medical sector

Area of application	Equipment / Device
1.	Dishwasher, washing machine, garden sprinkler, DVD player, etc.
2.	Scanner, printer, fax
3.	Face and fingerprint recognition, airport security system, alarm system
4.	Fuel injection controller, air-bag system, GPS, cruise control
5.	Automatic landing system, flight attitude controller, navigation system
6.	ECG, glucose monitor, pressure monitor, diagnostic devices
7.	ATM, cash register
8.	MP3, videogames, smart toys

24 PET **Read the text and complete it with the missing words.**

What Is a Smartwatch?

A smartwatch is a small smartphone-like device worn **1.** ..... the wrist. Many smartwatches are connected to a smartphone that notifies the user **2.** ..... incoming calls, e-mail messages, and notifications from applications. Some smartwatches **3.** ..... even make telephone calls. Many smartwatches have colour displays, but **4.** ..... inexpensive models use a black-and-white "e-paper" display. The user can operate the smartwatch through a touch screen, physical buttons, or a combination of the two. Some smartwatches come with pedometers and heart-rate monitors to help users track **5.** ..... health.

As computers shrank in size **6.** ..... the 20th century, electronic equipment became small enough to fit into a watch. One of **7.** ..... first calculator watches was the Calcron (1975), **8.** ..... had a nine-digit display.

One of the earliest true smartwatches was the Microsoft SPOT (Smart Personal Object Technology), introduced in 2004. The SPOT received information such **9.** ..... weather, news, and stock updates through FM radio. It also received e-mail and instant messages, but users could not reply. With the rise of the smartphone, smartwatches such as the Sony Ericsson LiveView (2010), the Pebble (2013), and the Apple Watch (2015) emerged and they could receive data **10.** ..... a phone. In 2014 Google developed Android Wear – a version of its mobile operating system, Android – specifically for wearable devices like smartwatches.

Adapted from: *https://www.britannica.com/technology/smartwatch*

PREFIXES AND SUFFIXES

Here is a brief list of the main prefixes and suffixes used in the IT field:

Prefix	Meaning	Example
a- / dis-	opposite of / not	*asynchronous, disconnect*
in- (il- / im- / ir-)	opposite of / not	*impossible, irreplaceable, illegal*
un-, non-	opposite of / not	*uninstall, non-volatile, unzip*
mis-	wrong(ly) / bad(ly)	*misuse, misdirect*
mal-	wrong(ly) / bad(ly)	*malfunction*
over-	too much	*overload, overheat*
out-	surpassing	*outrun, outperform*
fore-	in front of /in advance	*foreclose, foreground*
re-	again	*re-centre, re-designed*
multi-	many	*multiprocessors, multicore*
pre-	before	*preview*
intra-	within / inside of	*intranet*
inter-	within / inside of	*interface, interactive*
de-	opposite of	*decode, deselect*

Adjectival suffix	Meaning	Example
-ful	full of	*helpful, useful*
-less	without	*wireless*
-able / -ible	capable of	*attachable, flexible*
-proof	that can resist something	*hackerproof*
-like	similar to	*robotlike*
-ical	connected with	*optical*
-al	connected with	*optional, computational*

Noun suffix	Meaning	Example
-ability / -ibility	quality of being	*usability, accessibility*
-ing	doing the action of	*programming, coding*
-ment	state	*advancement, development*
-tion, -sion	state	*communication, conversion*
-er, -or	executor of the verb	*compiler, operator*
-ship	status	*leadership*
-age	state	*shortage, storage*

Adverbial suffix	Meaning	Example
-ly / -ally	modality	*digitally, virtually*
-ward(s)	in the direction of	*forward(s), backward(s)*
-wise	similar to, as regards	*bytewise, bitwise*

25 **Write the opposite of the following words.**

1. install .....
2. possible .....
3. legal .....
4. proportionate .....
5. connect .....
6. direct .....
7. zip .....
8. synchronous .....
9. connect .....
10. plug .....
11. logical .....
12. safe .....

ANDROIDS vs HUMANS

26 PAIR WORK **Read the definition of an android and discuss it.**

An android is a robot with a human appearance.

1. How can you distinguish a human from an android?
2. What are the characteristics of a human being that cannot be copied or recreated?

27 GROUP WORK **Read Asimov's Laws of Robotics and discuss the questions.**

First Law: A robot may not injure a human being or, through inaction, allow a human being to come to harm.
Second Law: A robot must obey the orders given it by human beings except where such orders would conflict with the First Law.
Third Law: A robot must protect its own existence as long as such protection does not conflict with the First or Second Law.
Zeroth Law: A robot may not harm humanity, or, by inaction, allow humanity to come to harm.

1. According to the first law, what does a robot need to do if it sees a human in danger?
2. The second law is unethical because it would require intelligent beings to be slaves. Do you agree with this statement?
3. According to the third law, robots have to kill themselves if ordered by a man (2nd law) or sacrifice their lives to save a man (1st law). Discuss this point.
4. Later, Asimov created the zeroth law because he imagined that robots could take responsibility for government or human civilisation. What is the difference between this law and the first one?

28 GROUP WORK **Discuss the following question.**

In the novel *Never Let Me Go* by K. Ishiguro, human clones are created for organs transplants. Once they grow up, they have to donate their organs until they die. The protagonists try to affirm their right to live because they are capable of experiencing feelings like love. Do you think that any being, regardless of its origin, can be considered human if able to show human feelings?

29 **Watch the trailer of the film *Never Let Me Go* and answer the questions.**

▸ Never Let Me Go | Official trailer | Fox Searchlight
posted by SearchlightPictures

1. How old is Kathy?
2. What happened to the students who tried to escape from Hailsham?
3. What is of paramount importance?
4. How long do the donors live?
5. What arrangement is Tommy dreaming of?
6. What does Miss Emily answer when Tommy says that he's in love with Kathy?

VOCABULARY

1 **Write the correct words for the following pictures.**

analogue and digital • binary system • convertible (or hybrid) computer • desktop (computer) • laptop • mainframe (computer) • punched cards • QR code • smartphone • smartwatch • supercomputer • tablet

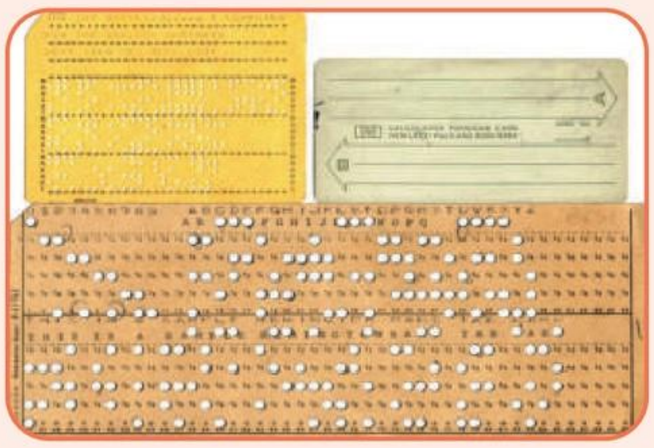
1. .....

2. .....

3. .....

4. .....

5. .....



6. .....

7. .....

8. .....

9. .....

10. .....

11. .....

12. .....

2 Complete each sentence with one of the given words.

analogue • assistant • binary • byte • desktop • digital • embedded • mainframe • punched • supercomputers • transistors • vacuum

1. The ..... system uses combinations of zeros and ones.
2. A ..... is a combination of eight bits.
3. ..... technology translates information into electric pulses.
4. ..... technology translates information into binary digits.
5. Jackard's loom used ..... cards.
6. The first generation of computers used the ..... tube technology.
7. The second generation of computers used .....
8. ..... are used for weather forecasts.
9. Minicomputers were developed in the 1960s to replace ..... computers.
10. A ..... is a type of PC not designed for portability.
11. PDA means Personal Digital .....
12. A computer integrated into another machine is called an ..... computer.

PDA

3 Find 6 types of computers in the following wordsearch.

D	I	R	B	Y	H	O	U	D	P
N	M	G	R	D	O	H	D	J	O
O	O	I	X	T	Z	F	U	S	T
T	L	H	P	D	Z	C	E	P	K
E	M	A	R	F	N	I	A	M	S
B	L	N	E	T	B	O	O	K	E
O	E	Z	Y	I	M	U	X	A	D
O	G	V	K	J	L	X	B	D	W
K	X	I	S	M	J	A	T	L	W
T	P	E	I	A	L	C	F	H	K

4 Read the text and complete it with the missing words.

What Is Mobile Technology?

1. M_ _ _ _ _ technology is technology that goes where the user goes. It consists of portable two-way communications devices, computing devices and the networking technology that connects them.

Currently, mobile technology is typified by internet-enabled devices like **2.** S _ _ _ _ _ _ _ _ _ _, **3.** T_ _ _ _ _ _ and **4.** WA _ _ _ _ _ .

These are the latest in a progression that includes two-way pagers, **5.** N _ _ _ B _ _ _ computers, **6.** M _ _ _ _ _ telephones (flip phones), GPS-navigation devices and more.

The communications networks that connect these devices are loosely termed wireless technologies. They enable **7.** M _ _ _ _ _ devices to share voice, data and applications (mobile **8.** A _ _ _).

REAL-LIFE SKILLS

CHOOSING THE RIGHT COMPUTER

There is not simply one computer that is best for everybody. Finding the right computer depends on the user's needs and also on the money available. The first step is choosing between a desktop and a laptop. Next, memory and specific features come into consideration.

5 **Read the information in the table below and use the Internet to complete it. Then, for each criterion, choose which one would be best for you, desktop (D) or laptop (L). The one that gets the highest score is the best fit for your needs.**

Criteria	Desktop computers	Laptop computers	D/L
Cost	Large range of prices starting from relatively cheap ones.	Higher prices for good quality ones.	
Portability	Large in size and with a separate monitor. They are designed to be used in a single location.	Highly portable because of their size. They can be taken from place to place.	
Processor			
Ease of assembly	It is not difficult to connect everything together, yet it is more complicated than with a laptop.	Laptops are easy to use and are quick to get running.	
Keyboards			
Screen size			
Upgrading	Most components are easily removable, making it easier to upgrade.	Memory and the hard drive are the only components that can be upgraded in a laptop. The other components are built in or not removable.	
Gaming			
Repair	Repairing a desktop computer is much easier since most of the hardware can be easily purchased off the shelf in local computer shops.	Having to open a laptop to repair a component can be difficult. Also, finding a replacement is not easy as it is often necessary to contact the manufacturer.	

6 **Answer the questions.**

1. Do you need to run heavy software programs? If so, you'll need more RAM.
2. Do you need to store a considerable amount of data? If so, you'll need a bigger hard disk.
3. Do you need a DVD drive?
4. How many ports do you need?

7 **Briefly write down the characteristics of your ideal computer and use the Internet to find the one that best matches your needs.**

ARTISTIC CREATIONS WITH E-WASTE

The WEEE man, designed by Paul Bonomini, is a huge robot made of scrap electrical and electronic equipment.

8 **Watch the video on the WEEE Man Sculpture at the Eden Project and answer the questions.**

▸ WEEE Man Sculpture at the Eden Project *posted by* edenprojecttv

1. What is the sculpture made of?
2. What does WEEE stand for?
3. What are the sculpture's sinews made of?
4. And its teeth and ears?
5. What about the brain?
6. What can we do as individuals to reduce the amount of waste we produce?

9 **The WEEE man sculpture was made with clear objectives. Read them and decide if they are realistic. Justify your answer.**

The WEEE man project's main objectives are:

- to transform public perception of waste from "out of sight, out of mind" to visible, thought–provoking and behaviour–changing;
- to encourage the public, retailers and manufacturers to think carefully about waste reduction;
- to raise the profile of the recycling industry;
- to educate people on ethical consumer choice and sustainable resource management.

10 PAIR WORK **The WEEE Man represents the average e-waste of a UK household in a lifetime. Try to guess which electrical and electronic appliances it is made of and how many of them were used.**

11 **Complete the text with the words given below.**

four • nearest • supplement • admission • stay • daily • opening • signposted • rail • details

Visit the WEEE Man at the Eden Project in Cornwall

You will find the Eden Project **1.** ..... miles to the east of St Austell, it is **2.** ..... from the A30, A390 and A391.

How to get there

By Bus: Buses run **3.** ..... from St Austell, Newquay, Helston, Falmouth and Truro to the Eden Project. For **4.** ..... call Truronian on 01872 273453. No need to book. You can buy a combined bus / Eden **5.** ..... ticket on the bus.

By Train: The **6.** ..... train station to the Eden Project is St Austell. Buses connect with most mainline **7.** ..... services.

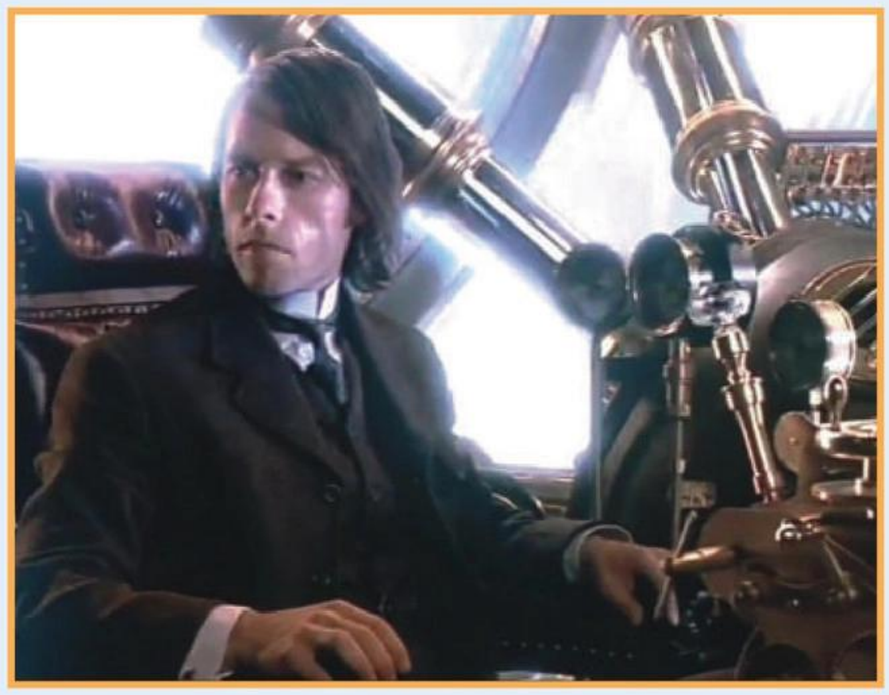
A combined train, bus transfer and admission ticket is available for a small **8.** ..... Call 08457 484950 for details.

For more information on **9.** ..... times, booking tickets and where to **10.** ....., please visit the Eden Project website.

Adapted from: *http://www.weeeman.org/html/impact/visit.html*

THE TIME MACHINE

- PRODUCTION: USA 2002
- DIRECTORS: Simon Wells, Gore Verbinski
- STARRING: Guy Pierce (Alexander Hartdegen), Samantha Mumba (Mara), Sienna Guillory (Emma), Kalen (Omero Mumba), Jeremy Irons (Ueber-Morlock), Orlando Jones (Vox).



SYNOPSIS

In 1899, Dr Alexander Hartdegen is a young inventor teaching at Columbia University in New York City. After a mugger kills his fiancée Emma, he starts building a time machine to travel back in time and save her. Four years later, he travels back to 1899 and prevents her murder, only to see her killed again in a different way.

So, Alexander travels forward in time to 2030 to discover if science has been able to solve the question of how to change the past. At the New York Public Library, a holographic librarian called Vox 114 insists that time travel is impossible, so Alexander travels to 2037, when the accidental destruction of the Moon by lunar colonists has begun rendering the Earth virtually uninhabitable. While restarting the time machine to avoid falling debris, Alexander is knocked unconscious and accidentally travels 800 millennia into the future. When he regains consciousness and stops the machine, it is the year 802,701. The human race has reverted to a primitive lifestyle, and the Earth has healed. Some survivors, called Eloi, live on the sides of cliffs of what was once Manhattan. Alexander is nursed back to health by a girl named Mara, one of the few Eloi who speak English. One night, Alexander and Mara's young brother, Kalen, dream of a frightening face. Alexander informs Mara of the dream and she tells him they all have that dream, and he notices that his watch is now missing. The next day, the Eloi are attacked, and Mara is dragged underground by ape-like monsters. The creatures are called Morlocks and they hunt the Eloi for food. In order to rescue her, Kalen leads Alexander to Vox 114, which is still functioning after 800,000 years. After learning from Vox how to find the Morlocks, Alexander enters their underground caves and he is almost immediately captured and thrown into the area where Mara sits in a cage. There he meets an intelligent, humanoid Morlock, who explains that Morlocks are the evolutionary descendants of the humans who went underground after the Moon broke apart, while the Eloi evolved from those who remained on the surface. The humanoid Morlocks are a caste of telepaths who rule the other Morlocks.

Alexander asks the Morlock leader to give him back his watch and the Morlock says that the watch also represents memory for him, too. Alexander gets into the machine but also pulls the Morlock in with him, carrying them into the future as they fight. The Morlock dies by rapidly ageing when Alexander pushes him outside the machine's temporal bubble. Alexander then stops over six hundred million years in the future in the year 635,427,810, revealing a harsh, rust-coloured sky over a wasteland of Morlock caves.

Finally accepting that he cannot save Emma, Alexander travels back to rescue Mara. After freeing her, he starts the time machine and jams its gears, creating a violent distortion in time which kills the Morlocks. Alexander begins a new life with Mara and the Eloi in 802,701.

Adapted from: *https://timemachine.fandom.com/wiki/*

BEFORE WATCHING

12 **Read the synopsis and answer the questions.**

1. Who is Alexander Hartdegen?
2. Why does he decide to build a time machine?
3. Who are the Eloi and the Morlocks? Where do they live?
4. How does Alexander kill the Morlocks?

ONLINE RESOURCES

- The Bicentennial Man

debris: *detriti*
gear: *cambio*
to heal: *guarire*
to jam: *pigiare*
mugger: *scippatore*
to revert: *ritornare*
rust: *ruggine*
wasteland: *terra desolata*

13 Complete the table with the main events in chronological order.

Year	Events
1899	
1903	
2030	
2037	
802,701	
635,427,810	

WHILE WATCHING

14 In 2030 Alex visits the New York Public Library and meets Vox 114. Watch the video and choose the best answers.

1. Vox 114 has a… memory.
   a. photographic
   b. photonic
   c. factual
2. Vox is the librarian of the public library in the … Avenue.
   a. Fifty
   b. Fifth
   c. Five
3. Alex asks if Vox 114 is a…
   a. stereotype.
   b. stereo icon.
   c. stereopticon.
4. Vox is…
   a. a third generation photonic.
   b. connected to the biggest database on the planet.
   c. a photonic with verbal and physical abilities.
5. According to Vox, a photonic is…
   a. a temporal paradox.
   b. dimensional optics.
   c. a compendium of human knowledge.
6. What subject does Vox associate with time travel?
   a. mechanical engineering.
   b. science fiction.
   c. chronography.

AFTER WATCHING

15 Read the text and answer the questions.

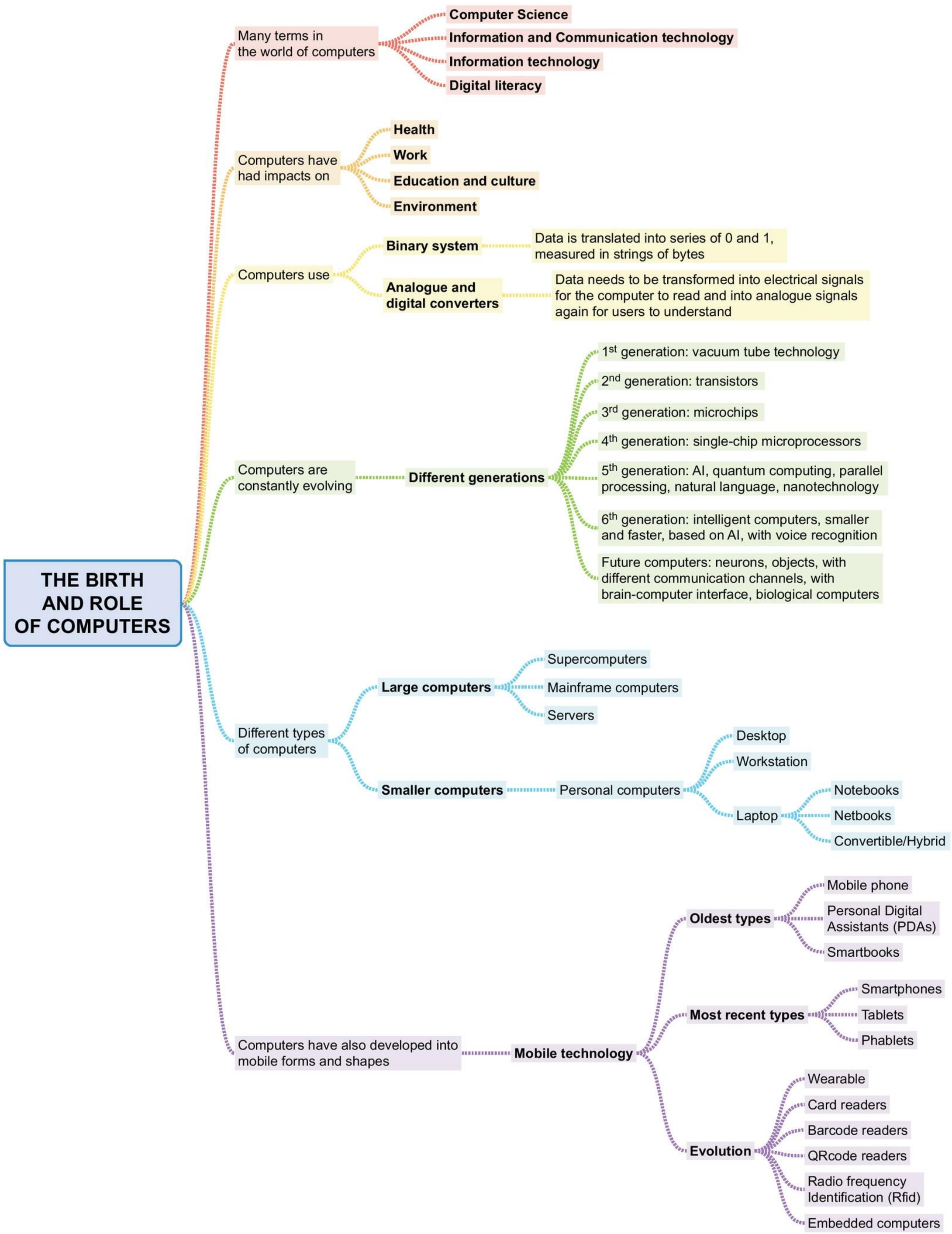
From Stereopticons to Holograms

A stereopticon is a slide projector that combines two images to create a three-dimensional effect. A development of this technology is a computer screen which can display traditional 3D images. In fact, 3D displays form the final image from only two images, one for the left eye and one for the right eye. The screen always displays the same image angle regardless of the viewer's position.
With holographic 3D images, instead, if you change position, you can see different angles of the image, as in reality.

Holographic 3D screens differ in the number of viewpoints they can display, from 4 to 45, making the experience much more complete. The market tends to label the screens with few points of view as 'holographic 3D', and simply 'holographic' those with a high number of points of view.
Holograms are images that float in the air without any screen. However, this is unrealistic and we only see it in films. To be able to create holograms, not only does technology need to evolve, but also content creators have to get used to working with three dimensions.

1. What is a stereopticon?
2. What is the difference between traditional 3D screens and holographic 3D ones?
3. What is the difference between holographic 3D and holographic screens?
4. What are holograms?

MAPPING YOUR MIND



2 MODULE

THE BODY OF COMPUTERS

Unit 2.1 • The electronics of computers

- Integrated circuits
- Transistors and microprocessors
- Transmission media

Unit 2.2 • The structure of computers

- Hardware and software
- The CPU and the machine cycle
- Computer memory
- Primary storage
- Secondary storage: magnetic devices
- Secondary storage: optical discs and solid-state memory

Unit 2.3 • The peripherals of computers

- Peripheral devices
- Primary input devices
- Other input devices
- Primary output devices
- Other output devices
- Automated input devices and control devices

ONLINE RESOURCES

- The motherboard

LANGUAGE SKILLS

- At the computer shop
- Discussing computers
- Describing computers and computer problems

EXTRA FIRST AND IELTS READING PRACTICE

- First, part 2

LITERARY BITS

- Isaac Asimov, *The Machine That Won The War*

EUCIP CORE SYLLABUS 3.1

- Types of processors and instruction execution (Operate C 1.3)

2.1 THE ELECTRONICS OF COMPUTERS

INTEGRATED CIRCUITS

The integrated circuit was invented in 1958 by Jack Kilby and Robert Noyce who came up with the idea independently and fought furiously for the rights to the invention.

How big is an integrated circuit?

A PCB is essentially a board that connects electronic components.

Watch this silent video and see how IC, or chips, are made:

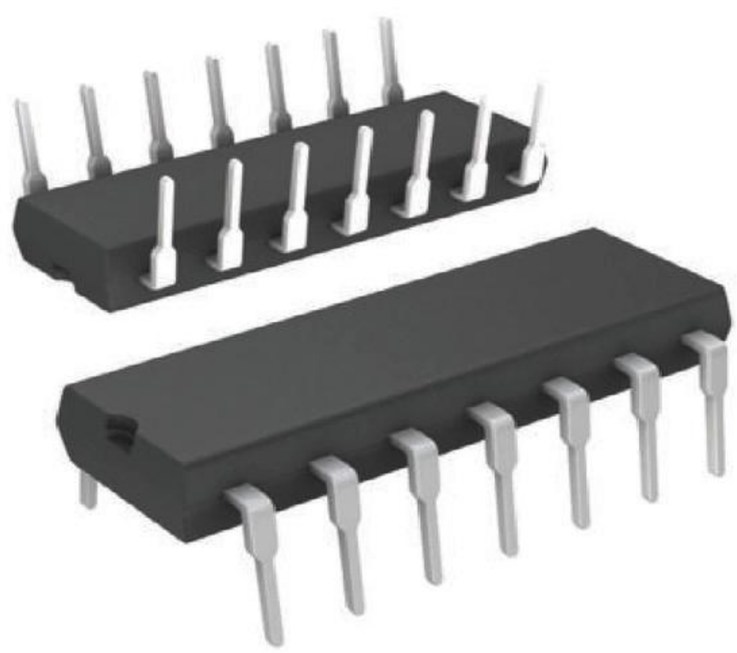
From Sand to Silicon: the Making of a Chip *posted by* Intel

The interior of a computer is made of a set of electronic circuits, called integrated circuits, built on a single small flat piece of semiconductor material, usually silicon. The integration increases speed and reduces costs if compared to the building of discrete, i.e. separate, electronic components.

■ What is an IC?

An **integrated circuit** **(IC)** or **chip**, is a tiny component, no bigger than a fingernail, which contains a huge amount, i.e. thousands, millions or even billions, of interconnected microelectronic devices to serve a specific function.

The basic idea behind integrated circuits is to recreate a complete microscopic circuit on the surface of a piece of silicon. Electronic devices are built around a **printed circuit board** (PCB) which looks like an electric street map with all the electronic components, such as resistors and capacitors, in the place of buildings. Printed copper connections link them together like miniature metal streets. Although this structure is perfect for small appliances, computers require eight electronic switches to store a single byte, or character. As a consequence, the size of a computer electric plant would have been huge without the invention of the integrated circuit.



copper: *rame*
die: *piastrina di materiale semiconduttore*
disposable: *monouso*
to dope: *drogare, trattare chimicamente*
fab: *fabbrica*
to fill: *riempire*
fingernail: *unghia*
to mark out: *delimitare*
pipe: *tubo*
to peel apart: *aprire, sfogliare pezzo per pezzo*
plant: *impianto*
to slice: *tagliare*
switch: *interruttore, commutatore*

■ Uses of ICs

The major uses of ICs are for computer microprocessors, mobile phones, digital computer memories, and other electronic devices such as timers and sensors.

■ How to make ICs

The process of making an integrated circuit starts with a raw chemical element such as silicon, which is chemically treated, or doped, to enable it to have different electrical properties. Then, a big single crystal of silicon is shaped like a long solid pipe which is sliced into thin disks as large as a CD, called wafers. The wafers are marked out into identical square or rectangular areas, each of which will make a single silicon chip. After that, the components are created by doping different areas on the silicon surface.

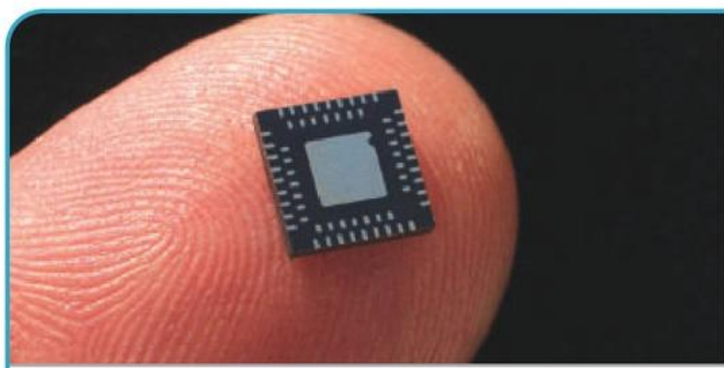
The die, the small block on which the circuit is fabricated, represents the IC in its smallest possible form. To make the connection of the IC possible, a package is used to encapsulate the die. The IC package turns the delicate die into the black chip we are all familiar with.

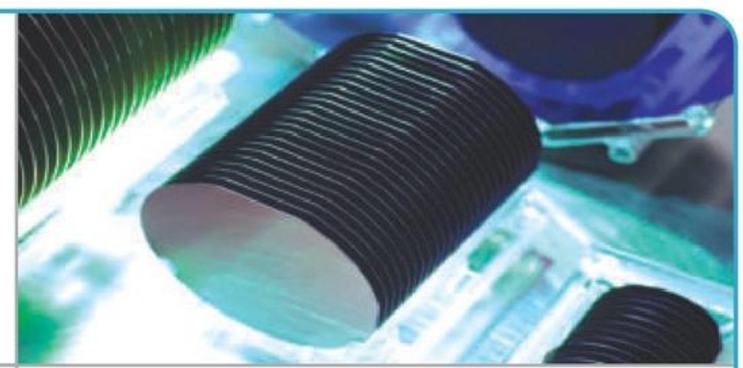
■ Types of integrated circuits

According to the way in which they are manufactured, integrated circuits can be classified as:

- **monolithic circuits**, monocrystalline, typically made of silicon;
- **hybrid circuits**, which contain transistors, diodes, and other components which are difficult to manufacture with monolithic technology, and which are therefore joined to a substrate or printed circuit board.

1 (2.1) **Listen to a short lecture on making chips and write the names of the objects in the pictures. Then listen again and complete the key facts.**





a. ..... **b.** ..... **c.** .....

- Silicon is the main ingredient of **1.** ..... sand and is a natural **2.** .....
- An **3.** ..... is sliced into thin disks called **4.** .....
- Chips have three **5.** ..... and may include up to 30 **6.** ..... of circuits.
- A clean room is **7.** ..... thousand times cleaner than a hospital operating room.
- The air in the clean room is changed **8.** ..... times per minute.
- Fab technicians have to wear bunny suits and are forbidden to sing, **9.** ..... or sneeze.
- Professionals take about 5-8 **10.** ..... to dress in a bunny suit.
- Bunny suit equipment also includes a helmet, gloves and two pieces of foot gear: disposable shoe **11.** ..... and outer **12.** .....

2 **Read the text and decide if the statements are true or false.**

Microscopic Art Inside Computer Chips

Considering the expense, precision and difficulty of manufacturing computer chips, you would think the engineers designing them are pretty serious people. But it's not all business inside a chip fab. The designers of microchips frequently hide tiny cartoons, drawings and even messages alongside the super-tiny circuits they create.

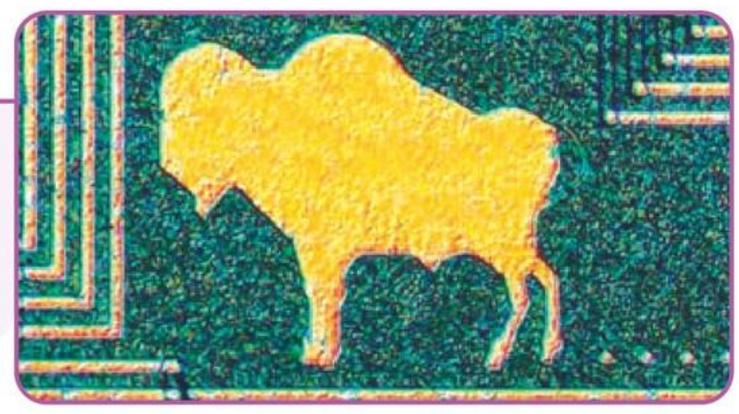
Chipworks, a company that analyses microchips by peeling them apart and looking at them under microscopes, has discovered many examples of silicon art. As they explain, these drawings are made with the same processes used to assemble the rest of a computer chip. If there's a little unused space in a chip, why not fill that with an entertaining design? It's not as if most of the chip companies' customers will ever notice. The only people likely to see these designs are the chip engineers' supervisors and analysts at companies like Chipworks. "The mass production of these works goes unnoticed by most observers, but," as Chipworks says, "their existence is a tribute to human resourcefulness and creativity."

Adapted from: *https://www.wired.com*

	T	F
1. Chip engineers are very serious people.	☐	☐
2. Chipworks produces artistic chips.	☐	☐
3. The drawings on chips are made in the same way in which the chip components are assembled.	☐	☐
4 Customers don't notice the drawings.	☐	☐
5. Chipworks praises this form of art.	☐	☐

MORE POWER, LESS SPACE

The history of computing looks like a magic trick. With the IC, more and more power was squeezed into less and less space. A modern laptop is a thousand times more powerful than old computers which were 100 times bigger.



TRANSISTORS AND MICROPROCESSORS

The human brain contains around 100 billion neurons. Computers also contain billions of miniature brain cells. They are called transistors.

Base current is the current flowing through the base of a transistor at any time.

A flip-flop is a device which stores a single bit of data; one of its two states represents a "one" and the other represents a "zero".

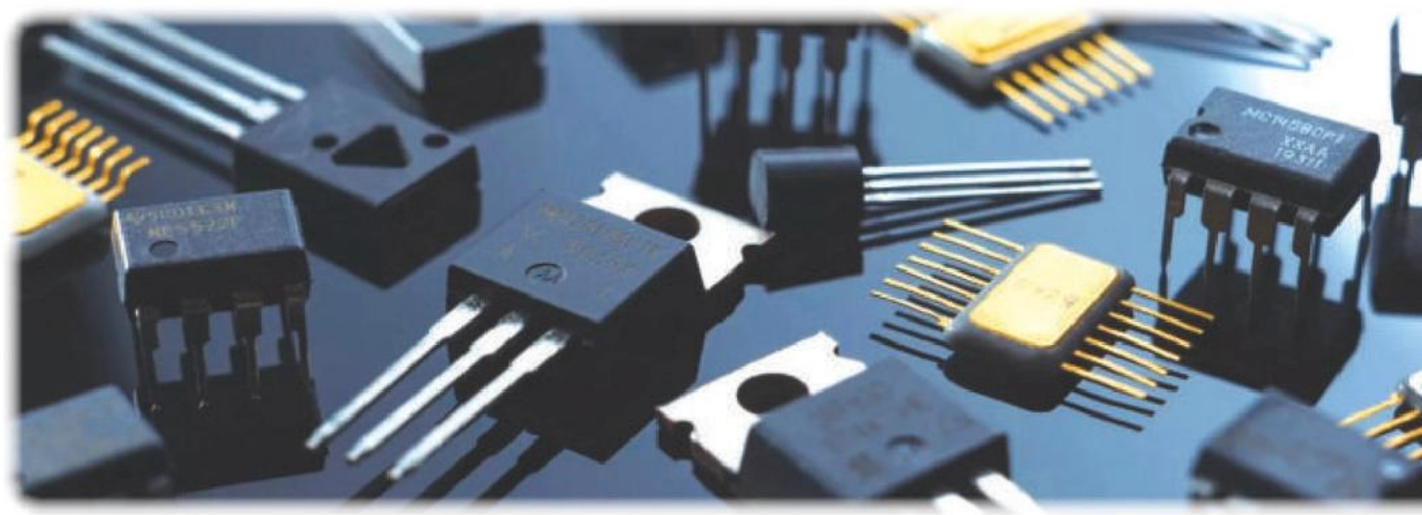
Integrated circuits can be used for a variety of different purposes, especially to build amplifiers, switches and microprocessors.

Transistors

Transistors • are miniature electronic components also made of silicon. To produce them, silicon is treated with impurities in a chemical process called doping. The results are transistors with negative charges (n-type) or positive charges (p-type).

Transistors can be used both as amplifiers or switches.

contains hundreds of millions or even billions of transistors, each of which can be switched on or off individually. Each time a new base current •• flows, the transistor flips on or off. It remains in one of those stable states, either on or off, until another current comes along and flips it as needed. This kind of arrangement is known as a flip-flop •••.

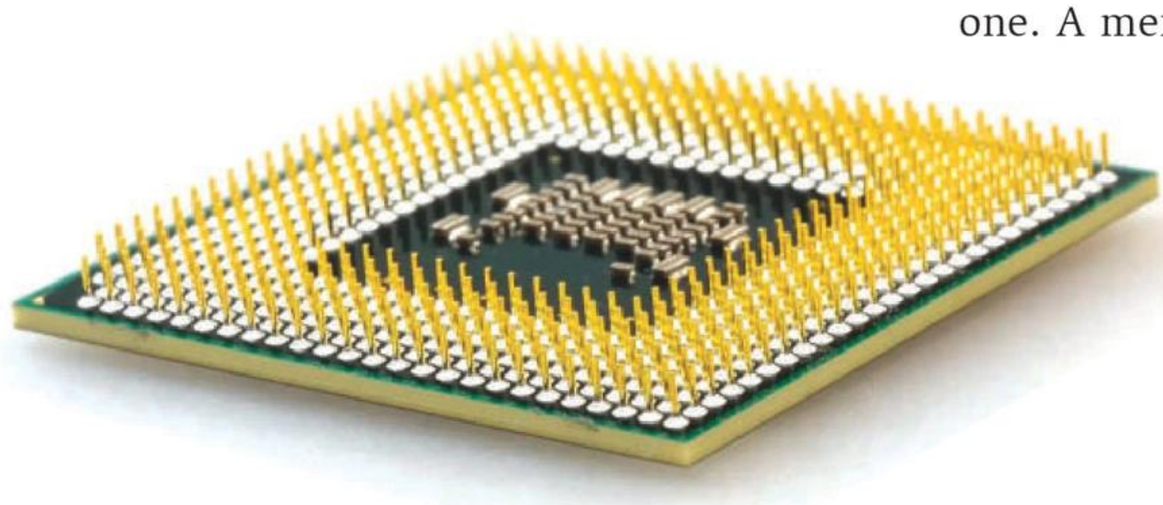


Amplifiers

When it works as an **amplifier**, the transistor takes in a tiny electric current at one end of a linear circuit, called input current, and produces a much bigger electric output current at the other end of the circuit. In other words, it works as a kind of current booster such as, for example, loudspeakers in hearing aids.

Switches

In computer chips, transistors work as **switches**. They are used to transform a tiny electric current flowing in one part of the transistor into a much bigger one in another part of the same. So, we can say that the small current "switches" on the larger one. A memory chip



Microprocessors

A **microprocessor** is an integrated circuit of billions of transistors which incorporates all the functions of a central processing unit (CPU) on a single chip.

Modern microprocessors have the shape of a flat prism which is installed in a housing called a socket. The socket enables the microprocessor to plug into a larger network of components, the **motherboard**, which is the main printed circuit board (PCB) of the computer and which contains the main computer components. In some cases, a special socket on the motherboard hosts both the microprocessor and the cooling system, usually a fan, to reduce the waste heat produced by the working of the computer components.

booster: *amplificatore*
extent: *misura, entità*
fan: *ventola*
to flip: *ruotare, scattare*
hearing aid: *apparecchio acustico*
to host: *ospitare*
insulator: *isolante*
socket: *presa*

3 Answer the questions.

1. Define conductors, insulators and semiconductors.
2. How are transistors produced?
3. What does an amplifier do?
4. What does a switch do?
5. What is flip-flop technology?
6. What is a microprocessor?
7. What is a socket? What is its function?
8. What is a motherboard?

4 Read the text and complete it with the words given below.

century • circuit • electronics • energy • plastic • transistor • tube • video

1947: Invention of the Transistor

The first **1.** ..... was invented at Bell Laboratories on December 16th, 1947. This was perhaps the most important electronics event of the 20th **2.** ....., as it later made possible the integrated **3.** ..... and microprocessor, which make up the basis of modern **4.** ..... Prior to the transistor, the only alternative to current regulation and switching functions was the vacuum **5.** ....., which could only be miniaturised to a certain extent, and wasted a lot of **6.** ..... in the form of heat. Although **7.** ..... recording on tape was possible with vacuum tube equipment, as in the case of the Ampex VRX-1000, the quality was poor. So, the invention of the transistor was a real improvement in the field. The first transistor was built by Walter Brattain and consisted of a **8.** ..... triangle lightly suspended above a germanium crystal put on a metal plate which was attached to a voltage source.

Adapted from: *http://www.cedmagic.com/history/transistor-19479*

5 (2.2) Listen to the extract and complete the table.

Generations of microprocessors

Generation	Time period	Company	Type	Characteristics
1st generation				
2nd generation				
3rd generation				
4th generation				
5th generation				
6th generation				
7th generation				
8th generation				
9th generation				
10th generation				//
11th generation				//
12th generation				//

FLIP-FLOPS AND LOGIC GATES

A flip-flop turns a transistor into a simple memory device that stores a zero when it is off, or a one when it is on. Flip-flops are the basic technology behind computer memory chips. With billions of transistors, a chip can store billions of zeros and ones. Transistor switches are put together to form logic gates which let computers make very simple decisions using Boolean algebra. Operators such as AND, OR and NOR are used to produce logical series of instructions that are the foundations of computer programming.

TRANSMISSION MEDIA

A single OF cable can carry trillions of data bits per second.

Does digital TV need a different type of antenna or can it use the same as an old TV?

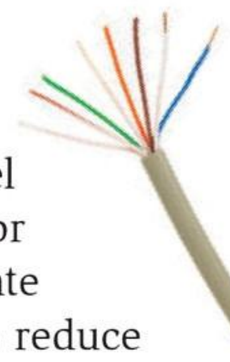
Microwaves are electromagnetic waves with frequencies between 300MHz (0.3GHz) and 300GHz in the electromagnetic spectrum. Radio waves are electromagnetic waves within the frequencies 39KHz-300GHz and include microwaves.

Transmission media refer to the physical means by which information is transmitted. Computers need cables or wires to be connected to a voltage source, to their peripherals or to a network, although the connections can also be wireless.

■ Transmission through wires

Information can be transmitted through wires.

- **Untwisted pairs** are insulated wires moulded into a straight, flat, parallel cable which can be used for short distance or low bit rate communication in order to reduce electromagnetic interference.



- **Twisted pairs** are insulated wires twisted around each other. This system offers better electrical performance and higher bit rates than untwisted pairs. They are used in telephone and computer networks.

- **Coaxial cables** are two-wire conductors with a larger bandwidth than a twisted pair cable (1GHz instead of 1 MHz). They are used in television, radio and Ethernet connections, where each coaxial cable supports about 60 speech channels. Today, a **triax**, or three-conductor video cable, is often used to meet more advanced video needs.

- **Fibre optics**, or **optical fibre (OF)** offers the possibility to operate at high speeds and high bandwidth (75THz), with high data capacity and a minimum signal loss. It is a cable made of long, thin strands of pure glass as thin as a human hair that carry digital information over long distances. The medium of transmission is high frequency light waves which travel at 300,000 kilometres per second.

■ Wireless transmission

Data can also be transmitted without the use of cables (or 'wires').

- The **infrared** system sends data as light rays. It is the system by which a TV communicates with its remote control and some peripherals with the computer.
- **Antennae**, or aerials, can work either as receivers or transmitters. As receivers, they capture radio frequency signals and convert them into electrical ones, while as transmitters they convert electrical signals into radio frequency ones. They are used in radio and television broadcasting, radar, cell phones and satellite communication.
- **Satellites** are basically any objects that revolve around a planet in a circular or elliptical path and that allow radio, television, and telephone transmission to be sent anywhere in the world. They send radio frequency signals to the antennae on the Earth which capture the signals and process the information.
- **Microwaves** are a type of electromagnetic radiation to establish point-to-point communication with distant locations. This system is used for mobile and cordless phones, Bluetooth, Wi-Fi computer connections and microwave ovens, but also in satellite and space communication and for radars. The only problem is that microwaves can only be used in the line of sight.

atop: *in cima*
to be moulded: *essere sagomato*
buffer coating: *strato/rivestimento cuscinetto*
cladding: *rivestimento*
straight: *diritto*
strand: *filo*
twisted: *attorcigliato*
unreliable: *inaffidabile*
wave: *ondata*

6 Answer the questions.

1. What are untwisted pairs? What advantage do they offer?
2. What are twisted pairs? Why are they better than untwisted pairs? What are their main uses?
3. What is a coaxial cable? What are its main uses?
4. What is a triax?
5. What is fibre optics? What are its advantages? What is its medium of transmission?
6. How does infrared communication work? What are its main uses?
7. How does an antenna work?
8. What is a satellite? What does it do?
9. What are microwaves? What are their main uses? What is the main problem with them?

7 Watch the video and find out about the advantages of fibre optics as compared to copper cables.

▸ The advantages of fibre optics - video 4
posted by Anderson Fibre Optic Products

1. .....: you can carry more information at faster speeds and over longer distances
2. Communication quality: .....
3. Size: .....
4. Security: .....
5. .....: fibre optic cables are not intrusively manufactured, they are made from glass
6. Costs: .....

WARNING IGNORED

An early radar installation was built atop Kahuku in Hawaii. The station detected the first wave of Japanese aircraft on their way to Pearl Harbour. However, because the system had been in operation for only two weeks, it was considered unreliable, and the warning was ignored.

8 Complete the paragraphs below with the missing words.

bend • circular • elliptical • lines • move • remain • satellites • transmission

Satellites

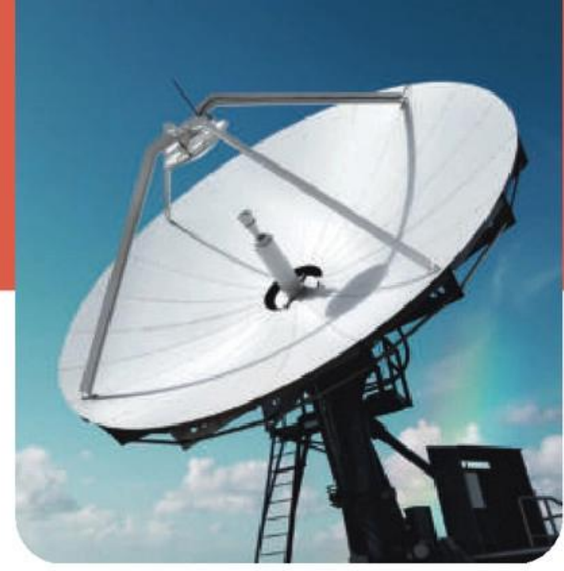
A satellite rotates around the Earth in a **1.** ..... or **2.** ..... path. Before the use of satellites, the **3.** ..... of signals was rather difficult. Signals, in fact, travel in straight **4.** ..... and cannot **5.** ..... around the Earth. Nowadays there are hundreds of active **6.** ..... orbiting the Earth. As geo-stationary satellites **7.** ..... at the same speed as the Earth, they **8.** ..... in a fixed position.

cables • coating • index • material • signal • three

Fibre optics

A single optic fibre is made up of **9.** ..... parts. The core is the central part of the fibre where the **10.** ..... travels. It has a higher reflective index than the cladding, which is a layer of optical **11.** ..... surrounding the core with a lower reflective **12.** ..... The cladding does not absorb any light from the core but reflects it back into the core itself. The buffer coating is a plastic **13.** ..... that protects the fibre from any damage. Optical fibres are arranged in **14.** ..... which are protected by an outer covering called a jacket.

GRAMMAR



QUANTIFIERS

Quantifiers are grammatical words used to talk about non precise quantities. Here are the most common.

Large quantities

Quantifier	Sentence	Nouns	Example
A lot of / Lots of	+	Plural countables / Uncountables	➤ *An integrated circuit contains **a lot of** interconnected electronic devices.*
Much	–, ?, (+ formal)	Uncountables	➤ *You didn't pay **much** attention to my lecture on microprocessors.*
Many	–, ?, (+ formal)	Plural countables	➤ ***Many** people think that fibre optics is the quickest transmission system.*

Reduced quantities

Quantifier	Sentence	Nouns	Example
A few	positive meaning	Plural countables	➤ *They need **a few** more cables to complete the network.*
Few	negative meaning	Plural countables	➤ ***Few** people know how to set up an antenna properly.*
A little	positive meaning	Uncountables	➤ *Let me help you… I have **a little** experience with processors.*
Little	negative meaning	Uncountables	➤ *Paul has **little** or no experience with transistors.*

Indefinite quantities

Quantifier	Sentence	Nouns	Example
Some	+, ? (offers)	Plural countables / Uncountables	➤ *Would you like **some** help?*
Any	–, ? (doubt), + (whatever)	Plural countables / Uncountables	➤ *In wireless systems there aren't **any** cables.* ➤ *You can use **any** cable to charge this device.*

9 **Fill in the blanks with an appropriate quantifier. Sometimes more than one answer is possible.**

1. Can you give me ..... wafers?
2. ..... ingots are produced every day due to high demand.
3. A satellite is ..... object that revolves around the Earth.
4. ..... people in the factory need to wear special clothing.
5. I have very ..... experience with transmission media. They are a mystery to me.
6. I don't know ..... about it, but I know fibre optics is fantastic.
7. In ..... cases, a special socket hosts the microprocessor.
8. There were only ..... workers in the fab. It was 15th August.
9. ..... signals are high frequency, while others are low frequency.
10. Unfortunately, ... materials are semiconductors.
11. There isn't ..... silicon left.
12. ..... TV sets stills have a traditional antenna.
13. ..... cables are twisted, while others are untwisted.
14. Only ..... circuits are monolithic.

CITIZENSHIP

SAFETY AND QUALITY CONTROL IN CHIP FARMS

Types of hazards

Due to the nature of their roles, workers face numerous hazards on a daily basis. It is important for every employer to identify and mitigate all the risks that their workers may face.

10 **Match each of the following examples of hazards with the correct type.**

1. Handling contaminated substances
2. Handling dangerous liquids, solvents or inflammable gases
3. Lifting or sitting for long periods
4. Poor posture
5. Radiation
6. Slips and falls
7. Sun and ultraviolet rays
8. Working with infected people, animals or plants

Type of hazard	Definition	Examples
Safety hazards	They can affect any employee, but these are more likely to affect people who work with machinery.	1,
Biological hazards	They are extremely dangerous and include exposure to substances or professional diseases.	
Physical hazards	They affect people who work in extreme weather conditions or harmful environments.	
Ergonomic hazards	They affect individuals whose work puts a strain on their body.	
Chemical hazards	They may affect people who are exposed to dangerous chemical substances.	

Quality in chip farms

In order to guarantee the quality of the chips, which need to be protected from any contamination, workers have to wear special clothes which are called bunny suits.

11 **Watch the video and answer the questions.**

▸ The evolution of the Intel Bunny Suit *posted by* Newsplex Now

1. Why do Intel lab workers wear bunny suits?
2. What are fabs?
3. What was used before bunny suits?
4. In which American state were Fab 1 and Fab 3 both located?
5. What was the novelty in Santa Clara's D2 fab in 1989?
6. What hardware commercial showed bunny suits in the '90s?
7. What happened on 1st April 2011?
8. Where can you find Intel chips nowadays? Quote 3 examples.

12 GROUP WORK **Discuss the questions.**

1. What types of hazards are typical of a chip farm or a computer hardware factory?
2. Do you think that bunny suits protect both the chips and the workers?
3. Do you think that bunny suits could also protect workers who have to deal with dangerous substances?
4. How important is it to protect oneself in the workplace?
5. Do you know of any specific accident that happened in a factory?

2.2 THE STRUCTURE OF COMPUTERS

HARDWARE AND SOFTWARE

Do you know other words with the suffix *-ware*? What does it mean?

This architecture is a theoretical design for a general-purpose stored program computer that serves as the basis for almost all modern computers. It was created in 1945 by John von Neumann, who based his work on the studies of Alan Turing.

Give examples of application software.

ONLINE RESOURCES

- The motherboard

to carry out: *svolgere*
motherboard: *scheda madre*
payroll: *buste paghe*
to run: *gestire*
spreadsheet: *foglio di calcolo*

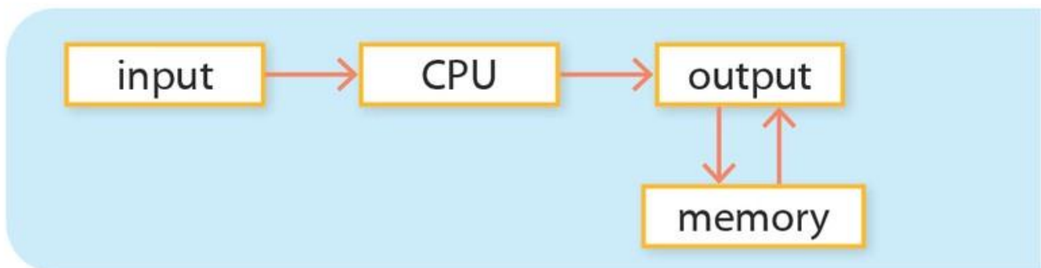
Computer systems consist of both hardware and software•. **Hardware** refers to the physical components that make up a computer, while **software** is the programs, instructions and data that make it possible for a computer to operate and carry out a task.

What is the relationship between hardware and software? Hardware is useless without software and vice versa. They need each other. Software makes hardware useable by giving it the instructions that it needs in order to operate.

Hardware

Hardware consists of both external and internal parts. The external parts, also called **peripherals**, perform the basic functions of **input**, i.e. providing data to the computer, and **output**, i.e. producing outcome after the processing of the input. External hardware also includes storage devices such as external hard disks or memory sticks. Internal hardware, also called **components**, on the other hand, refers to parts built into or inside the computer case and which are: the central processing unit (CPU), the memory chips, the motherboard, the video and sound cards, and the internal hard disk drive.

Hardware is responsible for performing four basic functions: **input**, **processing**, **output** and **storage**. The basic relationship of these different hardware components in a simple computer system, also called **Von Neumann architecture**•, can be represented in this way:



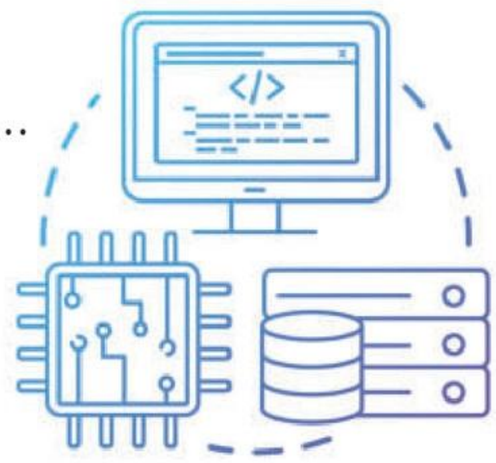
Software

Software can be classified depending on its function.

- **System software** is used to run and maintain the computer and it includes:
  - the operating system (e.g. Windows);
  - drivers (e.g. printer drivers to connect a printer to the computer);
  - utility software (e.g. a file manager to save or delete files);
- **Application software**••, or an application program, is used to carry out tasks on a computer. Some software, such as word processors, spreadsheets and desktop publishers, is called **general purpose software** because it can be used to carry out different tasks with the same application; other software is called **special purpose software** because it is used to perform only one specific task as in the case of a flight simulator or payroll software.

1 Choose the best option.

1. Hardware refers to…
   a. all the physical parts inside a computer.
   b. all the physical parts except internal memory.
   c. all the internal and external physical parts.
   d. all the internal parts and external hard disks.
2. Software is…
   a. computer programs.
   b. computer instructions.
   c. computer programs and instructions.
   d. programs, instructions and data.
3. The main functions of hardware are…
   a. input, output and processing.
   b. input, output and storage.
   c. input, output, processing and storage.
   d. input, processing and storage.
4. System software includes…
   a. the operating system, drivers and apps.
   b. the operating system, utilities and word processing.
   c. the operating system, drivers and utilities.
   d. the operating system, utilities and applications.
5. … is a type of application software.
   a. Data-modelling
   b. A web browser
   c. Desk publishing
   d. Video-handling
6. Special purpose software is used for…
   a. very complicated tasks.
   b. multi-tasking.
   c. a specific task.
   d. a set of specific tasks.



2 (2.3) Listen to seven different definitions of hardware and decide which ones corresponds to the statements below.

1. Hardware is the machines and wiring of a computer. ☐
2. Hardware is what you can physically touch. ☐
3. Hardware is the physical aspect of computers and other devices. ☐
4. Hardware is the components and peripherals of a computer. ☐
5. Hardware is abbreviated as HW. ☐
6. Hardware is the physical equipment for the performance of data. ☐
7. Hardware is the mechanical, magnetic, electronic and electrical devices of a computer. ☐

JOHN VON NEUMANN

John von Neumann (1903-1957) was a Hungarian-American mathematician and computer scientist who first designed a computer architecture where program data and instruction data are stored in the same memory.
His computer architecture won against a similar model, the Harvard architecture, where there were separate storage and separate buses for instruction and data, because it was simpler to implement in real hardware.

3 Decide if this software refers to programs (P), instructions (I) or data (D).

	P	I	D
1. My HTML program for a website	☐	☐	☐
2. An operating system	☐	☐	☐
3. A printer driver	☐	☐	☐
4. A scanner driver	☐	☐	☐
5. A word processor	☐	☐	☐
6. A web browser	☐	☐	☐
7. A social network	☐	☐	☐
8. My Java script for an online game	☐	☐	☐
9. My PDF files	☐	☐	☐
10. A spreadsheet	☐	☐	☐
11. An SQL query	☐	☐	☐
12. My school notes	☐	☐	☐
13. My word documents	☐	☐	☐
14. Video editing	☐	☐	☐
15. Presentation software	☐	☐	☐
16. My school presentations	☐	☐	☐

4 Read the list from the previous activity and decide if the programs refer to system or application software.

THE CPU AND THE MACHINE CYCLE

The arithmetic operations include addition, subtraction, multiplication, and division of numbers. Logic operations are used to compare numbers and include "less than", "equal to", and "greater than" and other logic operators such as AND, OR, XOR, NOT, and SHIFT.

Clock speed is measured in cycles per second or hertz. This means that a CPU with a clock speed of 2 gigahertz (GHz) can carry out two billion cycles per second.

A *dual core* processor can fetch and execute two instructions in the same time needed by a single core processor, a *quad core* has four cores. As of 2022, a PC can have up to 12 cores.

■ The CPU

The **Central Processing Unit**, or **CPU**, is the heart and brain of the computer. It is a set of electronic circuits that interprets and executes instructions from stored programs. It is designed to be general-purpose, i.e. it can run any sort of program.

The architecture of the CPU consists of three parts:

- the **Control Unit (CU)**, which controls the flow of data across the whole system by coordinating and organising all the operations of the computer. It is responsible for fetching the instructions that are stored in the primary storage, interpreting them, and then issuing commands to all the hardware units that are necessary to carry out the instructions;
- the **Arithmetic Logic Unit (ALU)**, which performs all the arithmetic and logic operations•;
- the **Immediate Access Store (IAS)**, also called **registers**, which is where the CPU holds all the data and programs that are being used.

■ The machine cycle

A **machine cycle** identifies the four steps performed by the CPU for each instruction received. This cycle includes reading and interpreting the instruction, executing the code and then storing the code. The four steps are the following:

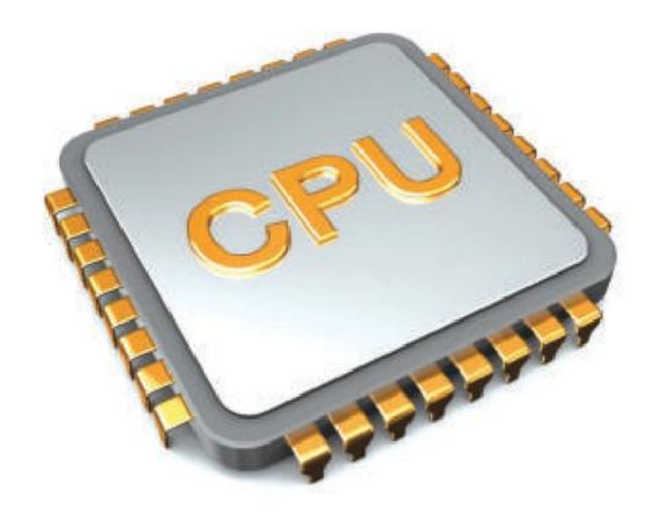
1. **fetch**, i.e. the CU fetches the instruction from the main memory (hard drive) and stores it in its temporary memory (IAS);
2. **decode**, i.e. the retrieved instruction is made ready for execution;
3. **execute**, i.e. the ALU carries out the instruction;
4. store, i.e. the results are sent to and written down in memory.

Steps 1 and 2 are called **I-time (instruction time)** and steps 3 and 4 are called **E-time (execution time).**

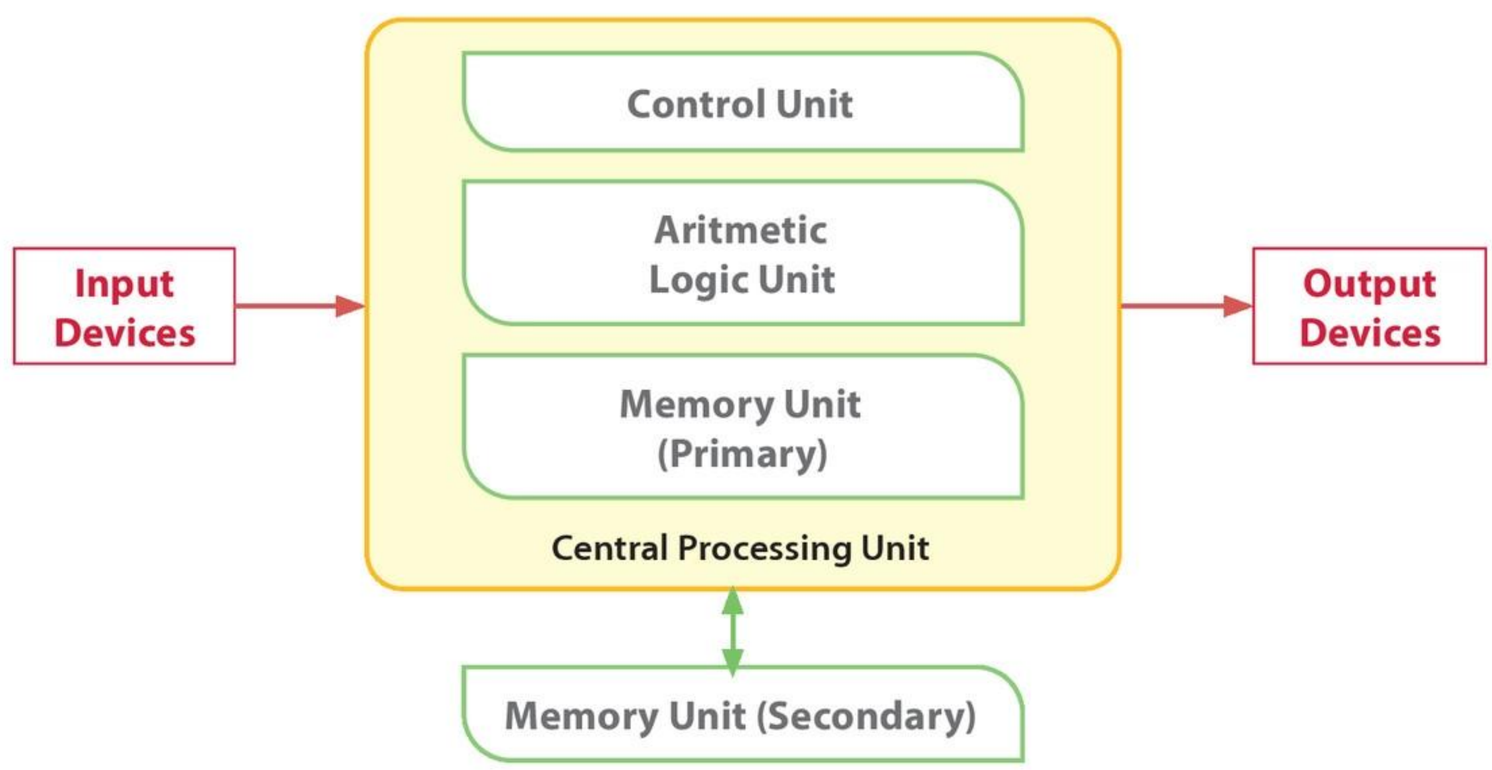
■ Speed of the CPU

The speed of the CPU depends on three factors:

- **clock speed**••, that is the speed at which the CPU carries out a machine cycle;
- **cores**, that is the number of instructions that can be processed at one time (1 core = 1 instruction); a CPU was traditionally made up of a processor with a single core, but modern computers have two or more cores•••.
- **cache**, that is a tiny block of memory built onto the processor for the most commonly used instructions. The bigger the cache, the more quickly the instructions and data can be retrieved into the processor and used.



bootstrap: *programma di avvio del sistema operativo*
to fetch: *andare a prendere*
to hold: *tenere, trattenere*
to load: *caricare*
to retrieve: *recuperare*
to store: *immagazzinare, memorizzare*

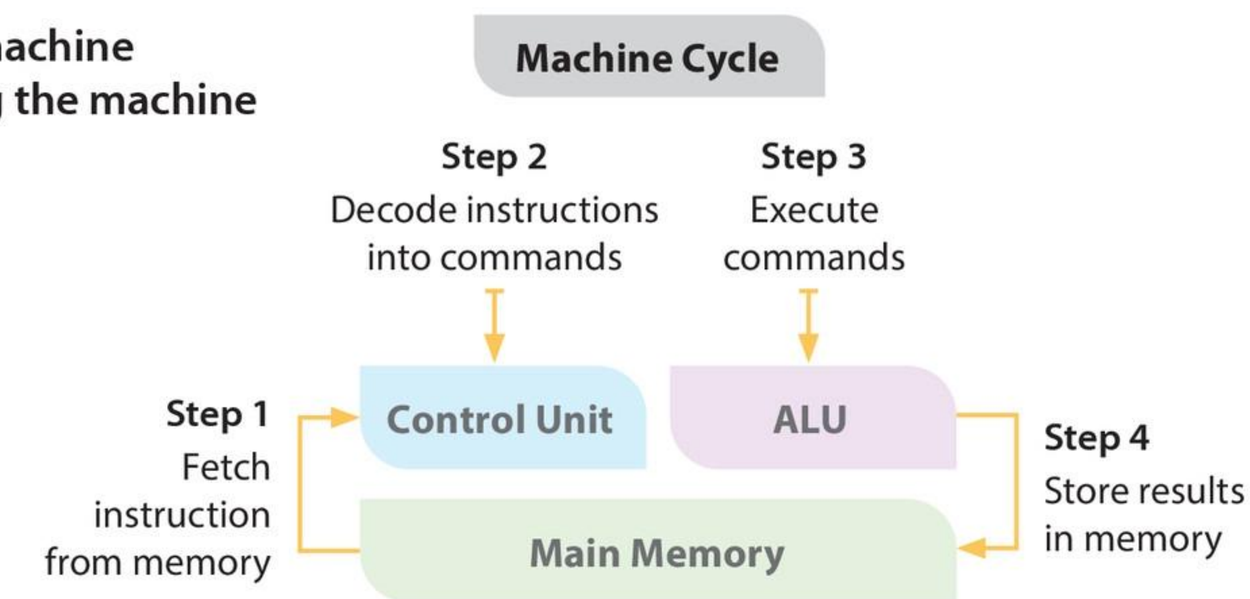


5 Complete the table.

Sub-system/unit		Function(s)
Input device		• Converts data into electronic pulses • Passes the instructions into the memory
Memory unit (hard drive)		• Stores data and programs
CPU	Control unit	
	Arithmetic and logic unit	
	Immediate access store	
Output device		• Converts electronic pulses back into information • Presents information to the user

6 **Look at the chart and describe the machine cycle orally. Then write a short text describing the machine cycle using the sentences below to help you.**

The machine cycle is made up of... steps.
In the first/second/last step...
The first/second step is called...



7 **Read the text and decide if the statements are true or false.**

How Does a CPU Start Working?
The operating system is not immediately available when the computer is switched on, in fact it is dependent on another program to be initialised. A bootstrap or boot loader is a small program with limited functionality, but which can load enough other software for the operating system to start. It searches storage devices for a special section, the boot sector, to load the first small program from there. The bootstrapping process starts when the CPU executes the BIOS (Basic Input Output System) contained in the ROM (Read Only Memory) at a predefined address. The BIOS is special software whose main function is that of starting the operating system. Once the operating system has been loaded, the CPU receives the instructions on how to read the hard disk and can start working. The system initialises and the BIOS performs a power-on self-test (POST) for all the different hardware components in the system to make sure that everything is working properly.

	T	F
1. The complete operating system is always available in memory.	☐	☐
2. A boot loader is a small but complete operating system.	☐	☐
3. A CPU always looks for the same address when starting.	☐	☐
4. The boot loader executes the BIOS.	☐	☐
5. The boot loader executes a POST.	☐	☐
6. The POST is a test to check the functionality of hardware components.	☐	☐

COMPUTER MEMORY

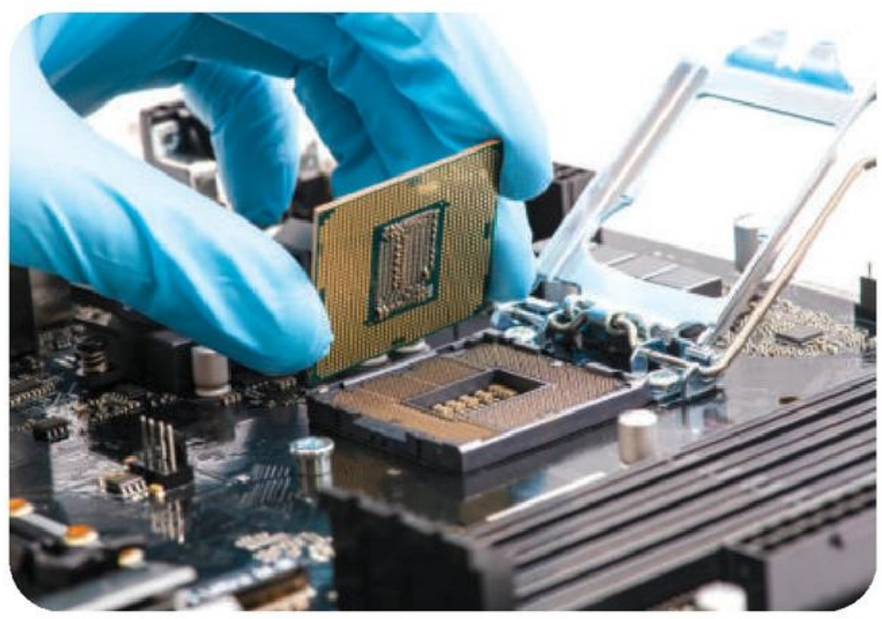
What is a backup?

Locality is a phenomenon in which a computer program tends to access the same set of memory locations for a particular time period.

What unit of measurement is used for latency? How can you test latency?

Capacity is the amount of memory that can be used by a computer (working memory), while capability is the amount of data that a device can store (backing store). They are both measured in bytes.

Computer memory is any physical device capable of storing data and applications on a temporary or permanent basis. It enables users to retain information that is stored on the computer. There are various types of memory that can be installed depending on the actual needs for functioning and specifications of the system.



Types of memory

There are different types of memory that are assigned the task of storing several kinds of data. Each type has certain features and capacities.

Volatile memory is a memory that loses its contents when the device loses power. **Non-volatile memory** is a memory that keeps its contents even if the power is lost.

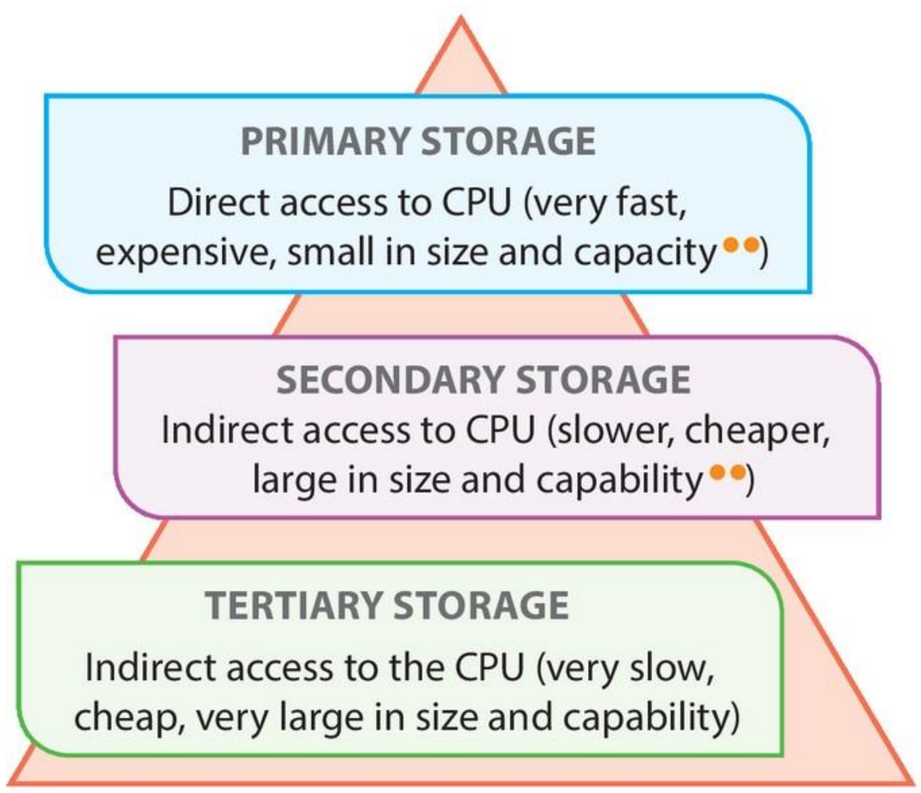
Data can be stored in chips inside the main processor or on other media called backing stores•.

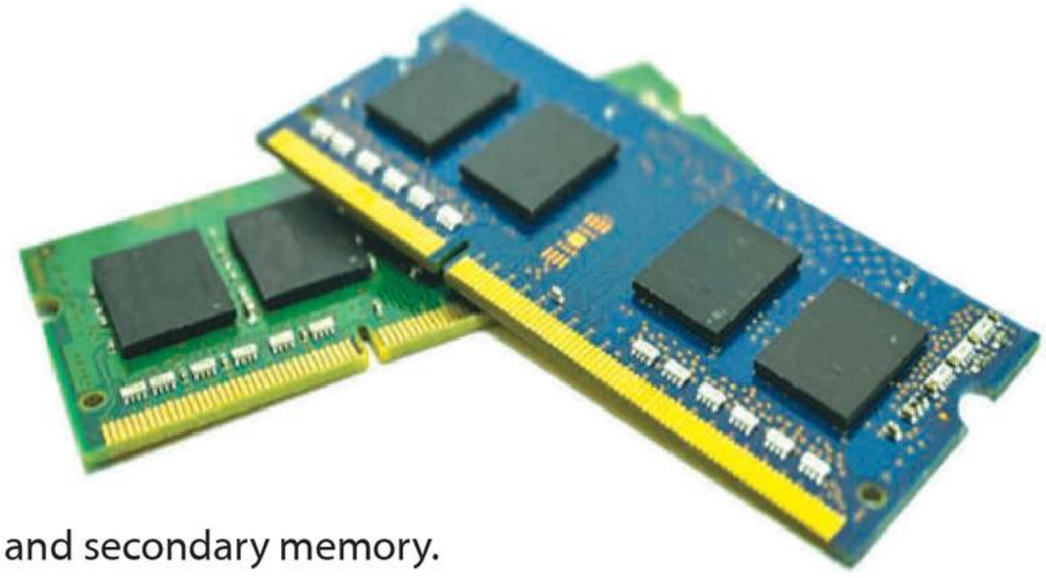
The different types of memory are classified according to a **memory hierarchy** that reflects the hierarchical arrangement of storage in current computer architecture and that is designed to take advantage of memory locality• in computer programs. Each level of the hierarchy is of higher speed and lower latency••, i.e. the time needed to get a response from the computer, and is of a smaller size than the lower levels.

auxiliary: *ausiliario*
backing store: *memoria secondaria*
content: *contenuto*
failure: *guasto*
hierarchy: *gerarchia*
latency: *latenza*
ratio: *proporzione, rapporto*
to retain: *trattenere, conservare*

Memory hierarchy

- **Primary storage** (or main storage, main memory, primary memory, or internal memory) is the area of the computer in which data and applications are temporarily stored for a short period of time while the computer is running. It includes, in hierarchical order: CPU registers, cache, RAM and ROM.
- **Secondary storage** (or backing store, auxiliary or external store) is non-volatile storage which is not under the direct control of the CPU and which does not directly interact with applications. It is often used to back up primary storage through replication or other data protection methods. The most common types of secondary storage are the hard disk drive and other types of external storage devices to save data permanently, such as magnetic and optical devices and solid-state memory.
- **Tertiary storage** refers to removable media units (e.g. magnetic tapes or optical discs) which are mounted or dismounted by a robotic mechanism from a fixed storage drive. It is used in scientific computing on large computer systems and business computer networks.





8 Answer the questions.

1. What is computer memory? What can memory store?
2. What is the difference between volatile and non-volatile memory?
3. How is memory capacity measured? And capability?
4. What does memory hierarchy represent? Describe primary and secondary memory.

9 Match the words that are used to evaluate memory with their definitions.

availability • capacity • cost • latency • reliability • speed • portability • volatility

1. ....., the amount of data that can be stored per unit.
2. ....., the time it takes to access data.
3. ....., which refers to the duration of time from initialisation to the first/next failure event.
4. ....., the proportion of time that a device is up and running.
5. ....., if the device retains data when the computer is off.
6. ....., when memory can be transferred from one device to another.
7. ....., the time necessary to provide data after the CPU makes a request.
8. ....., typically expressed as a ratio of dollars per byte.

10 Complete the table with the relevant information then practise making comparisons between the different types of memory.

	Primary memory	Secondary memory	Tertiary memory
Speed	*Very fast*		
Size			
Capacity			*Very large*
Cost			

11 Read the text and decide if these statements are true or false.

Internal and External Memory

In order to make a computer work very fast, instructions and data should be immediately accessible to the CPU. For this reason, computers use internal memories with large capacities located directly in the CPU (registers) or on the motherboard like the RAM. However, external memory is still needed for storage. In fact, internal memory is volatile and its content is lost when the computer is switched off.

Sometimes files need transferring from one computer to another and this can be done by using external storage devices, since transfer would not be possible if the data was stored inside the computer. Moreover, without external memory we would always have to work on the same computer and never switch it off. Fortunately, we can save data on the hard disk which, although it is not part of the motherboard, is often located inside the computer case.

	T	F
1. The CPU transfers instructions and data to and from the internal memory.	☐	☐
2. External memory is non-volatile.	☐	☐
3. Internal memory is portable.	☐	☐
4. A hard disk is a primary memory device.	☐	☐
5. A hard disk saves data when the computer is off.	☐	☐
6. A hard disk is part of the motherboard.	☐	☐

PRIMARY STORAGE

A system bus is a single computer communication channel that connects the major components of a computer system.

A variation of ROM is PROM (programmable ROM). A PROM is a ROM that can be modified, but only once.

There are two levels of cache: level 1 (L1) and level 2 (L2). L1 cache is built into the processor, while L2 cache is on another chip, between the processor and the RAM. L1 is smaller and faster, while L2 is bigger but with a higher latency.

Primary storage includes the registers, RAM, ROM and cache memories.

Processor registers

A **processor register** is a small amount of storage available as part of a digital processor such as in the case of the CPU. A register may hold an instruction, a storage address, or any other kind of data, and some instructions may even specify registers as part of the same instruction (for example, an instruction may specify that the contents of two defined registers be added together and then placed in another specified register). A CPU contains multiple registers and they provide the fastest way to access data.

RAM

Random Access Memory (RAM) is a temporary kind of memory, attached to the motherboard and the system bus•, which stores data as temporary electrical signals. If the electrical power is switched off, all the data stored in RAM is lost. The amount of RAM in a computer will influence its processing power, speed and the number of programs it can run at the same time. Instructions and data are transferred to RAM from an input device and the processor, according to instructions, manipulates the data held in it.

Each program is stored in a specific RAM location called the **address**. The address enables the location, access and processing of instructions and data. As RAM is a working memory, once the program is no longer in use, the storage space is assigned to another program waiting for execution.

ROM

Read Only Memory (ROM)•• is a permanent type of memory chip which contains the BIOS and important programs like the firmware, or logic, of some devices like the motherboard. Data and programs essential for the computer to start working are put onto the ROM by the manufacturer of the computer system and no new data or programs can be written or loaded onto the ROM by the user. ROM contains the instructions that enable the operating system to be loaded. The amount of ROM in most computers is small if compared to the amount of RAM.

Cache

The **cache memory**••• is a sort of high-speed RAM which holds data and programs previously read by the CPU from the RAM and kept temporarily in order to reduce delays while fetching and executing instructions. In other words, the CPU anticipates the data and programs of immediate need and puts them in the cache for faster access because of physical proximity.

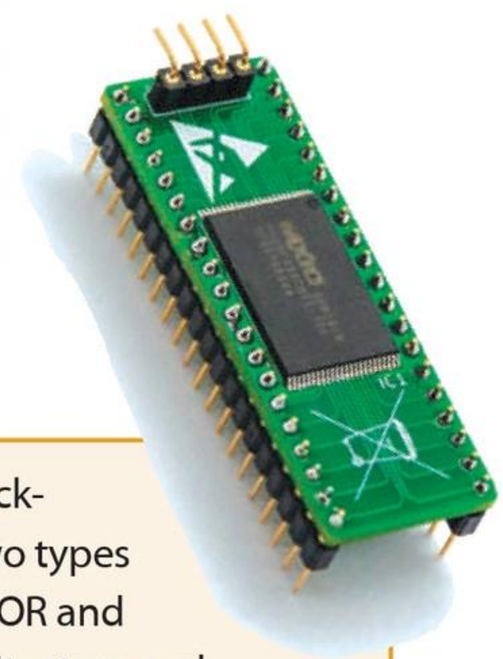
delay: *ritardo*
to enable: *consentire*
firmware: *componente logico permanente*

12 Complete the table.

	Registers	RAM	ROM	Cache
Definition/type				
Location				
Function(s)				

13 Do these definitions refer to RAM or ROM?

	RAM	ROM
1. It can be both read and written onto.	☐	☐
2. It can only be read.	☐	☐
3. It is an internal chip where data is stored temporarily while a program is running.	☐	☐
4. It is volatile.	☐	☐
5. It keeps data when the computer is switched off.	☐	☐
6. It stores permanent data and instructions.	☐	☐
7. It stores software, like the BIOS, which allows the computer to start.	☐	☐



14 Read the text and choose the correct option.

Flash Memory (Flash ROM)

Flash memory is a type of non-volatile memory that erases data and can be reprogrammed in blocks rather than one byte at a time. Dr Fujio Masuoka was credited with the invention of flash memory when he worked for Toshiba in the 1980s. One of his colleagues coined the term *flash* because the process of erasing all the data from the semiconductor chip reminded him of the flash of a camera. Flash memory is technically a variant of EEPROM (electrically erasable programmable read-only memory), but the industry reserves the term EEPROM for byte-level erasable memory and applies the term *flash memory* to larger block-level erasable memory. There are two types of flash memory: NOR and NAND. NOR and NAND flash memories differ in architecture and design characteristics. NOR flash can connect individual memory cells in parallel enabling random access to data; NAND flash is more compact in size and achieves greater storage density. It is also better suited to serial rather than random data access.

Adapted from: *http://searchstorage.techtarget.com/definition/flash-memory*

1. Flash memory is *volatile / non-volatile*.
2. Flash memory erases *single files / data in blocks*.
3. The inventor of flash memory worked for *Toshiba / Samsung*.
4. The term flash was used because it brought to mind *the flash of a camera / a flash of lightening*.
5. Flash memory is a variant of *EEPROM / ROM*.
6. There are two types of flash memory: *AND and OR / NAND and NOR*.
7. NOR flash uses a *parallel / serial* connection.

SECONDARY STORAGE: MAGNETIC DEVICES

How often do you carry out a backup of the programs and data on your computer?

Hard disks were first introduced by IBM in 1956 and since then they have decreased in cost and physical size over the years, while dramatically increasing in capacity and speed.

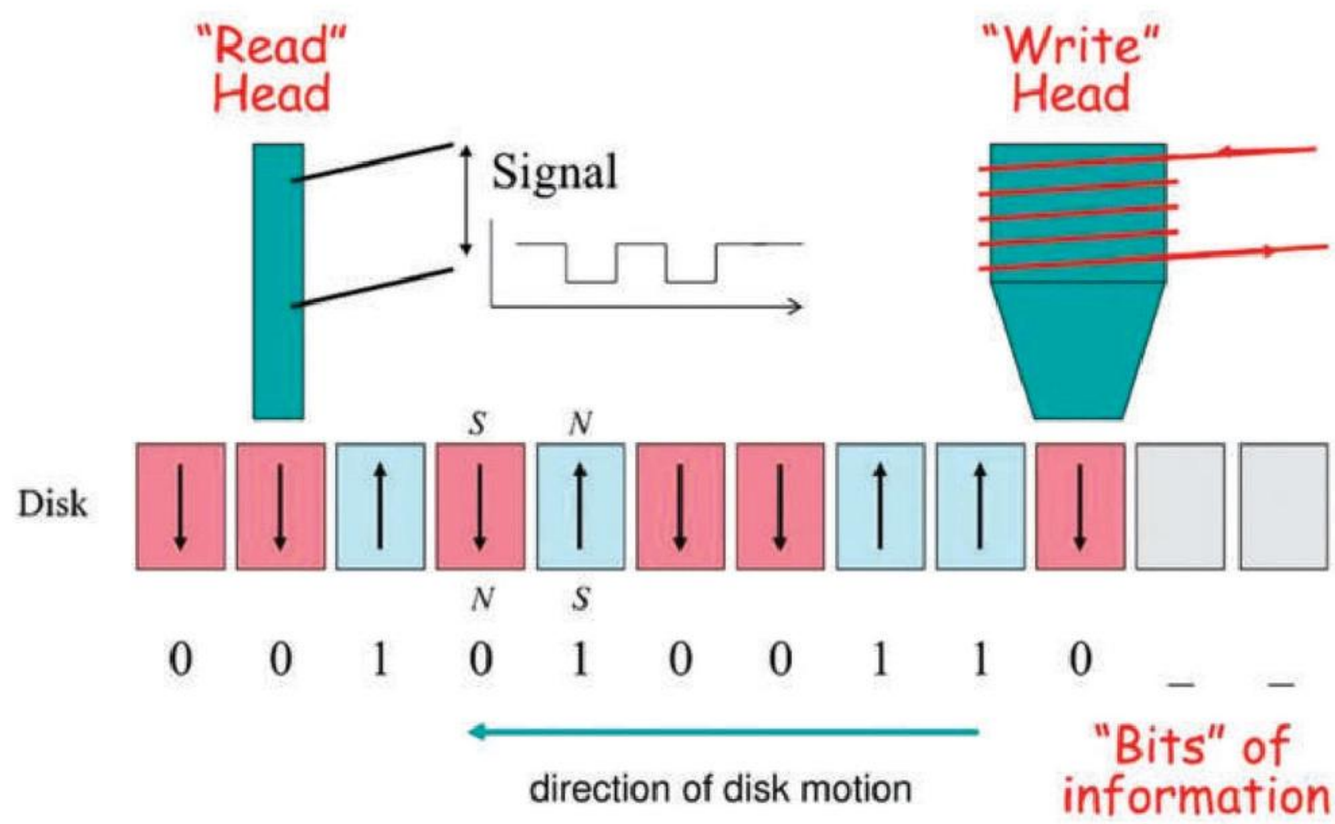
The word *disk* is commonly used for magnetic storage, while *disc* is used for optical media.

Secondary storage, or **backing store** is any data-storage that is not under the direct control of the CPU. It is used for the storage of programs and data that are not needed immediately by the computer and for storing backups• of programs and data in case the original ones are damaged or destroyed.

It can be in the form of magnetic, optical or solid-state devices.

■ Magnetic storage

Magnetic storage is one of the most widely used types of digital storage. It uses a magnetised medium with two types of polarities which represent the binary values of either zero or one.



There are different types of magnetised media, but they work in the same way. There is a disk which rotates at a high speed and small devices called heads. Each head has a tiny electromagnet which consists of an iron core wrapped in wire. The write head sends a signal to the surface and magnetises the surface of the disk; the read head reads the magnetic field on the surface of the disk and transmits the signal to the computer in magnetic digits.

Magnetic storage is non-volatile and is widely used because it is relatively cheap in comparison with other storage technologies. Moreover, it is read-write, which makes it possible to re-use the storage capacity over and over again by deleting older data. Its storage capacity is also very large, making it attractive for storing very large amounts of data. Its only limitation is that accessing the data can be slow.

■ Hard disks

The most common type of magnetic storage is the hard disk•; other types include the old floppy disks, magnetic tapes and magnetic stripes on credit cards. A **hard disk**••, or hard drive or hard disk drive (HDD), is the main internal backing store and is usually found inside the computer case, although there are also removable or external hard disks if additional storage is needed. It is used both for storing and retrieving data. It consists of one or more rigid, hence *hard*, rapidly rotating discs – called platters – coated with magnetic material, and of magnetic heads arranged to write data on the surfaces and read it from them.

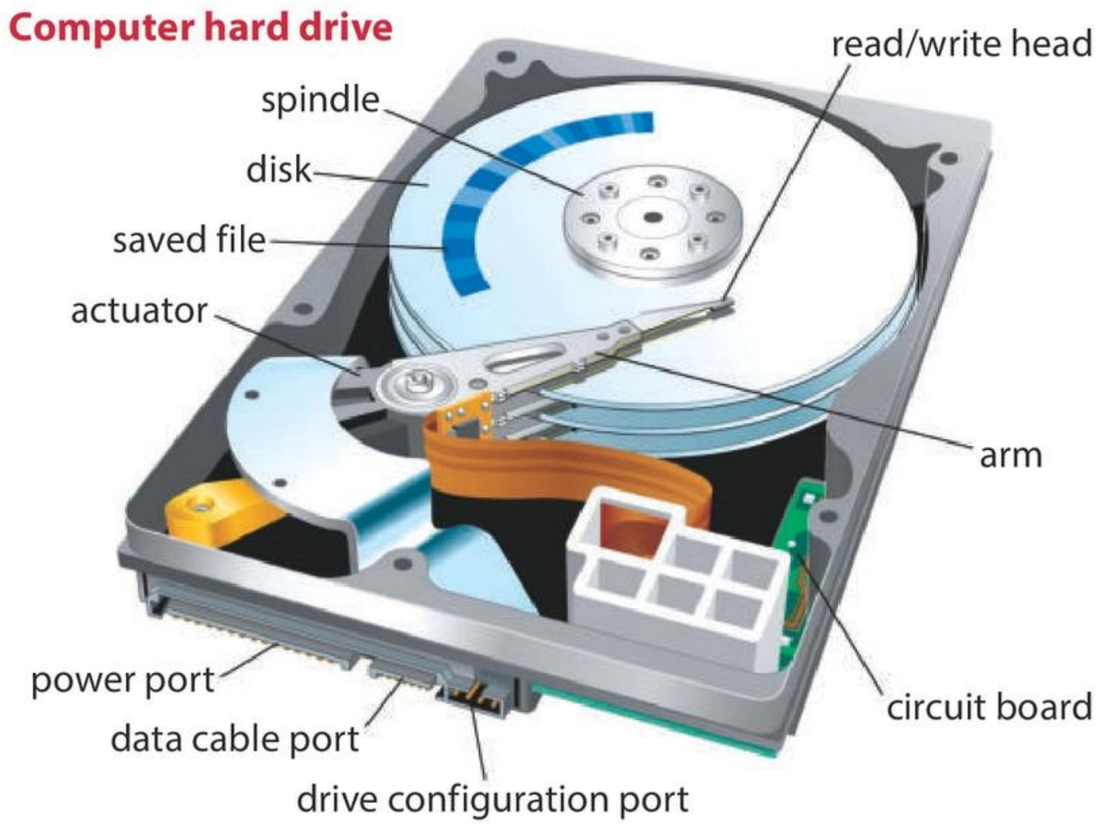
carrier: *contenitore*
coated: *rivestito*
to damage: *danneggiare*
to destroy: *distruggere*
head: *testina*
hence: *quindi*
main: *principale*
over and over again: *ripetutamente*
sealed: *sigillato*
to spin: *ruotare*
tiny: *minuscolo*

15 This text is in note form. Add all the missing words and write a full text, including a short introduction.

Step 1
Circuit board controls movement of head actuator and a small motor.

Step 2
Small motor spins platters while computer is running.

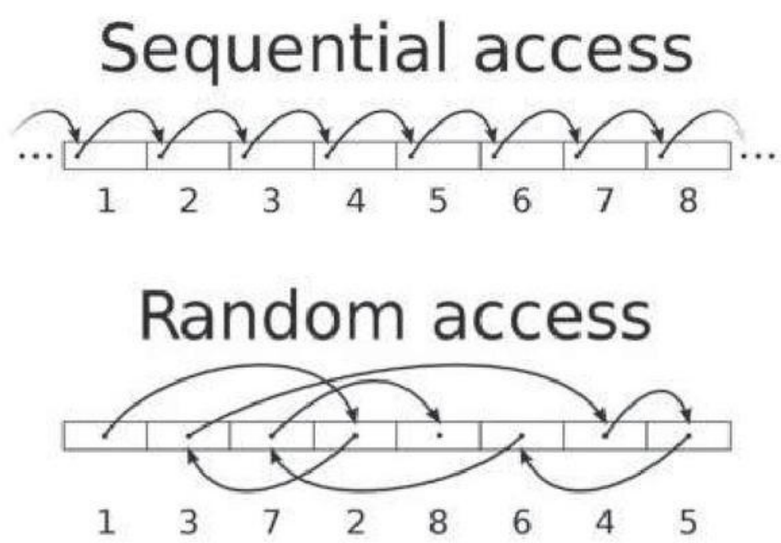
Computer hard drive



Step 3
When software requests a disk access, read/write heads determine current or new locations of data.

Step 4
Head actuator positions read/write head arms over correct location on platters to read or write data.

16 PAIR WORK **Look at the pictures and answer the questions.**



1. Which type of data access can be associated with a music or video cassette, which one with a CD or hard disk? To help you, look at the images above.
2. What happens when you want to listen to the 4th song on a cassette? And if the song is on a CD or on your hard disk?
3. Provide a definition for sequential access and random/direct access.

17 (2.4) **Listen to an extract from a radio program called "Archeocomputing" and answer the questions.**

1. Where can you still find the icon of a floppy? What action does it represent?
2. What was FloppyDisks.com?
3. What were the reasons for Tom Persky's success?
4. Why were floppy disks still in demand in the 2010s?
5. What institutions used floppy disks until June 2019?
6. What were the advantages of floppy disks?
7. If floppy disks are no longer produced, how can the demand be met?

OLD TYPES OF MAGNETIC DEVICES

Magnetic tapes use the same technology as analogue audio recordings. Information on a tape can only be accessed in sequential order, which means that you may need to fast forward through a lot of tape to get to a specific piece of data. They are still used in some backup systems because they last longer than hard disks (30 years against 5 on average).
Floppy disks were composed of a thin, flexible magnetic disk, divided into sectors like a hard disk, but which relied on an external reader to spin the disk. They were sealed in a square plastic carrier and the most common format was the double-sided, high-density 1.44 MB disk drive.

SECONDARY STORAGE: OPTICAL DISCS AND SOLID-STATE MEMORY

A CD-ROM has a capacity of 700 MB, while the capacity of a DVD varies according to the type, from 4,7 GB (DVD 5) to 17 GB (DVD 18).

Reading and writing at the same time makes it possible to watch a previously recorded TV programme while another is being recorded.

What do you need to read a Blu-ray disc?

Flash drives are faster and have more storage capacity. Memory stick and pen drive are synonyms. They can store a smaller amount of data than a flash drive, which is comparable to a CD-ROM for its capability.

Optical discs

Optical discs are a storage medium where data is read or written by lasers.

The basic types are:

- **CD-ROM (Compact Disc - Read Only Memory)**, such as audio CDs with non-modifiable permanent data already encoded onto them;
- **WORM (Write Once Read Many)** or **CD-R (Compact Disc - Recordable)**, which can be written, but only once; it behaves just like a CD-ROM;
- **EO (Erasable Optical) or CD-RW (Compact Disc - Rewritable)**, which can be erased and loaded with new data more than once;
- **DVD-R (Digital Versatile Disc** or **Digital Video Disc - Read Only)**, which is like a CD-ROM, but which holds much more data•;
- **DVD-RW (DVD - Read-Write)**, which can be written or recorded many times;
- **DVD-RAM (DVD - Random Access Memory)**, which has several discrete concentric tracks rather than a single spiral track and which, for this reason, can read and write at the same time. It can be written many times and is mainly used for home video••;
- **Blu-ray Disc**•, which needs a blue/violet laser beam at the end of the spectrum to read and write the disc rather than the red laser needed by DVDs. Since the light used has a shorter wavelength, more data can be stored and read on the disc. For this reason, Blu-ray discs have the largest capacity of all optical media.

Solid-state memory

Solid-state memory is similar to magnetic and optical media in that it stores digital data. However, instead of changing the magnetic properties on the thin film surface of a rotating disc, or of using a laser, these solid-state systems control the movement of electrons in a microchip. Therefore, they have no moving parts, consume much less power and are extremely robust. They are used primarily as removable storage devices and they are also collectively known as flash memory.

The most common types are:

- **solid-state drive (SSD)**, ie. hard disk drives;
- **memory cards** in portable devices, such as MMC (multimedia card) and SD (secure digital);
- **USB flash drives**•••, i.e. pocketable, removable storage devices in various shapes and sizes (flash drives, memory sticks or pen drives).

to behave: *comportarsi*
bump: *protuberanza*
to burn: *masterizzare*
beam: *raggio*
discrete: *distinto, separato*
encoded: *codificato*
to erase: *cancellare*
to etch: *incidere*
lack: *mancanza*
to stretch: *estendersi*
surface: *superficie*
tight: *teso*
to unwrap: *svolgere*
wavelength: *lunghezza d'onda*

18 Answer the questions.

1. How do optical discs read data?
2. What types of optical discs are mentioned in the text?
3. How many times can you write onto a WORM?
4. What do the initials DVD stand for?
5. What types of DVD can you write on?
6. What is the main advantage of a DVD-RAM?
7. What is a Blu-ray disc? Why does it have a larger capacity?
8. Why is solid-state memory different from other devices? What are its most common types?

19 Read the text below and think of a word that best fits each gap.

How to Write on a CD or DVD

When you burn a CD **1.** ..... a DVD, the disc is burnt **2.** ..... a laser beam that etches bumps, called pits, into its surface. **3.** ..... bump represents number zero, so every time **4.** ..... laser burns a bump into the disc, a zero **5.** ..... stored there. The lack of a bump, which is a flat, unburned area **6.** ..... the disc, called a land, represents number one. The disc holds **7.** ..... information in a tight, continuous spiral of about 3-5 billion pits. If you could unwrap the spiral and lay it **8.** ..... a straight line, it would stretch for about 6 kilometres.

20 IELTS Watch the video and choose the most appropriate title.

▸ PC USB Ports Explained *posted by* PCMag

1. How to Use USB Ports
2. Different Types of USB Ports
3. The Speeds of USB Ports

21 IELTS Watch the video again and answer the questions or complete the sentences.

1. Is a USB port really universal?
2. USB ports may differ in size and speed; some can charge when the PC is .....; and some even double as ..... ports.
3. Which USB type has curved sides?
4. Which type is mainly used for connecting peripherals?
5. Which type is the blue one?
6. Type 3.0 is better for ....., while 2.0 can be used for .....
7. A Thunderbolt port is ..... times faster than type .....
8. What does a battery icon indicate?
9. How does the speaker read 2.0? He says *two point zero / two point 0 / two point nought*.
10. What is the plural of mouse used by the speaker, *mouses* or *mice*?

GRAMMAR

ARTICLES

Indefinite article – A/AN

• When someone/something is one of many.	➤ *I've never seen **a** hard disk.*
• When you mention someone/something for the first time.	➤ *There's **a** cache memory built onto the processor.*
• For professions.	➤ *What's your job? I'm **a** computer programmer.*
• Before certain expressions of quantity.	➤ ***A** few students in my class can assemble a pc.*

Definite article – THE

• For specific people, places, things.	➤ ***The** cpu is **the** heart and brain of a computer.*
• When we talk about someone/something that has already been mentioned.	➤ *There's a cache memory built onto the processor. **The** cache stores commonly-used instructions.*
• When there is only one of something.	➤ ***The** world wide web (www) was invented by Tim Berners Lee in 1989.*
• Before superlatives.	➤ *A **Thunderbolt** is **the** fastest USB port.*

Zero article

• To talk about people and things in general.	➤ *DVDs are mainly used to store films.*
• With abstract and uncountable nouns.	➤ *Backing storage is the medium used to save computer data.*
• With *home, school, work, university, bed, hospital, church, prison* when used as institutions.	➤ *Children can study computing at school.*

22 **Complete the text with the missing articles. For zero articles, write /.**

Solid-state Drive

1. ..... solid-state drive (SSD) is **2.** ..... data storage device, typically used in **3.** ..... computer. It uses **4.** ..... flash memory to store **5.** ..... data even after power is turned off. SSDs are designed to access data in **6.** ..... same way as **7.** ..... traditional hard disk drives (HDDs). An HDD can usually be directly replaced with **8.** ..... SSD.

9. ..... best thing about solid-state drives is that they have **10.** ..... much faster read/write speed than hard disk drives. They also have no moving parts, which means they don't make **11.** ..... noise or break as easily. However, SSDs can be more expensive than **12.** ..... hard drive. This also means that for **13.** ..... same price, someone can get much more capacity if they select an HDD instead.

A hybrid drive combines the features of **14.** ..... HDD and an SSD into one unit. It contains **15.** ..... large HDD and a smaller SSD cache to improve performance of frequently accessed files. **16.** ..... hybrid drive can offer almost **17.** ..... same performance as an SSD and it can contain more capacity. The price is also lower than that of an SSD.

18. ..... solid state drive technology is improving quickly and **19.** ..... new SSD models are being introduced often. However, they have not gained **20.** ..... popularity among many users yet.

Adapted from: *https://simple.wikipedia.org/wiki/Solid-state_drive*

CITIZENSHIP

RESPECTING SAFETY RULES AT WORK

Respecting safety rules when working with electronic or electrical components is of primary importance in order to prevent serious accidents and injuries.

23 GROUP WORK **Imagine that you work for a big company that produces computer storage devices. Read the list of safety rules and answer the questions. For questions 1-2 you can find images on the Internet.**

1. What might 'appropriate clothing' be?
2. Why are alcohol and drugs not allowed?
3. Why is it necessary to report unsafe conditions?
4. What does it mean when it says that you are responsible for yourself and others?

SAFETY RULES

1. You are responsible for your own and other people's safety.
2. Wear personal protective equipment for the job.
3. Always use equipment, tools and machinery safely and properly.
4. Lift objects properly by bending your knees, not your back.
5. Keep your area clean.
6. Wear appropriate protective clothing and footwear.
7. Report any unsafe condition.
8. Clean up spills immediately.
9. Report all injuries.
10. No alcohol or drugs are allowed on the company premises.

24 GROUP WORK **Following the example above, write a list of rules for a computer lab at school.**

School Name:	Safety Rules for the Computer Lab
General hygiene and safety rules	Tips for computer users
1.	1. .....
2.	2. .....
3.	3. .....
4.	4. .....
5.	5. .....

2.3 THE PERIPHERALS OF COMPUTERS

PERIPHERAL DEVICES

Do you know other uses of the word *input*?

And other uses of the word *output*?

The data on the monitor, and any other type of virtual data, are called **soft copy**, while the printed ones are called **hard copy** because they are tangible and cannot be modified.

Peripheral devices, **computer peripherals**, or simply **peripherals**, are any kind of device used to enter information and instructions into a computer for processing and to deliver the output to a human user or to a machine controlled by a computer. They are usually divided into input devices and output devices.

■ Input• devices

An **input device** converts incoming data and instructions into a pattern of electrical signals in binary code in order to make them comprehensible to a digital computer. It can send data to another device but cannot receive data from another one. For example, a keyboard and a mouse can send data to the computer, but they cannot receive or reproduce information.

Input devices can be:

- **Manual peripherals**, which are input devices that allow the user to interact directly with the computer such as in the case of a keyboard, a mouse or a video capturing device;
- **Automated input devices**, which use methods of capturing and entering data directly without any human intervention. This mechanism, called **direct data entry** (DDE), is used when very large amounts of data need to be input quickly and accurately. The most common types of automated devices include sensors and different types of card readers.

buzzer: *campanello*
to display: *mostrare*
microwave oven: *forno a microonde*
pattern: *schema*

■ Output•• devices

An **output device** translates digitised signals into a form that is understandable to the user. In other words, it reproduces or displays the results of the computer processing. It can receive data from another device, but it cannot send data. For example, a monitor can receive data from the computer, but cannot send information to it.

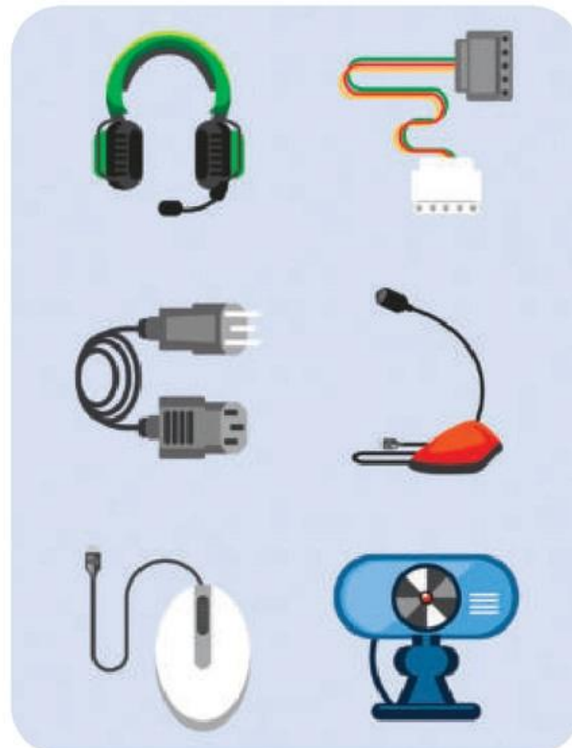
There are:

- **Manual output devices**, like a monitor or a printer•, and
- **Control devices**, which are used to control processes together with sensor input devices. They convert the signals received by the computer into sounds, light, etc., as in the case of a microwave oven which has a buzzer that produces a sound when the food is cooked.

■ Input/output devices

There are some devices that can be both input and output **(I/O) devices**. They can both send and receive data from one device to another. An example of I/O is the touch screen.

1 Complete the definitions with the words given below.



automated • control (2) • hard • input (5) • manual • output (3) • peripheral • soft

1. An ..... device converts data into binary code for the computer.
2. An ..... device can be manual or automated.
3. An ..... input device is also called direct data entry.
4. An ..... device receives data from the computer.
5. A ..... device converts signals from the computer into sounds or lights.
6. An ..... device is any kind of device which can load information onto a computer.
7. ..... devices are divided into input and output devices.
8. With ..... devices the user can interact directly with the computer.
9. ..... input devices are used when the input consists of large amounts of data.
10. An ..... device cannot receive data from another device.
11. An ..... device cannot send data to another device.
12. An ...../..... device can both send and receive data.
13. A ..... copy refers to data on a screen.
14. A ..... copy refers to printed data.

2 Read a list of common peripherals and decide if they are input devices, output devices or input/output devices.

1. Digital camera
2. Touch screen
3. Web cam
4. Scanner
5. Keyboard
6. Monitor
7. Mouse
8. Joystick
9. Multimedia projector
10. Printer
11. Speakers
12. Microphone
13. Graphics tablet
14. Earphones
15. Bar code reader
16. Modem

Input devices	Output devices	Input/output devices

3 PAIR WORK Give reasons for your choices in the previous activity.

➤ *... is an input device because it sends data/texts/files/images/... to the computer.*

4 Make a list of all the peripherals connected to your desktop or laptop computer (or to the computer in the lab you use), then write a short text about them.

My desktop/laptop computer is connected to some essential input and output devices.

The primary/essential input devices are .....

The primary/essential output devices are .....

I also have other input and output devices. They are .....

I use ..... to ..... and ..... for .....

For me, having a/an ..... is very important because .....

I would like to buy .....

PRIMARY INPUT DEVICES

The joystick and the joypad used to play computer games are the equivalent of a mouse.

The QWERTY keyboard is based on the design of the first typewriters. AZERTY and QUERTZ are respectively the French and German version.

Some old laptops had a tracker ball instead of touch pad. A tracker ball worked in the same way as a mouse, but the ball was on the surface and was moved directly by the hand.

Do you feel at ease with a touch pad or do you prefer using a mouse? Give reasons for your answer.

The primary input devices are the keyboard and the mouse•. The mouse indicates and selects data, while the keyboard enables the entry of text.

■ The keyboard

The **keyboard** is still the most commonly used and versatile device for direct human input into computers. The most common type of keyboard is QWERTY••. The name comes from the first row of letters on the left hand-side of the keyboard. Each key is connected to a switch which closes when the key is pressed and which, in this way, sends a signal to the CPU.

■ Types of keyboards

- **Virtual keyboards** are commonly used as on-screen input methods in devices with no physical keyboard, so usually where there is no room for one, such as pocket computers, personal digital assistants (PDA), tablets or smartphones. Virtual keyboards are common but not comfortable to use and some people prefer to attach a physical keyboard to their device.
- **Concept keyboards** are common in information points, tourist attractions and means of transport: a touch-screen shows pictures of the items and functions available. Railway stations, for example, use them for enquiries and ticket purchases.

■ The mouse

The **mouse** is a pointing device and is used to move a cursor on the screen. The name comes from its shape: it looks like a mouse and it has a tail in the form of the cable. However, many versions of the mouse are wireless and transmit infrared or radio signals (RF) to a base station attached to the computer. Every mouse is made up of two main parts:

- **buttons**: when the cursor is over an icon, menu item, or the edge of a picture, the mouse buttons can be clicked or double-clicked. The left button can also be held down to drag something across the screen;
- a **ball** under the mouse: sensors measure the movement of the ball on the x and y axes. From this, the computer can work out the direction and distance the mouse has travelled and can move the cursor similarly on the screen. However, today most models use optical technology, which uses a beam of light, instead of the original ball, to track the mouse's motion. An optical mouse is more accurate than a roller-based one and it does not get dirty inside.

■ Touch pads

Laptops use **touch pads**••• instead of a mouse. Touch pads look like small screens: users move their fingers across the pad to move the cursor•.

axis: *asse*
beam: *raggio*
hand-side: *lato*
item: *articolo*
to patent: *brevettare*
to remind: *ricordare*
row: *riga*
to stick: *rimanere*
tail: *coda*
think tank: *gruppo di esperti*

5 Read the text and think of the word which best fits each gap.

Who Invented the First Computer Mouse and When?

The computer mouse as we know **1.** ..... today was invented and developed by Douglas Engelbart, with **2.** ..... assistance of Bill English, during the 1960s and was patented **3.** ..... November 17th, 1970. While creating the mouse, Douglas **4.** ..... working at the Stanford Research Institute, a think tank sponsored by Stanford University. The mouse was originally referred to **5.** ..... an "X-Y Position Indicator for a Display System" and was first used with the Xerox Alto computer system **6.** ..... 1973. During what was called "The Mother of All Demonstrations," Douglas showed the movement of the cursor on the screen of the Alto computer.

The mouse was made **7.** ..... wood, was much larger than today's mouse, rectangular in size, and had a small button in the top right corner. With the cord coming out of the back of **8.** ..... mouse, Douglas said the device reminded him **9.** ..... the rodent mouse and the name stuck. It's a lot easier **10.** ..... remember than a "X-Y Position Indicator for a Display System".

Adapted from: *http:/www.computerhope.com*

6 (2.5) Listen to a text on joysticks and joypads and complete it with the missing words.

Joystick or Joypad?

A joystick can input movement. It is mainly used to play computer **1.** ....., but it can also be used to move a computer-controlled device such as a **2.** ..... The joystick is fixed to a base but it can be moved in any **3.** ..... Sensors convert the **4.** ..... into coordinates which tell the computer how to move the screen **5.** ..... or robot device.

The new models may look cooler, but they are still a **6.** ..... that you move around and press some buttons on.

The rival of the joystick is called joypad, or gamepad. It can be held in two **7.** ....., and the fingers, especially the **8.** ....., are used to provide input.

The basic difference between a joystick and a joypad is that a joystick is a **9.** ..... device in which the players move a sort of stick, while a joypad is a game controller held in the hand where your **10.** ..... are used to provide input.

7 Write the appropriate name for each picture.

1. .....

2. .....

3. .....

4. .....

5. .....

6. .....

OTHER INPUT DEVICES

What type of scanner is used in airports to check travellers?

A *pixel* is the basic unit of a digital image, representing a single colour or level of brightness. A *bitmap* defines a display space and the colour for each pixel or bit in the display space.

As an alternative, thinner and lighter devices like smartphones and tablets use touch screen technology.

There are some input devices that deal with images, and others that deal with sound.

Scanners

Scanners convert images into digital data. A scanner works a bit like a fax machine or photocopier. A piece of paper is placed on the glass, called a **platen**, and a light bar moves across the object to be scanned, called the **target.** By a system of mirrors, the light is reflected on the **charge coupled device (CCD)**, a linear array inside the scanner, and each cell of the CCD produces an electrical signal proportional to the strength of the reflected light that hits it. The signal, which in the original image represents a single dot called a pixel, is converted into a binary number and is sent to the computer. The computer then builds up a map of the information based on the individual bits of data and creates a digital image.

Scanners can also be used to scan text into a word-processing file; in this case it is not necessary to retype the text.

Small scanners are usually **hand-held,** whereas larger **flat-bed** ones fit onto a worktop.

Digital cameras, webcams and video digitisers

Digital cameras are a bit like scanners in that they save an image as a series of pixels. The image can then be uploaded to a computer and edited using photo-editing software. Nearly all of them can also record short video clips. Photographic film is not needed and the image is available for immediate use.

A **webcam** is a front-facing video camera that is attached to a computer typically via a USB cable or is built into the laptop or desktop screen, and which is capable of inputting images into the computer for transmission over the Internet or other network, thus allowing videoconferencing.

A **video digitiser** takes an image from a video camera or a TV set and digitises it so that it can be read by and stored on a computer. Video sequences captured in this way are often used in multimedia presentations.

Graphics tablets

A **graphics tablet** consists of a flat pad, the **tablet**, which the user can draw on with a rigid **stylus**, i.e. a special pen. As the user draws on the pad with the stylus, the position is registered by the membrane switch in the pad and the drawings or texts produced with the stylus are displayed on the screen.

Sound devices

Microphones are used to input data into voice recognition systems which convert sounds into text or commands for the computer. Moreover, they are also used to record sounds so that they can be stored digitally and sent over the Internet or by email.

brightness: *luminosità*
to hit: *colpire*
platen: *piastra in vetro*
to rebound: *rimbalzare*
to rely on: *basarsi su, conare su*
to retype: *ridigitare*

8 Decide if the statements are true or false. Correct the false ores.

	T	F
1. A scanner works exactly like a fax machine.	☐	☐
2. A CCD is a light bar which scans the object on the glass.	☐	☐
3. A pixel represents a single dot of an image.	☐	☐
4. A hand-held scanner is smaller than a flat-bed one.	☐	☐
5. A graphics tablet sends photos to the computer.	☐	☐
6. A microphone is used in voice recognition systems.	☐	☐

9 Read the text and answer the questions.

Laser Scanners

Laser scanners are especially used by archaeologists to reproduce 3D images of buildings, objects and sites. The technology works by sending a laser beam out towards an object. Time of flight calculates the time taken for the laser beam to rebound back to the scanner and converts this to distance via our knowledge of the speed of light.

Using a laser scanner allows for an accurate three-dimensional representation of the object scanned. This can be used as a tool for investigation: line data can be extracted, volumes calculated, animations can be created, and changes over time can be observed. Laser scanning relies on lines of sight, but, by setting up the scanner in multiple positions, it is possible to create a complete model. Once the model is created, for example a castle, we can place ourselves virtually inside it in any position, e.g. on the floor, and look in any direction, including through surfaces. The scanner has an integrated camera to capture RGB (red/green/blue) values per point, which allows colour to be added to the model and can be used in both light and dark conditions.

Adapted from: *https://www.futurelearn.com/courses*

1. Who uses laser scanners? Why?
2. How does laser scanning work?
3. What does time of flight calculate?
4. Explain why laser scanning can be used as a tool for investigation.
5. What happens once a model is created?
6. What are the advantages of having an integrated camera?

MILLIMETRE RADIO-WAVE SCANNERS

A millimetre radio-wave scanner is a type of scanner used in airports for security. It includes a booth where people stand with their arms raised and are scanned with millimetre radio waves. Antennae then collect the reflected waves to generate high-resolution images of unusual objects that may be concealed by passengers' clothing.

As this type of scanner does not use x-rays, but radio waves similar to the ones produced by a mobile phone, there is no risk of radiation.

10 (2.6) Listen to an interview with an archaeologist and answer the questions.

1. What is laser scanning?
2. What type of scanner is mentioned in the interview?
3. Are there other types of laser scanning?
4. Why is phase scanning used?
5. What type of information does the scanner record? How does it work?
6. What are the disadvantages of a laser scanner?

11 Watch a silent video on 3D scanning in archaeology and use the information from the previous activities to write a short summary of what you see.

▸ 3D scan in the archaeology *posted by* Salisbury Archaelogy

PRIMARY OUTPUT DEVICES

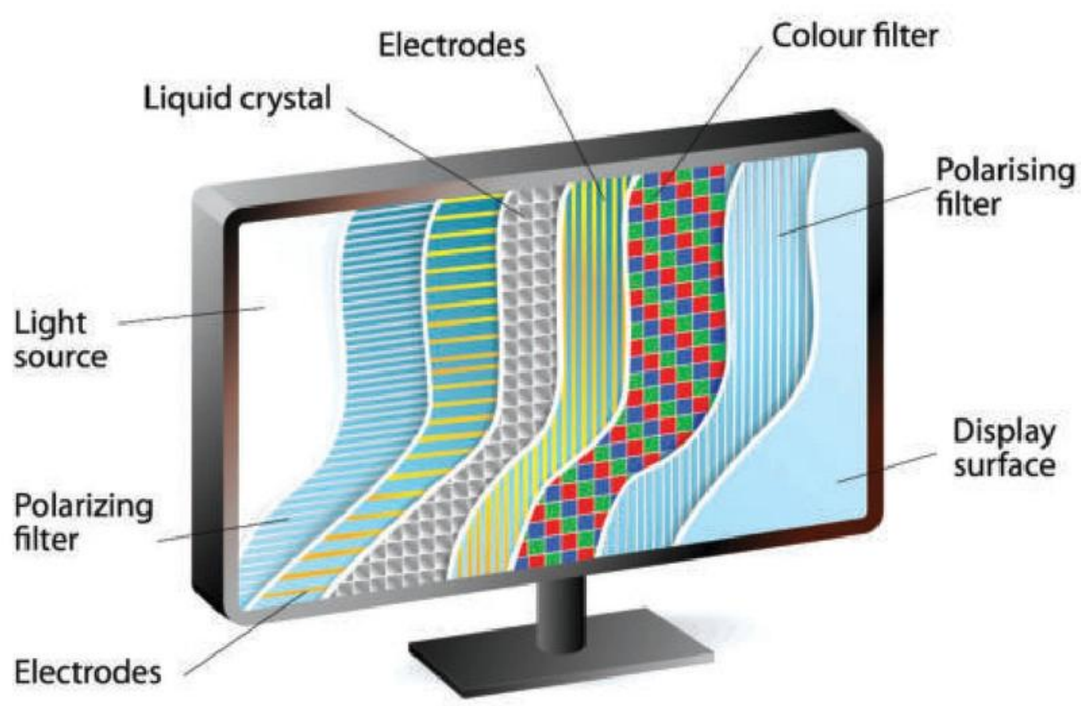
LEDs are particularly good for tasks that require precise movements like gaming.

Curved monitors are popular among video users and programmers.

Monitors

There are different types of monitors.

- The **LCD (liquid crystal display)** is the most common type found everywhere today. It has two joint polarised layers of glass where the liquid crystals let the light pass or block it.
- A variation of the LCD is **TFT/LCD,** where TFT stands for **thin-film transistor**. It has an array of transistors at the back of the panel. For this reason, the screen is able to retain pixels while addressing others, using a minimal amount of energy.



- A **LED (light emitting diode)** is a type of LCD in which the light comes from a series of lamps at the back of the screen.
- A **curved monitor** is the latest in monitor technology; the light comes from all angles and is directed toward the viewer's eyes, but it can be very expensive.
- A **CRT (cathode ray tube)** is the oldest type of computer monitor. It is large, heavy and requires a lot of energy, but, though obsolete, it is still widespread because it is cheap and has a very clear display.
- A **flat panel monitor** is a variation of CRT, but with some advantages: no bulky tube, stable viewing, high image quality and a relatively low cost.
- An **OLED (organic light emitting diode)** is a type of flat panel display. It uses less power than LCDs because its organic, carbon-based materials emit light only when electricity is applied.
- A **DLP (digital light processing)** is the best type of monitor for displaying natural colours on a computer because it has three primary colours which are used in light.

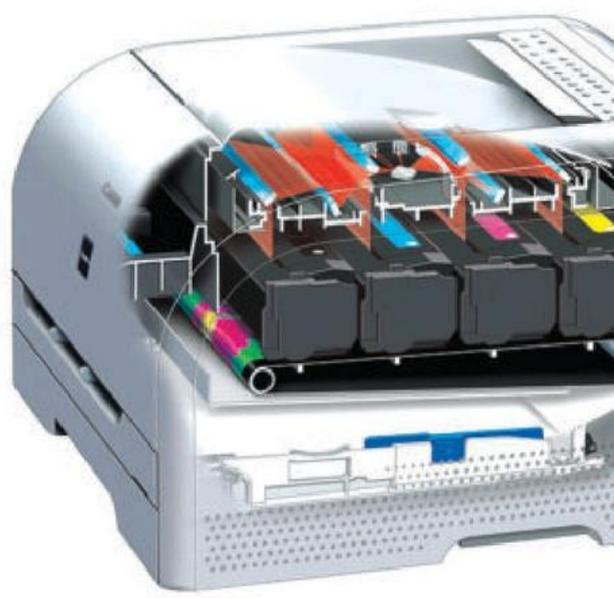
Printers

Printers can be classified as **impact**, i.e. they print by hitting an inked printer ribbon against the paper, or **non-impact**, i.e. they press ink directly onto the paper.

A **dot matrix printer** is an old type of impact printer still used in dirty environments (such as garages, factories or warehouses) because they are much more resistant than the other two types. This printer creates characters using a group, or **matrix,** of tiny printing pins on the print head. These press the printer ribbon onto the paper.

Modern printers are non-impact and the two main types are:

- **Inkjet printers**, which work by spraying ink onto the paper and which can produce very high-quality printouts, ideal for printing photographs or brochures. Unfortunately, with the wrong type of paper, the printed ink may smear;
- **Laser printers**, which use a laser beam, or **charge**, on a roller called a **drum**. The **toner**, a type of dry ink, sticks to the dots on the drum which have been previously electrically charged by the laser beam. The toner-covered drum is then pressed against the paper. A fusing system fixes the toner permanently. Laser copies last longer than ink copies because laser ink does not contain water.



array: *serie*
bulky: *voluminoso*
drafting board: *tavola per schizzi*
dye: *colore, tinta*
to draw: *tracciare*
drum: *tamburo*
fabric: *tessuto*
joint: *unito*
pin: *puntina*
printout: *stampa*
ribbon: *nastro*
to smear: *macchiare, strisciare*
to spray: *spruzzare*
tray: *cassetto, vassoio*

12 Answer the questions.

1. What is the most common type of monitor used today?
2. What is the difference between an LCD and a TFT/LCD?
3. What happens in an LED monitor?
4. What is an OLED display?
5. What is an impact printer?
6. What is a non-impact printer?
7. Where and when are old dot matrix printers still used?
8. What are the two most common types of non-impact printers?
9. How does an inkjet printer work? What is the problem with these printers?
10. How does a laser printer work? Why is it better?

13 Read the definitions of these types of printers and match them to their correct name.

character printer • dye sublimation printer • LED printer • plotter • thermo autochrome printer • 3D inkjet printer

Different Types of Printers

1. ..... It is used to output A3 size or bigger diagrams such as maps and plans or three-dimensional illustrations. It uses pens to draw lines, with each pen drawing a different colour. There are two types, flat bed which resemble drafting boards, and drum ones, which draw on paper that is rolled onto a drum-like mechanism.
2. ..... It is a new type of printer that produces solid 3D models using modified inkjet technology. In this technology, known as tomography, thin layers of fine powder (plastic and resin) are linked together as a 3D model is slowly built up.
3. ..... It is an old type of printer, very similar to an old typewriter. It has physical characters (letters and numbers) on a ball or on bars. When a character strikes the ink ribbon, an image of the character is pressed onto the paper. It is usually monochrome.
4. ..... It is a computer printer which uses heat to transfer dye onto materials such as a plastic, card, paper, or fabric. The word 'sublimation' was used at first because the dye was considered to make the transition between the solid and gas states without going through a liquid stage. It is often used to print logos or images on T-shirts.
5. ..... The paper used with this printer contains three layers of pigment (cyan, magenta and yellow), each of which is sensitive to a particular temperature. The printer is equipped with both thermal and ultraviolet heads and the paper is passed beneath these three times.
6. ..... It is similar to a laser printer, but it uses a light-emitting diode array as a light source, instead of the laser used in laser printers.

14 (2.7) Listen to an expert listing the things that should be considered when choosing a printer. Write the appropriate name for each definition.

1. The number of pages printed per minute. .....
2. The accuracy of printing measured in dots per inch (dpi). .....
3. The time required to warm up the printer before it starts printing. .....
4. The amount of data that a printer can keep in memory. .....
5. The maximum sheet size that a printer can accept. .....
6. Whether the printer has a tray that stores a large number of sheets or if it needs to be fed often. .....
7. Whether it is serial, parallel, port, USB, Wi-Fi, etc. .....

OTHER OUTPUT DEVICES

Passive speakers require a separate amplifier to produce the sound. Active speakers contain an internal power amplifier and can be directly connected to a mixer.

A combination of a microphone and headphone is called a **headset**.

Use the Internet to find another example of an input/output device.

■ Multifunction printers

Multifunction printers (MFP), also called **all-in-one printers**, can print, copy, scan and even fax. They are designed to meet the needs of a home office as well as those of a small, medium or large business. In fact, copying and faxing are not the only additional capabilities consumers get in all-in-one printers: manufacturers continue to introduce more features such as colour LCD displays and memory card ports that allow a phone or a digital camera to be plugged directly into the printer.

They have become more compact and less obtrusive, and a wireless connection is practically standard for MFPs today. There are even web-enabled MFPs which allow Internet access and offer services beyond those available on ordinary printers. One such example is looking up driving directions using the printer's interface, without using a computer. There are three main types on the market: black-and-white laser MFPs, colour laser MFPs, and inkjet MFPs.

■ Multimedia projectors

Multimedia projectors receive signals that can be either analogue or digital (though most modern projectors only work with digital inputs). The signal can be from a computer, but also from either TV sets or DVD/Blu-ray players. The image from the source is magnified and projected onto a large screen. The device usually works by remote control, but can also use a virtual mouse which works in the same way as a cordless PC mouse.

■ Speakers and headphones

Speakers• are electrical devices used to reproduce sound or music. They can be connected directly to a computer or be built into the monitor or the computer case, as in the case of laptop computers. Digital data from the computer is converted into analogue form, and the signal is then amplified through the speakers.

Headphones•• are pairs of head-mounted speakers that are positioned over the ears.

■ Touch screen

The **touch screen** is an example of an input/output device•. Touch screens are electronic visual displays that can detect the presence and location of a touch within the display area. The term generally refers to the action of touching the display of the device with a finger or hand. Touch screens can also sense other passive objects, such as styluses, and are common in devices such as game consoles, all-in-one computers, tablet computers and smartphones.

obtrusive: *ingombrante*
remote control: *telecomando*

15 Underline the correct option.

1. Multifunction printers are used *at home and in small offices / in both small and large businesses*.
2. The standard connection in an MFP is *through a port / Wi-Fi*.
3. *All MFPs / Web-enabled MFPs* have an Internet connection.
4. MFP technology has *remained the same / changed over time*.
5. Modern multimedia projectors work with *both analogue and digital signals / only digital signals*.
6. A virtual mouse is *a type of remote control / like a cordless PC mouse*.
7. Speakers *amplify / magnify* sounds.
8. Touch screen displays are *only sensitive to hands and fingers / also sensitive to passive objects*.

16 PAIR WORK Use the table to compare the most common types of printers.

Type of printer	Advantages	Disadvantages
Laser	• Very high resolution • Very fast • Very quiet	• Expensive to repair • Can't use continuous stationery
Inkjet	• Good resolution • Cheap to buy • Small	• A bit slow • Expensive to run (cartridges)
Multifunction	• Cheaper than a good quality inkjet • Both a printer and a scanner (it takes up less room) • Can be used autonomously	• Expensive

17 Watch the video and answer the questions.

▸ Identifying Types of Touchscreens *posted by* T-Mobile

1. Which two types of touch screen are described by Jen?
2. What does the first type consist of?
3. What can you do with the first type?
4. What does the second type consist of?
5. What can you do with the second type?
6. Which type reacts to pressure?

18 Match these different types of headphones with their definitions.

1. Closed-back headphones ☐
2. Open-back headphones ☐
3. On-ear headphones ☐
4. Over-ear headphones ☐
5. In-ear headphones ☐
6. Earbuds ☐
7. Bluetooth headphones ☐
8. Noise-cancelling headphones ☐

a. They are small speakers that rest on the outer ear.
b. They block out any peripheral noise and create an isolated sound experience for close listening.
c. They fit on top of the head and over, i.e. on and around, the ear cartilage.
d. They go over the head and stay on top of the ears.
e. They have open ear cups that allow some sound to escape into the environment.
f. They rest inside the ears and are close to the ear drums.
g. They use wireless connection.
h. Using special technology, they reduce background noise and create a quiet environment.

AUTOMATED INPUT DEVICES AND CONTROL DEVICES

A variation of the barcode is the QR code. It carries information both horizontally and vertically. It is referred to as a two-dimensional code and can carry a lot of information in a smaller space. It is also used in museums.

In a security alarm system, when a burglar breaks the infrared light sensor (input), the data is sent to a small computer inside a security light. The computer sends instructions (data processing) to an actuator (output) which switches on the security lights.

■ Automated input devices

This category includes code readers and sensors.

- **Barcode readers**• read barcodes, which are black vertical bars usually found on products on sale. Each product has a unique code and, when the barcode is read, the information stored in the database is recalled, e.g. product name and price. The information later appears on customers' receipts. The scanning process also assists in stock management.
- **Magnetic strip (or stripe) readers** are used to read magnetic stripes built into plastic cards such as debit or credit cards, magnetic identity cards, national health insurance cards, travel cards, fidelity cards, etc. The magnetic strip on the back of the card holds the personal details of the card owner and, with the necessary PIN, allows access to secure information, e.g. sensitive personal data or bank account details.
- **Magnetic ink character readers (MICR)** are used in banks to read magnetic ink characters at the bottom of cheques and obtain data such as account numbers and bank sort codes. A particular font is used to make it easy for the machine to discriminate between characters. The ink is magnetised in order to prevent creases and dirty marks.
- **Optical mark readers (OMR)** read marks made by pencil on a printed form and enter this data into the computer. They are used to read pre-printed forms and check boxes such as certain lottery tickets (e.g. football pools, bingo) and multiple choice exam papers.
- **Sensors**•• are often linked to a control program and collect data continuously. The program specifies acceptable levels, for example the maximum or minimum temperature in a greenhouse or the maximum weight in a lift. The information sent by the sensor is processed and the control program decides what to do next.

■ Control devices

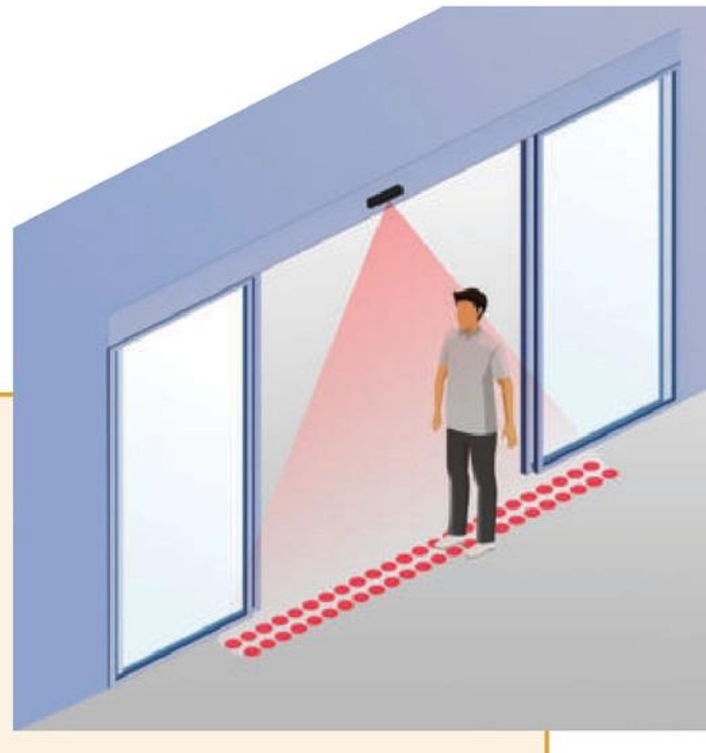
Control devices work with sensors to control processes.

- **Actuators** are used to take signals from a computer and convert them into some form of motion, for example pumps, switches or valves.
- **Motors** are used in domestic appliances, while in computing they are used to operate fans and disk drives.
- **Buzzers** produce a sound and are often used either in burglar alarm systems to warn of intruders or to signal that a process is complete (e.g. in a microwave).
- **Lights** are used for alarm systems.
- **Heaters** are used in appliances to control the temperature (e.g. central heating, automatic greenhouses).

actuator: *attuatore*
burglar: *ladro d'appartamento*
crease: *piega*
to be recalled: *essere richiamato*
to discriminate: *distinguere*
flow: *flusso*
greenhouse: *serra*
heating: *riscaldamento*
pump: *pompa*
receipt: *scontrino, ricevuta*
strip: *striscia*

19 **Read a text on the different categories of sensors and fill in the gaps.**

heat sensitive • infrared • magnetic • temperature



The Role of Sensors

Sensors are used to measure physical quantities such as temperature, light, pressure, sound, and humidity. They send signals to the processor. For example:

1. A security alarm system may have an 1. ..... sensor which sends a signal when the beam is broken.
2. A ..... sensor in the corner of a room may detect the presence of a person.
3. ..... sensors could be used to control the heating in a large building.
4. ..... sensors are used to detect metal and can be placed in roads to monitor traffic flow.

20 **Read the text and chose the appropriate heading for each paragraph.**

1. Cut costs
2. Improve operational efficiency
3. Reduce Errors
4. Save time

Benefits of Barcodes

a. ☐ Since barcodes permit a faster and more accurate recording of information, work in process can move quickly and be tracked precisely. Barcodes can help you keep better track, so you can save time and respond more quickly to inquiries and changes.

b. ☐ Depending on the application, time savings can be significant. Often the most dramatic examples involve the 'beloved' chore of taking inventory. One customer needed a crew of 25 employees working over a weekend to take the 6-month inventory; with barcodes this was reduced to 4 employees and a total of about 5 hours.

c. ☐ The typical error rate for human data entry is 1 error per 300 characters. Barcode scanners are much more accurate; the error rate can be as good as 1 error in 36 trillion characters depending on the type of barcode used.

d. ☐ Barcodes are effective tools that, when applied with thought and planning, can save time and reduce errors, resulting in a reduction of costs.

Adapted from: *http://www.makebarcode.com/info/benefit.html*

21 PAIR WORK **Choose the most appropriate control device for this list of appliances (actuator, buzzer, heater, light, motor).**

1. Air conditioning (to make fans spin) .....
2. Alarm system (to switch on security lights) .....
3. Automatic greenhouse (to give plants the correct amount of light) .....
4. Central heating system (to keep the correct temperature) .....
5. DVD player (to make the disc spin) .....
6. Microwave oven (to signal that the food is cooked) .....
7. Washing machine (to keep water at the correct temperature) .....

GRAMMAR

RELATIVE CLAUSES

- They provide information about the person, place or thing we are talking about.

Defining relative clauses

	Subject	Object	Indirect Object
Person	who/that	who(m)/that/ -	prep. + whom / … prep.
Object/animal	which/that	which/that/ -	prep. + which / … prep.
Place	where		
Time	when		
Possession	whose		

- The pronoun *that* is often used instead of *who* and *which* in a conversational, informal style.
  ➤ *A computer mouse is an input device that appears as a cursor on the screen.*
- The pronoun is often left out when it is the object of the verb in the relative clause.
  ➤ *A keyboard is an input device we use to input text.*
- Prepositions can come before the relative pronoun, or at the end of the relative clause in conversational, informal style.
  ➤ *A keyboard is a device with which we write text → A keyboard is a device we write text with.*

Non-defining relative clauses

- They provide additional information which is usually included between commas.
- They are rarely used in conversation but are very common in formal written English.

	Subject	Object	Indirect Object
Person	who	who(m)	prep. + whom
Object/animal	which	which	prep. + which

- The pronoun can never be omitted.
  ➤ *My mouse, which is wireless, is very expensive.*
- The pronouns for place, time and possession are the same as those for defining clauses.

22 Fill in the gaps with a relative pronoun. Write all possible alternatives.

1. D. Engelbart is the man ..... invented the mouse.
2. A keyboard is an input device ..... we can use to input text.
3. A screen is ..... data appears.
4. A joypad is a device with ..... we can play computer games.
5. A barcode reader is a device ..... function is that of reading barcodes.
6. The platen is the part of the scanner ..... we put the sheet of paper we want to scan.

23 Link the two sentences with a non-defining relative clause.

1. D. Engelbart invented the mouse. At the time, he was working at the Stanford Research Institute.
2. A computer mouse is made of buttons and a ball. It is a pointing device.
3. A graphics tablet needs a stylus to write on it. A stylus is a special pen.
4. A 3D scanner is highly technological. It is used in archaeology.

CITIZENSHIP

THE RISKS AND ETHICAL IMPLICATIONS OF AUTOMATION

There is no doubt that automation brings many advantages such as, for example, producing goods quicker and in larger quantities. However, we also have to consider a series of risks and some ethical implications.

24 **Read the following risks of automation and match them to their definitions.**

1. Poor business process selection ☐
2. Failing to optimise business processes before automating ☐
3. Allowing islands of automation to exist ☐
4. No governance model ☐
5. Over-automation ☐
6. Using outdated mechanisms to communicate automation design ☐

a. Automation must include the whole production process. Separate islands of business design with an independent automation system do not work.

b. Business organisations tend to push for more and more automation because of operational efficiency and cost reduction, and so they become unable to work without it if needed.

c. Effective automation design requires a strong governance model which is able to assess and validate processes.

d. It is illogical to invest care and practice into automation design based on outdated paper-based projects.

e. Many business organisations lack the expertise to select the appropriate automation process because they do not understand the limits of automation.

f. When a process does not work, it is useless to try to automate it. The whole process needs rethinking.

25 GROUP WORK **What do you think are the major risks of automation for the production line of an IT factory that produces input and output devices? Refer to the list from the previous activity.**

26 **Read four different opinions on the ethical implications of automation. Which one do you agree with? Why?**

1. Ethical implications of automation can concern the risk of mass unemployment and the lack of control over decision-making procedures.
2. A possible scary scenario could be that of humans becoming slaves of smarter machines which begin to communicate with each other in ways incomprehensible to human beings.
3. Humans will and should remain critical and central to the workplace of the future, controlling and complementing the technological solutions.
4. Automation is a tool that should be used to enrich human lives and prevent people from doing highly dangerous tasks.

27 GROUP WORK **Discuss these questions.**

1. Would you like a machine to do everything for you? Even homework?
2. If you did, what would you do with all the free time you would have?

VOCABULARY

1 **Write the correct words for the following pictures.**

(digital) camera • graphics tablet • headphones • headset • joystick • keyboard • laser printer • microphone • mouse • plotter • scanner • webcam

1. .....

2. .....

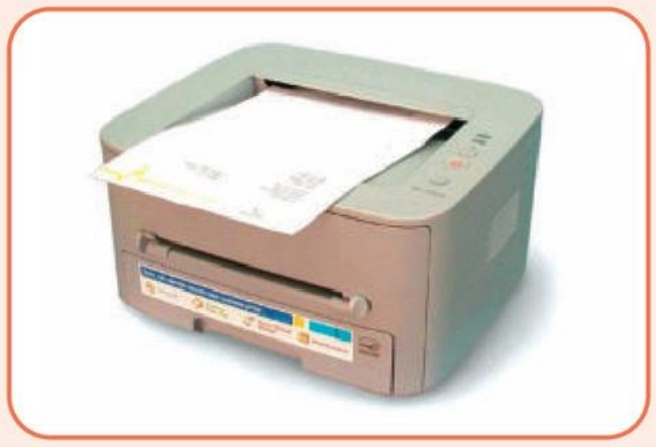
3. .....

4. .....

5. .....

6. .....

7. .....



8. .....

9. .....

10. .....

11. .....

12. .....

2 **With the help of a dictionary, turn the following verbs into adjectives and nouns.**

Verb	Adjective	Noun
Control		
Display		
Buzz		
Convert		
Heat		
Print		
Read		

3 **Use the word given in capitals at the end of some of the lines to form a word that fits in the gap in the same line.**

Scanning technology

There are several different scanning devices available, such as hand-held **1.** ..... SCAN
or various types of flat-bed scanners.
A **2.** ..... bar moves across the object to be scanned and the result of the process of scanning is an image which is LIGHTER
3. ..... on the computer's screen. DISPLAY
You can then **4.** ..... as many PRINTING
5. ..... of the same image as you like. COPY
Video **6.** ..... work in a similar way. DIGITISE
They digitise images for multimedia presentations.

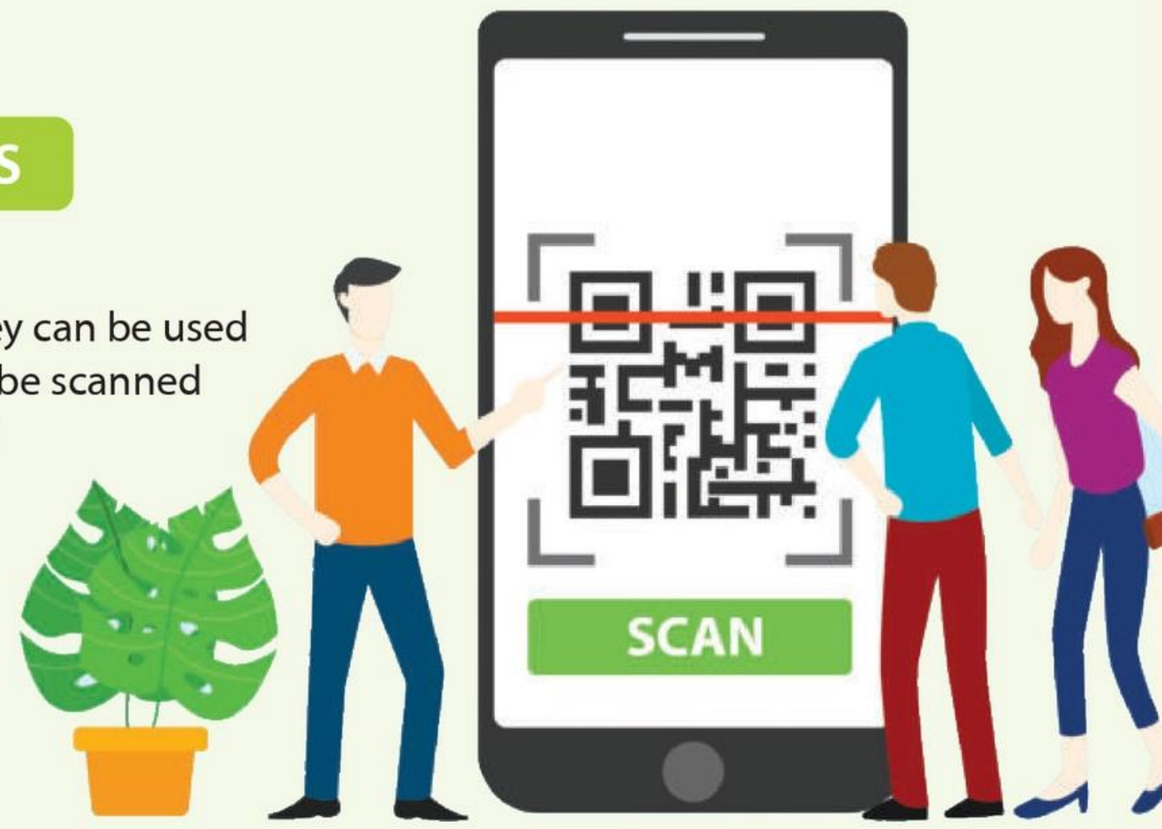
4 **Find the right word for these definitions.**

1. They can be impact or non-impact.
   .....
2. It is used to move the cursor on the screen.
   .....
3. You hold it with one hand when you play videogames. .....
6. It is similar to a digital camera but is connected directly to a PC and does not have a memory.
   .....
4. It reads pencil marks on printed forms.
   .....
5. It is similar to a mouse, but you can rotate the ball. .....
7. It is an input device on which you can draw with a stylus. .....
8. It produces a sound at the end of a process.
   .....

5 **Use the clues and write six names of output or control devices.**

1. A _ T U _ _ _ _
2. SP _ _ _ _ _ S
3. _ _ ZZ _ _
4. L _ S _ _ P _ _ _ T _ _
5. L _ D D _ _ _ _ _ Y
6. M _ _ _ _ M _ D _ _ P _ _ J _ _ _ _ R

DEALING WITH QR CODES AND BARCODES



Creating a QR code

The main advantage of a QR code is its versatility, in fact they can be used for anything, and everything can be done with them. It can be scanned anytime, anywhere with a smartphone app. The use of a QR code reduces paper and material consumption and allows file sharing.

Though a QR code reader software or application is required in order to scan the QR code image and a QR code generator is also needed to generate the code, they are both available for free.

6 **Use the Internet to find more information on QR codes and write a short text on their advantages. Add a final question.**

7 **Use a QR code generator and create a QR code for the text you wrote in the previous activity.**

8 PAIR WORK **Scan the QR code from your classmate. Read the text and answer the question. Then, work together to create a single, unique text about the advantages and disadvantages of QR codes.**

Why calculate the check digit of a barcode?

It could be useful to know how to calculate the check digit of a bar code. Why? Let's imagine you have a problem with your PC or any kind of peripheral and customer services asks you to read the barcode, but unfortunately the last number, the check digit, is no longer readable. No problem. Just a bit of maths and here it is.

Calculating the check digit in 5 steps

Let's assume that we are using the fictitious code 0 54321 22345 …

1. Add all of the digits in the odd positions (digits in position 1, 3, 5, 7, 9, and 11)
   0 + 4 + 2 + 2 + 3 + 5 = 16
2. Multiply by 3.
   16 x 3 = 48
3. Add all of the digits in even positions (digits in position 2, 4, 6, 8 and 10).
   5 + 3 + 1 + 2 + 4 = 15
4. Sum the results of steps 3 and 2.
   48 + 15 = 63
5. Determine what number needs to be added to the result of step 4 in order to create a multiple of 10.
   63 + 7 = 70

The check digit equals **7**.

9 **Calculate the check digits of the following barcodes.**

1. 9 87654 32109 …
2. 1 21016 80195 …
3. 0 51111 40759 …
4. 8 12345 00000 …

FEDERICO FAGGIN AND INTEL 4004

ITALY 24 NEWS
November 16th | 2021

INTEL 4004, THE FIRST MICROPROCESSOR DESIGNED BY FEDERICO FAGGIN TURNS 50

In November 1971, Intel 4004 was launched inside a Nippon Calculating Machine Corp computer. This microprocessor changed the history of computer science allowing the use of technologies that are common today.
Half a century has passed since Intel 4004 became the world's first commercially available microprocessor. That step in November 1971 was a pivotal moment for the whole of modern computing because it provided the foundation not only for subsequent microprocessors, but also for all the other chip-based technologies we constantly use such as cloud computing or artificial intelligence.

The role of Faggin
Among the protagonists of that historical period was the Italian physicist Federico Faggin, who, together with Tedd Hoff and Stan Mazor, designed Intel 4004. In 1969 the Nippon Calculating Machine Corp had contacted Intel to build some integrated circuits for the prototype of the Busicom 141-PF computer. The original request was for 12 chips, but the three scientists adapted the original design by making 4 chips, including CPU 4004 which was launched 50 years ago.

Continuously evolving project
Making comparisons is always useful to understand how technology is evolving. Faggin and his colleagues created a processor that, with a surface comparable to that of a fingernail, guaranteed a computing power equal to that of the first electronic computer which, in 1946, occupied an entire room.
Only at the end of October this year, Intel launched the twelfth generation of microprocessors and these, thanks to their new hybrid architecture with high-efficiency and high-power cores, will be able to guarantee performance at the highest levels on any device.

Adpated from: *https://www.italy24news.com/technology/267147.html*

10 Answer the questions.

1. Why was the launch of Intel 4004 a pivotal moment?
2. How did Intel's design differ from the original request of the Nippon Calculating Machine Corp?
3. How does Intel 4004 compare with the 1946 first electronic computer?
4. What is the relationship between Federico Faggin and Intel 4004?

11 (2.8) Listen to a short biography of Federico Faggin and complete the table.

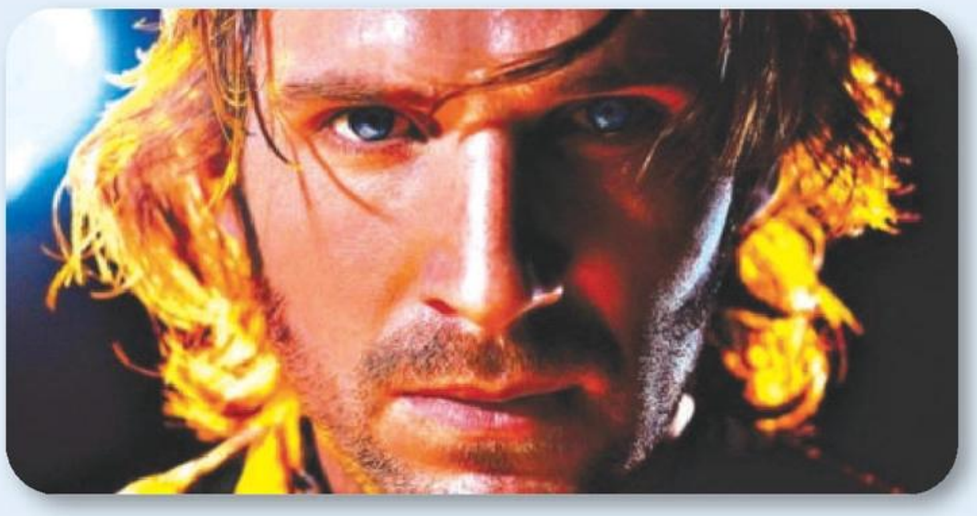
Year	Invention	Company
1961	Experimental transistorised electronic computer	Olivetti
	Fairchild 3708: the first integrated circuit with SGT	
1971		
1972		
1974		
1976		Zilog Inc.
1978		
1994		Synaptics Inc.
1999		

STRANGE DAYS

- PRODUCTION: USA 1995
- DIRECTORS: Kathryn Bigelow
- STARRING: Ralph Fiennes (Lenny Nero), Juliette Lewis (Faith Justin), Angela Bassett (Mace Mason), Tom Sizemore (Max Peltier), Michael Wincott (Philo Gant).

SYNOPSIS

The story takes place in Los Angeles during the last two days of 1999. The protagonist, Lenny Nero, a former LAPD (Los Angeles Police Department) vice cop, now deals with data discs, containing memories and emotions recorded directly from people's cerebral cortex. These discs allow viewers to experience the participants' recorded emotions through a brain wave transmitter (SQUID). SQUID is described as a drug and Lenny is highly dependent on it, always trying to recreate through it the emotions that he experienced with Faith, his former girlfriend, a beautiful singer. Lenny is a loser, still pathetically in love with her. His only two friends are Mace Mason, a bodyguard and limousine driver who is secretly in love with him, and a private detective, Max Peltier.
On 30th December, Lenny receives a disc which contains the memories of a murderer while killing a prostitute, Iris. He and Mace start to investigate and discover a conspiracy of blackmail, murder and rape. Iris's death is tied to a cover-up of the murder of Jeriko One, a rapper killed for political reasons. Another man, Tick, has been rendered brain-dead from the use of highly amplified SQUID by Iris's killer, and Philo Gant, Faith's manager, is also killed in the same way. Faith is involved in the conspiracy with Max, who Lenny then throws off the balcony after a hand-to-hand fight.
In the meantime, Mace is pursued by two other criminals who are finally arrested. The new year is coming and, with it, the New Millennium, and Lenny, who is no longer in love with Faith, kisses Mace passionately.



BEFORE WATCHING

12 **Answer the questions.**

1. After reading the synopsis, what do you imagine a SQUID to look like?
2. Do you think it is immoral to experience other people's emotions? Why? Why not?
3. Would you like to record happy moments to "feel" them again later?
4. The protagonist's surname is Nero. Do you remember a famous Nero in history? What was he famous for?
5. What is the connection between the name 'Nero' and discs?

Halliburton case: *tipo di valigetta in metallo*
playback: *riproduzione*
rack: *(qui) una serie*
setup: *apparecchiatura*
trod: *elettrodo*
walkman: *un apparecchio portatile per ascoltare musica incisa su audiocassette*
ziploc bag: *bustina di plastica con chiusura a cerniera*

WHILE WATCHING

13 **Watch the clip and decide if these statements are true or false.**

Lenny Nero is in a bar, sitting at a table with a potential customer, Keith.

	T	F
1. Keith is a policeman.	☐	☐
2. Keith has never tried SQUID.	☐	☐
3. The technology was developed for the CIA.	☐	☐
4. SQUID is illegal.	☐	☐
5. Lenny only deals with software.	☐	☐
6. Lenny can provide hardware on request.	☐	☐
7. SQUID is better than TV.	☐	☐
8. SQUID is part of somebody's life.	☐	☐
9. The clips come directly from the neurons.	☐	☐
10. The viewer can see and hear, but not feel.	☐	☐

14 **Watch the clip again and decide who says these statements: Lenny (L) or Keith (K).**

1. Have you ever **jacketed in**? Have you ever **wiretripped**? ☐
2. A **virgin brain**! Well, we're going to start you off right. ☐
3. That the technology was developed for the Feds, to replace the **body wire**. And now **it's gone black market**. So, uh, do I get the deck from you? ☐
4. **I'll set you up**, get you **a deck at my cost**... since **my thing is the software**. ☐
5. This isn't like TV only better. This is life. It's a piece of somebody's life. **Pure and uncut**, straight from the cerebral cortex. You're there. You're doing it, seeing it, hearing it... feeling it. ☐

15 **With the help of a dictionary find out the meaning of the expressions in bold.**

AFTER WATCHING

16 **Read this extract from the film script in which Lenny meets Tick, who is one of his regular suppliers of clips. In this scene the whole SQUID system is described.**

Lenny has a Halliburton case often next to him, like a drug dealer. In fact, the whole setup looks like a drug deal, but it's not. Though it is illegal. The case holds Lenny's personal playback deck, his trodes, and a rack of the little tapes in which he deals. They are about the size of DAT (digital audio tapes) tapes and hold about 30 minutes of sensory experience... everything a person sees, hears, and feels... recorded directly from the cerebral cortex at the moment it is happening.
Tick holds up a ziploc bag containing a Walkman-sized stainless steel cortical resonance recorder, or record deck, with a wire running to the SQUID array, a matrix of sensors designed to conform to the human head (this looks much more complex than the playback trodes).
SQUID stands for Superconducting QUantum Interface Device.

1. How can the playback deck be connected to the SQUID array?
2. How is the record deck connected to the SQUID array?
3. What is the technical name of the record deck?
4. What are the tapes like?
5. What size are the tapes?
6. What does SQUID stand for?
7. Which is the input device? And the output device?
8. Can you recognise the three essential parts of the system?

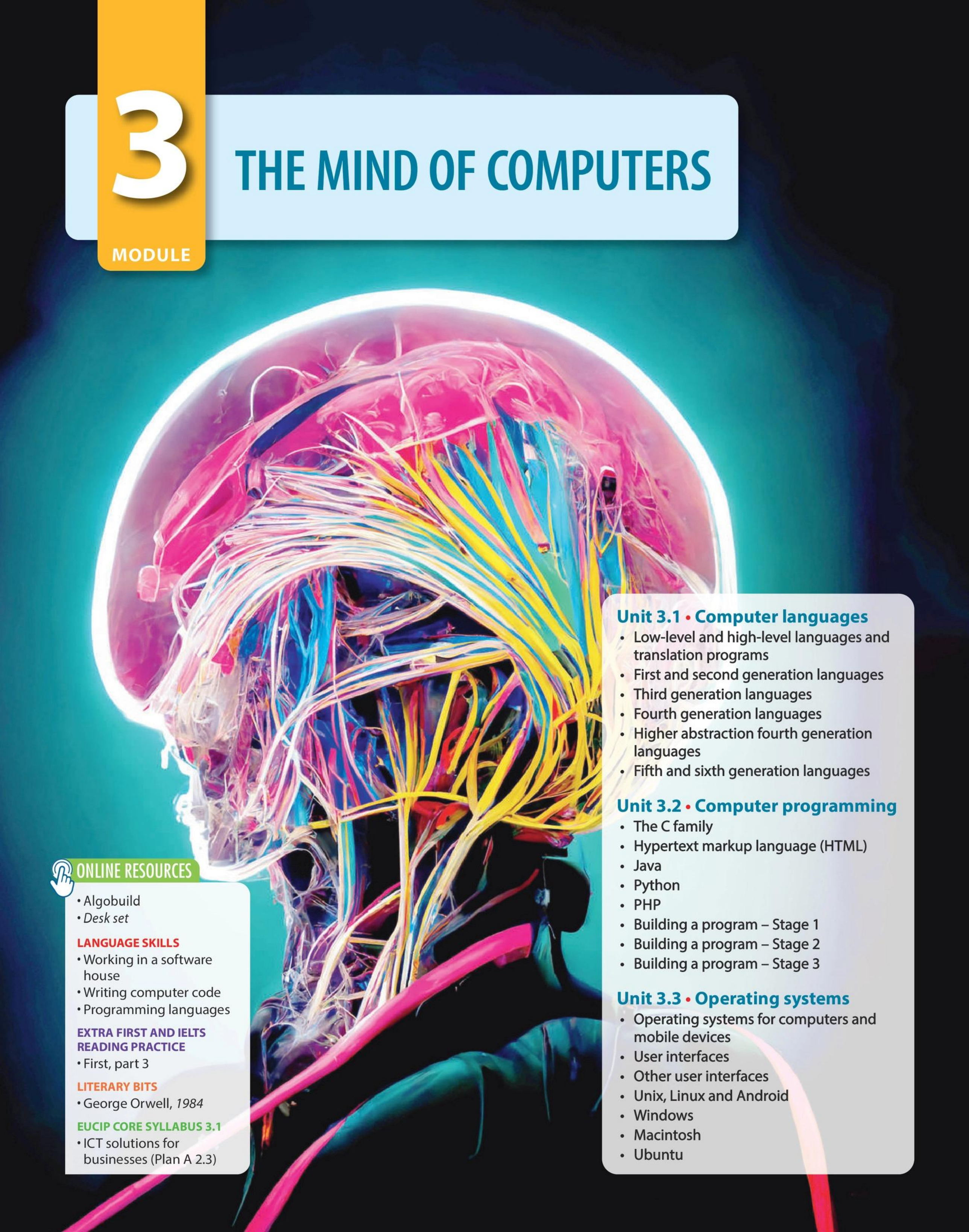
MAPPING YOUR MIND

THE BODY OF COMPUTERS

- **Electronics**
  - **Integrated circuits**
    - Tiny components built on a flat piece of silicon including many interconnected microelectric devices
    - **Uses**
      - Computer microprocessors, mobile phones, digital computer memories, etc.
    - **Types**
      - Monolithic
      - Hybrid
    - **Examples**
      - **Transistors**
        - Can be used as
          - **Amplifier**
          - **Switch**
      - **Microprocessors**
        - Have all the functions of a Central Processing Unit (CPU) on a single chip
  - **Transmission media**
    - Physical means by which information is transmitted
    - Can take place
      - **Through wires**
        - Untwisted pairs
        - Twisted pairs
        - Coaxial cables
        - Triaxes
        - Fibre optics
      - **Wireless**
        - Infrared system
        - Antennae
        - Satellites
        - Microwaves
- **Structure**
  - Computers consist of
    - **Hardware**
      - Physical components that make up a computer
      - Consists of
        - **Peripherals**
        - **Components**
      - Responsible for performing
        - **Input**
        - **Processing**
        - **Output**
        - **Storage**
    - **Software**
      - Programs, instructions and data that make it possible for a computer to operate
    - **Central Processing Unit (CPU)**
      - General purpose electronic circuits that interpret and execute instructions
      - Consists of
        - **Control Unit (CU)**
        - **Arithmetic Logic Unit (ALU)**
        - **Immediate Access Store (IAS) or Registers**
    - **Memory**
      - Any device capable of storing data and applications
      - Types
        - **Volatile memory**
        - **Non-volatile memory**
      - Arranged according to levels
        - **Primary storage**
          - Processor registers
          - RAM (random Access Memory)
          - ROM (Read Only memory)
          - Cache
        - **Secondary storage**
          - Magnetic storage
          - Optical storage
          - Solid-state memory
        - **Tertiary storage**
- **Peripherals**
  - Any kind of device used to enter information and instructions into a computer and to deliver the output to the user
  - Can be
    - **Input**
      - Converts data into electrical signs and sends them to a device
      - **Primary input devices**
        - Keyboard
        - Mouse
        - Touch pad
      - **Other input devices**
        - Scanner
        - Digital camera
        - Webcam
        - Video digitiser
        - Graphics tablet
        - Microphone
    - **Output**
      - Receives and translates digitised signals into comprehensible data for the user and displays them
      - **Primary output devices**
        - Monitor
        - Printer
      - **Other output devices**
        - Multifuntion printer
        - Multimedia projector
        - Speakers
        - Headphones
    - **Input/Output**
      - Can both send to and receive data from another device
      - Touch screen
    - **Automated input devices**
      - Barcode reader
      - Magnetic strip reader
      - Magnetic ink character reader (MICR)
      - Optical mark reader (OMR)
      - Sensor
    - **Control devices**
      - Actuator
      - Motor
      - Buzzer
      - Light
      - Heater

3 MODULE

THE MIND OF COMPUTERS



Unit 3.1 • Computer languages

- Low-level and high-level languages and translation programs
- First and second generation languages
- Third generation languages
- Fourth generation languages
- Higher abstraction fourth generation languages
- Fifth and sixth generation languages

Unit 3.2 • Computer programming

- The C family
- Hypertext markup language (HTML)
- Java
- Python
- PHP
- Building a program – Stage 1
- Building a program – Stage 2
- Building a program – Stage 3

Unit 3.3 • Operating systems

- Operating systems for computers and mobile devices
- User interfaces
- Other user interfaces
- Unix, Linux and Android
- Windows
- Macintosh
- Ubuntu

ONLINE RESOURCES

- Algobuild
- *Desk set*

LANGUAGE SKILLS

- Working in a software house
- Writing computer code
- Programming languages

EXTRA FIRST AND IELTS READING PRACTICE

- First, part 3

LITERARY BITS

- George Orwell, *1984*

EUCIP CORE SYLLABUS 3.1

- ICT solutions for businesses (Plan A 2.3)

3.1 COMPUTER LANGUAGES

LOW-LEVEL AND HIGH-LEVEL LANGUAGES AND TRANSLATION PROGRAMS

An algorithm is a detailed sequence of actions to perform or accomplish a task.

Most commercial programs are sold compiled, so that they will run faster and it will be difficult for others to change the program since it is now in machine code, thus protecting the manufacturer's intellectual property.

Lisp was the first example of an interpreter. It was first defined in 1958 by Steve Russell.

Machine language

Computers are devices which follow instructions, but they only understand **machine language** (or machine code). Machine language is made up of a sequence of 0s and 1s that the computer interprets electrically as instructions. Programmers plan the set of instructions using an **algorithm**•, and they then have to write them in a language that the computer can understand. However, it is almost impossible for humans to program using a machine language since it is very difficult to remember long sequences of binary code. For this reason, other **programming languages** were invented; they are easier for humans to write, but computers cannot understand them, so, special translation programs are needed.

Programming languages can be classified into low-level and high-level languages.

"HelloWorld" in binary

01001000 01100101 01101100 01101100
01101111 00100000 01010111 01101111
01110010 01101100 01100100

Low-level and high-level languages

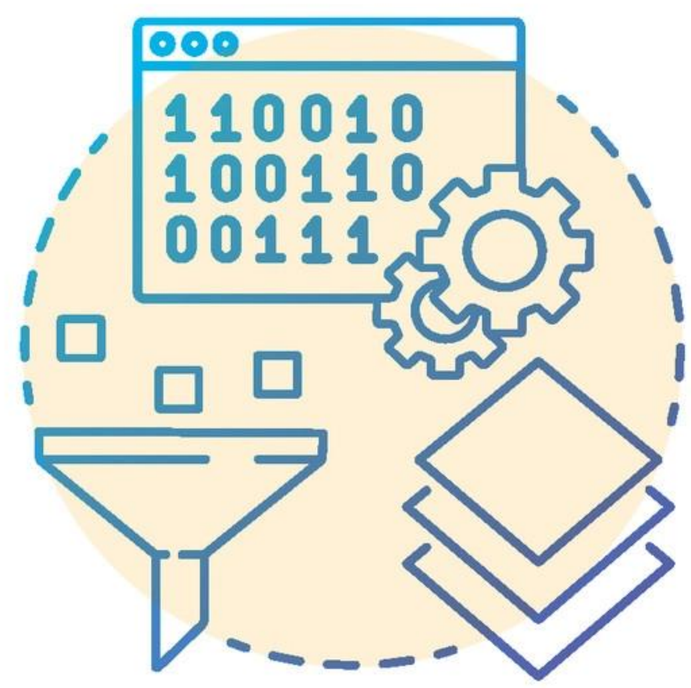
Low-level languages (LLL) are considered closer to computers and their primary function is to operate, manage and manipulate the computer hardware and components. Programs and applications written in a low-level language are directly executable on the computer hardware without any further translation. **Machine language** and **assembly language** are examples of machine-dependent, low-level languages.

High-level languages (HLL) were created with the programmer in mind and their syntax is closer to a natural language like English; for example, they have words and a sentence-like structure. For this reason, they are easier to learn and use. Moreover, they are not machine-dependent and a program, once written, can be used on different types of computers.

Translation programs

There are three types of **translation programs**: compilers and interpreters are used for high-level languages, and assemblers for assembly language.

- A **compiler**•• converts the whole program in one go, i.e. all at once. It converts it into an **object file,** and a second, related program, called **linker**, converts the object file into an **executable file**.
- An **interpreter**••• takes each line of instruction from the **source code** in turn, converts it into machine code and executes it one by one.
- An **assembler** translates assembly language into machine code. One instruction in assembly language corresponds to one machine code instruction.



to add: *aggiungere*
source code: *codice sorgente*
syntax: *sintassi*
time-consuming: *lungo*

1 **Write short definitions for the following words/phrases.**

1. Machine language
2. Low-level language
3. High-level language
4. Assembly language
5. Compiler
6. Interpreter
7. Assembler
8. Programming language

2 PAIR WORK **In turns, describe the differences between HLL and LLL, and between interpreters and compilers.**

HLL	LLL
Easy to learn	Difficult to learn
Close to human languages	Different from human languages
Slow in execution	Fast in execution
Easy to modify	Difficult to modify
Knowledge of hardware is not required to write programs	Deep knowledge of hardware is required to write programs
Used to write application programs	Used to write hardware programs

Interpreter	Compiler
Translates and executes every single instruction directly	Translates all the program into machine code and then runs it
The code is tested instruction by instruction and any errors are immediately found	It takes more time to translate the whole program, but it allows for a faster execution
Execution is slower	Debugging is at the end and it is harder
It doesn't generate an executable code, so it is more memory efficient	It generates an executable, so memory requirements are heavy
It needs to be used every time the program is run	Once the program has been compiled, the compiler isn't needed anymore

3 3.1 **Listen to a recording on the dfferences between compilers and interpreters. Answer the questions and complete the sentences below.**

1. Which one is better for error reporting?
   ☐ compiler ☐ interpreter
2. Which one is slower?
   ☐ compiler ☐ interpreter
3. Which one is easier to use?
   ☐ compiler ☐ interpreter
4. If errors have occurred, then the program cannot .....
5. Some compilers assist by adding line .....
6. Programmers must use the error messages to identify and remove the .....
7. Error correction can be very time-consuming and .....
8. Compilers can produce much more efficient object .....

4 **Find the 8-bit binary code sequence for each letter of your name and write it down with a small space between each set of 8 bits.**

Letters of the Alphabet in Binary Code

a 01100001	g 01100111	m 01101101	s 01110011	y 01111001
b 01100010	h 01101000	n 01101110	t 01110100	z 01111010
c 01100011	i 01101001	o 01101111	u 01110101	
d 01100100	j 01101010	p 01110000	v 01110110	
e 01100101	k 01101011	q 01110001	w 01110111	
f 01100110	l 01101100	r 01110010	x 01111000	

FIRST AND SECOND GENERATION LANGUAGES

Machine language is understood by any computer or electronic device. Can it be considered a sort of lingua franca through which machines can communicate?

Assembly language is still used today. A version of it is built into every processor. It is needed for writing system software such as operating systems and drivers.

The evolution of programming languages can be studied by dividing them into different generations, strictly connected to computer hardware development. There are five generations, starting from machine language to languages that are similar to natural languages.

Independently from the language used for programming, the algorithm has to be represented graphically and **flowcharts** are the most common tools.

■ First generation

The **first generation** of programming languages (1940s) was called **machine language** • or machine code. This is the only language a computer really understands, a binary sequence of 0s and 1s that the CPU interprets as commands. Each instruction consists of two parts, both in binary digits: an **operation code**, which specifies the action to be carried out, and an **operand**, or **memory address**, relevant to the instruction. A typical program looks like two or three columns of 1s and 0s, intelligible only to computer experts.

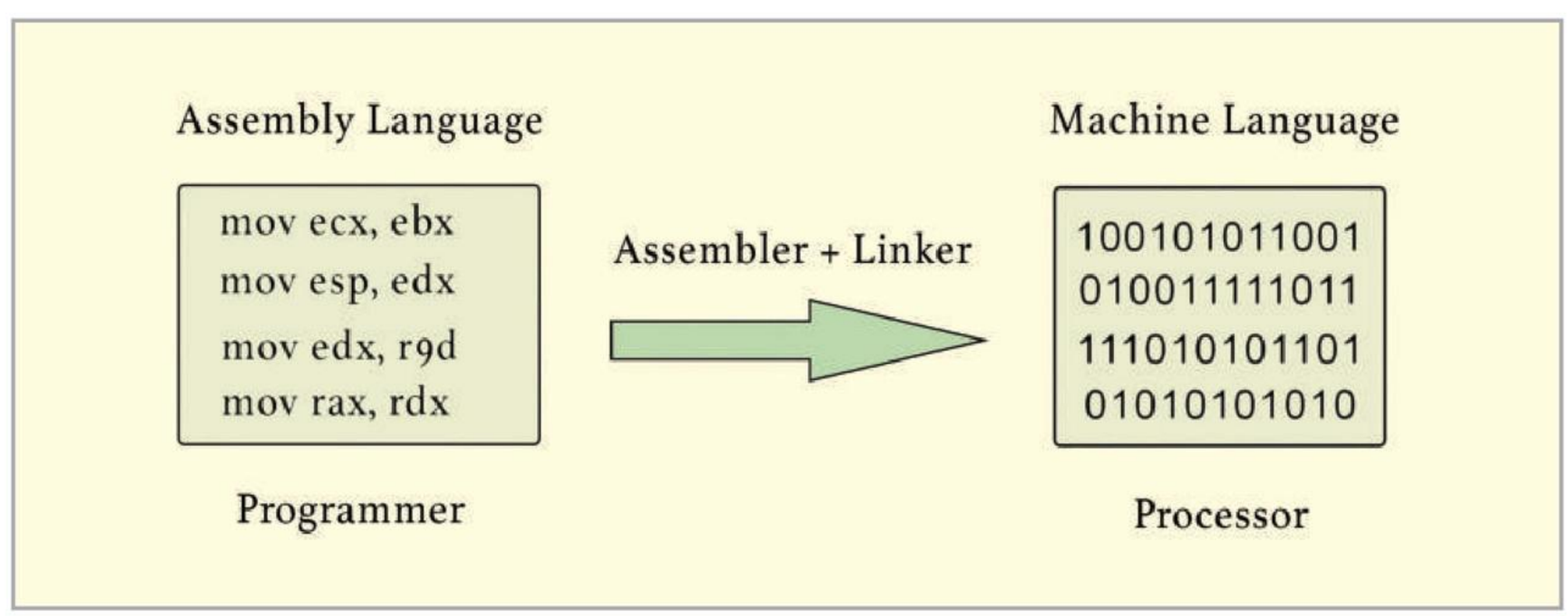
Before the invention of machine language, skilled engineers had to manipulate some parts of computer hardware with their own fingers by positioning electrical relay switches in either the on or off position. The invention of machine language was a revolution, although a program written in machine code is **machine-dependent**, i.e. programmers have to completely rewrite the program if the same program is needed on another computer. Moreover, even though the language is easily executed by the computer, it is subject to errors because people find it difficult to decipher it. This language was used with vacuum tube computing machines.

■ Second generation

The **second generation** was called **assembly language** • and it was used to program transistor-based computers. It appeared in the 1950s and represented a step forward because it made it possible to program with macroinstructions. In fact, assembly language turns the sequences of 1s and 0s into alphabetic abbreviations of English words called **mnemonics,** or **memory aids**, to represent operation codes and **abstract symbols** for the operands. The result is still two or three lines of code, but more intelligible than machine language and less subject to errors. Examples of mnemonics include words such as *add, load* and *store*, while symbolic operands include *num1, num2* and *sum*.

Assembly is still popular among programmers because it creates compact, fast code. However, like machine language, it is **machine-dependent**, and a low-level language. Therefore, it is still more difficult than high-level languages.

to compress: *comprimere*
operand: *operando*
to resemble: *assomigliare*
skilled: *abile, esperto*
to sort: *organizzare, sistemare*
underlying: *sottostante*



5 (3.2) **Listen to the recording and correct the sentences.**

1. Flowcharts don't have any advantages for assembly language programming.
2. Flowcharts are microprocessor-dependent.
3. Machine code is easier to read than flowcharts.
4. A flowchart is better when organised on two pages.
5. The end of a flowchart is represented by a diamond shape.
6. Questions are included in circle shapes.
7. Lines allow the logic representation of the flowcharts to be followed.
8. A parallelogram shape shows a process, an action, something that has to be done as an addition.

6 (3.3) **Listen to this recording on assembly language and write down the pros and cons.**

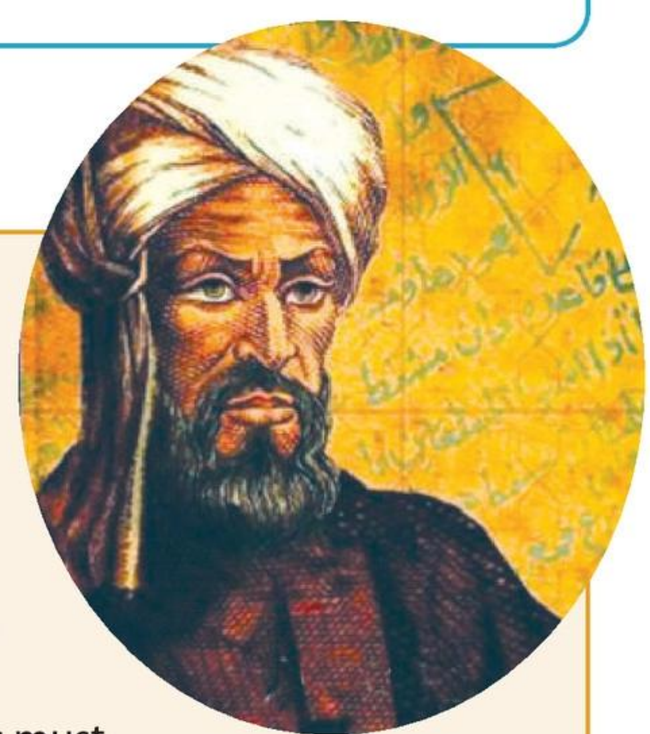
Pros	Cons
//	

7 **Read the text and complete the sentences.**

Algorithms

The word algorithm is a distortion of the name of the Persian mathematician Mohammed Ibn-Musa al-Khwarizmi, who lived from approximately 780 to 850 AD, and who wrote an influential book on algebra. An algorithm is a set of precise, i.e. unambiguous, rules that specify how to solve a problem. Its characteristics are: precision (each step is precisely stated), determinism (the intermediate results of each step of execution are unique and are determined only by inputs and results of the previous step), termination (ends after a finite number of instructions), correctness (the output generated is correct) and generality (each algorithm applies to a set of inputs).

The study of algorithms is at the core of computer science, since they are essential to the way computers process information: a computer program is basically just an algorithm that tells computers what specific steps to perform, and in what sequence, in order to carry out a specified task. Algorithms are often studied abstractly, i.e. without the use of a specific programming language or other implementation. Thus, they resemble other fields of mathematics in that the analysis focuses on the underlying principles rather than on any specific implementation.



The algorithms used in computational processes must be defined rigorously, that is, they must apply to all possible situations that could occur. Some of the most common types of applications for algorithms used by computers are for searching text, sorting files or lines of text in alphabetical order, compressing and decompressing data, detecting errors, encrypting and decrypting data and compiling. Algorithms can be expressed in a variety of ways; for example, they can be stated using ordinary sentences in any human language or they can be shown schematically with flowcharts.

Adapted from: *http://www.linfo.org/algorithm.html*

1. The word algorithm is …
2. An algorithm is …
3. The main characteristics of an algorithm are …
4. An algorithm tells the computer …
5. Algorithms are often …
6. Algorithms must apply to …
7. The most common applications for algorithms are …
8. Algorithms can be stated …

THIRD GENERATION LANGUAGES

PASCAL is effective for both business and scientific applications, while BASIC is a language for non-specialist students which was popular in the 1980s.

Search the Internet. Which is the oldest language? BASIC, COBOL or FORTRAN?

The **third generation** of programming languages developed after integrated circuits were designed. These languages were called high-level languages and were designed around the ease of use for the programmer with the aim of reducing bugs and the ability to reuse the codes, i.e. creating languages which were not machine-dependent.

High level languages are meant for general purpose programming and show a great enhancement in logical structure over assembly language. The instructions, called **statements**, are a combination of English-like phrases and mathematical terms to express a problem or task. Both the syntax, i.e. the sentence structure, and the semantics, i.e. word meaning, do not reflect the internal machine code of any particular computer, so they can be used on any machine.

Third-generation languages are also procedural languages and the first examples of modular programming.

Procedural languages

A procedure is a sequence of steps performed in a particular order; a **procedural language** is one that expresses a computer problem both as a series of discrete tasks and the instructions needed to accomplish them.

Procedural languages can be classified as: **business, scientific** or **multipurpose.** COBOL is an example of language used to create business systems, while FORTRAN (Formula Translator) is still a popular scientific language. PASCAL• and BASIC are examples of multipurpose languages•.

to accomplish: *compiere*
branch: *diramazione*
discrete: *separato*
ease: *facilità*
enhancement: *miglioramento*
nesting: *annidato*
to reuse: *riutilizzare*

Modular and structured programming

Modular programming means that programs can be written in modules, otherwise known as subroutines, which are independent and modifiable.

Such **subroutines** are independent sections of a program which can be incorporated into a complete one. A subroutine can be added at any point in the main program and is usually built so that, when the instructions have been performed, a return branch is automatically made to the instruction immediately following. The instructions performed by the subroutine can be modified by the use of parameters that may be specified in the main program.

Apart from independent subroutines, it is also possible to have **nesting subroutines:** a series of subroutines arranged at different levels, i.e. one written within another.

The concept of modular programming leads to another aspect of high-level languages that is **structured programming**. Structured programming refers to any program that consists of blocks of code whose internal details are independent.

8 Decide if the statements are true or false. Correct the false ones.

	T	F
1. The invention of integrated circuits followed the invention of 3GL.	☐	☐
2. A language which is not machine dependent produces no bugs.	☐	☐
3. In a 3GL, statements combine words and mathematical terms.	☐	☐
4. A procedure is a random sequence of steps.	☐	☐
5. In a procedural language, the program identifies both the task and how to achieve it.	☐	☐
6. COBOL and PASCAL can be used for business systems.	☐	☐
7. Subroutines are sets of fixed instructions.	☐	☐
8. Parameters are used to modify subroutines.	☐	☐
9. Subroutines can be organised at different levels.	☐	☐
10. Structured programming means coding in interdependent blocks.	☐	☐

9 Complete the text with the words given below.

needs • writing • which • easy • solved • subroutine • such as • problem • approach • instructions

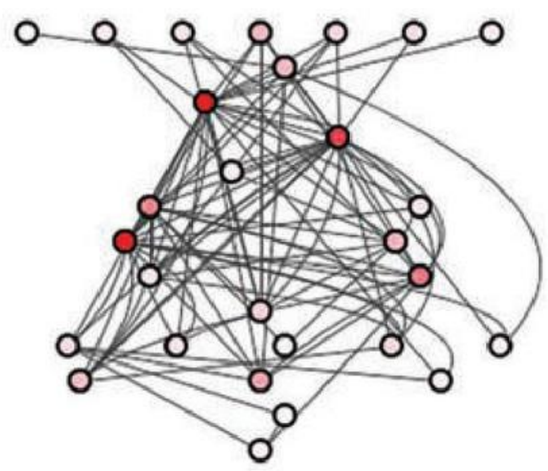
Structured Programming

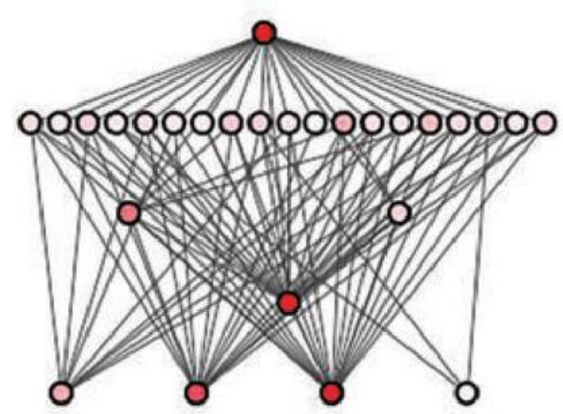
Structured programming is the art of **1.** ..... programs that are logical and easy to follow. It involves the sectioning of the original **2.** ..... into small program units, each of **3.** ..... is self-contained and can be tested separately.

The main program can then consist of a series of **4.** ..... each sending the computer to a particular unit or **5.** ..... which carries it out and then returns. In addition, instructions **6.** ..... FOR… NEXT, REPEAT… UNTIL and DO… WHILE allow **7.** ..... structuring in program writing. With a top-down **8.** ..... the program is written in units in the same way as the problem was originally **9.** ..... and it can be argued that flowcharts are not required with this method. However, the program **10.** ..... to be extremely well structured to work first time without them.

10 (3.4) Listen to a short recording about spaghetti code and answer the questions.

1. What is meant by "spaghetti code"?
2. Which wrong uses lead to spaghetti code?
3. What does program flow look like with spaghetti code?
4. What factors cause spaghetti code?
5. What helps to reduce spaghetti code?





11 (3.5) Listen to the recording about COBOL and say what the numbers refer to.

1. 200,000 billion: .....
2. $4-8 trillion: .....
3. 13.6%: .....
4. $92,086: .....
5. $100,000: .....
6. 1 out of 17: .....
7. 25: .....

FOURTH GENERATION LANGUAGES

With SELECT FROM you can, for example, select all the names of the students who are over 18 from the school database.

It is possible to type a simple statement like *Staff members by name* and the result will be the list of all the company's employees in alphabetical order.

They use markup indicators (commands) called *tags*, and the instructions are contained between the symbols < > (for example the instruction <br> means a line break).

The **fourth generation** of languages, those of microprocessors, are even more human-like than previous languages. These languages are even more programmer-friendly and allow for the use of a graphical user interface (GUI) to move the cursor over an object and move it to a new location (e.g. *drag and drop)*. They are **non-procedural languages**, which means that the program specifies what to do, but not how to do it, and are mainly used to retrieve and format data for reporting.

They include three categories, which are all related to database management and markup languages.

Database management languages

- **Query languages** are primarily used for creating, accessing and modifying data in and out of a database management system (DBMS). They typically require the user to input a structured command that is similar to an English-like querying construct, such as SELECT FROM•. As the contexts of use are simple, query languages are easy to learn and use. There are different types of QL and the most popular is SQL (Structured Query Language).
- **Report writers** take the information retrieved from a database, or from an existing application, and format it in an appealing output. They can also perform a limited number of calculations such as totals, subtotals, and averages, and some provide custom calculation formulae. Report writers enable the user to create virtually any print or on-screen report that is too complex or time-consuming to create by hand.
- **Application generators** enable the user to specify a problem and describe the desired results. One statement or descriptive line may generate a huge routine or an entire program, usually in assembly language or binary code••.

Markup languages

Markup languages are not programming languages in a strict sense: they do not run routines (i.e. repetitive operations) and do not do logical operations. They are **declarative languages** that focus on data presentation and structure and are used to explain, or declare, how texts are to be edited, as, for example, when a word has to be displayed in italics or in bold.•••

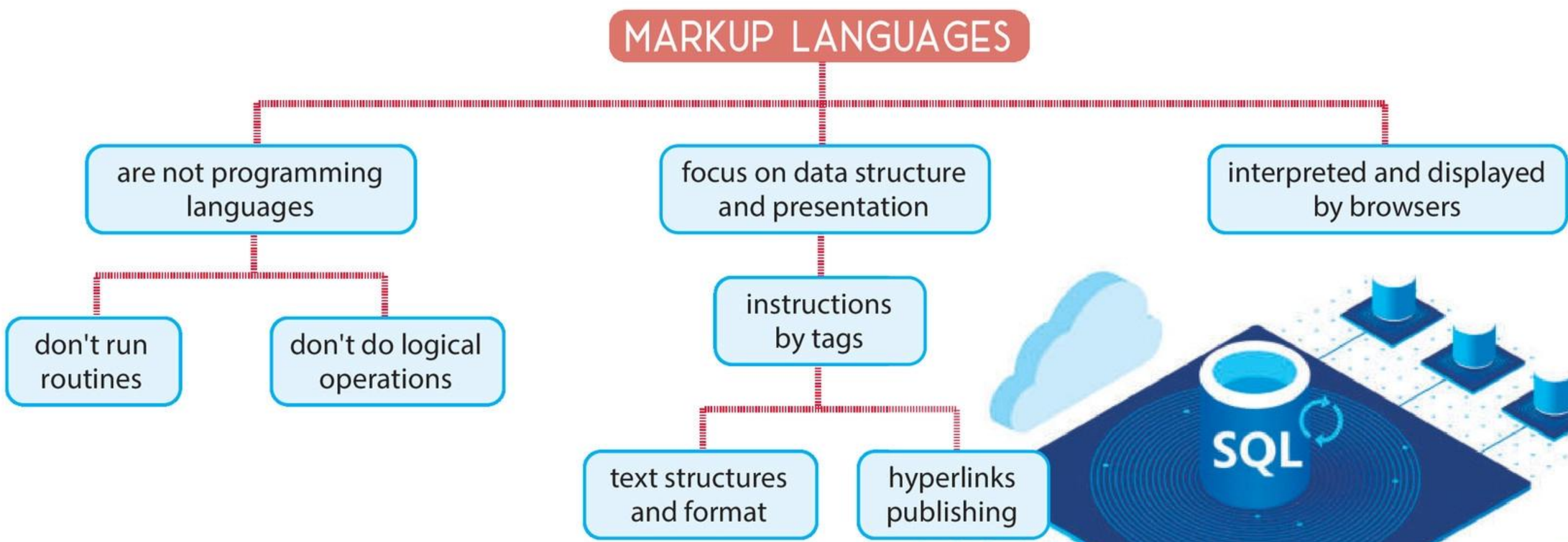
The most common markup language is **HTML (HyperText Markup Language)** which is used to display web pages.

appealing: *accattivante*
average: *media*
bold: *grassetto*
custom: *standard*
italics: *corsivo*
to retrieve: *recuperare*

12 Decide what these definitions refer to.

1. It is the most common markup language for the web. .....
2. The most popular is SQL. .....
3. They are used to create, access and modify data from a database. .....
4. They can generate an entire program from a user's statement. .....
5. They create virtual reports. .....
6. They can perform calculations. .....
7. They do not run routines. .....
8. They use drag and drop. .....
9. They explain how texts are to be edited. .....
10. They specify what to do, but not how to do it. .....

13 Look at the diagram and describe markup languages.



14 Read the text and complete it with the words given below.

changing • database • declaratively • query • rules • schema

Query Language

A query language is a specialised programming language for searching and **1.** ..... the contents of a database. Even though the term originally refers to a sublanguage for only searching (querying) the contents of a **2.** ....., modern query languages such as SQL are general languages for interacting with the DBMS, including statements for defining and changing the database **3.** ....., populating the contents of the database, searching the contents, updating the contents, defining integrity constraints over the database, defining storing procedures, defining authorisation **4.** ....., etc. The data definition statements of a **5.** ..... language provide primitives for defining and changing the database schema, while data manipulation statements allow populating, querying, as well as updating the database. Queries are usually expressed **6.** ..... using logical conditions.

Adapted from: *https://link.springer.com/referenceworkentry/*

HIGHER ABSTRACTION FOURTH GENERATION LANGUAGES

The first object-oriented language was *Simula* in 1965.

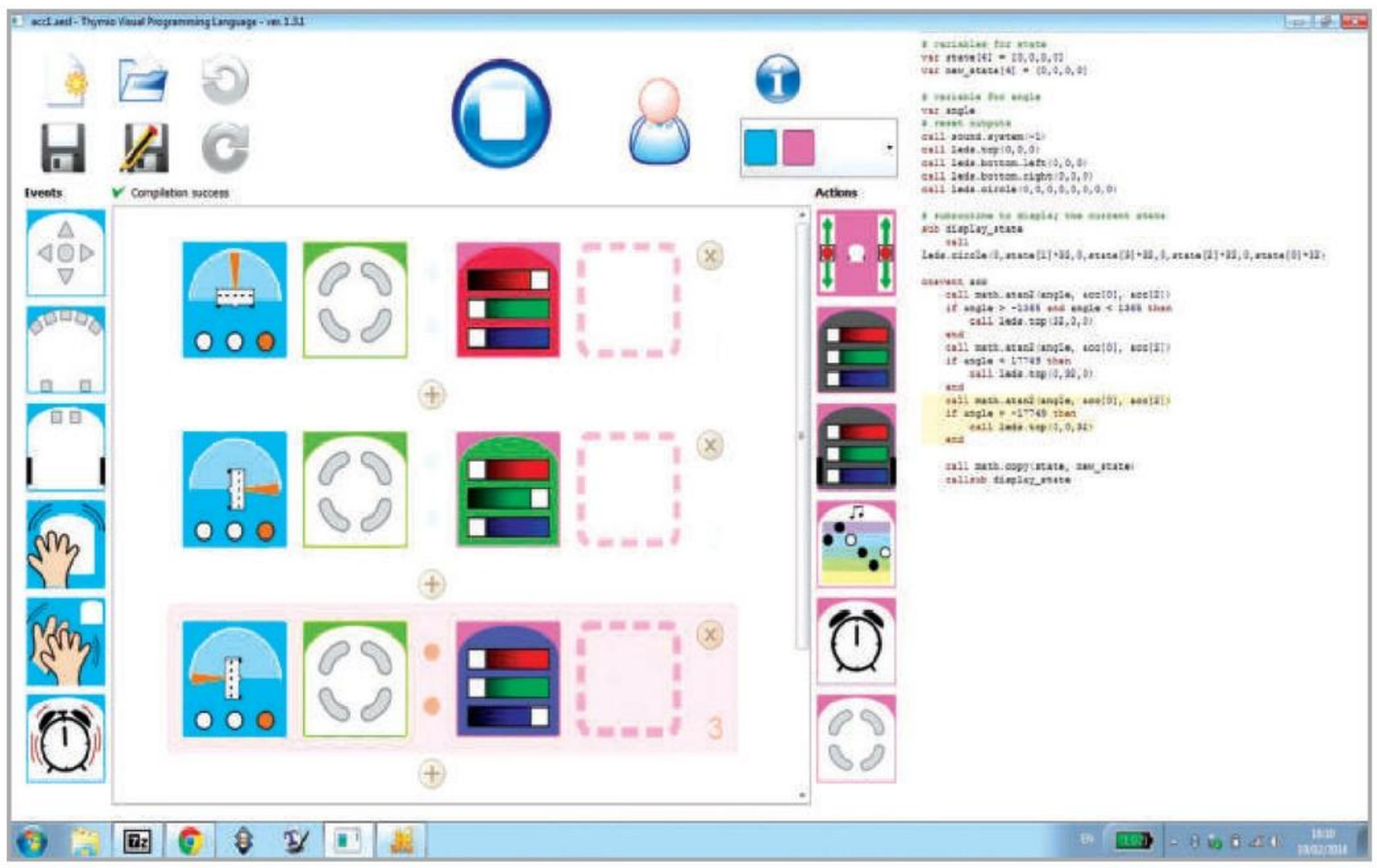
With encapsulation it is possible to alter an object without changing the rest of the program.

Two further categories of languages which belong to the fourth generation, but which show a higher level of abstraction, are object-oriented languages and visual languages.

Object-oriented languages

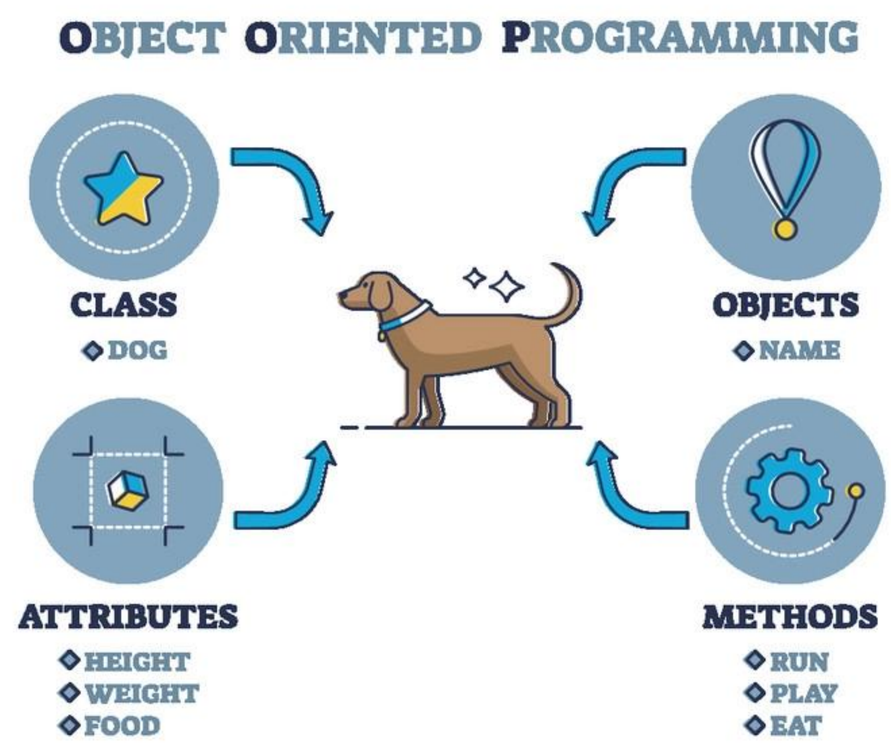
Object-oriented languages are used in **Object-Oriented Programming (OOP)** and are often described as the opposite of procedural languages since programs are built around objects and their interactions rather than on actions. Each **object** is a series of instructions to simulate a real-world object, for example the object *car* is a series of instructions to simulate a real *car*. An object belongs to a **class,** which is a set of procedures and data definitions from which many objects of the same kind can be created according to the principle of **inheritance**. For example, *vehicle* is a class to which the object *car* belongs. An **instance** of a class or of an object is the actual object created in run time (during the execution of the program), for example a real car, while the **methods** are the object's capabilities, that is what it can do, for example *move forward*. So, in OOP, a programmer tells the object what to do according to the characteristics that have been attributed to the object.

to belong to: *appartenere*
inheritance: *ereditarietà*
pattern: *schema*
run time: *tempo di esecuzione*
wheel: *ruota*



Features of OOP

Two important features of OOP are encapsulation and abstraction. **Encapsulation** is the technique by which all the data concerning the object are kept together. **Abstraction** is the process of identifying common patterns with only systematic variations. For example, for the class *vehicle* a common pattern is wheels because they are present in the class as a whole but can vary according to the object. In fact, there are two in a motorcycle, four in a car and many more in a lorry. Thanks to this process of generalisation the amount of information which needs to be memorised can be reduced.



Visual languages

With **visual programming languages (VPL)**, programs are created through a **GUI** (graphical user interface) which interacts with windows, icons and menus in order to execute commands such as copying, deleting, and moving files. The advantage is that it is no longer necessary to write a program using syntax. In fact, visual programming uses one or more **IDEs** (Integrated Development Environment), an applications package with interfaces providing a series of functions such as a code editor, a compiler or interpreter, a debugger and automation tools to assist the program developer. Today, there are many VPLs and some of them are hybrid, i.e. also text based, like the popular Visual Basic.

15 **Watch the video and answer the questions.**

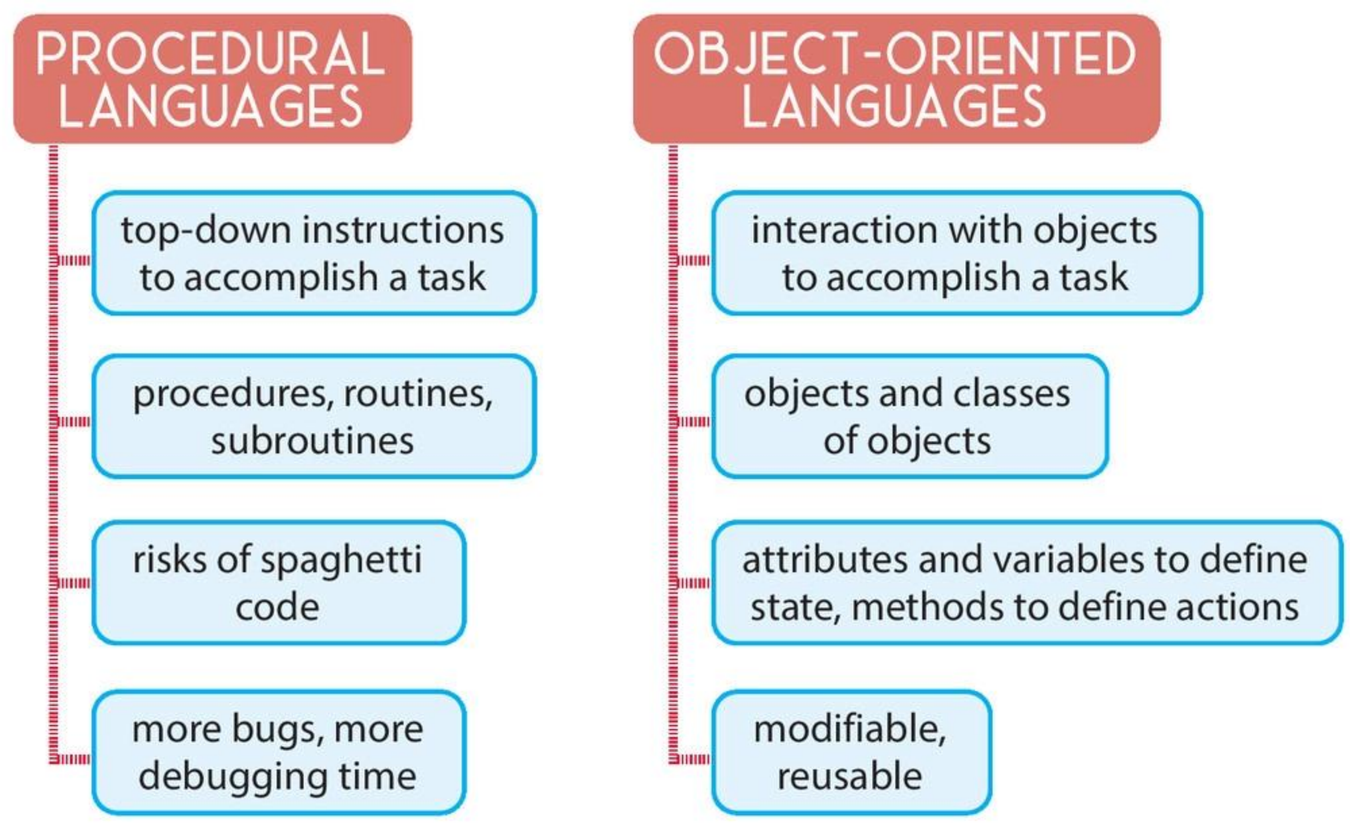
▸ What is Object-Oriented Programming (OOP)? *posted by* Treehouse

1. What are the advantages of OOP?
2. What can you encapsulate with OOP?
3. What are the properties of the object *card*?
4. How can new objects be created?
5. What do objects have?
6. What are actions called in OOP?

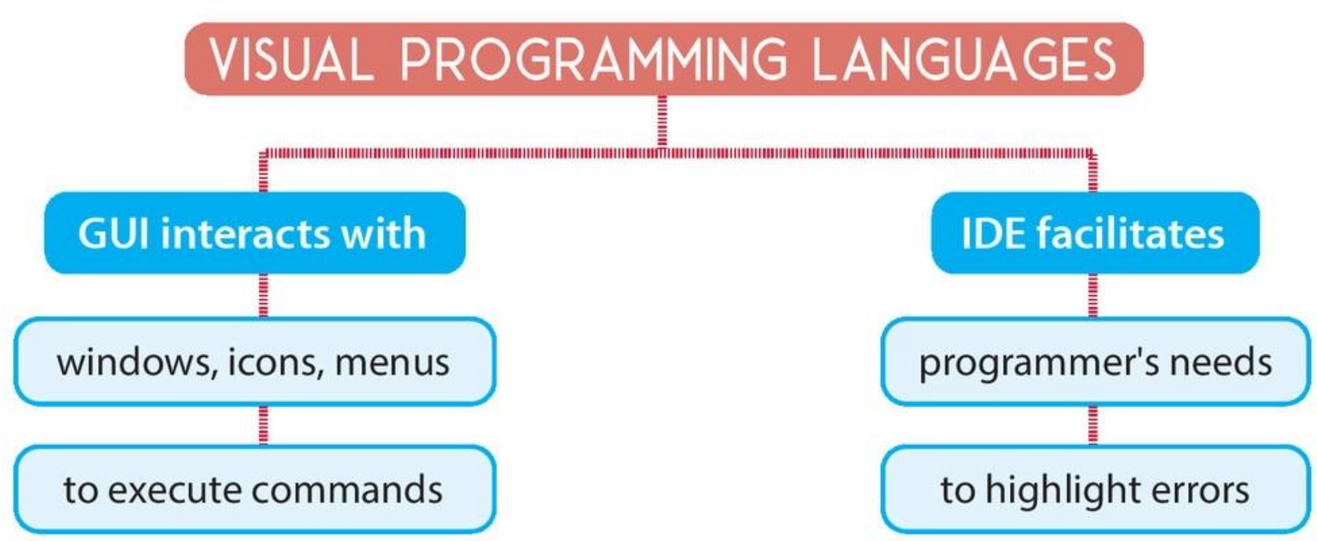
16 FIRST **Read the sentences, then complete the second so that it means the same as the first. Use no more than three words.**

1. A programmer can use a top-down approach to develop a program. →
   A top-down approach can ..... a programmer to develop a program.
2. Objects with the same characteristics are grouped into classes that have important similarities. →
   Classes are ..... with the same characteristics.
3. Class attributes are owned and shared by every object of the class. →
   An object ..... the same attributes with all the other objects of the class.
4. Subroutines are combined and nested in one another by programmers. →
   Programmers ..... subroutines in one another.
5. Once programmers have learnt OOP, they become more productive. →
   Learning OOP ..... become more productive.

17 **Look at the diagrams showing the different characteristics of procedural and object-oriented languages. Write a short text comparing the two.**



18 **Look at the diagram and describe the uses of visual programming languages.**



FIFTH AND SIXTH GENERATION LANGUAGES

Typical features of fifth generation languages are: a multiprocessor-based system, the use of AI and optical fibre circuits, and automated audio to control the workflow of the computer.

X++ is an example of a sixth generation language. It is used in enterprise resource planning (ERP) and database applications.

Fifth generation languages

Rather than using an algorithm written by a programmer (imperative programming), a **fifth generation programming language** (**5GPL**) • is based on solving problems using given constraints without the programmer, who only needs to worry about what problems need to be solved and what conditions need to be met without worrying about how to implement a routine or algorithm to solve them. This kind of programming is also called constraint-based programming, but 5GPLs also include logic programming languages (which use a form of mathematical logic to solve queries on a programmer-given database of facts and rules), and some declarative languages.

Limits

Fifth generation languages are used mainly in artificial intelligence research. Some examples are: Prolog (acronym for PROgramming LOGic), OPS5, and Mercury.

In the 1980s, fifth-generation languages were considered the future, and some predicted that they would replace all other high-level languages. However, as larger programs were

built, the flaws of the approach became more apparent. Starting from a set of constraints to define a particular problem is in fact very difficult. This step cannot yet be automated and still requires the insight of a human programmer.

Sixth generation languages

A **sixth generation programming language** (**6GPL**) is a very high-level programming language with extreme abstraction •• which usually consists of a set of human-readable instructions. It may be domain-specific or general-purpose and often applies natural language processing in order to function.

Basically, the operating system uses a natural language processor to analyse a command and determine its meaning. After determining the meaning, the natural language processor invokes an interlanguage decompiler (ILD) to rewrite the command in a common high-level language. Once the ILD decompiles the command, a low decompiler rewrites the command into assembly language or machine code. Then, the central processing unit executes the command.

constraint: *vincolo*
to deploy: *distribuire*
flaw: *difetto*
to implement: *implementare*
insight: *intuizione*
menial: *umile*

19 Read the text on Prolog and complete the notes.

An Introduction to Prolog

Prolog is a logic programming language. It has an important role in artificial intelligence. Unlike many other programming languages, in Prolog, logic is expressed as relations, called Facts and Rules. Formulation or computation is carried out by running a query over these relations.

In Prolog, we declare some facts. These facts constitute the Knowledge Base of the system. We can query against this Knowledge Base. We get an affirmative output if our query is already in the Knowledge Base or if it is implied by the Knowledge Base, otherwise we get a negative output. So, the Knowledge Base can be considered similar to a database, against which we can query. Prolog facts are expressed in a definite pattern. Facts contain entities and their relations.

Adapted from: *https://www.geeksforgeeks.org/prolog-an-introduction/*

Prolog

- Type of language: logic programming language
- Relations are called: .....
- Formulation: carried out by .....
- Facts: form the .....
- Knowledge Base: similar to .....
- Facts contain: .....

20 Read the text and choose the correct heading for each paragraph.

Abstract • Automation • Easy API calls • Easy learning curve • Potential for expansion • Special purpose languages

Key Elements for Future Programming Languages

What are future programmers going to need from their programming languages? That's a big and complicated question, especially considering we don't know what humanity's technological needs are going to be in the near or distant future. However, we can speculate about some important elements that all future programming languages are going to need to have.

1: ..... Today's apps and tools need to make frequent exchanges with each other, with the cloud, and with other databases. That's why modern programming languages need to have easy and convenient API (Application Programming Interface, ie. libraries of compiled code) calls available.

2: ..... It's easy to understand why developers favour automation: it makes everything easier. With the help of automation in a programming language, you can simplify your most menial tasks, test for bugs, and deploy code faster and more effectively.

3: ..... To date, some of the most successful programming languages have been ones that can be used for just about anything. But as our needs become more focused and more refined, it's going to be more important for "special purpose" languages to emerge – highly concentrated programming languages that are exclusively good for one or two types of applications.

4: ..... Everyone is going to be a programmer in the future – at least to an extent. Simple apps and scripts, like ones that make spreadsheet management easier, are going to be in demand by professionals and amateurs alike. That's why new programming languages need to have the simplest, most accessible learning curve; they need to be easily learnable if they're going to survive.

5: ..... The original purpose of programming languages was to convert the highly technical realm of coding to a higher layer of abstraction. In the future, programming languages may take this abstraction to an even higher level – grouping functions and simplifying commands to be even more intuitive.

6: ..... It's hard to imagine what kinds of devices we'll invent (and grow to need) in the future. That's why tomorrow's programming languages need to be flexible and allow plenty of room for further growth and development. You can't just make a language for today; you have to make a language for the decades to come.

Adapted from: *https://readwrite.com/what-the-future-of-programming-languages-looks-like/*

GRAMMAR

PRESENT TENSES

FORM

	Present Simple	Present Continuous	Present Perfect
+	I/we/you/they *write* code He/she/it *writes* code	I *am ('m) writing* code He/she/it *is ('s) writing* code We/you/they *are ('re) writing* code	I/we/you/they *have ('ve) written* code He/she/it *has ('s) written* code
–	I/we/you/they *do not (don't) write* code He/she/it *does not (doesn't) write* code	I *am ('m) not writing* code He/she/it *is not (isn't) writing* code We/you/they *are not (aren't) writing* code	I/we/you/they *have not (haven't) written* code He/she/it *has not (hasn't) written* code
?	*Do* I/we/you/they *write* code? *Does* he/she/it *write* code?	*Am* I *writing* code? *Is* he/she/it *writing* code? *Are* we/you/they *writing* code?	*Have* I/we/you/they *written* code? *Has* he/she/it *written* code?

USE

Present Simple	Present Continuous	Present Perfect
• **To state general truths or facts** ➤ *Programmers write computer programs.* • **To describe routines** ➤ *Every day I test and debug new programs.* • **To talk about habits.** ➤ *I always use flowcharts.* ➤ *I fix errors twice a week.*	• **Actions happening at the time of speaking** ➤ *I'm debugging the program at the moment.* • **Temporary actions** ➤ *I'm learning a new programming language this week.*	• **Finished actions in an indefinite past** ➤ *I have worked on a new program recently.* • **Actions close to the present** ➤ *I have just/already finished debugging.* • **Past to present actions** ➤ *I have worked on this program for three months.*

21 **Complete the sentences with the correct form of the verbs in brackets.**

1. I usually ..... (test) programs, but today I ..... (help) a colleague with code writing.
2. John ..... (not write) a program for ages, but he ..... (work) as a teacher recently.
3. A junior programmer usually ..... (job shadow) a senior programmer to learn the job.
4. I ..... (just finish) debugging.
5. Before writing code, I ..... (think) of an algorithm and then I ..... (draw) a flowchart, while Mary ..... (prefer) using pseudocode.
6. I ..... (write) hundreds of programs in the last 10 years.
7. A programmer ..... (write) programs, a user ..... (use) them.
8. ..... (you, complete) the test yet? – I ..... (work) on it now.
9. I ..... (be) a programmer since I was 25.
10. Writing code also ..... (include) some menial tasks.
11. I ..... (work) as a programmer since I graduated.
12. I ..... (never test) any program before.
13. I ..... (not write) an algorithm now, but I worked on one last month.

CITIZENSHIP

COMPUTER LANGUAGES vs NATURAL LANGUAGES

■ Computer languages

Computer languages or programming languages are used by computers and by programmers to communicate with computers. These languages have syntactic and semantic rules and are unambiguous, i.e. they are context-free. In fact, each command always has the same meaning, which is understood by all computers.

■ Natural languages

Natural languages such as English are languages spoken and written for communication. They consist of syntax, semantics, phonetics, etc. All natural languages have some fundamental grammar rules, and these rules are known and used. Natural languages can be ambiguous, i.e. one word can have different meanings according to the context and, for this reason, they require interpretation in context to be fully understood. However, these languages are creative and allow literary productions like poetry or the use of metaphors.

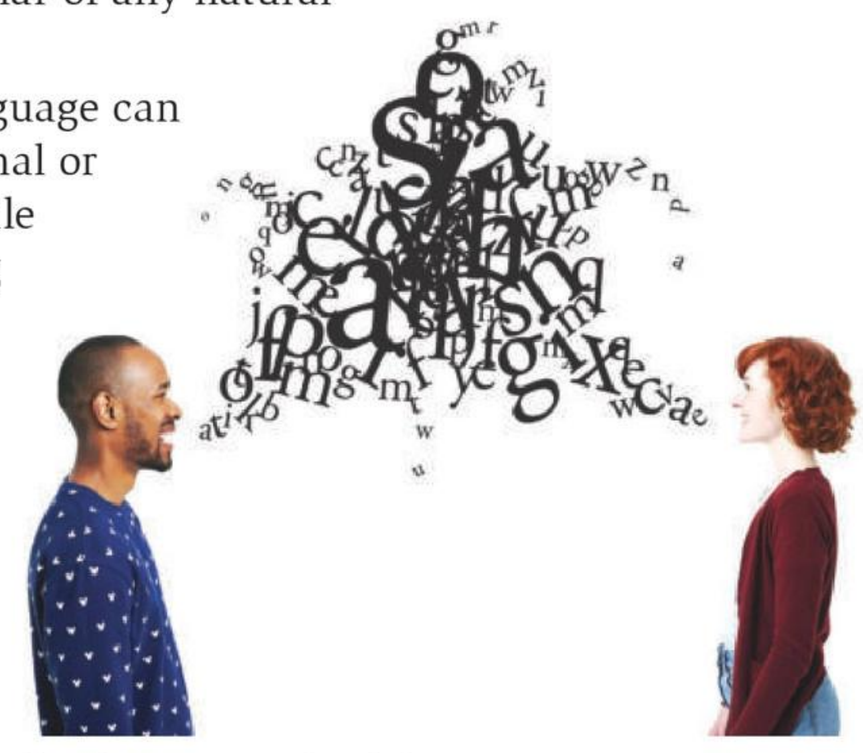
■ High-level languages vs natural languages

High-level languages are closer to natural languages than low-level languages. For example, high level languages also have a grammar, i.e. syntax and semantics.

However, they are still different from natural languages in many ways.

The main differences are that:

- natural languages are used for human communication, while programming languages are used by people to interact with machines;
- programming languages need a high degree of expertise and precision because computers can only understand the statements provided by the programmer literally, i.e. they cannot 'read between the lines'. On the contrary, minor errors when speaking in a natural language are not an obstacle to the comprehension of the message;
- the syntax of programming languages is not based on the grammar of any natural language;
- a natural language can be either formal or informal, while programming languages follow only one, specific syntax.



22 **Answer the following questions.**

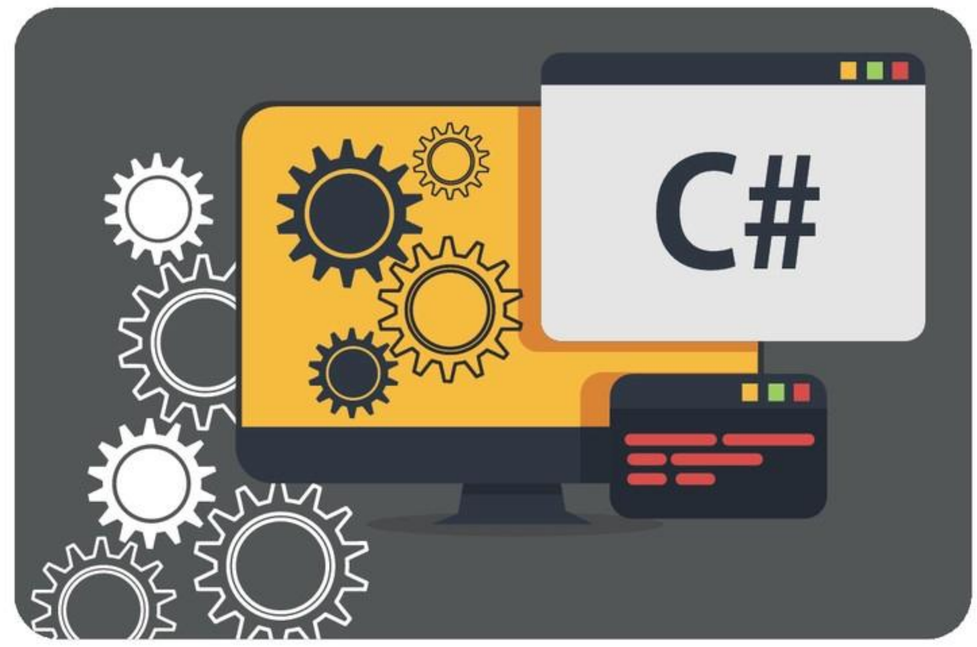
1. What are the different uses of programming languages and natural languages?
2. What are the main characteristics of programming languages?
3. What are the main characteristics of natural languages?
4. What is the role of context in both languages?
5. Which is easier to use according to the text?
6. Is there a relationship between the grammar of a natural language and that of a programming language?

23 GROUP WORK **Discuss the following points.**

1. In your opinion, is ambiguity a problem or an advantage?
2. Would you like to eliminate ambiguity in everyday speech?
3. Do you think that the adoption of a simplified artificial language would facilitate communication?
4. Do you think that an unambiguous language would be an obstacle to creativity and would therefore be against the freedom of expression?
5. A lingua franca is a language that facilitates communication between people who speak different languages. Do you think that life would be easier if we all spoke the same language? Why? Why not?
6. What do you think of languages spoken by minority groups? Should they be preserved or replaced by a language spoken by a larger group or a lingua franca?

3.2 COMPUTER PROGRAMMING

THE C FAMILY



■ The first C language

C is a general-purpose programming language•. Its design provides constructs that map typical machine instructions efficiently, and it has therefore found lasting use in applications that had formerly been coded in assembly language, in particular system software like the Unix operating system. Its success is due to the fact that there are different types of C compilers to fit any type of computer architecture.

It was developed by Dennis Ritchie between 1969 and 1973 at Bell Labs.

■ Other C languages

Many later languages have borrowed directly or indirectly from C, including C#, Java, JavaScript, Perl, and Unix's **C Shell** in the late 1970s. The most pervasive influence on these languages has been syntactical, in fact they tend to use the recognisable expression and statement syntax of C.

Successive developments of C language include:

- **C++** •• It was designed for general object-oriented programming in the days when the typical computer was a standalone machine running a command line-based user interface. It is a general-purpose programming language with high-level and low-level capabilities. It is usually compiled and supports procedural programming, data abstraction, object-oriented programming and generic programming.

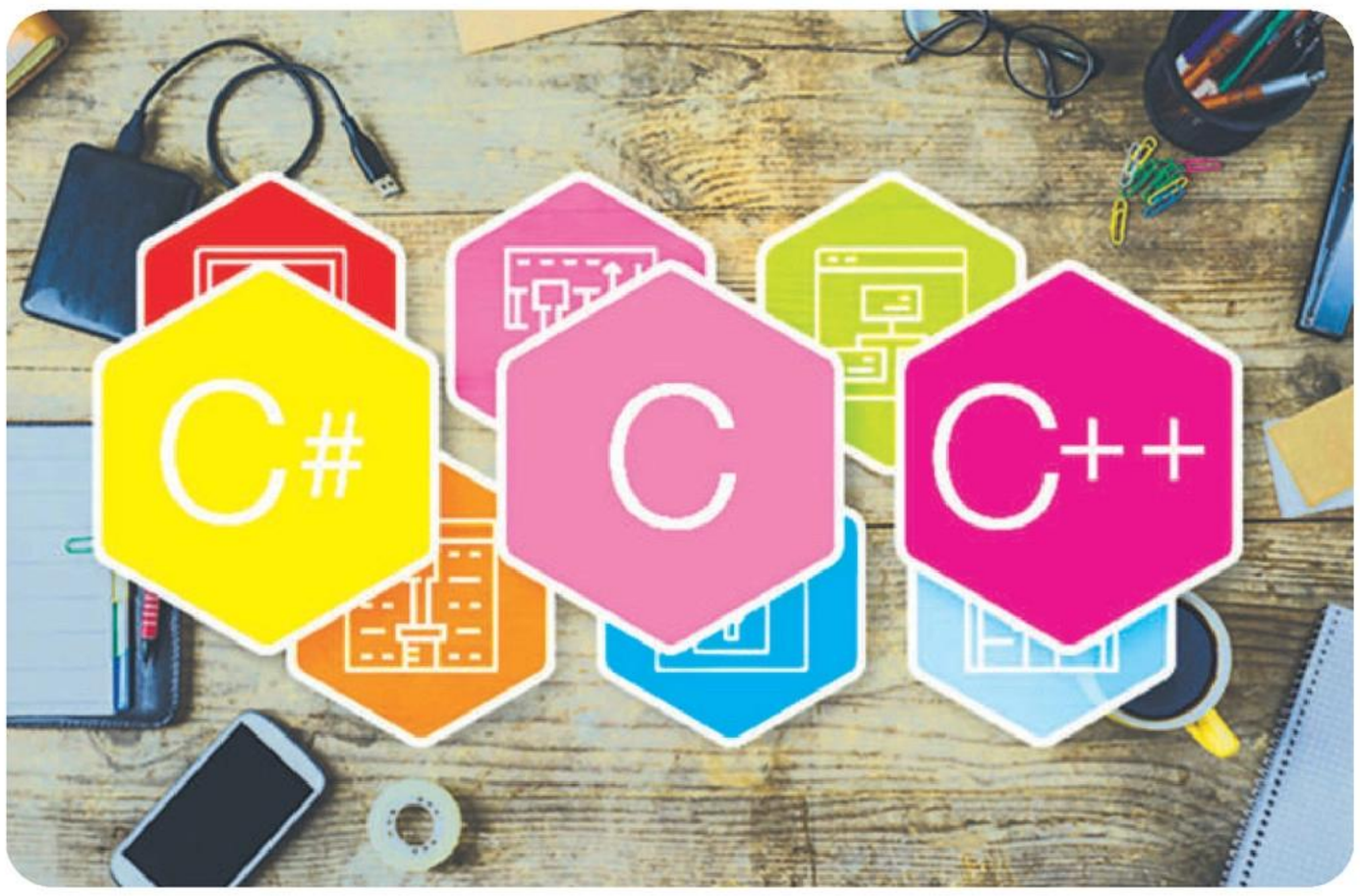
It was designed and implemented at Bell Labs in 1979. The programmer was Bjarne Stroustrup. The ++ in its name indicates that a variable should be incremented by 1.

- **C#** ••• It is a simple, modern, general-purpose, object-oriented programming language. It is one of the programming languages designed for the **Common Language Infrastructure (CLI)**, a technical standard developed by Microsoft that allows multiple high-level languages to be used on different computer platforms. C# is specifically designed to work in the modern environment of Windows and mouse-controlled user interfaces, networks and the Internet.

C# is pronounced *see sharp*. The name C# was inspired by musical notation where a sharp indicates that the written note should be made a semitone higher in pitch.

- **Microsoft Visual C#** Developed in 2010, it is a programming environment used to create computer applications for the Microsoft Windows family of operating systems. The latest version is **Visual Studio 2022**•.

Check if Visual Studio is free.



to borrow: *prendere in prestito*
construct: *costrutto*
formerly: *precedentemente*
to handle: *gestire*
lasting: *durevole*
pitch: *tono*
to require: *necessitare*
standalone: *autonomo*

1 (3.6) **Listen to a radio extract and complete the tables.**

The 2021 Top Programming Languages		
Rank	Language	Spectrum ranking
1		100
2		
3	C	
4		92.4
5	Javascript	88.1
6		82.4
7	R	81.7
8		77.7
9	HTML	
10	Swift	

Predictions for the year 2022	
Rank	Language
1	
2	
3	
4	
5	
6	
7	Go
8	
9	Swift
10	

2 **Use the Internet to find data on the top programming languages for the current year. Compare this with the information in the tables of the previous activity.**

3 **Read the text and decide if these statements are true or false. Correct the false ones.**

The Design of C++

The purpose of a programming language is to help express ideas in code. To do this, a programming language performs two related tasks: it provides a vehicle for the programmer to specify actions to be executed by the machine, and it provides a set of concepts for the programmer to use when thinking about what can be done. The first purpose ideally requires a language that is close to the machine so that all important aspects of a machine are handled simply and efficiently in a way that is reasonably obvious to the programmer. The C language was primarily designed with this in mind. The second purpose ideally requires a language that is close to the problem to be solved so that the concepts of a solution can be expressed directly and concisely. The facilities added to C to create C++, such as function argument checking, classes, constructors and destructors, exceptions, and templates, were primarily designed with this in mind. Thus, C++ is based on the idea of providing both: 1. direct mappings of the operations and efficient memory use, and 2. affordable and flexible abstraction mechanisms.

This was initially achieved by applying ideas from Simula to C. Over the years, further application of the simple ideas resulted in a far more general, efficient, and flexible set of facilities. The result supports a synthesis of programming styles that can be simultaneously efficient and elegant.

The design of C++ has focused on programming techniques dealing with fundamental notions such as memory, mutability, abstraction, resource management, expression of algorithms, error handling, and modularity, which are the most important concerns of a system programmer.

Adapted from: *B. Stroustrup, The C++ Programming Language, Fourth Edition, Addison-Wesley Professional, 2013*

	T	F
1. Actions are executed by the machine and concepts are expressed by the programmer.	☐	☐
2. Concepts require a language that is close to the machine.	☐	☐
3. C++ added facilities to C in order to solve problems in a more direct and concise way.	☐	☐
4. C++ provides efficient memory.	☐	☐
5. Applying ideas from Simula to C++ made the language more efficient and flexible.	☐	☐
6. C++ takes into account memory, changeability, the use of resources, and dealing with errors.	☐	☐

HYPERTEXT MARKUP LANGUAGE (HTML)

XML is another example of a markup language. Use the Internet to find out what the acronym means and what the program is used for.

The current HTML5 is now just HTML and will continually be updated with new features without changing its version number. It's called a "living standard".

Web page editors are available for people who do not know how to use HTML. They provide readymade templates to be filled in with texts and images.

Hyper Text Markup Language, or simply **HTML**, is one of the best-known examples of a markup language and is one of the protocols (that is, agreed-upon formats for transmitting data between devices) of the World Wide Web (www).

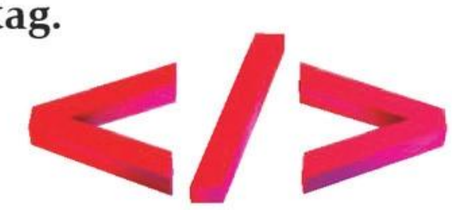
It is the standard language for creating the structure of web pages. Web pages are nothing more than simple text files containing a series of HTML commands which are interpreted by a browser to display a page. HTML elements, represented by **tags,** are the building blocks of the web page; the browser does not display them, but uses them to render the content of the page.

Tags

HTML tags are element names surrounded by angle brackets:

<tagname> *content goes here* </tagname>

HTML tags normally come in pairs like and . The first tag in a pair is the **start (or opening) tag,** the second is the **end (or closing) tag.** The end tag is written like the start tag, but with a **forward slash** inserted before the tag name.



The main parts of a basic HTML document

<!DOCTYPE html>	The **declaration** that defines the document type; in this case it is an HTML document.
<html>	The **root element** of an HTML page. It marks the opening of the document.
<head>	The **head**, i.e. content that appears at the top of every page of the website such as a logo, navigation menu, etc.
<title>Page Title </title>	The **title** of the page.
</head>	The **closing of the heading** before the specific content of the page, e.g. an article.
<body>	The **body** or visible content to be displayed by the browser.
</body>	The end of the visible text.
</html>	The **closing** of the document.

Longer texts are organised in **headings** and subheadings with a set of tags from <h1> to <h6>, where <h1> defines the largest heading, and <h6> the smallest. For example, <h1> for the title of a module, <h2> for a unit, <h3> for a chapter, etc.

Tags for graphic elements

<form> ..... </form>	A **form** is an area that allows the user to enter information such as fields, menus, checkboxes, etc.
<table> ..... </table>	A **table** can be further divided into **rows** (<tr>) and **data cells** (<td>). The content of the cell can be text, images, lists, etc.
<frame> ..... </frame>	With frames it is possible to display more than one HTML document in the same browser window. Each document is called **a frame** and is independent from the other documents.

agreed-upon: *concordato*
angle bracket: *parentesi angolata*
frame: *cornice*
heading: *titolo*
root: *radice*
sidebar: *barra laterale*

4 (3.7) **Listen to three people discussing HTML5 and decide who says what: John (J), Adam (A) or Tess (T).**

1. HTLM5 adds new tags. ☐
2. HTML5 has a lot of new features. ☐
3. HTML is an application development platform. ☐
4. HTML5 is very different from the previous versions. ☐
5. HTML5 provides geo-localisation. ☐
6. HTML5 removes old tags. ☐
7. With HTML5 it is possible to draw graphics using Java Script. ☐
8. With HTML5 you can build interactive 2D and 3D graphics. ☐
9. With HTML5 you can play audio and video. ☐
10. With HTML5 allocation is more precise. ☐

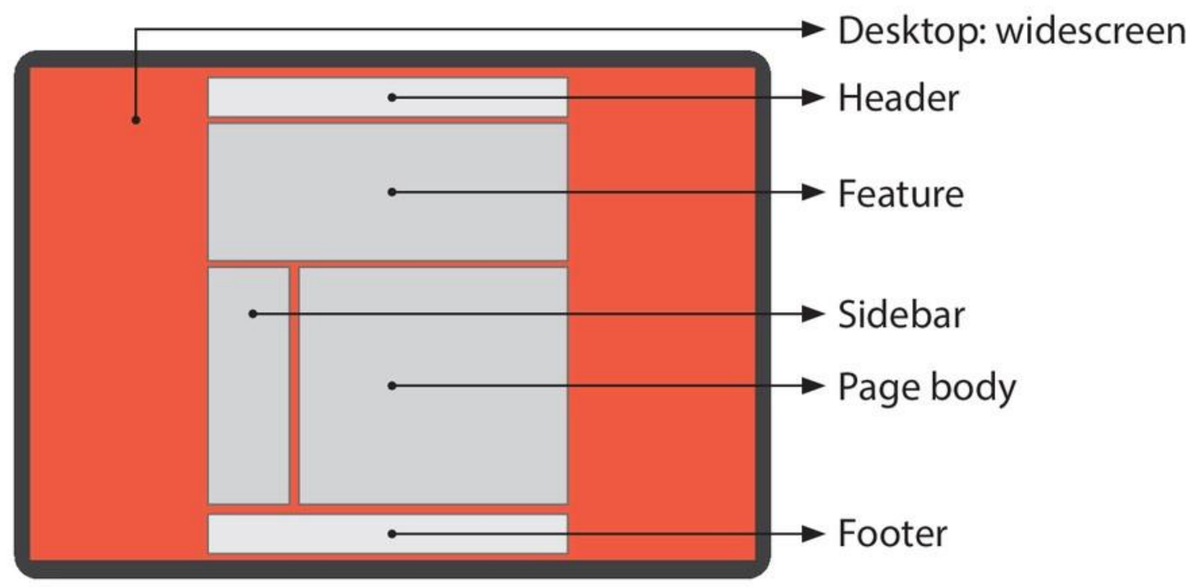
5 **Match these tags of HTML5 with their definitions.**

address • article • aside • footer • header • main • nav • section

1. It is used to contain the content that appears at the top of every page of your website: the logo, tagline, search prompt, and possibly a navigational menu. .....
2. It is the element between the header and the footer which contains the primary content of the web page. It is a direct descendant of the body element. .....
3. It is commonly placed at the top of the web page, in a sidebar, or in the page footer. It is used for blocks of links that provide navigation. .....
4. You can use this element when you want to include blog posts or articles on your web page. It is a direct descendant of a main element. .....
5. This element is used to identify content that is a major sub-section of a larger whole. For example, you can divide a chapter into smaller parts. .....
6. If your website contains information that is not directly related to the main content of the page, it would be more appropriate to use this type of tag. For example, if you write a post that includes some technical terms, you can add the definitions to the sidebar. .....
7. This element provides contact information. It can be used inside an article to provide information about the article's author, or outside the article, for example in the footer, to provide information about the website's owner. .....
8. It appears at the bottom of a document section. Typically, it is a direct descendant of the body element and its most common use is for copyright notice, links to related content or to policies, e.g. privacy policy, and website terms of service. .....

Adapted from: *http://html.com/document/#ixzz4bKbd1Omn*

6 **Look at the template of a standard web page and imagine you want to create a personal website. What would you put in each section?**



JAVA

Find out what Javascript and Javasoft refer to.

Java was initiated by a small group of engineers called the Green Team in 1991 and later developed by Sun Microsystems. Originally called Oak, it changed its name, was modified for the www and was later acquired by Oracle in 2009.

Java standard library includes hundreds of classes and methods in six major functional areas which are: language support, utility, input/output and networking classes and a toolkit for platform-independent GUI applications.

Java is both a programming language and a platform.

Java programming language

Java is a general purpose, high-level programming language originally designed for handheld devices.

It is an object-oriented language similar to C++, simplified in order to eliminate language features that might cause common programming errors. Java **source code**, i.e. files with a *.java* extension, is made up of files written in plain text and then compiled into a format called **bytecode**, i.e. with the extension *.class*.

Java is both compiled and interpreted. Compiled Java code can run on most computers because Java interpreters and runtime environments, known as **Java Virtual Machines (JVM)**, exist for most operating systems, including Windows, Unix and Macintosh OS. Bytecode can also be converted directly into machine language instructions by a **just-in-time compiler (JIT).**

Java platform

Java is more than just a language; it is also a platform, which means that Java also provides the environment in which a Java program runs. The **Java platform** differs from most other platforms, which are a combination of the operating system and the underlying hardware, because it is a software-only platform that runs on top of other hardware-based platforms.

Java platform is made up of two components:

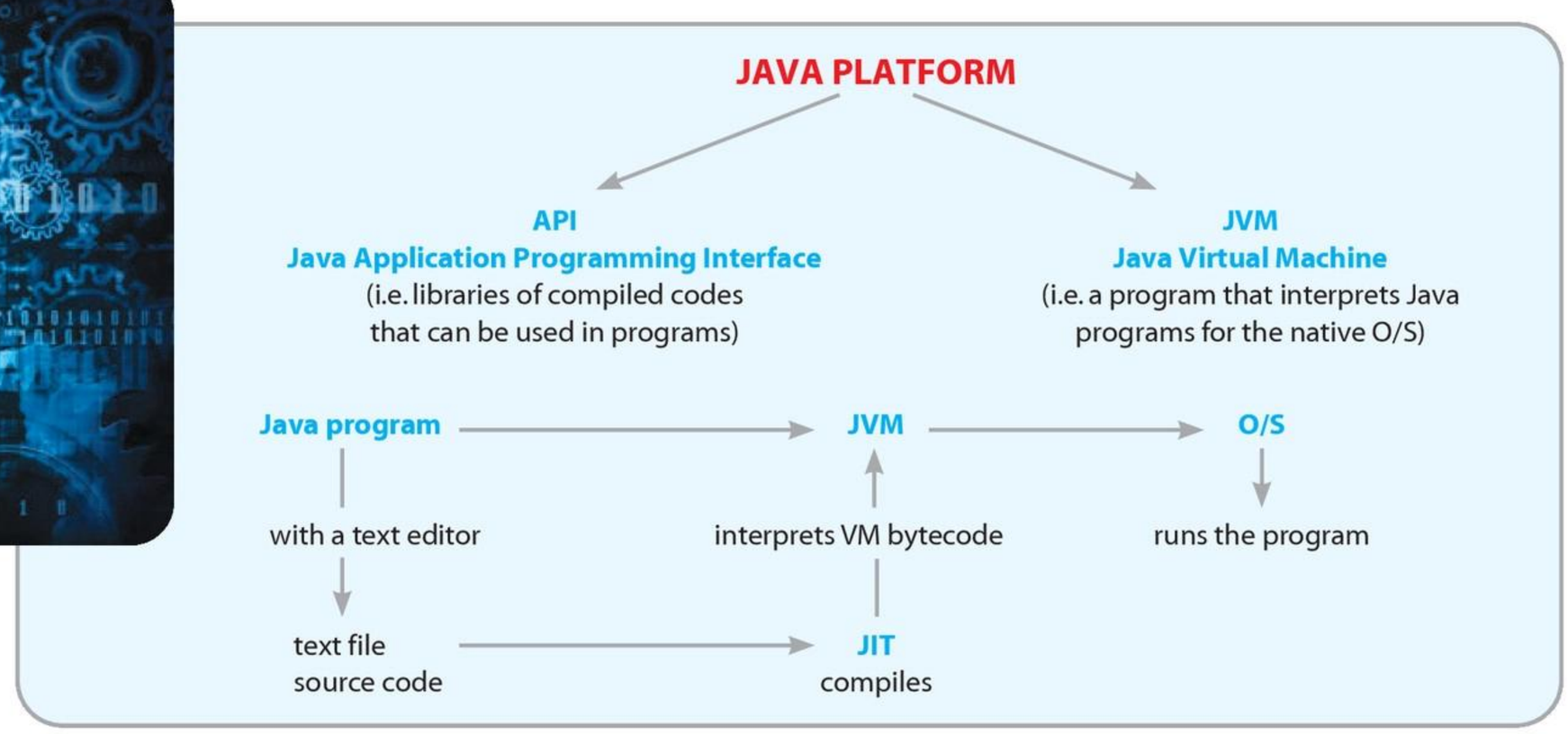
- Java Virtual Machine (JVM),
- Java Application Programming Interface (API).

JVM

The **Java Virtual Machine** is an abstract computing machine, a type of environment that works with any platform. It converts Java bytecode into machine language and executes it. It makes it possible to run Java programs on any platform that has it. With a JIT compiler, Java applications, after a short delay during loading, tend to run as fast as native programs. While Java programs are platform independent, the code of Java Virtual Machines (JVM) is not and every supported operating platform has its own.

API

The **Java Application Programming Interface (API)** is a large collection of ready-made software components that provide many useful capabilities grouped into **libraries** of related classes and interfaces known as **packages.**



delay: *ritardo*
plain: *semplice*
tip: *consiglio*
underlying: *sottostante*

7 (3.8) **Listen to an extract from a lesson on Java technology and take notes.**

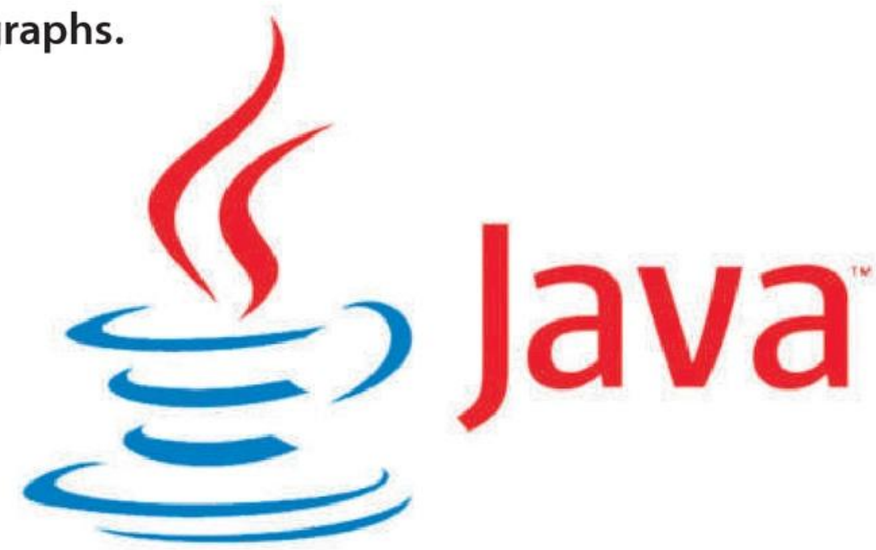
1. What Java technology means: .....
2. What type of programming language Java is: .....
3. What its main characteristics are (at least 6): .....
4. Whether the program is compiled or interpreted: .....
5. What the compiler does: .....
6. What Java bytecodes are .....
7. What the interpreter does: .....
8. How many times compilation occurs: .....

8 PAIR WORK **Discuss the characteristics of Java language. What do they mean? Use the Foldoc online dictionary to help you.**

1. Simple
2. Object-oriented
3. Distributed
4. Interpreted
5. Secure
6. Architecture neutral
7. Portable
8. High performance

9 **Read a text on Java and match the headings with the paragraphs.**

1. Write less code
2. Write once, run anywhere
3. Develop programs faster
4. Write better code
5. Distribute software upgrades from a central server
6. Get started quickly
7. Avoid platform dependencies



How Will Java Technology Change my Life?

We can't promise you fame, fortune, or even a job if you learn the Java programming language. Still, it is likely to make your programs better and requires less effort than other languages. We believe that Java technology will help you do the following:

- ☐ Although Java is a powerful object-oriented language, it is easy to learn, especially for programmers already familiar with C or C++.
- ☐ A program written in Java can be four times smaller than the same program in C++.
- ☐ Java encourages good coding practices. Its object orientation lets you reuse other people's tested code and introduces fewer bugs.
- ☐ Your development time may be twice as fast versus writing the same program in C++. Why? You write fewer lines of code and it is a simpler programming language than C++.
- ☐ You can keep your program portable by following the tips mentioned throughout this tutorial and avoiding the use of libraries written in other languages.
- ☐ Because 100% pure Java programs are compiled into machine-independent byte codes, they run consistently on any Java platform.
- ☐ You can upgrade applets easily and from a central server.

10 **Look at the diagrams on Java platform on the previous page and explain how it works.**

The Java platform consists of…
A Java program…

PYTHON

Python• is a general-purpose, open source, high-level language created by Guido van Rossum•• and first released in 1991. It is an interpreted language which focuses on code readability. For this reason, it uses whitespace indentation to delimit code blocks and a syntax which allows programmers to express concepts in fewer lines of code than C++ or Java.

Monty Python, or The Pythons, were a British surreal comedy group active between 1969 and 2014.

Van Rossum started Python to keep busy during his Christmas holidays. He wanted his codes to be reusable and easily readable.

A programming language is dynamically-typed when the majority of its types are checked at run-time, i.e. during the execution of the program. This way, the program is able to catch more errors.

Uses of Python

Python is a **dynamically-typed** language••• and supports multiple programming paradigms such as object-oriented, functional and procedural programming. It is also available for many operating systems and is mainly used for web developments, data analysis, artificial intelligence, and scientific computing. Some developers also use it for productivity tools, games and desktop applications.

Python has an abundance of libraries that assist with data analysis and scientific computing.

Features of Python

Python has the following characteristics:

- **Beginner friendly** – It is easy to understand and fun to use. In many top American universities, it has replaced Java for building prototypes and tools quickly;
- **Flexibility** – Being a dynamically-typed language, there are no strict rules on how to write the code and problems can be solved by using different methods.
- **Difficult maintainability** – As the language is flexible, the same thing can mean something different depending on the context. Moreover, as a Python application grows larger and more complex, it may become difficult to track and fix errors.
- **Slow speed** – It is slow because it is too flexible. The machine needs to do a lot of referencing to check the meaning of a definition sometimes, and this may slow the performance down. **Pypy** is a faster implementation which, although not as fast as Java, improves the speed greatly.

alongside: *accanto*
hangup: *blocco*
indentation: *rientro (tipografico)*
pipeline: *canale*
powerhouse: *potenza*
shell: *interprete di comando che trasmette un comando al sistema operativo*

11 **Define these expressions using your own words. Make reference to what you have learned up to now.**

1. General-purpose language
2. High-level language
3. Object-oriented language
4. Procedural language
5. Dynamically-typed language
6. Beginner friendly

12 **Read the text and complete it with the missing words. Then, read it again and answer the questions below.**

A Python Success Story

Industrial Light & Magic (ILM) was started **1.** ..... 1975 by filmmaker George Lucas, in order **2.** ..... create the special effects for the original *Star Wars* film. Since then, ILM has grown into a visual effects powerhouse that **3.** ..... contributed not just to the entire *Star Wars* series, but **4.** ..... to films as diverse as *Forrest Gump, Jurassic Park, Who Framed Roger Rabbit, Raiders of the Lost Ark,* and *Terminator 2.* ILM has won numerous Academy Awards for Best Visual Effects.

In 1996, ILM staff began **5.** ..... search for ways to control an increasingly complex and compute-intensive production process. It was around this time that Python version 1.4 came out, and Python was proving itself to be **6.** ..... powerful yet simple language that could **7.** ..... used to replace Unix shell scripting. Python was evaluated, compared **8.** ..... other technologies available at the time, and chosen as **9.** ..... easier way to learn and use language with which to incrementally replace older scripts.

At ILM, speed **10.** ..... development was crucial, and Python was a faster way to code, and re-code, the programs **11.** ..... controlled the production pipeline. But Python was not designed just as **12.** ..... replacement for shell scripting and, as it turned out, Python enabled much more for ILM than just process control. As Python was used more widely, extending and customising in-house software became a lot easier. By writing **13.** ..... Python, users could recombine software components and extend or enhance standard applications needed for each new image production run, and even some of ILM's non-technical users **14.** ..... able to learn enough Python to develop simple connections and **15.** ..... create and modify production control scripts alongside the technical users. Encouraged **16.** ..... its successes, ILM started to use Python in other applications as well.

Python is now used **17.** ..... tracking and auditing functionality within the production pipeline, while **18.** ..... Oracle database keeps track of the hundreds of thousands of images that are created and processed for each film.

Adapted from: *https://www.python.org/about/success/ilm/*

1. What type of company is ILM?
2. Which film productions did they take part in?
3. What happened in 1996?
4. Why was Python chosen?
5. What was the initial use of Python?
6. What is Python used for now?

WHERE DOES PYTHON COME FROM? WHERE DOES IT GO?

Van Rossum's main influence in creating the Python language were two other languages, namely ABC and Modula. Python's distinct features such as readability, reusability and indentation for statement grouping were taken from the teaching language ABC. Python's feature of generating fewer hangups compared to other conventional programming languages was influenced by Modula-3.

Today, Python is one of the most popular languages and it's used by every tech giant in one way or another. YouTube, Google, Reddit, Spotify, and Facebook are using Python alongside many other technologies to make their algorithms effective and efficient.

PHP

A scripting language is a language that is interpreted and that is usually used for short scripts rather than full programs. Javascript is also a scripting language used for web development. Look up the difference between Javascript and PHP.

A recursive acronym is an acronym where the first letter is the acronym itself.

The Zend Engine is a compiler and runtime environment for the PHP scripting language.

PHP is both an open-source server-side scripting language used for web development and a general-purpose language for a lot of projects, including graphical user interfaces (GUIs).

The abbreviation PHP initially stood for Personal Homepage, but now it is a recursive acronym for PHP Hypertext Preprocessor.

PHP runs on the Zend Engine, which is the most popular implementation. There are some other implementations like HPVM (Hip Hop Virtual Machine), and Hip Hop.

PHP is mostly used for making web servers.

Advantages of PHP

PHP has some advantages that have made it so popular.

- **Cross-platform**: PHP is platform-independent, i.e. it can work with different operating systems.
- **Open source**: the original code is available to everybody on the Internet.
- **Easy to learn**: PHP is not hard to learn for absolute beginners.
- **Synchronisation with all databases**: PHP can easily be connected to any database, relational or non-relational.
- **Supportive community**: PHP has a very supportive online community. The official documentation provides guides on how to use its features.

Who uses PHP?

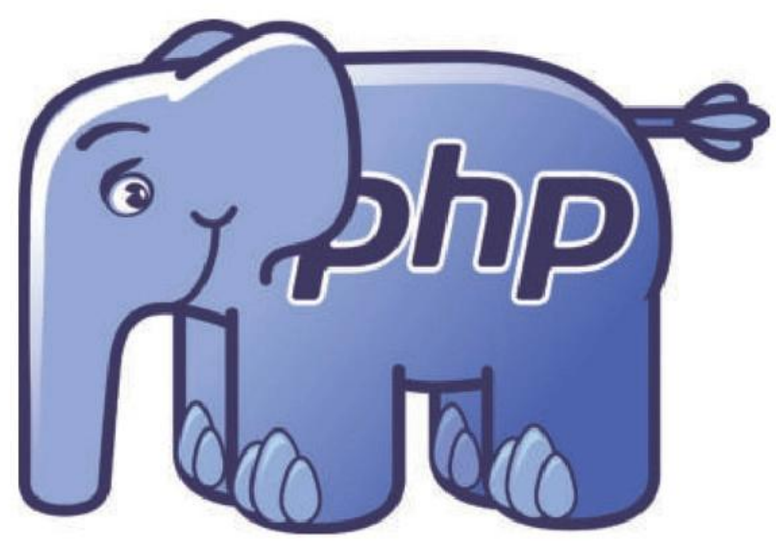
A number of established companies and tech giants use PHP to run their servers.

Here are some examples:

- Facebook; the company contributed to the community by creating an implementation known as Hip Hop.
- WordPress, one of the most popular content management systems.

Other examples are Wikipedia, Joomla and Spotify.

In terms of job availability, PHP ranks better in the job market than a lot of other programming languages because of its diffusion.



fledged: *sviluppato*
implementation: *realizzazione, attuazione*
model-view controller (MVC): *modello di architettura del software*
to rank: *posizionarsi, classificarsi*

13 Decide if the following statements are true or false. Correct the false ones.

	T	F
1. PHP is a client-side scripting language.	☐	☐
2. The Zend Engine is a PHP implementation.	☐	☐
3. Cross-platform can be used to mean platform-independent.	☐	☐
4. PHP can work with any database.	☐	☐
5. PHP has created Hip Hop for Facebook.	☐	☐
6. PHP programmers have difficulty finding a job.	☐	☐

14 Watch the video about PHP and find and correct the six mistakes in the following text.

▸ What is PHP? *posted by* Treehouse

What is PHP?

PHP is an open-source, general purpose scripting language, built using the C+ language, which stands for PHP, Hypertext Processor.

PHP initially stood for "Personal Homepage", but today PHP uses a recursive acronym, that is to say, an acronym that refers to itself. Nifty huh?

PHP can be embedded directly into HTML and is excellent for creating advanced websites or a half-fledged Software as a Service application.

PHP is also the foundation language of Laravel, one of the most in-demand open-source PHP implementations which speeds up development and uses MVC, a design pattern for building basic web applications.

15 Use the following information to compare programming and scripting languages.

Programming language	Scripting language
It has all the features needed to develop complete programs and applications.	It is mostly used for routine tasks.
The code has to be compiled before it can be executed.	The code is usually interpreted.
It does not need to be embedded into other languages.	It is usually embedded into other software environments.

COM AND BINARY REUSE

COM is a model base on binary reuse. This means that software components adhering to COM can be reused without any dependencies on source code.

Developers can ship their code as binary files without revealing their proprietary algorithms.

The use of COM eliminates compile-time problems.

The binary reuse makes it possible to build COM-based applications using language-independent components.

When several teams are building components for a single system, each team can choose its programming language independently.

BUILDING A PROGRAM – STAGE 1

A task can be anything from the solution of a mathematical problem to the production of a company payroll.

Ada Lovelace was the first to create an algorithm intended for implementation on a computer in 1842.

What do you use to map a program? A flowchart or pseudocode? Why?

■ Programming

Programming is the process by which a set of instructions is produced for a computer to make it perform a specific task•. The instructions ultimately obeyed by the computer are the numerical codes significant to the computer's central processor.

Since a computer cannot reason, it cannot be expected to perform any task adequately unless: 1. the problem it is required to solve has been specified correctly in every detail, and 2. the instruction it is asked to obey has been defined in complete detail for each step of the solution.

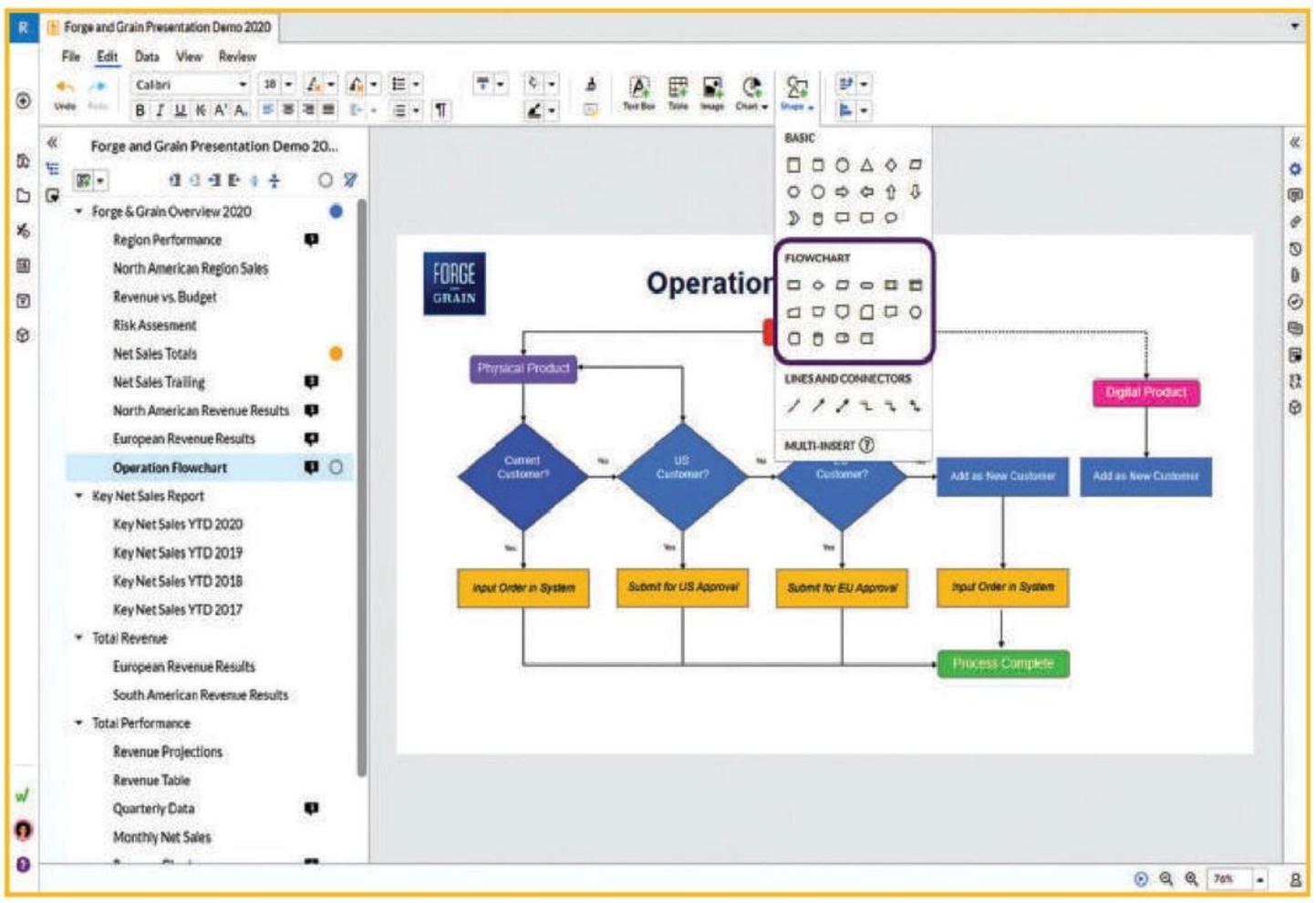
■ Stages of programming

The main steps which have to be covered before a program is completed are:

- **understanding and mapping** the program, that is understanding the problem, developing an **algorithm** for its solution, and preparing a flowchart or **pseudocode**;
- **writing the program** in a programming language;
- **testing the program** and **writing documentation**.

ONLINE RESOURCES

- Algobuild



■ Stage 1: understanding and mapping the program

Understanding the problem is of fundamental importance. A detailed program specification will include descriptions of all inputs to be processed by the program, the processing required and details of all output from the program. The procedure that will give the solution to the problem has been given the formal name of **algorithm**••.

■ Features of algorithms

A good algorithm defines a set of instructions that are:

- **well-defined**: it defines the exact steps to follow and their specific order;
- **unambiguous**: it leaves no doubt what action must be taken at each step;
- **effective**: it produces the desired solution or results;
- **finite**: it terminates, i.e. it does not execute indefinitely.

■ Flowcharts and pseudocodes

Flowcharting the problem is the next step. A **flowchart** provides a snapshot of the logic of the algorithm: it is a graphic representation of the flow of operations by means of symbols. These usually conform to some standard set in which each symbol has a specific meaning.

We use flowcharts to describe algorithms because they are both an excellent aid in developing the logic, and an accepted means of documenting the algorithm. Alternatively, **pseudocode**• can be used: it is a compact and informal high-level description of an algorithm. It usually combines some of the structures of a programming language with an informal natural language description of the computations to be carried out.

to be carried out: *essere eseguito*
snapshot: *immagine*

16 Answer the questions.

1. What is programming?
2. What should a detailed program specification include?
3. What is an algorithm?
4. What are the characteristics of an algorithm?
5. What is a flowchart?
6. What is pseudocode?

17 In a popular mobile game, "Talking Tom", you have to look after a cat called Tom. Here is a series of algorithms of what you can do with Tom. Match the beginnings and endings.

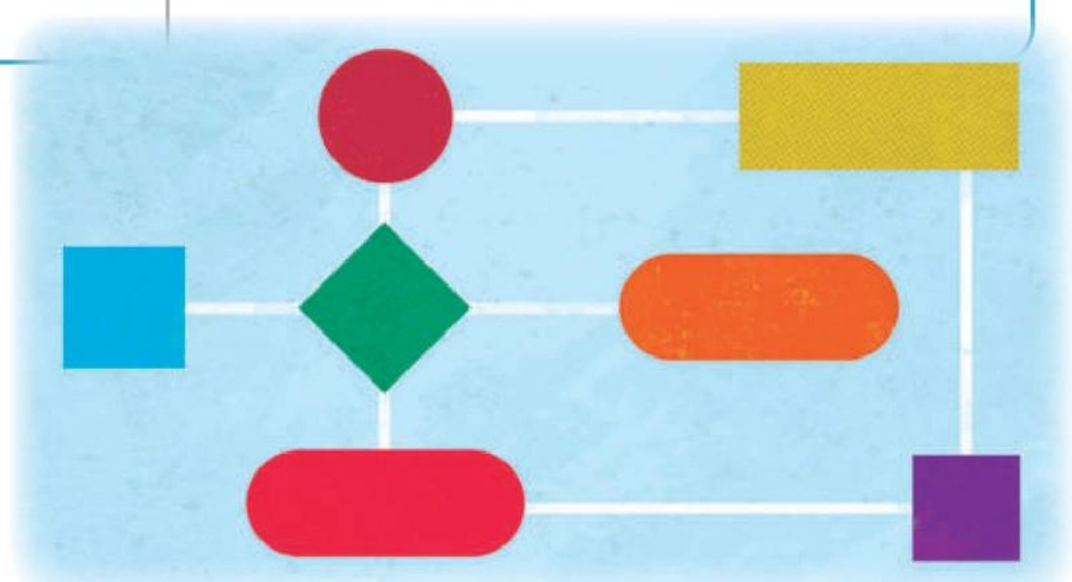
1. If I speak, ☐
2. If I don't speak, ☐
3. If I select food, ☐
4. If I select clothes, ☐
5. If I choose play, ☐
6. If Tom is tired, ☐
7. If Tom goes to bed, ☐
8. If I win a game, ☐

a. Tom can get new clothes.
b. he goes to bed.
c. Tom gets one year older.
d. Tom repeats my words.
e. I switch off the light.
f. Tom is silent.
g. Tom plays a game.
h. Tom eats.

18 Imagine extra functions for the previous game and write a few sentences.

19 (3.9) Listen to a description of the main symbols used in flowcharting and complete the table.

Symbol	Shape	Function
		Start/end



20 Draw a flowchart for this situation.

You want to save a presentation. If your pen drive is big enough, you want to save it there, otherwise you will save it in the hard drive. Draw a flowchart to represent the algorithm.

BUILDING A PROGRAM – STAGE 2

Windows users could use an editor such as Notepad++ which is free and supports syntax highlighting. For Mac users there is another free editor called TextEdit.

Writing a program

The second stage of building a program is writing it. Writing a program means preparing the **instructions** in **coded** form. The logical steps described in the flowchart are translated into instructions for the computer. Whatever language is used to write a program, the programmer must achieve the same basic end: to reproduce the logic of the program as shown in the flowchart as simply, economically and efficiently as possible.

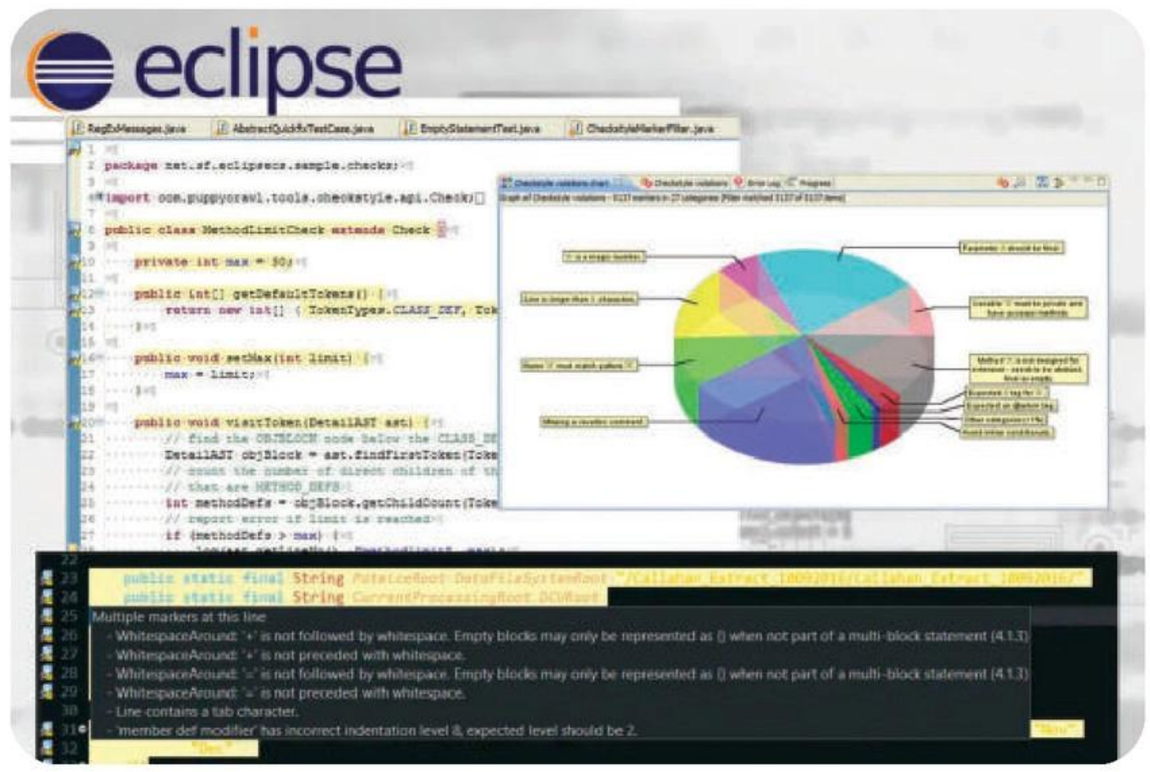
The writing stage can be divided into the following steps:

- choosing the programming language,
- choosing an editor,
- choosing a compiler or interpreter,
- writing the code.

Making choices

As there are different **programming languages**, choosing the most appropriate language for the program might be challenging especially since different languages create different types of software. Also, sometimes more than one language is needed to create the perfect program, so making the right choice is crucial.

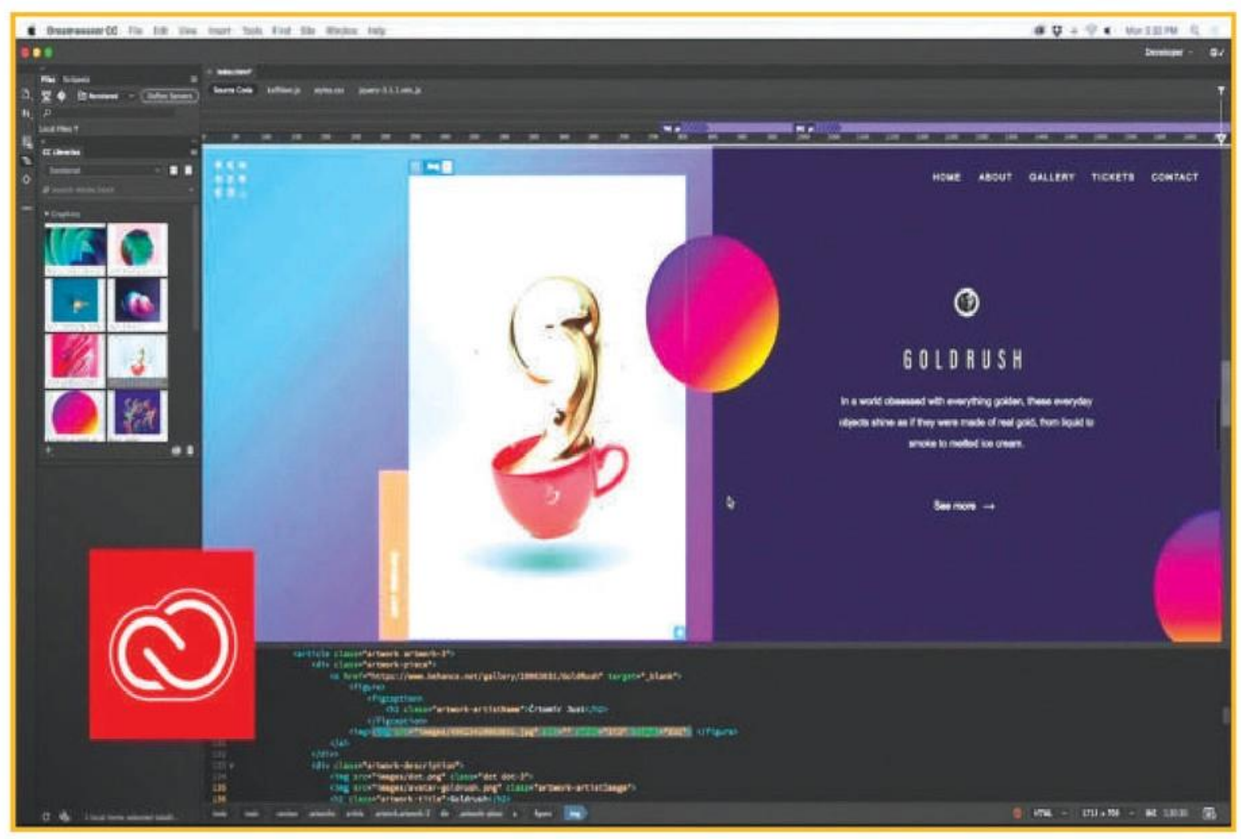
challenging: *impegnativo*
cluster: *insieme/gruppo*
whatever: *qualunque*



Choosing an appropriate **editor** is also vital because it is the program needed to write computer code. Some editors are simple, like any basic text editor, while others (such as Adobe Dreamweaver, Eclipse or Microsoft Visual Studio) have advanced functionalities. Although any program can be written in a text editor, a more advanced editor• is recommended to make coding and testing more efficient.

When programs are written in high-level languages, a **compiler** or **interpreter** is necessary to translate the code for the computer. According to the type of language chosen for code writing, the programmer will have to choose either a compiler or an interpreter.

The last stage is the actual writing of the program.



Basic rules for code writing

When writing, it is important to remember the language syntax, whose basic concepts include:

- understanding how to declare variables;
- creating conditional statements (e.g. if, else);
- performing loops (e.g. do, for, go to, while);
- understanding escape sequences;
- learning how to make comments or temporarily disable parts of the code;
- understanding regular expressions.

21 (3.10) **Listen to the first part of an extract on the basics of program writing and complete the table.**

	Elements	Description
1.		They are like ..... to put information in.
2.		They do things to pieces of ....., like adding, subtracting, multiplying, etc.
3.		They are rules for making ..... (e.g. if... then, else...)
4.		They say what must happen every time an imaginary wheel .....
5.		They put a name to clusters of the above to ..... the work.

22 (3.11) **Listen to the second part of the extract and complete the text.**

Information

Information is always **1.** ..... to a computer, but often words to us.

Strings

Words and sentences are numbers linked together like **2.** ..... in strings. To a computer they are opaque in meaning and processed like a sausage machine chopping them into **3.** ..... according to one rule or another.

Variables

A variable is the name given to something that can **4.** ..... or vary.

Operators

Addition, subtraction, multiplication and **5.** ..... are the basic operators. There's also a special kind of operator called *assignment* which puts the **6.** ..... of an operation into a variable. When you sit down to program a computer, you use a language that classifies variables by **7.** ....., which helps it figure out how to apply those operators.

Conditionals

A conditional is a **8.** ..... for making a decision, and it uses operators.

Loops

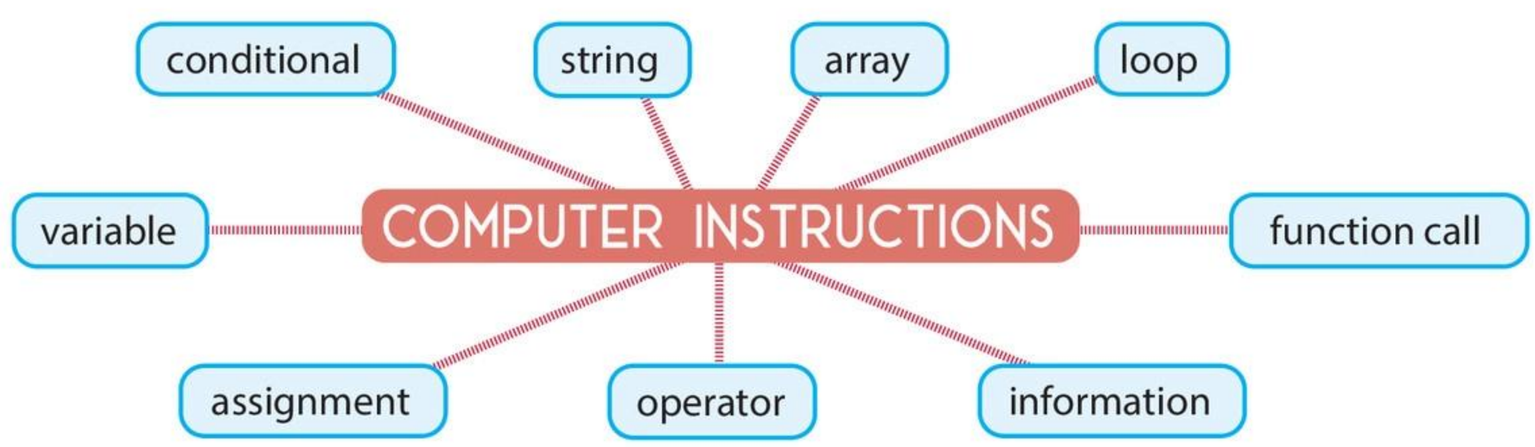
Computers were invented to perform **9.** ..... tasks accurately, and computer programs spend most of their runtime in a loop with some kind of rule to tell it when to stop after all the work is done.

Collections

The primitive collection is an *array*, which is like a cardboard box with a block of **10.** ..... marked off. Each division contains a unique value that is respected in itself.

Adapted from: *http://www.yacoset.com/Home/how-to-write-computer-programs*

23 **Practise describing the basic elements of computer instructions and their characteristics.**



BUILDING A PROGRAM – STAGE 3

When its coding is complete, the whole program must be tested: it is most unusual for a program to work correctly the first time it is tested.

Dynamic testing is used to test: *utility*, i.e. meeting the user's needs, *reliability*, i.e. the incidence of failures, *robustness*, i.e. response to valid and invalid inputs, and *performance*, i.e. memory usage.

Can you provide an example of syntax error?

The final steps of program-making include: **testing**, **debugging** and preparing detailed **documentation** of the program. Testing means checking for verification and validation; **verification** means checking if the program has been built correctly and if it conforms to the specifications, **validation** means checking if the program is the correct one, i.e. the one which satisfies the customer.

Testing

Testing is both **static** (non-execution based) and **dynamic** (execution based).

Static testing checks for verification and includes:

- **walkthroughs**, reviews carried out by small teams who find problems which will then be fixed by a competent member of the team;
- **inspection**, a more rigorous procedure with a checklist of potential faults in order to detect, log and correct defects.

Dynamic testing, which checks for validation, is carried out using test data. It is not very reliable because of the limitations given by the possible scenarios and for this reason it can show the presence of some errors, but not the absence of others.

Errors

The errors that may occur in a program are usually of three types:

- **Syntax errors**, which are the most common and arise from incorrect typing of the language commands;
- **Logic errors,** which are the most difficult to locate because they do not interrupt the program execution but produce incorrect results;
- **Run-time errors,** which can occur if, for example, an incorrect data type is input into the system or if a printout is expected when the printer is switched off; errors such as these cause execution to stop and often an error message appears which describes the fault.

Debugging

Debugging is the activity carried out by the Development Team, or the single developer, to find out the cause of each error or defect and fix it. When the bug is found, the portion of code containing it is modified and the program is checked again to see if the error has definitely been removed.

Documentation

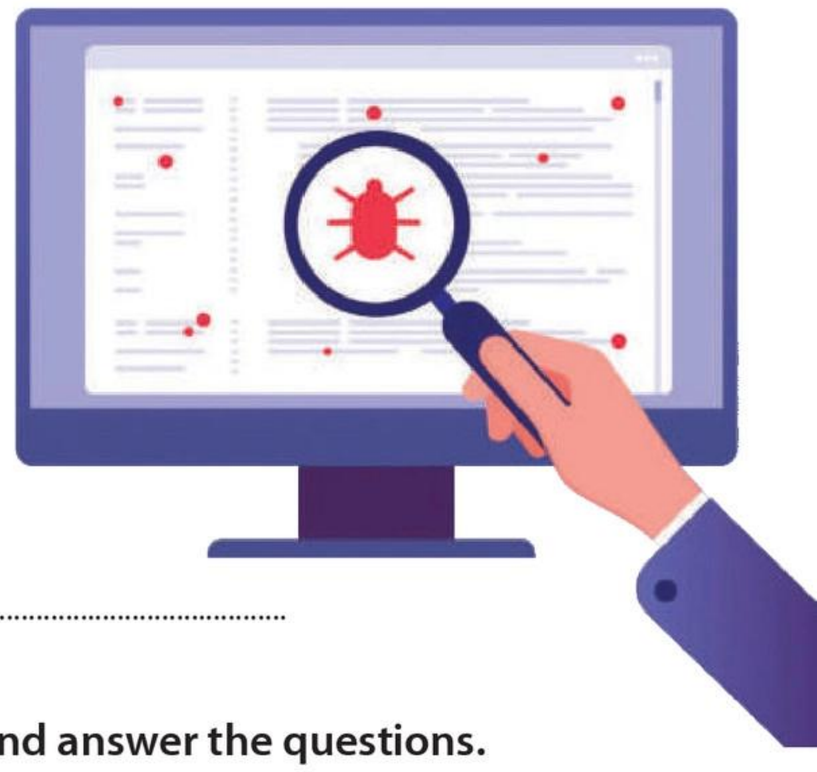
There are two types of **documentation** that must be produced:

- **User documentation**, which is a manual with a set of instructions to enable a user to operate the program correctly;
- **System documentation**, which are program specifications to enable people, other than the programmer who first wrote the program, to understand the program so that it may, if necessary, be modified or corrected.

to arise: *sorgere*
glitch: *errore, problema tecnico*
moth: *falena*
walkthrough: *spiegazione passo per passo*

24 Find the correct word/phrase for the following definitions.

1. An error which produces incorrect results. .....
2. A review carried out by a small team to find errors in a program. .....
3. A rigorous procedure with a checklist to detect, log and correct errors. .....
4. A type of documentation for programmers. .....
5. A type of documentation for the final user. .....
6. Checking for verification and validation. .....
7. Checking if the program has been built correctly. .....
8. Checking if the program satisfies the customer. .....
9. It can be both static and dynamic. .....
10. It is carried out by the Development Team. .....
11. It tests the performance of a program. .....
12. This error occurs when incorrect data type is input into the system. .....



25 (3.12) Listen to an extract on the difference between testing and debugging and answer the questions.

1. Who is responsible for testing?
2. What do they do?
3. Who do they report to?
4. What do they have to report?
5. Who is responsible for debugging?
6. When is debugging carried out?
7. What does the debugging team do?
8. What do they do after finding the bug?

26 Read the text and answer the questions below.

The Moth in the Machine: the Story of the First Bug

The computer scientist and U.S. Navy Rear Admiral Grace Hopper coined the terms *bug* and *debug* after an incident involving Harvard University›s Mark II calculator. The story goes like this:

On September 9, 1945, a Harvard technical team looked at Panel F and found something unusual between points in Relay 70. It was a moth, which they promptly removed and taped in the logbook. Grace Hopper added the caption "First actual case of bug being found," and that's the first time anyone used the word bug to describe a computer glitch. Naturally, the term debugging followed. Yes, it's an oft-repeated tale, but it's got more bugs in it than Relay 70 probably ever had. For one thing, Harvard's Mark II came online in the summer of 1947, two years after the date attributed to this story. For another thing, you don't use a line like "First actual case of bug being found" if the term bug isn't already in common use. The comment doesn't make sense in that context, except as an example of engineer humour. And, although Grace Hopper often talked about the moth in the relay, she did not make the discovery nor the log entry.

The core facts of the story are true – including the date of September 9 and time of 15:45 hours – but that's not how this meaning of the word *bug* appeared in the dictionary. Inventors and engineers had been talking about bugs for more than a century before the moth in the relay incident.

Adapted from: *http://www.computerworld.com/article/2515435/app-development/moth-in-the-machine--debugging-the-origins-of--bug-.html*

1. Who invented, and when, the terms *bug* and *debug* according to common belief?
2. Where did it happen and how?
3. What is the problem with the dates?
4. Was Hopper the real inventor of the term *bug*?

GRAMMAR

FUTURE TENSES

Form	Use	Examples
Present Simple	Timetabled actions (trains, flights, cinemas, libraries, offices, etc.)	➤ *The computer shop* opens *at 8:00 on Monday.*
Present Continuous	Plans and arrangements	➤ *The General Management* is meeting *the senior programmers on Monday.*
To be going to	Intentions	➤ *I am stressed. I'm* going to change *my job.*
	Future predictions with evidence in the present	➤ *Things are not going well at work. I'm* going to lose *my job.*
Future Simple (*will* + base form)	Predictions	➤ *By 2050 there* will be *more people retired than working.*
	Decisions at the time of speaking	➤ *This job is too stressful. I'll* find *a better one.*
	Offers of help	➤ *I'll* help *you with your project.*
	Promises	➤ *I promise I'll* help *you with coding.*
Future Continuous (*will be* + *-ing* form)	Action in progress at a given time in the future	➤ *By 7 pm I* will *still* be debugging.
Future Perfect (*will have* + past participle)	Action completed at a given time in the future	➤ *By 2024, I* will have stopped working. *I don't have to wait long.*

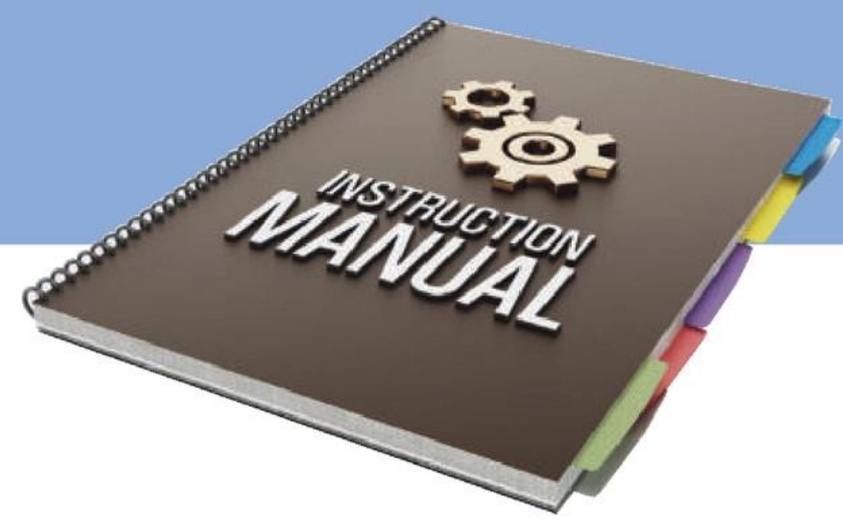
27 **Put the verbs in the correct future form. Choose between *Present Simple*, *Present Continuous*, *To be going to* and *Future Simple*. Sometimes more than one form is possible.**

We **1.** ..... (have) a meeting with the General Manager tomorrow. The situation is serious. We haven't sold any software programs for months. Things **2.** ..... (not get) better. I **3.** ..... (have) to find another job. The Job Centre **4.** ..... (open) at 8:00 a.m. tomorrow morning. I **5.** ..... (go) in early but I'm sure there **6.** ..... (be) a queue anyway. I **7.** ..... (ask) if there are any job vacancies anywhere. However, I hope the Unions **8.** ..... (suggest) signing a solidarity contract for the debugging team.

28 **Choose the best option between the *Future Perfect* and *Future Continuous*.**

I have an appointment with a client to validate a program at 9:00 a.m. tomorrow. I'm going to take the bus so, if I leave early, I think I **1.** *will have got / will be getting* there by 8:45. The client has another appointment at 8:00 but he is often running late, so I think that probably by 9:00 I **2.** *will still have waited / will still be waiting.* Anyway, by 9:30 I think I **3.** *will have spoken / will be speaking* with my client and by 10:00 I **4.** *will have finished / will be finishing.* It won't take more than 20 minutes.

CITIZENSHIP



WRITING READABLE USER MANUALS

Writing readable user manuals

Software programs should be accompanied by user manuals, but, unfortunately, these manuals are often not easy to read. Readability is the primary objective of a user manual: it is critical that the instructions are easy to read and able to be understood by all users. Many user manuals have instructions that are incomplete, incorrect, or that simply have no bearing on the actual product. However, by following some simple rules, it is possible to write readable and easy to use manuals.

bearing: *impatto*

29 GROUP WORK **Read a list of guidelines for user manuals and choose the top five you believe are more important to ensure readability. Justify your answer.**

General Guidelines for User Manuals

- ☐ Include a one-page quick start guide.
- ☐ Present instructions as step-by-step procedures and sequence them in the right order.
- ☐ Consider the needs of disabled users (i.e. low vision, colour-blind) and provide alternative manuals in Braille, large print, audio, etc.
- ☐ Follow the timing and sequencing of the actual operations.
- ☐ Provide visual stepping stones (e.g. Step 1, Step 2, etc.).
- ☐ Avoid lengthy paragraphs.
- ☐ Use everyday words and terms, avoid jargon.
- ☐ Explain what a function or feature is for (in basic practical terms) as well as "How to" instructions.
- ☐ Explain symbols, icons and codes early.
- ☐ Write in the present tense and the active voice.

Adapted from: *https://www.userfocus.co.uk/articles/usermanuals.html*

30 **Read these notes and use them to write a series of instructions on how to write a good user manual following their advice.**

- Font size: at least 12 point
- Text-to-background contrast: black on white
- Font type: sans-serif
- Colour: no blue for text or small details
- White space: between sections and around images and paragraphs
- Users' notes: sections or margins for them

31 **Read the text and correct six grammatical or lexical mistakes.**

How to Write a User Manual

Step 1: Identify the Audience
Understanding who your audience is can be half the battle when writing a user manual. Identifying your audience help you decide what type of information and how much details you need to include in the manual as well as how the information should be presented.
For example, a user manual for a piece of computer equipment can include technic terms without definitions if the audience is professional computer technicians, but that isn't the case if the audience is end-users.

Step 2: Define the Purpose of the Manual
Make sure you know exactly what the readers need. There is a big difference among writing an instruction manual that focuses on explaining how to use a item versus how to repair one. If you're writing a manual to beauticians who will use a new hair dryer model in a salon, that is very different from creating a manual for the purpose of explaining how to service or repair the hair dryer.

Adapted from: *https://grammar.yourdictionary.com/grammar-rules-and-tips/tips-on-writing-user-manuals.html*

3.3 OPERATING SYSTEMS

OPERATING SYSTEMS FOR COMPUTERS AND MOBILE DEVICES

Besides computers and mobile devices, other devices which perform a specific task, like a washing machine or a microwave oven, have an embedded operating system. This O/S allows the software which runs the programs to access device hardware.

The first operating system as we know it today was developed by IBM in the 1960s for the System/360 series of machines, all with the same instructions and input/output architecture.

to be devised: *essere concepito*
firmware: *impostazioni di fabbrica (che non possono essere modificate dall'utente)*
overall: *complessivo*
to prove: *dimostrarsi*
room: *spazio*
thread: *parte di un programma*
time slice: *intervallo di tempo*

An **operating system** (O/S) is a system of different programs that work together to control and manage the hardware to provide the most efficient use of the available equipment and memory resources, and to act as an interface between the computer and the user.

The main parts of an O/S

The most important part of the O/S consists of the **supervisory programs**, which control all the other programs in the O/S, and the **service programs**, which provide system services to the user. These fall into two categories: utility programs and system aids.

- **Utility programs** allow files to be saved, copied, renamed or deleted. They activate all peripheral devices and are able to format a disk in preparation for storing information.
- **System aids** assist the user when developing a program. Any system errors experienced in a program at run time will be located and identified by the O/S. System aids also include translation programs such as assemblers, interpreters and compilers.

Types of operating systems

The most common types of O/S are:

- **Single program:** one application program is run at a time, both in real time and batch processing. In **real time processing** the user interacts with the computer during the execution of a program and that means that the computer is able to respond immediately to inputs; in **batch processing** a series of programs are run in sequence and an output is only provided at the end.
- **Multi-user**: a number of users use the computer system at the same time. The computer resources are time-shared among the users, each user having exclusive use of the resources at any one time. As all operators are offered a time slice in turn, every user has the impression that they have exclusive use of a computer all the time;
- **Multi-processing**: a very complex program is run on more than one CPU at the same time. The CPUs are linked in parallel as in the case of supercomputers;
- **Multi-programming** or **multi-tasking**: more than one program can run at the same time. Different areas of primary storage are reserved for each program and any one particular program can be called into operation by the user at any time;
- **Multi-threading**: different parts of a single program run at the same time;
- **Virtual storage**: data is moved between primary and secondary storage as and when the primary storage proves to be too small. The user has the impression of a computer with a larger memory;
- **Virtual machine:** different users can use different operating systems simultaneously on the same PC.
- **Distributed:** various computer systems, which are connected to each other using a shared communication network, have their own CPU, main memory, secondary memory, and resources.

1 **Read the text and decide if the statements are true or false.**

Virtual Storage and Virtual Machine Operating Systems

The virtual storage operating system was originally devised for programs that were too large to be wholly contained within primary storage. Even today, with large amounts of primary storage available, it is not unusual for the amount of RAM available to be too small to satisfy the needs of a particular application program. In this case, a virtual storage operating system will permit data to be moved between primary and secondary storage when primary storage is not big enough for a program to run.

Many professional word processors use this facility. If the RAM available is too small to accommodate a complete document, then only a few pages will be in RAM at any one time. Any other pages that are required will be brought in from the secondary storage, with room being made for them by downloading current pages from primary storage to secondary storage.

Another aspect of virtual storage is called spooling. Spooling is the process of sending output to a disk file and then printing that output directly from the file, thus freeing up the CPU to do other tasks.

Multi-programming and timesharing can potentially bring users into conflict over shared resources. Consequently, the idea of the virtual machine was devised to give users the impression that they each have control over the entire computer: i.e. each user has what appears to be a separate copy of the physical machine. In such a virtual machine operating system, different users can even use different operating systems simultaneously.

This facility allows different application programs to use the operating system appropriate for them. The overall control of such a system is under the supervision of a virtual machine.

	T	F
1. The virtual storage operating system was devised for large programs.	☐	☐
2. Today, with bigger RAM, virtual storage is no longer necessary.	☐	☐
3. Virtual storage is very useful for large documents.	☐	☐
4. With spooling, it is possible to print directly from a file.	☐	☐
5. With a virtual machine operating system, we can change the operating system according to the program we need to use.	☐	☐
6. The virtual machine manages the simultaneous use of different operating systems.	☐	☐

2 (3.13) **Listen to an introductory talk on operating systems and take notes.**

1. Main functions:

- .....
- .....
- .....
- .....

2. Examples of two other functions: ....., ...

3. Names of five examples of operating systems: ....., ..., ..., ..., ...

3 **Complete the text with the missing words.**

after • also • like • loaded • may • other • their • very • when • which

Operating System Storage

Most computers have **1.** ..... operating system stored in secondary storage, **2.** ..... is accessible from a system resident device **3.** ..... a hard drive. **4.** ..... the computer is switched on, the appropriate secondary storage device is **5.** ..... switched on and the operating system is loaded into the CPU's primary storage. If the operating system is **6.** ..... large, then only essential parts of the supervisory programs are loaded and when **7.** ..... parts of the operating system are needed, they are **8.** ..... as necessary and deleted **9.** ..... use. Alternatively, the operating system **10.** ..... be part of the firmware.

USER INTERFACES

One common command line O/S is MS-DOS and the command to tell the O/S to display all files is *dir*, for example, which stands for *directory*. This is still a common way to control a computer, especially for IT professionals.

The first computer with all the elements of a modern GUI was Alto, produced by Xerox in 1973.

A **user interface** is the means by which the user communicates with the O/S or other software. It is the boundary between the user and the machine and it is how the computer presents itself. Making the user interface easy to use and intuitive has been one of the biggest challenges in developing computer systems. Much of the design of the interface is dictated by how the underlying operating system works. For example, all applications that run under Windows look very much the same, with similar layouts and menus. However, it is important to remember that an operating system can use different interfaces.

Common interface types are:

- Command line interface (CLI);
- Menu-driven interface (MDI);
- Graphical user interface (GUI);
- Touchscreen graphical user interface (touchscreen GUI).

Command line interface

A **command line interface** is an old, but still used, way of interacting with a computer that presents the user with a blank screen. The user types in commands, usually abbreviated, which the operating system then carries out. Once the user has learnt all the commands, the system is quicker to operate than the other systems, but it can take a long time to learn all the commands needed.

Menu-driven interface

A **menu-driven interface** displays a list of commands or options, organised under various headings or menus. The user selects a command by pressing a key on the keyboard corresponding to that option or by clicking on it with the mouse. This type of user interface means that the user does not need to learn many commands, but it can be slow and sometimes not very practical.

blank: *vuoto*
boundary: *confine*
to carry out: *eseguire*
narrow: *stretto*
to overwhelm: *sopraffare*
requirement: *condizione, esigenza*

Graphical user interface

A **graphical user interface** is the most popular type of interface; all major modern operating systems use it. GUIs are intuitive, there is no need to learn commands, and users can see a representation of what will be output or printed, with several choices visible at once. Icons or small pictures represent actions or files, which the user touches or clicks on with a mouse. GUIs are also known as **WIMPs**, because they make use of **W**indows, **I**cons, **M**enus and **P**ointers.

WINDOWS contain information relevant to one particular task, and multi-tasking systems can have many windows open at the same time.	**ICONS** are pictures representing commands, e.g. by clicking on the picture of a floppy disk you save the active file.
POINTERS are usually arrows or something similar that the user can move about the screen using a mouse or any other pointing device.	**MENUS** give the user a list of options; each option corresponds to a possible command.

Touchscreen graphical user interface

A **touchscreen graphical user interface** is very similar to a regular GUI except that, instead of a mouse, users touch the screen with their fingers or with a stylus to select icons and perform tasks. It is common in mobile devices and some medical devices.

4 PAIR WORK **Write the different features of each type of interface in the right place in the table.**

1. Difficult to learn
2. Easy to use
3. It is not necessary to remember a long list of manual commands
4. Large amount of memory
5. Limited menu options
6. Many applications can run simultaneously
7. Minimal memory usage
8. Self-explanatory
9. Self-explanatory menu options
10. Similar format among different programs
11. Simple functions may require many menu options
12. Simple structure

	Advantages	Disadvantages
Command line interface (CLI)		
Menu-driven interface (MDI)		
Graphical user interface (GUI)		

5 **Read the text and answer the questions.**

Mobile User Interface (Mobile UI)

A mobile user interface, or touchscreen GUI, is the graphical and usually touch-sensitive display on a mobile device that allows the user to interact with the device's apps, features, content and functions. Mobile user interface design requirements are significantly different from those for desktop computers. The smaller screen size and touch screen controls create special considerations in UI design to ensure usability, readability and consistency.

In a mobile interface, symbols may be used more extensively and controls may be automatically hidden until accessed. The symbols themselves must also be smaller and there is not enough room for text labels on everything. Users have to be able to understand a command icon and its meaning whether through legible text or comprehensible graphical representation.

Mobile UI design best practices include a series of basic features:

- The layout of the information, commands, and content in an app should echo those of the operating system.
- Click points must be usable for touch-based selection with a finger. This means a click point can't be too small or narrow in any direction, to avoid unwanted selection of nearby items.
- Maximise the content window size. On small screens, the UI should not unnecessarily dominate screen size.
- The number of controls or commands displayed at any given time should be appropriate to avoid overwhelming the user or making viewing and interacting with content confusing.

It can be challenging to strike a balance between concentrating on design and dealing with the specific requirements of different apps.

Adapted from: *http://searchmobilecomputing.techtarget.com/definition/mobile-UI-mobile-user-interface*

1. Why is mobile UI significantly different from a computer GUI?
2. What are the best practices regarding the layout of information, click points, window size, and number of commands?
3. What is challenging when designing a mobile UI?

OTHER USER INTERFACES

Can you think of any examples of a form-based interface?

Have you ever used a digital assistant? Describe your experience.

Other user interfaces include:

- form-based user interface;
- natural language interface;
- headset-driven interface.

Form-based interface

Form-based interfaces are often used in business situations and are similar to paper-based interfaces. They reproduce paper forms which need to be completed. There are field names and names next to the place where the information must be entered. The place where the information should be entered by the operator is known as a **response field.**

Form-based interfaces are suitable for any application that involves entering predictable pieces of information into a computer•.

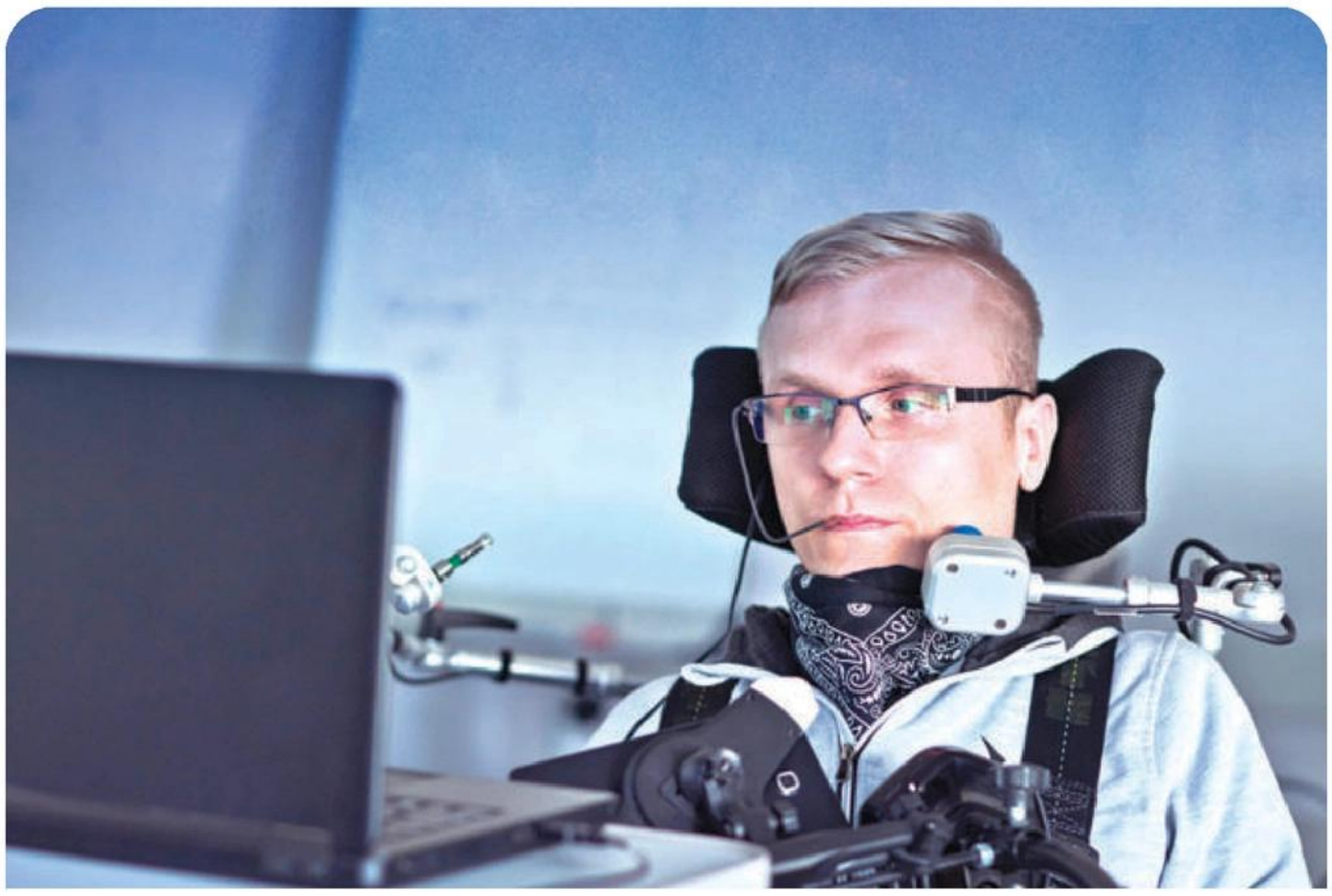
Natural language interface

A **natural language interface** allows the user to interact using written or spoken commands instead of using a computer language. Words are used to communicate with the computer to create, select or modify data.

Siri, Alexa, Google Assistant or Cortana are examples of **digital assistants**•• that use a natural language interface, making it possible to communicate with the operating system in a human language like English or Italian.

The advantages of a natural language interface are many, for example users do not have to learn the syntax or principles of a particular language. Moreover, it is suitable for users with physical disabilities and can provide a safer interface in certain environments like whilst driving a car. However, natural language interfaces can be difficult to use effectively due to the unpredictability and ambiguous nature of human speech. Variation in tone and accent can lead to misinterpretation. Furthermore, a voice interface might need training to get the software to recognise what the user is saying.

to be a long way off: *essere molto lontano*
to fail: *fallire*
form: *modulo*
unpredictability: *imprevedibilità*
wearer: *la persona che lo indossa*



Headset-driven interface

A **headset-driven interface** enables users to communicate with a computer without touching a keyboard or opening their mouths. The headset has sensors that read the signals from areas of the brain as if the user had said something aloud. Then, via a web connection, the device carries out the task on the computer. The headset uses a bone conduction speaker that only users can hear to inform them of the results of the task.

The prototype of this revolutionary interface has been made at the MIT Media Lab and researchers say that the device can understand its wearer 92% of the time. The interface is currently being tested in limited hospital settings where it can help patients with multiple sclerosis to communicate.

6 (3.14) **Listen and complete the text.**

Spoken Language Interface

It is common for computers to speak to us and for us to **1.** ..... to them. Many telephone systems ask you to say "Yes" or "No", to give a number or your postcode, and they then try to capture the **2.** ..... However, the interaction sometimes fails because of people's differing accents or the speed at which they talk. So spoken interfaces have to be trained to recognise **3.** ..... and typical words that might be used in the interaction. However, finding a way to enable computers to understand normal **4.** ..... is a long way off. Public announcements are often computer-generated. These are commonly used in transport systems such as in railway stations and on **5.** ..... Some researchers are trying to improve the way a user can communicate with a machine by **6.** ..... nerve impulses, the so-called neural interface.

7 (3.15) **You will hear five short extracts in which people discuss natural language interface. Match the speakers with the topic of their short speech.**

a. The main uses of natural language interfaces — Speaker 1: ☐
b. The advantages of a natural language interface — Speaker 2: ☐
c. Examples of natural language interfaces — Speaker 3: ☐
d. Problems with natural language interfaces — Speaker 4: ☐
e. How a natural language interface works — Speaker 5: ☐

8 **Read the text below and think of the word that best fits each space.**

What is Cortana?

First launched in 2014, this virtual voice assistant's name and concept were inspired **1.** ..... a 26th-century artificial intelligence character of the same name **2.** ..... the popular *Halo* video game series. Designed to integrate with Windows Phones and Windows 10 PCs, Cortana's capabilities include organising and managing daily meetings and reminders, alongside more traditional web searches, all through typed text **3.** ..... voice prompts. Everything you do with Cortana for is stored **4.** ..... a virtual "Notebook". This approach to a virtual assistant **5.** ..... based on the work of actual human assistants who spoke **6.** ..... Microsoft software developers during Cortana's development process. Since 2014, Cortana's presence has grown **7.** ..... Microsoft has integrated it everywhere, from Xbox and smart speakers to Apple and Android apps and third-party skills like Fitbit, Spotify, and more. But in the years since its launch, Microsoft users' needs have changed, and **8.** ..... company's vision for its digital assistant has evolved along with it.

Adapted from: *https://www.businessinsider.com/what-is-cortana?r=US&IR=T*

UNIX, LINUX AND ANDROID

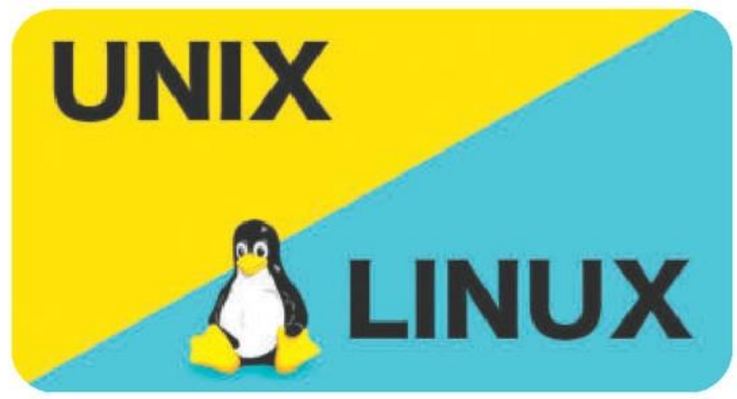
Although the last version was released in 1989, Unix still runs on a wide variety of architectures and its variants of Unix for mobile devices have become increasingly popular. So, we can no longer talk about a unique Unix system, but rather of several Unix-type systems.

Unix quickly grew and became widely adopted by academic institutions and businesses. In 1984 it started to be sold as a proprietary product by AT&T.

Linus Torvalds

Unix

The **Unix** operating system was first released in 1971 and was initially entirely written in assembly language. In 1973 it was rewritten in C, with the exception of the kernel and the I/O. Such availability of an operating system written in a high-level language allowed greater portability to move easily from one computer platform to another.



The main parts of Unix

Everything in Unix is either a file or a process. A **process** is an executing program identified by a unique process identifier (PID), while a **file** is a collection of data created by users using text editors, running compilers, etc. Examples of files are: documents, the text of a program in a high-level language, machine instructions, or a directory with information about its content.

The Unix O/S is made up of three parts: the kernel, the shell and the commands or programs.

- The **kernel**, i.e. the central O/S component, is the hub of the operating system. It allocates time and memory to programs and handles the files and communications in response to system calls.
- The **shell** acts as an interface between the user and the kernel. The shell is a command line interpreter (CLI) which interprets the commands the user types in and arranges for them to be carried out.
- The **commands** are themselves programs: when they terminate, the shell gives the user a prompt for another command. The most commonly used programs are memorised by the shell. The user can either scroll the list or type *history* to see it.

Linux

Linux, also known as GNU/Linux, is a Unix-like, open-source O/S. By the 1990s most of its components, such as libraries, compilers, text editors and a Unix-like shell, had already been produced or collected. The kernel was released by Linux Torvalds in 1991 and originally called *freax* (i.e. free Unix-like), but Ari Lemmke gave it the name Linux for the directory from which the program could be downloaded.

Linux has historically been used as a server operating system, but its low cost, flexibility, and Unix background make it suitable for a wide range of applications. It is often used in embedded systems such as mobile phones and handheld devices, but also in supercomputers. Although criticised in the past for not ensuring ease of use, Linux now has a user interface which is very similar to those running on other operating systems.

Android

Android is another Linux-based open-source O/S, but it is designed primarily for touch screen mobile devices such as smartphones and tablets. The code of Android is released by Google and, being open source, is continuously enriched by applications, or apps, written by a large community of developers.

ANDROID

edge: *vantaggio*
to ensure: *assicurare*
framework: *struttura*
kernel: *nucleo*
to release: *distribuire*
royalty fee: *tassa sui diritti d'autore*
to scroll: *scorrere*
shell: *shell (interprete dei comandi)*

9 **Complete the questions about Unix and answer them.**

1. What/PDI/identify?
2. What/Unix/made up of?
3. What/kernel/do?
4. What/shell/interpret?
5. What/history/used for?
6. Who/files/created by?

10 (3.16) **Listen to a recording about the history of Unix, Linux and Android, and take notes for these dates.**

Year	O/S	What happened
1969	Unix	It was conceived and implemented by Thompson, Ritchie and others at AT&T's Bell Laboratories.
1971		
1973		
1983		
1984		
1989		
early 1990s		
1991		
2005		
2008		
2012		

11 **Read the text and complete it with the words below.**

browser • companies • complete • developers • drawbacks • free • open • runs

The Android Platform

Android was developed by Google and the Open Handset Alliance (OHA), a coalition which involved more than thirty **1.** .....

The Android platform includes an operating system based upon Linux, a GUI, a web **2.** ..... and end user applications that can be downloaded. Android **3.** ..... on the most widely used mobile standards (GSM, UMTS and CDMA-2000) and is the first mobile platform with the following characteristics:

- **4.** .....: the designers took a comprehensive approach when they developed the platform. They began with a secure operating system and built a robust software framework;
- **5.** .....: the platform is provided through open-source licensing;
- **6.** .....: the applications are free to develop. There are no licensing or royalty fees to develop on the platform.

Android is the first in a new generation of mobile platforms which gives its platform **7.** ..... a distinct edge on the competition. Its designers examined the benefits and **8.** ..... of existing platforms and then incorporated the most successful features.

Adapted from: *http://searchenterpriselinux.techtarget.com and http://media.techtarget.com/searchMobileComputing/downloads/Introducing_Android.pdf*

WINDOWS

Which version of Windows are you currently using? Do you remember the first version that you used?

There is no Windows 11 for embedded systems.

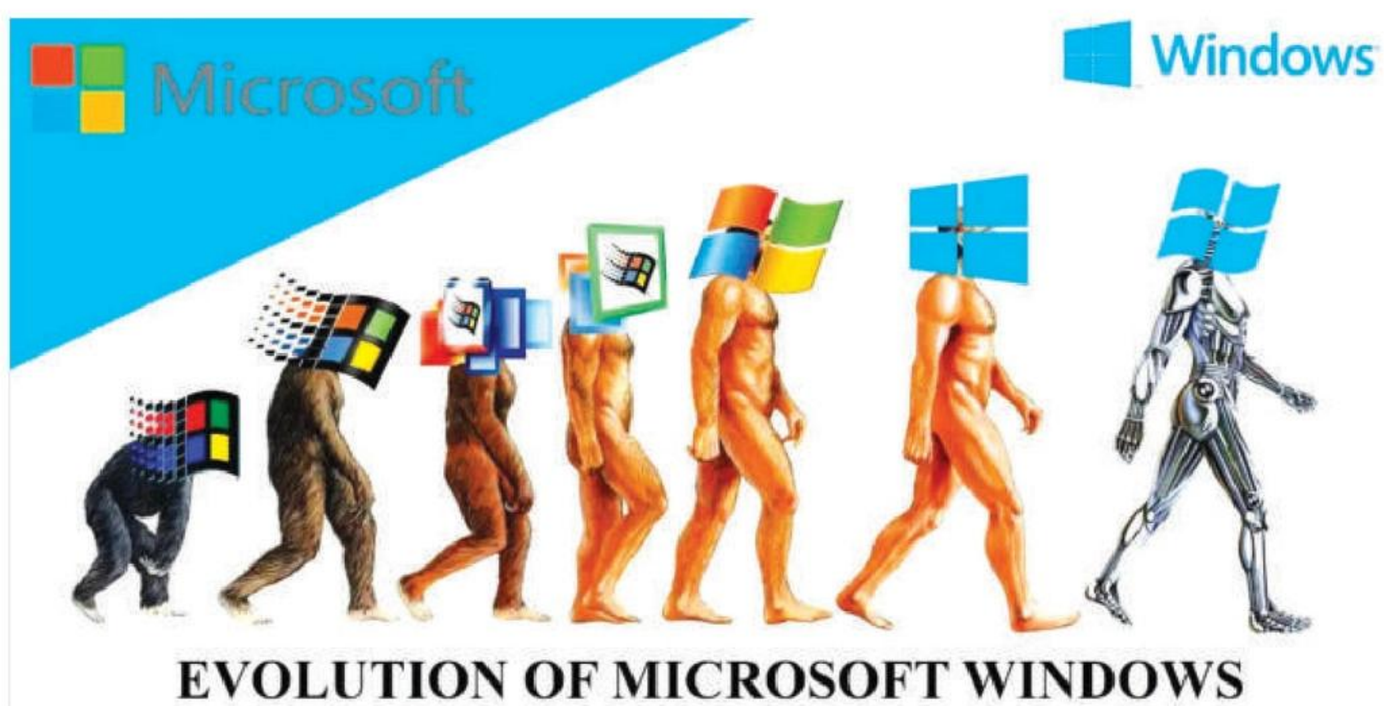
Microsoft Windows, or Windows O/S, or simply Windows, is a family of operating systems originally meant for personal computers and later adapted for servers and mobile devices. It dominates the personal computer world with a market share of more than 80%, the remainder belonging to Mac OS and Linux. It provides a graphical user interface (GUI), virtual memory management, multitasking and support for many peripherals.

It dates back to 10th November 1983, when Microsoft announced a GUI for MS-DOS. Subsequently, the product line changed and the GUI became a complete O/S.

Windows versions

- The first versions, **Windows 1.0** and **2.0**, were released between 1985 and 1987 and were considered a novelty since they allowed the user to point and click with a mouse to access the windows, instead of typing a command. Other older versions include Windows 3.0 and 3.1, Windows 95 and 98, Windows ME – Millennium Edition, and Windows 2000, all released between 1990 and 2000.
- **Windows XP**, the longest running Microsoft O/S so far, was released in 2001 and discontinued in 2014. In 2014 it was still used by an estimated number of 430 million PCs, and in 2017 it still had around 8% of the market share. It is considered one of the best versions of Windows, even though it had security problems: it had a built-in firewall which was turned off by default. For this reason, the system attracted hackers and criminals.
- Other older versions still in use are **Windows 7**, released in 2009, and **Windows 8**, which appeared in 2012. Windows 7 replaced **Windows Vista** and introduced multi-touch and virtual hard disk support. It was also the last in the old line of Windows operating systems.
- **Windows 8**, released in 2012, was a completely redesigned operating system with touch screen use and capable of loading and starting up in a matter of seconds. It also had a new Metro design system interface that was first used with **Windows Phone 7** mobile O/S. The Metro user interface consists primarily of a start screen made up of live tiles which are links to applications and features that are dynamic and updated in real time. Together with PC O/S, Microsoft has produced different versions of O/S for mobile devices, from **Windows CE** in 2006 to **Windows 10 Mobile**.
- **Windows 10**, released in 2015, with a new browser, Microsoft Edge, was especially important because it worked on all systems: personal computers, smart phones, tablets and Xbox consoles: Microsoft has succeeded in unifying the different systems.
- The latest version is **Windows 11**, released in November 2021, for PCs and tablets, made available for free for existing Windows 10 users from January 2022.

to discontinue: *cessare la produzione*
market share: *quota di mercato*
tile: *mattonella*



12 Answer the questions.

1. What is Windows?
2. What does it provide?
3. Why were Windows 1.0 and 2.0 considered a novelty?
4. What has been the longest running version of Windows so far? What was its main problem?
5. Why was Windows 8 a revolution?
6. What is Metro design user interface? In which system was it first used?
7. What did Microsoft achieve with Windows 10?
8. What is the latest version of Windows?

13 Watch the video and complete the first part of the table with the correct dates.

▸ Microsoft Windows: Entire History in 3 Minutes *posted by* Bloomberg Quicktake

Windows history

Version	Date	Features
MS DOS	1981	
Windows 1.0		
Windows 1.1	//	
Windows 2.0		
Windows 3.0		
Windows 3.1		
Windows 95		
Windows 98		
Windows ME		
Windows 2000		
Windows XP		
Windows Vista		
Windows 7		
Windows 8		
Windows 10	2015	

14 Watch the video again and pay attention to what you hear and what you see in order to complete the last column of the previous activity.

15 Watch the video and correct the statements.

▸ Introducing Windows 11 *posted by* Windows

Introducing Windows 11

1. Create, connect, share
2. Start, search, send
3. All traditional themes
4. Stay active
5. Pick up where you want
6. Connect with a touch
7. Personalised feed with Windows
8. Write, sort and switch and do your tasks
9. Xbox game trial
10. Designed for your device

MACINTOSH

Its first version was developed between 1997 and 2001, after Apple's purchase of NeXT.

Mac computers have a trash can on their desktop, while Windows has a recycling bin.

The OS X kernel was part of an open-source project.

The family of Macintosh operating systems was developed by Apple Inc. in 1984 to provide the first GUI-based operating system for the Macintosh series of personal computers. The first O/S, called **Classic Mac OS**, was rebranded Mac OS in 1996 and installed on every Macintosh computer until 2002.

As of 2022, the operating system has been Mac OS X. It has a new architecture based on Unix in order to eliminate some of the technical problems of the Classic Mac OS. The Mac OS X was preinstalled on any Mac computer and automatically updated, annually since 2011, with every new version carrying the name of an animal or place.

All the Mac operating systems share a common set of GUI principles, including a menu bar across the top of the screen, the finder, i.e. a shell with a GUI, a desktop with icons for applications and related concepts like directories, file deletion, a trash can, and overlapping windows for multitasking.

Characteristics

Mac OS X offers many benefits to both users and developers, such as improved reliability and performance, enhanced networking features and an object-based system programming interface. With OS X, the kernel provides many enhancements. Though in a traditional operating system the kernel is a small nucleus of software that provides only the minimal facilities necessary for implementing additional operating system services, in Mac OS X the kernel environment contains much more: the kernel, the I/O kit, file systems and networking components. The kernel assigns each process its own address space, controlling access to the address spaces so that the applications are run in each user space and ensuring that no application can inadvertently access or modify another application's memory. Thus, there is no risk of damaging or modifying each other's files when several users are using the same application.

MacOS, the new brand name of OS X since 2015, is Apple's current system software for PCs.

Mac for mobile devices

iOS is a mobile operating system for iPhone and iPod Touch, while for the iPad there is the iPadOS.

The iOS interface is based on direct manipulation using multi-touch gestures on control elements such as sliders, switches and buttons. It manages the hardware and provides various system applications such as a browser, a camera, messaging and email notification. iOS is the second most popular mobile O/S after Android.

customisable: *personalizzabile*
to rebrand: *cambiare marchio*
trash can: *cestino (dei rifiuti)*

16 Decide if the following statements are true or false. Correct the false ones.

	T	F
1. Mac OS was developed by Apple in 1984.	☐	☐
2. Classic Mac OS was the first GUI operating system.	☐	☐
3. Mac OS X is a development of Mac OS.	☐	☐
4. Mac OS X is updated every year on demand.	☐	☐
5. Mac OS X allows object-oriented programming.	☐	☐
6. The kernel of OS X provides basic features.	☐	☐
7. The OS X kernel checks that different applications do not access each other's memory.	☐	☐
8. iOS is used on smartphones.	☐	☐

17 (3.17) Listen to the extract and complete the table with the different names of the Mac OS.

System version	Year of release	Code name
Mac OS X 10.0	2001	Cheetah
Mac OS X 10.1	2001	
Mac OS X 10.2	2002	
Mac OS X 10.3	2003	
Mac OS X 10.4	2005	
Mac OS X 10.5	2007	
Mac OS X 10.6	2009	
Mac OS X 10.7	2011	

System version	Year of release	Code name
OS X 10.8	2012	
OS X 10.9	2013	
OS X 10.10	2014	
OS X 10.11	2015	
MacOS 10.12	2016	
MacOS 10.13	2017	
MacOS 10.15	2020	
MacOS 12	2021	

18 PAIR WORK Read the text and decide if the statements refer to Android (A) or iOS (i).

Android vs iOS

Google's Android and Apple's iOS are operating systems used primarily in mobile technology, such as smartphones and tablets. Android, which is Linux-based and partly open-source, is more PC-like than iOS, in that its interface and basic features are generally more customisable from top to bottom. However, iOS' uniform design elements are sometimes seen as being more user-friendly.

You should choose your smartphone and tablet systems carefully, as switching from iOS to Android or vice versa will require you to buy apps again in the Google Play or Apple App Store. Android is now the world's most commonly used smartphone platform and is used by many different phone manufacturers. iOS is only used on Apple devices, such as the iPhone.

Moreover, Android is available in more than 100 languages, while iOS is only available in 40 languages.

Adapted from: *https://www.diffen.com/difference/Android_vs_iOS*

	A	i
1. It is Linux-based.	☐	☐
2. It is partly open-source.	☐	☐
3. It is more PC-like.	☐	☐
4. Its interface and basic features are more customisable.	☐	☐
5. Its design is more user-friendly.	☐	☐
6. You can buy apps from Google Play.	☐	☐
7. You can buy apps from Apple App Store.	☐	☐
8. It is the world's most commonly used smartphone platform.	☐	☐
9. It is used in different smartphone brands.	☐	☐
10. It is only used on Apple devices.	☐	☐
11. It is available in more than 100 languages.	☐	☐
12. It is available in 40 languages.	☐	☐

UBUNTU

Ubuntu is an ancient African word meaning "humanity to others". The Ubuntu philosophy is: "I am what I am because of who we all are".

A distro is an operating system which uses the kernel of another operating system.

The latest LTS version is Ubuntu 20.04 "Focal Fossa".

Ubuntu•, which was first released in 2004, is a distribution, or distro••, of Linux. It is distributed by a company called Canonical, whose mission is to provide a free software platform for users and developers. In fact, the Ubuntu project is committed to the principles of open-source software development. It is free to install and free to modify, although donations to the project are most welcome.

How it works

Ubuntu relies on the architecture of Linux to communicate with computer hardware, its commands follow the same rules of hundreds of other Linux distros, and it uses a GUI like Windows, Mac OS and Android. The OS represents applications as icons or menu choices that can be selected using keyboard commands or a mouse, so there is no need to learn a library of commands or terms. Users with a basic knowledge of how a GUI works find it easy to use Ubuntu.

The operating system supports different types of software such as productivity applications, media software and communication programs which run on other operating systems and especially on Microsoft Suite. In general, Ubuntu supports software that is compatible with Linux, but with the purpose of adapting the Linux operating system in order to make it easier and more intuitive for the user.

Ubuntu versions•••

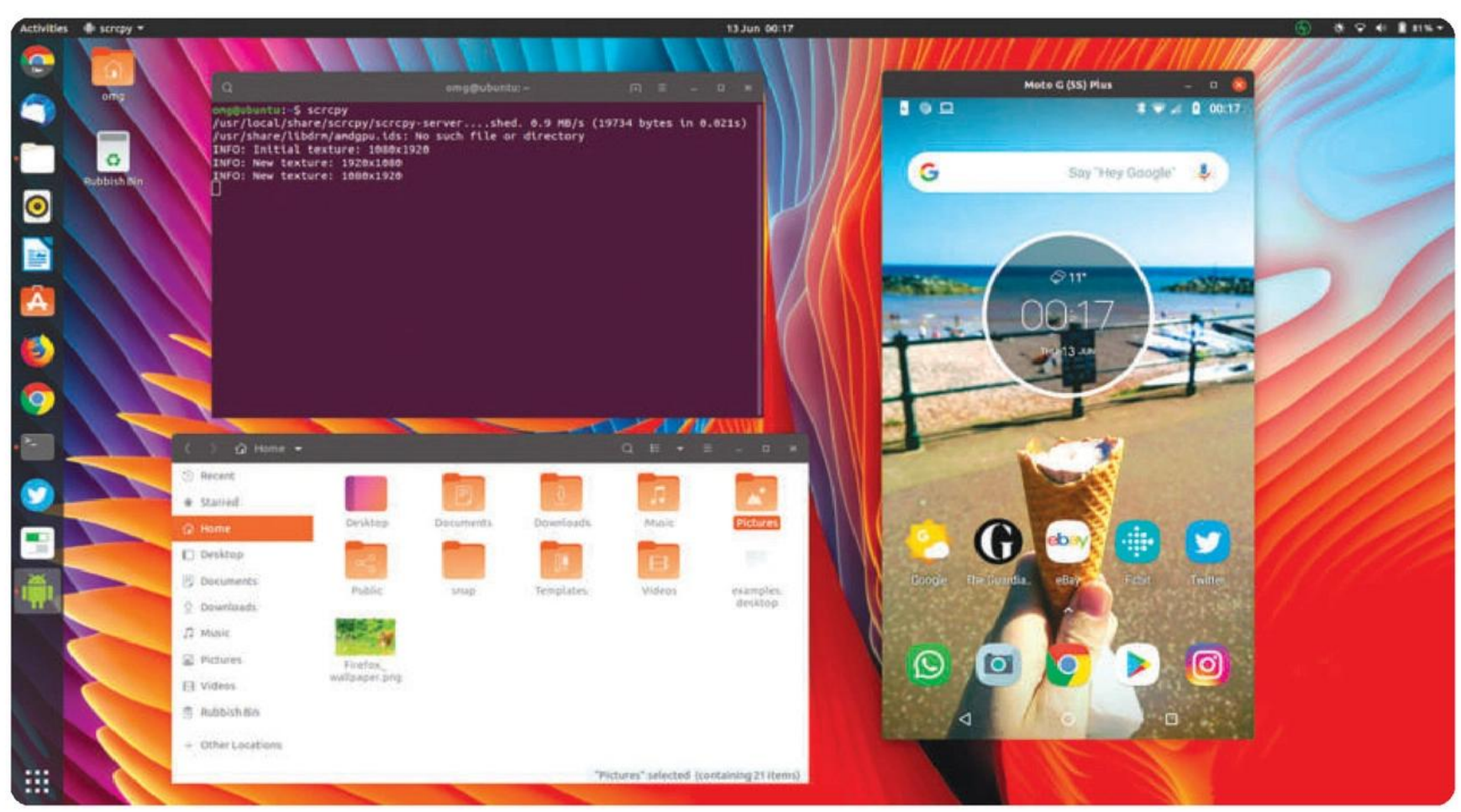
Ubuntu is available in three versions: desktop, server and core. Every two years a LTS (long-term support) version, which is supported for 5 years, is released. Non-LTS versions are released every 6 months and are supported for 9 months.

Ubuntu Touch for smartphones and tablets was released in 2013. It was then discontinued, but a small team called UBports picked up the project, which, apparently, still exists, supporting 64-bit applications.

Ubuntu desktops

The default desktop of Ubuntu is a very modern desktop environment called Unity, which has a powerful search tool for finding applications and documents and which integrates well with common applications such as audio players, video players, and social media.

A free copy of Ubuntu is available for download from the Ubuntu website.



to be committed: *essere impegnato, dedicarsi*
crisp: *nitido*

19 **Answer the questions.**

1. What is Canonical's mission?
2. What is the relationship between Ubuntu and Linux?
3. What is the purpose of Ubuntu O/S?
4. How many versions is Ubuntu available in? What are they?
5. What does an LTS version mean?
6. What is Unity?

20 **Read the text on Ubuntu values and complete the short summary.**

Ubuntu Values

We believe everyone has the right to a great computing experience – and we also believe it should be free. Ubuntu is the result of a growing community, working together to provide just that. As such, the Ubuntu brand embodies four values.

- **Freedom**: Ubuntu celebrates freedom. Freedom to choose, to change, to participate.
- **Reliability**: you can depend on Ubuntu. Like the people who make it, it is trustworthy and keeps its promises.
- **Precision**: Ubuntu is crisp and clean in engineering and attitude. There is beauty in the precision of the process and product.
- **Collaboration**: working together is at the heart of Ubuntu. It is the essence of 'humanity towards others'.

Adapted from: *http://design.ubuntu.com/*

Everyone has the right to... .....

.....

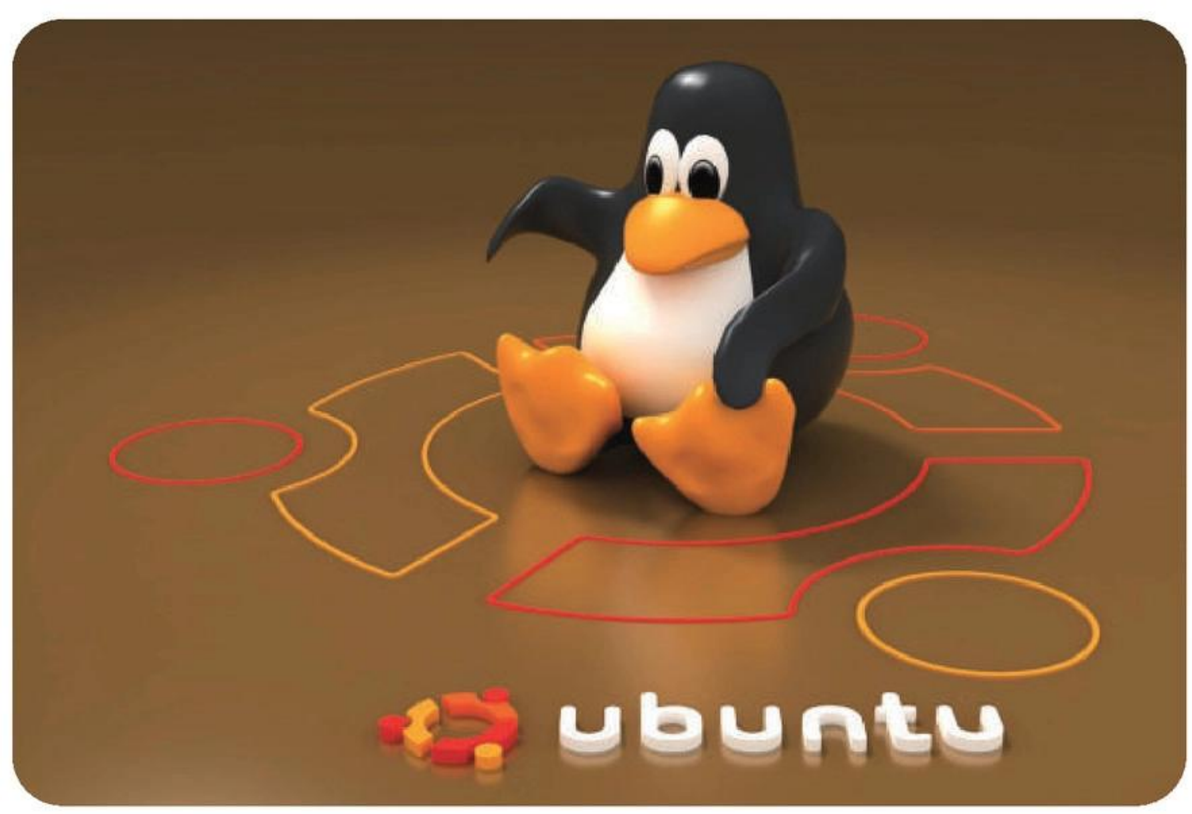
.....

21 (3.18) **Look at the Ubuntu logo, listen to its description and complete the definitions.**

1. Wordmark: .....
2. Circle of friends: .....
3. Roundel: .....
4. Registered trademark: .....

22 PAIR WORK **Discuss the meaning of this message from Ubuntu's website.**

"You make Ubuntu, you use Ubuntu, you talk Ubuntu, Ubuntu is yours".



GRAMMAR

PAST TENSES

FORM

	Past Simple	Past Continuous	Past Perfect
+	I/he/she/it/we/you/they *bought* the latest version of Windows.	I/he/she/it *was buying* the latest version of Windows. We/you/they *was buying* the latest version of Windows.	I/he/she/it/we/you/they *had bought* the latest version of Windows.
–	I/he/she/it/we/you/they *did not (didn't) buy* the latest version of Windows.	I/he/she/it *was not (wasn't) buying* the latest version of Windows. We/you/they *were not (weren't) buying* the latest version of Windows.	I/he/she/it/we/you/they *had not (hadn't) bought* the latest version of Windows.
?	*Did* you/he/she/it/we/they *buy* the latest version of Windows?	*Was* he/she/it *buying* the latest version of Windows? *Were* you/they *buying* the latest version of Windows?	*Had* you/he/she/it/we/they *bought* the latest version of Windows?

USE

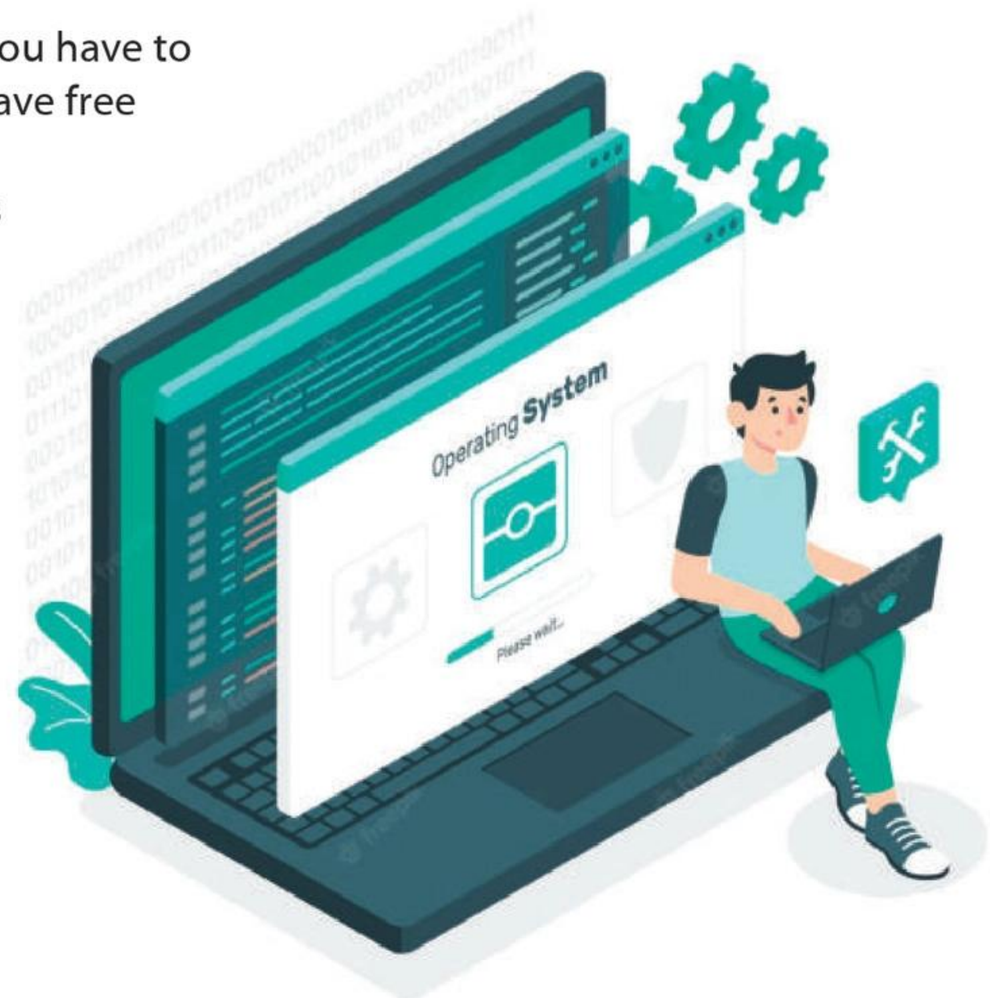
Past Simple	Past Continuous	Past Perfect
• **Finished actions in a definite past.** ➤ *Yesterday I downloaded the latest version of Ubuntu.* • **Habits in the past** ➤ *When I was a child, I played solitaire on my PC.* **Time expressions:** *yesterday, last …, … ago, when I was a child, in +* year, *on +* date	• **Actions in progress at a given time.** ➤ *I was trying a new operating system at 9:30 pm last night.* • **A longer/background action interrupted by a shorter/main action in the past simple.** ➤ *While I was upgrading my operating system, a strange alert appeared on the screen.* **Time expressions:** *while* with the past continuous and *when* with the past simple.	• **Together with the past simple to talk about two past events. The past perfect expresses anteriority and is used to identify the event which happened first.** ➤ *After I had finished downloading the new operating system, I started using it.* **Time expressions:** *after, before, by the time…*

23 **Complete the sentences with the right tense and form of the verbs given below.**

1. Bill Gates ..... (begin) to show an interest in technology at the age of 13.
2. Microsoft ..... (start off) as a small computer company with only 15 employees.
3. IBM ..... (look for) software to operate their upcoming PCs so they ..... (decide) to approach Microsoft.
4. Gates ..... (to convince) IBM managers that his company could meet their needs, but the main problem ..... (be) that IBM ..... (not develop) the basic operating system that could run on IBM computers yet.
5. I ..... (start) using Ubuntu while I ..... (do) an experiment of virus-free operating systems.
6. Before I ..... (learn) how to use Windows 7, Windows 8 ..... (appear).

FREE OPERATING SYSTEMS FOR EVERYBODY

Operating systems such as Windows or Mac are proprietary software, i.e. you have to buy them. This means that many people in developing countries do not have free access to technology and digital information, creating what is known as a digital divide, i.e. a cultural difference between the people who can access them and people who cannot.
Fortunately, there are open-source operating systems such as Linux and Ubuntu which are available for free.



24 GROUP WORK **Discuss the following points.**

1. Do you think that there should be free access to operating systems for everybody? Why?
2. Windows 10 was made available for free to people who already had Windows 8 and now Microsoft is doing the same with Windows 11. Do you think this is a good practice?
3. Not having an operating system also means not using a PC or any other electronic device. Do you think that this can limit the access to information?

25 **Read an extract from the Declaration of Human Rights and underline the parts of the text that could refer to the free access to operating systems.**

Declaration of Human Rights (Paris, 10th December 1948)

Article 26

1. Everyone has the right to education. Education shall be free, at least in the elementary and fundamental stages. Elementary education shall be compulsory. Technical and professional education shall be made generally available and higher education shall be equally accessible to all on the basis of merit.
2. Education shall be directed to the full development of the human personality and to the strengthening of respect for human rights and fundamental freedoms. It shall promote understanding, tolerance and friendship among all nations, racial or religious groups, and shall further the activities of the United Nations for the maintenance of peace.

Article 27

1. Everyone has the right freely to participate in the cultural life of the community, to enjoy the arts and to share in scientific advancement and its benefits.

26 GROUP WORK **Imagine that you have to take part in an initiative in which you have to suggest the amendment of articles 26 and 27 in order to adapt them to the new technological world. Follow the instructions.**

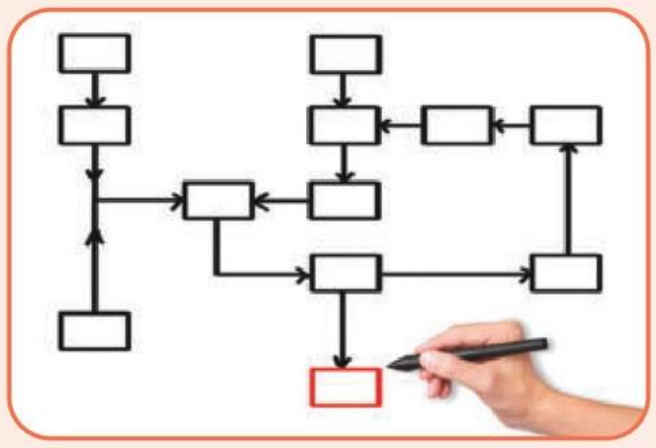
1. Add a 3rd paragraph to article 26 in which you refer to the right to free access to the information shared through the Internet thanks to free operating systems and a free Internet connection for everybody.
2. Add a 2nd paragraph to article 27 in which you state everybody's right to enjoy technological progress and to have free access to technology.

VOCABULARY

1 **Write the correct words for the following pictures.**

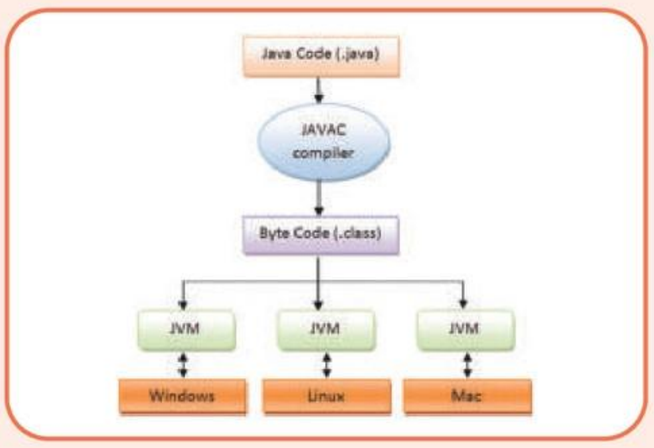
binary code • command line • declarative language • documentation • editor • flowchart • GUI • programming language • loop • menu-driven interface • Ubuntu • virtual machine

1. .....

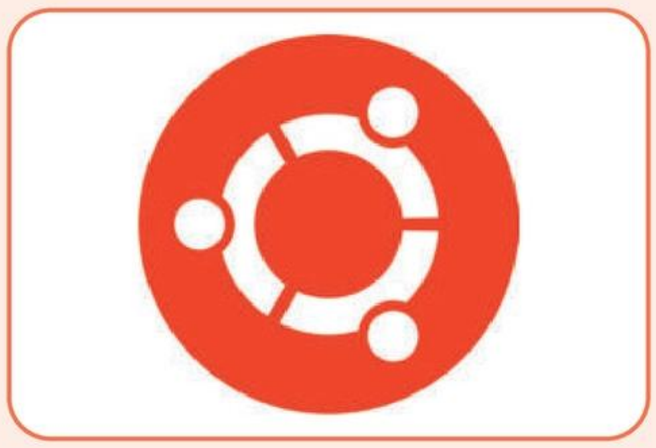


2. .....

3. .....

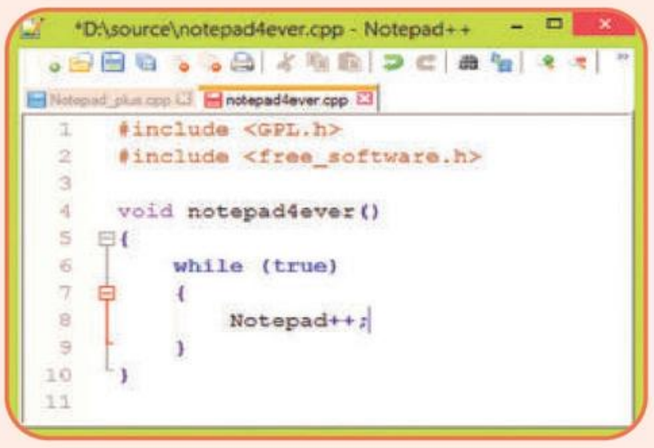


4. .....



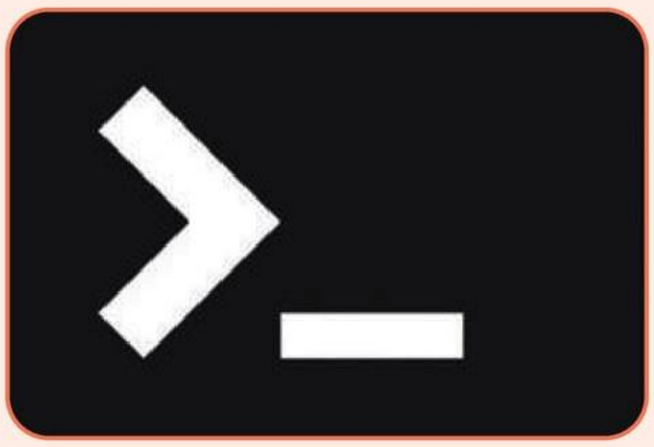
5. .....

6. .....



7. .....

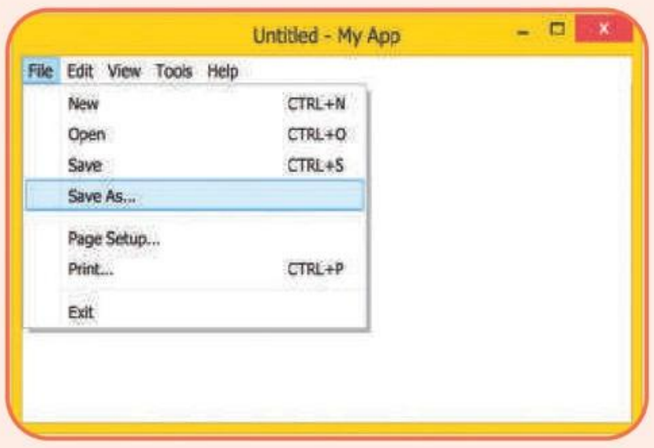
8. .....



9. .....

10. .....

11. .....



12. .....

2 **Find eight nouns made from the following verbs.**

debug • declare • develop • document • flowchart • map • perform • program

G	D	M	Q	J	Z	X	G	G	W	M	N	V	K	X
S	E	I	Q	F	C	G	J	S	I	C	O	T	N	Q
D	V	X	F	S	I	N	T	Q	B	W	I	I	G	N
F	E	D	E	G	U	I	L	H	G	G	T	X	F	O
I	L	E	C	N	R	P	R	Z	N	L	A	V	S	I
S	O	B	N	I	W	P	K	X	I	D	T	V	Q	T
Q	P	U	A	T	Z	A	X	L	M	E	N	D	N	A
B	M	G	M	R	E	M	C	Y	M	C	E	M	V	R
R	E	G	R	A	E	K	C	J	A	H	M	W	X	A
L	N	I	O	H	V	G	N	P	R	O	U	D	R	L
R	T	N	F	C	P	D	L	U	G	F	C	X	T	C
G	B	G	R	W	S	J	D	J	O	D	O	Y	V	E
G	R	C	E	O	A	R	B	Q	R	S	D	S	A	D
C	N	M	P	L	X	Y	H	O	P	O	Y	D	Y	M
J	A	A	X	F	G	C	J	Y	K	P	V	K	M	F

3 **Fill in the gaps with words that appear in this module. Some words may be used more than once.**

1. A ..... provides a snapshot of the logic of the algorithm.
2. The formal name for a procedure that will provide a solution to a problem is called an ..... .
3. A ..... combines some structure of a programming language with descriptions in an informal natural language.
4. A ..... says what must happen every time an imaginary wheel turns.
5. A ..... is so called because it is something that can vary.
6. Additions and multiplications are examples of .....
7. An ..... is a program for writing computer code.
8. Interpreters and ..... are necessary to translate the code for a computer.
9. When writing a program, ... must be declared and ..... performed.
10. ..... is both static and dynamic.
11. A ..... is less rigorous than an inspection.
12. ..... is carried out by the Development Team to find the cause of an error.
13. ..... testing is carried out while executing the program.
14. ..... means checking for verification and validation.

4 **Write a short text using the words provided. You can also add any extra words that you need.**

code • compiler • compilers • debugging • high level • language • languages • perform

.....

.....

.....

.....

REAL-LIFE SKILLS

CHOOSING THE BEST PROGRAMMING LANGUAGE FOR YOUR TASK

There is not one ideal programming language that works for every situation. For this reason, it is a good idea to have your task clearly in mind before choosing the language.
Here are a series of steps to help you make the right choice.

STEP 1: Defining the task

5 **Answer these questions.**

1. Do you need to create a website or something similar?
2. Do you need to write the content (text) or a website?
3. Do you need to interrogate a database?
4. Do you have to write a program as a series of steps, like for example creating a calculator?
5. Do you need to build a program around an object, for example making a ball move in a game?

STEP 2: Choosing the type of language

6 **Match the situations from the previous activity with an appropriate type of language and identify the one that you need for your specific task.**

STEP 3: Selecting the language

7 **Once you have identified the type of programming language that you need, you will have to choose among the different ones that you know. Complete the table.**

The languages I know:

Type of language	Languages
Procedural languages	
Query languages	
Mark-up or declarative languages	
Scripting languages	
Object-oriented languages	

The language for my task: .....

STEP 4: Code writing

```
Hello, World_
```

8 GROUP WORK **As a group, choose a common task. Work individually to go through the various steps described above, then compare your answers to the previous activity and answer the following questions.**

1. Do you all know the same languages?
2. Did you choose the same programming language for the common task?
   If not, would you change your mind now?

9 **Once they start using a new programming language or a new program, programmers like to make the computer say, "Hello world!". Write the code for "Hello world!" in as many languages as you know and check your answer with the class.**

ADA LOVELACE, THE FIRST COMPUTER PROGRAMMER

Ada Byron was the daughter of the Romantic poet Lord Byron and Anne Isabelle Milbanke.

Lady Byron wished her daughter to be unlike her poetical father, and so Ada received tutoring in mathematics and music. But Ada's complex inheritance became apparent as early as 1828, when she produced the design for a flying machine. It was mathematics that gave her life its wings.

Lady Byron and Ada moved in an élite London society. There, Ada met her lifelong friend, Charles Babbage, professor of mathematics at Cambridge.

Babbage was known as the inventor of the Difference Engine, an elaborate calculating machine that operated by the method of finite differences. Ada met Babbage in 1833, when she was just 17, and they began a voluminous correspondence on the topics of mathematics, logic, and ultimately all subjects.

In 1834, Babbage had made plans for a new kind of calculating machine – an Analytical Engine – although his Difference Engine was not finished yet. In 1842, an Italian mathematician, Luigi Menebrea, published an essay in French on the subject of the Analytical Engine. Babbage enlisted Ada as translator for the essay and she worked on the article and a set of Notes she added to it. These were the source of her enduring fame.

Ada understood the plans for the device as well as Babbage but was better at explaining its possible future uses. She rightly saw it as what we would call a general-purpose computer. For her the machine was suited for developing and tabulating any function whatsoever. The engine was the material expression of any indefinite function. Her Notes anticipated future developments, including computer-generated music.

Adapted from: *https://www.sdsc.edu/ScienceWomen/lovelace.html*

to enlist: *incaricare* **enduring:** *duratura*

10 **Answer the questions.**

1. What was Ada's first design for?
2. What was the Difference Engine?
3. What was the Analytical Engine?
4. How did Ada contribute to the Analytical Engine's development?
5. How would we define the Analytical Engine today?
6. What did Ada realise the Analytical Engine was able to do?

11 **Read the text and summarise it in four sentences.**

Ada's Notes on the Analytical Engine: Note G

Ada's paper is most famous for the final appendix, Note G. This demonstrates the operation of the machine by giving the example of the calculation of the so-called Bernoulli numbers. The Bernoulli numbers are particularly fit for machine calculation because they are defined recursively. There are several different ways of calculating these numbers, and Lovelace did not choose the simplest.

The paper contained a detailed explanation of how the various quantities involved in the computation of the Bernoulli numbers are fetched from the Store, used in calculation in the Mill, and moved back again, according to the instructions on the cards. The process is illustrated using a large table, whose columns represent the values of the data, the variables, and the intermediate results, as the engine carried out each stage of the calculation.

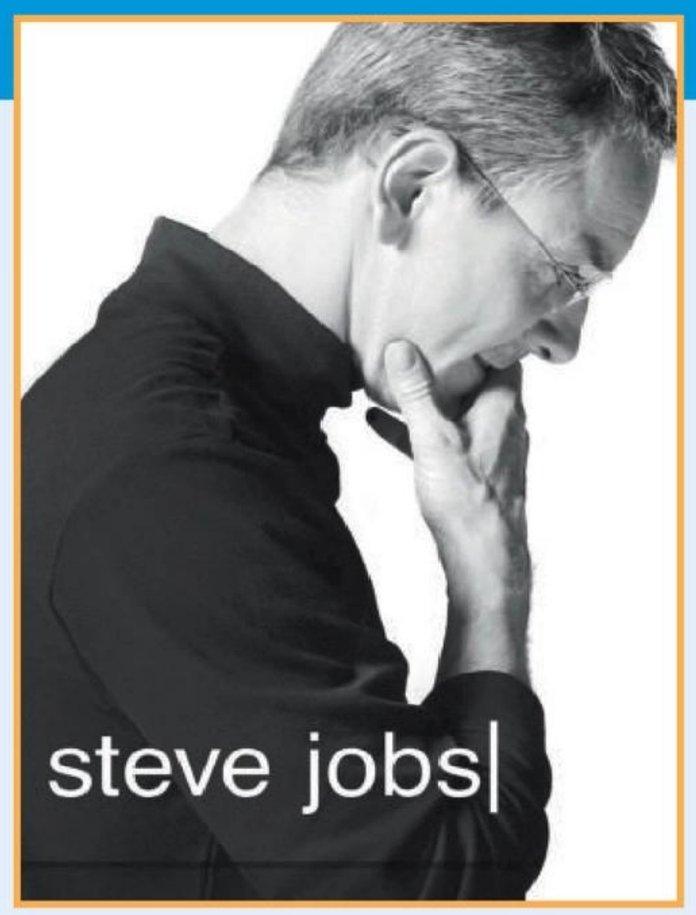
This table is often described as "the first computer program", though Lovelace wrote, more accurately, that it "presents a complete simultaneous view of all the successive changes" in the components of the machine, as the calculation progresses. In other words, the table is what computer scientists would now call an "execution trace".

Adapted from: *https://blogs.bodleian.ox.ac.uk/adalovelace/2018/07/26/ada-lovelace-and-the-analytical-engine/*

CLIP FILM

STEVE JOBS

- PRODUCTION: UK – USA 2015
- DIRECTOR: Danny Boyle
- STARRING: Michael Fassbender (Steve Jobs), Joanna Hoffman (Kate Winslet), Seth Rogen (Steve Wozniak), Jeff Daniels (John Sculley)



SYNOPSIS

The film is not an ordinary biopic, i.e. a film that takes the audience through Steve Jobs' life from the beginning to the end, but instead it focuses on the launch of three products: the Macintosh in 1984, the NeXT Box in 1988 and the iMac in 1998. It is the specific portrait of a man in his most stressful moments.

The film shows Jobs' difficult relationship with his daughter Lisa and with his collaborators and former colleagues, especially Steve Wozniak and his former boss John Scully. His ambitions, his strong personality and his often rude behaviour make it difficult for other people to like him, apart from Joanna, a long-standing collaborator and counsellor.

However, we also see a man pursuing a dream of success that comes true when, in less than a decade, he becomes the CEO of Apple, the company from which he was fired.

What strikes the most is the film's intimate portrait of a man before a public event. In fact we never actually see the launch of the products in front of an admiring audience, but only the events backstage and the minutes that precede the public event.

BEFORE WATCHING

12 **Use the Internet to answer the following questions.**

1. Who was Steve Jobs? What are his greatest achievements?
2. What was the relationship between Steve Jobs and Bill Gates like? And between Jobs and Steve Wozniak?
3. Who is Joanna Hoffman?

ONLINE RESOURCES

- *Desk Set*

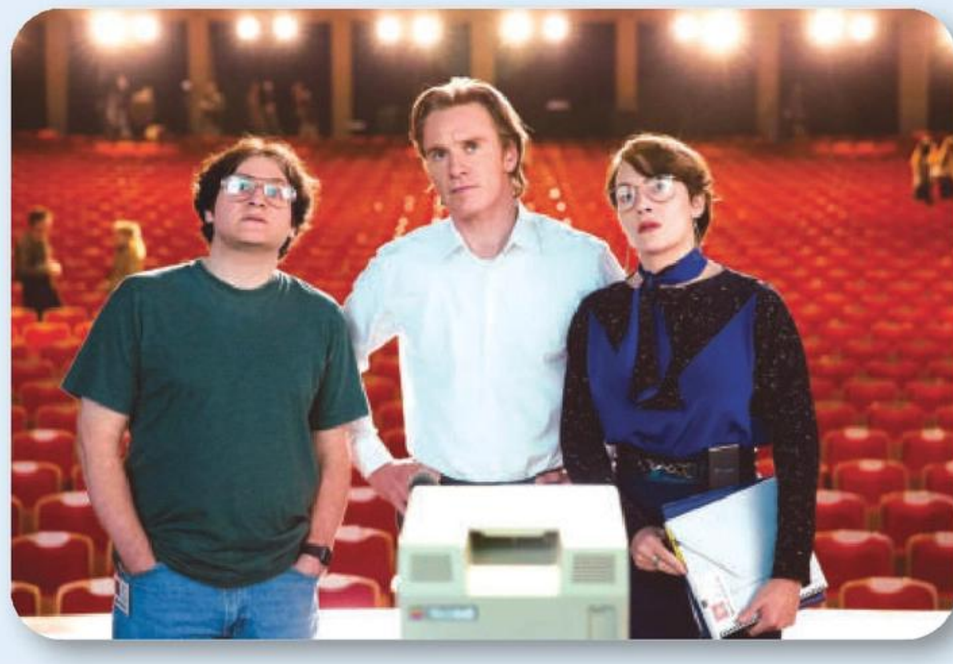
13 **Read the synopsis and answer the questions.**

1. What is a biopic?
2. What are the three events portrayed in the film?
3. In the film, do we see Jobs speaking in front of an audience? If so, what does he say? If not, what does the film show?

WHILE WATCHING

14 **Watch the video and choose the right option.**

1. Joanna defines herself as…
   a. a confident woman.
   b. a work wife.
   c. an old friend.
2. What is Skylab?
   a. A computer.
   b. A NASA missile.
   c. A satellite.
3. The Skylab…
   a. crashed in the Ocean.
   b. was lost in space.
   c. came back safely.
4. Jobs wants to build…
   a. a new computer.
   b. a computer for colleges.
   c. a faster computer.
5. What is the problem with Apple?
   a. They stopped innovating.
   b. They ran out of money.
   c. They produced expensive online dictionaries.
6. Tevanian is going to build…
   a. an Apple computer.
   b. speakers.
   c. an operating system.
7. What is Jobs' revenge?
   a. Apple will fail.
   b. Apple will call him back and pay him a lot of money.
   c. Apple will build a new operating system for him.



AFTER WATCHING

15 **Although Jobs was the CEO of Apple, he did not develop the Mac OS X. Read the text about the developer of the operating system and answer the questions.**

Avadis "Avie" Tevanian, Chief Developer of Apple Mac OS X

Avadis "Avie" Tevanian was the senior developer of the Apple Mac OS X operational system. While studying Computer Science at Carnegie Mellon University, Tevanian, along with Richard Rashid, developed the Mach operating system, which would become the base of Mac OS X. While working for NeXT Computer, Avie Tevanian met Steve Jobs, the founder of the company. Later, Jobs invited him to work with him in Apple, his newly founded company.

After Apple acquired NeXT, Tevanian headed the programming technology department in Apple until 2003. In 2003, he was appointed the senior vice president of Software Engineering of Apple. There, he was the principal figure responsible for the development of Mac OS X.

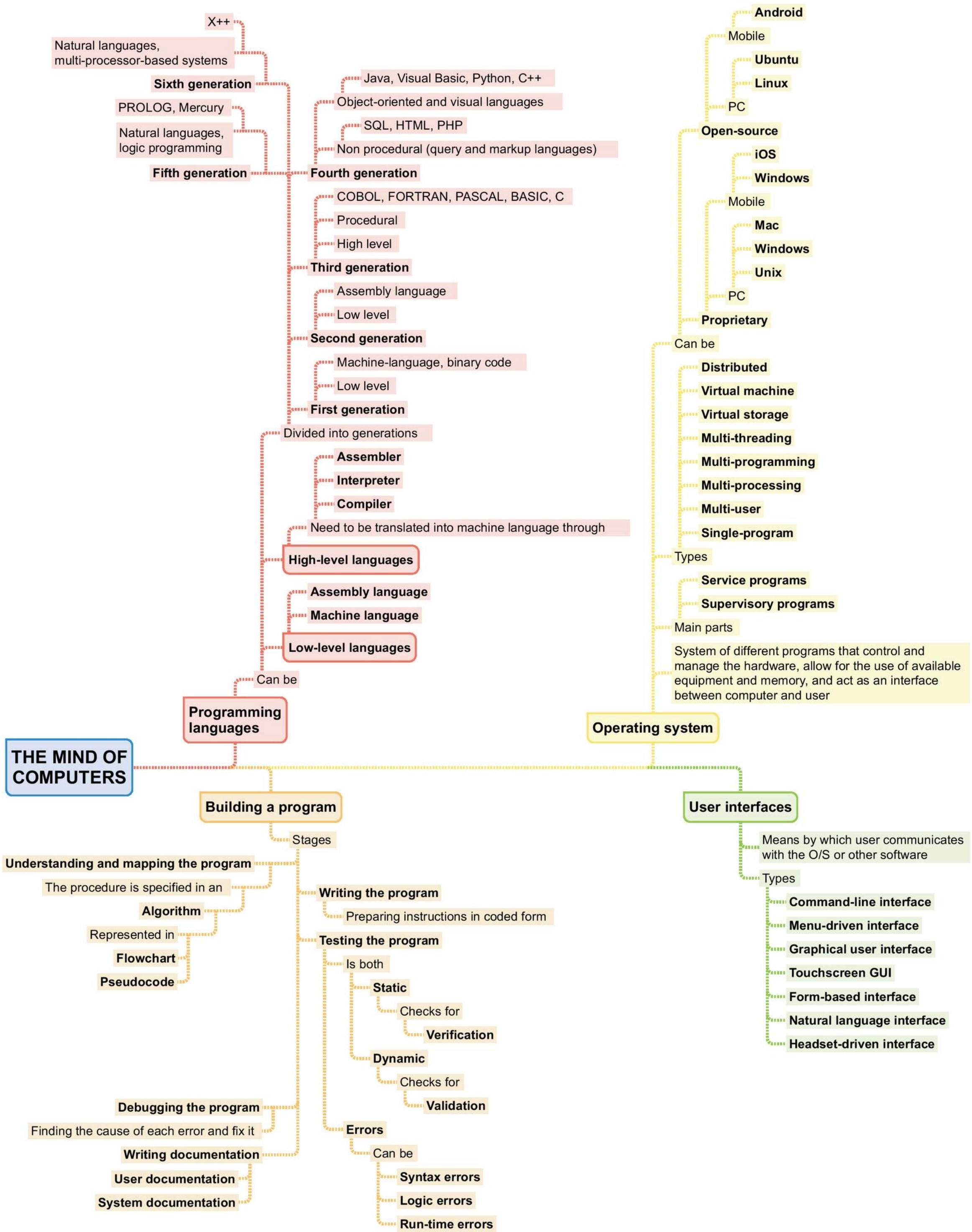
Tevanian would eventually manage to release the new Apple operating system, a task which no one else had succeeded in doing. Thanks to his engineering genius and managerial talent, Apple created an operating system that would go on to become one of the best on the market, even though the first versions were slow and incomplete.

Tevanian also supervised the development of further Mac OS X versions such as 10.0 Cheetah, 10.1 Puma, and 10.2 Jaguar, each one faster and more functional than the one before. It was Tevanian who set the direction of Apple's operating system's development for the years to come.

Adapted from: *https://allinnet.info/news/avadis-avie-tevanian-chief-developer-of-apple/*

1. What project did Tevanian develop when he was a university student?
2. When did Tevanian meet Jobs?
3. What was Tevanian's role in Apple when the MaC OS X was developed?
4. What type of improvements did the later versions of this operating system have?

MAPPING YOUR MIND



4 MODULE

THE USES OF COMPUTERS

Unit 4.1 • Main software

- Word processors
- Spreadsheets
- Presentations
- Electronic organisers
- Databases
- Databases and database applications

Unit 4.2 • Graphics software

- Painting and drawing software
- Photo editing software
- Desktop publishing software

Unit 4.3 • Other software programs

- Global Positioning System (GPS)
- Virtual reality and videogames
- Website creation
- Domotics and smart homes
- Industrial and manufacturing software
- Business software
- E-learning

Unit 4.4 • The New Frontiers of ICT

- Industrial applications
- Medical uses
- Artificial intelligence and augmented reality

ONLINE RESOURCES

- CAD
- Digital mapping
- Special effects and computer-generated imagery in film making
- Musical instrument digital interface and music software

LANGUAGE SKILLS

- Learning and playing with computers
- Interviewing
- Improving sound, music, pictures and texts

EXTRA FIRST AND IELTS READING PRACTICE

- Ielts, passage 1

LITERARY BITS

- Philip K. Dick, *Do Androids Dream Of Electric Sheep?*

EUCIP CORE SYLLABUS 3.1

- Audio-visual tools (Plan A 6.5)

4.1 MAIN SOFTWARE

WORD PROCESSORS

Do you use open-source/ free or proprietary software? Which is the most popular word processor in your class?

Do you use a word processor? What do you use it for?

Software programs are used every day by almost everybody working on a computer, can be used for very different functions and can be of different types.

Open-source, free software or proprietary software?•

- **Open-source** software is software available for free together with its source code so that it can be modified and shared.
- **Free software**, as the name suggests, is free but the source code is not available. It is often a trial or a basic version of proprietary software.
- **Proprietary software** refers to programs owned by an individual or companies which are sold with some restrictions of use and do not provide the source code, i.e. they cannot be modified by the user.

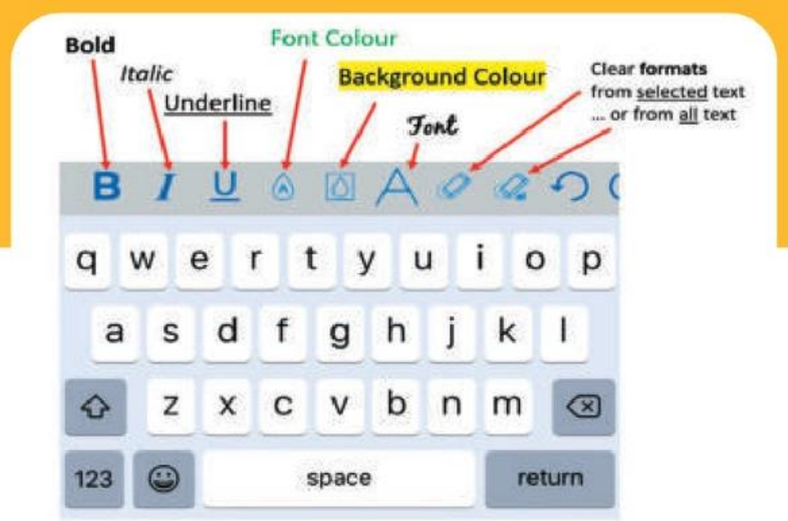
■ Word processors

Word processors•• are used to write and manipulate text documents. When the user enters text by typing, the software provides tools for copying, deleting and formatting the text.

■ Main functions

The main functions of a word processor can be grouped into two categories:

- **text formatting**, which refers to the appearance of the text and includes choosing the font type and size, bolding, underlining and italicising;
- **text editing**, which refers to the content of the text and includes creating, editing, saving and printing documents, creating and editing tables, inserting elements from other software such as illustrations or photographs, and correcting spelling and grammar.



■ Other features

Some important features of word processors are:

- the **layout**, which refers to the orientation of the page and margins;
- the **revision**, which is a function that enables multiple users to modify or add notes to a text. The notes and the corrections are visible to other users until they are accepted or refused.

Word processing software typically also contains features to make it easier to perform repetitive tasks, for example, a standard letter template can be used to send similar letters to different people.

■ Main uses

The very first word processors were just used to enter and edit simple texts. Modern word processors can produce different and more elaborate kinds of texts: letters, memos, CVs, questionnaires, reports, leaflets containing graphics, newsletters, printed envelopes, personalised letters using mail merge, worksheets, labels, web pages and so on.

■ Available software

The first word processor was a program called WordStar (1982) and worked with DOS. The first word processor for Windows appeared in 1989: Microsoft's Word 1.0. Today, other word processors are available to users, although Microsoft Word is the major player on the market. They include: Google Docs – a free online word processor which utilises cloud storage, Open Office Writer – both free and open-source, Lotus Word Pro – proprietary software provided with the Lotus SmartSuite but compatible with Microsoft Windows computers, and WPS Writer – part of a free office suite for different OSs, often found on smart phones and tablets.

to bold: *mettere in grassetto*
to italicise: *mettere in corsivo*
mail merge: *stampa unione*
misspelt: *con errori di ortografia*
template: *modello*
trial: *di prova*
unreliable: *inaffidabile*

1 Answer the questions.

1. What is a word processor?
2. What are the two main functions of a word processor? Describe them.
3. What are some other important features of a word processor? Describe them.
4. What is a template?
5. What kinds of text documents can be written with a word processor?
6. What was the name of the first word processor?
7. When did the first word processor for Windows appear? What was its name?
8. What word processors are available on the market?
9. Which word processors are proprietary? What does that mean?
10. Which word processors are free? Which one is also open-source? What does that mean?

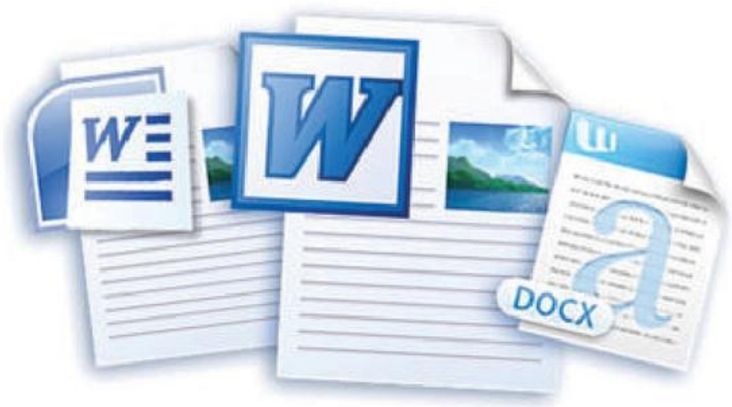
2 Read the text. Find the English equivalents for the Italian words given below. Then answer the questions.

Working on a Text

There are three main text formatting methods:

- Change the font, that is the character style. There are many types of font, for example Arial, Times New Roman, Calibri, etc;
- Change the size of the text. Emphasise headings and sub-headings by making them larger. A font size between 10 and 12 is easy to read for most people;
- Highlight the text. There are four ways to make text stand out. Words can be in bold type, italics, underlined, colour.
- Remember the golden rules: keep things simple, be consistent and don't do them all at once.
- There are four text editing methods:
- New text can be inserted within existing text;
- Existing text can be deleted by using the delete or backspace keys;
- Text can be moved to another position on the page (i.e. drag);
- Text can be copied so that it appears more than once on the page (i.e. copy and paste).

1. Dimensione
2. Sottotitoli
3. Formattazione
4. Trascinare
5. Titoli
6. Grassetto
7. Incollare
8. Spostare
9. Cancellare
10. Corsivo
11. Evidenziare
12. Tipo di carattere
13. What are the main text formatting methods?
14. What are the text editing methods?
15. What are the golden rules to remember when formatting?



3 (4.1) Listen to the recording and complete the text below with the missing words or phrases.

Spell-checkers and Grammar Checkers

Most word processors can automatically correct your spelling and **1.** .....This can improve the quality of your written **2.** ..... and avoid many little but annoying mistakes. So, learn how to use them and don't **3.** ..... to use them systematically. They are a great help! There are, however, some problems with spell-checkers. They only recognise misspelt words, not their **4.** .....This is a problem with words like "were" and "where", for example. If you use the wrong **5.** ....., the spell-checker won't detect the problem. Moreover, many words are spelt **6.** ..... in different parts of the English-speaking world: e.g. labor (American English) and labour (British English). So, you have to choose **7.** ..... you want to use. Grammar checkers can be unreliable and give confusing advice. This is because good grammar **8.** ..... on context, and most software isn't powerful enough to take this into account.

SPREADSHEETS

A **spreadsheet** is a program that can display and process data in a structured way. It can process both numerical and text data•. Spreadsheets can be used to: record data, search for particular items of data, perform calculations based on data, and produce graphs and charts.

Examples of uses include calculating the school results of a student or a whole class, producing graphs based on the results of a questionnaire, and keeping different kinds of records.

Some spreadsheets allow *conditional formatting*: the format of a cell is changed if the content of the cell meets certain conditions, for example, if a student's mark is below six the colour is red, if it is six or more, it is green.

Open Office and Libre Office Calc are both free and open source and are very similar. Google Sheets and Zoho are free, but with a limited functionality, if compared with Excel.

Cells

A spreadsheet is made up of **rows** and **columns.** These divide the sheet into individual **cells**. Each cell can be identified using the column letter and row number as **coordinates**.

Each cell can contain one, and only one, of three things:

- **numerical data**, e.g. numbers, dates, sums of money. Most spreadsheets recognise dates and money and convert them into a suitable format, so if you enter 13-4, it is converted to 13th April;
- **text data**, e.g. people's names, titles of books. Column headings usually contain text. One process that can be carried out with text, for example, is sorting it into alphabetical order;
- **formulas**, which allow results of calculations to be displayed inside a cell. For example, you can add up all the numbers in a column and display the answer in a cell at the bottom of the column.

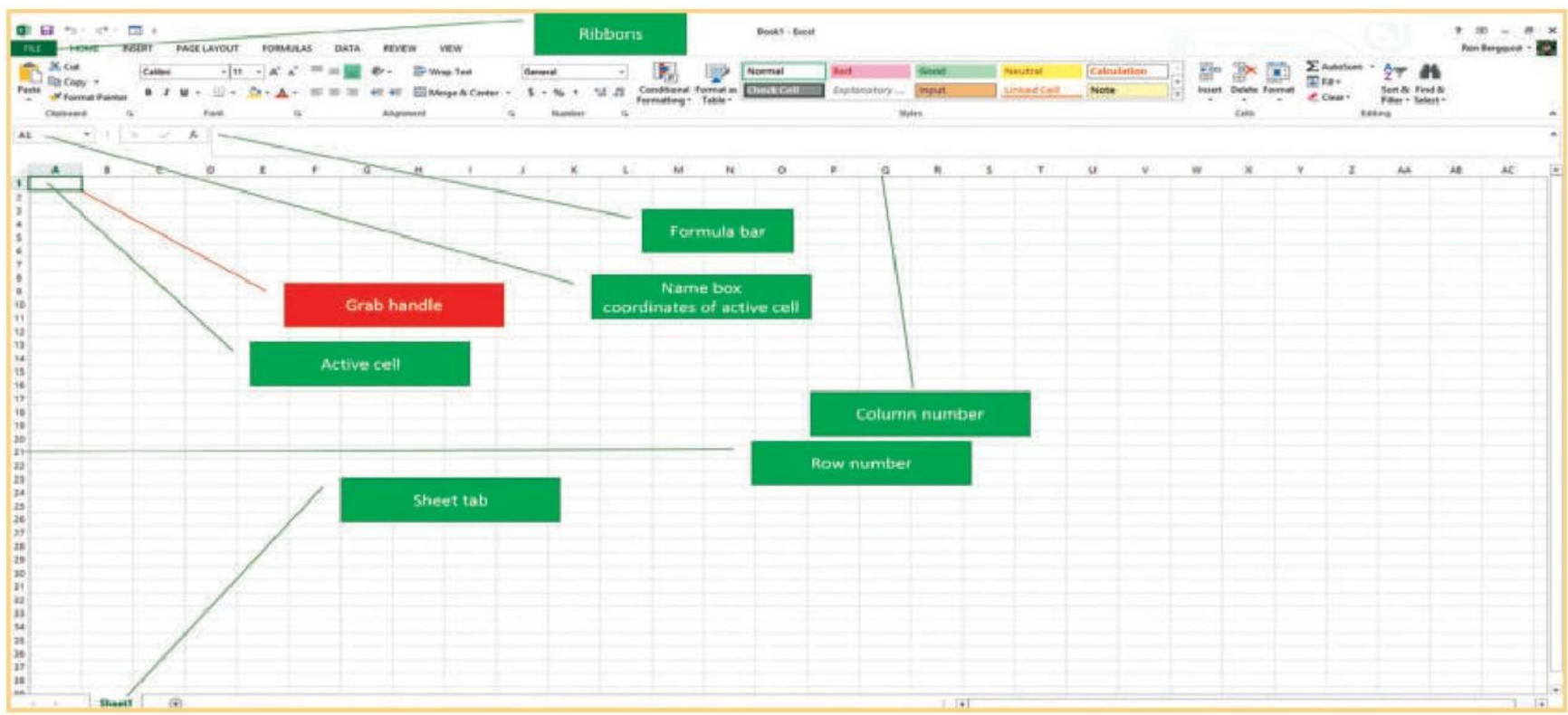
The golden rule is to put only one piece of data in each cell: different types of data should not be mixed.

Formatting

Data can be formatted•• in similar ways to a word processor by using italics, bold type, different fonts, colours, and sizes to make data stand out. Some spreadsheets allow for the insertion of graphics, movies and sounds, too.

Available software

The first spreadsheet, Visicalc, appeared in the late 1970s. Today, there is a great variety of spreadsheets: Microsoft Excel, Open Office Calc, Libre Office Calc, Google Sheets and Zoho Sheet•••.



average: *media*
row: *riga*
to sort: *ordinare*

4 **Answer the questions.**

1. What is a spreadsheet?
2. What can a spreadsheet be used for?
3. How is a spreadsheet organised?
4. What type of data can be entered into a cell?
5. Can one cell contain more than one data type?
6. What is a formula? What is it used for?
7. What is the golden rule of a spreadsheet?
8. What can you do to the text in a spreadsheet to improve its appearance?
9. What was the first spreadsheet called?
10. What are the names of some common spreadsheet software?

5 **Decide if the statements are true or false. Correct the false ones.**

	T	F
1. Spreadsheets can display numbers but not text.	☐	☐
2. Spreadsheets can be used to record data.	☐	☐
3. They can search for particular items of data.	☐	☐
4. They can be used to predict data.	☐	☐
5. They can perform calculations based on data.	☐	☐
6. They cannot produce graphs and charts.	☐	☐

6 (4.2) **Listen to a short history of the first spreadsheets and complete this summary with the missing data.**

Visicalc was the name given to the first
1. ....
It appeared in **2.** .....
At the time, the idea of organising numbers in rows and columns was **3.** ..... Visicalc was part of **4.** ....
when **5.** ....
appeared in 1981. Its rival, **6.** .....,
provided linkage to **7.** ..... In 1985,
8. ....
..... appeared, whose **9.** .....
were even better. Excel for Windows appeared in **10.** ..... and became the
11. ....

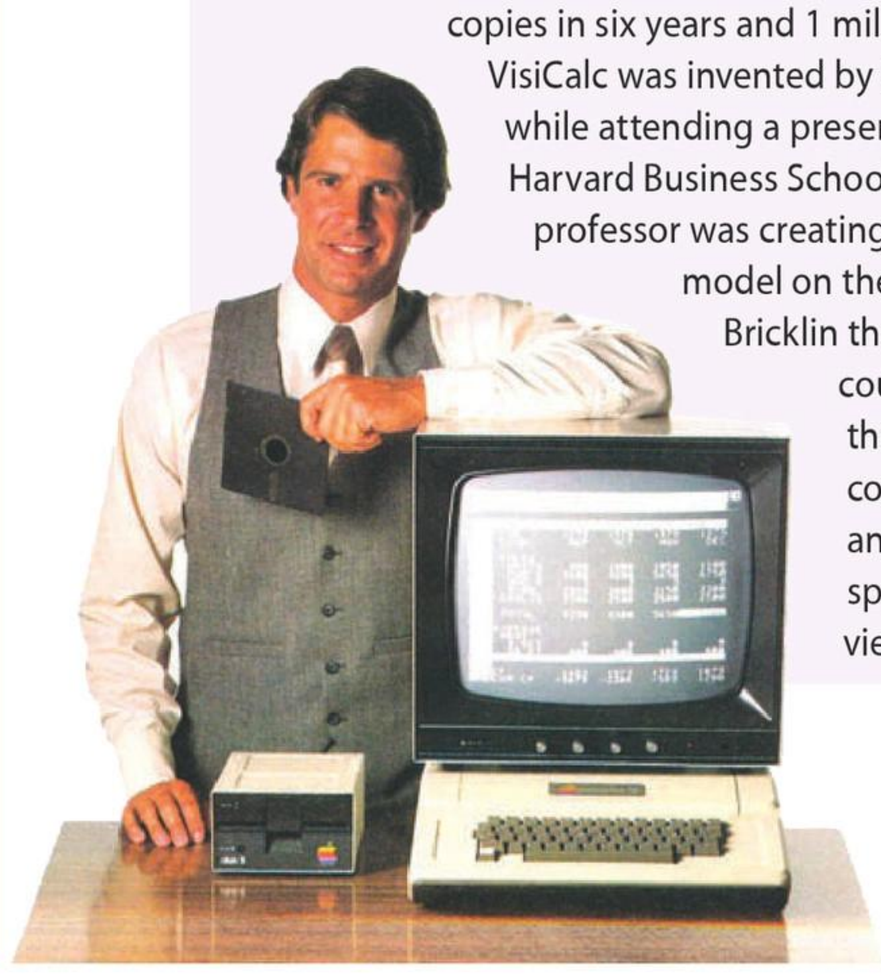
7 PAIR WORK **Decide how you would organise a spreadsheet of your school marks. Follow the instructions.**

1. You have to consider all the subjects and all the marks, both oral and written (when required). How would you organise your rows and columns? Make a sketch.
2. Calculate the average mark for each subject. If the subject has both oral and written marks, first calculate the average mark for each and then the average between the two.
3. Calculate the overall average mark. It is useful for credits at the end of the school year.
4. Apply conditional formatting to three levels (decide which ones) and choose the colours. What are the levels? Remember that there must be a clear distinction between positive and negative marks. What colours would you choose?

8 **Write a text explaining how the spreadsheet of the previous activity is organised.**

VISICALC

VisiCalc stands for visible calculator and was the first spreadsheet for personal computers, originally released for the Apple II by VisiCorp. It is considered the application that turned the microcomputer into a serious business and Apple II's killer application. In fact, it sold over 700,000 copies in six years and 1 million in total. VisiCalc was invented by Dan Bricklin while attending a presentation at Harvard Business School. While the professor was creating a financial model on the blackboard, Bricklin thought that he could replicate the process on a computer using an electronic spreadsheet to view the results.



PRESENTATIONS

Do you make school presentations? For which subjects? Do you just show text and images, or do you also include audio and video?

Which main software program(s) do you use for your presentations? Why? Do you know any other programs to make presentations?

A **presentation** is a speech or talk in which a new product, idea or a piece of work is shown and explained to an audience. Nowadays presentations often make use of presentation software in order to become more visually appealing to the audience.

Types of presentations

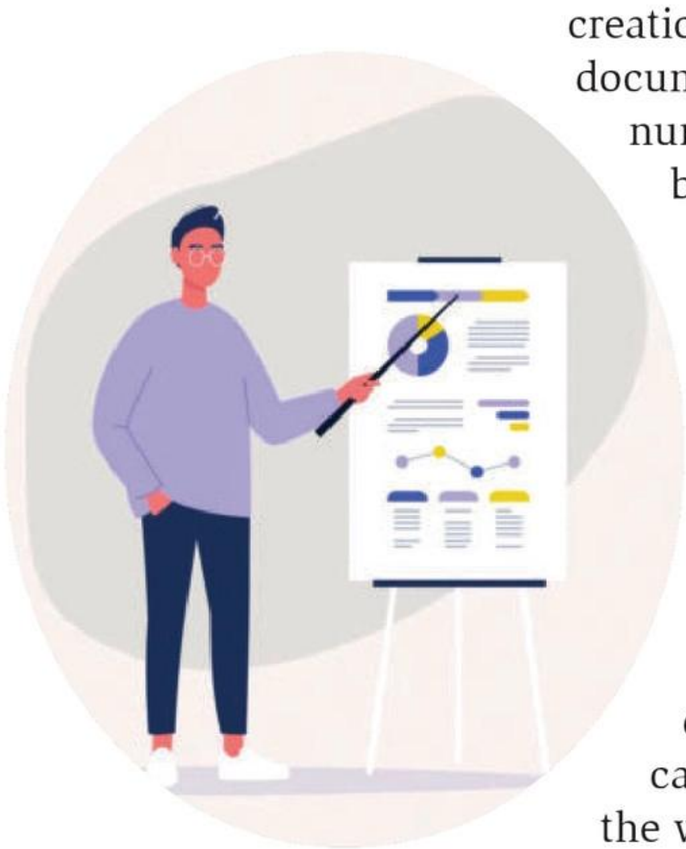
Presentations• can be given with or without a speaker. The typical way to give a presentation is with a speaker introducing slides projected on a large screen. The audience can read the information on the screen while the speaker gives them more detailed spoken information.

The other way is to give a presentation without a speaker. For this to work well, the slides have to be good enough to communicate all the required information by themselves. Multimedia presentation software can help by allowing a **commentary** to be recorded.

Presentation software

Presentation software•• allows for the creation of a series of slides in a single document; each slide can contain a number of frames, i.e. something like boxes for text or images. This means that text and images, and even videos and sounds, can be added onto a slide. A speaker can decide when each frame on a page appears, so each point in a list can appear on screen at just the right moment.

Animation effects can even make the frames arrive on screen in different ways, e.g. a line of text can appear one word at a time, or the whole line can fly into place from either side of the screen. These animation effects can either happen at set times, usually if there is no speaker, or they can be controlled by the speaker as they are talking, usually with the click of a mouse or a remote control button.



frame: *cornice*
remote control: *telecomando*
set: *prestabilito*

Advantages and disadvantages

Using multimedia presentation software can have both advantages and disadvantages.

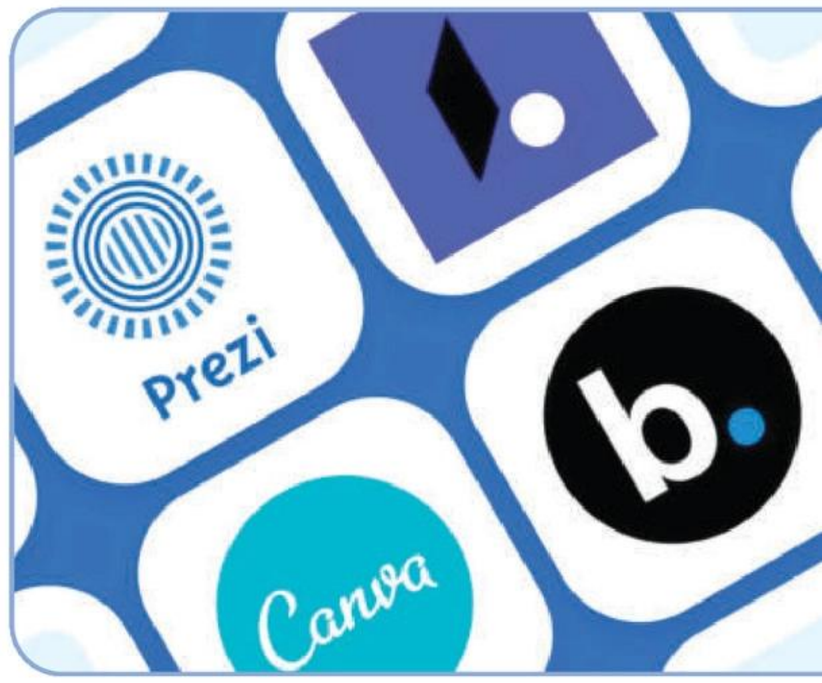
- + It produces professional-looking presentations.
- + It can help attract and keep the attention of the audience.
- + Presentations can be saved and reused, with or without the speaker being present.
- + It is easy to edit presentations and adapt them for different audiences.
- − It is very easy to get carried away by technology and produce badly designed slides.
- − The software needs appropriate hardware to run the presentation.

Popular presentation software

Microsoft PowerPoint is the most popular presentation software and in business it is the absolute standard. However, there are also other programs available such as Prezi, Powtoon, Canva, Google Slides and others.

9 Correct these statements.

1. Presentations can be given with or without an audience.
2. The speaker reads the information on the screen while the audience listens.
3. The speaker reads a commentary during the presentation.
4. Each document contains a slide.
5. Each frame always appears at a given time.
6. Animation effects allow films to appear on screen.
7. The animation effects are controlled by the audience with a remote control.
8. Microsoft Powerpoint is the only software available.



10 (4.3) Listen to an expert giving advice on how to make an effective presentation and complete the summary.

1. Less is better than .....
2. Variety is better than .....
3. Images paint a better picture than a lot of ....
4. Use a set of ..... and a colour scheme.
5. Use one ..... style.
6. The title of a slide should be at least ..... points.
7. Do not use ..... letters.
8. Avoid the following combination of background and text colours: orange and .....
9. Avoid ..... on a dark background.
10. Don't use too many .....

11 (4.4) Listen to a recording about the alternatives to Microsoft Power Point and complete the table.

Software	Characteristics	Pros	Cons
PowToon			
Prezi			
Google Slides			
Canva			
Ludus			

12 Match these terms with their definition.

1. Slide ☐
2. Animation ☐
3. Transition ☐
4. Slide master ☐
5. Design themes ☐
6. Slide layout ☐
7. Slide sorter ☐
8. Outline view ☐

a. A view of all the slides in the presentation that allows you to rearrange them as required.
b. Each page within a presentation.
c. It displays only the text contained on each slide.
d. Pre-defined layouts for arranging content on slides.
e. Pre-defined styles that set the background, layout and colours of a presentation.
f. A template slide with fonts, colours and sizes that can apply to every new slide.
g. The graphical effect applied as you move from one slide to the next.
h. Visual effect that can be applied to any object within a presentation to provide movement or emphasis.

ELECTRONIC ORGANISERS

Do you use an electronic organiser? Which one(s)? What for?

Calendars can be set up to send an alert at a certain time or at recurring times. Group calendaring can alert an entire team. Team members are automatically e-mailed, and the program waits for the collective responses.

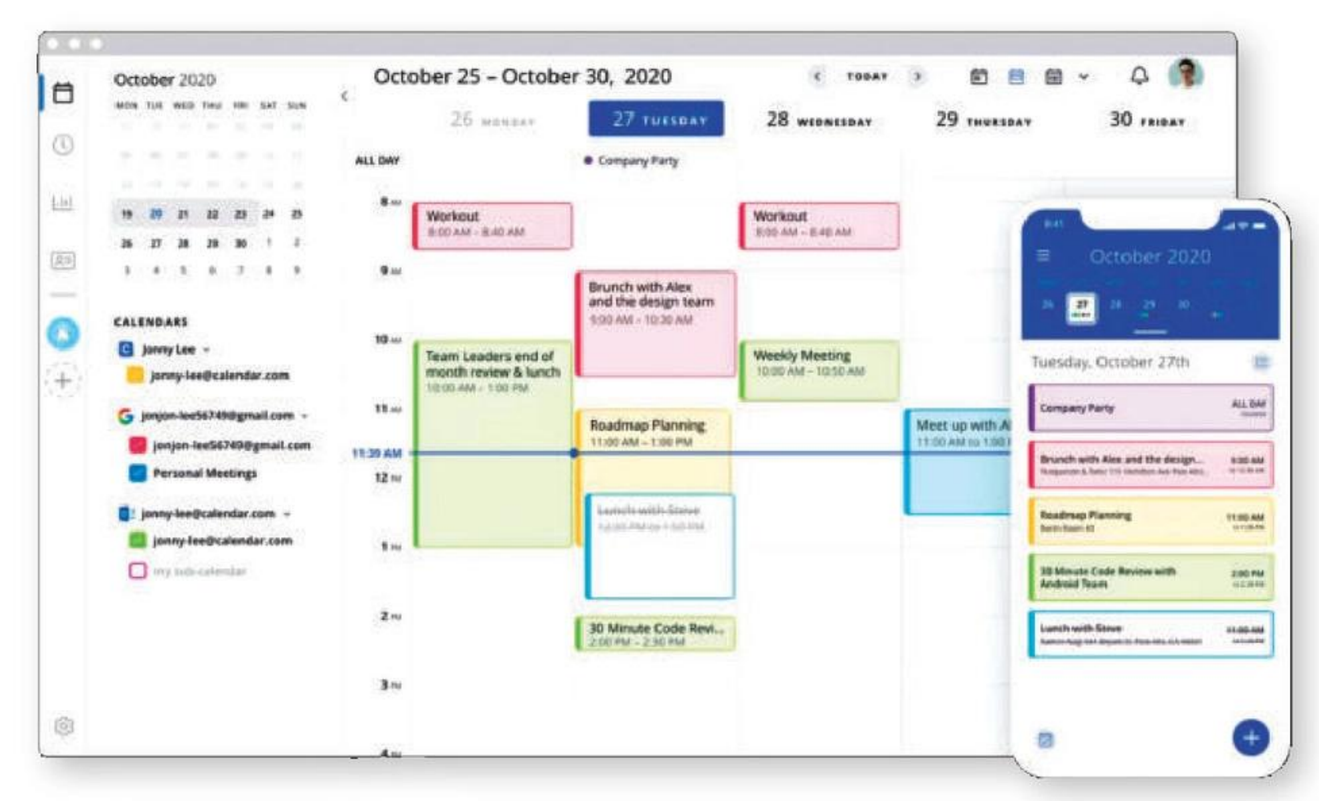
A PDA is a personal digital assistant. It is a handheld organiser which was very popular in the 1990s and 2000s and that is still used today by many people in business.

In our everyday life we often need to write down appointments, things we want to remember or simply take notes•. Different types of software are available for these purposes. A broad distinction identifies three categories, even though sometimes they overlap: calendaring software, electronic diaries and notebook applications.

One of the main advantages of almost all these programs is that it is possible to access your data from different devices and that you can share it with your friends or colleagues.

■ Calendaring software

Calendaring software• provides an electronic version of a traditional paper calendar, generally used for adding events and keeping tracks of your appointments. In addition, it can also provide an appointment book, an address book, and a contact list. Calendaring is a standard feature of many PDAs••, smart phones and office suites for personal computers. The most commonly used are: Infinity, Google Calendar, Apple Calendar (for Mac and iOS), Outlook Calendar and Fantastical 2.



■ Electronic diaries

An **electronic diary** is a way of keeping a copy of a diary on a computer. Users can browse their appointments and mark new ones on the diary pages. Since the computer holds the details of each appointment, users can also be reminded in advance of meetings and appointments. The format of the diary is flexible, presenting different views, such as by year, month or week. The computer automatically adds new pages when needed, extra room for each day, and retains copies of diaries of past years. Notes, texts, photos, etc. may be added to each page.

Unlike a paper diary, which is kept in one place, an electronic diary can be accessed over a computer network, enabling employees to check when colleagues are free. In this way, electronic diaries make booking meetings much easier: meetings times are easier to find, arrange and confirm, all from the computer, saving time and effort.

There are three main categories of electronic diaries: desktop applications, portable personal organisers, and web-based electronic applications like Microsoft Outlook. Among the many free diary applications available, the most popular are: Diarum (for Windows), Day One (for Mac) and Penzu (for social media).

■ Notebook applications

Notebook applications come in all shapes and sizes, from simple plain-text notebooks to applications that recognise the user's handwriting and record audio. They are used to take notes during a lesson, conference or meeting, for example. The most popular are the full-features apps such as Evernote, Microsoft OneNote, Google Keep and Simplenote, which can save any kind of file. There are also handwriting applications designed for scribbling notes on a tablet.

briefcase: *valigetta 24 ore*
broad: *ampio*
to keep track: *tenere traccia*
to overlap: *sovrapporre*
reminder: *promemoria*
to retain: *mantenere*
unlike: *diversamente da*

13 (4.5) **Listen to the extract and write down nine additional functions of calendaring software.**

1. .....
2. .....
3. .....
4. .....
5. .....
6. .....
7. .....
8. .....
9. .....

14 **Read the text and choose the appropriate heading for each paragraph.**

1. Booking meetings electronically
2. Keeping a diary
3. Room and resource booking
4. Sharing a diary
5. Viewing free times

What Can an Electronic Diary Be Used for?

a. ☐ An electronic diary allows users to keep track of their appointments in electronic form. The key advantage here is that the diary can be viewed in many different formats. In addition, since each diary page is held on the computer, there are none of the space restrictions of small paper diaries. Reminders can be set up so that the computer can alert you before an appointment. Diary pages can be printed out and carried around in paper form, too.

b. ☐ The second usage that electronic diaries offer is the ability to share diaries between other diary users. Also, since the diary is always online, there is never the case of a diary being lost, or being taken away in a briefcase. The diary can be accessed from any computer on the network, so there is no need to keep multiple paper copies of the diary.

c. ☐ Since diaries are online, the details of other staff members' free time can be viewed. In this way, it is possible to quickly suggest suitable meeting times. The usual way this is done is by picking a list of meeting participants, and the computer displaying the time when all the participants are free.

d. ☐ Most systems allow staff to book meetings completely automatically.
That is, using the diary to find a free moment, and using the system to send invitations to the meeting's attendees. Most systems send these invitations through electronic mail.

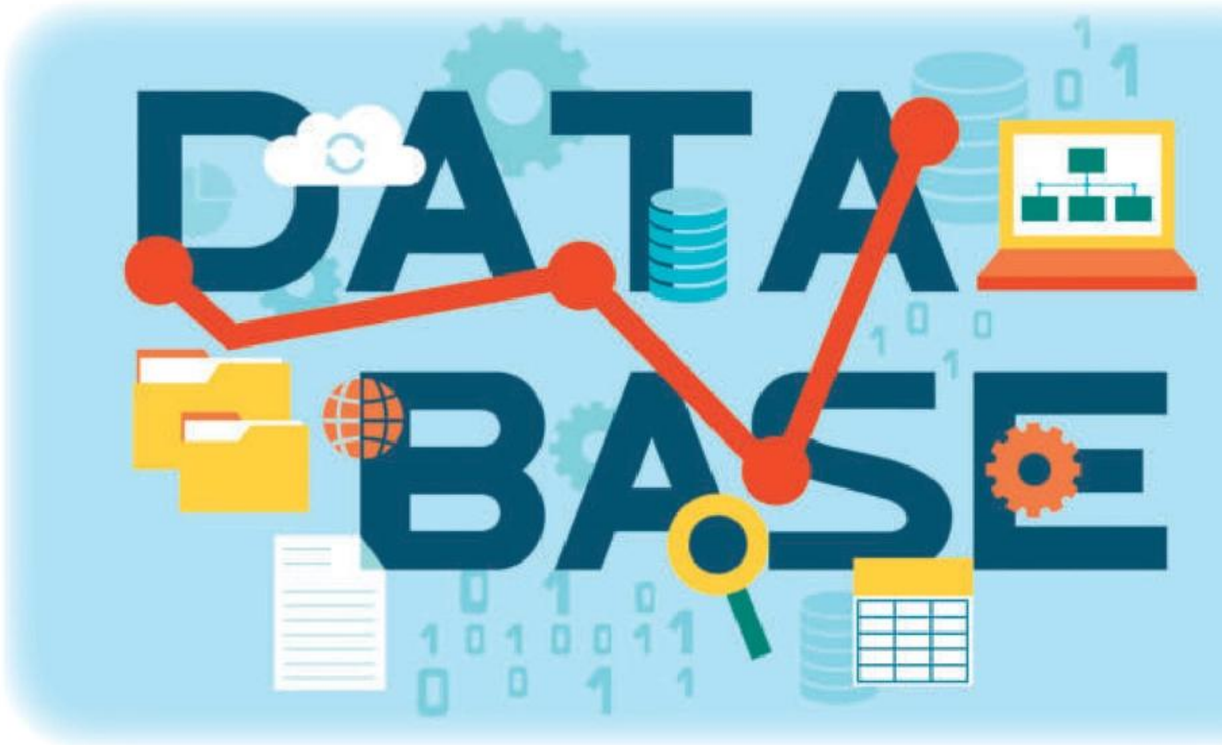
e. ☐ Another feature is the managing of shared resources, such as laptops or meeting rooms. Staff can book a room or resource just in the same way they would book a meeting with a person. The computer then manages the booking of resources and prevents double bookings or problems with allocation.

Adapted from: *http://www.leeds.ac.uk/educol/documents/00001342.htm*

15 **Look at the table of the most common notebook applications and briefly describe each one.**

App	Logo	Best for	Supports
Evernote		Taking notes, clipping web pages and recording audio	iOS, Android, Mac, Windows, Web
Microsoft OneNote		Organising thoughts, to-do lists, and projects	iOS, Android, Mac, Windows, Web
Google Keep		Collecting images, drafting documents, and creating checklists	iOS, Android, Web
Simplenote		Taking notes without distraction	iOS, Android, Mac, Web

DATABASES



A **database** is an organised way to store huge amounts of data, making it possible to search for specific information and generate reports. A **report** is the result of a database **query**, which is a way to interrogate the database. Databases can be classified as relational or non-relational•.

There are also hybrid object-relational databases. They are similar to a relational database, but with an object-oriented database model which uses objects and classes supported in the query.

Non-relational databases

Non-relational databases, i.e. not based on relationships between tables, can be classified as follows:

- **Flat-file database**: all the data is organised sequentially and into one single table. It can be created by using all databases and most spreadsheets;
- **Network database**••: the **entities**, i.e. the names given to each record, are organised in a graph, and some of them can be accessed through several paths, which are the result of very complex relationships of data;
- **Object-oriented database**•••: data is stored as **objects,** which belong to a **class** and which are defined by a **method**. For example, the object 'oak' belongs to the class 'tree' and has certain characteristics.

This kind of database is extremely complex to develop and maintain and there are also security problems because of its multiple accesses.

This database can retrieve data and also perform an analysis on the data in each object.

One way to reduce the file size of the database is to use coding, e.g. use M and F for male and female. This uses fewer characters and so takes up less memory.

consistent: *coerente, costante*
integer: *numero intero*
oak: *quercia*

Relational databases

A **relational database** stores data in separate tables and files, and data is organised in **fields** and records. All the data is linked together by **key fields** and a **DBMS (Database Management System)** which controls who can access what (e.g. some employees may have restricted access to company data). The **key field** contains an item of data that is unique to that record, so no records have the same value in the key field.

Relational databases are predominant today because they have a high level of flexibility and enormous power, which makes it possible to create queries from almost any perspective. The language used for queries is called SQL (Structured Query Language).

Creating a database

The first step in creating a database•••• is to decide what fields you need for each table. Then, each field needs a name, a description of its contents, a data type and format. Data type is very important, as different processes can be performed on different types of data. The most common data types are: text (e.g. characters), integers (i.e. whole numbers such as 18), real numbers (e.g. 11.36), dates (e.g. 20/10/16) or Boolean data (i.e. with only two values, e.g. yes or no).

16 Complete the text with the missing words.

alternate • junction • key • many-to-many • one-to-many • one-to-one • primary • referential integrity • foreign

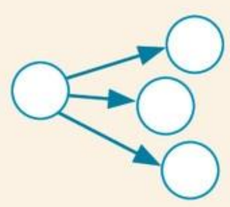
Relational Model Terms

Relational databases support a number of different relationships between tables. There are three types of relationships:

1. ..... relationship: it connects one entity to one other entity.

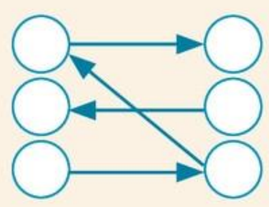
A row in table A can have no more than one matching row in table B, and vice versa.
Both the related columns are primary keys.
The relationship between husband and wife belongs to this category, for example.

2. ..... relationships: it connects one entity to one or more other entities.



This is the most common type of relationship.
A row in table A (for example personal data) can have many matching rows in table B (a variety of things associated with people, for instance), but a row in table B can have only one matching row in table A. The relationship between a football team and its players belongs to this category, for example.

3. ..... relationships: it connects many entities to many other entities.



A row in table A can have many matching rows in table B and vice versa. The relationship is created by defining a third table, called a **4.** ..... table, whose primary key consists of the foreign keys from both table A and table B. The relationship between students and different school subjects belongs to this category, for example.

Let's now explain the concept of a key and describe the different types of keys.

A **5.** ..... is an attribute to sort or identify data.

- **6.** ..... key: each row in a table should have a column or set of columns that uniquely define it.
- **7.** ..... key: any other key not selected to be the primary key.
- **8.** ..... key: a field or fields that point to the primary key of another table. It identifies a column in one referencing table that refers to a column in another referencing table. It does not need to be unique.

And now the concept of **9.** ..... It is a database concept that ensures that the relationships between tables remain consistent. It means that you cannot add a record to the table that contains the foreign key unless there is a corresponding record in the linked table.

17 Complete the text with the missing words.

Hybrid Databases

The relational model **1.** ..... relational database management systems **2.** ..... been the de facto industry standard for organising and managing data in most computer-integrated manufacturing environments. **3.** ..... recent years, however, some new database technologies have emerged – namely, object-oriented and hybrid or extended relational – making the job of managers more difficult with regard **4.** ..... selecting a database technology that would **5.** ..... most appropriate for their operations. It is hoped **6.** ..... the presented framework would prove useful to practising managers.

Adapted from: *https://www.emerald.com/insight/content*

DATABASES AND DATABASE APPLICATIONS

A database designer creates the physical and logical design of a database, while a database administrator (DBA) enhances and refines the design.

A database user is a person who will use the completed database.

When we talk about databases, it is important to distinguish between the database itself, the database management system (DBMS) and database applications.

Parts of a database

A **database** contains **data files,** which store the database information, and **metadata.** Metadata includes the following:

- a **data dictionary**, i.e. a centralised repository of information about data such as their meaning, origin, usage, format and relationship to other data. It does not contain any actual data from the database, but only information on how to manage data (e.g. names and descriptions of tables and fields, lists of fields, the number of records, the type of each field). It is kept hidden from users;
- an **index**, which contains a list of keys or keywords, each of which uniquely identifies a single record. It is used to sort data logically and improve the searching speed;
- **statistical data**, data stored over time and which has been collected, analysed and interpreted.

end user: *utente finale*
repository: *deposito*

DBSM

A **database management system (DBMS)** is system software for creating and managing databases. It serves as an interface between the database and the application programs, and manages three things:

- the **data** (e.g. read, update, delete);
- the **database engine**, which allows data to be accessed, locked and modified;
- the **database schema**, which defines the logical structure of the database.

These three elements help provide security, data integrity and uniform administration procedures (typical administration tasks include back up and data recovery, for example). The DBMS can limit what data the end user can see, as well as how that data can be viewed.

Database applications

Database applications are addressed to users.
They are software programs used to search, sort, calculate, report and share information. They can also contain code to perform mathematical and statistical calculations on the data to support queries submitted by users.
The most commonly used are Microsoft Access and FileMaker Pro, Oracle, SQL Server and FoxPro.
These applications provide security by restricting access to specific users through passwords.

18 (4.6) **Listen to the recording and complete the graph on SQL.**

SQL

Data definition language (DDL)	Data **1.** ..... language (DCL)	SQL queries

Data definition language (DDL)		
CREATE	= to create objects	➤ CREATE DATABASE Students_info CREATE TABLE Students_ **2.** .....
ALTER	= **3.**	➤ ALTER TABLE Students_info
4.	= to add a new attribute to the table	➤ **5.** ..... Student_ID
DROP	= **6.**	➤ DROP TABLE Students_info
7.	= to rename an object	

Data control language (DCL)		
8.	= to give user's access = privileges	Privileges: • CONNECT • UPDATE • INSERT • **11.** ..... • **10.** ..... • EXECUTE
9.	= to withdraw privileges given with the GRANT command	

SQL queries		
INSERT	= to add records to an existing table	➤ INSERT INTO Students_info values first_name, last_name, student_ID
12.	= to allow the user to retrieve specific information	➤ SELECT last_name FROM Students_info
13.	= to delete a record from a table	➤ DELETE FROM Students_info WHERE Student_ID RTSDSL01S25L219T
UPDATE	= to **14.** ..... information from a table	➤ UPDATE Students_info set date_of_birth = 25-10-01 WHERE Student_ID RTSDSL01S25L219T

19 **Watch the video and answer the questions.**

▸ What is Database & SQL? *posted by* Guru99

1. What is data?
2. What is a database?
3. What is a DBMS?
4. Quote examples of uses of a DBMS.
5. Who invented the first DBMS? When?

6. What are the main types of DBMS? Define them.
7. What does SQL mean? What is it?
8. What can you use SQL for?
9. What are the most famous DBMS? What type are they?
10. Write an example of a query.

GRAMMAR

CONDITIONALS

	Condition	Consequence	Example
Zero Conditional Cause-effect relationship, general truths	**If + Present Simple**	**Present Simple**	➤ *If you* give *instructions to a computer, the computer* executes *them.*
First conditional Likely situations in the future	**If + Present Simple**	**Future simple**	➤ *If you* use *presentation software, your presentation* will improve.
Second conditional Improbable or impossible situations in the present or future	**If + Past Simple***	**Conditional simple** (Would + bare infinitive)	➤ *If I had a spreadsheet, I* would use *it for my maths homework.*
Third conditional Situations which did not happen (impossibility in the past)	**If + Past Perfect**	**Conditional perfect** (Would have + past participle)	➤ *If the school* had had *a library database, it* would have been *easier to find books.*

*with the verb *be*, in formal English, the form *were* is used for all persons.

20 **Complete the sentences with the correct form of the verbs in brackets.**

1. If you ..... (have) a word processor, you can edit your text.
2. If your query is correct, you ..... certainly ..... (get) an answer.
3. If you want to edit a text, you ..... (need) a word processor.
4. If I could use conditional formatting, I ..... . (create) a table with all my school notes.
5. If there ..... (be) too much information on a single slide, the presentation is difficult to follow.
6. If I had had a notebook application, I ..... (write down) all my history notes.
7. If there ..... (not be) a database, it would have been very difficult to archive all the documents.
8. If I ..... (be) you, I would learn how to use a spreadsheet.
9. If I had studied how to create a database, I ..... (pass) the exam.
10. If you ..... (not be) an administrator, you cannot access the DBMS.
11. If I were a DBMS administrator, I ..... (grant) access only to reliable users.
12. If I had had a calendar, I ..... (not forget) Mary's birthday.

21 **Complete the sentences.**

1. I will be able to interrogate a database if ....
2. You will surely improve your presentation if ....
3. If I had an electronic organiser, I .....
4. If I could create a database, ...
5. If I had attended the course on conditional formatting, now .....
6. If I had used more videos and images, the presentation .....
7. You can edit your text if .....
8. If you can't afford proprietary software, ...

CITIZENSHIP

MANAGING LARGE VOLUMES OF DATA

It is not easy to manage large volumes of data and there are also some organisational and ethical implications.
For this reason, there are systems and techniques on how to organise and manage this data.

22 **Complete the text with the words given below. Then answer the questions.**

applications • governance • high • layers • management • sensors • sources • terabytes

Data Management

Data management is the organisation, administration and **1.** ..... of large volumes of both structured and unstructured data.
The goal of data management is to ensure a **2.** ..... level of data quality and accessibility for business intelligence and data analytics **3.** ..... Corporations, government agencies and other organisations employ data management strategies to help them contend with fast-growing pools of data, typically involving many **4.** ..... or even petabytes stored in a variety of file formats.
Effective data **5.** ..... particularly helps companies locate valuable information in large sets of unstructured and semi-structured data from various **6.** ....., including call detail records, system logs, **7.** ....., images and social media sites.
Data architectures include various data management **8.** ....., plus ones for analysing and visualising data.

Adapted from: *https://www.techtarget.com/searchdatamanagement/definition/big-data-management*

1. What is data management?
2. What is the purpose of data management?
3. Why is data management necessary?
4. What are the advantages of effective data management?

23 **Read the passage and complete the summary.**

Data Classification

As part of the data management process, companies must decide what data must be kept for compliance reasons, what data can be disposed of and what data should be analysed in order to improve current business processes or provide a competitive advantage. This process requires careful data classification so that, ultimately, smaller sets of data can be analysed quickly and productively.

Companies must decide on:

- what data to keep (for compliance reasons)
- what data to **1.** .....
- what data to **2.** .....

Data classification can lead to **3.** .....

compliance: *conformità* **to dispose:** *smaltire*

24 **Imagine that you have to organise the students archive for your school. Follow the instructions.**

Decide on the following:

1. the data to be kept;
2. the data to dispose of;
3. the data useful for analysis;
4. what types of analyses to carry out.

4.2 GRAPHICS SOFTWARE

PAINTING AND DRAWING SOFTWARE

Do you use any graphics programs? If so, what for?

The quality of a bitmap image depends on the total number of pixels, i.e the *resolution*, and the amount of information in each pixel, often called *colour depth*.

Microsoft Paint is a simple raster graphics editor included in all versions of Microsoft Windows.

Both painting and drawing software are examples of **graphics programs** used to create, manage and edit 2-dimension digital images.

Painting software

Painting software is pixel-based software which allows the user to create and save a series of coloured dots, called **pixels**, in a **bitmap** file. Bitmap-based images, also called **raster graphics**, are therefore made up of pixels in a **grid** like a mosaic, and each pixel, or **bit,** holds a specific colour value. The most common bitmap-based formats are: JPEG, GIF, TIFF, PNG, PICT and BMP.

Bitmap-based images have a fixed resolution and cannot be resized without losing image quality. Moreover, as the image files tend to be rather large, they are often compressed to reduce their size. Bitmaps can be stored, reused, and converted into other bitmap formats very easily. It can take thousands of dots to make up a whole picture and to edit the image, each dot needs to be altered individually, although there are a lot of different tools to make it easier.

The general features of a painting program are the following:

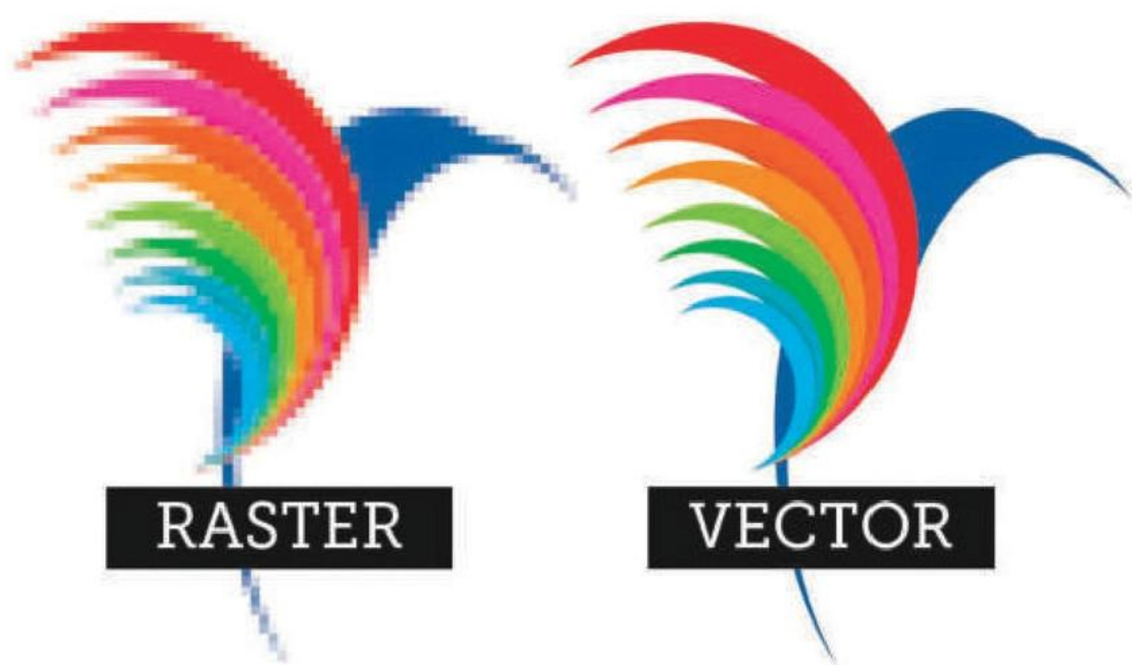
- a palette from which the user can choose the colour;
- pens and brushes with different styles and line thickness;
- colour fill tools;
- spray cans and eraser tools;
- cut, copy and paste.

Microsoft Paint is a basic program for non-professional users. Another popular free program for general users is Krita.

Drawing software

Drawing software is **vector-based**, or **object-based**, **software**. Vector graphics are made up of many individual objects which are defined by mathematical formulas and individual properties such as colour, fill and outline. Although the result is still a bitmap, i.e. a series of dots, the image consists of separate lines and shapes, which are the objects, and is saved as coordinates and equations, making the file size a lot smaller.

The image is edited by manipulating the objects. For example, if you want to draw a circle, you only need four sets of values: the x,y coordinates of the centre, the stroke line style, the radius of the circle, and the fill colour (optional). The big advantage of the vector approach is **scalability:** one formula or set of formulas can represent many sizes of the object. Therefore, vector graphics are resolution independent and easy to modify by simply changing the sets of values. AI (Adobe Illustrator) is a common drawing program.



ONLINE RESOURCES

- CAD
- Digital mapping

brush: *pennello*
canvas: *tela*
dot: *punto*
grid: *griglia*
layer: *strato*

1 Answer the questions.

1. What do painting and drawing software have in common?
2. What does pixel-based software mean?
3. What is a bitmap?
4. What are JPEG and GIF?
5. Name a painting program for non-professional users.
6. What are the disadvantages of bitmap-based images? And the advantages?
7. What are vector graphics made up of?
8. What does a vector image consist of?
9. What is the biggest advantage of vector graphics?
10. How can you modify a vector image?

2 Watch the video and answer the questions.

▸ What are Vector Graphics? *posted by* Eduard Stinga (VideoPlasty.com)

1. What are vector graphics?
2. What are the most common formats for raster graphics?
3. What are the most common formats for vector graphics?
4. What is the problem with raster graphics?
5. What example is used for raster graphics? And for vector graphics?
6. With the help of a dictionary, explain the word "pixelate".

3 Read the text and complete it with the missing words.

bitmap • drawing • information • layer • objects • painting • placed • raster • screen • size

Drawing vs Painting

Images in a **1.** ..... program are created as independent objects that can be placed on top or underneath each other, moved apart and scaled to a different **2.** ..... and even reshaped. Objects are filled with colour.

A **3.** ..... program is an electronic canvas. Images are created with electronic brushes that paint colour onto the canvas. You can paint separate **4.** ....., but they are not independent. Some editing programs that contain layers enable bitmapped images to be treated independently so that they can be **5.** ..... into different layers as if each were a separate canvas. Although bitmap elements cannot be resized as effectively as drawing objects, they can be moved independently with their own **6.** ..... without affecting the elements in the others. When the final result is obtained, all the layers are put one above the other to form a single layer.

When the objects are displayed on **7.** ....., they are always turned into a **8.** ..... format both for bitmap and vector structures. That's how screens and printers display and print **9.** .....

Bitmapped graphics are also known as **10.** ..... graphics.

Adapted from: *http://www.bbc.co.uk/education/guides/zv2v4wx*

PHOTO EDITING SOFTWARE

A JPEG is a compressed bitmap; when you convert a bitmap to a JPEG, you lose some of the picture quality, but in a way which is not noticeable to the human eye, e.g. there might be slight colour changes.

To store photos once they have been edited, there are several programs to help share and store them online such as Flickr, Picasa and Photobucket.

Photo editing software allows users to edit and adjust existing images and photos which have been previously converted and stored as digital data. The original images can be:

- photographs on film or in a book, or hand-drawings on paper converted into digital images with a scanner. These images are usually stored as bitmap files, though they can be converted to other formats, e.g. JPEG;
- images made using a digital camera and then downloaded onto a computer as JPEG files.

Programs or web applications?

Photos can be edited using a program on the computer or within the web browser. Among photo editing computer programs, the most widely used are: Windows Paint provided with Windows O/S, Adobe Photoshop, which is very expensive and aimed at professionals, and GIMP, which is an open-source alternative. The most common applications within the web browser are: Photoshop, Pixlr and Photoscape X.

Common features

Although some programs offer more features than others, all of them offer the following:

- **air brushing**, to cover up skin imperfections, change eye colour and make people look slimmer;
- **red-eye removal**, to correct the effect a flash can have on eye colour;
- **cropping**, to select part of the image and get rid of the rest;
- **special effects**, to make the photo look like an oil painting, sketch or cartoon;
- **brightness and contrast**, to brighten the photo if it is too dark or if it is too light; to change the contrast or adjust the richness of colours;
- **layers**, to add elements to an existing photo.

More advanced techniques

More advanced techniques include:

- **Image enhancement**, which is a process used to highlight or enhance a particular aspect of the image or change its structure. An example of this technique is **false-colouring**, or **pseudo-colouring**, which involves changing the colour of the whole image or assigning colours to certain parts;
- **Restoration**, which is a process used to eliminate flaws or degradations;
- **Morphing**, which is a technique that distorts the original image frame by frame until a predetermined final image is obtained.

ONLINE RESOURCES

- Special effects and computer-generated imagery in film making
- Musical instrument digital interface and music software

aberration: *deviazione, anormalità*
to crop: *tagliare*
dust speck: *particella di polvere*
enhancement: *miglioramento*
flaw: *difetto*
to get rid of: *sbarazzarsi di*
to highlight: *evidenziare*
misleading: *ingannevole*
previously: *precedentemente*
scratch: *graffio*
skin: *pelle*

4 Decide if the statements are true or false. Correct the false ones.

	T	F
1. Photo editing software allows you to take photos with an incorporated camera.	☐	☐
2. Both scanners and digital cameras produce JPEG files.	☐	☐
3. It is not necessary to buy photo editing software.	☐	☐
4. Cropping means reducing the size of an image.	☐	☐
5. It is possible to correct imperfections with photo editing.	☐	☐
6. Enhancing an image means improving its quality.	☐	☐
7. Restoration is a technique used on damaged photos.	☐	☐
8. With morphing you change the image step by step.	☐	☐

5 Complete the text with the missing words. Then answer the questions.

best • colour • editing • geometry • pixel • original • repetitive • time

Image Editing

Image editing is considered a creative, artistic act. Image editing is done for removing unwanted elements such as dust specks and scratches, adjusting the **1.** ..... of the image, like rotating and cropping, correcting for lens aberrations, sharpening or softening the image, making **2.** ..... changes or adding special effects to it. Often the tasks involved in image editing are **3.** ..... and need intense processing. In digital image processing, image **4.** ..... is basically categorised into **5.** ..... editing and parametric image editing. Pixel editing focuses on altering the image by working at the pixel level. Parametric image editing, on the other hand, focuses on changing the appearance of the image without altering the **6.** ..... image.

There are benefits associated with image editing. It helps to produce the **7.** ..... possible image in the interests of the viewers. However, advanced software is expensive and often requires **8.** ..... for an individual to understand and become familiarised with its features. Furthermore, edited images can be considered false or misleading, causing image editing to have a negative reputation for some people.

Adapted from: *https://www.techopedia.com/definition/7686/image-editing*

1. What is the difference between pixel editing and parametric image editing?
2. What are the drawbacks of advanced software for image editing?
3. Why does image editing have a negative reputation?

6 (4.7) Listen to the extract and answer the questions.

1. Who might use professional photo editing software and what might they use it for?
2. Who are the beginners that might use photo editing software and what for?

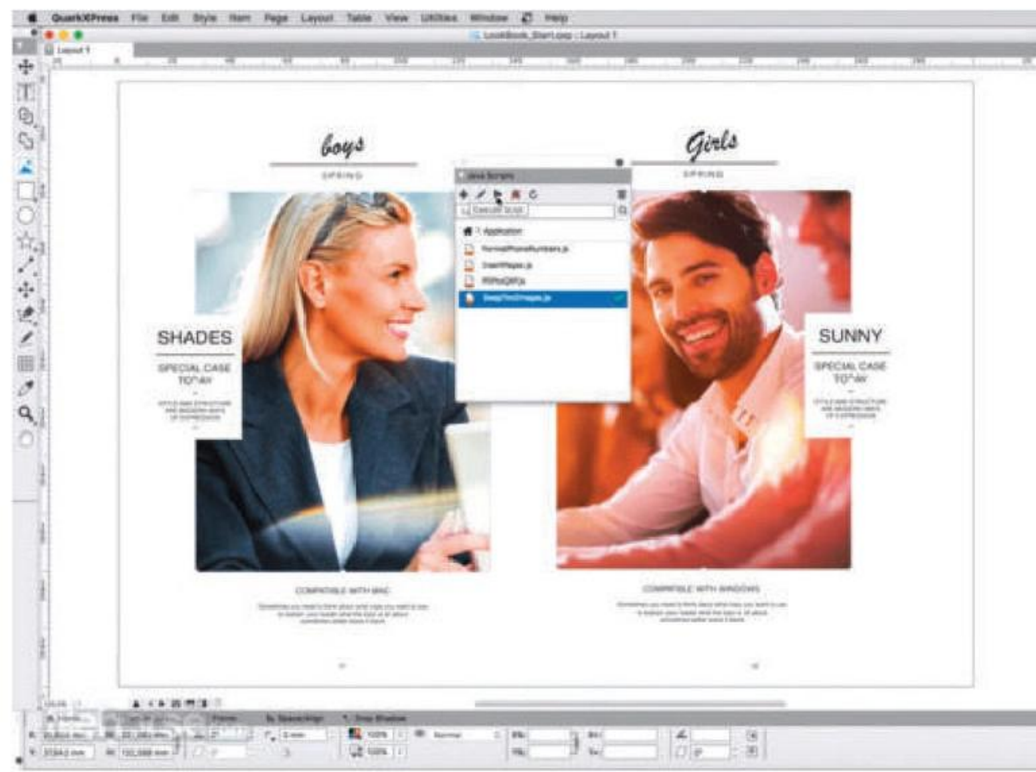
DESKTOP PUBLISHING SOFTWARE

Have you ever used DTP software? What did you use it for?

Although DTP software still provides extensive features necessary for print publishing, modern word processors now have publishing capabilities beyond those of many older DTP applications.

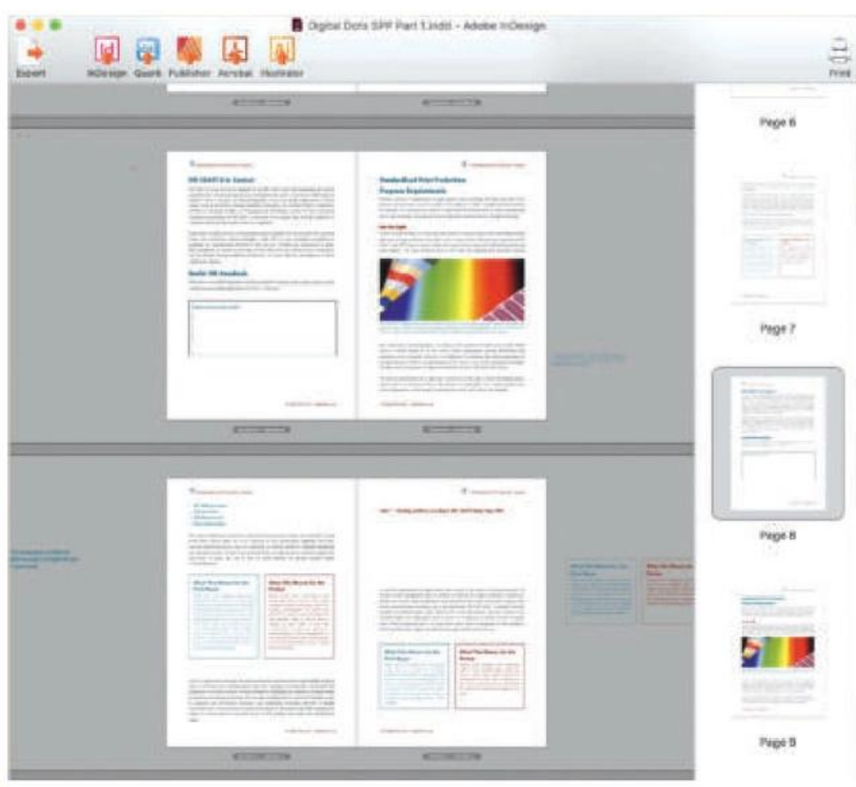
A good open-source alternative is Scribus, while the main professional applications include Adobe InDesign, Quark, and Affinity Publisher.

Desktop publishing (DTP) is the process of using a computer and specific types of software to combine text, images and artwork to produce documents properly formatted for print or visual consumption. Examples of documents produced using DTP include newsletters, newspapers, brochures, leaflets, posters, business cards, greeting cards, letterhead, books, magazines, and packaging•. They are all designed on a computer using page layout and graphic design software.



Features

DTP software is usually **frame-based**. Pages, also called **pasteboards**, are built as a series of **frames,** i.e. invisible bounding boxes around objects, which can be either **text frames,** containing text, or **graphic frames,** containing images. Information is put on the page in **blocks**, i.e. **frames**, that can be moved or resized with the help of special handles. With some software applications, the frame becomes visible when the object is selected and then lighter or invisible when the object is de-selected. Some programs also allow for the frames to be adjusted in order to reduce the space between the text and the frame, change the background colour, or add visible rules or enclosed borders around the object. While text frames are typically rectangular, some applications allow for the creation of text frames in other shapes such as circles and stars. Text frames can be also linked together so that longer articles can flow from one text frame to the next, such as columns of text in a newsletter.



Uses

DTP usually lets the user create text and simple pictures, but it often works best when the source material is created with other specialised software, e.g. a word processor or a graphics package, and then imported into the DTP package.

It is possible to create professional-looking documents, even with relatively inexpensive DTP packages or open-source application programs, although the quality of the printed document is often limited by the quality of the printer. If compared with a word processor, a DPT program offers many advantages•: the layout of the documents can be changed more easily, and the package contains almost the same features as a word processor and many others. For this reason, it gives the user greater power and flexibility.

The most commonly used DTP is Microsoft Publisher of the Office Suite••, which is very easy to use and popular with individuals, small businesses and schools.

handle: *maniglia*
in-house: *all'interno dell'azienda*
properly: *correttamente*
untrained: *privo di formazione*

7 **Read the text and match the headings with the paragraphs.**

1. Trends in DTP jobs
2. DTP and graphic designers
3. New features in DTP
4. PostScript revolution
5. The birth of DTP and its aftermath
6. The first DTP software
7. The future of DTP
8. Who invented desktop publishing?

The History of Desktop Publishing

a. ☐ In the mid 1980s, Apple Computer, Adobe, Aldus and Hewlett-Packard each produced a variety of key technology that, when combined, allowed graphic designers and publishers to bring the whole publishing process in-house. This literally created desktop publishing, or DTP.

b. ☐ So, DTP was created in 1984 when Hewlett-Packard's LaserJet laser printer combined with the Apple Macintosh computer, Adobe's PostScript language, and Aldus's PageMaker software. Later, with the release of Windows 95 and its successors, all the tools were combined in a single software program.

c. ☐ In 1985, Aldus released the first desktop publishing software. Called PageMaker, it allowed designers to layout pages in a simple way.

d. ☐ In 2000 Adobe released InDesign and soon after other desktop publishing tools were introduced.

e. ☐ Adobe used PostScript for creating vector graphics as a page description language. This software, in combination with Apple Laserwriter, the first enabled desktop laser printer, allowed the production of press quality film directly from a publisher's digital file. Its success encouraged Adobe to use PostScript technology with fonts and other DTP publishing tools and in applications like Adobe Illustrator.

f. ☐ DTP has often been criticised as being responsible for lowering design standards. The reasons for this are often related to the ease with which amateur designers can use DTP to produce published documents, but also to the increasing reliance on untrained in-house staff to produce everything in-house.

g. ☐ Computers are constantly getting faster, allowing for more graphics intensive procedures to be performed with DTP, and the ongoing interaction between the printed design world and the interactive digital world will no doubt continue.

h. ☐ According to the US Bureau of Labor Statistics, desktop publishing was one of the fastest-growing business activities until 2014, with an increase of 67% in the number of publishers between 2000 and 2014. Unfortunately, in the period between 2014 and 2022 there was a decrease of 14% and this is expected to continue at least until 2026.

Adapted from: *http://www.designtalkboard.com/design-articles/desktoppublishing.php*

8 (4.8) **Listen to the classification of the most popular DTP software. Match the type of software with its rating (1-10) and its characteristics.**

☐ Adobe InDesign • ☐ Canva for Enterprise • ☐ Crello • ☐ Foxit PDF Editor • ☐ Lucidpress • ☐ Microsoft Publisher • ☐ Quark • ☐ Scribus • ☐ Serif PagePlus • ☐ Venngage

a. Allows non-professional designers to use templates, images, videos to create unique publications. ☐

b. Best publishing software application to create compelling, high-quality visual content. ☐

c. Can be used for creating a newsletter and multi-page publications. ☐

d. Great tool to create engaging visual content for business like reports, research papers and more. ☐

e. It has advanced features like master pages, styles, and scripts. ☐

f. Lets you create engaging social media graphics and other visual content. ☐

g. It provides free versions to use. ☐

h. Provides you with everything you need in order to market your product. ☐

i. Versatile publication software that is available for Mac and PC. ☐

j. Can be used to create high-quality publications, newsletters, and magazines. ☐

GRAMMAR

INDEFINITE PRONOUNS

	People	Things	Places
every-	everybody, everyone (= tutti) ➤ *Everybody/everyone can use painting software.*	everything (= tutto) ➤ *With DTP software you can do almost everything.*	everywhere (= dovunque) ➤ *Free software can be found everywhere on the Internet.*
some-	somebody, someone (= qualcuno) ➤ *Somebody/someone will teach you how to use DTP.*	something (= qualcosa) ➤ *There is always something to learn.*	somewhere (= da qualche parte) ➤ *I put the DVD with the program somewhere, but I can't find it now.*
any-	anybody, anyone (= nessuno, chiunque) ➤ *There wasn't anybody to help me with photo editing.*	anything (= nulla) ➤ *There isn't anything you can do.*	anywhere (= in nessun luogo, in qualunque luogo) ➤ *I couldn't find the DVD anywhere.*
no-	nobody, no one (= nessuno) ➤ *There was nobody to help me.*	nothing (= nulla) ➤ *There is nothing you can do.*	nowhere (= in nessun luogo) ➤ *The DVD was nowhere to be found.*

All indefinite pronouns are followed by singular verbs.

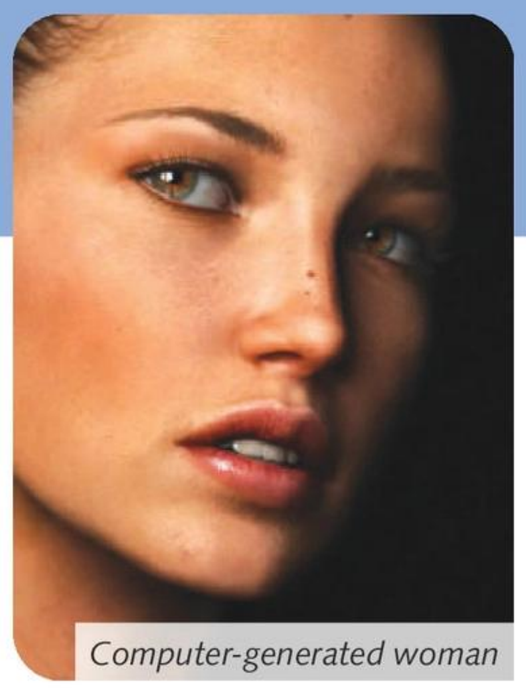
9 **Circle the correct option.**

1. There was *anybody/nobody* at the presentation of the new DTP software.
2. The CD is missing. I can't find it *everywhere/anywhere*.
3. *Everything/Something* I write is correct because I use a spell checker.
4. There is always *someone/something* new to meet at a presentation.
5. I didn't expect there to be many people, but *anyone/nobody* at all came.
6. I thought it was lost forever, but luckily *someone/nobody* found it at last!

10 **Translate the sentences.**

1. Chiunque può imparare ad usare Microsoft Paint.
2. Si può fare quasi tutto con DTP.
3. Che cosa vuoi? Adobe Illustrator o CorelDraw? – Dammi qualunque cosa.
4. Vorrei seguire un corso di Photoshop, ma non riesco a trovare un posto da nessuna parte.
5. Con DTP si possono mettere le immagini dovunque nella pagina.
6. Ieri non c'era nessuno al corso di foto ritocco.
7. Non lascio vedere i miei progetti di foto ritocco a nessuno.
8. Si possono trovare ovunque dei software gratuiti.
9. Che cosa dovrei usare per il mio progetto? – Chiedi a qualcuno nel tuo ufficio.
10. Qual è il miglior programma di DTP? – Tutti preferiscono Microsoft Publisher.

CITIZENSHIP



Computer-generated woman

PHOTO EDITING AND FAKE NEWS

Photographs are often modified with photo editing software not only to improve the quality of the image, but also to support false information.

11 **Read three definitions of fake news and use them to write your own definition that includes all the main aspects.**

1. Fake news is a term that refers to false stories that appear to be news, spread on the internet or using other media, usually created to influence political views or as a joke.

   From: *https://dictionary.cambridge.org/it/dizionario/inglese/fake-news*

2. Fake news means false news stories, often of a sensational nature, created to be widely shared or distributed for the purpose of generating revenue, or promoting or discrediting a public figure, political movement or a company. It is also a parody that presents current events or other news topics for humorous effect in an obviously satirical imitation of journalism.

   From: *https://www.dictionary.com/browse/fake-news*

3. Fake news is false or misleading information presented as news. Fake news often has the aim of damaging the reputation of a person or entity, or making money through advertising revenue.

   From: *https://en.wikipedia.org/wiki/Fake_news#:~:text=Fake%20news*

12 **Read the text and choose the correct heading for each paragraph.**

a. Continuity of edges
b. How to use a Fake Image Detector app
c. Luminance gradient
d. Noise analysis
e. To spot a fake image, sometimes you just need common sense

Detecting Fake Images

Although fake images can look very realistic, there are sometimes some signs that may help us to discover the deception. Here are some clues.

1. ☐ A fake image often looks unbelievably and extraordinarily spectacular. We should ask ourselves whether the contents of the image could be real or whether it agrees with the character of the subject.
2. ☐ When a part of an image is modified, it is likely that the colour, brightness and texture around the edges of the modified part do not match with that of the original image. By carefully inspecting the image, it may be possible to detect the non-continued edges.
3. ☐ The noise I refer to here is the tiny, small defects produced by cameras. Different cameras produce different noises under different conditions. When images captured by different cameras are superimposed over one another, the noise patterns and levels of each image are likely to be different.
4. ☐ When a light source shines a light on an object, the brightness of the object and its surroundings should be similar. If an image of an object is superimposed onto another image, their luminance is likely to be different.
5. ☐ Download and install the Fake Image Detector app. Then perform a reverse image search.

Adapted from: *https://www.open.edu/openlearn/society-politics-law/sociology/detecting-fake-image*

13 **Find an example of a fake image on the Internet. Describe why it is fake and what you think its purpose is.**

4.3 OTHER SOFTWARE PROGRAMS

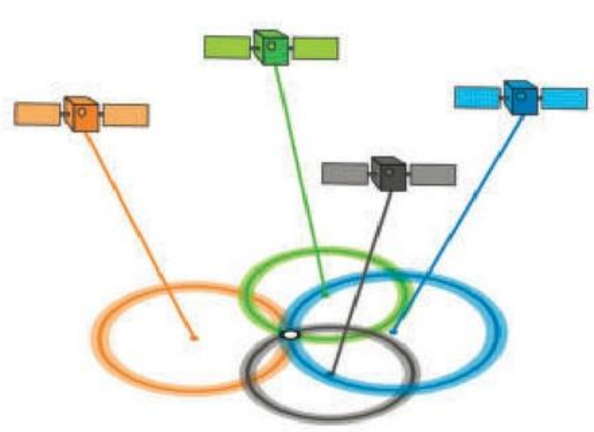
The location accuracy varies, according to the equipment, from 10 to 100 metres. However, with military-approved equipment, the approximation can be reduced to 1 metre.

GLOBAL POSITIONING SYSTEM (GPS)

In 2022 the **Global Positioning System (GPS)** was made up of 31 well-spaced satellites in orbit around the Earth. The satellites make it possible for people with ground receivers to pinpoint their geographical location. The owner and operator of the GPS system is the US Department of Defense, but the system is made available for general use around the world.

■ The satellites

In order to work properly, the GPS needs 24 satellites, each orbiting twice a day at an altitude of 12,550 miles, i.e. 20,200 km, above the Earth. However, in order to guarantee coverage during maintenance, there are 31 operational satellites in total. They are spaced in such a way as to ensure that, from any point on Earth, four satellites will be above the horizon. Each satellite contains a computer, an atomic clock and a radio. With an understanding of its own orbit and the help of the clock, the satellite continually broadcasts its changing position in time. Moreover, each satellite checks its own sense of time and position with a ground station once a day and makes any minor corrections that may be necessary.



bearing: *rilevamento*
to broadcast: *trasmettere*
to ensure: *assicurare*
ice sheet: *ghiacciaio continentale*
to pinpoint: *individuare*

■ The receivers

Any GPS receiver on the ground contains a computer that triangulates its own position by getting bearings from three of the four satellites. The result of this **triangulation** is provided in the form of a geographic position expressed in longitude and latitude. If the receivers are also equipped with a display screen that shows maps, e.g. a smartphone or tablet, the position can be shown on a map. If a fourth satellite can be received, the receiver can also figure out the altitude as well as the geographical position. If the receiver is moving, it can also calculate the speed and direction and give estimated times of arrival at a specified destination.

■ Mains uses

The main uses of GPS are in science. It provides data that has never been available before, as regards both quantity and accuracy. At the moment, it is being used to measure the movement of the arctic ice sheets, the Earth's tectonic plates, and volcanic activity.

However, as the cost has become relatively low, almost anyone can own a GPS receiver. Mobile GPS technology in smartphones enables end users to receive navigating instructions via a global positioning system process called **trilateration**. A built-in GPS receiver communicates with an array of satellites which provides navigation instructions. Smartphones can identify individual streets and places on maps and provide narrated tracking capability.

1 Answer the questions.

1. What is GPS made up of?
2. Who owns the GPS system?
3. How many satellites are in orbit around the Earth at an altitude of more than 10,000 miles?
4. How many satellites are always above the horizon?
5. What does each satellite contain?
6. What is triangulation?
7. What type of data is the result of triangulation?
8. What happens if a fourth satellite can be received?
9. What are the major uses of GPS technology in science?
10. What is trilateration?

2 Read the text and choose the best heading for each paragraph.

a. How do we use GPS in our daily lives?
b. How does GPS operate?
c. The four global navigation satellite systems
d. What are GPS devices?
e. What is an example of GPS?
f. What is the main purpose of GPS?

Types of GPS systems

1. ☐ The four global GNSSs (Global Navigation Satellite Systems) are: GPS (US), GLONASS (Russia), Galileo (EU) and BeiDou (China). Additionally, there are two regional systems: QZSS (Japan) and IRNSS or NavIC (India).
2. ☐ A satellite navigation device, colloquially called a GPS receiver, or simply a GPS, is a device that is capable of receiving information from GNSS satellites and then calculating the device's geographical position. Using suitable software, the device may display the position on a map, and it may offer routing directions.
3. ☐ GPS satellites circle the Earth twice a day in a precise orbit. Each satellite transmits a unique signal and orbital parameters that allow GPS devices to decode and compute the precise location of the satellite. GPS receivers use this information and trilateration to calculate a user's exact location.
4. ☐ The Global Positioning System (GPS) was developed in order to allow accurate determination of geographical locations by military and civil users.
5. ☐ There are five main uses of GPS:
   - Location, i.e. determining a position;
   - Navigation, i.e. getting from one location to another;
   - Tracking, i.e. monitoring the movement of an object or person;
   - Mapping, i.e. creating maps of the world;
   - Timing, i.e. making it possible to take precise time measurements.
6. ☐ A typical use is for example tracking a person driving from New York to Boston.

Adapted from: *https://lisbdnet.com/what-type-of-gps-technology-are-you-familiar-with/#What_are_the_3_types_of_GPS*

3 (4.9) Listen to five people talking about GPS trackers and match them with the right use. There are three extra uses.

a. Locating a position
b. Easy access to emergency road side support
c. Limiting car theft
d. Mapping and surveying
e. Tracking for law enforcement
f. Locating pets
g. Keeping watch on elderly people
h. Finding treasure

Speaker 1: .....
Speaker 2: .....
Speaker 3: .....
Speaker 4: .....
Speaker 5: .....

VIRTUAL REALITY AND VIDEOGAMES

Unlike VR, augmented reality uses the user's existing environment in real time and integrates it with digital information.

Haptics is the science of applying touch, i.e. tactile sensation and control to interaction with computer applications. By using special input and output devices such as joysticks, data gloves or other devices, users can receive feedback from computer applications in the form of felt sensations on the hands or other parts of the body.

Everything revolves around the game and the player's experience. As a consequence, game designers are more interested in creating a challenging framework for the game, rather than in telling a story.

■ Virtual reality

Virtual reality (VR) is an artificial environment created with software and presented to the users in such a way that they suspend belief and accept it as a real environment. On a computer, virtual reality• is primarily experienced through two of the five senses: sight and sound.

The simplest form of virtual reality is a **3-D** image that can be explored interactively on a personal computer, usually by manipulating keys or the mouse, so that the content of the image moves in some direction or zooms in or out. More sophisticated efforts involve such approaches as wrap-around display screens, actual rooms augmented with wearable computers, and haptics•• devices that let you "feel" the displayed images.

Virtual reality can be divided into: the simulation of a real environment for training and education, and the development of an imagined environment for a game or interactive story.

The **Virtual Reality Modelling Language (VRML)** allows the creator to specify images and the rules for their display and interaction using textual language statements.

■ Videogames

One of the main applications of virtual reality is in videogames.

A **videogame** is a game based on a story and played using an audio-visual apparatus. The interactive game can involve one or more players who have to follow rules that constrain their behaviour in an artificial conflict, or problem to solve, that ends with a quantifiable outcome. The **audio-visual apparatus** is an electronic system with computing capabilities, i.e. with input devices such as a mouse or a keyboard, and output devices, such as a screen and loudspeakers. The apparatus can be an arcade videogame, a videogame console, a handheld console, a computer, a PDA or a smartphone. The result is a human-computer interaction in which the videogames are user interfaces.

A videogame can be based on a **story**, but sometimes it is not, as in the case of abstract challenges. Narrative elements can be inserted in a videogame through **back stories**, i.e. videos at the beginning, **cut scenes** between levels or to introduce a special event in the game, or **discussions** with other characters. However, the most important thing to remember about games is that they centre on play, and not on a story, as in literature or films•••.

to constrain: *limitare*
pinball: *flipper*
haptic: *aptico*
narrow: *stretto*
outcome: *risultato*
take for granted: *dare per scontato*
wrap-around: *avvolgente*

4 Write questions for these statements.

1. It is an artificial environment created to make people believe it is real.
2. The simplest form is a 3D-image.
3. It can be an arcade videogame, a videogame console, a computer, a handheld console, a PDA, etc.
4. It means Virtual Reality Modelling Language.
5. It can be integrated into a videogame through back stories, cut scenes or discussions between characters.
6. It is a game based on a story and played with an audio-visual apparatus.

5 Read the text and answer the questions.

What if We Are Living in a Computer Simulation?

Virtual reality technology is making great advances, but it has also helped popularise a theory long debated by philosophers and now gaining supporters in Silicon Valley – that the outside world is itself a simulation.

Have you ever wondered if life is not exactly how you imagined it to be? Have you ever suffered from an identity crisis? One in which you suspected that you're not a real person, but instead an extremely sophisticated computer simulation of a real person produced by an immensely more developed civilisation than that which we take to be our own? It's just possible that I lost you on that last point, but stay with me, because the reality we take for granted is coming under increasing technological and theoretical threat. Right now, I'm wearing a large case over my eyes, and headphones. I feel instantly removed from my environment. In front of me I can see a ball, which I can move by looking at a cursor. The ball travels along a high narrow pathway in a vertiginous 3D computer simulation, and I must guide it into various targets to get to the next stages.

In terms of skill, it is quite simple, but the striking aspect of the game is the physical sensation of playing it. I feel, and therefore believe, that I am physically moving back and forth, as though I am on a chair on wheels. External reality has fallen away and I am in a strange world, anxious not to fall off the terrifying precipices. My brain sends signals to my body that create the illusion that it's shooting around like a pinball, when in fact I am stationary.

So, from one perspective, it's just another video game with added thrills. But there's also something else going on here: a radical change of narrative perspective. Computer games are a form of story, and human beings are devoted storytellers. As Yuval Noah Harari argues in his book *Sapiens*, the ability to create fictions is what enabled us to become the most dominant species on the planet. And what are stories if not representations, or simulations, of reality?

Adapted from: *https://www.theguardian.com/technology/2017/apr/22/what-if-were-living-in-a-computer-simulation-the-matrix-elon-musk*

1. What is the philosophical question which the author refers to?
2. What are the author's reactions when experiencing VR?
3. How does the author define virtual reality?
4. Why is the ability to create stories important?

ONLINE GAMING

Online gaming is any videogame that offers online interactions with other players. Online games can offer a huge amount of fun, enjoyment, teamwork, collaboration and imaginative adventure. Played healthily, they help socialisation.

6 (4.10) Listen to an extract on how to write a videogame and complete the table with key phases and words.

Stage 1	*idea* → …
Stage 2	
Stage 3	

WEBSITE CREATION

WYSIWYG is an acronym for 'what you see is what you get'.

The golden rule is to ensure the website is easy to navigate: a visitor shouldn't have to click more than twice to move from one page to another.

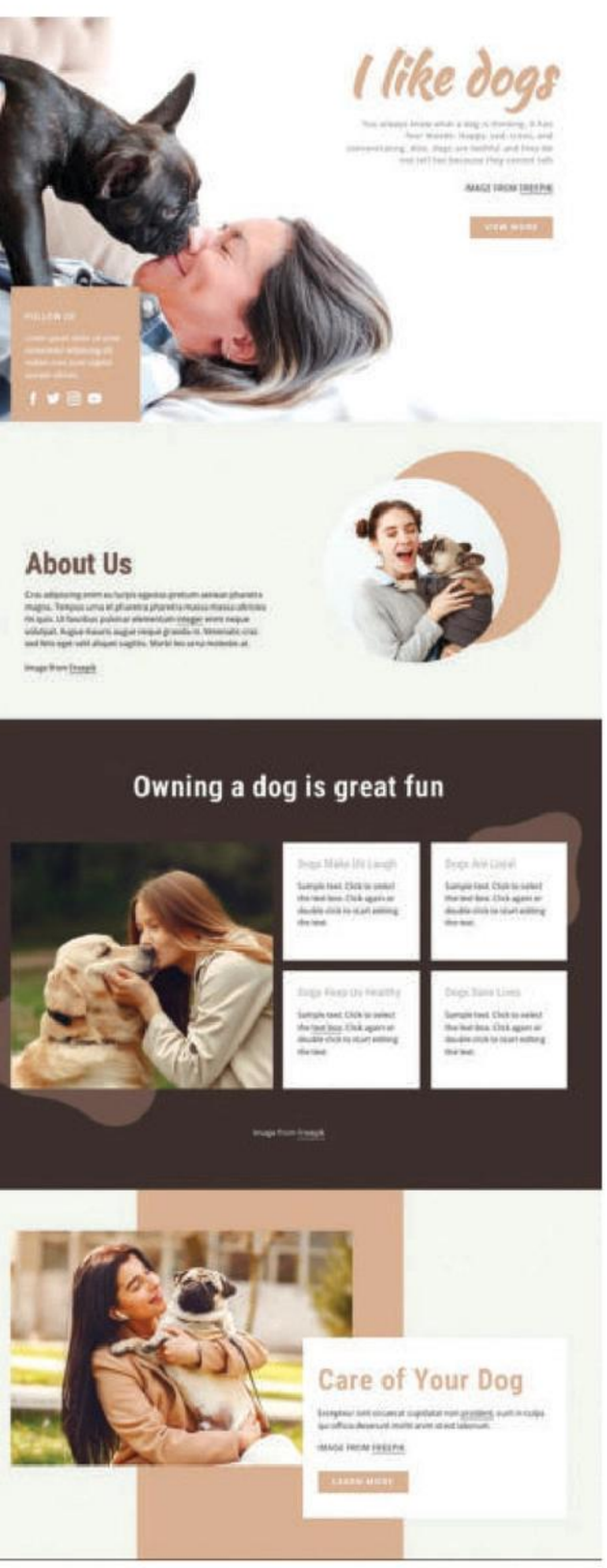
Experts create websites from scratch with a markup language like HTML, but it is also possible to get the same result with dedicated software which provides customised ready-made templates.

Building a website from scratch

A website can be created in just five simple steps:

1. Decide on the **type of website**, e.g. a blog, an online store, a photogallery etc., and think about what the visitors may expect to find on the website;
2. Choose a **domain name**. The domain is the website address and permanent home on the web. It typically includes the name of the website or the name of the business followed by an extension like .com or .org. Some website builders offer free domain names, but it is possible to pay for a personalised one that will give more credibility and help people find it more easily;
3. Design the **website layout.** By using a website builder that includes WYSIWYG software, no coding is needed to create the website. A set of templates is provided from which it is possible to choose the most appropriate and personalise it by selecting from a series of options in order to create a final layout;

4. Create a **sitemap**. The sitemap should include all the relevant pages and how they connect to each other. It is important to plan this in advance in order to offer a smooth browsing experience to users. The best solution is a **website menu** that remains visible on every page together with a clickable logo that leads the visitors back to the homepage.
5. Include all the **necessary pages**.



The essential pages of a professional website

A professional website should include the following pages:

- an **invitation homepage**, which is the face of the website;
- an **eye-catching gallery** displaying products in the case of business websites or photos of initiatives or events for non-commercial blogs;
- an **about page**, which is like a business card, where the person or organisation introduces themselves, e.g. strengths, values and any crucial information visitors might be interested in;
- a **contact section** containing contact numbers, email address, etc., which is usually added in the footer.

customised: *personalizzato*
strength: *punto di forza*

7 **Match the following words or phrases about optional elements of a website with their definition.**

1. Blog ☐
2. Informative faq page ☐
3. Online booking system ☐
4. Testimonial page ☐

a. A page in which previously satisfied customers can describe their experience.
b. A page where customers can schedule an appointment or reservation and pay directly through the website.
c. A page which is regularly updated and which adds fresh content to the website.
d. A page which provides answers to questions that may naturally come up as visitors browse the website.

8 (4.11) **Listen to a recording about the design of a website and answer the questions.**

1. What should the choice of colours correspond to?
2. What is the most common colour used in branding?
3. What are the positive values associated with blue?
4. What is the negative feeling associated with blue?
5. What is orange associated with?
6. What are the three types of fonts mentioned in the text?

9 **Watch the video and answer the questions.**

▸ How to Host a Website for Free? What are the best Free Web Hosting options? *posted by* Work Smart

1. What is the purpose of the tutorial?
2. The tutorials deals with the following topics. Put them in order.
   a. How to host a website with Netlify. ☐
   b. The best solutions available for hosting a website for free. ☐
   c. The characteristics of each solution. ☐
   d. Types of websites and what they are made of. ☐
   e. What the best solution for hosting a website should offer. ☐

10 **Watch the video again and complete the table.**

Types of websites and what they are made of	Static	
	HTML -	
Characteristics of a good host		
Google Drive	Pros:	Cons:
Firebase	Pros:	Cons:
Github	Pros:	
Netlify	Pros: Characteristics:	

DOMOTICS AND SMART HOMES

The regulation of light and climate, the automatic closing of doors and windows, and the control of surveillance systems are all examples of building automation.

An integrated home is controlled by using appropriate interfaces, e.g. buttons, remote controls, touch screens, keyboards and voice recognition, which communicate with a central computer unit or a distributed intelligence system.

We can only talk of 'smart homes' from the third level onward.

Domotics

Domotics, or **home automation**, involves using techniques or technology capable of automating private homes in order to provide a series of services for the comfort and security of the residents. Although many techniques are also used in **building automation**•, domotics also refers to additional functions such as multi-media home entertainment systems, automatic plant watering and pet feeding, and automatic settings for dinners and parties.

Smart home

The expression **smart home**, or **intelligent home**, relates to the integration•• of different devices for the automatic control of household appliances, with sensors and telecommunication systems for remote control or assistance.

Levels of automation

There are five levels of home automation•••:

1. **Homes which contain intelligent objects** – homes contain single, stand-alone applications and objects which function in an intelligent manner, i.e. a kitchen robot with a database of recipes;
2. **Homes which contain intelligent, communicating objects** – homes contain appliances and objects which function intelligently in their own right and which also exchange information between one another to increase functionality, i.e. when it is dark, a sensor sends a signal to the computer to switch on the lights;
3. **Connected homes** – homes have internal and external networks, allowing interactive and remote control of systems, as well as access to services and information, both within and beyond the home, i.e. a central computer controls all the devices in the house;
4. **Learning homes** – patterns of activity in the homes are recorded and the accumulated data is used to anticipate users' needs and to control the technology accordingly, i.e. the central system has a database and knows how to behave, for example, in case of snow, intense cold, etc.;
5. **Attentive homes** – the activity and location of people and objects within the homes are constantly registered, and this information is used to control technology in anticipation of the occupants' needs, i.e. lights are automatically switched on or off as you move from one room to another.

Location of the domotic system

The domotic system can be:

- **centralised** – a centralised controller receives information from multiple sensors and, once processed, generates the appropriate orders for the **actuators**;
- **distributed** – the intelligence of the system is distributed among all the modules that are sensors or actuators through a system of wires;
- **mixed** – several small devices are able to acquire and process the information of multiple sensors and to transmit them to the rest of the devices distributed around the house.

to drill: *trapanare*
straightforward: *immediato*

11 (4.12) **Listen to a recording about home automation applications and complete the table.**

1. Energy saving	• C..... • N..... I.....	• L..... • E..... m.....
2. C..... L.....	• A..... L..... • V..... s..... and d..... • I..... of all devices • M ..... of all multimedia devices	• Audio s..... and d..... • I..... s..... • Internet control • Generation of p.....
3. Home P..... and S.....	• D..... of i..... • Detection of d.....	• S..... of p..... • M..... a.....
4. Communications	• Ubiquitous c..... • A..... transmission • Robotics	• R..... c..... • I.....
5. Other systems	• G..... doors	• P..... feeders

12 PAIR WORK **Read the text and discuss the questions below.**

DoorBird, a New Video Doorbell

We are sure that at some point in time you may have come across the Ring video doorbell or even the Pro version. Ring is one of the most popular wireless doorbells available on the market. It is reasonably priced, easy to self-install and feature-packed. However, the one big drawback is that you have to keep charging your doorbell (the Pro version provides automatic recharging but at a higher cost). Remember, the main reason you want a video doorbell is so that you can view the visitor and open the door! So, you need a video doorbell with the following features:

- Doesn't require constant recharging;
- Able to unlock any smartlock or connect to any magnetic doorlocks, after viewing the visitor;
- Able to use the inbuilt sensor in any existing home automation system;
- Able to use a camera and stream the video to existing systems.

DoorBird is available in a variety of configurations. It has an HD camera with an infrared sensor, below which is a microphone/speaker grille and a stainless steel button, and it can be linked to your home network via ethernet cable or wi-fi. However, since the DoorBird reuses the existing wires for your doorbell, installation may not be so straightforward. Setting it up would require some wiring, waterproofing at the backplate, and drilling before you even turn it on.

Adapted from: *http://www.domotics.sg/review-doorbird-an-alternative-to-ring-video-doorbell/-*

1. What type of product is Doorbird?
2. What are its characteristics?
3. Would you like to install such a device in your house? Why/why not?
4. What do you think are the advantages of installing such a product?

INDUSTRIAL AND MANUFACTURING SOFTWARE

How do you image industrial robots?

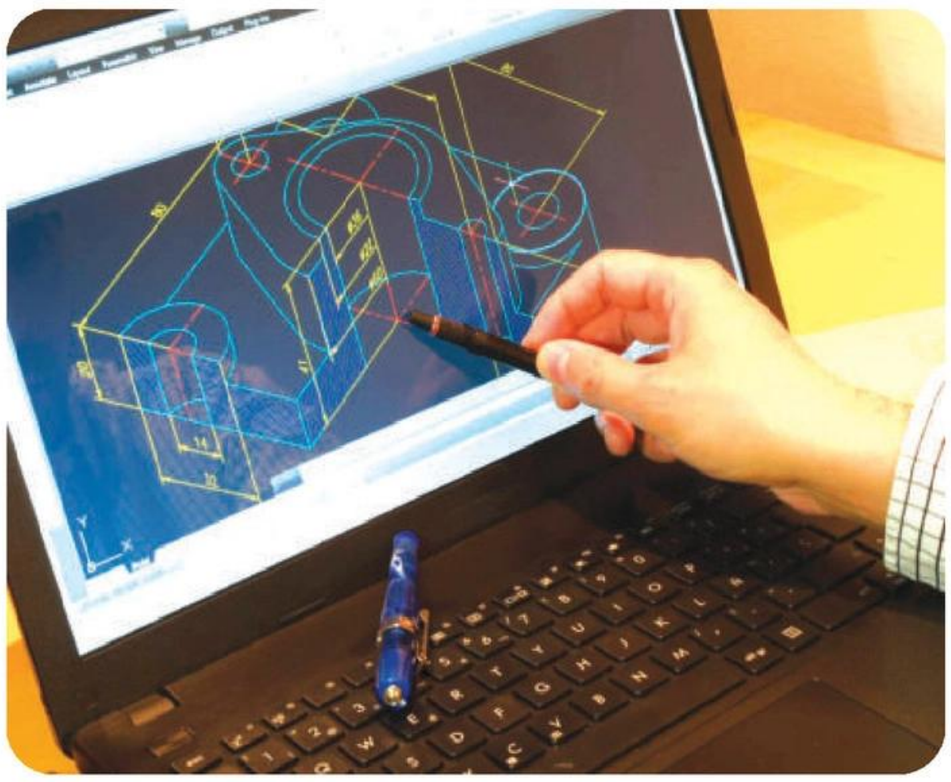
In which dangerous situations do you think robots could replace human workers?

Industrial software

The expression **industrial software** is a general term used for a series of application programs, processes, methods and functions that help the collection, manipulation and management of information on an industrial scale.

Manufacturing software

More specifically, **manufacturing software** has the purpose of automating the production process, from production planning, stock availability tracking, allocation of resources, etc. This software also integrates these processes and provides manufacturers with complete, real-time visibility of all procedures through one system.



Types of manufacturing software

The following applications are used to improve the production of goods and services:

- **Computer Aided Manufacturing (CAM)** is an accurate and faster system of production in which the computer controls the machinery and contributes to the reduction of labour costs;
- **Computer Integrated Machinery (CIM)** is a system in which the computer controls the whole production line with the use of robots to perform routine or dangerous tasks;
- **Computer Aided Design (CAD)** is a type of application software used to generate models and 3D drawings which reduce the need to produce physical models, or prototypes, to test in certain conditions.

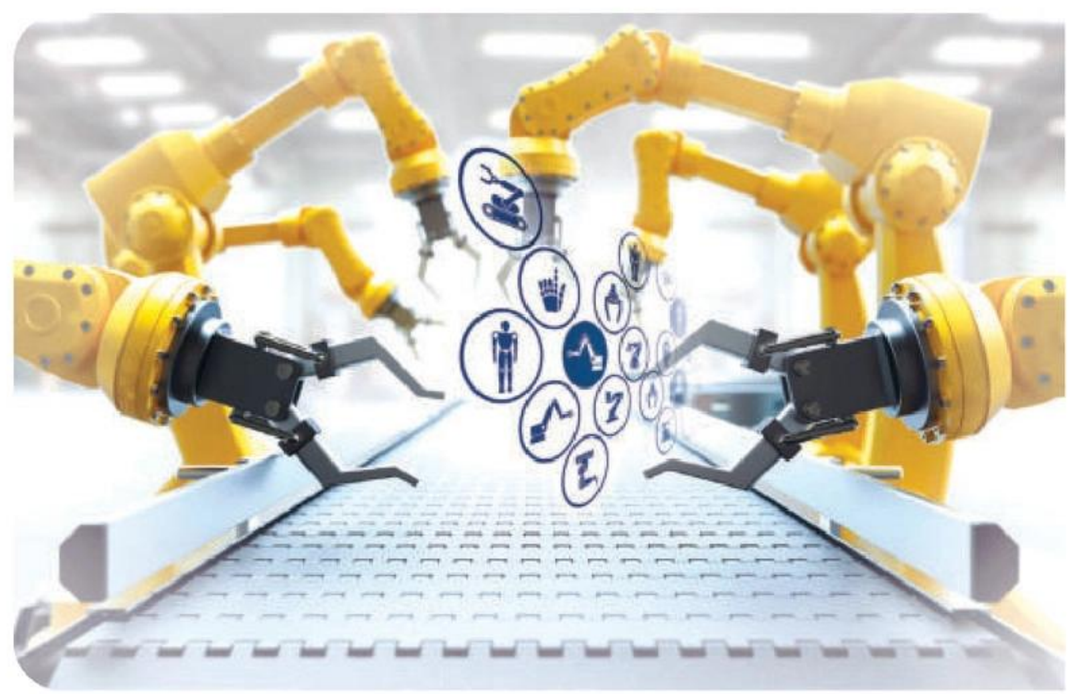
More on CAD

With CAD it is possible to do the following activities:

- design an object in two dimensions (e.g. height and width) and then process it into a three-dimensional design. The object can then be rotated to see how it looks from any angle;
- perform calculations, e.g. calculating the cost of the object based upon a database of standard costs for the product components;
- suggest suitable materials and components to do a particular job;
- simulate how the object will perform under certain conditions.

Manufacturing software and robotics

In dangerous environments, automated production makes use of robots and for this reason manufacturing software works together with robotics. **Robotics** is the branch of technology that deals with the design, construction, operation, and application of robots, as well as computer systems for their control, sensory feedback, and information processing. These technologies deal with automated machines that can take the place of humans in dangerous environments or manufacturing processes, or resemble humans in appearance, behaviour, and/or cognition.



allocation: *ripartizione*
stock: *scorte*

13 Read the text and complete it with the missing words. Then, answer the questions.

Computer-integrated Manufacturing

Since about 1970 there **1.** ..... been a growing trend in manufacturing firms toward the use **2.** ..... computers to perform many of the functions related to design and production. The technology associated with this trend **3.** ..... called CAD/CAM. Today it is widely recognised that **4.** ..... scope of computer applications must extend beyond design and production **5.** ..... include the business functions of the firm. The name given to this more comprehensive use of computers is CIM.

CAD/CAM is based **6.** ..... the capability of a computer system to process, store, and display large amounts of data representing part and product specifications. For mechanical products, the data represent graphic models **7.** ..... the components; for electrical products, they represent circuit information; and so forth. CAD/CAM involves not only the automation of the manufacturing operations but also the automation of elements **8.** ..... the entire design-and-manufacturing procedure.

CAD makes use of computer systems to assist in the

creation, modification, analysis, and optimisation of a design. The designer, working with the CAD system rather than the traditional drafting board, creates the lines and surfaces that form the object and stores this model in the computer database.

9. ..... invoking the appropriate CAD software, the designer can perform various analyses on the object, such as heat transfer calculations. The final object design is developed as adjustments **10.** ..... made on the basis of these analyses. Once the design procedure has been completed, the system can generate the detailed drawings required to make the object.

Adapted from: *https://www.britannica.com/technology/automation/Computer-integrated-manufacturing#ref390778*

1. What is the relationship between CIM and CAM/CAD?
2. What is CAD/CAM's role in mechanical products?
3. What is CAD/CAM's role in electrical products?
4. Apart from creating new objects, what are the other functions of CAD?
5. What is the difference between a traditional designer and a CAD designer?
6. Quote an example of analysis that can be performed on an object with CAD?

14 (4.13) Listen to a radio extract from "A day in the life of a CAD engineer" and choose the correct answer.

1. How long does it take Mike to get to work?
   a. 13 minutes **b.** 30 minutes **c.** 14 minutes **d.** 40 minutes
2. Mike's working day is from…
   a. 9 am to 6 pm. **b.** 8 am to 5 pm. **c.** 9 pm to 6 am. **d.** 8 pm to 5 am.
3. Mike's work is based on...
   a. delivery dates. **b.** appointments. **c.** date of order. **d.** priorities.
4. The order can take 10/15 minutes if the customer sends a file in a/an…
   a. PDF format. **b.** JPEG format. **c.** DXF format. **d.** AutoCAD format.
5. What is Mike working on at the moment?
   a. On a lift. **b.** He is support to a company. **c.** On support arms. **d.** For the Army.
6. What is the most important project he has worked on?
   a. Barrier panels. **b.** A logo for a stadium. **c.** A school plate. **d.** A logo for the city of Manchester.

BUSINESS SOFTWARE

What is your experience with business software?

The ERP system handles the manufacturing, logistics, distribution, inventory, shipping, invoicing, and accounting of a company.

Business software, or a **business application**, in a stricter sense, is any software that performs various tasks in order to increase and measure productivity and to improve business functions.

Enterprise software

As regards business management, small businesses usually use **home accounting software** and **office suites**, while larger companies use a wider range of more complex applications such as **enterprise software**, which provides essential business-oriented tools for computer-based systems. Enterprise software performs business functions such as order processing, accounting and customer relationship management.

An important application is **Enterprise Resource Planning (ERP)**, which integrates all the data and processes of an organisation into a single system by using a unified database to store data from various systems modules.

Other business applications

Other applications are:

- **Customer Relationship Management (CRM)**, a large database which makes it possible to organise, automate and synchronise different business processes for managing the customers archive.
- **Supply Chain Management System (SCM)**, a software system that coordinates all the supply activities, from the data on suppliers to the delivery of products to customers. The system helps to support and maintain a high degree of communication between customer and supplier.

accounting: *contabilità*
billing: *fatturazione*
cash flow: *flusso di cassa*
order processing: *gestione degli ordini*
strict: *stretto*
supplier: *fornitore*

Coding of goods

Barcodes and **radio frequency identification system (RFID)** are the technologies widely used in the coding of goods. The codes, which contain all the relevant data on the goods, can be read by portable devices.

A marketing application is the **Quick Response** or **QR Code**, similar to a bar code but in a square shape. The image can be read by a smartphone or tablet and a link is immediately established with the company's website.

Payment services

As regards the provision of services, the following applications are also available:

- **Electronic Point of Sale (EPOS)**, an application that allows payment with credit and debit cards in shops;
- **Payment gateways,** e-commerce application service providers that authorise credit cards or direct payments online. An example is PayPal.

15 Write a short definition explaining each of these terms.

1. ERP
2. CRM
3. SCM
4. Barcode
5. RFID
6. EPOS
7. Payment gateway
8. QR Code

16 Read the text and complete it with the missing words.

What Is CRM Software?

CMR software is a business strategy that puts the customer **1.** ..... the heart of the business. It is a set of techniques that help organisations manage **2.** ..... customer activities in **3.** ..... way that maximises value for the business, while simultaneously maximising value for the customers.

CMR is not just software but a tool to:

- manage more customer interactions faster;
- consolidate customer information **4.** ..... analysis;
- turn large amounts of data **5.** ..... useful information;
- increase revenue and profitability;
- improve customer loyalty.

With CRM software, **6.** ..... business can capture data about the customer and convert that data into processes. Typically, CRM applications include three core components: sales, marketing and customer service modules. Each **7.** ..... these modules is tightly integrated, as are additional modules that serve to extend the system, based **8.** ..... the specific needs of the business.

Adapted from: *http://www.knowbd.com/piedmont/mba605/projects/crm_doc.pdf* -

17 Match these descriptions of free business software with the right category.

1. *Express Invoice* manages and tracks all your customer billing. You can easily create, print, and email invoices for quicker payments. ☐
2. *Express Accounts* documents and reports on business cash flow, including sales, receipts, payments and purchases. ☐
3. *Inventoria* gives businesses of all sizes the ability to efficiently track all their inventory. ☐
4. *QuickFile* helps small businesses to automate their accounting system. ☐
5. *Reflect* helps you create a centralised database of customer information to make better informed business decisions and improve customer loyalty. ☐
6. *ClickCharts* creates visual representations of business processes, organisation structures and mind maps. ☐

a. Accounting software
b. Customer relationship manager
c. Flowchart and diagram designer
d. Inventory management software
e. Invoicing software
f. Accounting automation

E-LEARNING

The US Department of Defense has created a set of specifications to encourage the standardisation of LMSs which are called Shareable Content Object Reference Model (SCORM).

Moodle stands for Modular Object-Oriented Dynamic Learning Environment. It is used by thousands of educational institutions around the world.

to assess: *valutare*
attendance: *frequenza*
bandwidth: *larghezza di banda*
to hand in: *consegnare*
IWB: *LIM*

E-learning, or **electronic learning**, is a general term that describes education or training programmes which use computers and other electronic devices such as digital media. It includes everything from traditional classrooms that incorporate basic technology to online courses and **distance learning**.

E-learning in the classroom

E-learning may consist of:

- a **traditional setting**, which includes an **interactive whiteboard (IWB)**, i.e. a large interactive display in the form of a white board, or a **smart board**, a computer screen on which you can write with special markers. These media provide dynamic content that is more engaging than simply using a textbook. **Edutainment**, or content designed for being both educational and entertaining, can keep students' attention while providing knowledge about a topic;
- a **classroom performance system (CPS)**, which provides a completely digital learning environment. It includes a projector for displaying videos and web content and a digital chalkboard for the instructor. Students can complete quizzes and tests using digital response pads rather than handing in papers.

Distance learning

There are also other opportunities for self-study or distance learning:

- **computer-based training (CBT)**, in which students learn by using special training programs both online and offline. Its main advantage is that learners can work at their own pace, but there is no human interaction. However, it could be beneficial for revision at home or for individual work in the school lab;
- **web-based training (WBT)**, also called **online education,** or **web-based education**, in which the material is made available on the Internet through a **virtual learning environment**. Typically, it has text and graphics, animation, audio and video, and needs additional bandwidth and software to work properly. This system can be used both for individual or group training assigned to a **virtual classroom**, i.e. without the need of physical attendance. The content can be easily updated, and the system can easily be controlled by an administrator and a tutor. Moreover, WBT can be linked to other systems. Online education also allows students to submit assignments and complete tests online;
- **blended learning**, which is a mixture of class attendance and web-based training.

Virtual learning environments

In order to create a virtual learning environment, or a **learning platform** as it is also called, a **learning management system (LMS)** is necessary. A learning management system is a software application or web-based application used to plan, implement, and assess a specific learning process. It provides an instructor with a way to create and deliver content, monitor students' participation, and assess learners' performance. An LMS also offers interactive features such as discussion forums for the students.

Google Suite is an example of a widespread system which provides a virtual classroom, a conference room for synchronous lessons and other utilities. Another popular open-source learning environment is Moodle.

18 Explain why these statements are false.

1. CBT is a type of online training that requires a computer.
2. Edutainment means using videos in the classroom.
3. CPS stands for computer performance system.
4. Web-based training requires a virtual classroom.
5. Moodle is a learning management system.

19 Read the text and complete it with this list of characteristics.

1. Can be either an asynchronous or synchronous activity
2. Has a global reach
3. Is just-in-time/needs-based
4. Reduces costs
5. Spans multiple devices/mobile

What's the Value of E-Learning?

E-learning offers a lot of value compared to more traditional training options, such as lectures. It:

a. ☐ Traditionally, e-learning has been asynchronous, which means there is no predetermined time for the learning to take place. Everyone can go at their own pace and take their time to learn what they need to know, when they need to know it. However, more synchronous e-learning is now being offered through web conferencing and chat options. The great thing about e-learning is it gives you the option to do one, or both;

b. ☐ E-learning can simply be placed online and easily accessed by people around the world. There is no need for expensive travel or meetings across multiple time zones;

c. ☐ Online courses can work on computers as well as on mobile devices, such as smartphones and tablets. This means e-learning courses can literally be in the hands of the people who need them, at all times;

d. ☐ It's possible to create, publish, and share a course within a few hours. The software is so easy to use that almost anyone can create engaging courses;

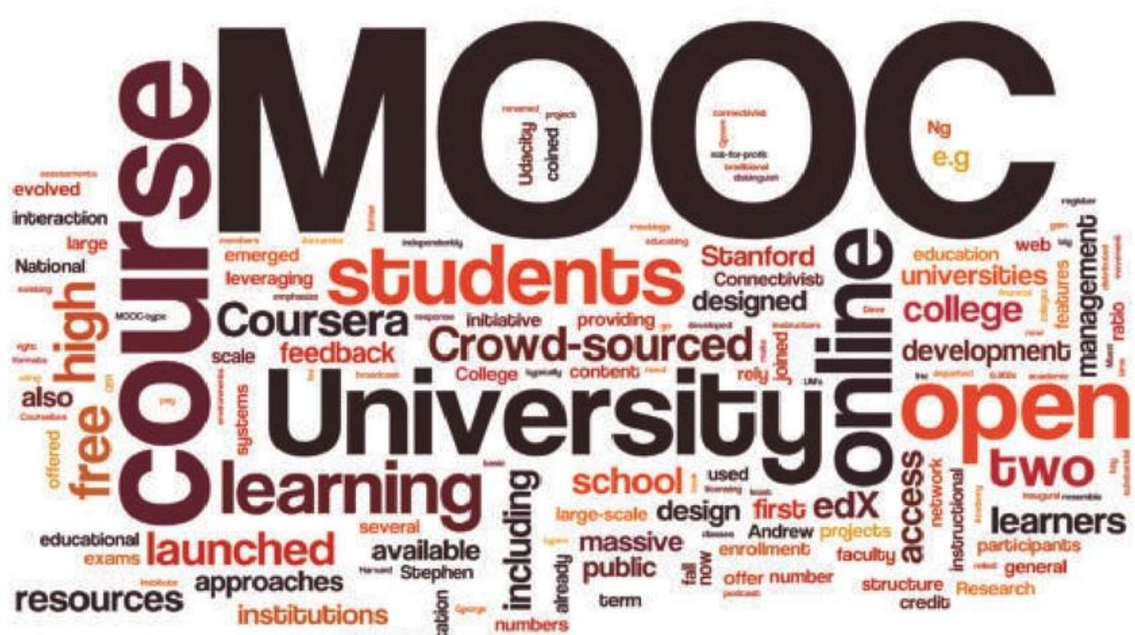
e. ☐ All of the above-mentioned factors result in cost savings for organisations that use e-learning courses to replace some of their traditional instructor-led training.

As the world becomes increasingly connected and globalised, more people have consistent access to the Internet, computers, smartphones, and other technological devices. When we provide people with learning opportunities on these devices, they can use them to access timely resources and training, while on the job.

Adapted from: *https://community.articulate.com/series/getting-started/articles/what-is-e-learning*

20 PAIR WORK Answer the questions below.

1. Have you had any experience of e-learning?
2. According to the types described on the previous page, how can you classify your e-learning experience?
3. Do you like e-learning? How would you describe your experience?
4. What platforms do you know of?



MOOC

A massive open online course (MOOC), or open online course, is an online course with an unlimited number of participants and open access via the web. It provides both traditional text materials, such as lectures, videos, articles, and interactive activities such as forums or social media discussions to support the interactions among the participants and with the tutors. Moreover, it provides feedback to quizzes and assignments. Popular platforms which provide free MOOC courses are: Future Learn, Coursera and the Open University in English and Edu Open in Italian.

GRAMMAR

THE PASSIVE VOICE

The **passive voice** is used when:

- the focus is on the action and it is not important to say who does the action, so the agent can be omitted;
  - ➤ *New open-source software is being continuously designed.*
- when the agent of the action is unknown or obvious.
  - ➤ *A computer was stolen in the school lab yesterday.* (= we do not know who the thief is)
  - ➤ *A lot of programs are written every year.* (= by programmers)

The passive voice is formed with the verb **be + the past participle of the main verb.**

To turn an active sentence into a passive one, the object of the active sentence becomes the subject of the passive sentence and the subject of the active sentence becomes the agent preceded by the preposition **by** (if necessary).

➤ *John uses a spreadsheet to do maths calculations.* (***active form***)

➤ *A spreadsheet is used by John to do maths calculations.* (***passive form***)

The preposition ***by*** is necessary is when the agent is a specific person/animal/object.

➤ *The Mac OS was created by Steve Jobs.*

21 Transform the following sentences into the passive form.

1. The police could track my stolen car.
2. Teachers use the IWB during their lessons.
3. Dad gave me a new videogame for my birthday.
4. Architects use CAD for their designs.
5. Computer and Co will use ERP very soon.
6. A smart home can control various devices.

22 Read the text and complete it with the appropriate active or passive form of the verbs in brackets.

Domotics

Home automation **1.** ..... (also call) domotics. It **2.** ..... (be) a field within building automation which **3.** ..... (specialise) in the specific automation requirements of private homes and in the application of automation techniques which **4.** ..... (require) for the comfort and security of its residents. Although many techniques **5.** ..... also ..... (use) in building automation, such as light and climate control, control of doors and window shutters, security and surveillance systems, there are additional functions which **6.** ..... (employ) in home automation. These additional functions **7.** ..... (include) the control of multi-media home entertainment systems, automatic plant watering and pet feeding, and automatic scenes for dinners and parties.

The main difference between building automation and home automation **8.** ..... (be), however, the human interface. In home automation, ergonomics **9.** ..... (be) of particular importance, in fact the control system should **10.** ..... (organise) around images, i.e. image-based, and therefore self-explanatory. When home automation **11.** ..... (install) during the construction of a new home, usually control wires **12.** ..... (add) before the drywall **13.** ..... (install). These control wires **14.** ..... (run) to a controller, which will **15.** ..... (control) the environment.

Adapted from: *http://future.wikia.com/wiki/Domotics*

CITIZENSHIP

USER-FRIENDLY SOFTWARE

In the technological world in which we live today, we do not learn only from books, but also through software programs and apps. But are all the programs we use really user-friendly? Let's analyse the problem step by step.

23 **Read an extract from article 26 of the Universal Declaration of Human Rights on education and answer the questions.**

> **Article 26**
> Everyone has the right to education. Education shall be free, at least in the elementary and fundamental stages. Elementary education shall be compulsory. Technical and professional education shall be made generally available and higher education shall be equally accessible to all on the basis of merit.
>
> Adaped from: *https://www.un.org/en/about-us/universal-declaration-of-human-rights*

1. Do you think this article could also refer to online education and therefore to software programs?
2. How do you interpret "generally available"? Does it simply mean physically available to everybody or also easy to use?

24 **Read a definition of user-friendly software and answer the questions.**

> User-friendly software not only includes functionalities that can benefit the user, but it also makes it easy for users to access all of its features. The goal of efficient software development is to make the product reliable and compatible for end-users.

1. Think of some adjectives that could be used to describe user-friendly software.
2. What is it that makes software user-friendly for you? Use your own experiences with software to list some characteristics.

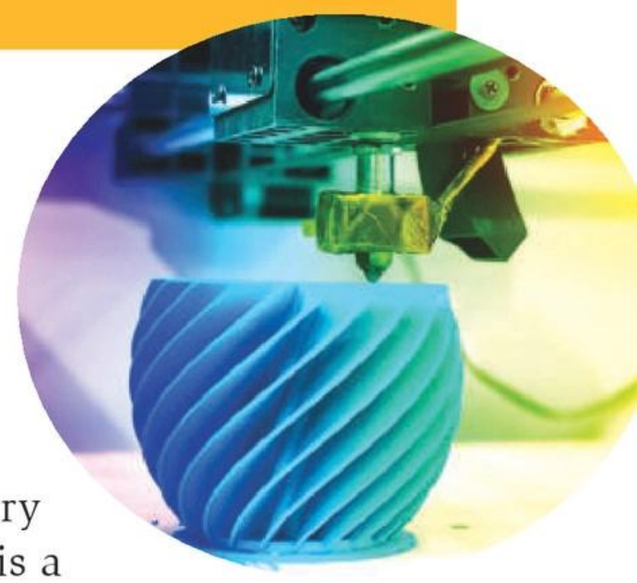
25 GROUP WORK **Read the text and then explain the meaning of the six characteristics that make a program user-friendly.**

> **What Is a User-friendly Program Like?**
> The success of any software product depends upon the kind of user-experience it offers. While the technical aspects of every system are different, one criterion that every software is judged upon is whether it is user-friendly or not. That's why it is important for software developers to keep the end-user in mind during the development process. Despite having unique functionalities and features in your product, if it is difficult to navigate, the chances of it being successful are greatly reduced.
> Users look for systems that are easy to understand and operate. Spending inordinate amounts of precious time learning to perform a single task is not an option. Hence, they might uninstall your application straightaway if it's not friendly to use. The secret to making your software user-friendly lies in viewing your software with a usability perspective. The top 6 features that users prefer in a software product are as follows:
>
> 1. Easy to install: the process is quick and easy;
> 2. Easy to navigate: .....;
> 3. Simple error messages: .....;
> 4. Easy to update: .....;
> 5. Good graphical user interface: .....;
> 6. Easy to uninstall: .....
>
> Adapted from: *https://rezaid.co.uk/make-software-user-friendly/#:~:text=A%20user%2Dfriendly%20software%20not,and%20compatible%20for%20end%2Dusers*

26 CLASS WORK **Think of a program you normally use. How user-friendly is it?**

Look at the characteristics from the previous activity and give one point for each criterion it meets. What is the score? Compare it with other similar programs with your classmates.

4.4 THE NEW FRONTIERS OF ICT



INDUSTRIAL APPLICATIONS

It was introduced in the same year at the Hannover Fair.

Direct Sound Printing (DSP) is a new platform technology which uses soundwaves to produce new objects.

Drones are also used for search and rescue, wildlife monitoring, firefighting, etc.

Apart from the uses of computers already analysed in the previous units, there are others which have emerged in recent years. Among the most important applications in the industrial sector, we have all the effects of the so-called Industry 4.0, with particular reference to 3D printing, delivery drones and the Internet of Things (IoT).

■ Industry 4.0

Industry 4.0 is the name given to the Fourth Industrial Revolution in which we are living now. It is characterised by increasing automation and the use of smart machines and smart factories to produce goods more efficiently.

The term originated from a project in the high-tech strategy of the German government which promoted the computerisation of manufacturing in 2011•.

Industry 4.0 is a futuristic construct whose purpose is the evolution of autonomous production systems using for example new sensor-based technologies to monitor machine utilisation, energy needs and staff training.

aerial: *aereo*
hub: *(qui) centro*
layer: *strato*
lightweight: *leggero*
unmanned: *senza pilota*

■ 3D printing

3D printing is an example of Industry 4.0 technology. It is a manufacturing process in which some material is laid down, layer by layer, to form a three-dimensional object from a computer created design.

With a new class of better-performing machines••, more materials available and greater ability to deliver 3D printed parts that are true to their mechanical properties, 3D has proven itself to be a significant time and cost saving option for design and manufacturing.

■ Drone delivery

A **delivery drone**••• is a type of unmanned aerial vehicle (UAV) guided by GPS systems and used for distributing packages to consumers during the last mile delivery process, i.e. from the nearest distribution hub to the final destination. These types of drones generally have 4-8 propellers, rechargeable batteries and the ability to carry lightweight containers. This type of delivery, which is generally used for various products including e-commerce goods, medical aids, food, etc, is particularly important because it is the most expensive and time-consuming part of the shipping process.

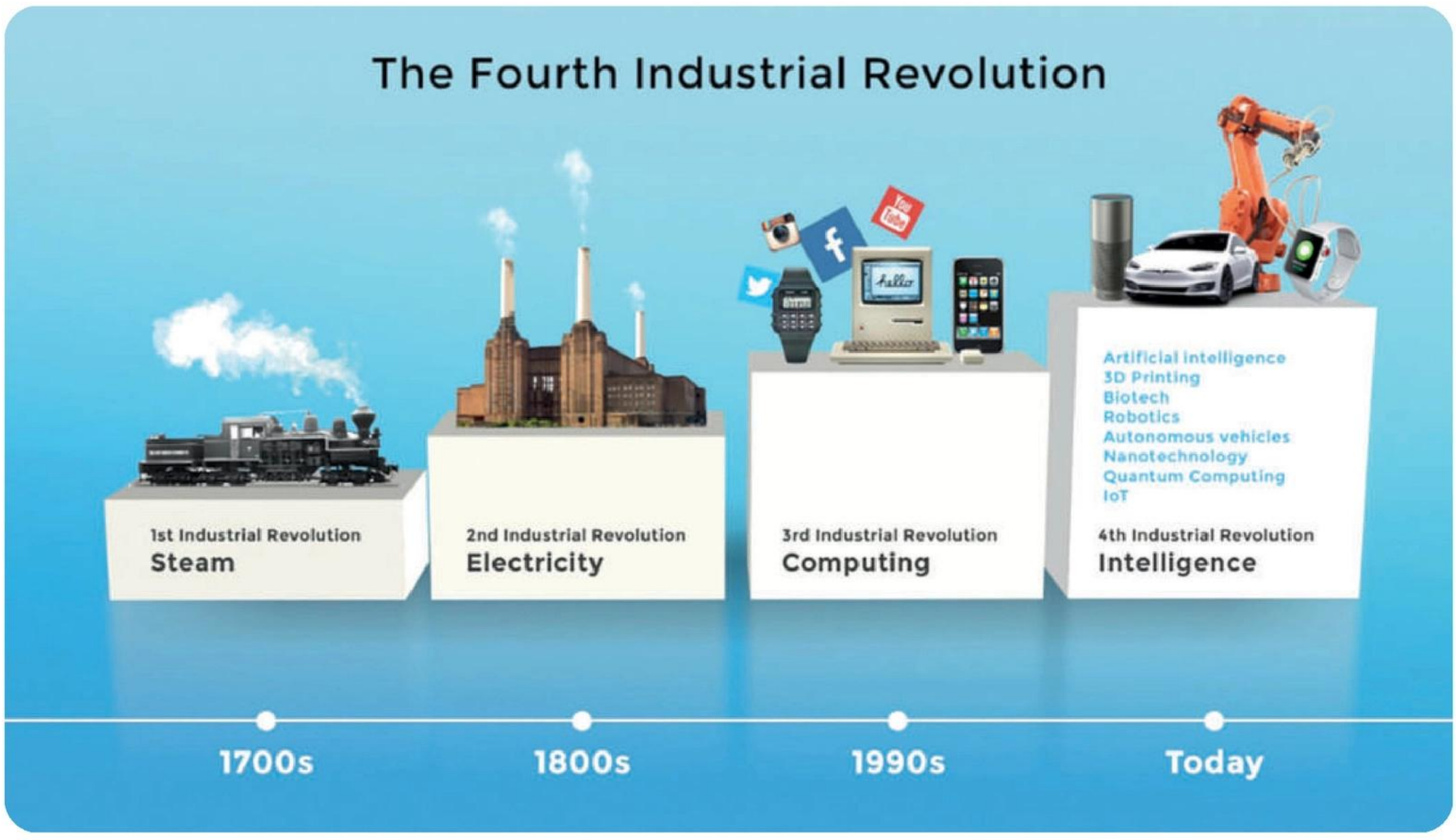
■ The Internet of Things (IoT)

The Internet of Things describes a network of physical objects, i.e. things, that are embedded with sensors, software, and other technologies for the purpose of connecting and exchanging data with other devices and systems over the Internet. These devices range from ordinary household objects like an AI voice assistant to sophisticated industrial tools like supply chain management.

1 **Decide if the statements are true or false. Correct the false ones.**

	T	F
1. Industry 4.0 and the 4th Industrial Revolution are synonyms.	☐	☐
2. Industry 4.0 focuses on automated production which is monitored with sensor-based technologies.	☐	☐
3. 3D printing is a design process.	☐	☐
4. A drone does not have a pilot.	☐	☐
5. Drones are used to transport heavy goods.	☐	☐
6. IoT only refers to industrial applications.	☐	☐

2 GROUP WORK **Look at the picture and comment on the four industrial revolutions. Share all the information that you have on the topic.**



3 **Use the Internet to answer the following questions.**

1. Who invented the steam engine in 1784?
2. When did Thomas Edison invent the first long-lasting electric bulb?
3. The 2nd Industrial Revolution is also associated with mass production. Quote an early example of mass production.
4. Think of computer networks. What happened in 1969?
5. When was the Internet invented?
6. Although the official birth of the 4th Industrial Revolution is 2011, when does the expression 'Internet of Things' (IoT) date back to?

MEDICAL USES

The word *laser* is in fact an acronym that stands for Light Amplification by the Stimulated Emission of Radiation.

In 2015, researchers at the University of Houston succeeded for the first time in making an amputee control his prosthetic hand using only his mind.

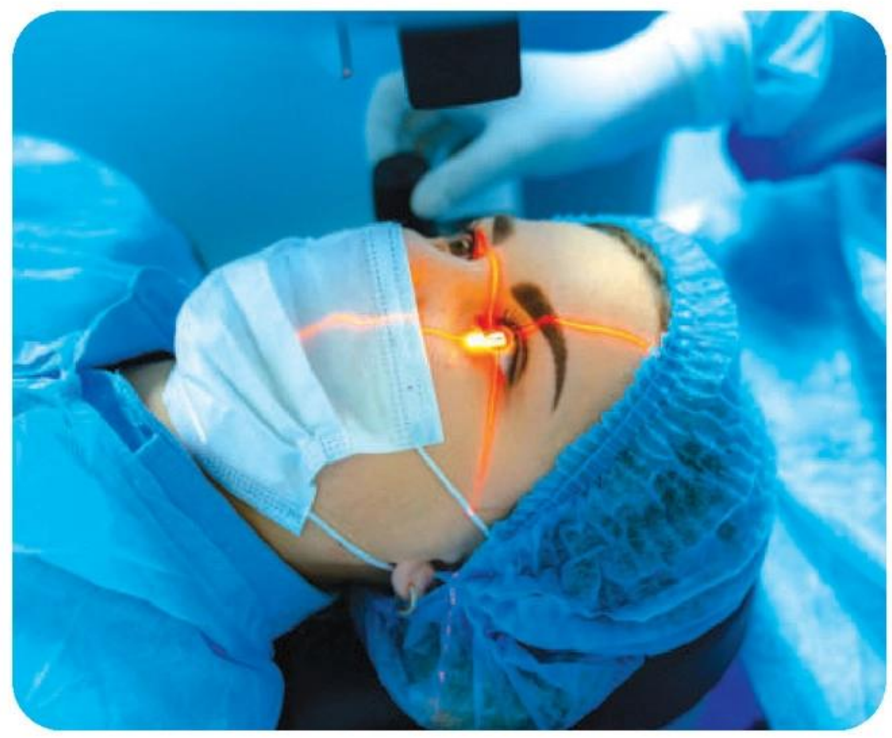
Two main uses of computers and technology in medicine are related to laser surgery and neurotechnology.

Laser surgery

Laser• surgery is a type of surgery, first developed in 1960, that uses special light beams instead of instruments for surgical procedures. There are different ways of using lasers in surgical operations: laser light can be delivered either continuously or intermittently and can also be used with fibre optics to treat areas of the body that are often difficult to access. Newer modifications have also had a large impact on medical and surgical practices, especially in the treatment of skin lesion and diseases.

Laser surgery is applied in different situations:

- to remove tumours;
- to help prevent blood loss by sealing small blood vessels;
- to seal lymph vessels to help decrease swelling and decrease the spread of tumour cells;
- to treat some skin conditions such as moles, tattoos, scars, wrinkles, etc.



beam: *raggio*
prosthetic: *protesi*
scar: *cicatrice*
wrinkle: *ruga*

Neurotechnology

Neurotechnology is the integration of technical components with the nervous system. These components can be computers, electrodes or any other piece of engineering that can be set up to interface with the electric pulses in our body.

Neurotechnology has two main objectives:

- to record signals from the brain and translate them into technical control commands, like for example a brain-controlled computer mouse;
- to manipulate brain activity by applying electrical or optical stimuli, used for example to help patients who are affected by paralysis.

The applications of neurotechnology are many, from academic research to therapeutical uses, developing brain-machine interfaces and more.

Brain computer interfaces

One of the many applications of neurotechnology is a **brain computer interface (BCI)**, a computer-based system that receives brain signals, analyses them and then translates them into commands for devices which produce the desired output. The main function of a BCI in a medical context is therapeutic. Turning brain signals into commands for computer systems means that patients can move a cursor, type on a keyboard or manipulate a prosthetic•• just by using their brain.

4 Read the text and answer the questions.

Laser Eye Surgery

What is it?

Laser eye surgery, or laser vision correction, involves using lasers to reshape the front surface (cornea) of your eyes so that you can focus better. It can correct short-sightedness, long-sightedness and astigmatism.

Who is it suitable for?

Laser eye surgery is suitable for most people over 18. Ideally, your eye prescription will have stayed more or less the same for about two years. Lens surgery may be more suitable if you have a high spectacle prescription or later in life.

What does it involve?

There are 3 main types of laser eye surgery: LASIK, SMILE and surface laser treatments.

- **LASIK** – this is done with 2 lasers, one to open up a thin flap in the surface of the cornea, and another to reshape the cornea underneath. The protective flap is then smoothed back over and stays in place without stitches.
- **SMILE** – the surgeon reshapes your cornea through a small, self-sealing hole.
- **Surface laser treatments (PRK, LASEK and TransPRK)** – the clear skin covering the cornea is removed so the surgeon can reshape your cornea with a laser. The skin then grows back naturally.

All three types of laser eye surgery have similar results. Your surgeon will talk through your options with you and help you decide on the most helpful one for you.

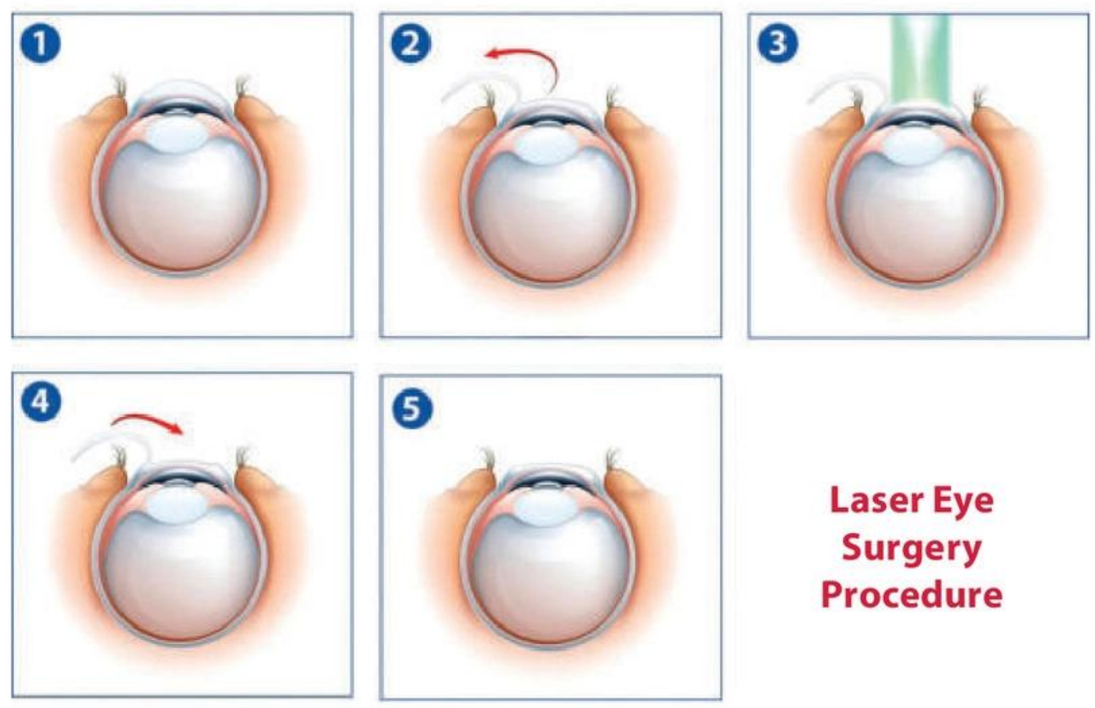
Are there any risks?

About one in ten people who have laser eye surgery needs more surgery to get the best possible results. There's usually no extra cost for this.
Common side effects include:

- **Mild, gritty discomfort** – artificial tears can help with this, and your eyes will usually feel comfortable again in about three to six months;
- **Visual disturbances** (such as glare from oncoming headlights when driving at night) – this usually resolves itself or can be treated successfully;
- **Red marks on the white of your eye** – these fade away in about a month. Severe loss of vision is very rare.

Adapted from: *https://www.nhs.uk/conditions/laser-eye-surgery-and-lens-surgery/*

1. What is laser eye surgery used for?
2. Can children be subject to laser eye surgery?
3. How many types of laser eye surgery are there? What are they?
4. Is laser eye surgery always successful after the first treatment?
5. When might people suffer from visual disturbances?
6. How long can the presence of red marks on the white of the eye last?



Laser Eye Surgery Procedure

5 (4.14) Listen to a presentation on further developments in neurotechnology and complete the table.

Field of application	Further developments
Education	Enhance learning and cognition
Workplace	
Military or national security	
Sports	
Consumer applications	

ARTIFICIAL INTELLIGENCE AND AUGMENTED REALITY

The earliest significant work in the field of artificial intelligence was carried out in the mid-20th century by Alan Turing.

The term was coined in 1990 by Thomas Caudell, an employee of Boeing Computer Services Research.

Artificial intelligence

Artificial intelligence (AI) is the ability of a computer, or a robot controlled by a computer, to do tasks that are usually done by humans because they require human intelligence.

The term artificial intelligence• is often applied to the project of developing systems that can perform the intellectual processes typical of human beings, such as the ability to reason, discover meaning, generalise, or learn from past experience.

At the moment, there are no AI devices that can perform the wide variety of functions that ordinary humans can do, but some of them can carry out very specific and complex tasks, such as discovering proofs of mathematical theorems or playing chess, and in very different application fields, such as medical diagnosis, computer search engines and voice or handwriting recognition. However, there are no programs that can match human flexibility or perform tasks that require everyday knowledge.

handwriting: *calligrafia*
process of cognition: *processo cognitivo*

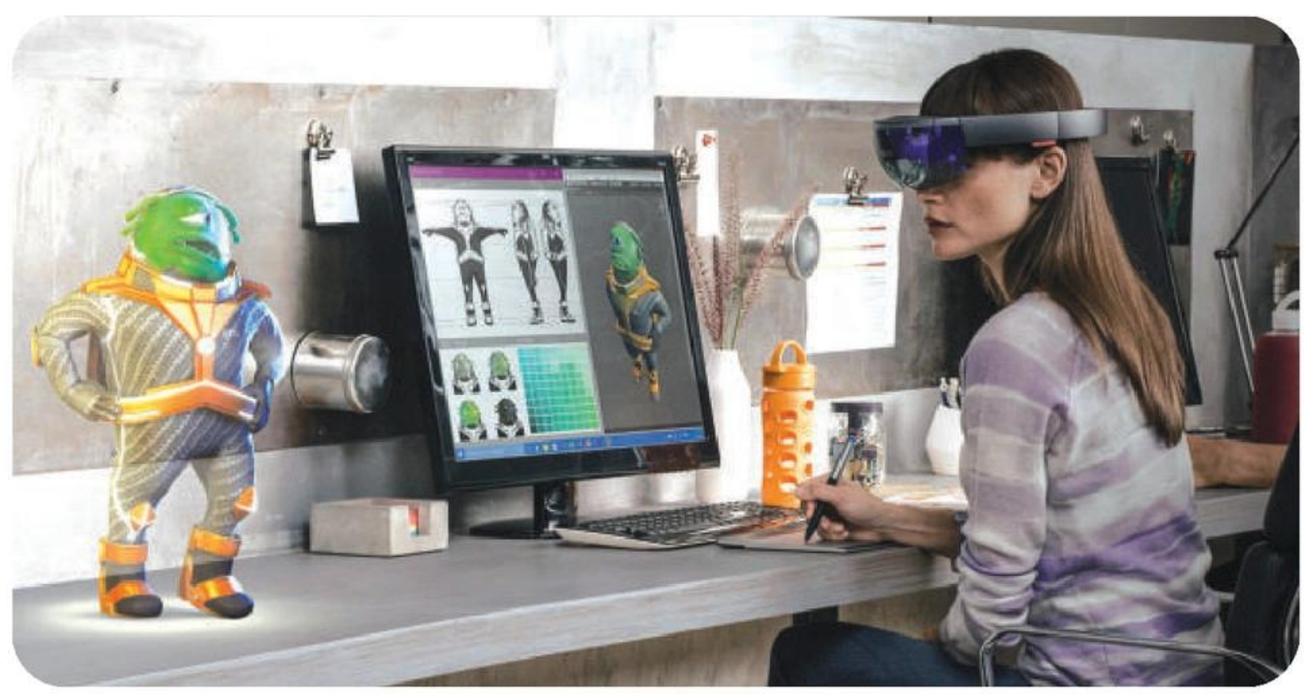
Methods of artificial intelligence

There are two distinct approaches of artificial intelligence:

- the **symbolic,** or **top-down, approach**, which tries to replicate intelligence by analysing the process of cognition independently from the biological structure of the brain, like processing symbols;
- the **connectionist,** or **bottom-up, approach**, which involves creating artificial neural networks in imitation of the brain's structure.

Augmented reality

Augmented reality (AR)•• is the integration of digital information with the user's environment in real time. Unlike virtual reality (VR), which creates a totally artificial environment, AR users experience a real-world environment with extra generated perceptual information. It is used to visually change natural environments in some way or to provide additional information to users. The main advantage of AR is that it manages to combine digital and three-dimensional (3D) components with an individual's perception of the real world. It can be used both for decision-making and entertainment, and it can be delivered in a variety of formats, including smartphones, tablets and glasses. The technology requires hardware components, such as a processor, sensors, a display and input devices.



6 Answer the questions.

1. What is the purpose of artificial intelligence?
2. With reference to the tasks they can perform, what is the difference between a human being and an AI device?
3. What type of tasks can a computer carry out?
4. Which method of artificial intelligence is more "practical"? Why?
5. What type of world is experienced with AR?
6. What hardware components are needed in AR?

7 Watch the video and answer the questions.

▸ Detroit become human – Chloe interview @ 1080p HD
posted by Rajman Gaming HD

1. What is Chloe?
2. What is surprising about Chloe?
3. How does Chloe describe the test?
4. How many operations per second can Chloe's brain perform?
5. Complete Chloe's sentence: "I only exist thanks to…".
6. What do humans have that Chloe doesn't?

8 Watch the video again and discuss the questions.

1. Chloe is a good example of artificial intelligence. What elements make her similar to a real human being?
2. What elements make it clear that she's an android?

9 Read the text and decide if the statements are true or false. Correct the false ones.

Creating an Artificial Neural Network

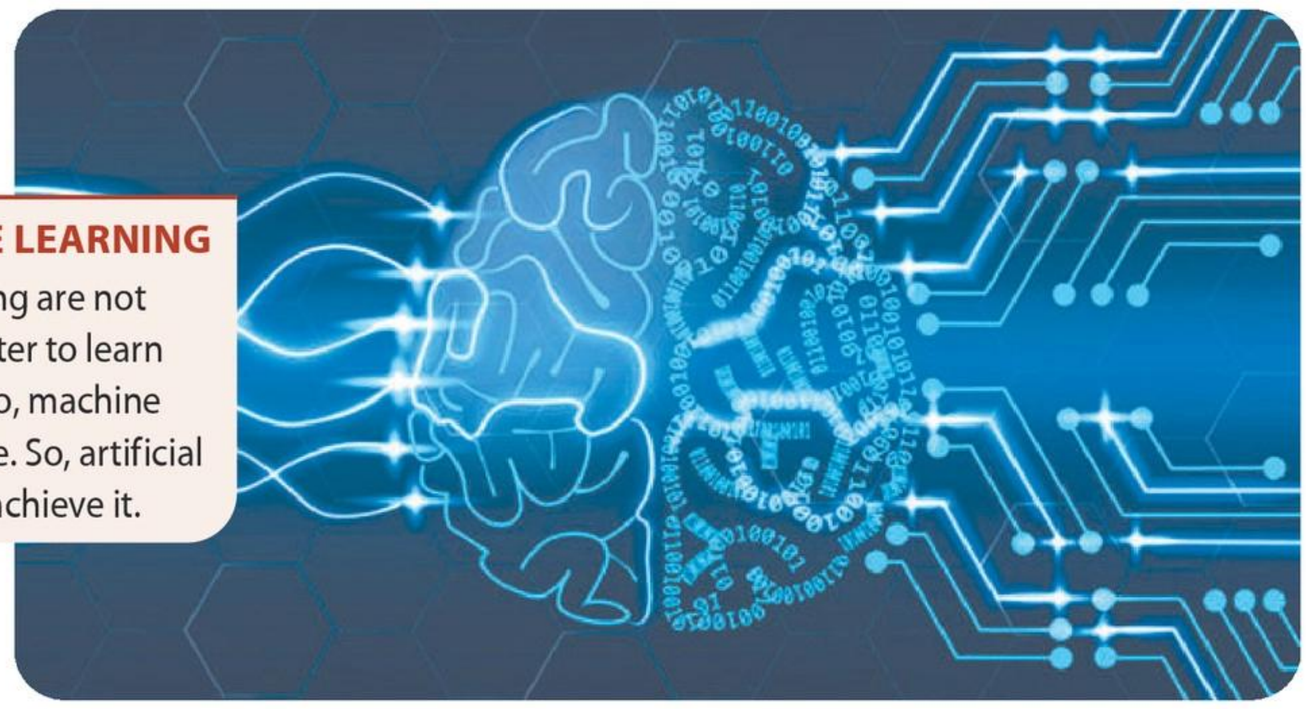
The first artificial neural network with 128 neurons was created by B. Farley and W. Clark of MIT in 1954. The neurons were trained to recognise simple patterns. Moreover, the random destruction of up to 10% of the neurons in a trained network did not affect the overall performance as is the case in a real brain.
A basic theoretical model consists of 5 neurons: 4 are used for input and 1 for output (called N). Each neuron could be firing (1), ie. sending a message, or not (0), and each connection leading to N had a weight, i.e. a value.
The network is trained by an external agent, i.e. a computer program, which operates in two steps: first, it inputs a pattern and observes the behaviour of N, then, it adjusts the connection weights. The striking thing is that the learning process is entirely mechanical and requires no human intervention or adjustment.

Adapted from: *https://www.britannica.com/technology/artificial-intelligence/Connectionism*

	T	F
1. A basic theoretical model of an artificial network consists of 128 neurons.	☐	☐
2. The output neuron is called N.	☐	☐
3. The value of a firing neuron is zero.	☐	☐
4. All the connections lead to N.	☐	☐
5. The external agent is a computer.	☐	☐
6. Human intervention is needed to adjust the weights.	☐	☐

ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

Though related, artificial intelligence and machine learning are not the same. Machine learning is a method to train a computer to learn from its inputs without explicit programming; by doing so, machine learning helps a computer to achieve artificial intelligence. So, artificial intelligence is the goal and machine learning the way to achieve it.



GRAMMAR

MAIN PREPOSITIONS

PREPOSITIONS OF TIME

AT	IN	ON
times of the day	months and seasons	days
mealtimes	years	dates
holidays	decades and centuries	parts of specific days
expressions ➤ *at present, at the moment, at night*	long periods and parts of the day	expressions ➤ *on our anniversary*

PREPOSITIONS OF PLACE

AT	IN	ON
point ➤ *at home, at school, at the bus stop, at the door, at the entrance*	enclosed space ➤ *in the garden, in Scotland, in a box, in the car, in the office*	surface ➤ *on the bus, on the carpet, on the menu, on the wall*

COMMON ADJECTIVE PREPOSITION COMBINATIONS

AT	*surprised at, angry at, good at, terrible at*
OF	*proud of, afraid of, fond of, full of*
WITH	*satisfied with, busy with, fed up with, associated with*
IN	*disappointed in, skilled in, interested in, involved in*
FOR	*known for, terrible for, excellent for*

10 **Fill in the gaps with the correct preposition.**

1. I work ..... the computer laboratory ..... the morning.
2. I prefer working ..... night.
3. I never read computer manuals ..... the bus.
4. I am working on a new program ..... the moment.
5. The first artificial neural system was developed ..... 1954.
6. Without computers we would be ..... the Ice Age.
7. Let's meet ..... Tuesday morning.
8. It's not a good idea to have a computer ..... the bedroom.
9. Forget your computer ..... the summer. Go out for a walk.
10. I always start working ..... 8:30 ..... the morning.
11. You have to finish your report ..... June.
12. I like writing programs ..... the weekend.
13. I am good ..... English and skilled ..... computing.
14. I don't like working ..... lunchtime.
15. Wait for me ..... the entrance.
16. The weekly timetable is ..... the wall.
17. I was disappointed ..... Sue, she didn't hand in her flowchart in time.
18. We are satisfied ..... the new program, it works perfectly!

CITIZENSHIP

THE RISKS OF TECHNOLOGY

11 GROUP WORK **Read a series of different definitions of the word technology. Discuss them and choose the one that you think is the most representative.**

Technology:

1. The branch of knowledge that deals with the creation and use of technical means and their interrelation with life, society, and the environment, drawing upon such subjects as industrial arts, engineering, applied science, and pure science.
2. The application of this knowledge for practical ends.
3. The terminology of an art, science, etc.; technical nomenclature.
4. A scientific or industrial process, invention, method, or the like.
5. The sum of the ways in which social groups provide themselves with the material objects of their civilization.

Source: *www.dictionary.com*

12 **Make a list of the uses of technology in your everyday life. How important is it? What are its main advantages?**

Examples of technology in everyday life	Advantages of technology

13 **Read a short text on the risks of technology and discuss the situations.**

The Risks of Technology

Technology certainly plays a major role in our world and will certainly continue to do so, but what are the risks? Are we not risking too much by relying too heavily on technology to make our decisions? What could, or will, happen if we are not able to control the future progress of technology, as many science fiction films suggest? Technology could take over, reduce us to impotence and even decide our destiny.

Imagine the following situations and think of the possible consequences.

Scenarios	Consequences
1. We live in a smart home. What happens if the computer which controls everything breaks down?	
2. Industry 4.0. What happens if the central computer goes mad?	
3. In a future world, all menial jobs are done by androids. What happens if they rebel?	
4. We are so used to technology that we lose our ability to reason, do calculations, make decisions, etc.	

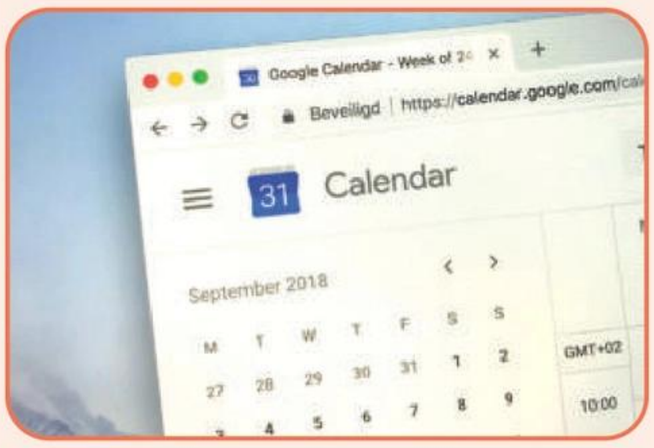
VOCABULARY

1 **Write the correct words for the following pictures.**

CAD • calendar • database • domotics • e-learning • electronic organiser • fonts • GPS • photo editing • presentation software • spreadsheet • videogame

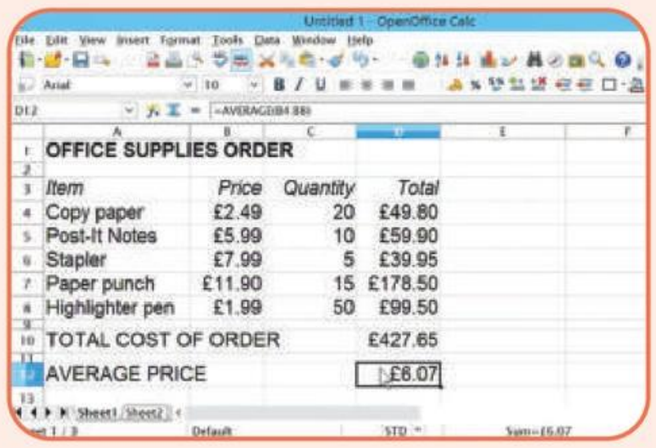
1. .....

2. .....



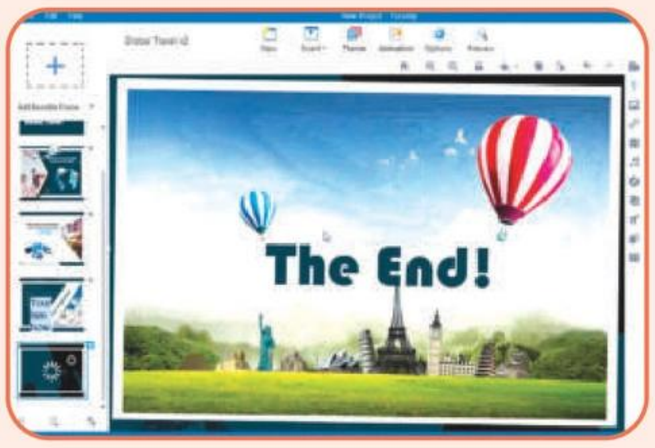
3. .....

4. .....

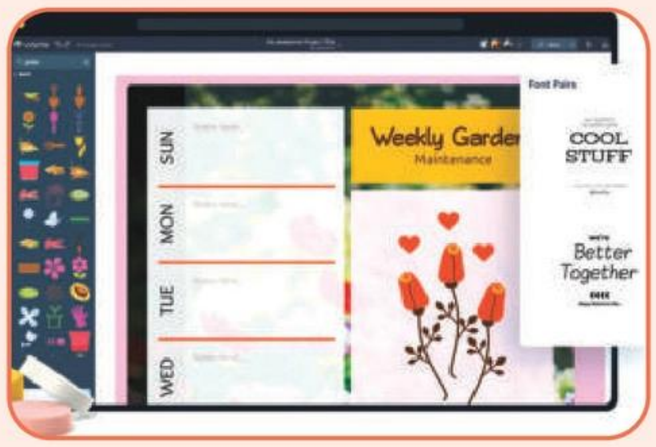


5. .....

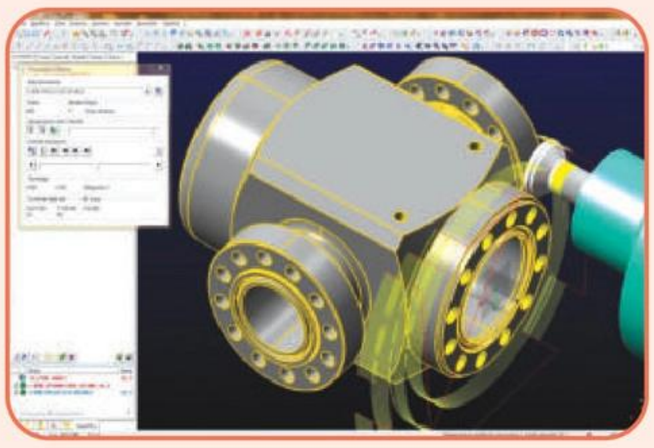
6. .....



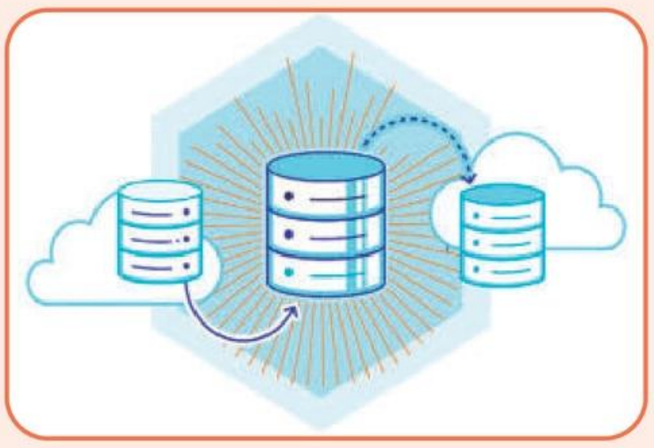
7. .....



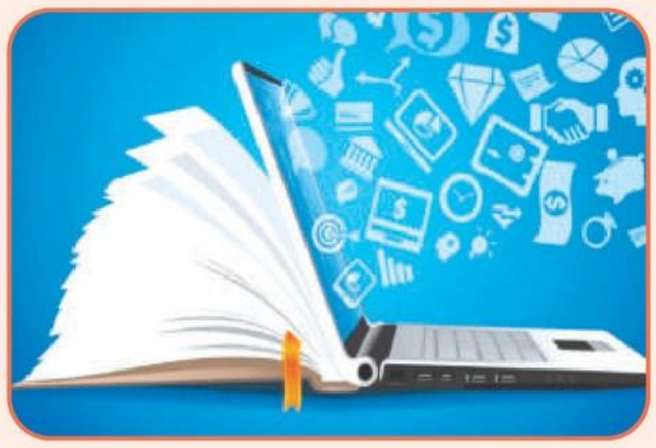
8. .....



9. .....



10. .....



11. .....

12. .....

2 Write the given words in the correct column.

air brushing • blended • column • brightness • cutting • field • image enhancement • IWB • platform • query • record • report • red eye removal • relational database • restoration • row • tutor

Photo editing	Databases	E-learning

3 Choose the correct option for each sentence.

1. ..... is used to cover up skin imperfections in a photo.
   a. Red-eye removal **b.** Cropping **c.** A special effect **d.** Air brushing
2. ..... are used to add new elements to an existing photo.
   a. Layers **b.** Restorations **c.** Contrasts **d.** Image enhancements
3. When a photo is too dark, you need to use the ..... function.
   a. contrast **b.** brightness **c.** cropping **d.** air brushing
4. To select part of an image, you can use the ..... function.
   a. special effects **b.** air brushing **c.** cropping **d.** contrast
5. DTP is .....-based.
   a. text **b.** frame **c.** image **d.** page
6. A ..... is used to interrogate a database.
   a. report **b.** query **c.** relationship **d.** row
7. The architecture of a domotic system can be centralised or .....
   a. independent. **b.** connected. **c.** distributed. **d.** virtual.
8. Animation effects make the ..... arrive on screen in different ways.
   a. frames **b.** fonts **c.** sound **d.** speakers

4 Find the words for these definitions in the word puzzle.

U	X	C	S	P	J	Q	B	A	P	R	N	R	D	T
B	D	G	X	C	P	S	S	G	V	T	A	E	T	R
M	H	G	K	V	I	P	V	C	W	S	H	N	N	E
R	V	H	T	Y	L	T	Q	V	T	V	E	I	C	C
O	B	G	Z	I	J	C	O	E	F	M	R	L	Q	O
C	A	L	E	N	D	A	R	M	N	S	S	N	E	R
Q	Q	O	L	X	C	Y	Q	I	O	S	O	O	V	D
O	H	L	K	V	Z	R	A	H	W	D	L	E	Q	S
I	B	V	O	F	V	T	K	Y	K	Q	C	L	P	O
G	A	J	K	P	R	X	I	J	G	Y	W	N	N	J
C	V	E	E	E	V	I	X	W	Y	E	I	K	P	M
K	Q	N	T	C	G	O	Q	M	X	P	O	S	G	Y
S	C	N	F	Y	T	L	Q	O	A	A	G	S	J	R
L	E	E	L	L	Q	S	P	T	N	P	U	S	S	B
G	B	R	O	T	C	E	V	D	J	M	U	S	O	C

1. It is used to write down appointments.
2. In a database, data is stored as…
3. A relational database is made of fields and…
4. A bitmap is also called… graphics.
5. … graphics is used for drawing.
6. The word used for home automation.
7. A synonym of web-based education is… education.
8. Edutainment means education and…

REAL-LIFE SKILLS

ORGANISING YOUR SCHOOL WEEK AND YOUR NOTES

A lot of students are not well-organised and often study the day before an oral or written test. Here are some tips to organise your study and your notes.

STEP 1: Finding out your deadlines for the following week

5 **Look at the school register for the following week and write down the information below on your electronic calendar.**

1. Date and time of written tests.
2. Date and time of oral tests.
3. Date and time of assignments/homework.

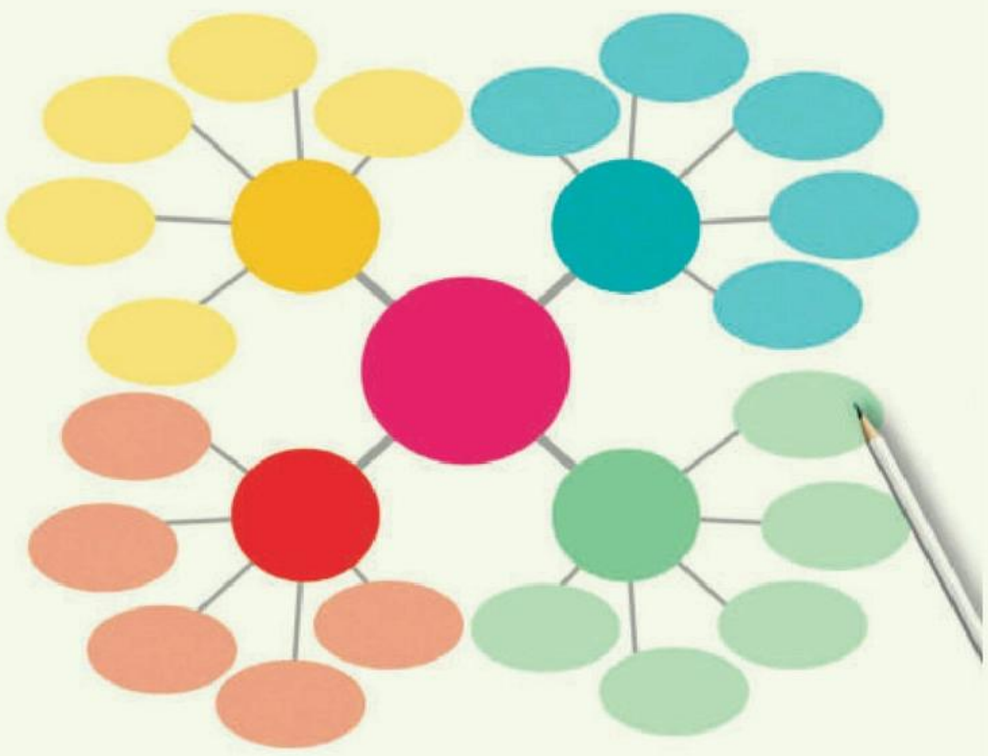
STEP 2: Organising your study time

6 **Look at your calendar and for each test or item of homework do the following tasks. Then, report the information on your calendar.**

1. Consider how many pages you have to study and how many hours you need.
2. Consider the time available each day.
3. For each hour available on your calendar: decide on the subject and the number of pages you have to study.
4. Leave enough time for revision.
5. Try not to study the same subjects for too many hours on the same day.
6. Leave time for breaks and a snack.

STEP 3: Organising your notes

Mind maps are a useful tool especially for revision. There are different software programs available.



7 **Prepare a mind map on any subject you have to study, or a topic assigned by your teacher. Draw your mind map and compare it with a classmate.**

THE STORY OF OPEN OFFICE

OpenOffice.org (**OOo**), commonly known as **OpenOffice**, is a discontinued open-source office suite. It was an open-sourced version of the earlier StarOffice, which Sun Microsystems acquired in 1999 for internal use. Sun open-sourced the OpenOffice suite in July 2000 as a competitor to Microsoft Office, releasing version 1.0 on 1 May 2002.

OpenOffice included a word processor (Writer), a spreadsheet (Calc), a presentation application (Impress), a drawing application (Draw), a formula editor (Math), and a database management application (Base). Its default file format was the OpenDocument Format (ODF), an ISO/IEC standard, which originated with OpenOffice.org. It could also read a wide variety of other file formats, with particular attention to those from Microsoft Office. OpenOffice.org was primarily developed for Linux, Microsoft Windows and Solaris, and later for OS X, with ports to other operating systems. It was distributed under the GNU Lesser General Public License version 3 (LGPL); early versions were also available under the Sun Industry Standards Source License (SISSL).

In 2011, Oracle Corporation, the then-owner of Sun, announced that it would no longer offer a commercial version of the suite and donated the project to the Apache Foundation. Apache renamed the software Apache OpenOffice. Other active successor projects, all originated from StarOffice, include LibreOffice (the most actively developed) and NeoOffice (commercial, and available only for MacOS).

Adapted from: *https://en.wikipedia.org/wiki/OpenOffice.org*

discontinued: *interrotto (non sono più state fatte nuove versioni)*

8 **Read the text and answer the questions.**

1. What is Open Office?
2. What is the relationship between Open Office and StarOffice?
3. What did the Open Office suite include?
4. Which operating systems does it work on?
5. What happened in 2011?
6. What are the other open-source suites mentioned in the text?

9 **Name the equivalent Microsoft Office applications for the following Open Office ones.**

1. Writer: .....
2. Calc: .....
3. Impress: .....
4. Draw: .....
5. Maths: .....
6. Base: .....

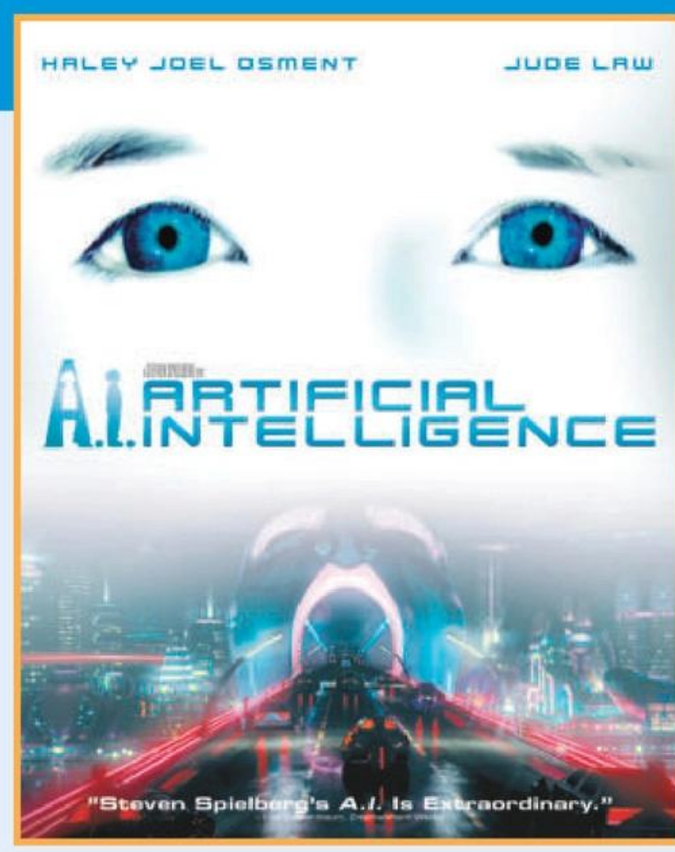
10 GROUP WORK **Find some information on other open-source office suites.**

Apache OpenOffice	
Libre Office	
NeoOffice	

CLIP FILM

AI – ARTIFICIAL INTELLIGENCE

- PRODUCTION: USA, 2001
- DIRECTOR: Steven Spielberg
- STARRING: Haley Joel Osment (David), Jude Law (Gigolò Joe), William Hurt (professor Allen Hobby), Frances O'Connor (Monica).



SYNOPSIS

The story, based on 1969 short story *Super-Toys Last All Summer Long* by Brian Aldiss, shows some similarities to Carlo Collodi's *Pinocchio* (1883). It was originally a project of Stanley Kubrick's, passed to his friend Steven Spielberg after his death.

The story takes place in the future where greenhouse gases have caused the polar ice caps to melt, flooding coastal cities. As resources are scarce and in order to stop population growth, people wishing to have children must apply for a licence. Professor Hobby, who works for a company called Cybertronics, has just designed a new child robot, a mecha, who is capable of emotional love for his mother. Eighteen months later, Henry, a Cybertronics employee, and his wife Monica, who have a comatose son, take David, the first mecha of the new kind, home with them. However, when Martin, the real son, recovers and comes back home, he is jealous of David and the couple decides to get rid of David. Monica, not willing to give David back to Cybertronics for destruction, leaves him in the wood together with his super-toy Teddy, a speaking teddy bear. David is desperate, but he is convinced that if he could become a real boy, Monica would love him again. Inspired by the story of Pinocchio that Monica used to tell him, David starts a journey to find the Blue Fairy and ask her to make him a real boy. In the wood, he is captured and brought to a Roman Circus-style event in which mechas are tortured and killed in front of an applauding audience. However, David succeeds in running away with Gigolò Joe, a male prostitute, and they reach Rouge City, where they meet Dr Know, a hologram, to whom David asks questions about the Blue Fairy. In their quest, they reach the submerged New York City, where David finds professor Hobby and discovers that he is producing other mechas like himself. Desperate, he throws himself into the water. He is saved by Joe who is then arrested by the police. With an amphibicopter David and Teddy go underwater and find the rest of a fairytale park with a statue of the Blue Fairy. Unfortunately, a ferris wheel collapses and David and Teddy are trapped underwater. After 2,000 years and after a new Ice Age and the death of all humans, a new species of mechas finds David and Ted. They want to study the remnants of the culture and species that created them. Searching through David's memories, they are surprised to discover that once he lived with the humans. To make him happy, they recreate his house and ask him for a wish. David, of course, wants to see his mum again. The mechas recreate Monica from the DNA of her hair, but, unfortunately, she can live only one day. The resurrected Monica and David, along with Teddy, spend an entire day together, doing all sorts of things. When it finally comes time for them to go to sleep, Monica tells David that she loves him. With this knowledge, David himself also goes to sleep, content and happy at last, and for the first time he reaches the world of dreams like a real boy.

BEFORE WATCHING

11 **Answer the questions.**

1. The title of the film is *Artificial Intelligence*. What do you think it refers to? Read the synopsis and check your answer.
2. Can you give a definition of artificial intelligence? What is the difference between virtual reality and artificial intelligence?
3. How do you think the production of mechas in the Cybertronics factory is organised?

WHILE WATCHING

12 **Watch the first sequence of a short videoclip and answer the questions.**

1. What is the family doing?
2. What does David do that a robot shouldn't do?
3. What are the consequences of his actions?
4. David reacted to his brother's provocation. Is it a normal reaction for a robot?

13 **Watch the second sequence and answer the questions.**

Two technicians are repairing David.

1. What do they have to do to the chest bridge?
2. What do they find difficult to locate?
3. What do they have to insert?
4. What devices are all hooked up on one side?

14 **Watch another short extract and answer the following questions.**

1. What is the name of the character?
2. Imagine you want to reproduce the image. Would you use a drawing/painting software or photo editing software. Why?

15 **Look at two images of David inside the mechas factory and answer the questions.**

1. Look at picture 1. What are the mechas like? What are they wearing?
2. What is the face mask like?
3. What do you think David finds out in this scene?
4. Look at picture 2. What is the name of the male model? And the female?
5. What software could have been used to draw the prototypes and simulate their movements?
6. The mechas are produced in an assembly line. What type of industrial software could be used?

AFTER WATCHING

16 **After reading the synopsis and watching the video extracts, find examples of the following in the film and give reasons for your answers.**

➤ *GPS: the amphibicopter definitely has one*

1. Painting and drawing software
2. Photo editing
3. Virtual reality
4. Domotics
5. Industrial software
6. E-learning

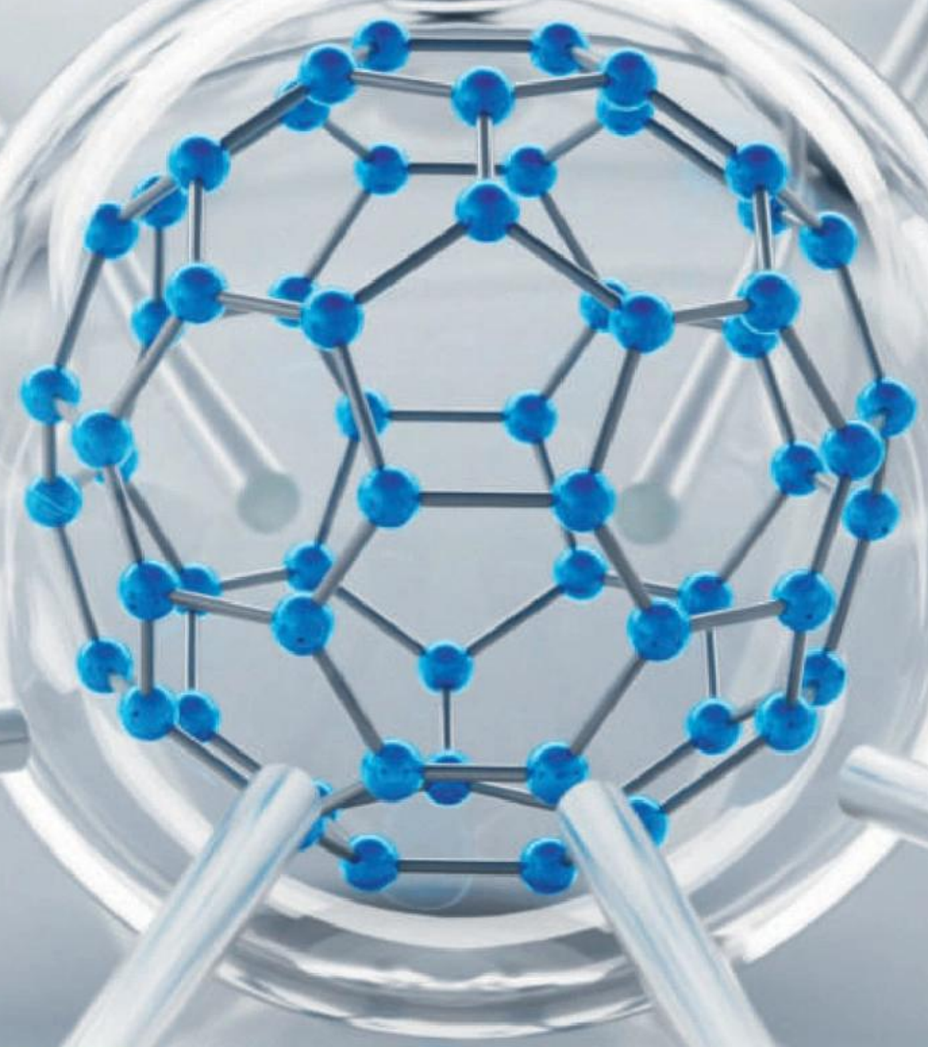
MAPPING YOUR MIND

THE USES OF COMPUTERS

- **Main software**
  - **Word processors**
    - Aim
      - Write and manipulate text documents
  - **Spreadsheets**
    - Aim
      - Display and process data in a structured way
  - **Presentations**
    - Aim
      - Creation of slides in a single document to show something to an audience
  - **Electronic organisers**
    - Aim
      - Write down appointments and things to remember, take notes
    - Types
      - **Calendaring software**
      - **Electronic diary**
      - **Notebook applications**
  - **Databases**
    - Aim
      - Store and search huge amounts of data
    - Types
      - **Non-relational**
        - Can be
          - **Flat-file database**
          - **Network database**
          - **Object-oriented database**
      - **Relational**
- **Graphics software**
  - **Painting software**
    - Creates raster graphics
  - **Drawing software**
    - Creates vector graphics
  - **Photo editing software**
    - Aim
      - Edit and adjust existing digital images and photos
  - **Desktop publishing software**
    - Aim
      - Combine text, images and artwork to produce documents for print or visual consumption
- **Other software programs**
  - **Global Positioning System (GPS)**
    - Aim
      - Pinpoint a geographic position thanks to the satellites in orbit around the Earth
  - **Virtual reality (VR)**
    - Artificial environment created with software and presented as a real one
  - **Videogames**
  - **Website creation**
  - **Domotics**
    - Use of technology to automate private homes and equip them with services to ensure comfort and security
  - **Industrial software**
    - Applications process, methods and functions to help collect, manipulate and manage information on an industrial scale
    - includes
      - **Manufacturing software**
        - Aim
          - Automating production process and planning, stock tracking, allocation of resources, etc.
      - **Robotics**
        - Branch of technology that deals with design, construction, operation and application of robots + computer systems for their control, sensory feedback and information processing
  - **Business software**
    - Software that performs tasks to increase and measure productivity and improve business functions
    - Types
      - **Enterprise software**
      - **Customer Relationship Management (CRM)**
      - **Supply Chain Management System (SCM)**
      - **Coding goods**
        - Barcodes
        - Radio Frequency Identification System (RFID)
        - Quick Response (QR) Code
      - **Payment services**
        - Electronic Point Of Sale (EPOS)
        - Payment Gateways
  - **E-learning**
    - Education or training programs which use electronic devices
- **The new frontiers of ICT**
  - **Industrial applications**
    - **Industry 4.0**
      - Contemporary fourth Industrial Revolution
    - **3D printing**
      - Manufacturing process in which some material is laid down, layer by layer, to form a three-dimensional object from a computer created design
    - **Drone delivery**
      - Unmanned aerial vehicle guided by GPS systems used for distributing packages to consumers during the last mile delivery process
    - **Internet of Things (IoT)**
      - Network of physical objects embedded with sensors, software, and other technologies for the purpose of connecting and exchanging data with other devices and systems over the Internet
  - **Medical uses**
    - **Laser surgery**
      - Surgery that uses special light beams instead of instruments for surgical procedures
    - **Neurotechnology**
      - Integration of technical components with the nervous system
  - **Artificial intelligence**
    - Ability of a computer, or a robot controlled by a computer, to do tasks that are usually done by humans because they require human intelligence
    - Approaches
      - **Symbolic / Top-down**
      - **Connectionist / Bottom-up**
  - **Augmented reality**
    - Integration of digital information with the user's environment in real time

5 MODULE

LINKING COMPUTERS



Unit 5.1 • Communication Networks

- Telecommunications
- Methods of transmission
- Short-region wireless and mobile transmission
- Networks
- Types of networks
- Network topologies
- Communication protocols: the ISO/OSI model
- Communication protocols: TCP/IP

Unit 5.2 • The Internet

- The Internet and its services
- The World Wide Web, websites and web browsers
- Search engines and web search
- Content aggregators
- Cloud computing

Unit 5.3 • Sharing online

- Social networks
- Blogs and online forums
- Audio, video and image sharing
- Collaborative documents and wikis
- Smart TV and streaming
- VoIP and videoconferencing
- Instant messaging and microblogging
- Apps and widgets

ONLINE RESOURCES

- Smartwork

LANGUAGE SKILLS

- Slideshare and other online activities
- Past and future
- Social media

EXTRA FIRST AND IELTS READING PRACTICE

- Ielts, passage 2

LITERARY BITS

- Herbert G. Wells, *The Crystal Egg*

EUCIP CORE SYLLABUS 3.1

- Domain name system (Operate C 4.3)

5.1 COMMUNICATION NETWORKS

TELECOMMUNICATIONS

Telecommunications began with the invention of the electric telegraph in the 19th century, soon becoming one of the fastest growing fields of industry.

Telecommunications over telephone lines is also called point-to-point because it is between one transmitter and one receiver.

Communication and telecommunications

Communicating is the process of sending information from one place to another. When this process of transmission involves significant distances, it is called **telecommunications**.

The objective of telecommunications is to convert the messages that have to be sent into signals that can be transmitted through wires, optical fibres and interplanetary space. A telecommunication system, whether electronic or only electrical consists of some basic blocks or **components**.

Sending messages

In telecommunications, a **message** is transferred along a **channel**, between a **transmitter**, i.e. the **source**, and a **receiver**, i.e. the **destination**. A **transducer**, e.g. a microphone, placed in the transmitter takes the message from the source, e.g. your voice, and translates it into a suitable form which can be transmitted along the communication channel. At the other end, in the receiver, another transducer, e.g. an earphone, delivers a copy of the original message to the destination, e.g. your ear.

The basic structure may be implemented by other components. An **amplifier** can be used to boost the strength of the signal either at the source or at destination; an **encoder** may be employed in the transmitter and a **decoder** in the receiver, to put the signal in the right form for transmission. In fact, before sending the information, the message has to be converted into electrical energy either in the analogue, i.e. continuous, or pulse, i.e. discrete or digital form, in order to be processed by electronic circuits.

megaphone: *megafono*
transceiver: *ricetrasmittente*
transducer: *trasduttore*

Types of telecommunication systems

There are different types of telecommunication systems:

- **Simplex**: a one-way system in which the message can travel only in one direction for a simple operation, e.g. using a megaphone;
- **Duplex**: a two-way system which works both as a transmitter and a receiver, or a **transceiver**. When the two directions are used one at a time, we have a **half-duplex** system as in the case of a walkie-talkie, while telecommunications over the phone are an example of a **full-duplex** system, i.e. in both directions at the same time through a bi-dimensional transmission channel;
- **Broadcast:** a system with one powerful transmitter and many low-power, sensitive receivers, as in radio and television broadcasts.
- **Multiplex:** a system in which multiple transmitters and multiple receivers cooperate and share the same physical channel, as in videoconferencing.

1 Write the name of the corresponding system and an example under each picture.

1.	2.	3.	4.	5.
A → B	A →	A → B ←	A ↔ B C ↔ D	A ↔ B
....	....	..... Walkie-talkie	....	....

2 Read the text and put the headings given below in their correct position.

a. Social impact
b. Society and telecommunications
c. Cultural impact
d. Economic impact

The Impact of Telecommunications on Society

1. ☐ Telecommunications have a significant social, cultural and economic impact on modern society.

2. ☐ Companies have used telecommunications to help build global business empires. In cities throughout the world, home-owners use their telephones to order and arrange a variety of home services. Because of the economic benefits of a good telecommunications infrastructure, there is increasing worry about the inequitable access to telecommunication services by various countries around the world – this is known as the digital divide.

3. ☐ Telecommunications have played a significant role in social relationships. Nevertheless, devices like the telephone system were originally advertised with the emphasis on the practical applications of the device, rather than the social ones. Since then, the role played by telecommunications in social relations has become increasingly important. In recent years the popularity of social networking sites has increased dramatically.

4. ☐ Telecommunications have increased the public's ability to access music and films and have transformed the way people receive their news. In fact, many people now read the news on the Internet and on social networks.

3 Complete the sentences with words from the previous text.

1. ..... have helped build global business empires.

2. .... means an unequal access to telecommunication services by various countries around the world.

3. The ..... played by telecommunications in social relations has become ..... important.

4. In recent years, the popularity of social networking sites has ..... dramatically.

5. Telecommunications have also transformed the ..... people receive their news, in fact many people now read the news on the Internet or on social .....

6. Telecommunications have a significant ..... on modern society.

7. Thanks to telecommunications, companies have built global business .....

8. Telecommunications have produced economic .....

METHODS OF TRANSMISSION

The size of a block can vary from a few bytes up to about 5,000 bytes.

In general, the size of a character is 8 bits, to which a parity bit is added, i.e. a start and stop bit that gives the total of 10 bits. For this reason, a clock for synchronisation is not required, in fact the parity bits tell the receiver how to interpret the data.

congestion: *congestione*
delay: *ritardo*
path: *percorso*
reliable: *affidabile*

Data can be transmitted point-to-point, i.e. directly from one transmitter to a receiver, or through a network such as the Internet.

Point-to point transmission

Point-to-point transmission can be synchronous or asynchronous.

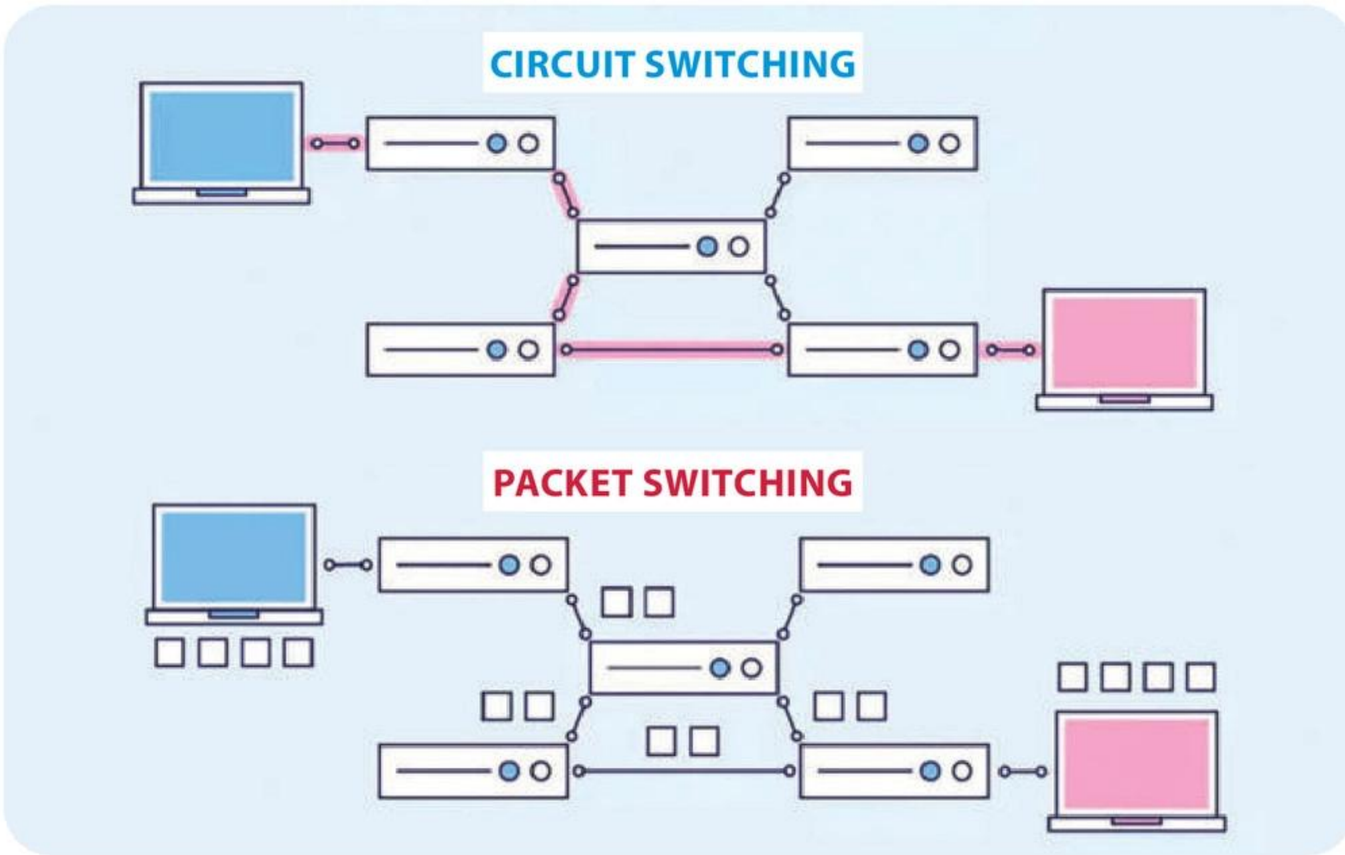
- In **synchronous transmission**, data flows in a full-duplex mode in the form of blocks or frames. This requires synchronisation between the sender and the receiver, so that the sender knows where the new byte starts since there is no gap between the data. Synchronisation is achieved with the use of a clock which is embedded in the data stream encoding or provided on separate clock lines. Synchronous transmission is efficient, reliable, and is used to transfer large amounts of data. It provides real-time communication between connected devices. Some examples of synchronous transmission are: chat rooms, videoconferences and phone conversations, which all resemble a face-to-face conversation using electronic devices.
- In **asynchronous transmission,** data flows in a half-duplex mode, i.e. one byte or a character at a time and data is transmitted in a continuous stream of bytes. Asynchronous transmission is simpler, cheaper and used for transmitting a small amount of data, and it does not take place in real time. Some examples are: emails, message boards and forums.

Both synchronous and asynchronous transmission have their advantages and disadvantages and are necessary for data transmission.

Network transmission

When data travels inside a network, this may happen through circuit switching or packet switching.

- In **circuit switching networks**, a dedicated channel has to be established between users before the sending of a message. The channel is reserved between the users until the connection is active. For half-duplex communication, one channel is allocated and for full-duplex communication, two channels are allocated. It is mainly used for voice communication which requires real-time without much delay, such as with videocalls.
- In **packet switching networks**, it is not necessary to establish an initial point-to-point connection. The connection, or channel, is available to many users. However, when the number of users increases, this will lead to a congestion in the network. Packet switching is mainly used for data and voice applications which do not require real-time connections, as for example when sending an email with a series of attachments. The message is broken into small packets which can travel independently in the network following different routes. When they reach their destination, they are assembled to form the original message that gradually appears on screen.



4 Answer the questions.

1. Which data transmission modes are used in synchronous and asynchronous transmission?
2. When is a clock needed? What for?
3. What are the advantages of synchronous transmission? And of asynchronous transmission?
4. What is the difference between circuit switching and packet switching as regards the channel/s?
5. What happens with circuit switching before the actual sending of the message?
6. How do packets travel in packet switching?

5 Use the table to compare synchronous and asynchronous transmission.

Characteristics	Synchronous	Asynchronous
How data is transmitted	Blocks or frames	One byte or character at a time
Transmission speed	Fast	Slow
Cost	Expensive	Cheap
Time interval	Constant	Random
Gap between the data	Absent	Present
Examples	Videoconferences, phone conversations	Emails, forums

6 (5.1) Listen to a lecture on packet switching and complete the text with the missing words.

Packet Switching

Every web page that you receive comes as a series of **1.** ....., and every e-mail you send leaves as a series of packets. Each packet carries the information that will help it get to its destination: the sender's IP address, the intended receiver's IP address, something that tells the **2.** ..... how many packets this e-mail message has been broken into and the number of each particular packet. Each packet is then sent off to its destination by the best available **3.** ....., i.e. a path that might be taken by all the other packets in the message or by none of the other packets in the message. This makes the network more efficient. Depending on the type of network, packets may be referred to by another name: frame, **4.** ....., cell or segment. Most network packets are split into three parts:

Header - The header contains **5.** ..... about the data carried by the packet. These instructions may include:

- Length of packet;
- **6.** .....;

- Packet number;
- **7.** ..... (on networks that carry multiple types of information, it defines what type of packet is being transmitted: e-mail, web page, streaming video)
- Destination address;
- **8.** ..... address.

Payload - Also called the body or **9.** ..... of a packet. This is the actual data that the packet is delivering to the destination.

Trailer - Sometimes called the footer, it typically contains a couple of **10.** ..... that tell the receiving device that it has reached the end of the packet. It may also have some type of error checking.

Adapted from: *http://computer.howstuffworks.com/question525.htm*

SHORT-REGION WIRELESS AND MOBILE TRANSMISSION

Two other types of short-region wireless transmission mode are UWB, especially used to reduce interference, and ZigBee, used for remote control devices.

Where does the name Bluetooth come from?

Other forms of transmission are short-region wireless transmission and mobile transmission.

Short-region wireless transmission

Short-region wireless transmission refers to the technology that allows communication wirelessly within a smaller diameter region. The most common short-region wireless transmission modes are Wi-Fi and Bluetooth.

- **Wi-Fi** is a technology that enables electronic devices to connect to local networks through radio waves. The basic components of a Wi-Fi network include a Wi-Fi connection point, a network member, and a structure station. A basic service set (BSS) is the most basic part of the network. It can be composed of two simple stations, and the station is dynamically associated with the BSS. A distribution system (DS) connects different BSSs. An access point (AP) can be used as a station and access to the DS.

- **Bluetooth** technology is a universal wireless sensor technology that can enable voice or data communication between multiple communication devices using radio signals over short distances. Two or more Bluetooth devices can communicate when paired successfully, replacing cable connections on existing digital devices.

Mobile transmission

Nowadays, the most commonly used methods of mobile transmission are LTE, HSDPA, HSPA+ and 5G NR.

- **Long-Term Evolution (LTE)** is a standard for wireless broadband communication for mobile devices and data terminals. However, because LTE frequencies and bands differ from country to country, only multi-band phones can use LTE.

- **HSDPA (High-Speed Downlink Packet Access)** is a packet-based mobile telephony protocol used in 3G Universal Mobile Telecommunication Service (UMTS) radio networks to increase data capacity and speed up download rates. It offers a maximum theoretical download rate of 14.4 MBPS and simultaneous downloads, uploads and voice. As an improved cellular radio standard, it is also called 3G+.
- HSDPA has evolved into **HSPA+**. Due to its high speed and features, HSPA+ is erroneously classified as a 4G standard, but it is still based on 3G standards.
- Though it relies on wireless data transmission, the 5th generation, called **5G New Radio (5G NR)** is a completely new standard.

7 Decide if the statements are true or false.

	T	F
1. Wi-Fi connection uses radio waves.	☐	☐
2. Bluetooth communication takes place between two previously paired devices.	☐	☐
3. LTE is a universal standard for wireless broadband communication.	☐	☐
4. HSPA is an evolution of HSDPA.	☐	☐
5. HSPA uses 4G technology.	☐	☐
6. The 5th generation is an evolution of HSDPA and HSPA.	☐	☐

8 Complete the text with the words given below.

coverage • hackers • Internet • name • password • radio • router • term

Wi-Fi Networks

A Wi-Fi network is simply an **1.** ..... connection that's shared with multiple devices in a home or business via a wireless **2.** ..... The router is connected directly to your Internet modem and acts as a hub to broadcast the Internet signal to all your Wi-Fi enabled devices. This gives you flexibility to stay connected to the Internet as long as you're within your network **3.** ..... area. Ironically, Wi-Fi doesn't stand for anything. Wi-Fi, often referred to as WiFi, wifi, wi-fi or wi fi, is often thought to be short for Wireless Fidelity but there is no such thing. The **4.** ..... was created by a marketing firm because the wireless industry was looking for a user-friendly name to refer to some not so user-friendly technology known as IEEE 802.11. And the **5.** ..... stuck.

Wi-Fi uses **6.** ..... waves to transmit data from your wireless router to your Wi-Fi enabled devices like your TV, smartphone, tablet and computer. Because they communicate with each other over airwaves, your devices and personal information can become vulnerable to **7.** ....., cyber-attacks and other threats. This is especially true when you connect to a public Wi-Fi network at places like a coffee shop or airport. When possible, it's best to connect to a wireless network that is **8.** .....-protected or a personal hotspot.

Adapted from: *https://www.verizon.com/info/definitions/wifi/*

9 Watch the video on 4G and 5G and complete the table.

▶ 4G vs. 5G: What's the Difference? *posted by* Eye on Tech

Main differences between 4G and 5G		
	4G	5G
Latency		1 millisecond
Download speeds	1 Gb/s	
Base stations		
Cell density	//	
OFDM encoding	20 MHz channel	
Virtualisation		

NETWORKS

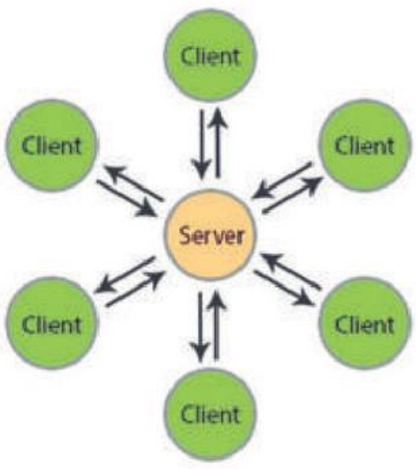
With a basic hub, all the computers connect to it and the speed of the network is defined by the slowest network card connected.

A switch treats each network card independently.

A **network** is a number of computers that are linked together so that they are able to share resources, software, data and even a connection to the Internet. This means that devices such as printers and scanners can be shared between all the computers in the network or they can share an Internet link that will allow all the computers access at the same time.

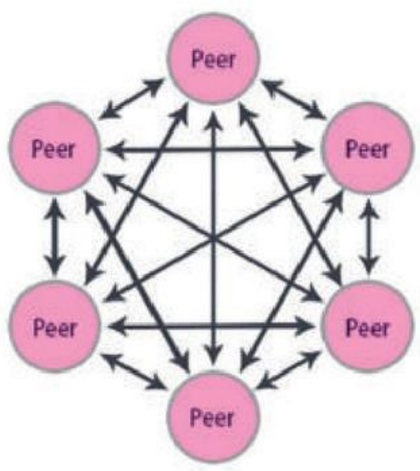
■ Peer-to-peer and client-server networks

Networks may be classified according to the way in which they operate. There are two ways of operating a network: **peer-to-peer** and **client-server**.



Client / Server

Peer-to-peer networks	Client-server networks
• All the computers have equal status. • All the computers can share each other's resources. • They are only suitable for small networks. • Only very basic knowledge is needed to set up and use one. • As more people use the network, the whole network slows down.	• One more powerful computer, called the **server**, which is in control of the network, is used to store the data and programs needed by the whole network. • Software and data are stored on the server, so it can be accessed by all the computers on the network. • The network is totally dependent on the server; if this breaks down, the network cannot be used. • They are the popular choice for networks that need many computers.



Peer To Peer

■ Network components

Networks need a medium through which the data signals can travel from one computer to another, and these media can be metal wires, fibre optic cables or a wireless connection.

In order to connect to the network, a computer must be equipped with a network card or adaptor called a **network interface card (NIC)** which prepares the data to be sent over the network.

Some other network components are:

- **Hub** – a small, simple, inexpensive device that joins several cables into a single output and which is equipped with small holes called **ports**. The common standard for hardware connectivity is **ethernet**;
- **Router** – a device that acts as the central point between computers and wired or wireless networks in order to pick the right path for communication traffic. As an alternative, there is a **broadband router** for home networks with a high-speed cable modem or DSL Internet service;
- **Network switch** – like a hub, it joins multiple computers in a network, but is more intelligent. It allows the network to be divided into independent segments which look at each packet of data reducing the amount of data travelling;
- **Bridge** – helps filter data traffic at a network boundary by dividing the network into two segments and deciding whether to forward or discard incoming data;
- **Repeater** – regenerates incoming signals because the quality degrades with distance via ethernet;
- **Gateway** – a passage to connect two networks which belong to different networking types.

ONLINE RESOURCES

• Smartwork

boundary: *confine*

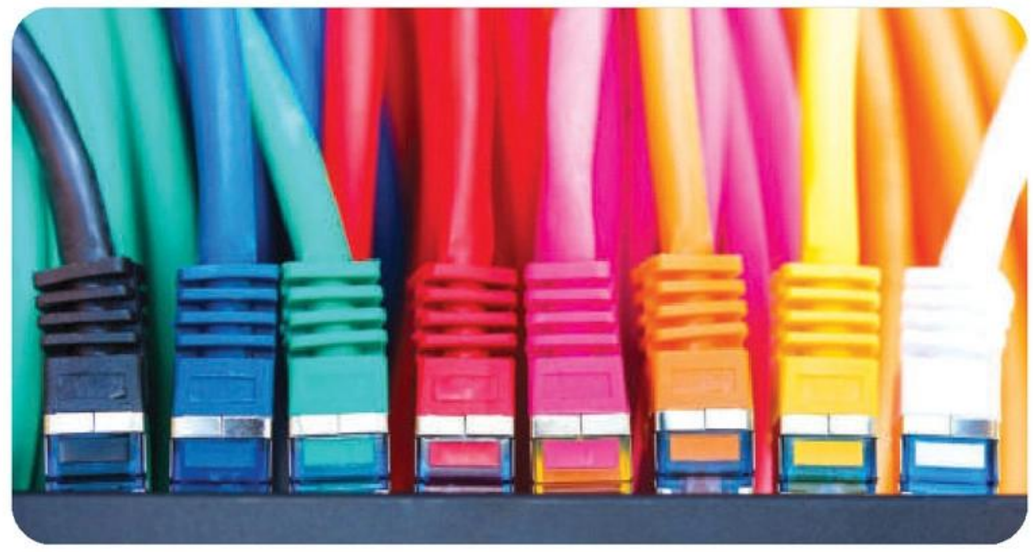
10 Decide if these statements refer to a peer-to-peer (P2P) or client-server network (CSN).

1. All the computers have equal status. ☐
2. One more powerful computer looks after the running of the network. ☐
3. The computers are connected to the Internet without using a server. ☐
4. It allows easy file sharing and can be used for illegal downloads of resources. ☐
5. The clients request services such as access, printing or storage from the server. ☐
6. It is a better organised network and runs faster. ☐
7. It is slow because computers can be working as workstations and communication devices at the same time. ☐
8. It is only suitable for small networks. ☐

11 Match each component with its function.

NIC • hub • router • switch • bridge • repeater • gateway

1. It connects channels together and divides a network into separate segments. .....
2. It connects two different networks. .....
3. It connects several cables to a single output. .....
4. It directs signals to the correct destination. .....
5. It improves the quality of degraded signals. .....



6. It inspects incoming traffic. .....
7. It provides the connection between the computer and the network cables. .....

12 Complete the text with the words given below.

backed up • cheaper • easier • expensive • faster • hackers • hardware • manager • quick • security • shared • store • whole

Pros and Cons of Networks

PROS

1. Peripherals such as printers and scanners can be ..... among different computers.
2. ..... can be shared among different users; it is ..... to install and ..... to maintain and upgrade.
3. ..... is improved with the use of passwords and the work is .....
4. Communication and the transfer of files across the network is very .....
5. Communication across the network is ..... than buying software for each stand-alone computer.
6. Users have access to a central ..... of data.

CONS

1. Cables and servers can be ..... to install and replace.
2. A fault with the server will prevent the ..... network from working.
3. A network ..... is needed and can be expensive.
4. Networks are vulnerable to viruses or .....

TYPES OF NETWORKS

In the 1960s, large colleges and universities had the first LANs.

A service provider is usually needed to connect the LAN nodes using private communication lines, fibre optics or wireless technology.

The Internet itself is a WAN.

Apart from the basic distinction between peer-to-peer and client-server, computer networks can also be classified according to their size. They are identified by acronyms and the most common types are LAN and WAN.

PAN	Personal Area Network	For data transmission among devices such as computers, tablets, smartphones, etc., belonging to the same person, at an average range of about 10 metres. The connection can be wireless.
HAN	Home Area Network	It links home devices, with cables or wireless.
LAN	Local Area Network	It operates within a limited geographical area, usually the same building, with cables, wireless, infrared or microwave links. It is controlled privately by a local administrator. It provides full time connectivity to local services and allows multi-access to high-bandwith media.
SAN	Storage Area Network	A group of storage devices connected to a server. It is a dedicated, high-performance network which avoids any traffic conflict between clients and servers. It guarantees high-speed connectivity between a server and storage resources and vice versa. SANs have disaster tolerance built in, in order to protect data in case of natural disasters or hackers' attacks.
CAN	Campus Area Network	Used to link devices in a limited area, such as a university campus or military base.
MAN	Metropolitan Area Network	A data network designed for a city or suburban area. It usually consists of two or more LANs in a common geographical area.
WAN	Wide Area Network	It covers a large area, between cities, countries and continents. It connects LANs to each other. Computers are connected by high-speed telephone lines, fibre optical cables, microwave and satellite links.
GAN	Global Area Network	The network extends all over the world and includes: the Internet, University and Research networks, and military networks.

Virtual Private Network

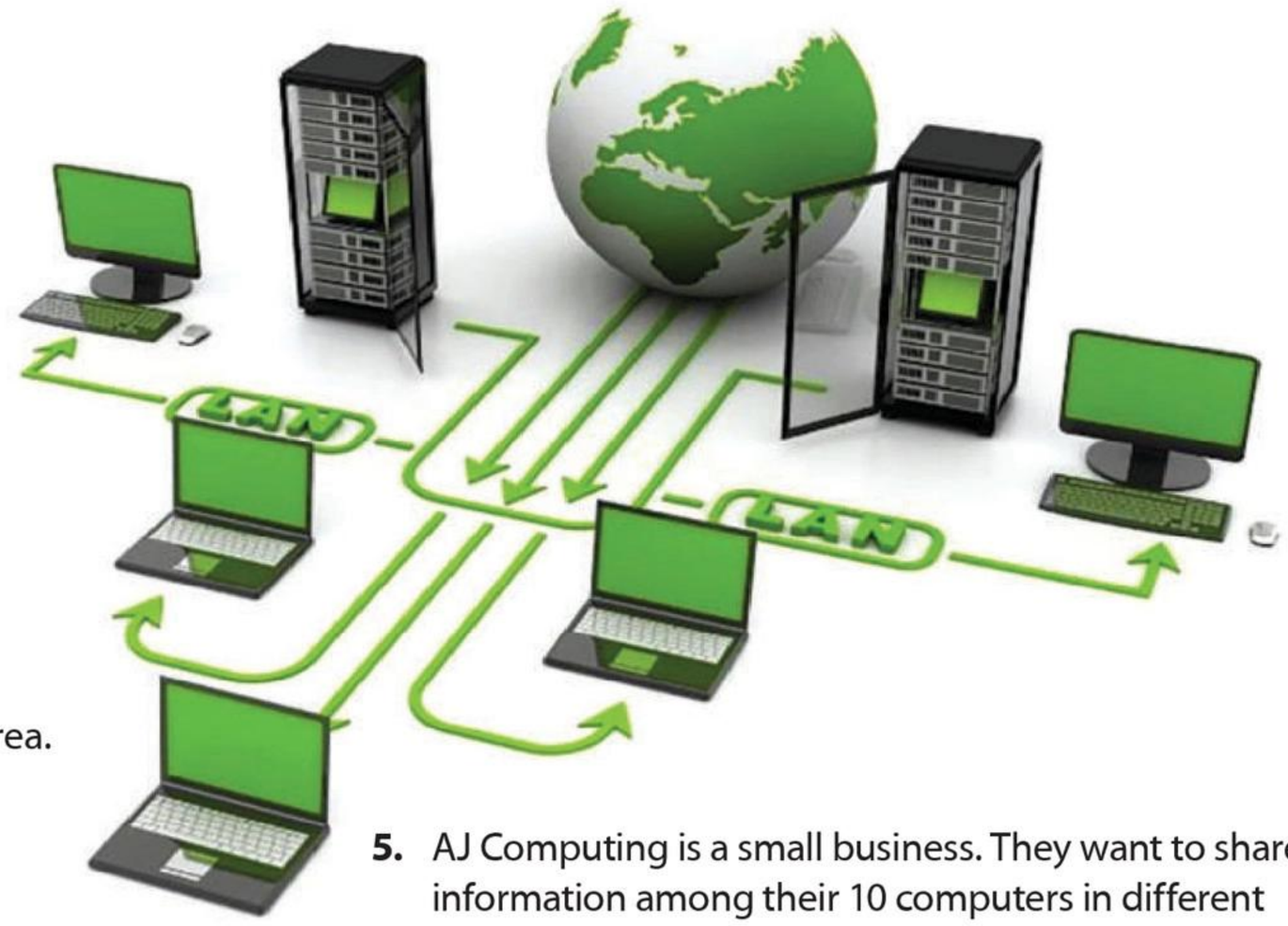
A Virtual Private Network (VPN), which is the most cost-effective method to establish a point-to-point connection between remote users and a company's network, is a private network which is set up online using the Internet as a method of connection.

There are three main types of VPNs:

- **Intranet VPNs**: to link subsidiaries or branches to a company's internal network through a dedicated connection and with access granted only to the company's employees;
- **Extranet VPNs**: to link people external to the company and to whom access is granted, to a company's internal network through a dedicated connection;
- **Access VPNs**: to provide remote access to the company's Intranet or Extranet, from home or from a small office.

13 **Choose the best answer for each question.**

1. What are the three most common types of network?
   - **a.** LAN, SAN, GAN
   - **b.** LAN, WAN, MAN
   - **c.** LAN, CAN, MAN
   - **d.** PAN, MAN, WAN
2. A possible definition of LAN is...
   - **a.** connected devices that share the resources of a single processor or server within a small geographic area.
   - **b.** something normally found in schools and businesses.
   - **c.** computers that share resources over a large area.
   - **d.** computers that share a storage device.
3. Which of the following types of networks has been arranged according to their size, from the largest to the smallest?
   - **a.** LAN, WAN, MAN
   - **b.** WAN, LAN, MAN
   - **c.** MAN, LAN, WAN
   - **d.** WAN, MAN, LAN
4. What type of network is the Internet?
   - **a.** LAN
   - **b.** WAN
   - **c.** MAN
   - **d.** GAN



5. AJ Computing is a small business. They want to share information among their 10 computers in different offices in the same building and have a central printing area. What type or network would be best for them?
   - **a.** MAN **b.** LAN **c.** WAN **d.** SAN
6. You work for a company that builds computer networks. You are asked to work on a project to build a MAN. Where is the project likely to take place?
   - **a.** In a university or college.
   - **b.** In a private home.
   - **c.** In a company's headquarters.
   - **d.** In a big city.

14 (5.2) **Listen to an extract about the advantages of a VPN and complete the summary.**

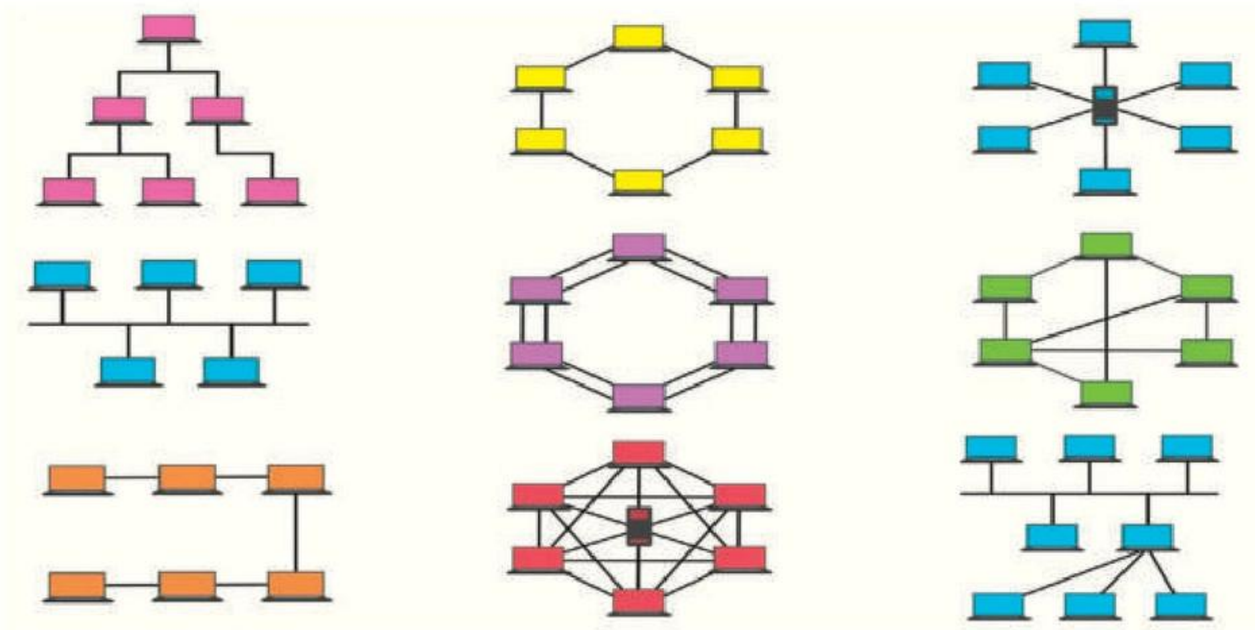
What Are the Advantages and Benefits of a VPN?

VPNs offer several advantages, especially for **1.** .....The two main advantages for organisations are: **2.** ....., and network scalability. The benefit for clients is **3.** .....

- **Cost savings:** a. eliminating expensive long-distance leased lines, b. reducing **4.** ....telephone charges, c. offloading support costs. VPNs use much cheaper local leased lines or **5.** .... to a nearby ISP. A VPN can also replace **6.** .... and long-distance dial-up network connections. The cost of maintenance can be outsourced to professional **7.** .... service providers.
- **Network scalability:** The cost of building dedicated private networks increases **8.** ..... as the organisation grows. Internet-based VPNs avoid scalability problems by tapping into **9.** ....
- **Using a VPN:** Clients must possess appropriate **10.** .... or hardware support. VPNs also work well with **11.** ..... LANs.
- **Limitations:** a. a detailed understanding of network security, b. reliability and **12.** .... are not under the organisation's **13.** ....., c. problems of **14.** .....due to VPN technology standards.

15 PAIR WORK **Discuss the different uses of LANs and WANs, their advantages and disadvantages. Use the Internet to find the information you need.**

NETWORK TOPOLOGIES



While the *physical topology* represents the actual layout of the wire or media, the *logical topology* represents how the host communicates across the medium.

To prevent collisions on a bus network, a set of rules can be used. An example of one of these sets of rules is CSMA/CD: If the bus is quiet, then transmit. If the bus is busy, listen until it is quiet, then transmit immediately.

This topology is widely used at a logical level.

A **network topology** is the actual layout of the links connecting pairs of **nodes**, i.e. computers and other electronic devices, in a network. A given node has one or more links to others, and the links can appear in a variety of different shapes.

The simplest connection is **point-to-point**, which is a dedicated link between two endpoints. It can be a one-way link, or a two-way communication when a return link is added.

Physical topologies

Physical topologies include:

- **Line** or **line bus**. Data is sent to all the nodes at the same time. The devices are positioned along a line and each device has equal status. It is cheap and reliable.
- **Bus.** The workstations are connected with a shared communication cable or line called **backbone.** Data travels in both directions, which can lead to collision. At either end, there is a **terminator** which absorbs signals so they do not reflect back down the line. It is the simplest way to connect multiple clients because it is easy and quick to set up, cheap to implement because it requires few cables, and because extra devices can be added easily; however, a cable break can disable the entire network.
- **Star.** The workstations are attached to a **central switch** or **hub** which acts as a router to transmit messages and which is connected to a server. It is easy to implement and extend, well-suited for temporary networks as the failure of a non-central node will not affect the functionality of the network, and there are no problems of data collision since each station has its own cable to the hub. However, it uses a lot of cabling, is expensive, and the failure of the central node can disable the entire network.
- **Ring.** Each node is connected to two other nodes so as to create a ring. It is a peer-to-peer network with no central hub. It is not very efficient because data passes through each computer before reaching its destination. Unfortunately, if one of the nodes breaks down, the entire network will also break down. The advantage is that no terminators are needed.
- **Tree** or **star bus.** A combination of the star and bus network for more versatility. Nodes in particular areas are connected along the backbone, while stars are nested with other stars. A computer which is out of order does not affect the others, but if one of the hubs goes down, the whole network also does.
- **Mesh.** Messages can take any of several possible routes from source to destination. The Internet and some other WANs use it. In a **full mesh** or **fully connected** topology, all devices are connected to each other, while in a **partially connected** one certain nodes are connected to one other node, while others are connected to two or more with a point-to-point link.

Logical topology

Logical topology defines how data travels in the network. The most common logical topologies are the bus and the ring topology. Under a bus topology a node broadcasts the data to the entire network. In a ring topology, only one node can be allowed to transfer the data in a network at a given time.

to affect: *influenzare*
to be nested: *essere nidificato*
branch: *ramo*

16 **Match each description with the appropriate network topology.**

Description	Name
1. All devices are connected to a main central node or server. The other nodes, i.e. any connection point, are connected to it and to each other through a switch or a hub.	
2. All devices are connected to a central cable, called backbone. There are more than two endpoints which are created by adding branches to the main section. If data is being sent between nodes, the others cannot transmit.	
3. All devices are connected to one another to form a round shape. Each device is connected directly to two other devices, one on either side of it.	
4. All the nodes of the network are connected to a common transmission medium with exactly two endpoints. The data transmitted is received simultaneously by all the nodes in the network.	
5. There is a direct link between all pairs of nodes. There are multiple paths for data provided by a large number of redundant links between nodes.	
6. There are redundant interconnections between network nodes. Every node has a connection to at least another node in the network.	
7. A hybrid type in which groups of star networks are connected to a linear backbone.	

17 **Decide if these topologies are peer-to-peer (P2P) or client-server (CS).**

1. Ring ☐ **3.** Star ☐ **5.** Line ☐ **7.** Bus ☐

2. Mesh ☐ **4.** Fully connected ☐ **6.** Tree ☐ **8.** Point to point ☐

18 (5.3) **Listen to an extract on logical topology and complete the table.**

Logical topology

1. .....

Principle: .....

Example: .....

2. .....

How it works: .....

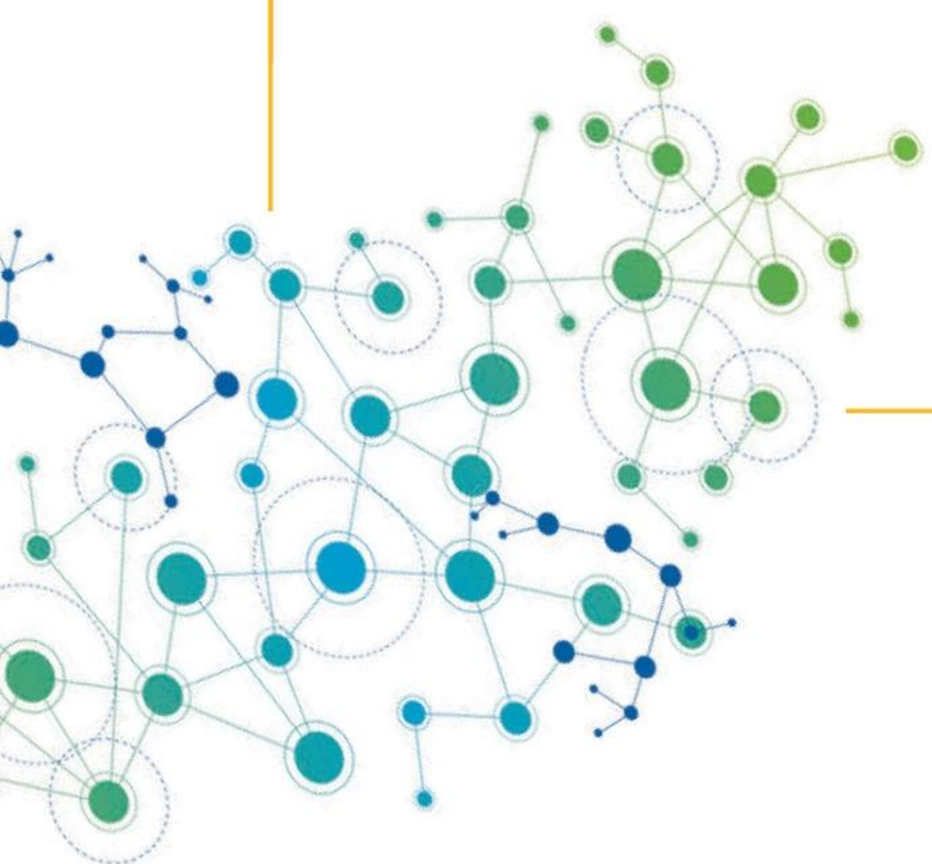
Examples: .....

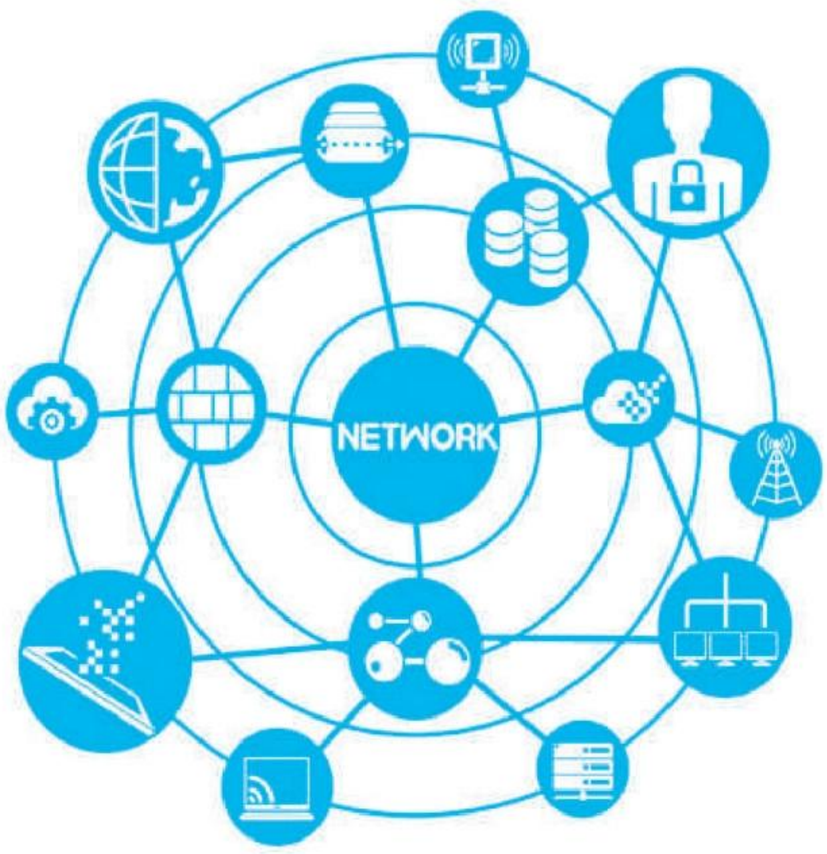
.....

Differences between the two systems:

.....

.....





COMMUNICATION PROTOCOLS: THE ISO/OSI MODEL

The ISO/OSI is a very precise model which clearly distinguishes between services, interfaces and protocols. The model supports both online and off-line services.

Each layer of the ISO/OSI system includes a set of protocols.

A **communication protocol** is a description of the rules that computers must follow in order to communicate with each other and to send data packets over a network.

The **Open System Interconnection (OSI)** is a theoretical model developed by the **International Organisation of Standardisation (ISO)** to ensure national and worldwide communication through the use of compatible systems. Commonly known as the **OSI** or **ISO/OSI model**, it consists of 7 layers, each one with its own specific function, which together form a complete communication system, starting from level 1 at the bottom.

Lower layers

- **Layer 1: physical layer.** It is the lowest layer and it activates, maintains and deactivates the physical connection. It is responsible for the transmission and reception of unstructured raw data over the network. It converts digital and analogue bits into electrical or optical signals and is responsible for data encoding.
- **Layer 2: data link layer**. It synchronises the information which is to be transmitted over the physical layer. It ensures that data transmission is error free and manages the transmission and reception of data frames sequentially. It also sends and expects acknowledgements for frames received or sent.
- **Layer 3: network layer**. It routes the signal through different channels and from one node to another and decides which route should be taken. It divides the messages into packets and assembles the incoming packets into messages for the higher levels.

Upper layers

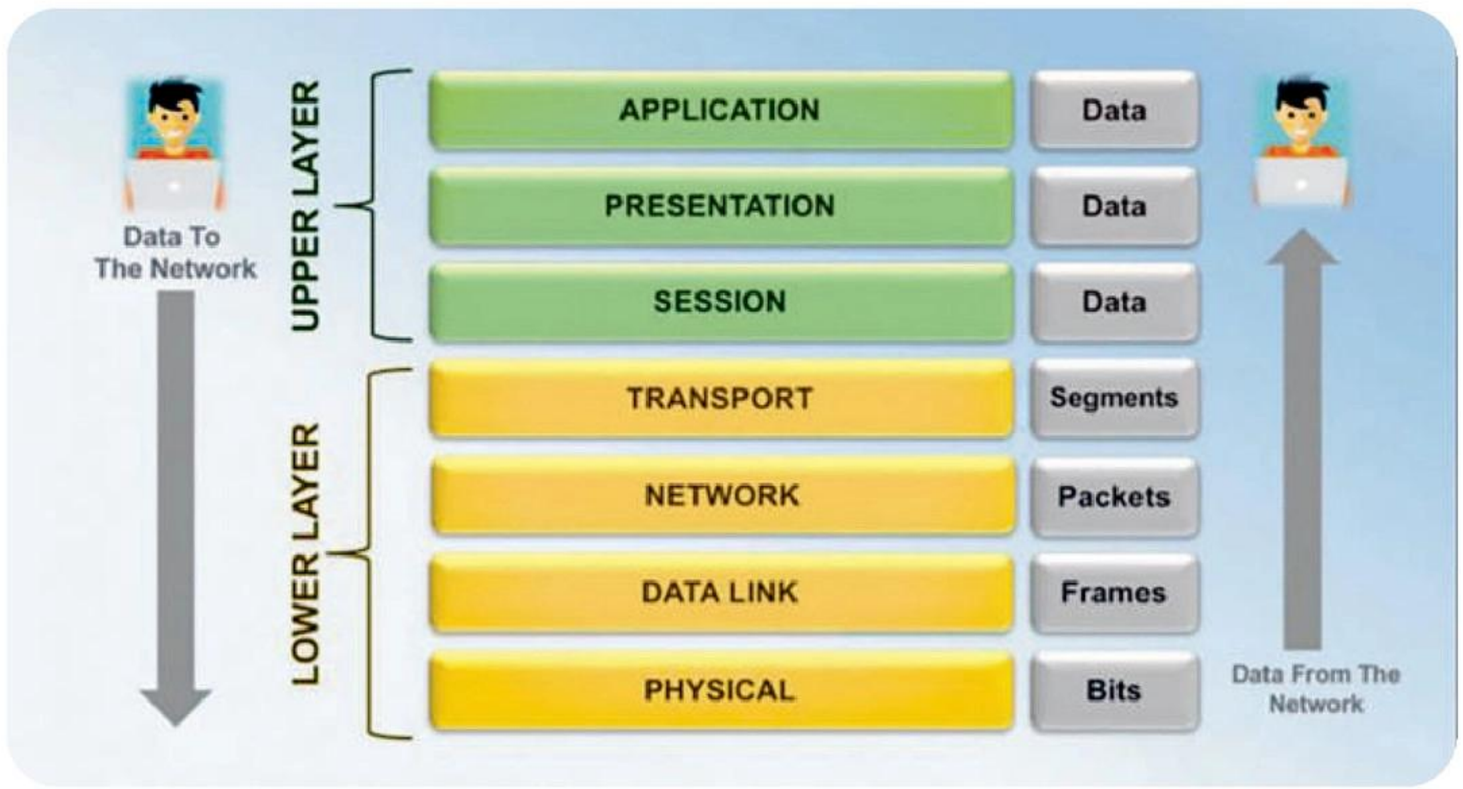
- **Layer 4: transport layer.** It decides if data transmission should be on a parallel or single path. It receives messages from the session layer, converts them into smaller units and passes them to the network layer. This level can be very complex, depending on the network requirements.
- **Layer 5: session layer**. It manages and synchronises the conversation between two different applications. Streams of data are marked and resynchronised properly, so that the messages are not cut prematurely and data loss is avoided.
- **Layer 6: presentation layer**. It ensures that the data is sent in such a way that the receiver will understand the information and will be able to use the data. When it receives data, it transforms it for the application layer, in other words it acts as a translator. It also performs data compression and encryption.
- **Layer 7: application layer**. It is the topmost layer. It provides mail services, directory services and network resources. It mainly holds application programs.

acknowledgment: *conferma*

19 Find out which layer corresponds to these functions.

Function	Layer No.	Layer name
Provision of cables or physical characteristics of the network media.		
End-to-end delivery of packets through a parallel or single path transmission.		
End user services provided by application programs, such as web browsing, e-mail, audio and video applications.		
Management of sessions between nodes and data flow from higher layers to lower layers and proper resynchronisation of messages to prevent data loss.		
Routing of the packets across a given network.		
Standardisation of data presentation, such as handling data syntax, problems and file compression.		
Transmission and reception of packets through the physical link.		

20 Look at the picture and complete the text. How does communication with the ISO/OSI model take place?



Imagine that user A, called layer 8, wants to send an e-mail to user B. So, he uses a program to write the e-mail and sends data at the application level. Then, data travels through the **1.** ..... and **2.** ..... layer. Next, data becomes segments in the **3.** ..... layer and are sent to the network layer to become **4.** ..... or **5.** .....Then, packets go to the **6.** ..... layer and become frames or **7.** ..... and then become bits in the **8.** ..... layer. After that, a **9.** .... or medium, called layer 0, sends the bits to the physical layer or user B. Then, the bits travel up all the **10.** ..... of user B and undergo all the transformations until they are data that can be read by user B, i.e. layer 8.

COMMUNICATION PROTOCOLS: TCP/IP

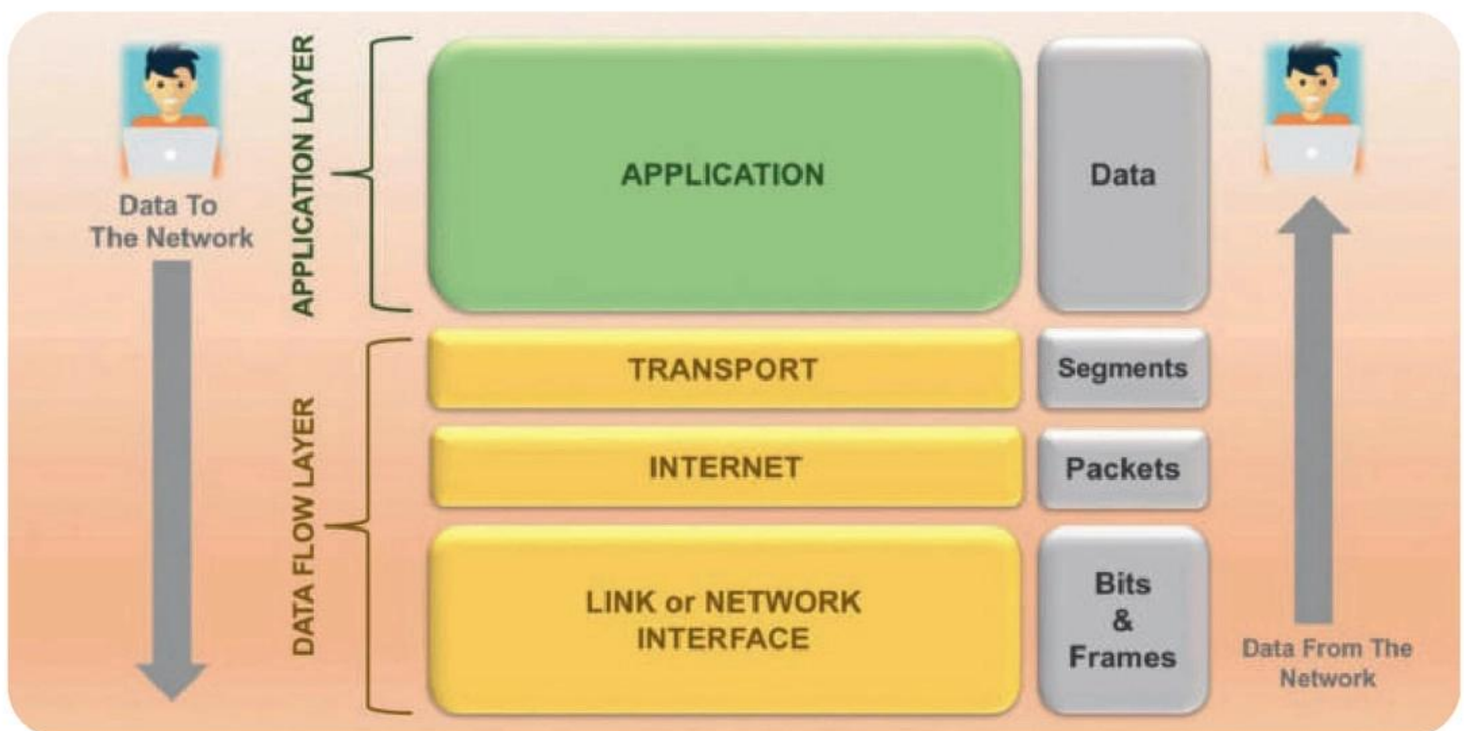
TCP/IP refers to a whole Internet Protocol Suite which is a conceptual model and a set of communication protocols used on the Internet and similar computer networks.

The TCP/IP model is an implementation of the ISO/OSI. In fact, the ISO/OSI first developed the layers, but without defining the protocols. Then, TCP/IP implemented the model with the protocols and later changed the layers. TCP/IP is more popular because it uses better technology and because it was chosen by universities.

While the traditional 4-layer model is still used, there is an updated model with 5 layers: application, transport, network, data-link and physical.

TCP/IP is the communication protocol for communication between computers on the Internet. It stands for **Transmission Control Protocol/Internet Protocol**. It defines how electronic devices should be connected to the Internet and how data should be transmitted between them.

- **TCP** has a fixed connection and is used for communication between different applications. If one application wants to communicate with another via TCP, it sends a communication request to an exact address. After a request of password for granting access between the two applications, TCP will set up a full-duplex communication between the two applications to occupy the communication line between the two computers until it is closed by one of the applications.
- **IP** is used for communication between computers. It is a connectionless communication protocol: it does not occupy the communication line between two computers and reduces the need for network lines. Each line can be used for communication between many different computers at the same time. With IP, data is broken up into small independent packets and sent between computers via the Internet.



- **TCP/IP** is TCP and IP working together. TCP takes care of the communication between the application software, i.e. the browser and network software, while IP is responsible for sending the packets to the correct destination.

The layers

The TCP/IP model is organised into four layers and each layer has a particular function. The communication process that takes place between two computers goes from layer 4 to 1, passing through 3 and 2, and the information sent arrives to the second system from layer 1 to 4, passing through 2 and 3.

- **Layer 4: application layer**. It provides network services to applications. The most important protocols are: HyperText Transfer Protocol (HTTP), Simple Mail Transport Protocol (SMTP) and File Transfer Protocol (FTP).
- **Layer 3: transport layer**. It is responsible for data transmission. The two main protocols are: Transmission Control Protocol (TCP) and User Datagram Protocol (UDP). While TCP guarantees that the proper data transfer will take place, UDP just sends the data without carrying out any checks.
- **Layer 2: Internet layer**. It accepts and delivers packets for the network. The layer includes the powerful Internet Protocol (IP) which describes a packet that contains a source IP address, a destination IP address and the actual data to be delivered.
- **Layer 1: network access layer**. It takes care of the encapsulation of the IP packets into frames for transmission, the mapping of IP addresses to physical hardware addresses (MAC Addresses, i.e. the address of the NIC), and the physical transmission of data.

21 **Complete this summary with the missing expressions.**

TCP/IP is the protocol for communication between **1.** ..... It stands for **2.** ..... TCP/IP defines how computers should be **3.** ..... and how data should be transmitted between them. If one application wants to communicate with another via TCP, it sends **4.** ..... to an exact address. After a contact between the two applications, TCP will set up a **5.** .....; this will occupy the communication line until it is closed by **6.** ..... IP is used for communication **7.** ..... It is a connectionless communication protocol and each line can be used by many different computers **8.** ..... TCP takes care of communication between **9.** ..... software, while IP takes care of the communication with other **10.** .....

22 **Look at the table and compare the ISO/OSI and the TCP/IP models. Refer to the number of layers, names, functions, etc.**

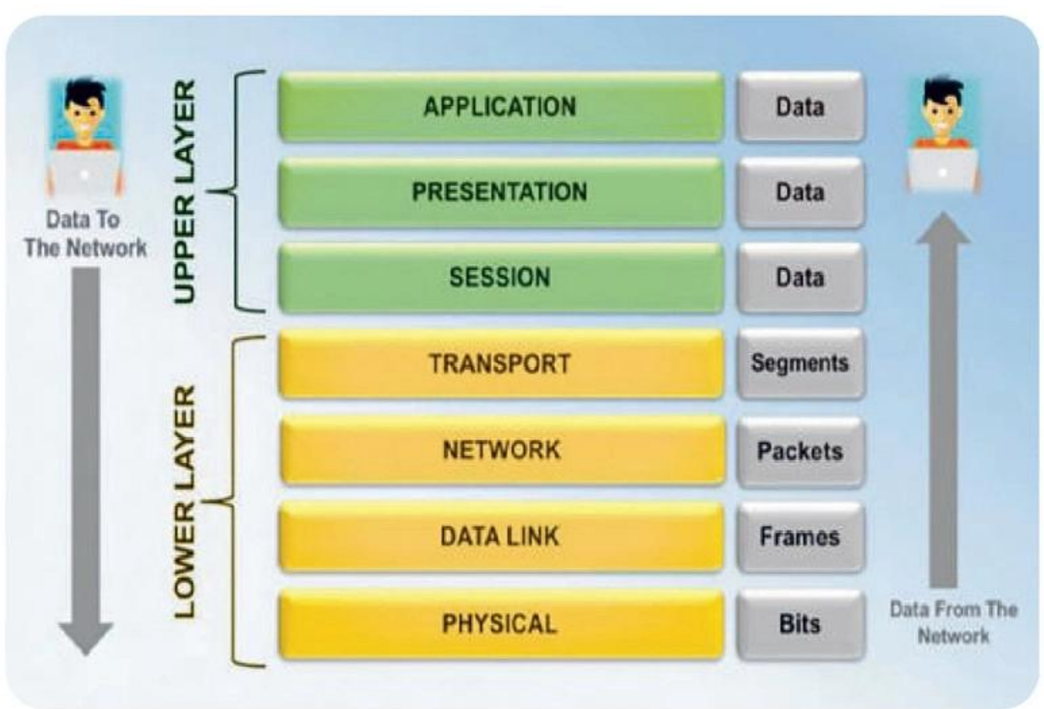
23 (5.4) **Listen to a short extract and find out why the TCP/IP model is more popular than the ISO/OSI one.**

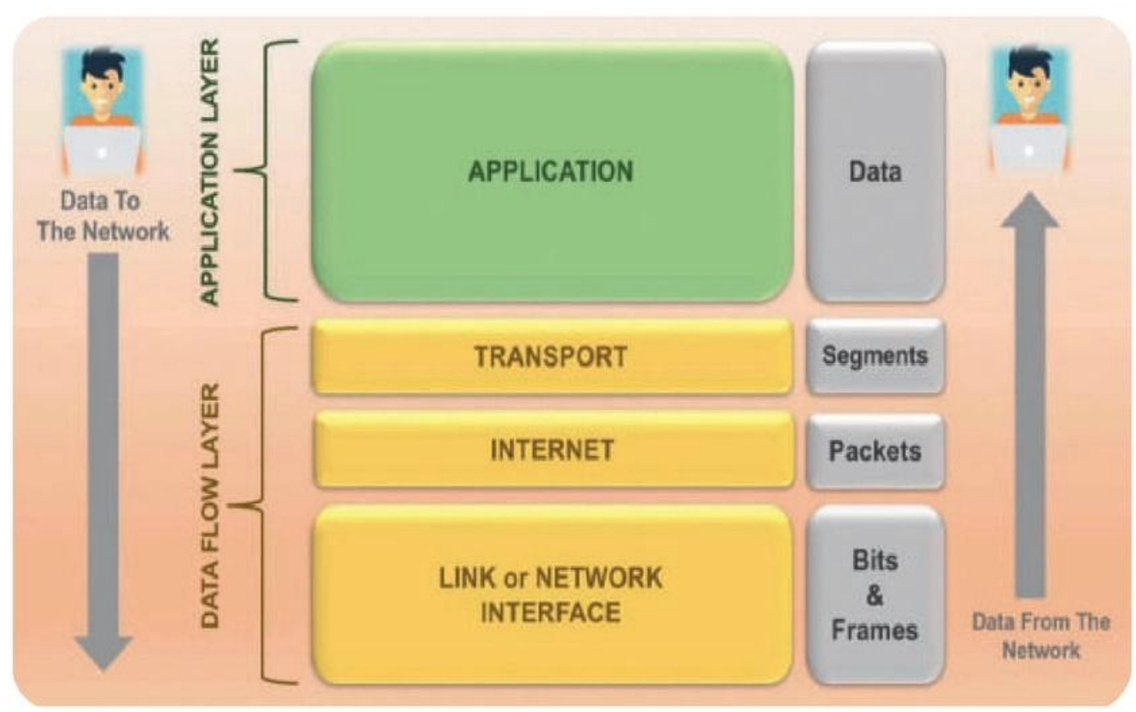
1. Bad timing: .....
.....
2. Bad technology: .....
.....
3. Bad implementations: .....
.....
4. Bad politics: .....
.....

ORIGIN OF THE TCP/IP MODEL

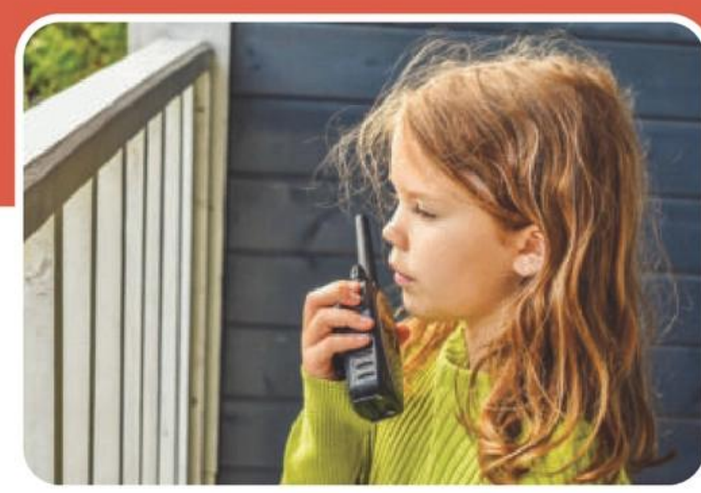
The TCP/IP model is simpler and older than the ISO/OSI. It originated in the 1960s and in 1982 it was chosen as the standard for all military computer networking except the US DoD. The ISO/OSI was published in 1984.

OSI MODEL VS TCP/IP MODEL





GRAMMAR



MODAL VERBS

Category	**Modal verb** (invariable) **+ base form**	Examples
Ability	• CAN (present ability) • COULD (general ability in the past)	• *The school technician* can *set up a new network.* • *When I was a child, I* could *only use a walkie-talkie.*
Advice	• SHOULD (personal advice) • OUGHT TO (what people are expected to do)	• *You* should *buy a new router.* • *You* ought to *ask an expert to install a new NIC.*
Request	• CAN/COULD	• Can/Could *you send me the message again?*
Permission	• MAY (formal) • CAN (informal) • COULD (tentative)	• *Excuse me,* may *I use your LAN?* • *Paul,* can *I use your LAN?* • Could *I use your LAN? This will be the last time I ask, I promise.*
Obligation	• MUST (order, strong necessity or recommendation)	• *I* must *choose the right topology, otherwise the school lab won't work properly.*
Prohibition	• MUSTN'T • CAN'T	• *Students* mustn't/can't *eat or drink in the computer lab.*
Deduction	• MUST (almost certain) • MAY/MIGHT/COULD (possibility) • CAN'T (impossibility)	• *It* must *be a star topology. There's just one server.* • *It* might *be an application protocol, but I'm not sure.* • *It* can't *be the ISO/OSI model. It only has 4 layers.*

24 **Read the sentences and decide which category the modal verb belongs to.**

1. You absolutely must buy the new B43 model. It's fantastic. .....
2. A packet switching network must have a dedicated channel. .....
3. You can only access a VPN with a password. .....
4. Can you help me choose the most appropriate network topology for my office? .....
5. I can describe the ISO/OSI model. .....
6. It can't be a full duplex system. You have to wait your turn to speak. .....
7. This program cannot be broadcast because it has been censored. .....
8. What are you doing? You must use a gateway to connect two networks! .....

25 **Choose the most appropriate option.**

1. It *ought / might / can't* be a ring topology: one computer broke and the others are not working.
2. You *should / can / must* have a password to access a VPN.
3. You *should / ought / mustn't* be more careful when you transmit sensitive data.
4. *Must / Can / Should* I use your LAN, please?
5. Stronger passwords *ought / must / should* to be used in VPNs.
6. Only an expert *can / must / should* explain the difference between the ISO/OSI and the TCP/IP models.

SCHOOL PRIVATE NETWORKS

Most schools today have a private network both in the form of a digital register and a platform for learning.

26 **Read the text and answer the questions with your school in mind.**

School Private Networks

Schools and universities that use private networks have complete autonomy over who has access, how they access the network, and what they are allowed to do. A private network is therefore an excellent option for the education sector looking to transform its communications infrastructure in order to connect students, teachers, devices, and applications.

The networks can be on a single site, for example at a single school location, or cover a wider geographical area, such as multiple locations. As regards security and data privacy, schools and universities are understandably concerned with the safety and welfare of their students and staff and, with a private network, the administrators have complete control over what devices are permitted to use the network.

Security policies can be defined from within the school's IT systems, allowing schools to have full ownership and control over this process, reducing their dependency on operators and Wi-Fi providers. To gain entry, students and teachers can access networks using a user name and a password.

Private networks carrying data traffic that belongs exclusively to schools and universities reduce the risk that data will be compromised by an external cyberattack; this provides assurances that students are protected with a safe learning environment. With greater visibility and control of the data, unauthorised traffic is easily detected and managed in order to preserve the integrity of the network.

Adapted from: *https://www.eschoolnews.com/2021/05/20/4-ways-private-lte-supports-learning-today-and-tomorrow*

1. What does your school provide? Tick as appropriate.
   - ☐ A digital register
   - ☐ A virtual classroom
   - ☐ A videoconference system (specify): .....
   - ☐ Other (specify): .....
2. Who has access and to what?
   - ☐ Students: .....
   - ☐ Teachers: .....
   - ☐ Families: .....
   - ☐ Other (specify): .....
3. What type of network does your school provide?
   - ☐ Single location .....
   - ☐ Multiple locations (specify): .....
4. What type of password do you use? Was it assigned to you or did you choose it?
5. Can you access the network with your personal email address or do you have an institutional one?
6. Have you ever experienced hackers' attacks or connectivity problems with your school network? If so, what happened?

27 GROUP WORK **Reflect on the use of a school private network and write down a short list of behavioural rules for students. Refer to security and data integrity.**

5.2 THE INTERNET

THE INTERNET AND ITS SERVICES

What do you use the Internet for?

Common examples of web-based emails are: Yahoo Mail, Gmail, Hotmail, etc.

Common examples of email clients are Outlook, which is part of Microsoft Suite, and Thunderbolt, which comes with the Firefox browser.

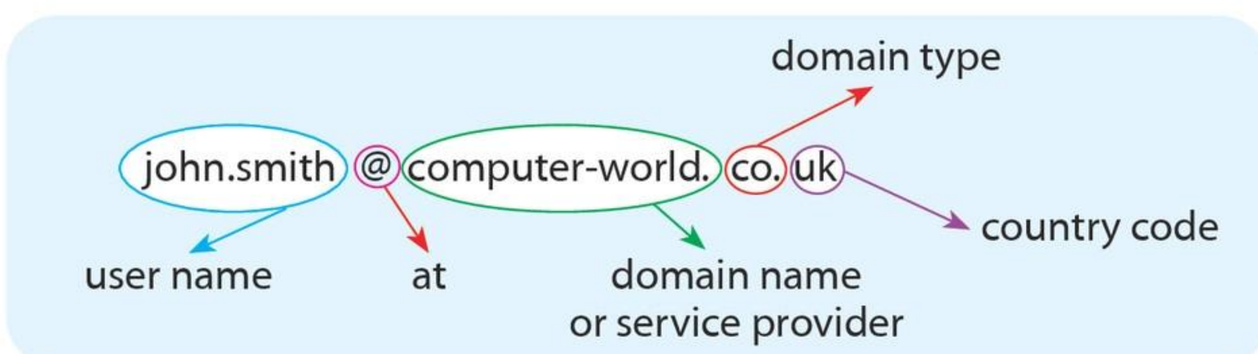
The Internet is a global network of computer networks. The official date of its birth is 1st January 1983, when the protocol TCP/IP was established and different kinds of computers on different networks were able to communicate for the first time. However, the origin of the Internet goes back in time to 1969 and the first packet switching WAN called **Arpanet** (Advanced Research Project Agency Network), a network which involved the American Defense Department and some academic institutions.

The most significant rise of the Internet in terms of the number of users was in 2000 and since then it has continued to increase steadily.

Internet connection

In order to connect to the Internet, the following are needed: an **Internet Service Provider**, or **ISP**, such as Yahoo, Libero, Alice, etc., and a **modem**, which converts digital signals into analogue signals and vice versa. The modem calls and connects the device to the ISP and receives **a temporary IP address** which identifies the device on the Net and it is connected. However, the Internet is just a path that makes us reach the website we want to connect to. For this reason, the ISP sends the request, i.e. the name of the site we want to reach or **URL**, to a server called **Domain Name Server**, or **DNS**, which acts as a kind of directory. Once the request arrives, the server retrieves the website and sends the correct data to our computer.

copper: *rame*
cradle: *supporto*
to get beamed: *essere inviato sotto forma di raggio*
satellite dish: *antenna parabolica*



Internet services

The Internet offers different services that can be grouped in five broad categories:

- **Communication**;
- **E-commerce**;
- **Leisure**;
- **Information retrieval**;
- **Education.**

Email

While for other types of services we just have to access a website, using an email means having an address on the Internet from which we can send and receive messages.

Electronic mail, or simply **email,** is a way of sending text-based messages and documents from one computer to another or from a WAP (Wireless Application Program) mobile phone or digital television.

Emails can be:

- **web-based**, which means they are operated from a website which allows users to access their email accounts as long as they have an Internet connection. It is not necessary to be connected to a particular ISP and an email address can be got from any online computer in the world, but the messages are not downloaded into the host computer. To access the website, a login with a username and a password is required;
- sent and received via an **email client**, a software program that uses a client-server architecture: emails are sent from many clients to a central server which then delivers the messages to the correct email addresses. The emails are stored on the host computer, they are accessible faster than using a web-based interface and can even be accessed offline, but cannot be accessed by other devices.

1 (5.5) **Listen to the history of the Internet and make notes on what happened in the years below.**

1957: .....

1958: .....

1969: .....

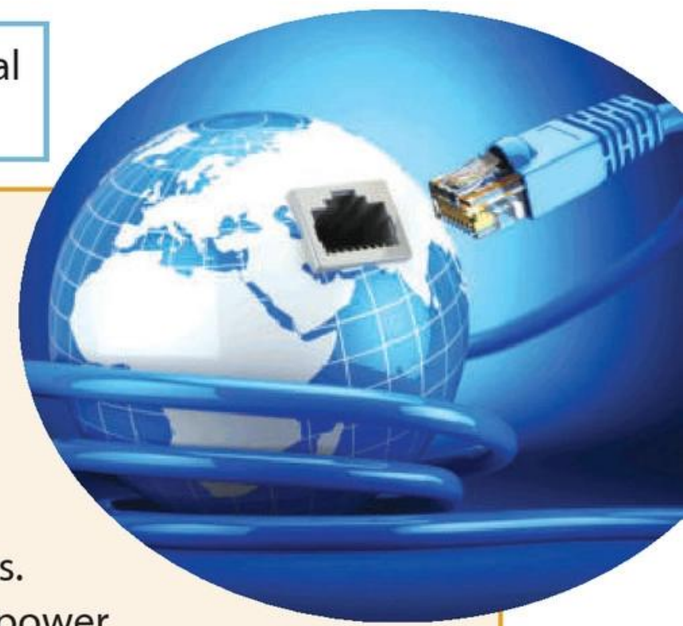
1990: .....

1991: .....

1992: .....

2 **Read the text and complete it with the words or phrases given below.**

ADSL (Asynchronous DSL) • Broadband over power line • Coaxial cable • Dial-up • DSL (Digital Subscriber Line) • Fibre optics • Mobile Internet • Satellite Internet • Wireless broadband



The Evolution of the Internet Connection

1. ..... This is where it all started. You would take your home or office phone handset and put it into a cradle called a modulator/demodulator, or modem as we know them today.

2. ..... The phone companies developed a way to send a second signal down the phone lines, which they did by sending it at a higher frequency.

3. ..... This system was invented to make DSL work even better. The average person is more concerned with download speeds than upload speeds; this means that more bandwidth was provided for downloading than for uploading.

4. ..... When Internet access made the jump from dial-up, cable was the first new medium to be used. The cable used was the same as the cable that you may have used for cable TV, one of those round cables with a solid copper wire core inside a thick plastic-like insulator.

5. ..... The technology that we've talked about so far uses electricity and copper wires to transmit the signal. Then, along came a new medium. To put it simply, the signal was light and the medium was a special type of flexible glass or clear plastic cable.

6. ..... You might not have heard of this method of connecting to the Internet. The basic idea was almost identical to using cable or phone lines. The signal went over the power lines that come to your house.

7. ..... This is the most common type of wireless connection. The ISP will connect to the Internet through a cabled connection and then broadcast that connection using radio waves. The customer has some sort of antenna and modem set up that allows for communication with the ISP.

8. ..... This is how you get the Internet on your phone, USB stick, or PC cards that go in your computer. Service providers typically refer to it as Mobile Wireless Broadband, even though the term broadband isn't technically being used correctly.

9. ..... As the name suggests, this is a way to get Internet access via a satellite dish. The signal gets beamed to a satellite which turns around and beams the signal to you, and vice versa.

Adapted from: *http://www.makeuseof.com/tag/types-of-internet-access-technologies-explained-and-what-you-should-expect/*

3 PAIR WORK **Using the information you have read above as well as your own knowledge, decide if these statements refer to an email client (EC), web-based email (WE) or both (B).**

	EC	WE	B
1. Anti-spam and anti-phishing are offered to the user.	☐	☐	☐
2. A particular ISP is not necessary.	☐	☐	☐
3. Emails can be written offline.	☐	☐	☐
4. It is a software program with a client-server architecture.	☐	☐	☐
5. It is used to send messages from one computer to another.	☐	☐	☐
6. Messages are sent to the recipient's mailbox.	☐	☐	☐
7. The emails are sent to a central server.	☐	☐	☐
8. The emails are stored in the host.	☐	☐	☐

THE WORLD WIDE WEB, WEBSITES AND WEB BROWSERS

The *Internet* is different from the *Web* because it is a physical network, while the Web, or World Wide Web, is a collection of different websites that can be accessed through the Internet.

What is your favourite web browser?

Common web browsers include Microsoft Internet Explorer, Google Chrome, Mozilla Firefox, Windows Edge and Apple Safari.

Microsoft Explorer calls this feature *favourites*.

bookmark: *segnalibro*
to mark up: *(qui) formattare una pagina*
properly: *correttamente*
retrieval: *recupero*

■ The World Wide Web

The **World Wide Web**, or simply **www** or the **Web**, was developed by the English scientist Tim Berners-Lee in 1989 while he was employed at the CERN in Geneva. It is an Internet-based hypermedia system for the global information sharing of resources which are identified by **URLs, Uniform Resource Locators**, i.e. website addresses, and interlinked by hypertext links.

Hypertexts are documents formatted and annotated with HTML which contain embedded hyperlinks to other relevant data, and which allow readers to move between areas of a document, following subjects of interest on a variety of different paths. **Hypermedia** are hypertext documents that contain, or have links to, other types of media such as pictures, sound, video and so on.

■ Websites

Multiple **web pages** with a common theme, a common domain name, or both, make up a **website**. Website content can largely be provided by the publisher or be interactive when users contribute content, or can depend upon the user or their actions. Websites may be mostly informative, primarily for entertainment, or largely for commercial, governmental, or non-governmental organisational purposes.

■ Web browsers

A **web browser**, or simply **browser**, is an application software used to access and view websites. Its primary function is to render HTML, which is the code used to design or mark up webpages. Each time a browser loads a web page, it processes the HTML, which may include text, links and references to images and other items, and then makes them available in a readable form in its window.

Early web browsers, such as Mosaic and Netscape Navigator, were simple applications that rendered HTML, and supported **bookmarks**, i.e. standard features of web browsers that save **URLs** and add them to a special list so that it is not necessary to type them again to access them.

Today, browsers are far more advanced, supporting multiple types of HTML, dynamic JavaScript, and encryption used by secure websites. Their capabilities allow web developers to create highly interactive websites. However, browser compatibility issues still remain a problem. Since browsers use different rendering engines, websites may not appear the same across multiple browsers. In some cases, a website may work fine in one browser, but not function properly in another.

4 Decide if these statements are true or false. Correct the false ones.

	T	F
1. The www is a physical network of hypertexts.	☐	☐
2. A hypertext is a text with links to other texts.	☐	☐
3. Hypermedia are hypertexts with videos, audio files, etc.	☐	☐
4. A web browser is a type of software to access and read websites.	☐	☐
5. The rendering of a web page is independent from the web browser used.	☐	☐
6. Some websites work well only with certain browsers.	☐	☐

5 (5.6) Listen to the text and complete it with the missing words or phrases.

Tim Berners-Lee's Original Proposal

In March 1989, Tim laid out his vision for what would become the Web in a document called **1.** ....: *A Proposal*. Unfortunately, his initial proposal was not immediately accepted. In fact, his boss at the time, Mike Sendall, noted the words as **2.** ..... but ..... on the cover. The web was never an official CERN project, but Mike managed to give Tim time to work on it in September 1990. So, Tim began work using a NeXT computer, one of **3.** ....'s early products. By October 1990, Tim had written the three fundamental technologies that remain the foundation of today's web:

- **HTML**, **4.** .... Markup Language, which is the mark-up language for the web, i.e. a set of standards for writing web pages;
- **URI**, Uniform Resource **5.** ....., which is a kind of address that is unique and used to identify each resource on the web. It is also commonly called **URL**. The URL is very important because as an **6.** .... is made up of a set of numbers and is therefore hard to remember, the DNS lets us use the URL which is made up of words which are easier to remember, e.g. computing.org. The DNS then changes the name into the right numbers, and we can find the website;
- **HTTP**, Hypertext **7.** ...., which allows for the retrieval of linked resources from across the web through the use of hyperlinks. Hyperlinks are references to URLs that are often coloured blue and underlined and that you can click on to go somewhere else. Hyperlinks connect different parts of the web; to the computer they are **8.** ..... to open a specified file which is located along a particular path; to us, we click on a hyperlink and that is where we next go.

Tim also wrote the first web page **9.** ....., or browser, called **WorldWideWeb.app** and the first web server **10.** ..... By the end of 1990, the first web page was served on the open Internet, and in 1991, people outside the CERN were invited to join this new web community.

6 Read the above text again and explain the following acronyms in your own words.

1. HTML: .....
2. URL: .....
3. HTTP: .....
4. www.app: .....

SEARCH ENGINES AND WEB SEARCH

A search engine is made of three different software programs: the crawler/s, the indexer and the ranking. The ranking provides the result page by giving a rate to each webpage.

Google whacking means finding a search term for Google that produces exactly one result.

Have you ever used any of the extra services described in this paragraph?

blank: *vuoto*
socket: *presa*

■ Search engines

If we already know the address of a website, i.e. its URL, we can just type it, otherwise we need a search engine. A **search engine** is a website that helps to search for other websites. It is software that creates indexes of databases or Internet sites based on the title of files, keywords, or the full text of files. It has an interface that allows us to type what we are looking for into a blank field. It then gives a list of the results of the search. When the search engine is used on the Web, the results are presented in a hypertext, which means that we can click on any item in the list to get the actual file. However, no single search engine will find data from every website, so it is worth using more than one.

■ How search engines work

Search engines use multiple **web spiders** to crawl, i.e. search systematically, large quantities of pages per second and generate large quantities of data. When looking at an HTML page, spiders take note of the words on the page and their position. Words occurring in the title, subtitles and other positions of relative importance are weighted for special consideration. Then, the spiders build lists of words and note where they can be found. Then, another program•, called an **indexer**, builds an index based on its own system of weighing. Finally, all the data is stored in a database for users to access in the form of a list of pages.

■ Web search

Various algorithms are used to decide the order in which the pages which have been found will appear. However, finding resources is easier than ever before. Users can restrict the results•• to include only those from a particular country or directly type the name of websites that they want to see, or use more than one keyword and then link them together with logical operators such as AND, OR, NOT or quotation marks (“ “) placed around multiple words to reduce the number of sites found in a search.

Furthermore, search engines provide many extra services. For example, we can type “*define*” followed by a word, and a list of the definitions of the word will appear or we can take a picture with a smartphone and this will be analysed and possibly recognised so that we can look up information about landmarks, works of art or even people•.

■ Search engine optimisation (SEO)

Search Engine Optimisation, which is a marketing strategy, is a set of practices designed to improve the appearance and positioning of web pages in search results. A SEO practice determines the ranking of webpages in the result page and therefore the prospective success of a business.

7 **Answer the questions.**

1. What is a search engine?
2. What does a web spider do?
3. What happens when users interrogate a search engine?
4. What are the main ways to find pages on the Internet?
5. What order do the pages appear in?
6. What is SEO?

8 (5.7) **Listen to a recording on how web crawlers work and answer the questions.**

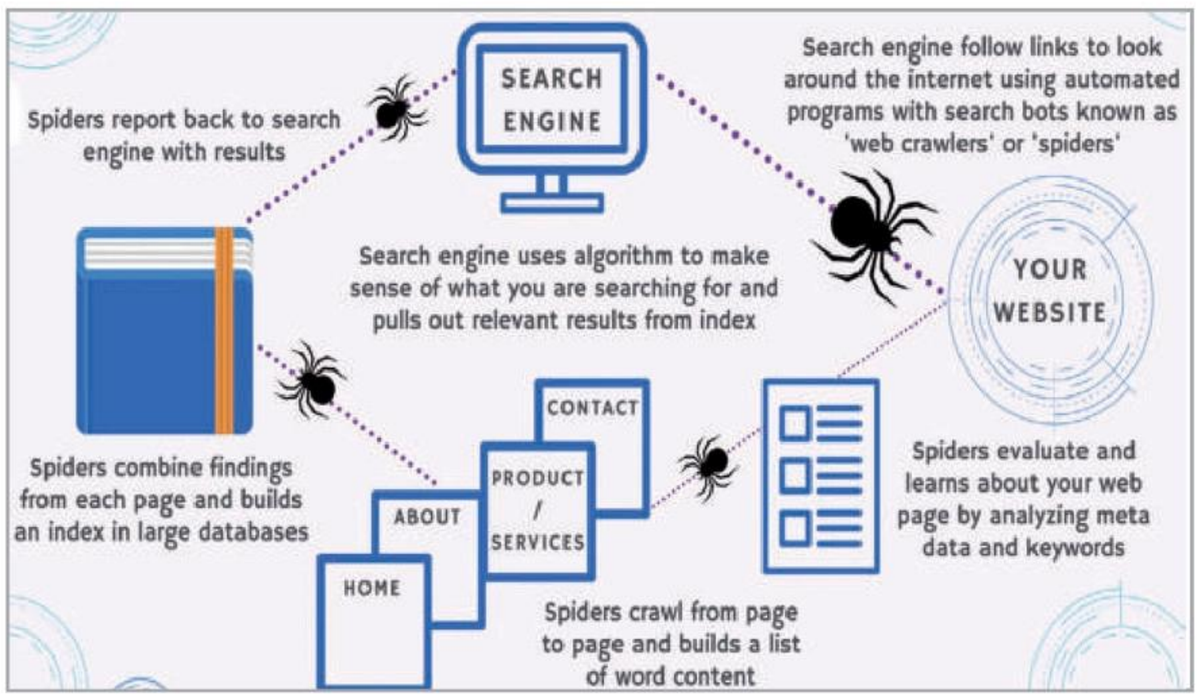
1. What are the other names for a search engine spider?
2. What is Google's spider called?
3. What does a bot do?
4. What does a web crawler do when it visits a page?
5. How many steps does the crawling procedure involve?
6. What happens when the crawler does not find a page?
7. What does the file robots.txt contain?
8. What is the standard crawl rate of Google's web spider?

9 PAIR WORK **Read what the different parts of a URL are and identify them in the examples provided.**

- **http**: 'hypertext language protocol', the language the web uses
- **https**: 'hypertext transfer protocol' over 'secure socket layer' (a protocol for securing the connection between client and server over an insecure network like the Internet)
- **www**: it means that what follows is a website
- **domain name**: the name of the site, which can be the name, nickname or initials of a company, organisation, government department or whatever
- **domain type**: it identifies the type of site and is separated by the domain name by a dot. Common domain types are: .com = business; .co = business UK; .gov = government; .org = organisation; .net = general
- **country code**: it shows that the website is held on an ISP in a given country (e.g. .it for Italy, .uk for the United Kingdom). Note that there is no country code for the USA.
- **/...**: this tells the computer exactly which page within the site you are after.

1. http://the-times.co.uk/news
2. http://amazon.co.uk
3. http://amazon.com
4. http://russell-moro-guarini.edu.it
5. http://repubblica.it
6. http://france.culture.fr

10 **Look at the picture and describe what happens when you enter a query in a search engine.**



CONTENT AGGREGATORS

A news aggregator that uses artificial intelligence automatically reads thousands of articles on the web and has an algorithm that determines the most interesting ones or prioritises them based on some predefined criteria.

While a *feed* is a text file which contains information on how to recover new content published on a website, a live feed is the broadcast of sound or video over the Internet from a live source such as a concert or a sports event.

Have you ever used an aggregator like Airbnb, Trivago or something else similar in order to find a hotel, a restaurant, etc.?

A **content aggregator** is an individual, organisation or tool that collects web content and applications from different online sources for reuse. In other words, a content aggregator does not produce its own original content, but rather gathers content produced by others to display for internal use or to distribute to customers. In the second case, it is also called **syndication**.

The main benefit of content aggregation is that it brings together a lot of content which is relevant to a specific topic or area of focus; the information is organised efficiently and makes it possible to find content quickly.

Aggregators may collect different types of content such as blogs, news or social media posts and are a way to organise a large amount of content on the Internet, fighting information overload.

How content aggregators work

Content aggregators continuously collect data from multiple sources on the Internet and put them into a single repository. They may look for content that centres around a certain topic or contains certain keywords.

Some aggregators even rely on sophisticated tools that use artificial intelligence to search, filter and collect data.

Types of content aggregators

Aggregators differ based on the type of content they work with and the sources they gather content from.

These are the most common types of content:

- **Blogs.** Blog aggregators, like Blog Engage, gather niche blog posts from multiple sources and present them on a central site;
- **News.** These aggregators collect news from multiple sources. Examples include Google News and Apple News;
- **Social media.** Social media aggregators, such as Curator, take information from various social sites like Facebook and Twitter and display that information as a live feed;
- **Research**. Research aggregators like Feedly gather information from research journals to answer questions from specialists or to keep up with trends in various industries;
- **Services**. Service aggregators gather multiple service providers and categorise them to make it easier for users to browse through the choices and select one. For example, Airbnb presents all the possible places a user could stay in a particular location;
- **Video**. Video aggregators like YouTube bring together recently published videos on specific topics from a variety of sites.

11 Choose the best option.

1. A content aggregator keeps content…
   a. for its archives.
   b. for further use.
   c. to generate new content.
2. In aggregators, the information is organised…
   a. so that it can be found quickly.
   b. in blogs, news and social media posts.
   c. in a way that encourages content overload.
3. Aggregators may differ according to…
   a. the type of content.
   b. the sources they use.
   c. both the content and the sources.
4. Curator is an example of a…
   a. blog aggregator.
   b. news aggregator.
   c. social media aggregator.
5. Feedly is a type of…
   a. service aggregator.
   b. video aggregator.
   c. research aggregator.
6. YouTube brings together…
   a. old videos on a specific topic and from specific sites.
   b. recently published videos on specific topics from a variety of sites.
   c. recently published videos on general topics from specific sites.

CURATORS

Curation takes aggregation a step further by manually selecting and arranging content to present to consumers or end users. An example of content curation is when social media sites like Twitter and YouTube use machine learning to detect and remove harmful content.

12 Complete the text with the missing words.

Why Use Content Aggregators?

There are different reasons **1.** ..... people and organisations use content aggregators.

Consumers gain access **2.** ..... a large variety of content that they may not otherwise see. This allows them **3.** ..... keep up with new content about existing interests and discover new interests.

Content creators use content aggregation to expose their works to broader **4.** ..... new communities and to get increased visibility **5.** ..... their content.

Digital marketers can use content aggregators to improve their digital content marketing strategies **6.** ..... distributing content on multiple platforms to gain exposure to a wider audience. They **7.** ..... also use aggregators to see **8.** ..... is engaging with their content on various platforms.

Adapted from: *https://www.techtarget.com/searchcontentmanagement/definition/content-aggregator*

13 Watch the video and correct the statements below.

▸ What's the difference between content aggregation and content curation? *posted by* Vable

1. Information people spend a lot of time reviewing, developing and maintaining websites.
2. Content aggregation is a process that brings together different types of content into a single available platform.
3. Dashboards are a great way to discover new social networks.
4. Information professionals know what people want.
5. Collaboration drives business success.
6. Finding an unexpected article can also increase inspiration.

CLOUD COMPUTING

The origin of the expression *cloud computing* appears to derive from the practice of using drawings of stylised clouds to denote networks in diagrams of computing and communication systems.

It is like having computing resources delivered in the same way as electricity or water.

A *hypervisor* is a computer software that makes it possible to host multiple virtual machines, each one running its own programs, on a single computer hardware.

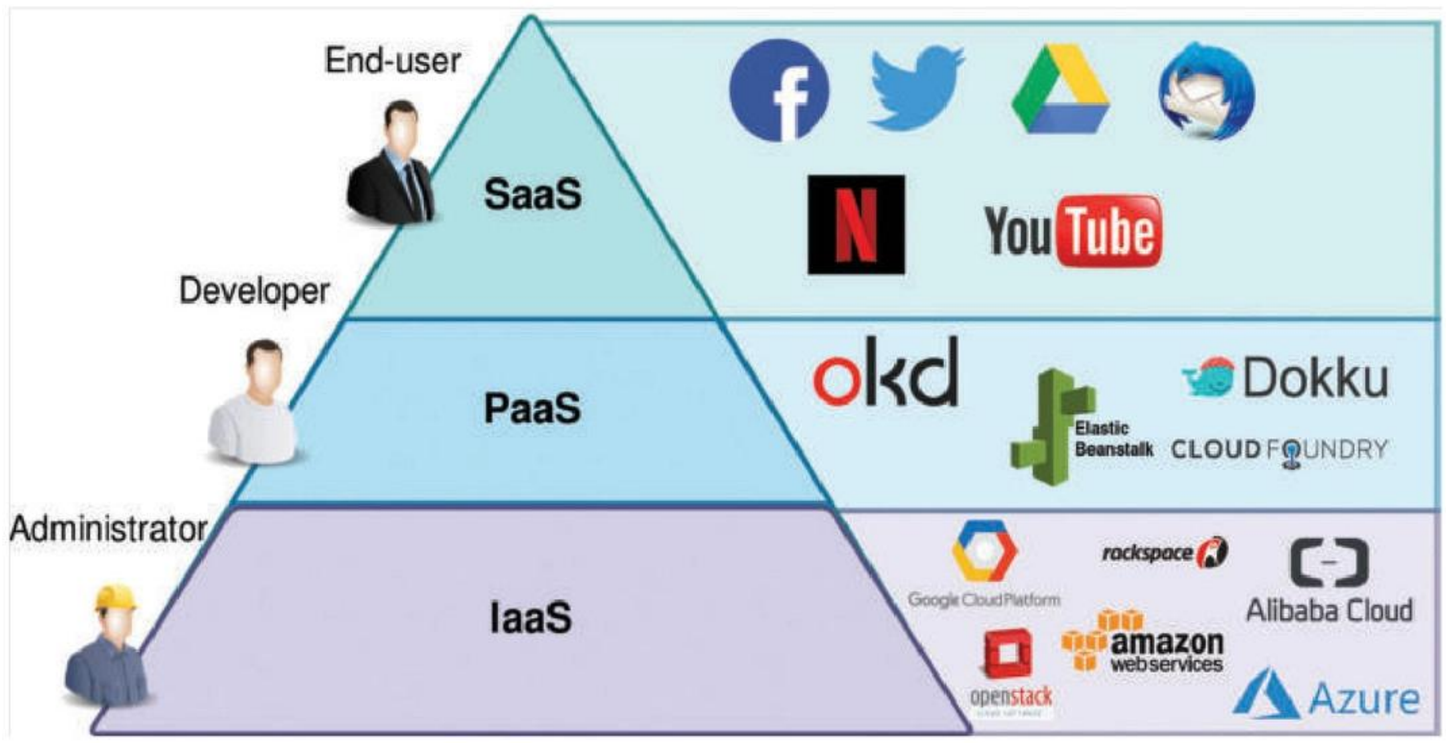
compliance: *conformità (a degli standard prestabiliti)*
deployment: *distribuzione*
end-recipient: *utente finale*
ongoing: *continuo*
slice: *fetta, porzione*
tenant: *utente, utilizzatore*
underlying: *sottostante, che è alla base*

Cloud computing is the delivery of computing and storage capacity as a service to a community of end-recipients on the Internet.

Types of cloud computing

There are three types of cloud computing:

- **Infrastructure as a Service (IaaS)** is the most basic model. Cloud providers offer computers and other resources as physical or virtual machines on demand and these are then run as guests by a hypervisor. This makes it possible for companies to store or process large amounts of data without having to invest a lot of money in hardware;
- **Platform as a Service (PaaS)**. Cloud providers offer a computer platform, normally including the operating system, programming language execution environment, database and web server, too. Application developers can develop and run their software solutions on this platform without the cost and complexity of buying and managing the underlying hardware and software. A series of applications and services are in the cloud so there is no need to download them on host computers;
- **Software as a Service (SaaS)**. Cloud providers install and operate application software in the cloud, and cloud users access the software from cloud clients without managing the infrastructure and platform on which the application is running. This eliminates the need to install and run the application on the cloud user's own computer.



Public or private?

According to the way in which the services are offered, cloud computing can further be classified as public, private or hybrid.

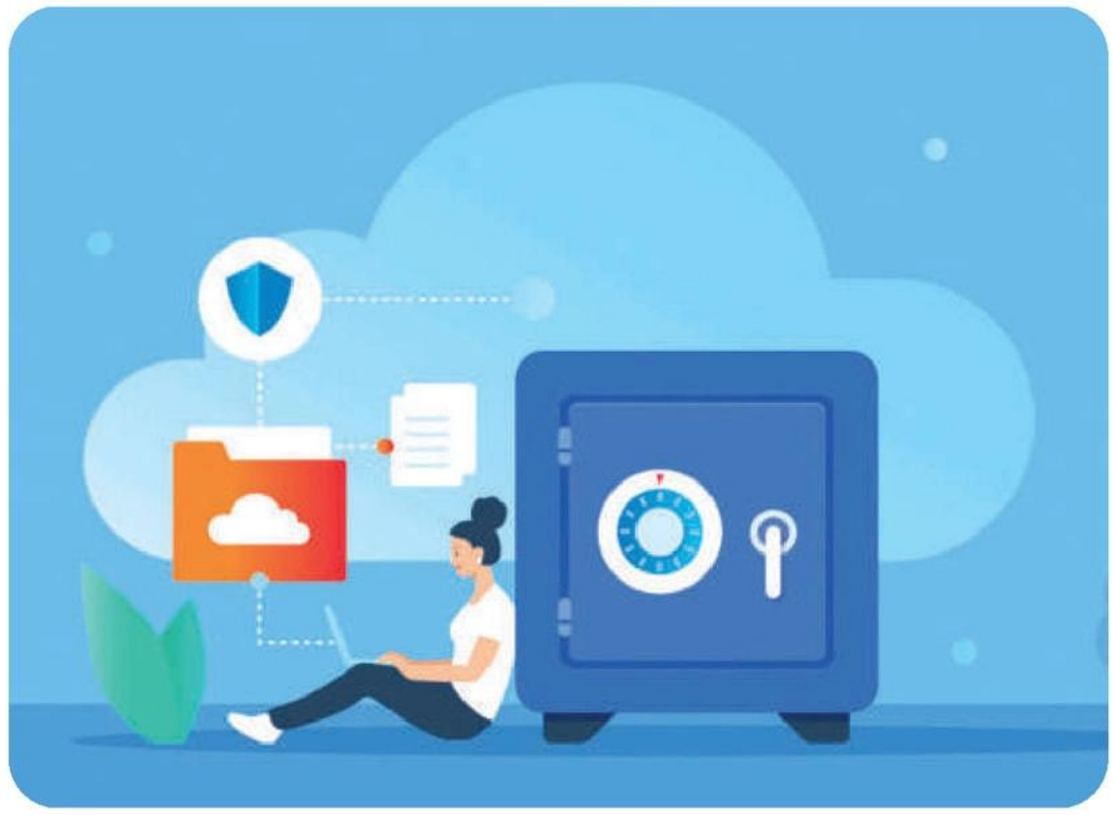
- **Public Cloud Computing** is a multi-tenant environment in which a server shares the same hardware, storage and network devices as other tenants, or users, in the cloud. The model is a pay-as-you-go model, which means that users pay by the hour for the computer resource that they use.
- **Private Cloud Computing** is a single-tenant environment where the hardware, storage and network are dedicated to a single client or company. The hardware is dedicated so, in this case, companies pay a fixed amount for the service.
- **Virtual Private Cloud Hosting**, a hybrid version, is a multi-tenant environment where companies achieve networking isolation and save money by buying hardware slices with other tenants and creating private subnets. It is the same as sharing a holiday apartment with other users: you pay for the portion of service (time/quantity) that you use.

Cloud storage

While the services mentioned above are generally intended for large organisations, **cloud storage** is a service also available to private users. It refers to online space that can be used to store data remotely and in a secure way. Cloud storage is usually provided using a large network of virtual servers that also come with tools for managing files and organising the virtual space.

14 Complete the sentences.

1. Cloud computing is …
2. There are three types of …
3. Cloud providers offer computers and other resources as …
4. With PaaS, cloud providers offer a computing platform including …
5. With SaaS, cloud users do not manage the cloud infrastructure and platform on which …
6. Cloud applications are called 'multi-tenant' when …
7. Virtual Private Cloud Hosting is …
8. Cloud storage is …



15 Read the text and write a heading for each paragraph.

Public Cloud Computing

1. ..... Public clouds normally deliver a pay-as-you-go model, where you pay by the hour for the computer resources you use.

2. ..... If you want to shut down your server after only 2 hours of use, there is no contract requiring your ongoing use of the server.

3. ..... Because the public cloud is by definition a multi-tenant environment, your server shares the same hardware, storage and network devices as the other tenants in the cloud.

4. ..... With the pay-as-you-go utility model, self-managed systems are required for this business model to make sense.

Private Cloud Computing

5. ..... Because private clouds are dedicated to a single organisation, the hardware, data storage and network can be designed to assure high levels of security that cannot be accessed by other clients in the same data centre.

6. ..... Different types of compliance can be delivered through a virtual private cloud or fully private cloud deployment, because the necessary hardware, data storage and network configurations are dedicated to a single client.

7. ..... Hardware performance, network performance and storage performance can be specified and customised in the private cloud.

8. ..... If a dedicated server is required to run a high-speed database application, that hardware can be integrated into a private cloud, in effect, hybridising the solution between virtual servers and dedicated servers. This cannot be achieved solely in a public cloud.

Adapted from: *http://www.onlinetech.com/resources/references/public-vs-private-cloud-computing*

16 (5.8) Listen to a presentation of two types of cloud storage, OneDrive (OD) and Google Drive (GD), and say which characteristic belongs to which.

	OD	GD
1. It is a service offered by Microsoft.	☐	☐
2. It provides advanced search capabilities.	☐	☐
3. Its former name was SkyDrive.	☐	☐
4. It allows users to synchronise digital content across computers and mobile devices.	☐	☐
5. There is a version for business.	☐	☐
6. The system allows users to edit different Office documents simultaneously.	☐	☐
7. The system offers Facebook integration.	☐	☐
8. Users can share and collaborate with others on documents.	☐	☐

GRAMMAR

COMPOUND NOUNS

Form

Usually, a compound noun is a noun with another term placed before it in a very close syntactic and semantic relationship.

adjective + noun	*remote control*
verb (-ing) + noun	*operating system*
noun + noun	*computer case*
noun + verb (-ing)	*cloud computing*
verb + preposition	*login*
preposition + noun	*input*

Spelling

- Spaced: with a space between the two words, e.g. *operating system*.
- Hyphenated: with a hyphen between the words, e.g. *mark-up*.
- Closed: with no space between the two words, e.g. *inmate*.

There are sometimes differences between British and American English and there are no definite rules as it is often a matter of style.

Plurals

- Generally by adding an *-s* to the base word, i.e. the most significant word, e.g. *remote controls, operating systems, inputs*.
- When the compound is made of two nouns, the first is treated like an adjective, so it is always singular.
- Some compounds have no obvious base, so it is necessary to look it up in a dictionary, e.g. *plug in* (when writing code) and *plug-in* (when searching documentation).

Pronunciation

The preferred stress pattern for compounds is on the first item.

17 **With the help of a dictionary, make compounds with the words computer and system.**

Computer	System
Computer system,	Operating system,

18 **Make the plural of the words from the previous exercise when possible.**

FREE INTERNET ACCESS

Free access to information and education are constitutional rights. For this reason, as the Internet has become a source of information, including for educational purposes, its free access should be granted to all citizens. Fortunately, there are some legal ways to access the Internet for free.
Here are the options.

Public Wi-Fi hotspots

A Wi-Fi hotspot is a physical location where people can access the Internet using Wi-Fi technology. Such hotspots are very often created by businesses to attract more customers. In fact, the chances are that your favourite coffee shop or fast-food place has one – you just need to know how to use it to get free Internet.
In most cases, connecting to a public Wi-Fi hotspot is just like connecting to any other Wi-Fi network. All you have to do is select the Wi-Fi hotspot in the network settings and log in. Sometimes a webpage will open and ask you to agree to certain terms of service or type in your user credentials.

Municipal Wi-Fi hotspots

A growing number of cities around the world are offering free Wi-Fi to residents and sometimes even to visitors. Municipal Wi-Fi hotspots are a great way for residents to get free Internet at home, but they tend to be suitable only for casual Internet browsing and not data-intensive services, such as high-definition video streaming and online gaming. To connect to a municipal Wi-Fi hotspot, you may be required to first prove that you are a local resident to obtain login credentials.

Adapted from: *https://www.netspotapp.com/blog/all-about-wifi/how-to-get-free-internet.html*

19 **Read the text above and discuss the following questions.**

1. Name some public places in the town/city where you live that provide a public Wi-Fi hotspot.
2. Does your school provide free Internet access?
3. Does your town/city provide free Internet access for residents?

20 **Read a short text about the differences between a public hotspot and a private one and discuss the questions.**

Public vs Private Wi-Fi Hotspots

- **Public Wi-Fi hotspots:** As the name suggests, public Wi-Fi hotspots are located in public areas, such as shopping centres, airports, and coffee shops. Public Wi-Fi hotspots are typically set up to provide free Wi-Fi access as a way of attracting customers, or they provide Wi-Fi as an extra service, such as airlines do with inflight Wi-Fi.
- **Private Wi-Fi hotspots:** These days, it is difficult to find a business or household that doesn't have a private Wi-Fi hotspot set up to wirelessly connect devices such as smartphones, tablets, and smart home appliances to the Internet. Private Wi-Fi hotspots are by definition accessible only to those who are allowed to join the network, typically after providing the correct password.

1. What is the difference between the two systems?
2. Does your school use a public or private system? Why?
3. When do you think it is more practical to offer a public hotspot?
4. Give some reasons why a private hotspot might be necessary.

5.3 SHARING ONLINE

SOCIAL NETWORKS

The terms social networks and social media are often used interchangeably, but there is a difference, although some platforms offer both services. Social media platforms broadcast information, while social networks are used to communicate with one another.

The success of social networks has contributed to changing the main purpose of the Internet itself: from a tool for archiving and transmitting data to a tool that facilitates relationships and collaboration, and allows users to add content, i.e. the Web 2.0.

Look at the names of the social networks provided as examples. Do you know or use any of them? Do you know any others?

Social networks are online communities of people who use dedicated websites to share interests and activities, socially interact with other members, and foster the development of online communication. To be part of a social networking site and benefit from the different options offered to members, it is necessary to sign up and give personal details. It is then possible to create and join groups in a virtual social playground in which members can interact in a variety of ways: through chat lines, instant messaging, emails, videos, voice chat, file sharing, blogging, and discussion groups.

Features of social networks

There are hundreds of different social networks, but they all share some common characteristics: they are free and easy to access; anyone can provide content or edit what is already there; and they are continuously updated. However, there are some problems around social networks since they may raise issues related to privacy and identity when writing very personal comments or publishing photographs.

Types of social networks

Depending on who their members are, social networks can be divided into three categories:

- **public social networks**, with free access for anybody who is interested;
- **customer communities**, with access granted by companies to their customers;
- **employee social networks**, with access restricted to staff members.

Depending on the type of service provided or the activities that can be done through the website, they can be divided into seven broad categories:

- **networking** (e.g. Facebook, LinkedIn, WhatsApp, Messenger, Telegram);
- **microblogging** (e.g. Twitter, Tumblr, Instagram);
- **collaboration** (e.g. Yahoo! Answers, WhatIs.com);
- **image sharing** (e.g. Flickr, Pinterest, Picasa);
- **audio and video sharing** (e.g. YouTube, Vimeo, TikTok, SoundCloud, Vocaroo);
- **live sharing** (e.g. Ustream, LiveStream, Blogtalkradio);
- **written and visual publishing** (e.g. Slideshare).

Social networks for business

Nowadays, social networks are becoming extremely important for business success, even for small businesses, too. Many companies use social networks in several different ways, for example to advertise their products, to allow their working teams around the world to keep in touch, or to search for personnel. In fact, social networks give employers the ability to connect with highly-qualified job seekers – especially the silent ones, i.e. qualified people who already have a job – without needing to involve a pricey headhunter, for example.

awesome: *eccezionale*
to foster: *promuovere*
to land: *ottenere*
pricey: *costoso*
quest: *ricerca*
to retain: *mantenere*

1 Decide if the statements are true or false. Correct the false ones.

	T	F
1. Social networks give the opportunity to interact with other people.	☐	☐
2. There are a few different social networks.	☐	☐
3. Anything you do on a social network may lead to problems related to privacy.	☐	☐
4. You need an invitation to access a customer community.	☐	☐
5. There are platforms that allow people to share presentations.	☐	☐
6. LinkedIn is useful only to employees.	☐	☐

2 Read the following text and answer the questions.

Social Media Trends in Italy 2022

Facebook is still one of the favourite social networks for the Italian online population. In particular, people between the ages of 57 and 64 are the most involved with the platform, while much younger generations have gradually and consistently neglected Facebook and migrated to other platforms. However, Zuckerberg has announced that he is in the process of re-equipping Facebook with tools and features that will attract and retain younger users, while at the same time trying to fight back TikTok's growing popularity with awesome Instagram additions.

Aside from Facebook itself, the Italian online population has been consistently active on Instagram, WhatsApp, and YouTube. Both Instagram and YouTube have been growing consistently by up to 90% across Italy, with nearly 30 million Instagram users and over 35 million YouTube users. According to a report conducted by Hootsuite and We Are Social, more than 85% of surveyed Italians, whose age range went from 16 to 64 years, confirmed that they use YouTube and WhatsApp on a daily basis. Users between 16 and 23 years of age seem to prefer using Instagram, whereas users between 24 and 56 usually opt for WhatsApp.

What about TikTok, then? Nearly 24% of Italians use TikTok regularly, and this figure is only expected to keep growing steadily. Very young Italians are those more likely to be found posting and sharing video content on TikTok, in keeping with the platform's worldwide demographic usage data. However, in Italy, older generations are also gradually getting interested in TikTok, as well as brands and entrepreneurs who are taking to the platform to promote their products and services.

Job-hunting in Italy is notoriously challenging, as the country has been dealing with a consistent economic crisis for at least a decade now. And this is where LinkedIn may come to the rescue. More and more Italians, in fact, are turning to this popular social network for professionals in order to connect with recruiters, companies, and employers, on a quest to land their dream job. Even though the current number of active LinkedIn users in Italy is not as astounding as the one for Facebook or Instagram – at the moment of writing, LinkedIn counts around 16 million users in Italy – it is likely that this figure will keep increasing.

Adapted from: *https://www.gaasly.com/blog/social-media-trends-in-italy-2022*

1. Which social networks are mentioned in the text?
2. Do you agree that they are the most popular in Italy? Why?
3. How do you imagine the trend for the next five years?

3 Read the text above again and collect relevant information for each social network and use it to write a few sentences that summarise the relevant data.

➤ Facebook is the favourite social network for users between the ages of 57 and 64.

BLOGS AND ONLINE FORUMS

It is different from a *chat room*, which is another example of online conversation, because texts are longer and are, at least temporarily, archived.

Some applications integrate forum features in weblog software with the possibility to follow different threads for discussion and with the presence of a moderation system.

■ Blogs

A **blog**, or **weblog**, is a frequently updated website consisting of dated entries arranged in reverse chronological order, so that the most recent appears first. In other words, it is an online diary.

The basic structure of a blog is the following:

Date and time	• The date and time of publication will appear automatically.
Category	• A category that identifies the type of blog.
Title	• An engaging title.
Tag	• A keyword or phrase to help describe the content of the entry.
Body	• A text with a short introduction and a conclusion. The body can be divided into paragraphs and subheadings.
Call to action (CTA)	• The CTA indicates what you want the reader to do next.
Request for comments	• An invitation to readers to send a comment.

to measure: *misurare, valutare*
on the hunt: *a caccia*
loads of: *un sacco di*
stuff: *cose*
to track: *tracciare*
treat: *delizia*

■ Business blogs

Although blogs are mainly used by people for personal interests, businesses also use them for promotional campaigns and even track them to measure customer satisfaction, for example. The most common types of **business blog entries** are the following:

- **How-to Post**, a blog entry that provides a step-by-step description of how a product works or how to apply for a service;
- **List Post**, which can be used to launch different sets of products on the market;
- **Review Post**, which offers an informed opinion about a particular product or service.

■ Online forums

An **internet** or **online forum**, also called a **message board** or **newsgroup**, is an online discussion site where people can use posted messages to hold a conversation•. Sometimes, a posted message might need to be approved by a moderator before being made visible.

A discussion forum has a hierarchical, or tree-like, structure and contains a number of sub-forums, each of which may have several topics. Within a topic, each new discussion started is called a **thread**, and can be replied to by an unlimited number of readers. Depending on the settings, users can either be anonymous or have to register with the forum and log in to post messages. However, on most forums, users do not have to log in to read existing messages.

Forum software packages are available on the Internet•• from the most basic, providing text-only postings, to the most advanced, which offer multimedia support.

4 PAIR WORK **Discuss the characteristics of personal blogs and decide if these statements are true or false. Note that not all the answers are in the text.**

	T	F
1. A blog is an online diary.	☐	☐
2. Blogs are only written for friends and family.	☐	☐
3. You can't talk about your feelings in a personal blog.	☐	☐
4. You can include images in your blog.	☐	☐
5. You have to update your blog regularly.	☐	☐
6. All blogs are open and readers can leave a comment.	☐	☐
7. Entries should be short.	☐	☐
8. You must not talk about your problems.	☐	☐
9. You should use an informal style.	☐	☐
10. You can't use contracted forms in a blog.	☐	☐

5 **Look at a table of the typical language features of a blog. Read two entries from the blog of a foreign student who lives in London and find examples to complete the table.**

23 JUN, 20… **Spotlight on the English National Opera**

Regular readers know that I'm constantly on the hunt for great nights out in London. Live entertainment is always a treat and luckily for us Londoners, we have loads of options. West End shows are an easy bet for a fun Friday night, but if you're after something special, why not spend an evening at the National Opera?

19 JUN, 20… **Houses of Parliament Tour: What to Expect**

You would think that the Houses of Parliament would have been one of the first places I visited when I moved to London, but it's taken me nearly 4 years to get around to it! I guess that just goes to show how much other stuff goes on in London and how difficult it is to find time to see everything!

Language features checklist	Examples from the blog entries
Use of the 1st person singular	
Use of contracted forms	
Addressing the reader (use of the pronoun "you")	
Vivid descriptions	
Use of question and exclamation marks	
Informal words and phrases	

6 GROUP WORK **Using what you already know and what you can find on the Internet, write a short text with some instructions and tips on how to write a blog post.**

7 **Read these posts in a forum, follow the thread and write your entry of about 20-30 words. Then, compare your ideas with the class.**

Forum	Are forums useful?
Mike 15th May 20…	I don't like forums. I think they are a waste of time. I prefer other forms of communication.
Jane 30th May 20…	I like taking part in forums. I like discussing a lot of different topics online. You can find very cool people online with great ideas.

AUDIO, VIDEO AND IMAGE SHARING

YouTube is the most popular video hosting service, while *SoundCloud*, an online audio distribution platform, is the equivalent for audio files. As for images, *Flickr* is the most famous image hosting service.

Have you ever used P2P file sharing?

Users who share files are called *seeds*, while those who download files are called *leeches*.

Audio, video and **image sharing** refers to websites or software where users can distribute their files. A **podcast** is a digital audio or video file or recording, usually part of a themed series, that can be downloaded from a website to a media player or computer.

Network file sharing

The general term **NFS**, **network file sharing**, means sharing all kinds of data or files on a network, even in a LAN. A file sharing system generally has one or more administrators and users may all have the same or different levels of access to read, view, modify or copy the files.

On the Internet, the file transfer system is called **File Transfer Protocol (FTP)**. It can be used to access files shared in a server among a particular set of users with a password. However, many FTP sites offer public file sharing or at least the ability to view or copy files by downloading them anonymously. Most website developers use FTP to upload new or revised web files to a web server, and indeed the World Wide Web itself can be thought of as large-scale file sharing in which requested pages or files are constantly being downloaded or copied down by web users.

broad: *ampio*
knot: *nodo*
proprietary: *brevettato, di proprietà di qualcuno*
to scurry: *correre*
to tangle: *aggrovigliarsi*

Types of NFS

NFS uses two basic sets of network criteria:

- **peer-to-peer (P2P) file sharing** is the most popular system because it allows the download of a file from multiple sources at the same time to speed up the process. An example is Emule. Network computer users locate shared data with third party software, i.e. Emule, and P2P allows files to be directly accessed, downloaded and edited. The third-party software, which is a sort of library of all the users' files, facilitates P2P sharing by collecting and segmenting large files into smaller pieces.
- **file hosting services** are service websites which usually host a broad selection of popular online materials to enable users to download them.

In the case of P2P, when the users download or make use of a file sharing network, their computer also becomes part of that network, allowing other users to download files from the user's computer. File sharing is generally illegal, with the exception of sharing material that is not copyrighted or proprietary. Another issue with file sharing applications is the problem of malware which may infect computers.

8 **Read the text and complete it with an appropriate word.**

A Brief History of YouTube

As content and photo sharing sites **1.** ..... taking off in 2005, the founders of YouTube noticed a small problem: there was an explosion in the number **2.** ..... expensive and inexpensive ways to capture video, but there was no good way to share them. Chad Hurley had studied design **3.** ..... Indiana University in Pennsylvania, while Steve Chen had studied computer science at the University of Illinois at Urbana-Champaign. After graduation, the two started working at PayPal in San Jose, California **4.** ..... they met many of their future employees. On Valentine's Day 2005, Hurley registered the trademark, logo and domain of YouTube. Three months later, in May 2005, a small group **5.** ..... early employees launched the beta test site www.youtube.com.

In November 2005, YouTube received funding **6.** ..... Sequoia Capital. In December, YouTube officially became a corporation. The first office **7.** ..... located above a pizzeria and Japanese restaurant in San Mateo, California. Over time, the number of employees increased, the desks multiplied, cables tangled into knots and from time **8.** ..... time, rats were discovered scurrying around. The time had come to move.

In October 2006, Google came knocking at the door. YouTube had about 65 employees. On the day **9.** ..... acquisition was announced, YouTube moved into a former GAP office in San Bruno, California. The much-discussed deal **10.** ..... settled one month later.

Today, YouTube **11.** ..... the first most visited website overall before Google. The platform comprises the largest video-sharing community **12.** ..... the world with more than 2.3 million users.

Adapted from: *https://sites.google.com/a/pressatgoogle.com/youtube5year/home/short-story-of-youtube*

9 (5.9) **Listen to a recording about Flickr and take notes on the services that the site can offer nowadays. Then, listen again and complete the table with the main events.**

Services: .....

.....

.....

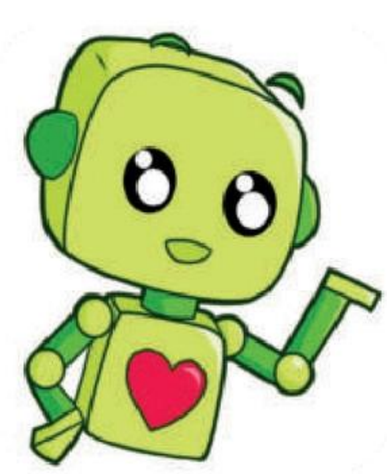
.....

2004	Flickr started life
2005	
2008	
2009	1. 2.
2011	1. 2.
2019	
Today	

10 **Watch a video on how to use Vocaroo and answer the questions.**

▸ Vocaroo Tutorial *posted by* Brad Nelson

1. How do you record a discussion using Vocaroo?
2. What can you do if you are unhappy with your recording?
3. Where do you have to click to save your recording?
4. Which box do you have to click to share your recording?
5. What do you do next?
6. Which button do you have to click to upload a discussion?



COLLABORATIVE DOCUMENTS AND WIKIS

Early online document collaboration used email. The comments were written in the email with the document attached. The problem was that the comments and the discussions around the document were separate from the document itself.

This website is home to an informal history of programming ideas, as well as a large quantity of material recording related to discourses and collaboration between its readers.

There are two ways to use Wikipedia: by searching or by browsing. If you have the name of the article, simply type it into Wikipedia's search box. Otherwise, browse the contents pages where there are alphabetical lists and indices by category.

Collaborative documents

Collaborative documents or **file collaboration**• are tools or systems to help more people work together on a single document or file to achieve a single final version. This software makes it possible for teams to work together on a single document, such as a word processor document or a spreadsheet, from different devices like computers, tablets or smartphones. In other words, people collaborate from different locations using an Internet, or cloud, enabled approach.

Most collaboration systems require a server computer which maintains copies of the documents for remote access. The server computer may be operated by the organisation owning the documents or outsourced to some service of cloud computing.

Features of collaborative documents

The main characteristics are:

- real-time comments and instant messaging features;
- presence indicators to identify when others are active on the documents;
- alerts to inform of latest activities per file or user;
- collaborating with people outside a company;
- handling large files.

Wikis

A **wiki** is a server program that allows users to collaborate in creating the content of a website with a simplified interface and no necessary knowledge of HTML. The term comes from the word *wikiwiki*, which means *fast* in the Hawaiian language. At any time, contributors can review the history of the page they are working on or preview the web page before publishing it. The simplest wiki programs allow users to create and edit content. More advanced wikis have a management component that allows a designated person to accept or reject changes.

The content of a wiki is written by users and anyone can change any page or create new pages since a wiki website operates on a principle of collaborative trust.

The first ever wiki was **Wiki Wiki Web**•• and all other wikis, included Wikipedia•••, Wikiquote and Wiktionary descend from it.

trust: *fiducia*

11 Read the text. All five types of software share common characteristics. Write down the special features for each one.

Top 5 Document Collaboration Software

1. **Document360**
   This software has a clean user interface that enables more than one user to work on a document at the same time. It automatically saves previous versions that you can restore whenever you need to. The platform makes it easy to create and share content for review.

2. **Zoho WorkDrive**
   Zoho WorkDrive is a platform for creating and editing documents and is highly suitable for businesses who have lots of documents to work on. Team folders enable you to organise your files and store them in one place. You can manage your team's data and usage all from one dashboard, keeping track of any edits that have been made to your files.

3. **Google Docs**
   Google Docs is a cloud document collaboration tool created by Google. It's possible to make all your edits online and Google Docs saves all previous versions of your files that you can revert back to whenever you need. Google Docs works primarily online so there's no need to save local files on your computer. Google alerts you with email updates when someone shares a document with you. The software supports the import of Word files and converts them into an editable format in Google Docs.

4. **Dropbox Paper**
   Dropbox Paper is an online document collaboration tool created by Dropbox which you can use for free. Paper helps you keep all your meeting notes organised. You can collate your background docs, agenda, minutes, next steps and task assignments. You can keep track of important tasks and deadlines.

5. **Microsoft Word**
   Collaboration hasn't been a strength of Microsoft Word but that all changed with the launch of Office 365. All of Microsoft's most popular apps are delivered through the cloud and it provides a real alternative to tools like Google Docs. Two of the best features of Microsoft Word are the ability to translate a document into different languages and transform it into web pages. Documents are shared in real-time.

Adapted from: *https://document360.com/blog/document-collaboration-tools/*

12 Read the text and complete it with the missing words.

Some Data on Wikipedia

Wikipedia **1.** ..... launched on 15th January 2001 and began as a complementary project for Nupedia, a free online English language encyclopaedia project whose articles were written **2.** ..... experts and reviewed by a formal process. **3.** ..... the beginning, there was only an English version of Wikipedia, but later similar versions **4.** ..... other languages were developed with different content and editing practices. Today, there are 327 language versions.

In March 2017 Wikipedia had about 40 thousand high-quality articles known **5.** ..... 'feature articles' and 'good articles' that cover vital topics. Today, there are more than 6,500,000.

In 2005, Nature published a peer review comparing 42 science articles from Encyclopaedia Britannica and Wikipedia and found that Wikipedia's level of accuracy was similar **6.** ..... that of Encyclopaedia Britannica.

WIKIPEDIA
The Free Encyclopedia

13 Watch the video and answer the questions.

▸ Print Wikipedia *posted by* Wikimedia Foundation

1. What did Michael do? Why?
2. What did he do to give attribution?
3. Which license did he use? What type of license is it?
4. How many people contributed to the English version of Wikipedia printed by Michael?

SMART TV AND STREAMING

Typical smart TVs support Ethernet, USB, Bluetooth and flash memory cards from digital cameras, as well as coaxial cables and other audio-video connections. Moreover, they support wireless connections to keyboards and mouses, cell phones and tablets to facilitate text entry, navigation and web browsing from the sofa.

There are many platforms for streaming available. Some examples for films are Netflix, Infinity, Hulu, Amazon Prime and Chili. For music: Spotify, Tim music, Google Play music and Deezer.

Common examples of media streaming services are Amazon Prime, Azure Media and Hulu Plus.

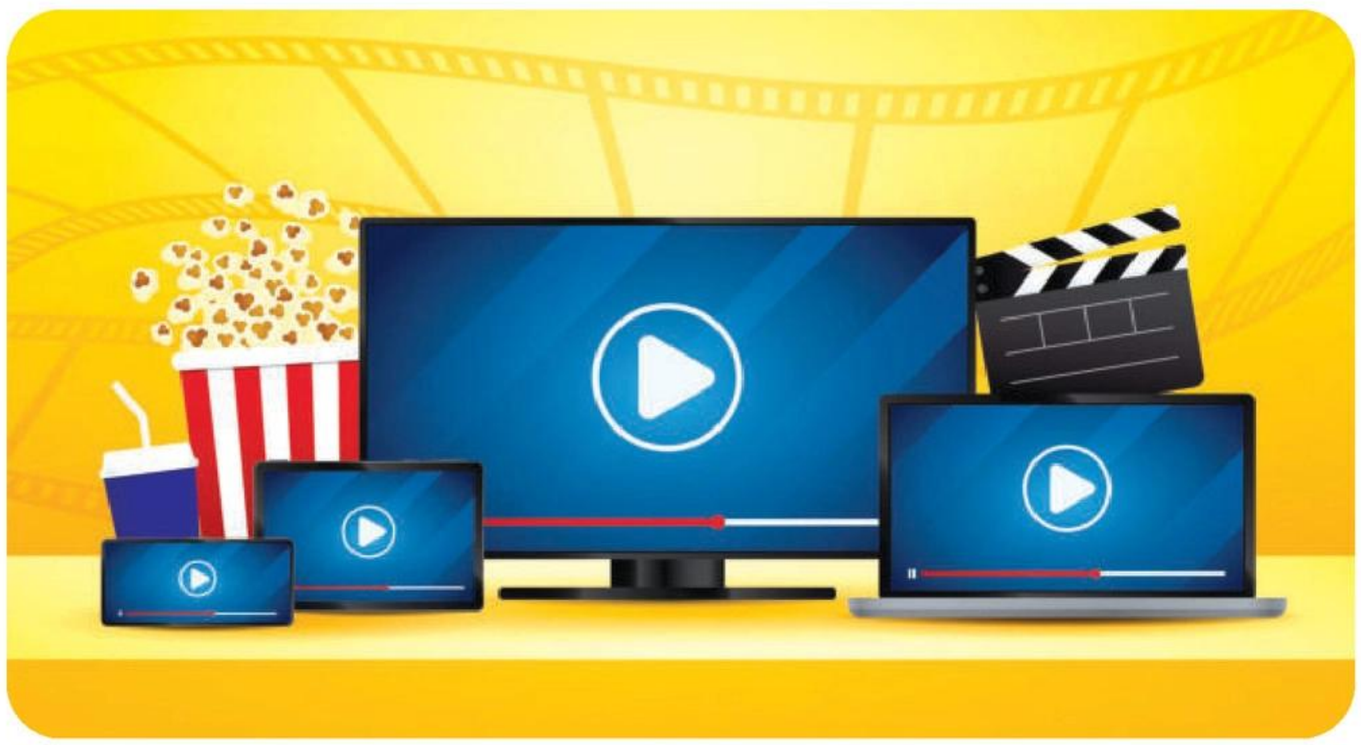
Smart TV

A **smart TV**, **connected TV** or **hybrid TV**, is a digital television set which integrates the Internet and web 2.0 features to provide users with a more interactive experience. In other words, it is an Internet-connected• computer specialised for entertainment. In fact, apart from being able to receive cable, satellite or over the air (OTA) transmissions, smart TVs are also fitted out with extra hardware and connections to offer web features which generally include web browsing, video-on-demand, streaming, social networking and access to pictures, music and videos from connected storage devices.

Smart TVs are available as stand-alone products with internal technology, i.e. with an operating system which manages the interactive functions, but regular TVs can also be made smart through **set-top boxes** that enable advanced functions.

The most common smart TV connections are:

- to websites like YouTube and Vimeo for video sharing, or to Netflix for streaming;
- to Internet radio services like Pandora and Rhapsody;
- to social networking sites like Twitter and Facebook;
- to smart programmes such as Google TV;
- to various apps and games.



Smart TV philosophy

Smart TVs can also be interpreted as a move towards a more interactive philosophy. In fact, the smart TV approach is transforming what used to be a passive broadcast into a high-design interactive interface. This phenomenon is part of a greater one that involves new exploration into more interactive consumer interfaces, such as the tablet touchscreen or wearable devices. Unfortunately, however, there are some problems related to privacy and security. In fact, cameras and microphones on smart TVs can be turned into snooping devices by malicious hackers.

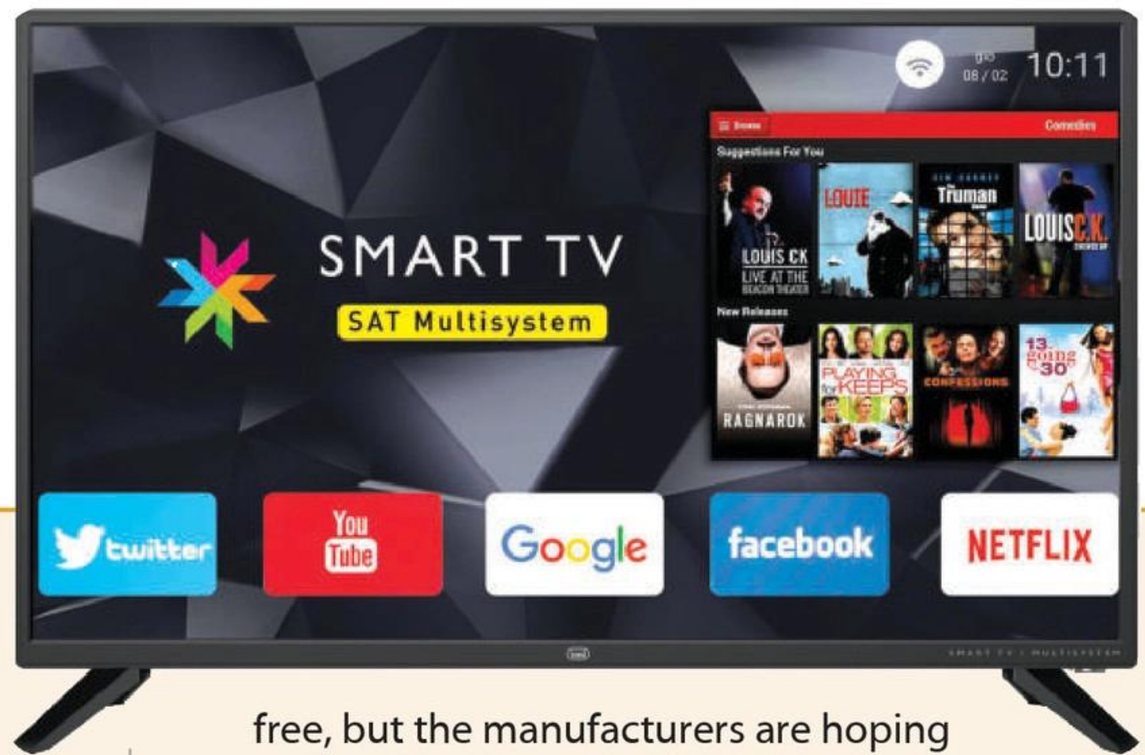
Streaming

Streaming, or **media streaming**, is a technique for transferring data so that it can be processed as a steady and continuous stream. This implies listening to music or watching videos in real time••, instead of having to download a file on a computer and watch or listen to it later. Some broadcasters prefer streaming for Internet••• and webcasts of live events because it is harder for the content to be saved and then distributed illegally. For users, the biggest advantage is that data is displayed before the entire file has been transmitted.

to be fitted out: *essere dotato*
to catch up on: *mettersi al passo con qualcosa*
flat-panel: *schermo piatto*
to imply: *implicare*
to snoop: *spiare*
steady: *regolare*

14 **Read the text and choose the correct heading for each paragraph.**

a. Can I use apps across TVs or devices?
b. How do I connect my TV to the Internet?
c. How do I control the TV?
d. How do TV apps work?
e. What can I do on a smart TV?
f. What does smart TV mean?
g. What if I don't want a new television?
h. Why do I need one?



Smart TV: What you Need to Know

1. ☐ A smart TV offers a number of Internet connected services that normal televisions can't offer. It has the equivalent of a computer built into it, giving you a greater number of services. These televisions offer apps, media streaming, web browsing, games and, perhaps most importantly, Internet Protocol Television (IPTV).
2. ☐ There is one feature that promises to revolutionise how we use our televisions: we no longer have to watch a programme while it is aired! What's more, if you download a lot of videos or music from the net, then the right smart TV can access that content directly, without having to copy it onto a disk or USB stick!
3. ☐ All smart TVs accept an Ethernet cable at the back of the TV, while most also support wireless connection. To connect to the Internet, you will need to set up a home network.
4. ☐ A smart TV enables you to browse the web, watch YouTube and catch up on social networking. To us, the most exciting capability of smart TV is the ability to watch videos on demand.
5. ☐ All smart TVs have a home page that lets you access all of the different functions, and from there they also link to individual app stores. At the moment, all of the apps available on smart TVs are free, but the manufacturers are hoping to translate the popularity of paid apps on mobile devices to televisions.
6. ☐ Unfortunately, all of the different TVs have their own unique operating environments, and you can't translate apps from one device to another. However, most smart TVs have their own remote applications on the Android and Apple app stores that will enable you to control the TV from anywhere in the house.
7. ☐ If you have already bought a flat-panel TV recently, then there is a way to get the smart TV features without having to buy a whole new television. Several companies offer set-top boxes with smart features onboard for a few hundred dollars.
8. ☐ To many people, a smartphone means that it has a touchscreen, but when your TV is six feet away, it is hard to touch it. As a way of getting around this, manufacturers have come up with several different methods now available for controlling smart TVs. Our current favourite is LG's Magic Motion remote. It acts like a Nintendo Wii-mote and enables you to naturally point at objects on the screen.

Adapted from: *https://www.cnet.com/news/smart-tv-what-you-need-to-know/*

15 (5.10) **Listen to a recording about smart TVs and decide if the statements refer to Samsung, Sony or LG.**

1. A smart TV is a device connected for content consumption. .....
2. A smart TV is an interactive device. .....
3. A smart TV is a set that can run apps. .....
4. Their future vision is a company-wide attitude. .....
5. Their future vision is content distributed across different touch points. .....
6. They did not comment on their future vision. .....

VOIP AND VIDEOCONFERENCING

Skype originated from the words *sky* and *peer*. Originally, the name was shortened to Skyper, but as the domain *skyper* was already taken, the final choice was Skype.

Which videoconferencing tool is used in your school? Do you know of any others?

Webex, Adobe Connect and Go To Webinar are examples of videoconferencing software for business.

VoIP

VoIP, or **voice over Internet protocol**, is a technology that allows voice and multimedia content to be carried over Internet connections or other networks, both LANs and WANs, not specifically designed to carry voice, using the Internet protocol, IP.

VoIP encapsulates audio via a **codec**, i.e. a device or program for encoding and decoding digital data stream or signals, into data packets which are transmitted across an IP network, and transforms them back into audio at the other end of the connection.

The main advantage of this method of transmission is the fact that it is comparatively inexpensive because it reduces network infrastructure costs by eliminating the use of circuit switched networks for voice. However, it does not provide real full-duplex communication. This happens because, unlike regular circuit switched phone networks, IP packet switched networks break the voice signals into chunks, or packets, that arrive at destination through different routes and at different intervals and are reassembled in the correct order by the receiving device. This process often results in discernible gaps in the flow of conversation.

chunk: *pezzo*
discernible: *riconoscibile*
to phase out: *eliminare gradualmente*

Skype

The first, and once most common, example of VoIP is **Skype**: a software application used for voice, video, and instant messaging communications, which uses a peer-to-peer technology. It offers free calling between subscribers and low-cost calling to people who don't use the service. In addition, it enables file transfer and videoconferencing. The service is available for desktop computers, notebooks, tablets and mobile devices.

Due to the fact that new videoconferencing systems are now available, Microsoft decided to phase out Skype for Business on June 2022 and replaced it with Microsoft Teams, while the consumer version is still available.

Videoconferencing

A **videoconference** is a live, visual connection between two or more people in different locations for the purpose of communication. It can both transmit static images and text or full-motion video images and high-quality audio between multiple locations. Applications like Google Meet, Zoom and Microsoft Teams make videoconferencing possible on desktops and mobile devices which have an embedded camera.

In the business world, desktop videoconferencing is a core component of unified communications applications and **web conferencing services**. In some cases, with minimal investment, it is possible to use cloud-bases conference rooms.

Nowadays, videoconferencing is also largely used for educational purposes.

16 Match the questions about Skype with their correct answers.

1. When did Skype come out? ☐
2. What was the original price of Skype? ☐
3. What is Skype? ☐
4. Who invented Skype? ☐
5. Who owns Skype now? ☐
6. When was Skype invented? ☐
7. Why was Skype invented? ☐
8. Is Skype still used today? ☐

a. Skype first began development in 2002. The beta version was released in 2003.

b. Skype has an estimated 1.95 billion users worldwide, as of 2022. While there are competitors, it remains one of the most popular applications used for video conferencing.

c. Skype was first introduced as a beta version in 2003. The code was written by Estonian developers Ahti Heinla, Priit Kasesalu, and Jaan Tallinn.

d. Skype is a Voice over Internet Protocol (VoIP) and video calling application. It allows users to call.

e. Skype was first used as a Voice over Internet Protocol (VoIP) service. It then added video conferencing, file transfer, and instant messaging services.

f. Skype has always been free to download. Depending on the type of call and your location, however, there can be a charge per call or per month.

g. Skype has been owned by Microsoft since 2011. It was initially developed by the Skype Group in 2003 before being sold to eBay in 2005.

h. Skype Group was founded by the Swedish entrepreneur Niklas Zennström and the Dane Janus Friis.

Adapted from: *https://history-computer.com/skype-guide/*

17 PAIR WORK Read a comparison table of the free basic versions of Microsoft Teams, Google Meet and Zoom. Write some questions about it and then practise asking and answering them.

	Microsoft Teams	Google Meet	Zoom
Participants	100	100	100
Length	1 hour	unlimited	40 minutes
Video quality	1080 p	720 p	720 p
Chat	yes	yes	yes
Breakout rooms	yes	no	yes

Google Meet

Write the questions first.

1. How many .....?
2. How long .....?
3. Which one .....?
4. Which one does not .....?
5. .....?
6. .....?

18 Use the Internet to answer the following questions.

1. What is the difference between a 720p and a 1080p screen?
2. What is a breakout room?

INSTANT MESSAGING AND MICROBLOGGING

SMS text messaging is still largely used for mobile marketing.

Text messaging and instant messaging are similar because they are both used to send text messages. The difference is that the first uses the mobile phone service, the latter uses the Internet.

Do you use any instant messaging software? Which one? How many messages do you send on average a day?

Traditional media organisations, including *The New York Times* and the BBC, send headlines and links in microblog posts.

Instant messaging

In everyday communication, traditional **SMS text messaging** has been largely replaced by instant messaging, which offers the same experience and more for free. **Instant messaging**, or simply **IM** or **IMing**, is the exchange of text messages over the Internet through a software application in real time. Moreover, IM offers the ability to see whether other people are online and connected through the selected service. Instant messaging differs from emails because of the immediacy of the message exchange and the simplicity of sending it back and forth. Most exchanges are text only, although most popular services allow voice messaging, file sharing and even video chat if both users have cameras.

How does IM work?

The instant message transmission is effective when both users are online and the receiver is willing to accept instant messages, because it is also possible to configure the IM client to reject chat sessions. If the online software is set to accept IMs, it alerts the receiver with a distinctive sound or a window that indicates that an IM has arrived and so the receiver can accept or reject it, or, alternatively, a window containing the message. The most popular instant messaging applications include: Facebook Messenger, WhatsApp, Telegram, Viber, LINE and Google Hangouts.

Microblogging

Microblogging is a combination of blogging and instant messaging. It is a web service that allows the subscriber to broadcast short messages to other subscribers of the service. **Microposts** can be made public on a website and/or distributed to a private group of subscribers. Subscribers can read microblog posts online or request the delivery of updates in real time to their desktop as an instant message or sent to a mobile device as an SMS text message.

The appeal of microblogging is both its immediacy and portability. Posts are brief, typically 140-200 characters, and can come in a variety of content formats such as text, images, video, audio and hyperlinks. Other potential applications of microblogging include traffic and sports updates and emergency broadcast systems. The most popular microblogging applications are: Twitter and Tumblr.

19 **Read the text and complete it with the words given below.**

apps • deleted • forth • free • location • messages • mobile • photo • privacy • username

Instant Messaging Applications

Facebook Messenger	It organises all your private **1.** ..... from your inbox in a way that is very familiar to regular texting.
WhatsApp	It allows users to chat back and **2.** ..... with individuals and in groups. It's available on all major mobile platforms and lets anyone send unlimited text, photo, audio and video messages.
WeChat	It promises free crystal-clear voice and video calls along with individual and group instant messaging. It's a unique and convenient walkie-talkie mode that lets you talk to up to 40 other friends with integrated real-time **3.** ..... sharing.
Kik Messenger	It lets you use a **4.** ..... to chat with others. You can even see when another user is typing back to you in real time.
Snapchat	It lets you send a self-destructing **5.** ..... or video message with a short text-based caption. After the recipient has opened the message, it will automatically be **6.** ..... after a few seconds. It also offers a feature to post longer messages through Snapchat stories.
Telegram	It is a good choice for those who want to ensure that their data and **7.** ..... is kept secure. Telegram messages are encrypted.
LINE	It offers all the various features needed for instant messaging. You can send unlimited text, images, video and audio messages using almost any device since the service is available on almost all major **8.** ..... and even computer platforms. Video calls are also available.
Viber	It lets you send free unlimited text and photo messages to your friends all around the world. HD video calls can be made for **9.** ..... as well, and groups can have up to 100 participants.
Google Hangouts	You can chat instantly either from your desktop or via the iPhone and Android **10.** ..... to send text or photo messages. You can also hold video calls with individuals or groups.

Adapted from: *https://www.lifewire.com/popular-and-free-instant-messaging-apps-3485937*

20 (5.11) **Listen to a short recording about common microblogging applications and take notes on their main features.**

Twitter	Tumblr	Instagram

APPS AND WIDGETS

A game app, for example, might take advantage of the iPhone's accelerometer. In fact, the specificity of a device is now part of its desirability because consumers can choose them based on what they are capable of doing.

Apps that use location-based features are built from the ground up with an eye to mobile, given that there is not the same concept of location on a PC.

The term widget has traditionally been used to refer to any relatively small mechanical object without a name, or unknown objects in general.

What are apps?

A **mobile application**, most commonly referred to as an **app**, is a type of application software specifically designed and developed to run on small, wireless mobile devices such as a smartphone or a tablet. Most apps provide users with services similar to those accessed on PCs. However, apps are generally small, individual software units with limited functions. Each application provides limited and isolated functionality such as a game, a calculator or mobile web browsing.

Although apps avoid multitasking because of the limited hardware resources and are designed by taking into account the demands and constraints of mobile devices, they also take advantage of any specialised capabilities that the devices have.

The simplest mobile apps take PC-based applications and port them to a mobile device. A more sophisticated approach involves developing specifically for the mobile environment.

Types of apps

Apps can be classified as follows:

- **native apps** are developed for use on a particular platform or device and downloaded via app stores;

- **web apps** are stored on a remote server and delivered over the Internet through the browser interface of the mobile device;
- **hybrid apps** are a combination of both native and web software;
- **killer apps** are programs that intentionally or unintentionally get people to buy the device the applications run on;
- **legacy apps** are apps that have inherited features from languages, platforms or techniques previous to the current technology.

Widgets

The term **widget** refers to both an element of the GUI which displays information or provides a specific way for the user to interact with the operating system or an application, and the small program which is written to describe what a particular widget looks like and how it behaves in response to the user's actions. Widgets include icons, pull-down menus, buttons, selection boxes, progress indicators, on-off checkmarks, scroll bars, windows, and many other devices for displaying information and for inviting, accepting, and responding to user's actions. A widget runs continuously to perform a particular task, e.g. clock or calendar, and consumes CPU memory and battery, while an app only runs when you want it to run.

21 (5.12) **Listen to the recording and decide if these statements refer to native apps (NA), web apps (WA) or hybrid apps (HA).**

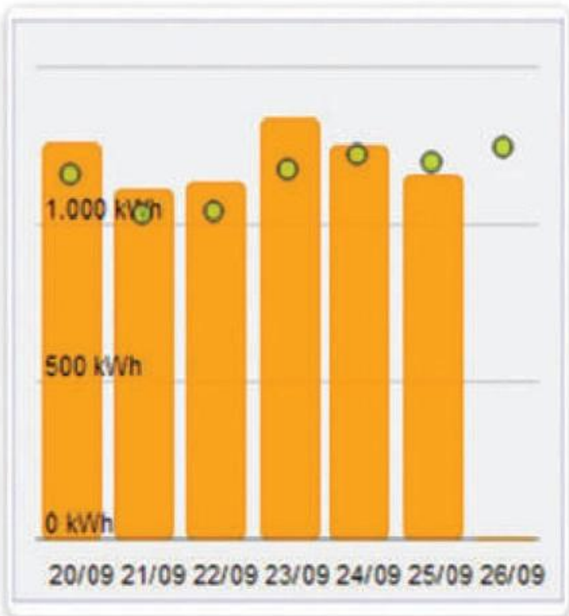
	NA	WA	HA
1. The browser is embedded within the app.	☐	☐	☐
2. They allow cross platform development.	☐	☐	☐
3. They are accessed through icons on the device's home screen.	☐	☐	☐
4. They are built as wrappers for web pages.	☐	☐	☐
5. They are developed specifically for one platform.	☐	☐	☐
6. They are incorrectly called web apps.	☐	☐	☐
7. They are installed through an application store.	☐	☐	☐
8. They are not real applications.	☐	☐	☐
9. They are run by a browser.	☐	☐	☐
10. They are written in HTML5.	☐	☐	☐
11. They can take full advantage of the device features.	☐	☐	☐
12. They can work offline.	☐	☐	☐
13. They live on the device.	☐	☐	☐
14. The same components can be reused on different mobile operating systems.	☐	☐	☐
15. They look and feel like native applications.	☐	☐	☐
16. They use the device's notification system.	☐	☐	☐
17. Users access them as they would access a web page.	☐	☐	☐
18. Users install them on the home screen and create a bookmark to the page.	☐	☐	☐

22 PAIR WORK **Discuss the following questions.**

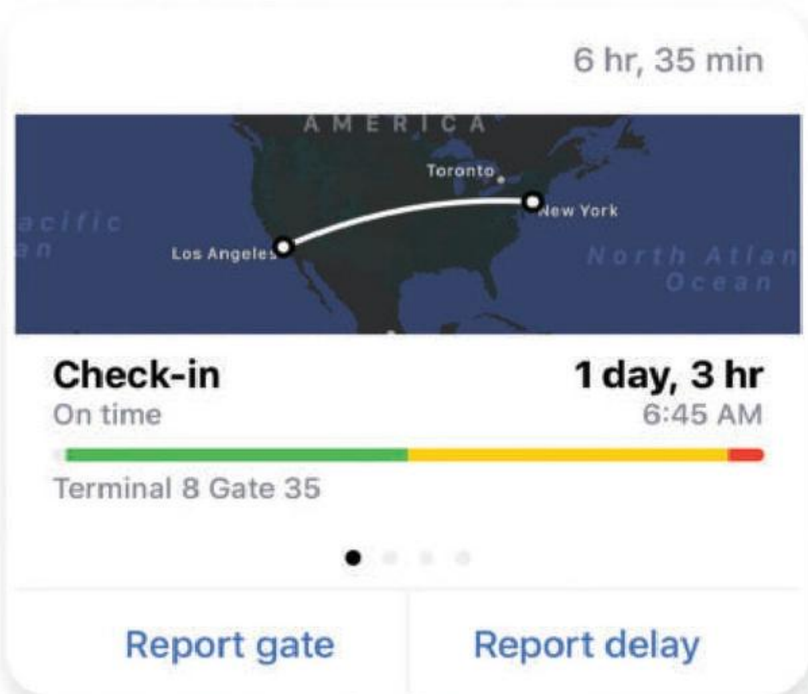
What types of apps do you use? What for? Why?

23 PAIR WORK **Look at the pictures and identify the different types of widgets.**

bar chart • counter • doughnut chart • list • speedometer • timeline



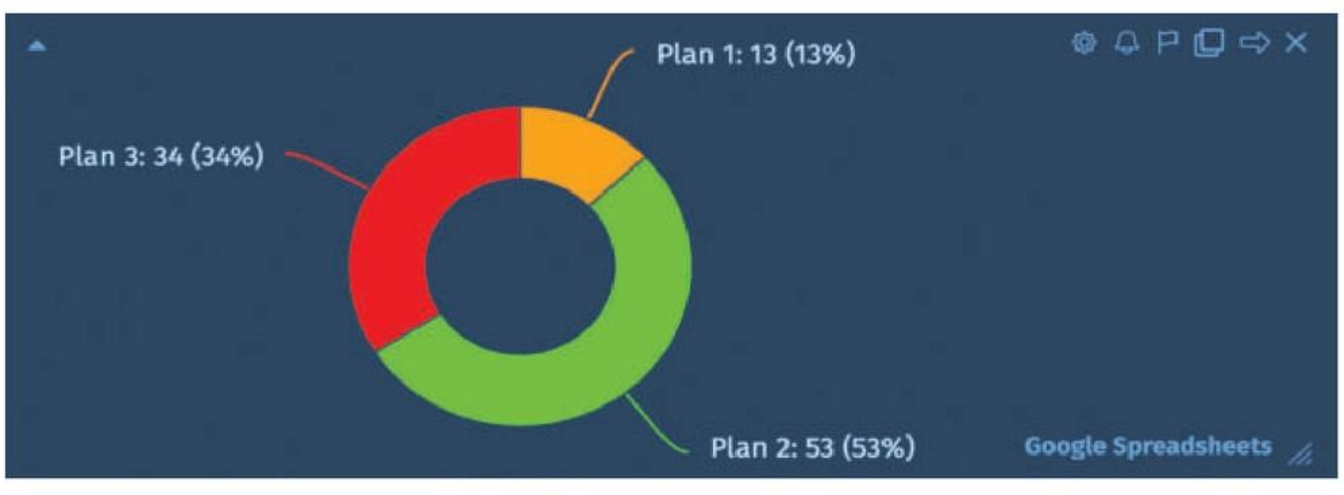
1. .....



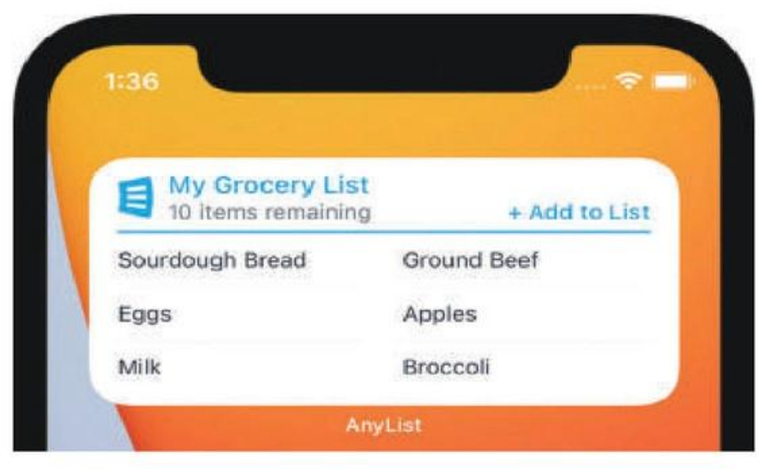
2. .....

3. .....

4. .....



5. .....



6. .....

GRAMMAR

CONNECTORS

Function	Connectors
Addition	*and, also, besides, too, even, additionally, in addition, moreover, furthermore, as well, as well as*
Exemplification	*for instance, for example (e.g.), that is, this/that means that, in other words, such as*
Cause-consequence	*so, so that, so … that, because of this, this/that is why, consequently, therefore, as a result, thereby, thus*
Cause-reason	*because, as, since*
Contrast	*yet, but, however, whereas, while, though, instead of, on the contrary, on the other hand, conversely, vice versa*
Concession	*(al)though, even if/though*
Conditional	*if, even, whether, unless, provided that, as/so long as, in case*
Expressing thoughts, facts or feelings	*that*
Purpose	*to, in order to, so as to, so that, in order that*
Manner	*as, as if, as though*
Time	*after, before, when, while, whenever, till/until, as long as, as soon as, once, since*
Correlation	*both … and; either … or, neither … nor*
Emphasis	*in fact, actually, as a matter of fact,*
Exclusion/inclusion	*apart from; except, excluded, including, included*
List and sequence	*first(ly), second(ly), third(ly) etc.; first, then, after, after that, finally; to begin with, to conclude, eventually, the former, the latter*

24 **Choose the correct option.**

1. I use YouTube to upload my own videos *and / but / because* watch videos published by others.
2. I never use Skype *though / while / because* I prefer Meet.
3. I needed some photos for my presentation, *after / so / while* I looked for a photo sharing platform.
4. *While / Whereas / Since* I was writing an email, my brother was chatting on Messenger.
5. I really liked Tom's new smart TV, *so / because / that is why* I'm buying one myself.
6. I don't like blogs. I don't know what to write. *Moreover / Since / Therefore*, you have to update them regularly.
7. Videoconferences are *both / either / neither* time *and / or / nor* money saving.
8. *Although / Because / Since* I like social networks, I rarely write posts.
9. I often use SlideShare *because / to / though* download ready-made presentations.
10. Skype offers a good service. *Although / However / But*, I never actually use it myself.
11. I think *so / that /so that* SlideShare is very useful.
12. *If / Unless / Although* you find a good picture, I won't post it.

PEER REVIEW

Peer review is the process by which scholars assess the quality and accuracy of other scholars' research papers before their publication in a major academic research journal. It is similar to the proofreading of newspaper articles, but it follows a more complicated, accurate and lengthy process. The same happens in computing with the writing of programs and apps.

Types of peer review

There are different types of peer review:

- **Single anonymised review –** The names of the reviewers are hidden from the author. This is the traditional method of reviewing and is the most common so far;
- **Double anonymised review –** Both the reviewer and the author are anonymous;
- **Triple anonymised review –** Reviewers are anonymous and the author's identity is unknown to both the reviewers and the editor;
- **Open review –** An umbrella term for many different models, all of which guarantee more transparency during and after the peer review process. The most common definition of open review is when both the reviewer and author are known to each other during the peer review process. Other types of open peer review include:
  1. the publication of the reviewers' names on the article page;
  2. the publication of peer review reports alongside the article, whether signed or anonymous;
  3. the publication of peer review reports, signed or anonymous, together with the author's and editor's responses alongside the article;
  4. a publication of the paper after a quick check and opening a discussion forum to the community who can comment, also anonymously.

Adapted from: *https://www.elsevier.com/reviewers/what-is-peer-review*

25 **Read the following situations and decide what type of peer review is being used.**

1. Mike has written an article. Jane is reviewing it, but Mike does not know that Jane is the reviewer. .....
2. Mike has written an article. Jane is the reviewer and Paul is the editor. Nobody knows who has done what. .....
3. Mike and Jane know each other. Mike has written an article and knows that Jane is reviewing it. .....
4. Mike has written an article and Jane is reviewing it. Mike does not know who is reviewing his article and Jane does not know who wrote the article. .....
5. Mike has written an article and Jane has reviewed it. Jane's name appears on the article. .....
6. Mike has written an article which is commented on by a community. .....
7. Mike has written an article and Paul is the editor. Jane is one of the two reviewers. The article is published with Jane's and another anonymous reviewer's comments together with Mike's and Paul's responses. .....
8. Mike has written an article. Jane is one of the two reviewers. The article is published with Jane's and another anonymous reviewer's comments. .....

26 **Imagine you have just written an article for a website. The peer reviewers are your classmates and the editor is your teacher. What type of review would you prefer? Why?**

VOCABULARY

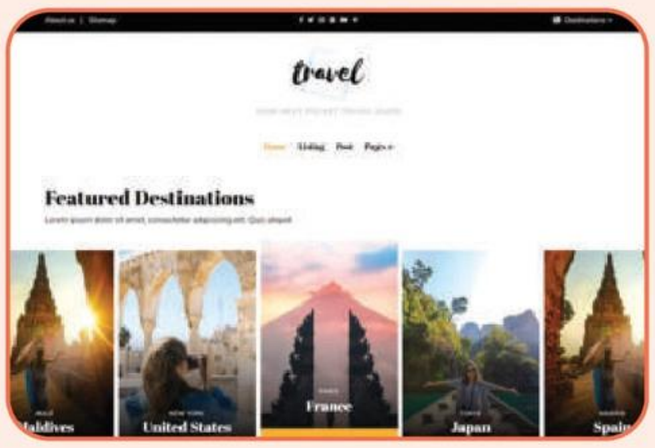
1 **Write the correct words for the following pictures.**

blog • chat line • cloud computing • collaborative document • ring topology • search engine • smart TV • star topology • videoconference • widget • wiki • Bluetooth

1. .....

2. .....

3. .....



4. .....

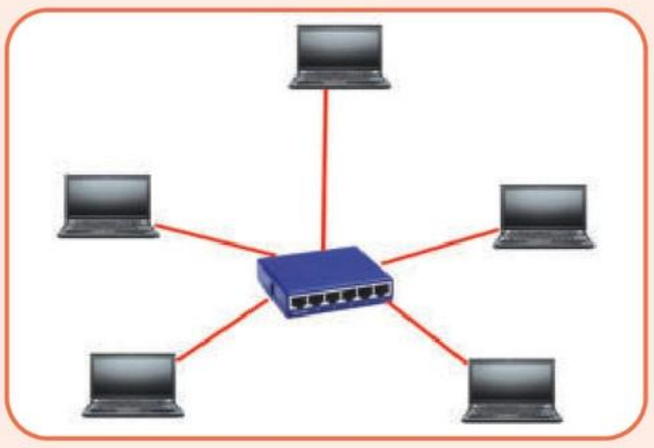
5. .....

6. .....

7. .....

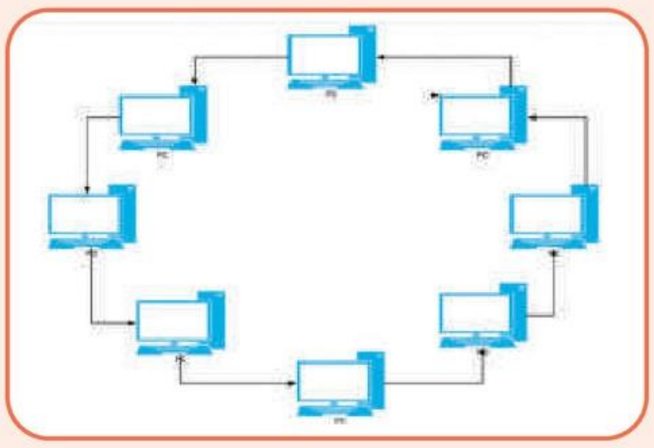
8. .....

9. .....



10. .....

11. .....



12. .....

2 **Find the words for these definitions in the wordsearch.**

1. It allows people to collaborate to form the content of a website.
2. It is an online discussion site where people post messages to hold a conversation.
3. It is a technique for transferring data in a steady and continuous way.
4. It is a popular VoIP application software.
5. It is a combination of a blog and instant messaging.
6. It is an application software specifically designed for a mobile device.
7. It is a kind of graphical "username".
8. It is a symbol used in microblogs.

D	T	R	G	A	T	H	S	A	H	K	E
W	B	V	L	U	L	S	K	S	K	J	L
P	M	P	Y	E	Q	Q	F	T	N	L	V
S	V	I	I	R	L	Q	U	O	U	K	W
K	T	I	C	K	D	V	G	Z	R	C	B
G	P	R	J	R	I	P	Z	H	I	U	G
Q	B	Z	E	D	O	W	P	R	G	P	M
V	K	M	A	A	K	B	U	A	L	E	X
R	V	G	W	A	M	F	L	M	W	P	C
G	I	F	W	F	J	I	L	O	E	Y	S
Q	Q	L	Z	E	G	I	N	A	G	K	W
Q	R	A	T	A	V	A	Y	G	J	S	F

3 **Find the odd one out for each group of four words/phrases and justify your choice.**

	a	b	c	d
1	social network	blog	forum	podcast
2	VoIP	website	app	widget
3	videoconference	VoIP	streaming	Skype
4	video clip	smart TV	streaming	chat line
5	user ID	username	password	blogger
6	microblog	forum	instant message	blog
7	search engine	forum	newsgroup	chat line
8	social network	chat line	username	hashtag

4 **Use these words to make new ones adding prefixes or suffixes or making compound words.**

➤ *blog: blogger, microblog*

1. chat .....
2. streaming .....
3. web .....
4. message .....
5. video .....
6. user .....

CHOOSING A NAME AND A TEMPLATE FOR A CLASS BLOG

5 GROUP WORK **Create a class blog. Follow the instructions.**

1. Split up into groups and decide on a topic, e.g. a school diary (events, school trips, etc.), notes on school subjects, free time activities, etc.

   A few tips

   You don't need to be an expert on any of the topics you write about. People who visit blogs don't want to read a textbook from a specialist, they want to hear about someone's personal experience. So, choose topics you are passionate about and share your thoughts.

2. Choose a descriptive name for your blog. Choose a name and use a search engine to verify that it is not already registered. If that is the case, try one of the following:
   - change the domain name (e.g. *.net* or *.org* instead of *.com* or *.it*);
   - add short words like *my, the* (e.g. *MySchoolBlog* or *TheSchoolBlog* instead of *SchoolBlog*);
   - add dashes between words (e.g *The-School-Blog* instead of *SchoolBlog*).
3. To get your blog online you will need a blog/web host and appropriate blogging software. Use the Internet to find the name of some blog hosts. Blog hosts are companies that store all the files of a blog and deliver them to the users when they type the blog name.
4. Choose a template for your blog. There are some templates available for free on the Net. Have a look, choose a basic model and then plan as many changes as you want. Present your template to the class.
5. Discuss different ways to promote your blog.
6. Write your first blog post keeping in mind all the various elements. Here is a template.

BLOG name		
Date:	Time:	Topic:
Title:		Tag:

TRIVAGO: AN AGGREGATOR WEBSITE

About Trivago

Trivago is basically a hotel search platform whose main focus is to reshape the way travellers search for and compare hotels online. During this process, Trivago enables hotel advertisers to expand their business by giving them access to a large consumer base that visits its platform via the website or the app. Trivago was conceptualised and started by three university friends in the year 2005 in the city of Düsseldorf, Germany. Similar to the majority of start-ups, the initial foundation of the business was started in a basement.

Trivago Revenue Streams

Trivago has mainly two streams of revenue:

- **revenue generated from listings:** basically, revenues that it generates from the fees paid to it by hotel booking sites for displaying their services and rooms listed on its platform. This is 59% of the total revenue and is generated by a cost-per-click model, i.e. when a user clicks on a hotel link in the platform, Trivago gets paid in return.
- **revenue generated from services: r**evenue that Trivago generates from fees that it gets paid by hotel brands for basically managing their visibility as well as the presence on Trivago's platform.

Adapted from: *https://businessfuels.in/trivago-success-story/*

Trivago versus booking sites

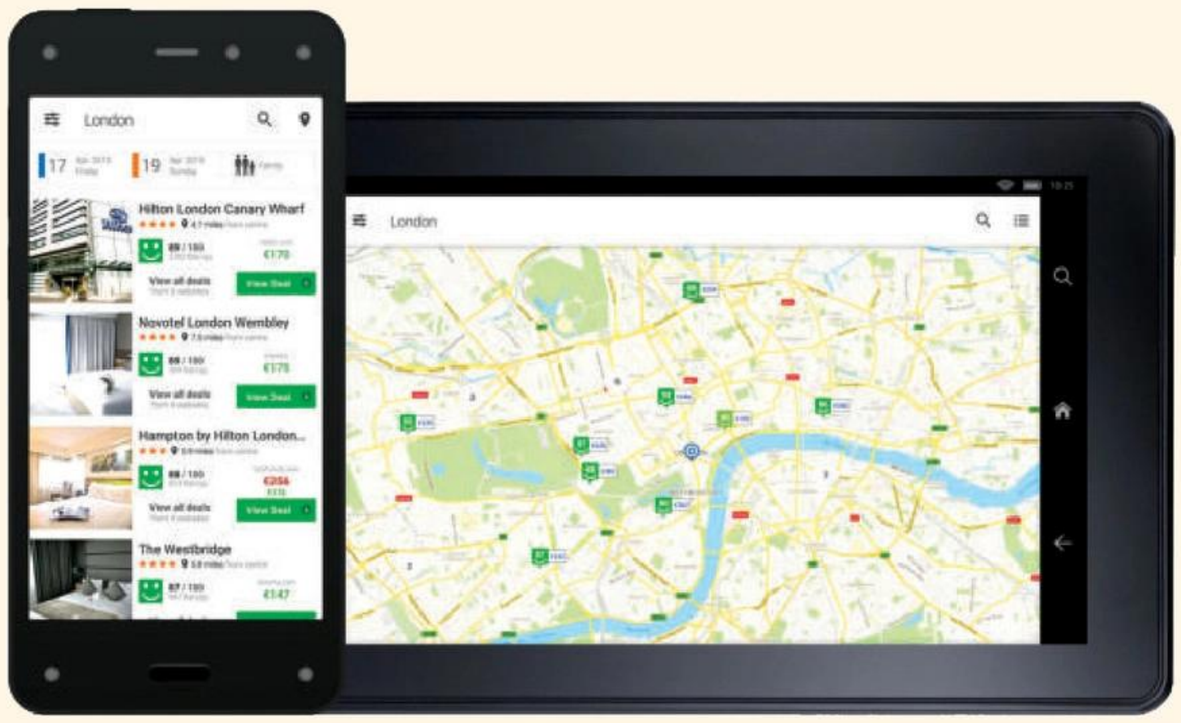
Trivago is a **metasearch engine** that compares accommodation prices and offers provided by many different booking sites globally, including online travel agencies (OTAs), accommodation chains and independent hotels. This means that while users decide on Trivago which hotel best suits their needs, the booking process itself is completed through the booking sites, which are linked to Trivago's website.

A booking site, or Online Travel Agency (OTA), on the other hand, is a web-based marketplace that allows consumers to research and book travel products and services, including hotels, flights, cars, cruises, activities and more, directly with travel suppliers.

How Trivago determines its guest ratings

Trivago scans many available guest reviews and rating sources across the web on a daily basis. The reviews and ratings are aggregated and converted with the **Trivago Rating Index®** that ranges from 0 to 10 (10 is the highest possible rating).

Adapted from: *https://support.trivago.com/hc/en-us/sections/360000014707-How-trivago-Works*



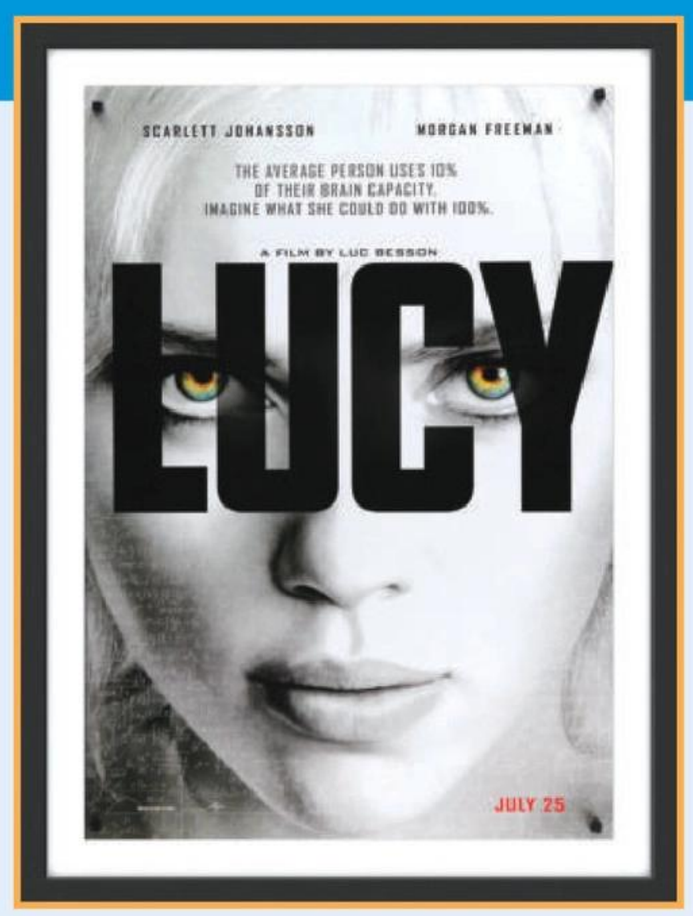
6 **Answer the questions extensively.**

1. What is Trivago?
2. What are its two main sources of revenue?
3. How is Trivago different from a booking site?
4. How does Trivago determine its guest ratings?

CLIP FILM

LUCY

- PRODUCTION: Usa/France 2014
- DIRECTOR: Luc Besson
- STARRING: Scarlett Johansson (Lucy), Morgan Freeman (prof. Samuel Norman), Amr Waked (Pierre Del Rio)



SYNOPSIS

The film starts with a cell splitting up into multiple other cells, and soon after a proto-human in prehistoric times is drinking from a lake. Lucy narrates that life began billions of years ago and ponders what we have done with it since then.
In the present, Lucy is a young woman with a drug, called CPH4, stuffed into her intestine. A criminal kicks her stomach and this causes a tear in the drug bag, leaking the powder into Lucy's system. Meanwhile, Professor Norman is giving a lecture. He explains what could happen if humans could exceed the 10% brain capacity that they use. If they could reach up to 40%, they could manipulate matter. Lucy reawakens, with her eyes glowing bright blue. She is able to dig a bullet out from her shoulder without feeling pain and hears peoples' voices from outside the car. A doctor pulls the bag of drugs out of her stomach and she contacts professor Norman. She has now reached 20% brain capacity and is able to manipulate electronics, appearing on Norman's TV, as well as on his phone and the radio. "40%" flashes onscreen. Lucy discovers a tooth in her glass, and then she spits up three more teeth. Then her skin starts to disintegrate. She wakes up in a hospital room, with her brain functioning now at 60%. She realizes that her brain exceeds human capacity. Lucy and Del Rio, a policeman, find Norman and she describes all she has come to realise with her brain power. Lucy gives the rest of the CPH4 to the professor to synthesise into a liquid material that goes into her bloodstream. Her brain function goes to 70% and her hands start to turn into a black wormy substance that attaches itself to the computers in the room, giving Lucy more energy from matter, and supplying her with an insane amount of power. As her brain function continues to increase, she manipulates matter and erases everything in the room, leaving a white space before creating some kind of new age super-computer. She travels backwards, from early 20th century New York to colonial times, even all the way to prehistoric times to come face-to-face with the proto-human from the opening scene. They touch fingers, sending Lucy through the cosmos and all of space and time, giving her unlimited and infinite power. She reaches 100% and her body disappears. The black matter morphs into a flash drive that lands in Norman's hands, thus expanding and completing his research. A message from Lucy appears on the phone: "I AM EVERYWHERE."

Adapted from: *http://www.imdb.com/title/tt2872732/synopsis?ref_=ttpl_pl_syn-*

to ponder: *riflettere*

BEFORE WATCHING

7 **Lucy is the protagonist of the story, but it is also the name given to an Australopithecus, the oldest hominid ever discovered. Read the synopsis to discover the relationship between the two.**

8 Read the synopsis and complete the table about the powers associated with brain capacity according to the film.

Brain capacity	Powers/abilities
10%	
20%	
40%	
60%	
70%	
100%	

9 According to the synopsis, Lucy becomes a kind of new age super-computer. How do you imagine it? Make hypotheses. If necessary, check the definition of a super-computer in module 1 unit 2.

WHILE WATCHING

10 Watch these clips and answer the questions.

1. What type of connection is Lucy making? Wires, cables, wireless?
2. What is she looking for, according to Professor Norman?
3. What does Professor Norman presume she is creating?
4. How can you describe the computer?
5. At this stage, are we talking about a LAN or WAN?

11 Watch another short sequence and discuss the questions.

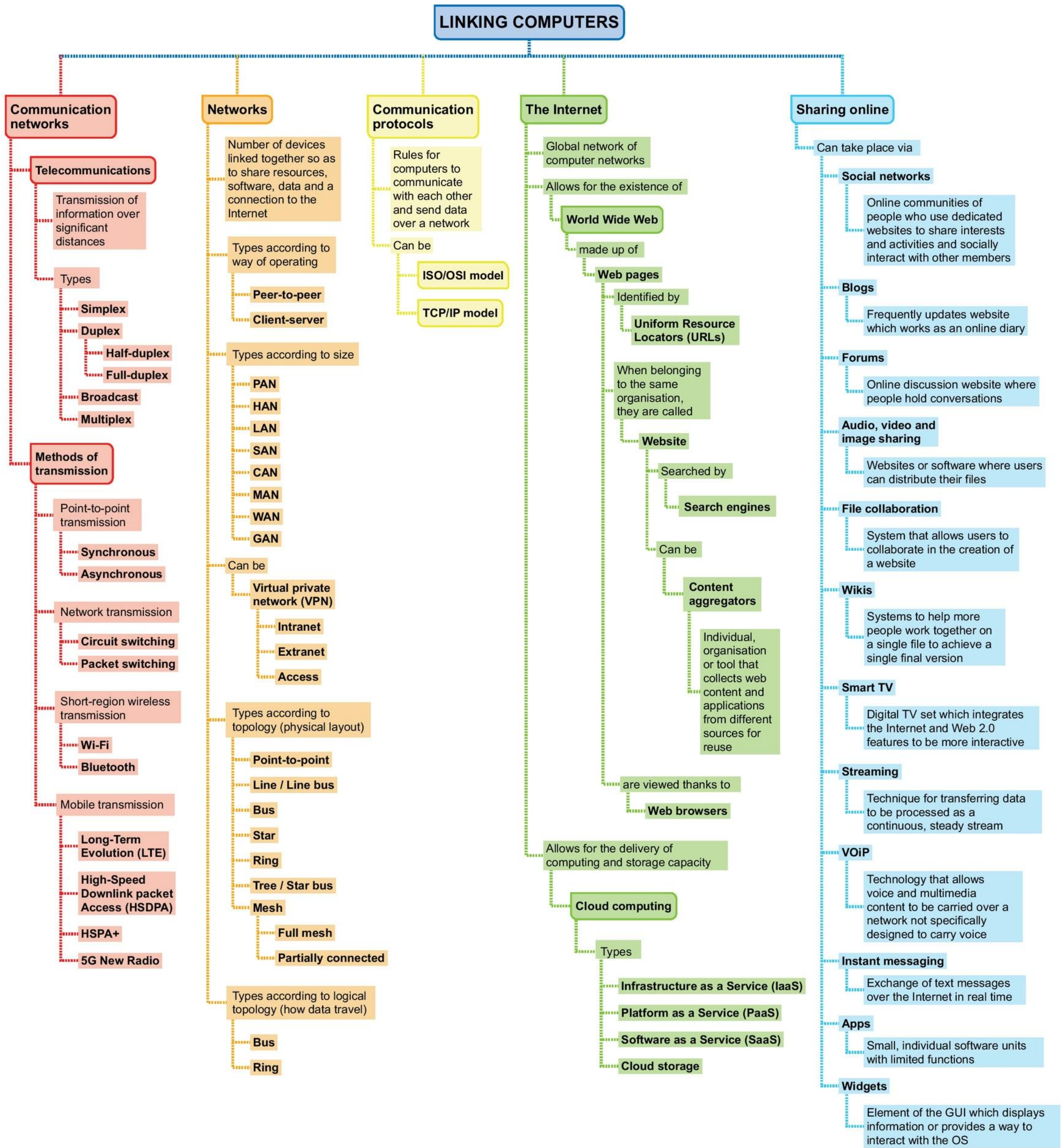
1. What happens to Lucy and the computer?
2. What do you think the pen drive given to Professor Norman contains?
3. Where is Lucy?
4. What does Lucy's final message mean? "Life was given to us a billion years ago. Now you know what to do with it."

AFTER WATCHING

12 An artificial neural network (ANN) is a computational model based on the structure and functions of biological neural networks. Read the table and use the information given to write a short text comparing conventional computers and neural networks.

	Conventional computers	Neural networks
Processing	One thing at a time; they work sequentially	Several things at once; they work in parallel
Functioning	Learn by rules; function logically with rules and calculations	Learn by example; function via images and concepts
Programming	Need higher level programming languages	Can program themselves
Speed	Depend on big processors or parallel processors	Require multiple chips built for the application

MAPPING YOUR MIND



6 MODULE

PROTECTING COMPUTERS

Unit 6.1 • Computer threats

- Malware, adware, spam and bugs
- Viruses, worms, backdoors and rogue security
- Crimeware
- Mobile malware
- Network threats

Unit 6.2 • Computer protection

- Cryptography
- Protection against risks
- Best practices to protect your computer and data
- Network security, copyright and copyleft
- Electronic payments and digital currency

Unit 6.3 • Protecting yourself and your data

- Big data
- Customer profiling
- GDPR and privacy regulations

ONLINE RESOURCES

- Software licences and digital certificates

LANGUAGE SKILLS

- Internet privacy
- Security problems
- Data encryption

EXTRA FIRST AND IELTS READING PRACTICE

- Ielts, passage 3

LITERARY BITS

- Robert Harris, *Enigma*

EUCIP CORE SYLLABUS 3.1

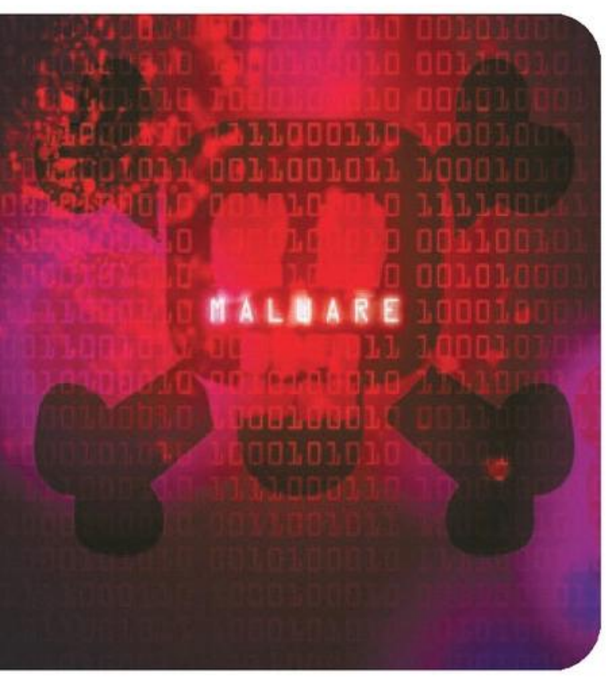
- Security policies (Build B 2.7)

6.1 COMPUTER THREATS

MALWARE, ADWARE, SPAM AND BUGS

The term *malware* was first used by computer scientist and security researcher Yisrael Radai in 1990. However, the first example of malware was the Creeper virus in 1971.

Spam is a problem because, apart from wasting people's time with unwanted emails, it consumes a lot of bandwidth.



Computers and electronic devices in general are subject to different types of risks which can be external attacks that can damage them or simply risks which are associated with incorrect use by users.

■ What is malware?

Malware•, short form for **malicious software**, refers to a variety of malicious programs that can be used to compromise computer functions, steal data, bypass access controls, monitor users' activity, and even damage hardware.

■ Classification of malware

Malware can be classified into the following broad categories:

- **malicious programs**, which compromise computer functions, damage or destroy data, damage hardware or facilitate malicious attacks;
- **crimeware**, which are programs that steal money or sensitive data;
- **mobile malware**, which are specific threats for mobile devices;
- **network threats**, which are attacks carried out to affect data transmission or intercept data.

Malware authors can use a variety of means to spread malware and infect devices and networks. Malicious programs can be delivered physically to a system through a USB drive or other storage devices or spread via the Internet through downloads from websites without the users' approval or knowledge, emails disguised as legitimate messages which contain malicious links, or attachments that contain executable malware. Sophisticated malware attacks often have a link to a server controlled by a hacker which can communicate with the infected system, take sensitive data and control and compromise the device or server remotely.

■ Adware

Adware, or **advertising-supported software**, is another type of program that shares common traits with malware, although it is distinctly different. Adware can be annoying for users because these programs automatically deliver unwanted adverts and can degrade the performance of the device or system. However, adware does not generally have any malicious intent, in fact it is often used to help recover development costs for the software developer and reduce or eliminate the cost for the user. Only in some cases can it contain harmful threats or features that allow it to collect information without the user's knowledge or consent.

■ Spam

Spam, or **junk mail** or **junk newsgroup posting** is not proper malware, but a medium through which malware can spread. It is the electronic bulk sending of unsolicited messages, especially emails. It is generally email advertising sent to a mailing list or newsgroup••.

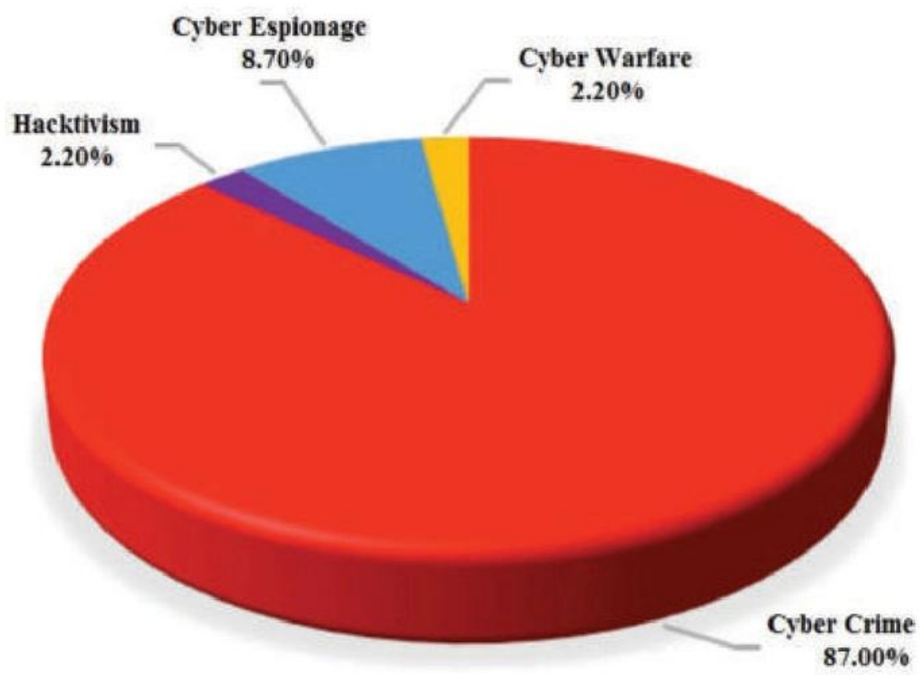
■ Bugs

A **bug** is a flaw in a program or source code due to human error. Security bugs are dangerous because they can allow hackers to bypass user authentication and steal data. Moreover, bugs can also be dangerous for host computers.

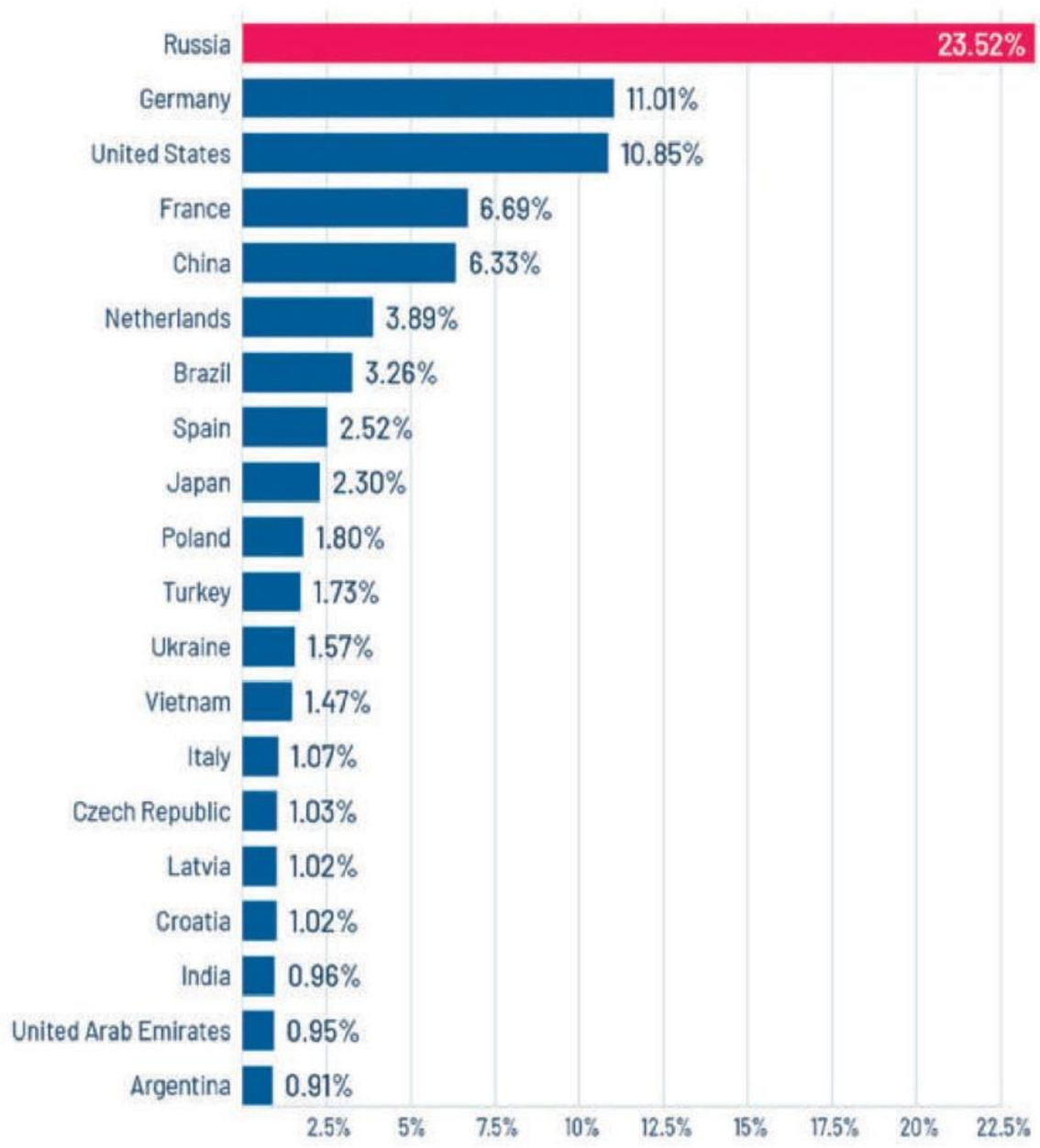
annoying: *fastidioso*
disguised as: *sotto forma di*
to draw away: *sottrarre*
due to: *dovuto a*
endless: *infinito*
flaw: *difetto*
outright: *assolutamente*
to spread: *diffondere*
trait: *tratto*
threat: *minaccia*
to undermine: *indebilire, danneggiare*
unsolicited: *non richiesto, indesiderato*
whack-a-mole: *acchiappa la talpa (gioco arcade)*

1 Give a brief description of the information represented in the pie chart and graph below.

Motivation behind cyber attacks • July 2021



Leading Countries by Amount of Outgoing Spam



2 Read the text and choose the best heading for each definition.

Eating up your data • Infinite pop-ups • Man-in-the-middle attacks • Slowing down your device • Spying

What is Adware? What Does Adware Do?

Not all adware is outright horrible. At its best, it's merely irritating. But at its worst, it can undermine your security settings to track your activities and display ads where it normally wouldn't have access. These security breaches can then be exploited by more dangerous players. When this happens, the software is sometimes referred to as malvertising. As advertisements become more complex, so does adware. Some of the more common ways adware acts on computers are the following:

1. .....: this is classic adware. Sometimes an endless stream will pop at once, while other times closing one only opens the next, like a bad game of whack-a-mole;

2. .....: with one foot in the spyware family, this kind of adware tracks your activities online and off to figure out what kind of advertisement it should show you;

3. .....: adware operates by redirecting all of your traffic through their system so they can display advertisements, but they do this even over what should be protected connections, like when you connect to your online bank account;

4. .....: loading and running advertisements draws processing power away from what you want to do, and this affects your device's performance;

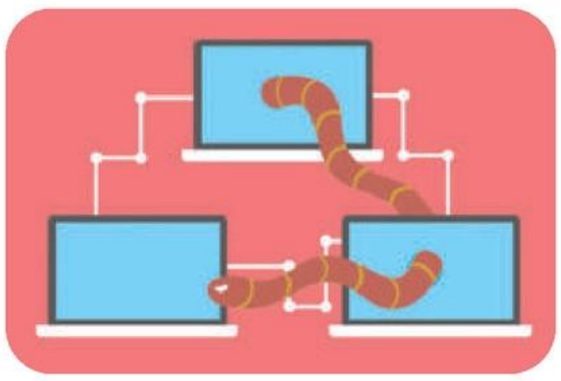
5. .....: just as there's a data cost when you download a picture or video, downloading advertisements also eats away your monthly mobile data allowance.

Adapted from: *http://www.avg.com/en/signal/what-is-adware*

VIRUSES, WORMS, BACKDOORS AND ROGUE SECURITY

Brain is the name of the first virus which was released on 19th January 1986.

The origin of worms goes back to the 1980s, when researchers were looking for programs which could distribute themselves automatically across the Internet.



There is a category of malware which can damage and destroy programs and data and compromise computer functions. The most common types of malware belonging to this category are viruses, worms, backdoor attacks (or simply backdoors) and rogue security.

Viruses

A **virus** is a software program that is designed to copy itself over and over and spread to other computers. It attaches itself to a program and executes the code when the user launches the infected program. Viruses can cause a lot of damage, waste a lot of time and result in financial loss for businesses. They can also corrupt software drivers which allow hardware devices to communicate with the computer, but luckily, they cannot physically damage the hardware.

The most common types of viruses are:

- **macro viruses,** which hide in office programs and spread through emails and file-sharing;
- **boot sector viruses,** which attack the computer at its core;
- **polymorphic viruses,** which change whenever they replicate;
- **overwrite viruses,** which take over files and delete the original code;
- **resident viruses,** which find a way into the computer's memory and activate themselves when a specific action is performed.

rogue: *disonesto, sleale*
waste: *spreco*

Worms

A **worm** is a program that spreads over computer networks by exploiting vulnerabilities in the operating system without needing users to do anything. Worms can cause harm to host networks by consuming bandwidth and overloading web servers. They may even contain a payload, i.e. a piece of code capable of damaging the host computer. The malicious program is often a downloader, i.e. a very small program that later connects to a remote computer to download more substantial malicious software. Moreover, worms can take control of host computers, either to steal sensitive data or convert them into remote-controlled zombies or bots. Sometimes, they infect computers by exploiting bugs in legitimate software.

The most common types of worms are:

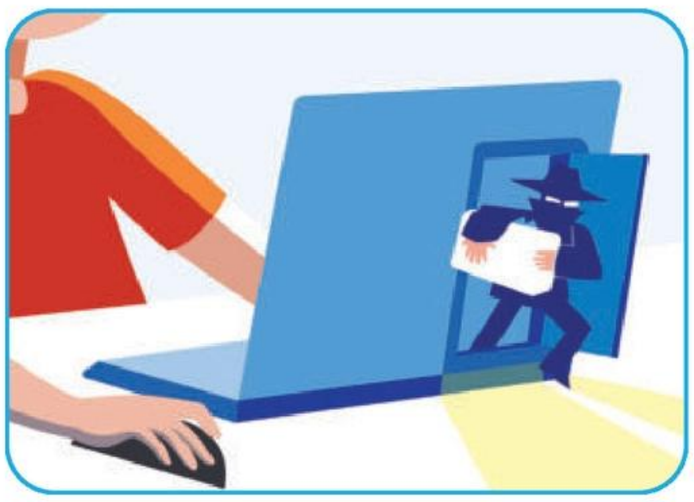
- **email worms,** which create and send messages to all the addresses in the user's contact list;
- **file-sharing worms,** which are disguised as media files;
- **cryptoworms,** which encrypt the victim's data;
- **Internet worms,** which replicate and distribute copies through the network;
- **instant messaging worms**, which are spread through instant messaging networks.

Backdoors and rogue security

Backdoors and rogue security facilitate malicious attacks.

- **Backdoors** find a secret way to enter the computer system and provide a network connection for hackers or other malware to enter, or for viruses and spam to be sent.
- **Rogue security** pretends to be a program which removes malware infections but it is actually malware that turns off the real antivirus program installed in the computer.

3 **Decide if these statements refer to a virus (V), worm (W), backdoor (B) or rogue security (R). Sometimes, more than one option is possible.**



1. It attaches itself to a program and executes the code. ☐
2. It can copy itself. ☐
3. It can corrupt drivers. ☐
4. It can delete files. ☐
5. It cannot damage hardware. ☐
6. It can damage the host computer. ☐
7. It can spread to other computers. ☐
8. It consumes bandwidth. ☐
9. It overloads web servers. ☐
10. It exploits vulnerability in the operating system. ☐
11. It helps a virus to be sent. ☐
12. It pretends to be an anti-malware program. ☐
13. It provides a network connection for hackers or malware. ☐
14. It spreads over computer networks. ☐

4 (6.1) **Listen to a lecture on computer viruses and complete the table. Note that sometimes more than one term is used for the same feature, but you are not required to write all of them.**

Virus parts	Virus life cycle • phases
1.	1.
2.	2.
3.	3.
4.	4.

5 **Use the Internet to find information on some recent malware types: Thanatos, Titanium and Pegasus.**

6 **Read the text and complete it with the missing words.**

The Dangers of Rogue Security Software

Smart computer users know about the importance **1.** ..... security software. These are the programs that prevent hackers **2.** ..... stealing your information and protect against viruses corrupting your computer. But did you know that some of **3.** ..... programs advertised as security software are actually fakes that don't protect, and in some cases, actually infect your computer **4.** ..... the very malware they pretend to defend you against? Rogue security software is a serious problem threatening computer users today. Because security software is necessary **5.** ..... every user, profiteering programmers have attempted to exploit it for their own benefit **6.** ..... offering users fake security software that is either ineffective or actually carries malware.

So how does rogue security software work? Users **7.** ..... manipulated into downloading the fake programs through **8.** ..... variety of techniques such as ads offering free trial versions of security programs, pop-ups warning that the computer is infected or spam that encourages you **9.** ..... click on a link for special offers on security programs. Once the scareware **10.** ..... installed, it can steal your information, slow your computer, corrupt files, disable updates for legitimate antivirus software, or even prevent you from visiting legitimate security software vendor sites.

Adapted from: *http://www.zonealarm.com/blog*

CRIMEWARE

It restricts user access to the computer by encrypting files on the hard disk, locking down the system, and displaying messages to force the user to pay in order to regain access to the computer.

The word *phishing* was coined in analogy with the sport of angling, i.e. fishing with a fishing rod in a lake or river, because the email sets out hooks to 'fish' passwords or other sensitive data from the sea of Internet users.

Crimeware refers to a set of programs which are intended to obtain financial gain in a fraudulent way by either stealing money or sensitive data.

Crimeware to steal money

The main types of crimeware to steal money directly from users are:

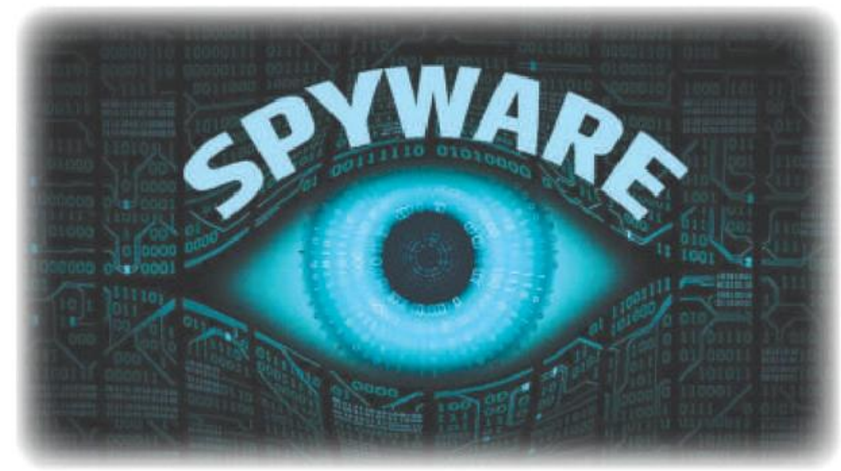
- **diallers,** which redirect dial-up connections to premium-rate numbers such as phone numbers abroad;
- **browser hijackers**, which redirect normal search activities and give the results wanted by the developers. Their intention is to make money out of users' web surfing;
- **ransomware,** which holds a computer captive while demanding a ransom•.

Crimeware to steal data

The main types of crimeware to steal sensitive data to be used illegally are:

- **keyloggers**, which record everything which is typed into a computer in order to get passwords and other sensitive information which is then sent to the source or the keylogging program;
- **phishing••**, which is a type of online scam, i.e. a message that tries to get users to reveal passwords for accessing online services. It can be mass-mailed, i.e. sent to all users or large groups of users, or to specific targets, i.e. only users with certain characteristics in the case of **spear phishing**;

captive: *"prigioniero", bloccato*
to disguise oneself: *travestirsi*
hijacker: *dirottatore*
hook: *amo*
ransom: *riscatto*
scam: *truffa*
to trick: *ingannare*



- **rootkits,** which are designed to remotely access or control a computer without being detected by the user or security programs. They can execute files remotely, access and steal data, modify the system configuration and install other types of malware;
- **spyware,** which spies on users' activities without their knowledge by monitoring and collecting sensitive data such as account information, logins and financial data. **Cookies** are a non-malicious form of spyware. A cookie is information about the user that a server stores on the user's hard disk for future use. It usually records the user's preferences when visiting a particular site.
- **Trojan horses,** or Trojans, which disguise themselves as normal files or programs to trick users into downloading and installing malware. They can give a malicious party remote access to the infected computer in order to steal sensitive data, modify files and install more malware.

More advances forms of crimeware

More advanced forms of crimeware include:

- **social engineering,** which involves trying to obtain confidential information from users by tricking them into doing things that their security policy would prevent them from doing;
- **identity theft,** when someone who has stolen a user's sensitive data pretends to be them and opens a bank account, gets a credit card, uses their driving licence or gives their name to the police if arrested.

7 Complete the table.

Crimeware	How it works
Dialler	It redirects dial-up connections.
Browser hijacker	It redirects a search activity.
Ransomware	
Keylogger	
Phishing	
Rootkit	
Spyware	
Trojan horse	
Social engineering	
Identity theft	

8 **Watch a video on phishing and answer the questions.**

▸ What is Phishing? *posted by* Topic Simple

1. What kind of information does phishing usually ask to give away?
2. What does the video say about our brain?
3. What types of emotions are mentioned?
4. What are the favourite channels for phishing?
5. When is phishing more effective?
6. When are we more likely to be fooled?
7. How can we stop a phishing attack?
8. What type of verification is suggested in the video?

9 (6.2) **Listen to a recording about cookies and complete the table.**

Cookies

A computer cookie can also be referred to as:

- HTTP cookie
- **1.** .....
- Internet cookie
- **2.** .....

How cookies work

- A browser requests a webpage from a server.
- The server sends the **3.** ..... with a cookie.
- Your computer **4.** ..... the cookie in your hard drive.

Why websites use cookies

- To recognise your computer
- To **5.** ..... the web experience to you
- To track your activity
- To **6.** ..... your use of the website
- To enhance the website's **7.** .....

Three types of cookies

- Persistent cookie
- First-party or **8.** ..... cookie
- Third party cookie

A **supercookie** is a cookie stored at **9.** ..... level. To protect yourself from a supercookie, you have to use an encrypted connection or a **10.** .....

10 (6.3) PAIR WORK **Listen to a short recording about the characteristics of the different types of cookies. Take notes and ask and answer questions on the recording in pairs.**

MOBILE MALWARE

The first known mobile malware was a virus called *Timofonica* which originated in Spain and was identified by antivirus labs in Russia and Finland in June 2000.

What do you do protect your smartphone or tablet from malware? Do you have an antivirus program installed?

The threats associated with mobile malware are expanding. Mobile malware is growing in sophistication, borrowing deployment and obfuscation techniques from conventional PC malware, reflecting the continuous evolution of the cyber threat landscape.

The malware gains control of all system resources making it unresponsive and draining the battery. It steals the user's personal data from the phone.

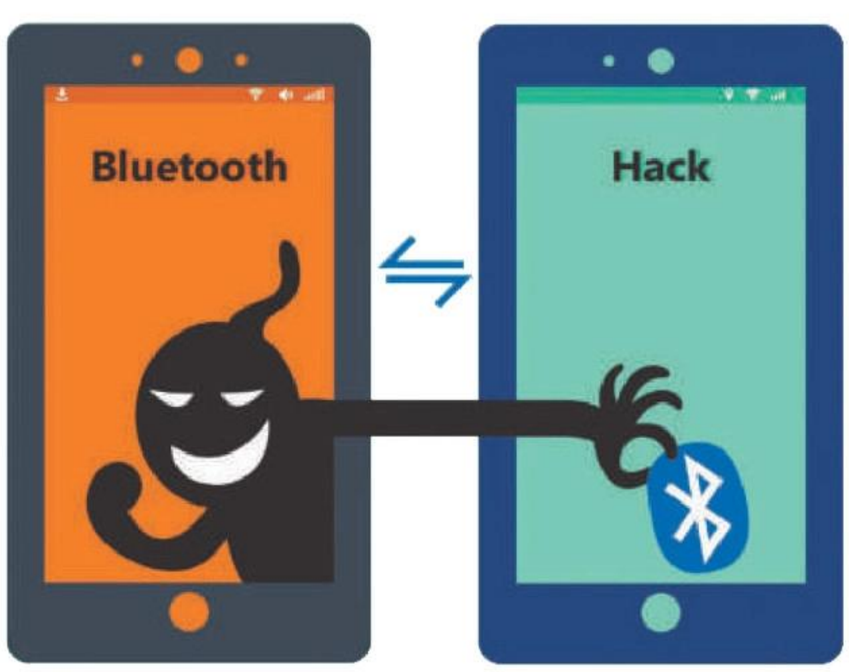
Mobile malware is malicious software that is specifically designed to target mobile device systems such as smartphones and tablets. Its purpose is to cause the collapse of the system and allow a malicious user to control the device remotely or steal personal information stored on the device itself. It can be divided into three broad categories: malware that can also be found in computer devices, mobile specific malware and Bluetooth hacking.

Spyware, Trojan horses, worms and ransomware are the main malware common both in computers and mobile devices.

Mobile specific malware

There are some types of malware specifically designed for mobile devices, in particular:

- **Expander**: it targets mobile meters, i.e. the amount of expansion that can be added to the signal, for additional phone billing and profits in a way that is similar to the one used by diallers with computers;
- **Ghost push**: it is a kind of malware which infects the Android o/s by automatically gaining root access, i.e. privileged control over various subsystems. The malicious software is downloaded, converted into a system app and at that point root access is lost, which makes it virtually impossible to remove the infection with a factory reset.



Bluetooth hacking

Some types of malware are connected with attacks through a Bluetooth connection:

- **Blueborne:** it can spread through the air (airborne) and attack devices. The hacker uses the Bluetooth connection to penetrate and take complete control of the targeted device;
- **Bluesnarfing:** it is a type of network attack that occurs when a hacker pairs with a Bluetooth device without the user's knowledge and steals or compromises their personal data;
- **Bluejacking:** a hacker searches for devices in the area and then sends spam in the form of text messages to the device. This form of hacking is rather childish and harmless;
- **Bluebugging:** it uses Bluetooth to establish a backdoor on a victim's device. The attacker can hack the device and also view all the user's data.

deployment: *distribuzione*
to drain: *scaricare*
frailty: *fragilità*
to pair with: *accoppiarsi*

11 Draw a summary map of the different types of malware.

12 PAIR WORK Take it in turns to describe a type of mobile malware and ask the other student to identify it.

13 Watch a video on the evolution of mobile malware and answer the questions.

▸ GReAT Security Moments - Mobile Malware Evolution *posted by* Kaspersky

1. Why are mobile phones subject to the same types of attack as computers?
2. What types of attack are mentioned?
3. How many malicious apps were detected in 2018?
4. Why is Android a target for cyber criminals?
5. How can we protect our mobile devices?
6. After watching the video, use the Internet and find out the number of malicious apps detected in the current year. Are they more or less than in 2018?

14 Read the text and complete the table.

Notable Mobile Malware

- **Cabir:** this malware infects mobile phones running on Symbian OS, a type of mobile operating system in use between 2012 and 2016, and was first identified in June 2004. When a phone is infected, the message 'Caribe' is displayed on the phone's screen every time the phone is turned on. The worm then attempts to spread to other phones using wireless Bluetooth.
- **Duts:** a file infector virus for the Pocket PC platform. It attempts to infect all EXE files that are larger than 4096 bytes in the current directory.
- **Skulls:** a Trojan horse that targets mainly Symbian OS. Once downloaded, the virus replaces all phone desktop icons with images of a skull. It also renders all phone applications useless. This malware also tends to send text messages containing malicious links to all contacts accessible through the device in order to spread the damage.
- **Commwarrior:** a worm which uses MMS messages and that can spread through Bluetooth as well. It infects devices running under OS Symbian Series 60.
- **Gingermaster**: a Trojan developed for an Android platform that propagates by installing applications that incorporate a hidden malware for installation in the background. It exploits the frailty in the version Gingerbread (2.3) of the operating system and creates a service that steals information from infected terminals.
- **DroidKungFu**: a Trojan content in Android apps, which, when executed, obtains root privileges and installs the file com.google. ssearch.apk, which contains a backdoor.
- **Ikee**: a worm for iOS platforms. It only works on terminals whose private file system has already been corrupted, and spreads by trying to access other devices.
- **Shedun**: adware serving malware able to root Android devices.

Adapted from: *https://en.wikipedia.org/wiki/Mobile_malware*

Name	Type of malware	Platform or o/s affected	Effect produced
Cabir			
Duts			
Skulls			
Commwarrior			
Gingermaster			
DroidKungFu			
Ikee			
Shedun			

NETWORK THREATS

Some threats that take place in the network in order to intercept data packets carry out attacks on computer systems or access sensitive data.

These attacks are probably the nastiest and most difficult to address as they are easy to launch and difficult to track.

Also called cyberattacks, they are malicious attacks by individuals or organisations carried out against computer information systems, infrastructures or computer networks by various means in order to steal, alter or destroy data by hacking into the system.

Intercepting data packets

Some attacks intercept data packets while travelling in a network:

- **Packet sniffing:** a packet sniffer is a tool used by technicians to monitor packets in the network and maintain efficient data transmission. A malicious intruder can place packet sniffers in the network and capture and analyse all the network traffic. Unfortunately, detecting rogue packet sniffers is not easy;
- **Port stealing:** a kind of attack where someone steals traffic that is directed to another port of an Ethernet switch. This attack allows someone to receive packets that were originally directed to another computer by making the switch believe that the attacker's port is the correct destination for the packet.

Attacking a computer system

Certain attacks are meant to compromise a computer system or modify or destroy data:

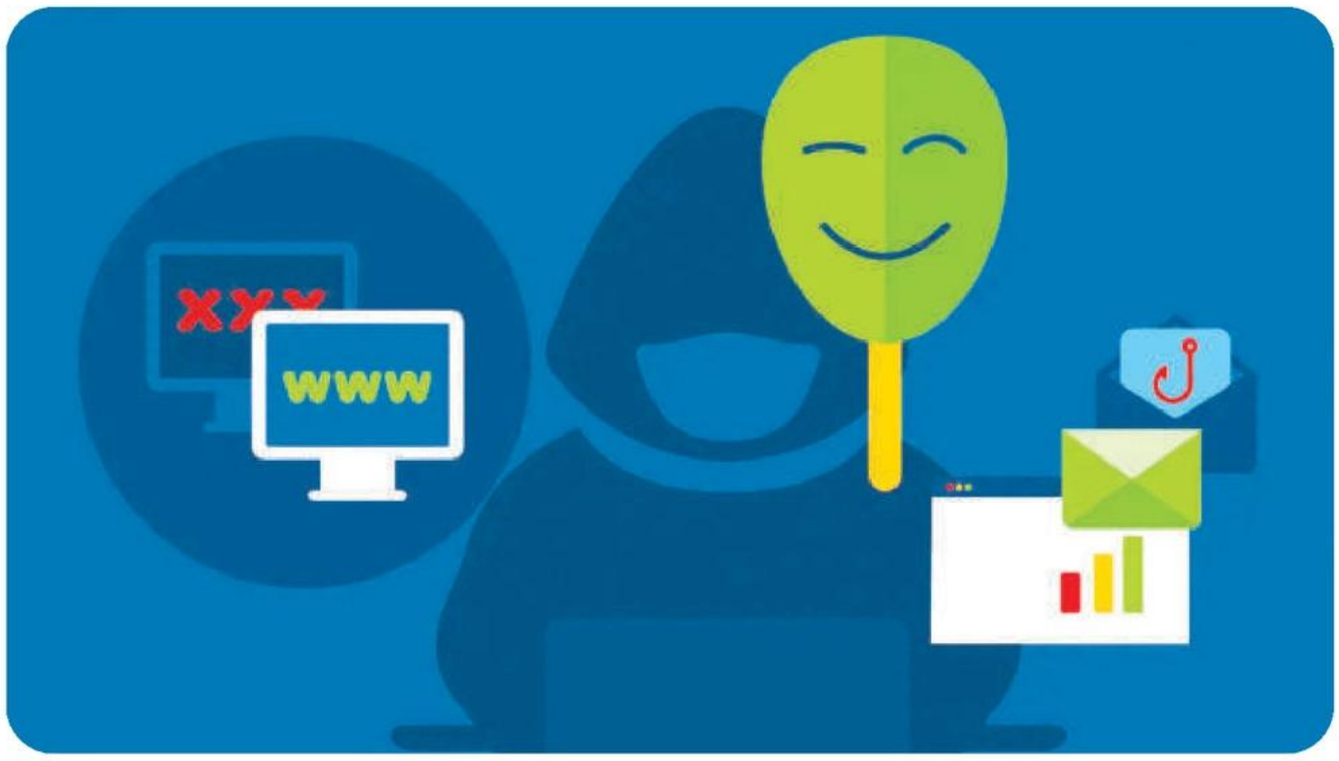
- **DOS (denial of service)**•**:** the attacker sends more requests to the machine than it can handle. Then, the attacker's program simply makes a connection on a service port in order to make forged packets enter the user's network address space;
- **Destructive attacks**••**:** attackers gain access by any connection possible in order to change data or destroy and delete it.

Accessing sensitive data

In some cases the purpose of network attacks is to access sensitive data:

- **Spoofing:** this is a fraudulent practice in which communication is sent from an unknown source disguised as a source known to the receiver. In fact, the attacker gains unauthorised access by making the malicious message appear to come from a trusted machine by 'spoofing' the IP address. Spoofed emails may request the recipient to reply with an account number for verification. The spoofer then uses the account number for identity theft purposes;
- **Unauthorised access:** this term is used for the different types of attacks that access information on the user's computer without permission. It can refer to when someone gains access by using someone else's account or, for example, by guessing the password or username.

forged: *contraffatto*
nasty: *cattivo*
to overflow: *traboccare*
to override: *scavalcare, escludere*
sniffer: *(lett. cane da fiuto), (qui) intercettatore*
spoofing: *"manomissione"*
straightforward: *diretto*
trusted: *fidato*

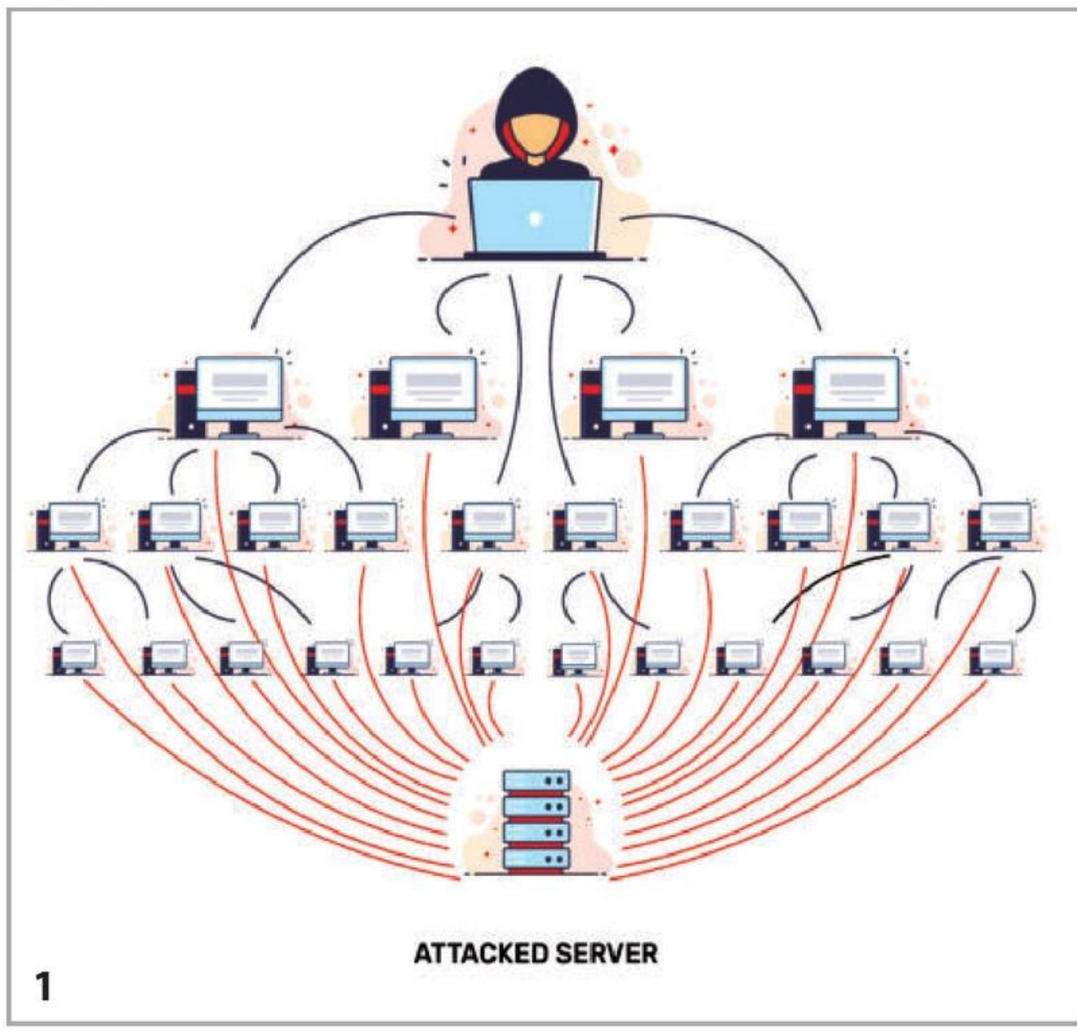


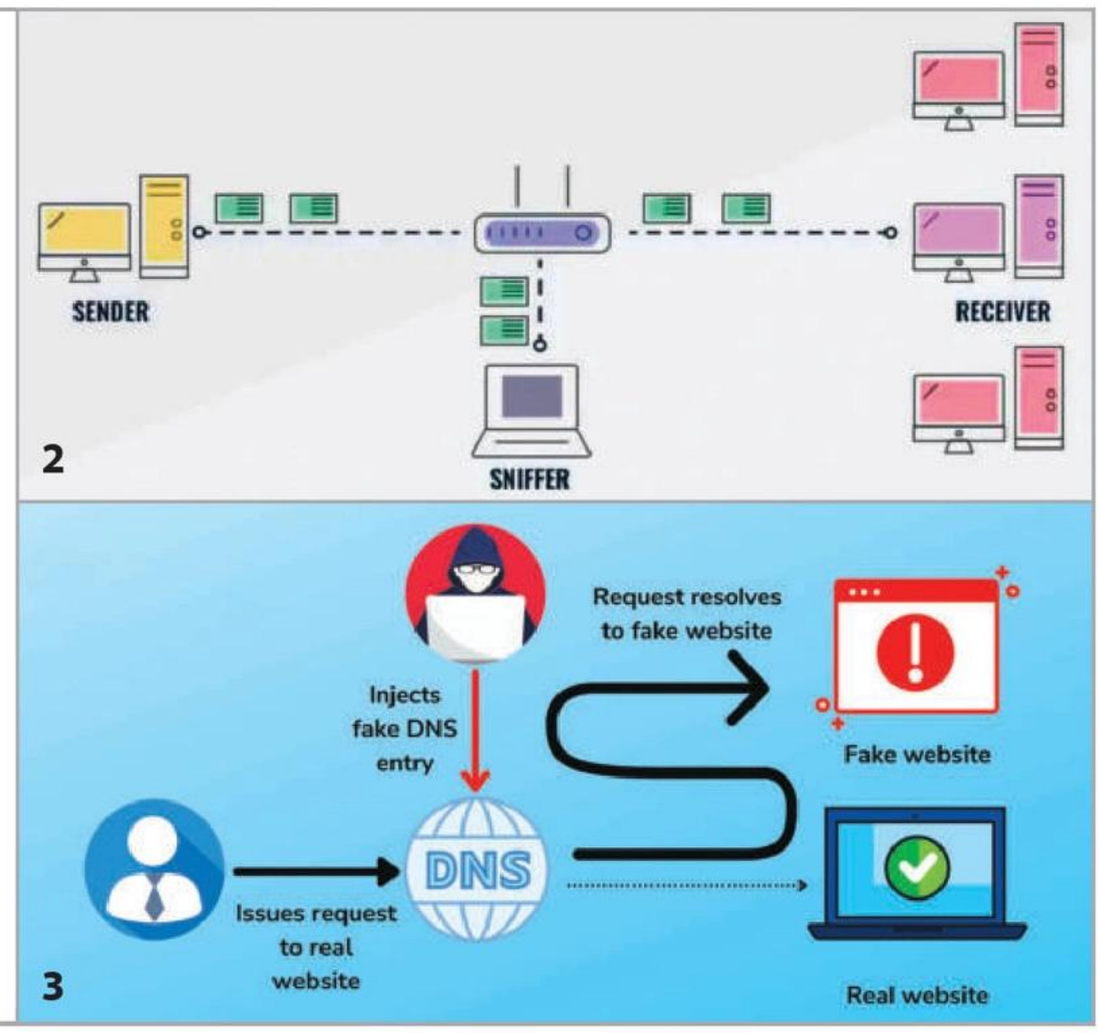
15 **Watch the video about Denial of Service and answer the questions below.**

▸ Denial of Service (DoS) *posted by* CiberShaolin

1. What is the difference between DoS and DDoS?
2. How many types of denial of service are there? What are they called?
3. What happens with browser redirection?
4. What happens in a resource exhaustion attack?

16 **Decide which threats the pictures below refer to. Using the pictures to help you, practise describing each threat.**





17 **Read this extract and answer the questions.**

Spoofing

An IP spoofing attack is one in which the source IP address of a packet is forged. There are generally two types of spoofing attacks.

IP spoofing-based DOS attacks are relatively straightforward. An attacker sends a packet to the target host with a forged IP address and the targeted host sends an acknowledgement and waits for a response. The response never comes, and these unanswered queries remain in the buffer of the targeted device. If enough spoofed queries are sent, the buffer will overflow, and the network device will become unstable and crash.

Man-in-the-middle attacks are much more onerous. Here, the attacker intercepts traffic heading between two devices on the network. The attacker can either monitor information or alter the data as it passes through the network. An attacker sits on the network and watches traffic. When another user on the network sends a request to a network device, the attacker sends a response saying the compromised machine is the requested device. Even if the actual device responds, the second response will override the first. The user now sends all data destined for the original device to the compromised machine. It is possible for an attacker to use this method to intercept enough data to effectively monitor and log all network traffic and gain important information such as usernames and passwords. Users may never know that the traffic is being intercepted, because each packet will eventually be forwarded onto its intended destination.

Adapted from: *A. Liska, Practice of Network Security, Prentice Hall, 2002, chap. 3*

1. What is an IP spoofing attack? How many types are there?
2. What happens in an IP spoofing-based DOS attack?
3. Which type of spoofing described here corresponds to the one described on the previous page?
4. What happens in a man-in-the-middle attack?
5. What is the difference in purpose between the DOS on the previous page and an IP spoofing-based DOS?
6. Do the users know that the traffic has been intercepted?

GRAMMAR

COMPARATIVES AND SUPERLATIVES

MAJORITY

Type of adjective	Comparative	Superlative
one-syllable adjectives ➤ *high, fast*	adjective + **-er** (+ **than**)* ➤ *higher, faster*	**the** + adjective + **-est** (+ **in/of**)** ➤ *the highest/fastest*
one-syllable adjectives ending in -e ➤ *safe, nice*	adjective + **-r** (+ **than**) ➤ *safer, nicer*	**the** + adjective + **-st** (+ **in/of**) ➤ *the safest, the nicest*
one-syllable adjective ending with one vowel + one consonant ➤ *big*	adjective + double consonant + **-er** (+ **than**) ➤ *bigger*	**the** + adjective + double consonant + **-est** (+ **in/of**) ➤ *the biggest*
two-syllable adjectives ending in -y, -ow, -le ➤ *easy, narrow, simple*	adjective without -y + **-ier** (+ **than**) ➤ *easier, narrower, simpler*	**the** + adjective without -y + **-iest** (+ **in/of**) ➤ *the easiest, the narrowest, the simplest*
adjectives with two or more syllables ➤ *important, dangerous*	**more** + adjective (+ **than**) ➤ *more important, more dangerous*	**the most** + adjective (+ **in/of**) ➤ *the most important, the most dangerous*
irregular forms ➤ *good* *bad* *far* *old*	➤ *better* *worse* *farther/further* *older/elder*	➤ *the best* *the worst* *the farthest/furthest* *the oldest/eldest*

* The preposition *than/as* is used if it is followed by the object.

** *in* is generally used with groups of people or with places, *of* in all other cases.

MINORITY

Comparative: less + adjective (+ **than**) ➤ *less big/dangerous*
Superlative: the least + adjective (+ **in/of**) ➤ *the least expensive*

EQUALITY

Comparative: **as** + adjective (+ **as**)* ➤ *as dangerous*

18 **Put the words in brackets in the comparative or superlative form.**

1. Timofonica is ..... (old) type of mobile malware.
2. Backdoors are ..... (bad) as rogue security.
3. Spam is ..... (dangerous) of all types of malware. It causes no serious consequences.
4. A rootkit is ..... (difficult) to detect than a keylogger.
5. The category of crimeware is ..... (large) than the one of malicious software.
6. Spoofing is a ..... (serious) attack than packet sniffing.
7. A DOS attack is ..... (straightforward) type of attack.
8. ..... (effective) bank robbery in 2016 was carried out thanks to a virtual attack.
9. I don't know which virus is ..... (bad).
10. If a Trojan horse is ..... (threatening) than spyware, then spyware is not ..... (threating) as Trojan horses.
11. Recognising spam is ..... (easy) than detecting malicious software.
12. For me, ransomware is ..... (disgusting) type of malware.

CITIZENSHIP

PROFILE OF A HACKER

19 CLASS WORK **Discuss the questions.**

1. Who is a hacker?
2. Are all hackers criminals?
3. What are their motivations?
4. What type of personality does a hacker have?

flaw: *falla*
mayhem: *caos*
whistle blower: *dipendente pubblico che segnala illeciti di interesse generale*

20 **Read the text and decide which hacker types can be defined as good (G), bad (B) or ugly (U). Sometimes, more than one option is correct.**

13 Hacker Types • The Good, the Bad and the Ugly

Good hackers work to find a flaw in a system in order to fix it. Bad hackers are criminals who attack a system to steal data or to destroy it. Ugly hackers do not destroy a system or commit a crime, but act in an unethical way.

☐ **1. Grey hats**: These hackers are not bent on destruction or in the game for personal gain. Nevertheless, they operate unethically. They typically find a security flaw in an organisation and then disclose the vulnerability publicly.

☐ **2. Black hats**: The stereotypical cybercriminal, i.e. "crackers".

☐ **3. Blue Teams**: Not strictly hackers in the conventional sense, Blue Teams consist of ethical hackers (white hats and sometimes grey hats) working to defeat attackers and secure the organisation's environment. Blue and Red Teams often work together.

☐ **4. Red Teams**: A team of ethical hackers acting as though they were black hats by pretending they are criminals trying to break into the organisation.

☐ **5. Script kiddies**: These hackers are usually low-skilled, but they can be a menace to individuals they target to harass or whose lives they try to infiltrate.

☐ **6. Spy hackers**: Involved in corporate espionage.

☐ **7. Cyberterrorists**: Bent on causing mayhem and creating fear, and the most likely to cause physical death and destruction.

☐ **8. Hacktivists:** Motivated by a cause, e.g., politics, ideology or religion.

☐ **9. Cyber-mercenaries:** Third-party hackers for hire.

☐ **10. State-sponsored hackers**: Supported by a government agency, or even government agencies themselves.

☐ **11. Organised crime:** Much like a digital mafia and usually in the game for financial gain.

☐ **12. Malicious insiders:** Internals and whistle blowers.

☐ **13. White hats**: Hackers who have the authorisation to attempt to breach a system.

Adapted from: *https://resources.infosecinstitute.com/topic/the-psychological-profile-of-a-hacker-with-emphasis-on-security-awareness/*

21 GROUP WORK **Read the short text then discuss the questions.**

Hackers

Two typical psychological characteristics of a hacker are openness to experience and neuroticism. **Openness to experience** means that hackers love a challenge. For example, some big companies in the world offer prizes to hackers who can breach their security system. The concept of **neuroticism** is very close to the idea of emotional stability. People with low emotional stability, like hackers, tend to be emotionally reactive and aggressive.

1. Do you agree with these two characteristics? Why? Do you think hackers are people with psychological problems?
2. Use the Internet to find out the average age of a hacker.
3. What should be done to prevent people from becoming black hats?
4. According to Italian law, if hackers are discovered and arrested, they could go to prison (for 3 years max). Do you agree with this type of punishment?

6.2 COMPUTER PROTECTION

CRYPTOGRAPHY

Keys are usually made up of 64 binary digits of which 56 are randomly generated and used directly by the algorithm, while the other 8 bits are used for error detection.

Symmetric-key encryption can be either *stream ciphers*, i.e. the bytes of the message one at a time, or *block ciphers*, i.e. a number of bits are encrypted as a single unit.

■ What is cryptography?

Cryptography is the study and practice of hiding information so that only those for whom it is intended can read and process it. Cryptography is most often associated with scrambling an ordinary text, called **plaintext** or **cleartext**, into **ciphertext** through a process called **encryption**, and then back again through decryption. Therefore, **encryption** is the process of transforming information using an **algorithm** or **cipher** to make it unreadable to anyone except those possessing special knowledge, which is usually referred to as a **key**. The result of the process is encrypted data.
Decryption is the opposite process, which takes place when the same key is used to convert the data back into its original form. The system is secure because the mathematical algorithm is not easily reversible•.

■ Types of cryptography

There are two types of cryptography, which are classified according to the type of key used:

- **public key** or **asymmetrical cryptography** is a system that uses a pair of related keys: a recipient's public key, which is widely distributed, and a private or secret key which is known only to the recipient. Any person can encrypt a message using the public key of the recipient, but only the holder of the paired private key can decrypt the message encrypted with the public key. **Digital signatures** are an example of public key cryptography: in fact, a message signed with the sender's private key can be verified by anyone who has access to the sender's public key;
- **private/secret key** or **symmetrical cryptography**•• is a system that uses the same key for both encryption and decryption. The keys may be identical or there may be a simple transformation. However, the fact that both parties have access to the secret key is one of the main drawbacks of the system.

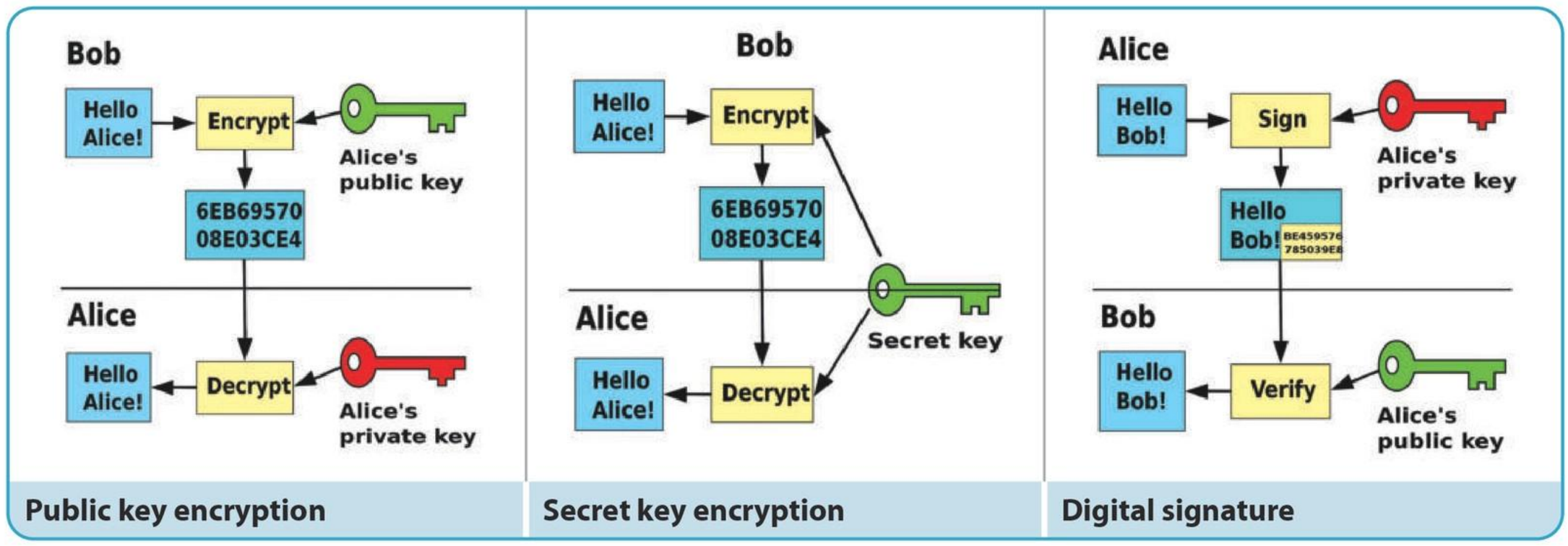
to craft: *creare*
drawback: *svantaggio*
to scramble: *mescolare, codificare*

■ Objectives of cryptography

Modern cryptography has four objectives:

- **confidentiality**: the information cannot be understood by people for whom it was not intended;
- **integrity:** the information cannot be altered in storage or in transit between the sender and the intended receiver without the alteration being detected;
- **non-repudiation**: the creator or sender of the information cannot deny at a later stage their intentions in the creation or transmission of the information;
- **authentication:** the sender and receiver can confirm each other's identity and the origin/destination of the information.

1 Look at the pictures and describe how public key, secret key encryption and digital signature work.



Public key encryption | Secret key encryption | Digital signature

2 Read the text and complete it with the words given below.

algorithms • combinations • computer • computers • cryptography • decode • digital • encrypt • keys • message • public • securely

Security Encryption Systems

Computer encryption is based on the science of **1.** ....., which has been used as long as humans have wanted to keep information secret. Before the **2.** ..... age, the biggest users of cryptography were governments, particularly for military purposes. Most forms of cryptography in use these days rely on **3.** ....., simply because a human-based code is too easy for a computer to crack. Ciphers are also better known today as **4.** ....., which are the guides for encryption • they provide a way in which to craft a message and give a certain range of possible **5.** ..... A key, on the other hand, helps a person or computer figure out the one possibility on a given occasion. Computer encryption systems generally belong in one of two categories:

- symmetric or private/secret key encryption,
- asymmetric or public-key encryption.

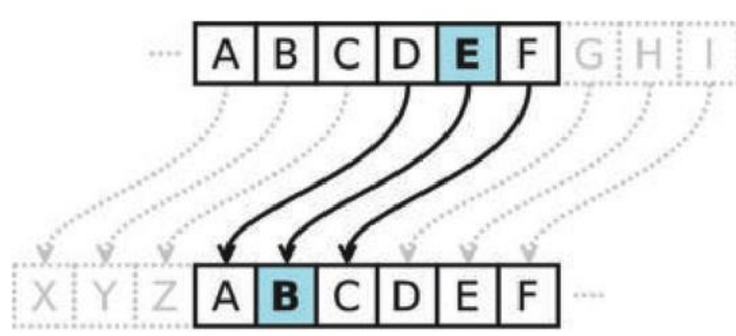
In symmetric-key encryption, each computer has a secret key (code) that it can use to **6.** ..... a packet of information before it is sent over the network to another **7.** ..... It is essentially the same as a secret code that each of the two computers must know in order to **8.** ..... the information. The code provides the key to decoding the message.

Also known as asymmetric-key encryption, public-key encryption uses two different **9.** ..... at once, a combination of a private key and a **10.** ..... key. The private key is known only to your computer, while the public key is given by your computer to any computer that wants to communicate **11.** ..... with it. To decode an encrypted **12.** ....., a computer must use the public key, provided by the originating computer, and its own private key.

Adapted from: *http://computer.howstuffworks.com/encryption3.htm*

CAESAR CIPHER

Caesar Cipher is one of the earliest systems of encryption. It is a type of substitution cipher in which each letter in the plaintext is shifted a certain number of places down the alphabet. Caesar used this method to communicate with his generals.

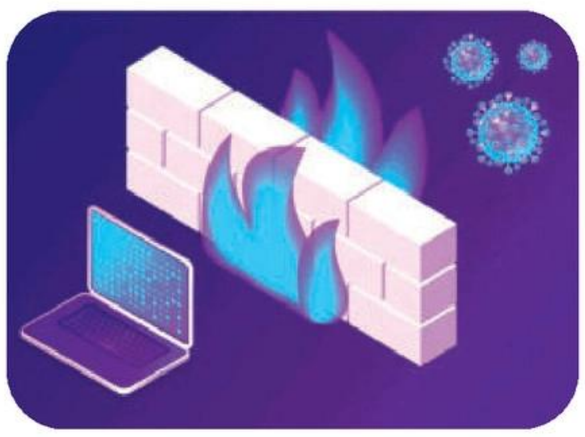


PROTECTION AGAINST RISKS

A first generation type of firewall was a packet filter which looked at network addresses and ports to determine if a packet should be allowed or blocked. A so called next-generation firewall combines packet inspection with stateful inspections, i.e. tracking the packets, and other network security systems.

Cloud hosted firewalls are also available. This service can track both internal network activity and third-party on-demand environments.

Which precautions from the list do you follow? Can you suggest any others?



The basic things to protect a computer against risks are: efficient antivirus software, a firewall and a series of precautions that a good user should follow.

Antivirus software

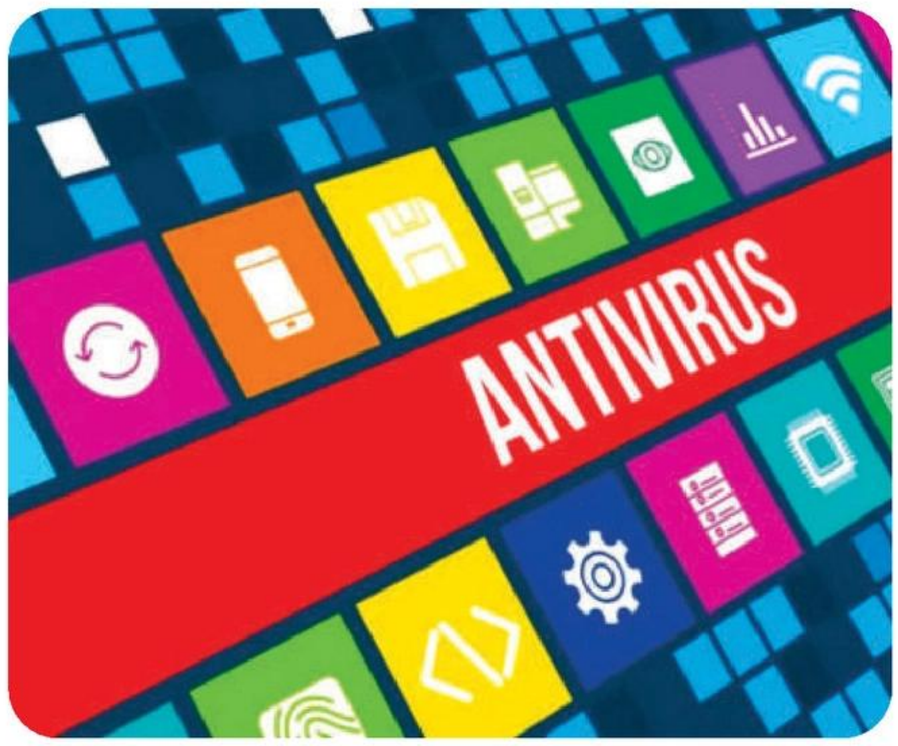
Antivirus software is a type of application used for scanning and removing viruses from computers. Most programs include both automatic and manual scanning, while others offer free online scanning. The **automatic scan** may check files downloaded from the Internet, storage devices inserted into the computer, and the entire hard drive on a regular basis. The **manual scan** option allows the user to scan the entire system or individual files whenever necessary.

Since new viruses are constantly being created, antivirus programs keep and regularly update a database of virus types. Most programs also protect against other types of malware and may also be bundled with firewall features. According to the functions available, antivirus software can be classified as follows:

- **stand-alone antivirus software**, the most basic type which only removes viruses;
- **malware protection antivirus software,** which combines virus detection with malware and spyware protection;
- **antivirus software security suite**, a bundled package of antivirus and firewall protection, or a combination of malware, firewall and antivirus protection.

Firewall

A **firewall** is a network security system designed to prevent unauthorised access to or from a private network. All messages entering or leaving a private network pass through the firewall, which examines each message and blocks those that do not meet the specified security criteria. Firewalls can be either hardware or software or a combination of both. **Hardware firewalls**



can be bought as a stand-alone product in the form of an expensive box, but are often found in broadband routers; **software firewalls** are installed on the computer and can be customised to allow the user to control their functions.

Best practices to protect data against risks

Here is a list of best practices to protect data:

1. always install operating system updates;
2. use licenced programs and keep them up-to-date;
3. do not use the same password for every site;
4. back up data regularly;
5. enable the display of file extensions;
6. do not download programs from unknown sources and do not open attachments from unknown people;
7. ignore emails pretending to offer a prize or asking for advice on money matters;
8. ignore pop-ups that state that the computer is infected or having a problem;
9. ignore and close pop-ups that pretend to be a Windows alert;
10. pay attention when using peer-to-peer software;
11. when installing software, watch out for bundled tool bars or unrequested programs;
12. when installing software, read the End User License Agreement.

to be bundled: *essere abbinato*

3 **Decide if these statements are true or false. Correct the false ones.**

	T	F
1. The combined use of antivirus software, firewall protection and users' precautions guarantee the highest level of protection.	☐	☐
2. Antivirus software scans the computer to find and delete viruses from the system.	☐	☐
3. Few antivirus programs offer both automatic and manual scanning.	☐	☐
4. Automatic scans mean that the computer is checked for viruses at regular intervals.	☐	☐
5. The databases of antivirus software are regularly updated because viruses have become more complex.	☐	☐
6. The basic version of an antivirus software only removes viruses.	☐	☐
7. A firewall blocks undesired messages.	☐	☐
8. Software firewalls are programs inside the router.	☐	☐

4 (6.4) **Listen to an IT consultant giving some advice on how to keep computers and data secure at work. Complete the summary below.**

To prevent a virus attack:

- **1.** ..... virus checking software;
- **2.** ..... file attachments unless you know who they are from;
- **3.** ..... your staff on the problems caused by viruses;
- **4.** ..... staff to attach portable drives or memory sticks unless they are scanned first, and;
- **5.** ..... employees to download games and other unauthorised software onto the company's computers.

Virus scanning software:

- **6.** ..... up-to-date, and
- scans **7.** ..... so that they are performed automatically on a **8.** ..... basis.

5 PAIR WORK **Look at the list of the 10 best antivirus software in 2022 and discuss the questions.**

1. Which popular software programs are not on the list?
2. Which ones are new to you? Find some information on the Internet about the ones you don't know.

Source: *https://www.matellio.com/blog/which-are-the-best-antivirus-software-for-2022/*

BEST PRACTICES TO PROTECT YOUR COMPUTER AND DATA

For the protection against risks, see the previous chapter.

Do you make regular backups of your data?

Do you use troubleshooting to solve minor problems? Describe your experiences.

The term **best practice** is used to describe the process of developing and following a standard way of doing things. It is a method or technique which has consistently shown results superior to those achieved with other means and it is used as a benchmark. It refers to both the correct use of a computer and to the safe storage of data.

How to start up and shut down a computer safely

When you switch a computer on, you usually have to wait a while before the familiar interface appears. This is because your computer is booting up and a number of activities are taking place:

- the BIOS (Basic Input/Output System) is being loaded;
- the hardware is being checked;
- basic settings, such as which drives are present, are being loaded;
- the boot record is being loaded this contains instructions about how to load the operating system;
- configuration files are being loaded;
- the registry is being loaded this is a huge database of settings needed by all the software that may be loaded later on;
- startup files are being loaded.

You should never just switch a computer off by turning off the power. You have to follow the suggested procedure to shut down the system. Otherwise, you could interrupt the writing of files on disk and the cancellation of the temporary ones and cause the loss of data, the damage of programs, or problems with the next start-up of the computer.

to be worth a try: *vale la pena tentare*
benchmark: *riferimento*
to shut down: *arrestare, spegnere*

How to store and keep data safe and secure

File storage systems are hierarchical, this means that files can be stored in **folders,** or directories, and sub-folders. Files should be given sensible filenames that indicate their content clearly, so that they can be easily found, updated, renamed, copied, moved or deleted.

Threats to data consist in security and integrity. **Security** concerns the loss, unauthorised viewing or copying of data; **integrity** is about the data being accurate and fit for the purpose. Regular **backups** are also necessary to save data.

Troubleshooting is a way of eliminating simple problems. The problems may refer to hardware or software. If the problem regards hardware, the manufacturer's website will probably have a FAQ (frequently asked questions) section, or you could also contact the manufacturer's helpline. As for software, sometimes the process of switching off the computer, switching it on again, loading the operating system and then the application software, is worth a try. Sometimes the only way is to reinstall the software.

6 **Answer the questions.**

1. What is meant by best practice?
2. What does the acronym BIOS stand for?
3. What is the registry?
4. Why should you never just switch a computer off by turning off the power?
5. How are files organised?
6. Why should files be organised with sensible names?
7. Where can you find help with solving hardware problems?
8. What can you do if you have software problems?

7 **Here is a list of simple problems that can be solved with troubleshooting. Match the beginnings and endings.**

1. Most simple computer problems are... ☐
2. When the storage is full, you should... ☐
3. When the software just freezes, you have... ☐
4. If a sheet of paper jams in the printer, you have to open... ☐
5. To find help on the Web, you need to type... ☐
6. You can use an online troubleshooting guide, which is... ☐
7. In a large organisation, there will be... ☐
8. If your work is interrupted by a power cut, … ☐

a. a support desk.
b. based on expert systems.
c. delete some old files or save your file on another storage media.
d. reported on screen.
e. the casing.
f. the symptoms into a search engine.
g. to press the Ctrl+Alt+Del keys together.
h. check if your computer has saved a working copy of your file.

8 (6.5) **Listen to a recording on best practices and put these statements in the order in which you hear them. Then, listen again and answer the questions.**

a. Be aware of suspicious malware. ☐
b. Don't download programs from Internet sites you don't trust. ☐
c. Don't install different versions of software. ☐
d. Install all updates required by your ICT department. ☐
e. Install only licensed programs. ☐
f. Let ICT know when hardware isn't working. ☐
g. Let ICT know when you need something. ☐
h. Use online support resources. ☐

1. What happens if you do not install updates?
2. What is the main problem with home licences?
3. What happens if you use the home version of a program in the office?
4. Who takes care of computers which are not working properly?

NETWORK SECURITY, COPYRIGHT AND COPYLEFT

Be sure that the padlock is not on the page itself, as this will probably indicate a fraudulent site.

Copyleft as a concept is usually implemented in the details of a specific copyright licence, such as the GNU General Public License (GPL) and the Creative Commons Attribution Share Alike License.

ONLINE RESOURCES

- Software licences and digital certificates

thumb: *pollice*

Network security

Network security consists of a series of policies and practices to prevent and monitor unauthorised access to a computer network and its resources. It involves:

- **Identification**, which identifies the user by a **username** or **user ID**;
- **Authentication**, which proves that the users are who they say they are. The users have to digit a **password** which is based on *something they know*, i.e. a secret between the users and the system. Other forms of authentication include presenting *something you have*, such as a driving licence or a smart card, or via *something you are* with biometrics. In this case, after identification you have to submit a thumb print, a retina scan or another form of bio-based authentication;
- **Authorisation**, which determines what the person can do on the system. In fact, in some cases users have read-only access and cannot modify data or can only have partial access to data.

Secure servers

It is also important to use a **secure server** when transferring personal information like credit card numbers over the Internet because any stop along the way could reveal our credit card number. With a secure server, the number is encrypted and it is unreadable to any computer except the receiver. Websites that encrypt details are called secure and can be verified in three ways:

- the padlock symbol in the browser window frame which appears when the users attempt to login or register•;
- the web address begins with https:// where *s* stands for secure;
- the address bar or the name of the website owner turns green when you digit the URL.

Copyright

Apart from protecting data, it is also important to protect the rights, and therefore also the economic benefits associated with those rights, of the people who write programs or apps.

Copyright is a legal term to describe the ownership of the right to use and distribute certain works of creative expression including computer programs. It includes both economic and moral rights. **Economic rights** refer to the fact that the creator has the right to prevent others from exploiting the work in various ways, without permission, and can charge a fee or royalty for the reproduction of the work. **Moral rights** include the **paternity** of the work, i.e. being identified as the author, and the **integrity right**, i.e. to prevent mutilation or distortions.

Copyleft

Copyleft is the strategy of using the law on copyright in order to make it possible and encourage the right to share, modify and improve creative works of authorship•• that are made available for free. Copyright holders of creative works can unilaterally choose copyleft licences for their own works, thereby building communities that collaborate, share and improve those copylefted creative works such as lesson plans, worksheets or video activities.

9 (6.6) **Listen to the first part of a recording describing how to create strong passwords and identify the four pieces of advice given.**

Tip 1: .....

Tip 2: .....

Tip 3: .....

Tip 4: .....

10 (6.7) **Listen to the second part of the extract and find out what the passphrase method is.**

Passphrase method: .....

Correct example given: .....

11 **Read the text and match the following categories with their definition.**

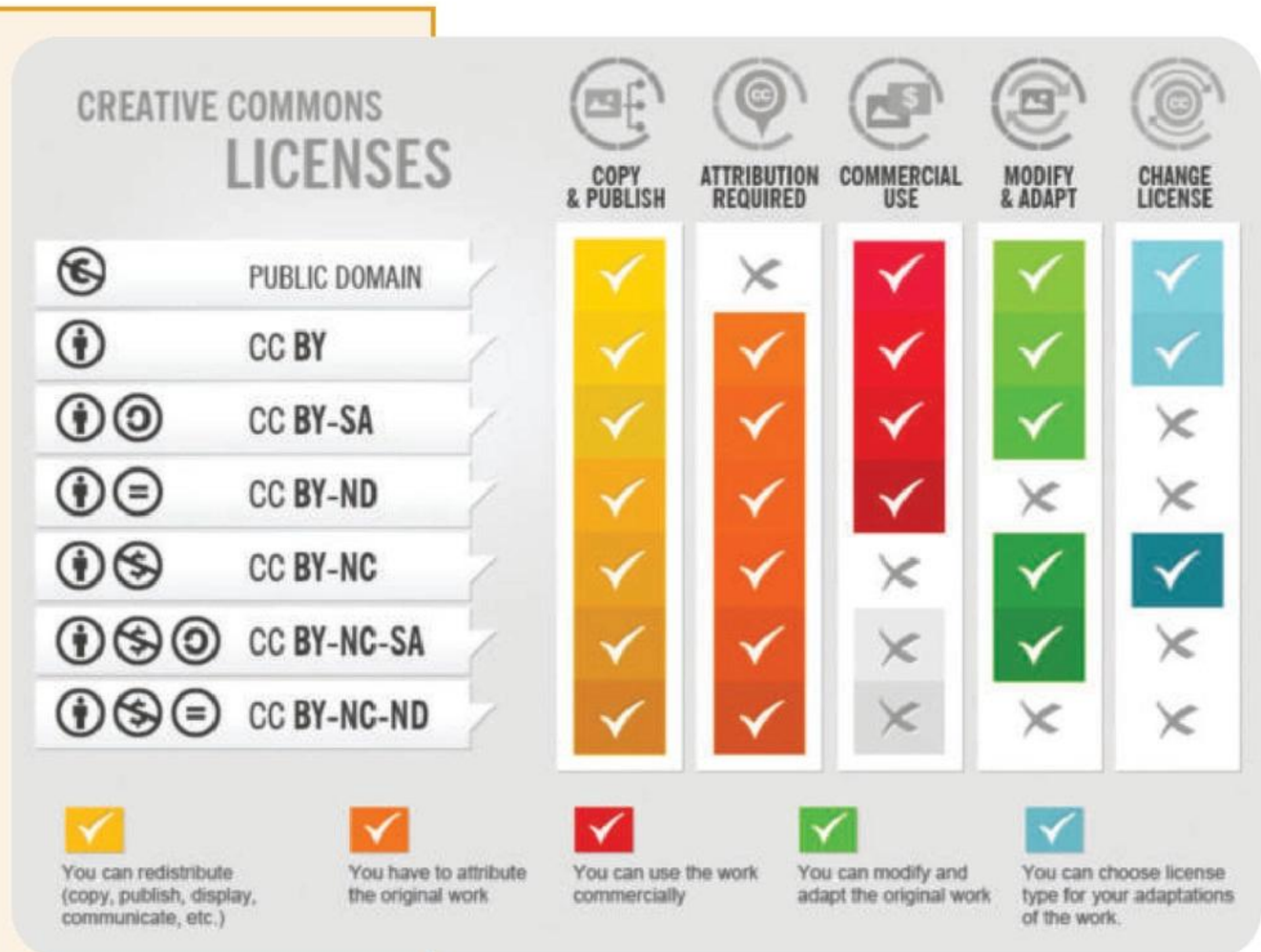
Creative Commons

Creative Commons is a non-profit organisation that offers copyright licences for digital work. No registration is necessary to use the Creative Commons licences. Instead, content creators select which of the organisation's six licences best meets their goals, then tag their work so that others know under which terms and conditions the work is released. Users can search the CreativeCommons.org website for creative works such as music, videos, academic writing, code or images to use commercially or to modify, adapt or build upon.

The six categories of licences offered are:

1. Attribution ..... • It lets others distribute, remix, build upon work, even commercially, as long as they credit the creator for the original work.
2. ..... • It allows for commercial and non-commercial redistribution, as long as the work is passed along unchanged and as a whole, crediting the creator.
3. ..... • It lets others remix and build upon work for non-commercial purposes, as long as they credit the creator and license any new creations under the identical terms.
4. ..... • It lets others remix and build upon work for commercial and non-commercial purposes, as long as they credit the creator and license new creations under the identical terms.
5. ..... • It lets others remix and build upon work for non-commercial purposes, crediting the creator. Derivative works do not have to be licensed under the same terms.
6. ..... • It allows others to download work and share it as long as they credit the creator, don›t change the work in any way or use it for commercial purposes.

Adapted from: *http://whatis.techtarget.com/definition/Creative-Commons-copyright.*



- ~~Attribution~~
- Attribution – share alike
- Attribution – no derivs (short for *derivates)*
- Attribution – non-commercial
- Attribution – non-commercial – share alike
- Attribution – non-commercial – no derivs

ELECTRONIC PAYMENTS AND DIGITAL CURRENCY

Tell the class about your personal experience with electronic payments. Which systems do you know? Which ones do you use?

Other synonyms are: digital money, electronic money and electronic currency.

Bitcoin and E-Gold are examples of virtual currency.

Electronic payments

Electronic payments, or e-payments, are transactions between two parties through an electronic medium, without the use of physical cheques or cash.

The transfer of money takes place, either online or in store, from one account to another thanks to a digital device like a computer or smartphone and/or through a credit/debit card or digital wallet.

Types of electronic payments

The main media for electronic payments are:

- **Credit cards**. They can be used to buy goods online or in shops and to pay bills. When a card is used, the details are sent to the seller's bank. The bank then gets authorisation from the credit card network to process the transaction and the money is taken from the debtor's account at the end of a billing cycle;
- **Debit cards.** As with credit cards, they are also used to withdraw money from ATM machines. The other difference is that once the transaction is approved, the money is taken immediately from the debtor's account;
- **Bank transfers**. At the time of payment, the customers provide their bank routing and account numbers and the sum is withdrawn from their accounts and transferred to the seller's account;
- **Digital wallets.** A digital wallet is a broad term for software that electronically stores credit or debit card numbers on the user's device or cloud and makes it possible to use data for online payments. Paypal and Google Wallet are examples of Internet-based digital wallets;

- **Mobile wallets.** These are a subset of a digital wallet that are only accessible on a mobile phone and allow you to tap to pay in shops. Satispay is a popular type of prepaid mobile wallet.

Digital currency

Digital currency is any currency that is managed, stored or exchanged on digital computer systems, especially over the Internet, and that does not have a physical form. This type of currency may be used to buy physical goods and services, but may also be restricted to certain communities such as for use inside an online game.

The main types of digital currencies include:

- **Virtual currency**: this is a general term used for any currency which only exists in electronic form for transactions that take place on online networks. It may or may not use cryptography to secure its networks. If it uses cryptography, it is also called cryptocurrency;
- **Cryptocurrency**: a digital currency whose transactions are verified and records maintained by a decentralised system using cryptography rather than by a centralised authority;
- **Central bank digital currency**: issued by a central bank, it is the digital form of a country's flat currency.

ATM machine: *apparecchiatura bancomat*
bank routing: *coordinate bancarie*
bill: *bolletta*
cheque: *assegno*
flat currency: *valuta piatta (al valore nominale)*
oversight: *supervisione*
payment reconciliation: *processo contabile di controllo dei pagamenti*
to tap to pay: *toccare per pagare*

12 Decide if the following statements are true or false. Correct the false ones.

	T	F
1. Electronic payment means payment through an electronic device.	☐	☐
2. If you pay by credit card, the money is immediately taken from your account.	☐	☐
3. A bank transfer involves moving money from one bank account to another.	☐	☐
4. A digital wallet is a software application.	☐	☐
5. A mobile wallet is completely different from a digital wallet.	☐	☐
6. Digital currency may have a restricted use.	☐	☐
7. Cryptocurrency and virtual currency always use cryptography to protect their networks.	☐	☐
8. The value of a central bank digital currency corresponds to the country's flat currency value.	☐	☐

13 Complete the text with the words given below.

cards • costs • help • less • paper • relations • systems • time

The Benefits of E-Payments

Electronic payments and e-payments **1.** ..... are highly convenient to both businesses and their suppliers. E-payments are a winning strategy because they reduce **2.** ....., improve relationships, increase visibility and provide more security when compared to traditional cheques. Here's how:

- **lowered processing costs:** The more payments a business can process electronically, the **3.** ..... they spend on paper and postage, along with the **4.** ..... required to print, sign and send cheques. In fact, shifting to a whole e-payments strategy can reduce payment processing costs up to 80%;
- **strengthened supplier relationships:** Businesses can improve vendor **5.** ..... by facilitating quicker, more secure payments that include a lot of data for easier payment reconciliation.
- **increased payment security**: Electronic payments are more secure than **6.** ..... cheques, and specific methods like virtual **7.** ..... offer even greater protection against fraud. On top of that, best-in-class e-payment systems include additional features and controls to **8.** ..... secure the payments process.

Adapted from: *https://www.mineraltree.com/blog/electronic-payments-what-your-business-needs-to-know*

14 Watch the video and answer the questions.

▸ Digital Euro *posted by* eurozonevideos

1. What is the digital euro?
2. What is its function as regards traditional money?
3. What is the purpose of the digital euro?
4. Who is abandoning cash for digital money?
5. Who is working on this new form of money?
6. Who will the digital euro have an impact on?

BITCOIN

Bitcoin is a type of digital currency which operates free of any central control or the oversight of banks or governments. It relies on peer-to-peer software and cryptography. There is a public record of all bitcoin transactions and copies are kept on servers around the world. Bitcoins are held in virtual wallets and can be accessed from client software. A private key is used to prove ownership of funds to the network when making a transaction.
Bitcoins have no intrinsic value as their value depends of their quotation that varies with time. They can be bought online from specific websites.

GRAMMAR

REPORTED SPEECH

Reported speech is used to communicate what someone else said.

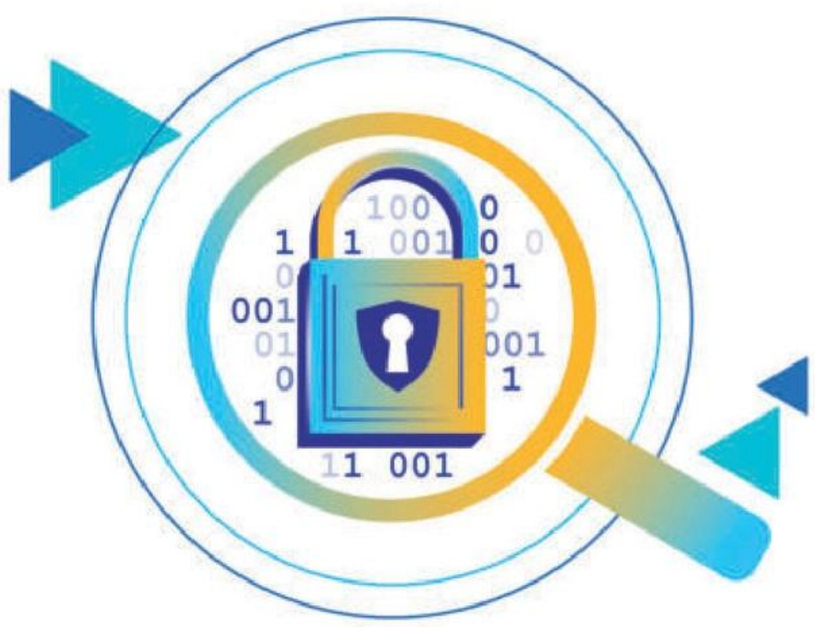
REPORTED STATEMENTS

They are introduced by the verbs *say/said* or *tell/told*.

➤ *He says/said // tells/told me (that) PayPal is a digital wallet.*

If a sentence starts in the past, there is often a backshift of tenses (see table below). If a sentence starts in the present, there is no backshift.
Other changes include pronouns, place (*here → there, this/these → that/those*) and time (e.g. *yesterday → the previous day, tomorrow → the following day*) expressions.

Direct speech Elon Musk:	**Reported speech** Elon Musk said (that)/told the journalists (that)…
Present simple ➤ *"Tesla never sells its bitcoins."*	Past simple ➤ *Tesla never sold its bitcoins.*
Present continuous ➤ *"Tesla is selling its bitcoins."*	Past continuous ➤ *Tesla was selling its bitcoins.*
Past simple ➤ *"Tesla sold its bitcoins."*	Past perfect ➤ *Tesla had sold its bitcoins.*
Present perfect ➤ *"Tesla has sold its bitcoins."*	Past perfect ➤ *Tesla had sold its bitcoins.*
Past continuous ➤ *"Tesla was selling its bitcoins."*	Past continuous ➤ *Tesla was selling its bitcoins.*
Future simple ➤ *"Tesla will sell its bitcoins".*	Present conditional ➤ *Tesla would sell its bitcoins.*
Modals ➤ *"Tesla can/may sell its bitcoins."*	Modals ➤ *Tesla could/might sell its bitcoins.*



REPORTED QUESTIONS

Direct questions are transformed into an indirect question with no inversion and question words *(where, when, who, what, how)* or *if/whether* are used to introduce it.

➤ *Paul asked: "Is the message encrypted?" → Paul asked if the message was encrypted.*

REPORTED COMMANDS

The infinitive tense is used for commands. Should/should not + base infinitive may also be used.

➤ *Paul told his sister: "Buy an antivirus program for your PC." → Paul told his sister to buy an antivirus program for her computer; Paul told his sister that she should buy an antivirus program for her computer.*

15 **Rewrite the sentences in reported speech.**

1. Mike said: "I always encrypt my messages."
2. Jane said: "I forgot to make a backup yesterday."
3. Kate said: "I will buy a new antivirus program."
4. Josh asked Jane: "Where did you buy your antivirus program?"
5. Jim's father told his son: "Don't open emails from unknown senders."
6. Jason said: "It's a bad idea to switch off the PC when it is still working."
7. The teacher asked Mike: "Can you tell me anything about cryptography?"
8. I said to my brother: "I am really interested in cryptography."

CITIZENSHIP

COOKIES AND CUSTOMER PROFILES

16 Read the short definition of cookies and answer the questions.

> **Cookies**
> Cookies are small text files stored on a user's browser by the websites they visit. They retain login credentials, identify customers, and provide a customised shopping experience. Note that, in accordance with the EU Cookie Law, when a customer enters a website with cookies, a window opens up and they are asked to decide if they accept the cookies or not. However, most websites force the user to consent by only allowing them to continue past a certain point if they agree to having their cookies stored.

1. What is your personal experience with cookies? Do you usually accept or refuse them? Why?
2. What type of information do you think cookies can collect? For what reason?
3. What do you think about the fact that you need to consent to cookies in order to read, for example, a full article?

17 Read this short text on customer profiles and answer the questions.

> **Customer Profiles**
> Consumer data is valuable for companies and, as a result, almost any interaction with a large company results in the collection of consumer data in order to create customer profiles.
> Apart from cookies, companies can use other tools to collect their customers' data:
> - customers' comments or feedback;
> - online questionnaires;
> - tracking purchases through loyalty cards that can be used to get discounts or prizes.
>
> With all this data, companies create customer profiles that are used for marketing purposes.

1. Have you ever answered a questionnaire on a product or service or rated your customer experience? If so, tell the class. Otherwise, would you be interested in doing so?
2. Have you ever written a comment on a restaurant, hotel, or any other product or service? How do you think they could be relevant?
3. Do you have a loyalty card for any shops or restaurants? If so, what are the advantages?
4. What information do you think a customer profile contains? Why do business organisations find them useful?

18 GROUP WORK Imagine you are a legislator and you have to make a law that limits the quantity and quality of data that companies can collect for customer profiling.

Decide on the following:

1. what information cannot be collected and stored with reference to customers' privacy;
2. the means through which companies can collect data with or without the customers' consent;
3. what type of data can be collected;
4. how to inform customers of the fact that they are being profiled.

19 PAIR WORK After reading the text, decide if it is a good idea to delete or ban all cookies from your computer.

> **Should I Block Cookies?**
> Some people delete all their cookies, then have to re-enter all their logins and find their favourite websites again. Others use anti-tracking software whenever they go online. This offers some level of protection against the threats associated with cookies and helps protect general online privacy. However, is eliminating or stopping cookies always effective? Yes, sometimes. It's a good idea to only shut out cookies for external organisations because without the necessary cookies, i.e. the ones related to your favourite websites, you'll suffer a downgraded browsing experience.
>
> Adapted from: *https://www.avg.com/en/signal/are-cookies-bad*

6.3 PROTECTING YOURSELF AND YOUR DATA

BIG DATA

Examples of structured data are transactions and financial records. As for semi-structured data, there are web server logs and streaming data sensors. For unstructured data: texts, documents and multimedia files.

A data warehouse is a type of data management system to perform queries on big data.

Data mining tools are a set of techniques which use special algorithms, statistical analysis, artificial intelligence and database systems to analyse data from different dimensions and perspectives.

to cleanse: *pulire*
raw: *grezzo*
repository: *archivio*

Big data is a combination of structured, semi-structured and unstructured data collected by organisations that can be used to extract relevant information for machine learning projects and for other advanced applications.

Features of big data

According to an early definition in 2001, big data is characterised by 3 Vs:

- the large **volume** of data in many environments;
- the wide **variety** of data types frequently stored in big data systems;
- the **velocity** at which much of the data is generated, collected and processed.

More recently, other Vs have been added:

- **veracity**, which refers to the level of accuracy of data;
- **value**, because data can have real business value;
- **variability,** as data can have different meanings and be formatted in different ways.

Although the term big data does not correspond to any specific volume of data, it usually involves terabytes and even exabytes of data created and collected over time.

Big data storage

Big data is often stored in a **data lake**, i.e a large repository which can store large amounts of unprocessed data of different kinds in its original form. Many big data environments combine multiple systems in a distributed architecture. For example, a central data lake might be integrated with other platforms, including relational databases or a data warehouse. The data can be left in its raw form and then filtered and organised as needed for particular uses or pre-processed using data mining tools and data preparation software.

Big data processing

Big data processing requires a large amount of computing power, often provided by hundreds or even thousands of server computers working together and using special technologies. Since this process is both cost-effective and challenging, clouds are popular locations for big data systems.

Big data analytics

Big data analytics is the name given to the process of gathering and analysing large volumes of data in order to extract information. To get relevant results from big data analytics applications, data scientists and data analysts must have a detailed understanding of the available data and a precise idea of what they are looking for. For this reason, data preparation is necessary.

Data preparation includes:

- profiling,
- cleansing,
- validation, and
- transformation of data sets.

Then, different tools can be used to analyse data such as data mining, statistical analysis, etc.

1 Watch the video and answer the questions.

▶ What is Big Data | Big Data in 2 Minutes | Introduction to Big Data | Big Data Training *posted by* edureka!

1. Which categories of devices are mentioned in the video?
2. What is the reason for the emergence of big data?
3. What is big data?
4. How much data is created daily according to Forbes?
5. What example is provided of big data at work?
6. What advantage will data scientists and analysts have due to the increase in volume of big data?

2 Decide if the following types of data are structured, semi-structured or unstructured.

transaction processing systems • customer databases • documents • emails • medical records • Internet clickstream logs • audio files • social networks

Structured data	Semi-structured data	Unstructured data

3 Look at the image and practise describing the 6 Vs of big data.

4 Read the text and match the appropriate heading to each paragraph.

comparative analysis • marketing analytics • sentiment analysis • social media listening

Different Types of Analysis with Customer Data

Using customer data as an example, the different branches of analytics that can be done with sets of big data include the following:

- **1.** ..... This examines customer behaviour data and real-time customer engagement in order to compare a company's products, services and branding with those of its competitors.
- **2.** ..... This analyses what people are saying on social media about a business or product, which can help identify potential problems and target audiences for marketing campaigns.
- **3.** ..... This provides information that can be used to improve marketing campaigns and promotional offers for products, services and business initiatives.
- **4.** ..... All of the data that is gathered on customers can be analysed to reveal how they feel about a company or brand, customer satisfaction levels, potential issues and how customer service could be improved.

Adapted from: *https://www.techtarget.com/searchdatamanagement/definition/big-data*

CUSTOMER PROFILING

Not every customer profile will necessarily have all of the types of information listed here. Businesses may use what is required depending on their company type or marketing objectives.

The right customer profile tool will make it easy to create and explain customer profiles to the sales team.

Big data can have different uses, but one of the most important is customer profiling.

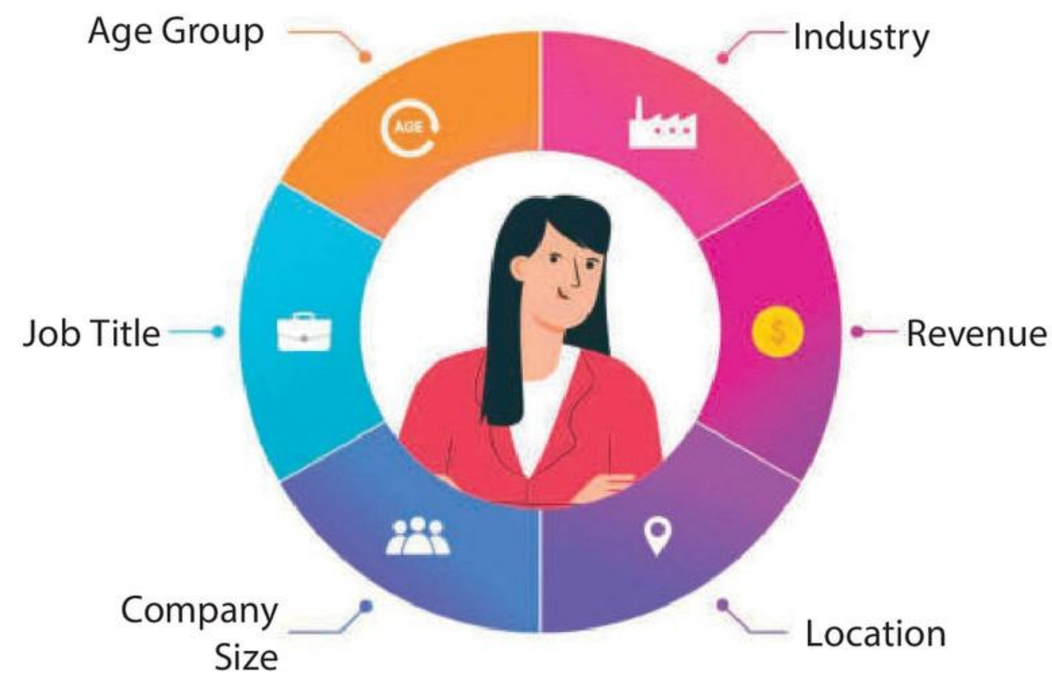
What is customer profiling?

Customer profiling is the practice of organising customers into specific groups that possess similar goals or characteristics. This process helps identify and create integrated profiles of ideal customers, who are segmented on the basis of different variables. Customer profiles, also called **buyer personas**, are therefore specific customer types who represent the typical users of a product or service and they are used because they can help businesses to address the right kind of audience for their products and services.

The elements of a customer profile

In order to compile a customer profile, it is essential to collect the following type of information:

- **Demographic:** information concerning the name, age, gender, race/ethnicity of the customer;
- **Socio-economic:** this includes the customer's highest level of education, their current occupation, income range per month and household structure (i.e. married or single, children, living with a partner, etc.);
- **Geographic:** the customer's hometown and the surrounding area;
- **Psychographic**: information about the customer's behaviours and beliefs, including personality, hobbies, interests, lifestyle and values;
- **Behavioural**: the identification of what influences the buying decisions in terms of product choice, price factor or promotions; if the influence is internal or external, and the motivation behind purchases;
- **Rfm (recency, frequency, monetary value):** how recently and how often the customer has made a purchase and how much is spent on each one.



Customer profiling software

Without customer profiling tools, sales and marketing initiatives tend to be random and ineffective. Fortunately, a vast suite of customer profile software has emerged in recent years.

These are the main types of software used for customer profiling:

- **Customer Relationship Management system (CRM)**: this helps keep track of the interactions with customers and potential customers;
- **Data Enrichment software**: this is performed when sales teams merge third-party data with proprietary data. This process gives a team a fuller picture and helps it make data-based decisions;
- **Survey software:** this helps businesses collect feedback and information from a given target audience;
- **Customer Profile software** in a strict sense: this helps create business profiles based on market research and real data.

household: *nucleo familiare*
income: *reddito*

5 Look at this customer profile and identify the different types of information. Look at the categories on the previous page.

➤ *Age = demographic; Single = socio-economic*

Ziggy Piper

- Age:23
- Single
- Lives in Austin, Texas
- Biology student

Associated words:
- Bohemian
- Hippie
- Earthy
- Indie
- Artsy
- Unconventional
- Spiritual

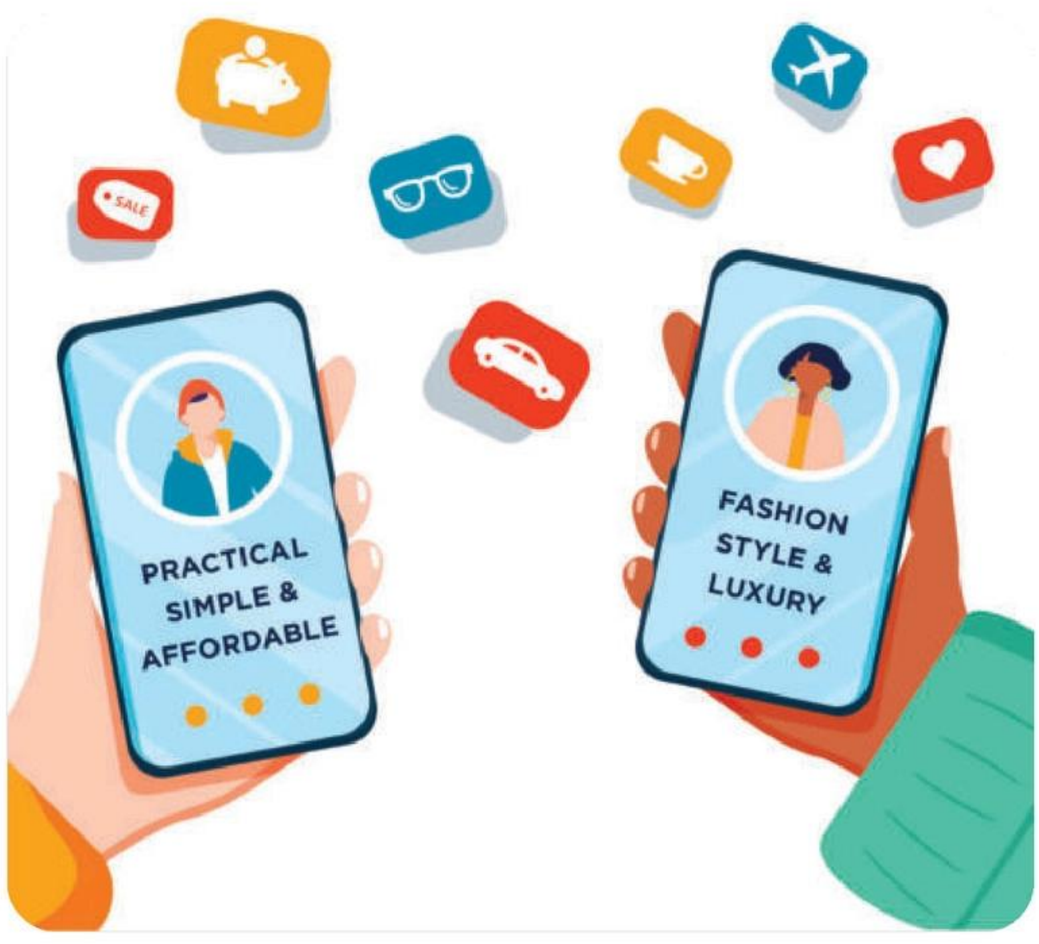
Personality style:
- Lives a non-traditional life
- Has a distinct "love not war" mentality
- Wears baggy, chic, bold colored, Boho style clothes
- Loves to reside with freedom of expression
- Vegetarian

Effective Promotions:
- Bohemian style inspired images/videos
- Creative eco-friendly clothing styles & designs
- Aesthetic social media layout
- Regular style guides and lookbooks.

6 PAIR WORK **Look at Ziggy's profile again and choose the type of company that you think carried out the profiling. Justify your answer.**

1. A coffee shop
2. A clothing and accessories brand
3. A wedding planning company
4. A digital marketing company

7 6.8 **Listen to the presentation of different types of customer profile software and decide if each statement refers to Make My Persona (M), PersonaBold (P) or Xtensio (X).**



	M	P	X
1. It is a free tool.	☐	☐	☐
2. It offers a 15-day free trial.	☐	☐	☐
3. You can choose an avatar and select demographic information.	☐	☐	☐
4. It makes it easy to create interactive online avatars.	☐	☐	☐
5. It includes various types of data like, for example, motivation.	☐	☐	☐
6. You can collaborate on ever-evolving documents.	☐	☐	☐
7. It offers a range of persona templates.	☐	☐	☐
8. You can create profiles that the entire company can use.	☐	☐	☐

GDPR AND PRIVACY REGULATIONS

European Regulation 2016/79.

D.Lgs. 196/2003 integrated by L.Lgs. 101/2018. See articles 11 and 13 for ISP.

See articles 31-32 of the Privacy Code.

People may be worried about the use of big data and the information that can be collected in customers' profiles, but the law sets limits to the collection and use of sensitive data by third parties. Data protection and privacy regulations are complex sets of rules that concern the management of personal data in different situations. In this chapter, we will focus on the aspects related to the use of the Internet.

General Data Protection Regulation (GDPR)

The **General Data Protection Regulation (GDPR)**•, put into effect on 25th May 2018, is the toughest privacy and security law in the world. Though it was drafted and passed by the European Union (EU), it imposes obligations onto organisations anywhere, so long as they target or collect data related to people in the EU.

The fines for violating the GDPR are very high. There are two levels of penalties:

- fines of up to €20 million or 4% of global revenue (whichever is higher);
- fines which may derive from the right of data subjects to seek compensation for damages.

collegiate body: *organo collegiale*
enactment: *emanazione*
enforcement: *applicazione*
to envisage: *prevedere*
fine: *multa*
hearing: *udienza*
to seek: *cercare*
tough: *severo*

Privacy regulations

According to the Italian Privacy Code••, the collected data must be correct, up-to-date and treated according to the law. Data should be stored and kept in a form recognisable by the user and only for the time necessary for the use for which they have been collected.

When this data is collected, the users have to be informed in a written form on:

- how their data will be treated and the purpose of the treatment;
- the nature of the provision of data, i.e. free or compulsory;
- the consequences of a refusal to answer the communication;
- the identification of the people or categories of people who will deal with the data;
- where their data would be available.

Special regulations for Internet Service Providers

Internet Service Providers (ISP)••• guarantee that users' data is only accessed by people who are legally authorised. All the data has to be stored and protected against damage, loss or unauthorised access.

ISPs have to inform users in the event of risks related to network attacks.

8 **Read the text and put the sentences which have been taken from the text in the correct place.**

a. data is processed as required by the law and the rights of individuals are respected whenever their personal data is processed.

b. if the nature of such data or the mechanisms or effects of the processing may substantially affect data subjects;

c. including the handling of cross-border cases;

d. which integrated what was already set out in the Personal Data Protection Code of 2003

e. who are elected by Parliament for a seven-year term.

f. whose findings are taken into account in drafting general application measures.

The Italian Data Protection Authority

The Italian Data Protection Authority is an independent authority set up to protect fundamental rights and freedoms in connection with the processing of personal data, and to ensure respect for individuals' dignity.

The Data Protection Act is a collegiate body including four members **1.** ..... The tasks of the Data Protection Authority were fixed by law in 2016, **2.** ..... and in other national and EU regulatory instruments. The Data Protection Act is committed to ensuring that, in all public and private sectors, **3.** .....

The tasks of the Data Protection Authority include:

- checking that personal data is processed in line with laws and regulations and, where appropriate, ordering data controllers and data processors to take specific measures;
- handling complaints;
- banning, in whole or in part, or ordering the restriction of the processing of personal data **4.** .....
- taking the measures envisaged in data protection legislation;
- giving advice to Parliament and Government before the enactment of legislation on data protection;
- drawing the attention of Government and Parliament, wherever appropriate, to the need for passing specific laws or regulations in various walks of life;
- participating in the debates on law-making activities through hearings before Parliament;
- issuing opinions;
- drawing up an annual report of their activities and the current enforcement of privacy legislation, which is submitted to Parliament and Government;
- participating in data protection-related activities at EU and international level, **5.** .....
- carrying out supervisory activities on Europol, Schengen and similar information systems;
- raising citizens' awareness of personal data protection issues and data security measures;
- seeking the involvement of citizens and stakeholders via public consultations **6.** .....

Adapted from: *https://www.garanteprivacy.it/web/garante-privacy-en/the-italian-data-protection-authority-*

9 GROUP WORK **Read the text again and answer the questions.**

1. What does the expression *collegiate body* mean?
2. Which laws set the role of the Italian Data Protection Authority?
3. Among the different tasks of the Italian Data Protection Authority, which one do you think is more important?

10 PAIR WORK **Discuss the questions.**

1. What is your personal experience with privacy? Filling in forms, expressing your consent by phone, etc.?
2. What is your personal opinion on the privacy law? Useful? A waste of time? Give reasons for your answers.

GRAMMAR

VERB PATTERNS

Gerund

- After prepositions and phrasal verbs. ➤ *Data analysts are good at dealing with big data.*
- As the subject of a sentence. ➤ *Dealing with big data is not an easy task.*
- After some verbs: *hate, spend, not mind, like, love, suggest, stop, finish, avoid.* ➤ *I love working with customer profiling.*

Infinitive

- After certain adjectives. ➤ *It is impossible to imagine how much data is processed every day.*
- To express a reason or a purpose. ➤ *GDPR was made to regulate a complex situation.*
- After some verbs: *learn, try, want, need, offer, would like.* ➤ *I would like to learn more about big data.*

Gerund or infinitive

- ➤ *I love/like dealing with big data.* (general)
  ➤ *I love/like to deal with big data with the appropriate software.* (specific)
- ➤ *I stopped working because it was too late.* (the activity is finished permanently)
  ➤ *I was so tired I stopped work to have a break.* (an activity is interrupted to start a new one)
- ➤ *I remember using customer profile software.* (to remember something done in the past)
  ➤ *I need to remember to use customer profile software tomorrow.* (to remember to do something in the future)

Object + infinitive

- After some verbs: *ask, encourage, force, want, teach, remind.* ➤ *I want my colleagues to deal appropriately with customers' data.*

Object + bare infinitive (infinitive without *to*)

- After the verbs *let, make.* ➤ *The average customer lets trusted business organisations collect their data.*

11 Complete the sentences with the appropriate verb form (gerund or infinitive).

1. You should avoid ..... (rely) too much on big data analytics.
2. I remember ..... (collect) a lot of customer data yesterday.
3. Jane, remember ..... (finish) your analysis by tomorrow.
4. ..... (learn) how to deal with privacy rules is not an easy task.
5. Come for a coffee when you finish ..... (process) customers' data.
6. I love ..... (work) with big data.
7. John offered ..... (help) me with my analysis.
8. I like ..... (interrogate) big data only when I can lead the team.
9. Don't forget ..... (speak) clearly when you explain policy rules.
10. A colleague suggested ..... (have) a break.
11. I ask my customers ..... (answer) some questions online.
12. I made my team ..... (work) very hard on the new project.

CITIZENSHIP

DIGITAL NATIVES AND DIGITAL CITIZENSHIP

The term **digital native** is used to describe people who have grown up in the information age. These individuals can consume digital information and stimuli quickly and easily through digital devices. People belonging to both Generation Z (born 1995-2010) and Generation Alpha (born 2010-2015) are considered digital natives.

A **digital citizen** is someone who is competent in their use of the Internet and devices, and who engages with technology in a responsible way.
Being a digital citizen means possessing a series of abilities:

- **Privacy management**: the ability to handle all personal information that is shared online with discretion and protect one's own privacy as well as that of others;
- **Critical thinking**: the ability to distinguish between true and false information;
- **Digital footprint**: understanding what a digital print is, realising the real-life consequences of posting online, being able to manage one's online content responsibly;
- **Digital empathy**: being able to understand other people's needs and feelings online;
- **Cybersecurity management**: knowing how to protect one's own and other people's data, being able to create strong passwords, protecting one's devices against malware attacks and recognising dangerous downloads.

12 **Answer the questions.**

1. Do you consider yourself a real digital native? Can you use any digital device easily and access information quickly?
2. Do you have all the characteristics required to be a digital citizen? Which ones are missing? Use these questions to help you.
   a. Are you able to protect your own and your friends' data?
   b. Can you recognise fake news?
   c. Do you consider the real life impact when posting a photo or a video on a social network?
   d. What does digital empathy mean to you?
   e. Do you protect your devices from malware and use passwords to protect your data?
3. What are your plans to become a better digital citizen?

13 FIRST PAIR WORK **Look at the image and discuss the different aspects of being a good digital citizen. Which two aspects do you think are the most important?**

VOCABULARY

1 **Write the correct words for the following pictures.**

adware • antivirus software • big data • cookies • cryptography • customer profiling • firewall • man-in-the-middle attack • phishing • ransomware • Trojan horse • worm

1. .....

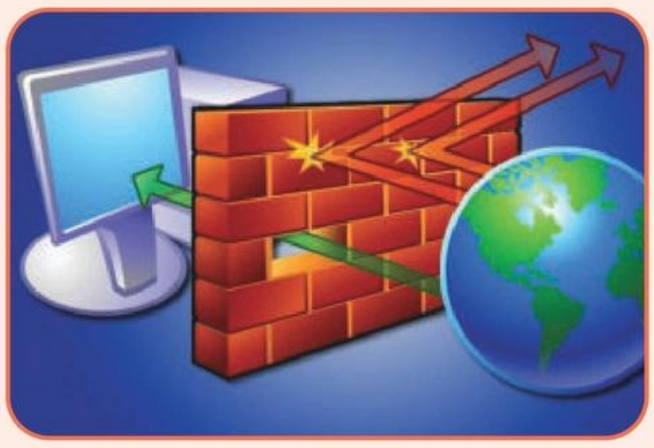
2. .....

3. .....

4. .....

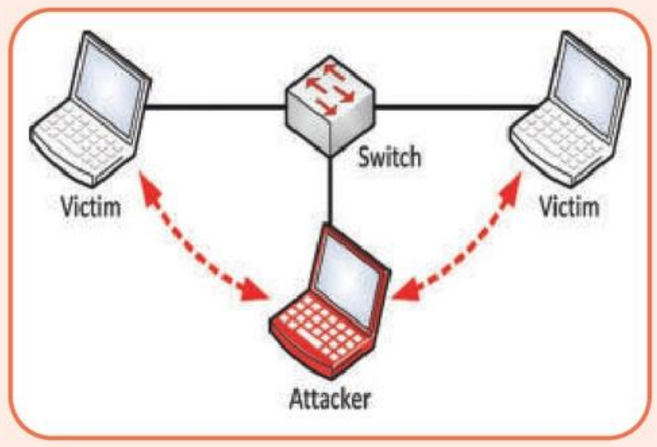
5. .....

6. .....



7. .....

8. .....



9. .....

10. .....

11. .....

12. .....

2 **Find the words for these definitions in the word search.**

1. It copies itself and executes the malicious code. .....
2. It protects the rights of a program's creator. .....
3. It is a way to solve simple computer problems. .....
4. It is a type of virtual currency. .....
5. It spies on users' activity. .....
6. It proves that users are who they say they are. .....

E	N	O	I	T	A	C	I	T	N	E	H	T	U	A
J	L	Q	V	V	A	O	H	S	E	P	O	G	C	P
J	S	L	O	T	E	G	P	A	G	Z	O	D	R	U
V	U	G	J	F	I	Y	X	O	D	P	A	T	Y	H
G	R	H	H	R	W	Y	Q	F	K	W	B	K	P	O
A	I	N	Y	A	S	R	M	P	H	V	X	X	T	I
E	V	P	R	U	C	E	C	X	W	Q	U	P	O	A
A	O	E	A	P	B	E	S	F	Q	B	B	Z	C	K
C	N	M	H	M	I	M	X	R	R	B	H	M	U	S
G	B	I	Z	I	T	U	W	P	N	Q	I	I	R	H
S	R	K	J	K	S	S	C	V	C	Y	V	G	R	C
U	Z	E	N	J	T	Q	U	G	Y	C	P	C	E	Q
T	R	O	U	B	L	E	S	H	O	O	T	I	N	G
G	G	U	Z	E	V	T	K	W	G	Z	N	T	C	M
O	A	D	S	V	M	B	Y	I	C	P	O	Z	V	E

3 FCE **Use the words given in capitals to form a word that fits in the gap.**

Viruses and Worms

Viruses are very dangerous because they can be **1.** ..... (INFECT) for host computers. Once they have **2.** ..... (REPLICATE) themselves, they start **3.** ..... (SPREAD). One of a virus's unique characteristics is its **4.** ..... (REPLICATE) mechanism. They attach themselves to programs and execute the code when the user launches the **5.** ..... (INFECT) program.

A worm is a program that **6.** ..... (SPREAD) through computer networks. Worms can cause harm to networks by consuming bandwidth and **7.** ..... (OVERLOAD) web servers. They can exploit bugs in legitimate software and computers can become **8.** ..... (INFECT).

4 **Find words related to IT with the suffix -*ware* and words with the prefix *crypto*-.**

5 **Find the odd one out for each line and say why.**

	a.	b.	c.	d.
1.	virus	backdoor	worm	dialler
2.	ransomware	spyware	rogue security	keylogger
3.	bluebugging	Bluetooth	bluesnarfing	bluejacking
4.	integrity	confidentiality	identification	authentication
5.	copyright	moral rights	economic rights	sharing rights
6.	spam	adware	junk mail	junk newsgroup posting

ENCRYPTING AND DECRYPTING MESSAGES WITH CAESAR CIPHER

6 **Write a short message of about 30-35 words. Then, encrypt it using Caesar cipher.**

Encrypting with Caesar cipher means replacing each letter of the message with another which is shifted by a certain number of places down the alphabet. Remember to use the English alphabet.

e.g. +1 = A → B; B → C; etc.

e.g. +2 = A → C; B → D; etc.

Original text:

Encrypted text: +n

7 **Exchange your encrypted message with a classmate and try to decrypt the one that you have just received. It is an intuitive activity, but once you get a clue, you can decrypt the entire message.**

8 GROUP WORK **Let's make it a bit more difficult. Encrypt the message replacing each letter with one that comes before it in the alphabet.**

e.g. -1 = N → M; A → Z; etc.

e.g. -4 = A → W; S → P; etc.

Original text:

Encrypted text: –n

9 **Decrypt the message from the previous activity.**

10 **Decrypt the message and answer the questions.**

The cipher is: +n = 1 + (2 x 3) – 4.

KDYH BRX HQMRBHG WKLV DFWLYLWB? ZDV LW GLIILFXOW?

2017 WANNACRY RANSOM ATTACK

The WannaCry ransomware attack was a global epidemic that took place in May 2017. This ransomware attack spread through computers operating Microsoft Windows. Users' files were held hostage, and a Bitcoin ransom was demanded for their return.

■ Ransomware

WannaCry is an example of crypto ransomware, a type of malware used by cybercriminals to extort money.

Ransomware does this by either encrypting valuable files, so you are unable to read them, or by locking you out of your computer, so you are not able to use it. Ransomware that uses encryption is called crypto ransomware. The type that locks you out of your computer is called locker ransomware.

Like other types of crypto ransomware, WannaCry takes your data hostage, promising to return it if you pay a ransom.

■ The hack and the patch

The cybercriminals responsible for the attack took advantage of a weakness in the Microsoft Windows operating system using a hack that was allegedly developed by the United States National Security Agency.

Known as EternalBlue, this hack was made public by a group of hackers called the Shadow Brokers before the WannaCry attack. Microsoft released a security patch which protected users' systems against this exploit almost two months before the WannaCry ransomware attack began. Unfortunately, many individuals and organisations do not regularly update their operating systems and so were left exposed to the attack.

Those that had not run a Microsoft Windows update before the attack did not benefit from the patch and the vulnerability exploited by EternalBlue left them open to attack.

■ The attack

When it first happened, people assumed that the WannaCry ransomware attack had initially spread through a phishing campaign. However, EternalBlue was the exploit that allowed WannaCry to propagate and spread, with DoublePulsar being the backdoor installed on the compromised computers.

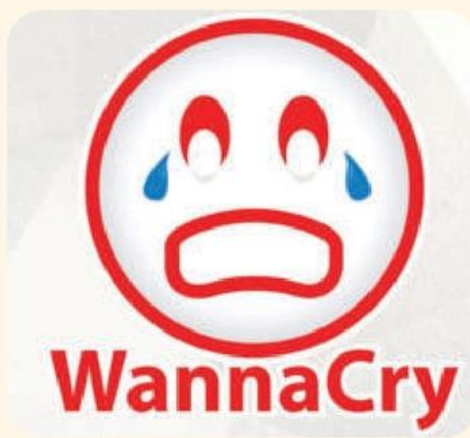
The WannaCry ransomware attack hit around 230,000 computers globally. One of the first companies affected was the Spanish mobile company, Telefónica. By May 12th, thousands of NHS (National Health Service) hospitals and surgeries across the UK were affected. A third of NHS hospitals were affected by the attack. Ambulances were reportedly rerouted, leaving people needing urgent care in need. It was estimated to cost the NHS £92 million after 19,000 appointments were cancelled as a result of the attack.

As the ransomware spread beyond Europe, computer systems in 150 countries were crippled. The WannaCry ransomware attack had a substantial financial impact worldwide. It is estimated this cybercrime caused $4 billion in losses across the globe.

Adapted from: *https://www.kaspersky.com/resource-center/threats/ransomware-wannacry*

11 **Read the text and answer the questions.**

1. What is WannaCry?
2. Describe crypto and locker ransomware.
3. What weakness did the cybercriminals exploit?
4. What did Microsoft do to protect users?
5. Why was WannaCry successful?
6. What was the impact of WannaCry both globally and specifically in the UK?



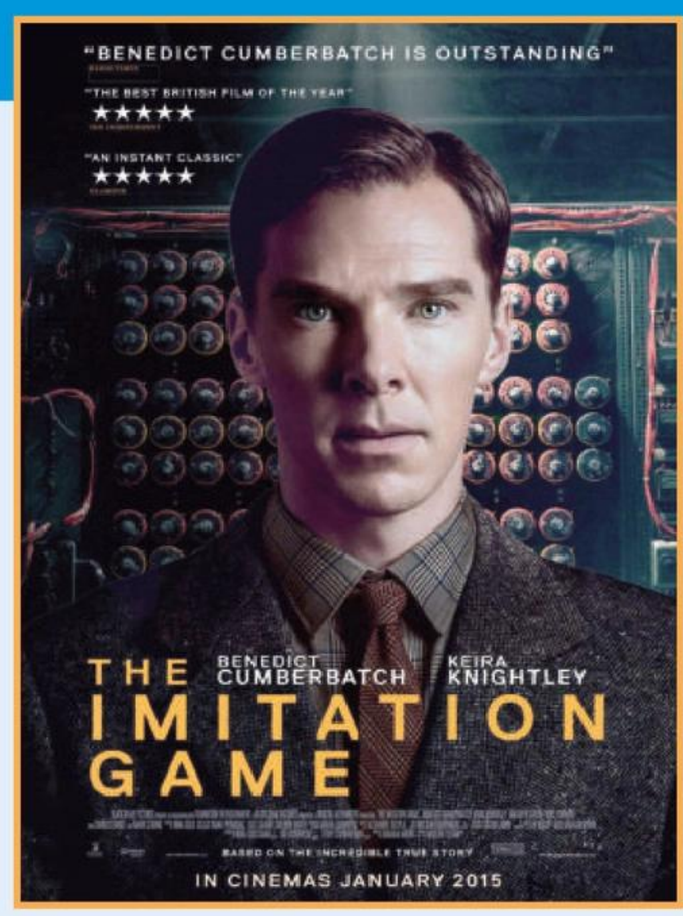
crippled: *paralizzato*
hack: *accesso*
patch: *pezza, rattoppo*

CLIP

FILM

THE IMITATION GAME

- PRODUCTION: USA/UK 2014
- DIRECTOR: Morten Tyldum
- STARRING: Benedict Cumberbatch (Alan Turing); Keira Knightley (Joan Clarke), Matthew Goode (Hugh Alexander).



SYNOPSIS

During World War II, the mathematician Alan Turing joins a team of code-breakers at Britain's top-secret Government Code and Cypher School at Bletchley Park to try to decipher the code of the German Enigma machine. The problem is that Enigma is recorded every day. That means that even if the team can decipher a coded message, that code would be obsolete the next day. There are 159,000,000,000,000,000,000 possible codes that could be input into Enigma. While the rest of the team works on breaking the day-to-day codes because they believe it is the only way to learn the secret of Enigma, Alan works by himself on developing a machine, with a sort of artificial intelligence, which he believes will be able not only to break a daily code, but also to break any code immediately when it is input into Enigma. The problem, of course, is convincing his superiors to fund the building of the machine. The arrival of the only female member in the team, the brilliant Joan Clarke, provides Alan with a sense of how to manage a team. Alan and his team are able to crack the code with the help of Alan's machine by concentrating their search on repeated patterns used in weather forecasts by the Germans. In the final scene, we see Joan making a visit to Alan, who has been completely destroyed by compulsory hormonal therapy because of his homosexuality.

BEFORE WATCHING

12 **Read the synopsis and answer the questions.**

1. Who was Alan Turing?
2. What did he do during WW2?
3. What was Enigma?
4. Why was Enigma so hard to crack?
5. What was Alan working on?
6. What was Joan Clarke's contribution?

13 PAIR WORK **Use the Internet to find the answers to the following questions.**

1. Why is Turing considered to be the father of modern computing?
2. What was the Bombe?
3. What was Delilah?
4. What was the automatic computing engine (ACE)?
5. What is the Turing Test?
6. What was the cause of Turing's death?

WHILE WATCHING

14 **Watch the clip and answer the questions.**

1. What is Alan interested in?
2. Who or what is Christopher?
3. What is Alan trying to build?
4. What are the characteristics of Alan's machine?
5. How does Alan compare Christopher with the human brain?
6. How does Alan define his machine at the end?

15 **Match the nouns with the correct adjectives. Then, watch the video clip again and check your answers.**

decrypted	messages (2)
digital	machine (3)
electrical	brain (2)
encrypted	computer (1)
human	
programmable	
re-programmable	
universal	

.....

.....

.....

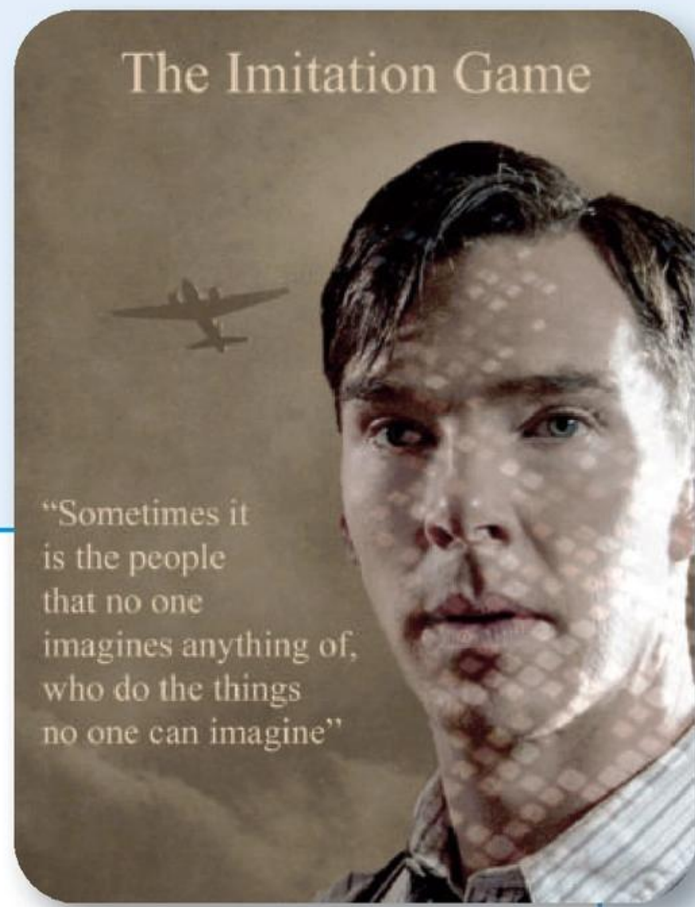
.....

.....

AFTER WATCHING

16 **Write a short comment on Turing's quotation.**

17 **Read the text and summarise what the connection between Turing and Apple Computers is.**



Alan Turing and Apple Computers

In 1954, Alan Turing died after biting into a cyanide-poisoned apple.

It's long been assumed that it was suicide, perhaps because he was frustrated by the chemical castration the British government forced upon him after he admitted to having a sexual relationship with a man, which was against the law at the time. Recently, some have speculated that Turing's death-by-apple wasn't necessarily intentional because he was known to be careless with his experiments. Whatever happened, the fact remains that a half-eaten apple was found by Turing's bedside.

About two decades later, a few people making personal computers in a garage had a name for their product and were now in need of a logo. The men were aware of Turing's contributions to computers and coding and decided to honour him and comment on his persecution by removing a single bite from the apple graphic they had picked to represent their company. And that's how we got the iconic Apple logo on the back of all of our phones, computers, and iPods.

So the story goes, anyway. But as nice as it is, it simply isn't true, according to the designer who created the logo, Rob Janoff. The size of the bite showed that the shape was an apple, not a cherry or any other vaguely round fruit. But that's not to say that the idea of paying homage to Turing is something the creators of Apple were against. When actor Stephen Fry once asked his good friend Steve Jobs if the famous logo was based on Turing, Jobs replied, "God, we wish it were."

Adapted from: *https://www.mentalfloss.com/article/64049/did-alan-turing-inspire-apple-logo*

MAPPING YOUR MIND

PROTECTING COMPUTERS

- **Malware**
  - Malicious programs that can compromise computer functions, steal data, bypass access controls, monitor users' activity and damage hardware
  - **Classification**
    - **Malicious programs**
      - Malware which damages data and compromise computer functions
      - Virus
      - Worm
      - Backdoor
      - Rogue security
    - **Crimeware**
      - Programs which are intended to obtain financial gain in a fraudulent way by stealing money or sensitive data
      - **Diallers**
      - **Keyloggers**
      - **Phishing**
      - **Rootkits**
      - **Spyware**
      - **Trojan horses**
      - **Social engineering**
      - **Identity theft**
      - **Browser hijackers**
      - **Ransomware**
    - **Mobile malware**
      - Malicious software that is specifically designed to target mobile device systems
      - **Spyware**
      - **Trojan horses**
      - **Worms**
      - **Ransomware**
      - **Expander**
      - **Ghost push**
      - **Blueborne**
      - **Bluesnarfing**
      - **Bluejacking**
      - **Bluebugging**
    - **Network threats**
      - Threats that take place in the network
        - **Packet sniffing**
        - **Port stealing**
        - **Denial of service (DOS)**
        - **Destructive attacks**
        - **Spoofing**
        - **Unauthorised access**
  - Can take the form of
    - **Adware**
  - Is different from
    - **Bug**
- **Computer protection**
  - **Cryptography**
    - Practice of hiding information so that only those for whom it is intended can read and process it
    - Types
      - **Public key or asymmetrical**
      - **Private key or symmetrical**
    - Objectives
      - **Confidentiality**
      - **Integrity**
      - **Non-repudiation**
      - **Authentication**
  - **How to protect against risks**
    - **Antivirus software**
      - Application used for scanning and removing viruses from computers
    - **Firewall**
      - Network security system designed to prevent unauthorised access to or from a private network
    - **Follow best practices**
      - Methods or techniques which have consistently shown results superior to those achieved with other means
  - **Network security**
    - Series of policies and practices to prevent and monitor unauthorised access to a computer network and its resources
    - Involves
      - **Identification**
      - **Authentication**
      - **Authorisation**
  - **Protection of rights of authorship**
    - **Copyright**
    - **Copyleft**
  - **Electronic payments**
    - Transactions between two parties through an electronic medium
    - Types
      - **Credit cards**
      - **Debit cards**
      - **Bank transfers**
      - **Digital wallets**
      - **Mobile wallets**
    - Can use
      - **Digital currency**
        - Types
          - **Cryptocurrency**
          - **Virtual currency**
          - **Central bank digital currency**
- **Protecting yourself and your data**
  - **Big data**
    - Combination of structured, semi-structured and unstructured data collected by organisations
    - Features
      - **Volume**
      - **Variety**
      - **Velocity**
      - **Veracity**
      - **Value**
      - **Variability**
    - Storage
      - In a data lake
  - **Customer profiling**
    - Practice of organising customers into specific groups possessing similar goals or characteristics
    - Through process of identification and description of integrated profiles of the ideal customers, segmented on the basis of different variables
    - Variables
      - **Demographic**
      - **Socio-economic**
      - **Geographic**
      - **Psychographic**
      - **Behavioural**
      - **RFM (recency, frequency, monetary value)**
    - Software
      - **Customer Relationship Management system (CRM)**
      - **Data enrichment software**
      - **Survey software**
      - **Customer profile software**
  - **GDPR and PRIVACY REGULATIONS**
    - Complex sets of rules that concern the management of personal data in different situations
    - **General Data Protection regulation (GDPR)**
    - **Italian privacy code**
    - **Special regulations for ISPs**

APPENDICES

1 • Biz bits
2 • Careers
3 • Technical Glossary
4 • Acronyms

ONLINE RESOURCES

Civilisation

1 BIZ BITS

PRODUCTION

Production is the process of making and supplying goods and services in order to satisfy people's needs and wants through the offer of a large variety of products. The process is divided into three parts:

- **Input**: raw materials and machinery;
- **Transformation process**;
- **Output**: finished goods and services.

Goods and services

Goods are any tangible and movable personal property which is the object of a business transaction. They can be divided into:

- **capital goods**, which are goods used to produce other goods, such as raw materials or industrial machinery. They do not satisfy needs or wants directly;
- **consumer goods**, which are goods for everyday use such as food, clothing, or electrical devices. They satisfy needs and wants directly.

Another distinction can be made between:

- **non-durable goods**, which are consumed soon after they are bought or used just once such as food;
- **durable goods**, which have a longer life and can be used repeatedly, such as furniture or clothes.

Services are non-physical products such as education, entertainment, transport, or tourism.

Needs and wants

Needs are necessities for the survival of people, animals or organisations, i.e. things we could not live without, such as water or food. **Wants** are desires, i.e. everything that is not essential but that can make our lives easier or happier, such as a new car or a TV set.

asset: *bene*
raw material: *materia prima*

The factors of production

The **factors of production** are the resources needed to produce goods and services.

Land	Labour	Capital	Enterprise
The production site and all the natural resources above or below the surface (e.g. air, sunlight, trees, soil, minerals, etc.).	The human input in the production process. The professionals working for a company are also defined as human capital.	All monetary resources or other assets such as machinery and equipment.	The combination of the other three factors by entrepreneurs, i.e. people with original and innovative ideas.

The sectors of production

According to the sectors in which they operate, businesses can be classified according to the following table.

Primary or Extractive	Secondary or Manufacturing	Tertiary or Services	Quaternary
The extraction and production of raw materials from nature (mining, forestry, farming, fishing, etc.).	The transformation of raw materials into finished products (manufacturing, building and construction, etc.).	The provision of services (personal, commercial and social).	Intellectual activities such as R/D and ICT.

The interdependence between the sectors is known as the **chain of production**.

1 **Write the following words in the correct columns.**

computer shops, cartridges, computer formatting, antivirus software, the Internet	**Goods**	**Services**

CDs, printers, silicon, assembly line, laptop computers	**Capital goods**	**Consumer goods**

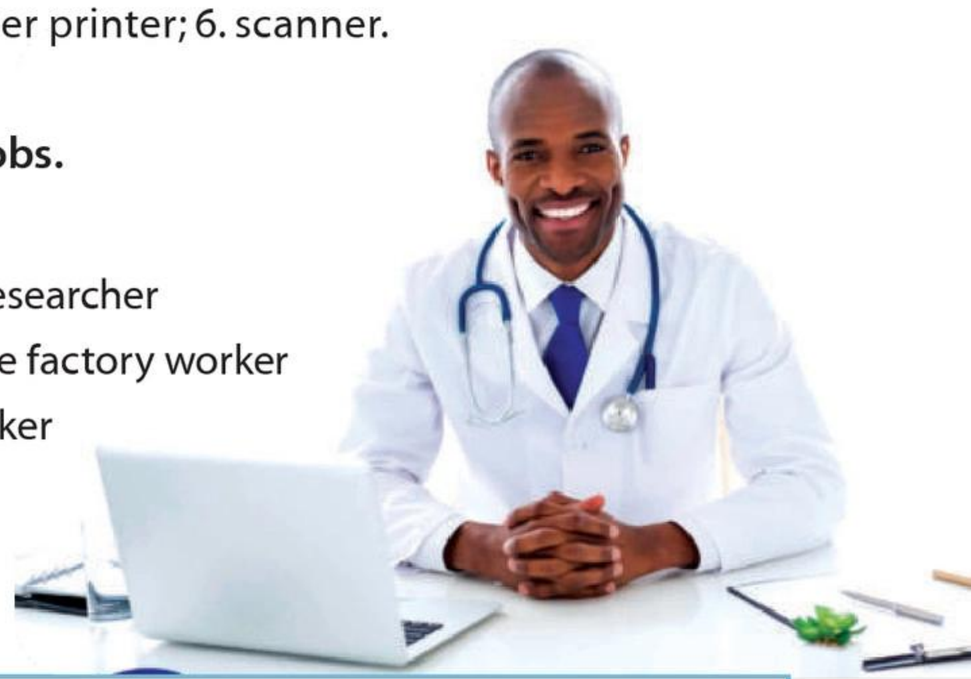
cartridges, keyboards, ink, webcams, monitors	**Durable goods**	**Non-durable goods**

2 PAIR WORK **Discuss whether the following are needs or wants.**

1. smartphone; 2. graphic tablet; 3. smart TV; 4. multifunction printer; 5. laser printer; 6. scanner.

3 **Choose the appropriate sector of production for the following jobs.**

1. Shop assistant
2. Dentist
3. Farmer
4. Voluntary ambulance driver
5. Miner
6. Exporter
7. Bank clerk
8. Teacher
9. Cocoa grower
10. Lawyer
11. Doctor
12. Market researcher
13. Chocolate factory worker
14. Stockbroker
15. Builder



4 **Decide which sector of production these activities belong to.**

communication • forestry • road building • import-export • oil refining • ship building • motor vehicle production • transportation • advertising

Primary sector	**Secondary sector**	**Tertiary sector**

5 **Put these services into the right category.**

advertising • banks • charities • cooperatives • distribution • doctors • electricity • gas • gyms • hairdressers • insurance • lawyers • retailing • stockbrokerage • teachers • voluntary organisations • water

Personal services	
Commercial services	
Social services	

THE DISTRIBUTION CHANNEL AND E-COMMERCE

The distribution channel

A **distribution channel** represents the link between the manufacturers of final goods or services and the consumers. The channel can be:

- **direct,** when a company sells its goods and services directly to the consumer without intermediaries;
- **indirect**, when a company uses various intermediaries such as wholesalers or retailers.

Wholesalers buy goods in bulk at a lower cost from producers, store them in warehouses and sell them in smaller quantities at a higher wholesale price to retailers. **Retailers** buy goods from wholesalers, fix a retail price to cover the costs and add a profit, then offer the goods to customers in shops.

The final price of the goods depends on the number of links involved. In the past, the indirect channel was the most common, but today it is disappearing, while the direct channel is becoming more popular.

Possible solutions to reduce the number of links are the following:

- **bypassing the retailer**, i.e. the wholesaler receives the goods from the manufacturer and sells them directly to the customer;
- **bypassing the wholesaler**, i.e. the manufacturer sells directly to large retail chains which are both wholesalers and retailers such as supermarket chains;
- **bypassing both retailer and wholesaler**, i.e. the manufacturer sells directly to the consumer. In this case, the products are sold in factory shops, farmers' markets or outlets.

This is a table of the main types of distribution channels:

E-commerce

E-commerce means business conducted electronically through the use of the Internet. The types of distribution channels in e-commerce are the following:

- **business to business (B2B)**, when companies do business with each other;
- **business to consumer (B2C)**, when a business sells goods directly to the general public. It can be:
  - **pure-click**, when it operates only through a website;
  - **brick-and-click**, when it has an online site for e-commerce added to its normal activity;
- **consumer to consumer (C2C)**, when individuals can buy online from other individuals on special sites, like, for example, e-Bay;
- **consumer to business (C2B)**, when consumers offer projects, goods or services to companies.

in bulk: *all'ingrosso, in grandi quantità*
retailer: *dettagliante*
wholesaler: *grossista*

A	B	C	D
manufacturer/producer	manufacturer/producer	manufacturer/producer	manufacturer/producer
↓	↓	↓	↓
	wholesaler	wholesaler	
	↓	↓	
		retailer	retailer
		↓	↓
consumer	consumer	consumer	consumer

6 **Describe the different types of distribution channels with the help of the tables on the previous page.**

7 **Look at the categories of e-commerce. Are they an example of direct or indirect channels?**

8 **Read the text and complete it with the missing words. Then answer the questions.**

Evolution of Distribution Channels

As consumers, we take it **1.** ..... granted that when we go to a supermarket the shelves will be filled with the products we want; when we are thirsty there will be a Coke machine or bar around **2.** ..... corner, and we count on being able to get online and find **3.** ..... product available for purchase and quick delivery. Of course, if we give it some thought, we realise that this magic is not a gift and **4.** ..... hundreds of thousands of people plan, organise, and work long hours to make this convenience available. It has not always been this way, and it is still not this way in many other parts **5.** ..... the world. Looking back over time, the channel structure in primitive culture **6.** ..... virtually non-existent. The family or tribal group was almost entirely self-sufficient. The group was composed **7.** ..... individuals who were both producers and consumers of whatever goods and services could be made available. As economies evolved, people began **8.** ..... specialise in some aspect of economic activity. They engaged **9.** ..... farming, hunting, or fishing, or some other basic craft. Eventually, this specialised skill produced excess products, which they exchanged for necessary goods that had been produced by others. This exchange process, **10.** ..... barter, marked the beginning of formal channels of distribution. These early channels involved a series of exchanges **11.** ..... two parties who were producers of one product and consumers of the other.

With the growth of specialisation, and with improvements **12.** ..... methods of transportation and communication, channels of distribution have become longer and more complex. Thus, corn grown in Illinois may be processed **13.** ..... corn chips in West Texas, which are then distributed throughout **14.** ..... United States. The channel mechanism also operates **15.** ..... service products. In the case of medical care, the channel mechanism may consist of a local physician, specialists, hospitals, ambulances, laboratories, insurance companies, physical therapists, home care professionals, and so **16.** ..... All of these individuals are interdependent and could not operate successfully without the cooperation and capabilities of all the others.

Adapted from: *https://courses.lumenlearning.com/wmopen-introbusiness/chapter/place-distribution-channels/*

1. What was the distribution channel like in primitive cultures?
2. What has happened thanks to the growth of specialisation?
3. What does it mean when it says that the various individuals in the channel are 'interdependent'?
4. Does the channel mechanism also apply to services? Quote an example from the text.

9 **Read these situations and decide which channel of e-commerce they refer to: B2B, B2C, C2C or C2B.**

1. Michael is a freelance journalist and sells his articles to different online newspapers. .....
2. Joe produces T-shirts and sells them to wholesalers all over the world through his Internet website. .....
3. Jane has just bought a rare book from an old lady who lives in Scotland on an auction website. .....
4. Mary sells her homemade jams from her online shop to customers all over the world. .....

TRADE AND ECONOMIC INDICATORS

Trade

The word **trade** means buying and selling goods and services in return for money. It is different from commerce which has a broader meaning. In fact, **commerce** is concerned with facilitating the exchange of goods and services and includes both trade and other activities considered **auxiliary to trade,** such as transportation, insurance, warehousing, banking, advertising, etc.

Trade can be divided into:

- **Home** or **domestic trade**, which is the exchange of goods or services within the country in which the trade is based, for example, Sicilian oranges sold in Italy;
- **Foreign** or **international trade**, which refers to the buying and selling of goods beyond national borders, which means that producers and consumers live in different countries. In other words, foreign trade refers both to **exportation**, i.e. selling abroad, and **importation**, i.e. buying abroad. All this can be done directly, as for example in e-commerce, or through the use of intermediaries.

Economic indicators

Economic indicators are used to measure the economic health of a country and its standard of living.

The most important are:

- the **balance of trade (BOT)**, which represents the difference between the total value of the visible exports and the visible imports over a period of time, normally 12 months
- the **balance of payments (BOP)**, which represents the flow of visible and invisible exports and imports, as well as the international monetary transactions into and out of a country.
- the **gross domestic product (GDP)**, which represents the monetary value of a country's production that occurs within its boundaries, both produced by residents and foreign producers;
- the **gross national product (GNP)**, which represents the total value of the goods and services produced by the citizens of a country regardless of their physical location;
- the **unemployment rate**, which represents the percentage of people who are not currently working, but who are willing to find a job;
- the **inflation rate**, which is a sustained increase in price levels. Its measurement is based on the **inflation basket**, which is reviewed every year and which includes a series of items that are representative of consumer spending. The yearly revision of the basket reflects the changes in the market and is representative of consumers' spending patterns.

gross domestic product: *prodotto interno lordo (PIL)*
gross national product: *prodotto nazionale lordo (PNL)*
inflation basket: *paniere ISTAT*

10 **Decide if the statements are true or false. Correct the false ones.**

	T	F
1. The word 'trade' has a wider meaning than the word 'commerce'.	☐	☐
2. The term 'commerce' includes both trade and other activities.	☐	☐
3. Foreign trade refers both to importation and exportation.	☐	☐
4. BOT represents the total flow of visible imports and exports.	☐	☐
5. The Italian GNP represents the value of goods and services produced by Italian citizens all over the world.	☐	☐
6. The unemployment rate refers to all the people who are currently out of work.	☐	☐

11 **Read these headings and decide with a partner whether they refer to an advantage (A) or disadvantage (D) of foreign trade.**

	A	D
1. Economic interdependence	☐	☐
2. Better management of productive resources	☐	☐
3. General increase of consumption	☐	☐
4. Reduction of market share for domestic industries	☐	☐
5. Exhaustion of resources	☐	☐
6. New commercial routes	☐	☐
7. Fall in prices	☐	☐
8. More competition	☐	☐
9. No need for a country to produce everything by itself	☐	☐
10. Speedy industrialisation	☐	☐
11. Lack of goods during emergencies	☐	☐
12. Wider range of goods	☐	☐

12 **Watch the video and answer the questions.**

▸ Unemployment Explained | Back to Basics *posted by* IMF

1. What is the relationship between production, demand and unemployment?
2. What type of unemployment is related to demand? Why is it called this way?
3. What type of unemployment is related to supply? What is the cause of this type of unemployment?
4. Why is structural unemployment related to technology?
5. What are two possible causes of frictional unemployment?
6. Why is frictional unemployment present in contemporary society?

13 FIRST **Read the text and complete it with the missing words.**

The UK's Basket of Goods

Consumer price inflation is the rate **1.** ..... which the prices of goods and services bought by households rise or fall. Imagine a very large "shopping basket" containing those goods and services bought **2.** ..... households. As the prices of the various items in the basket change **3.** ..... time, so does the total cost of the basket. Movements **4.** ..... consumer price inflation indices represent the changing cost of the shopping basket.

Within each year, the consumer price indices represent the changing cost of a basket of goods and services **5.** ..... fixed composition. In this way, changes in the consumer price indices **6.** ..... month to month reflect only changes in prices, and not variations in the quality **7.** ..... quantity of items purchased by consumers. Changes to the items and their associated item weights **8.** ..... introduced in the February index each year, but prices are collected for **9.** ..... old and new items in January. This means that the figures for each year **10.** ..... be "chain linked" to form a long-run price index spanning many years. In **11.** ..... words, price changes between December and January are based on the old basket, while price changes between January and February, and beyond, are based **12.** ..... the new basket.

Adapted from: *https://www.ons.gov.uk/economy/inflationandpriceindices/articles/*

BUSINESS ORGANISATIONS: SOLE TRADERS AND PARTNERSHIPS

In the private sector there are different types of business organisations.

Sole traders

A **sole trader** refers to any business activity which is owned and controlled by a single individual, although it may have workers or employees. A sole trader does not have a separate legal existence from its owner who has **unlimited liability**, i.e. he/she is responsible for the firm's debts and may have to pay for the losses with his/her own assets.

Advantages	Disadvantages
• Complete freedom in decision making. • Profits are not shared. • The firm is small and easy to set up. • Small capital and reduced start-up costs.	• No shared responsibility. • Only the owner's capital. • It is difficult to get a bank loan as small businesses are considered risky. • Working long hours and difficulty in taking holidays. • Need to sell personal assets to cover any business debts and the possibility of going bankrupt.

Partnerships

A **partnership** is a business owned by two or more people, each of whom owns part of the business. The relationship between partners and their duties are specified in the **deed of partnership.** Each partner must invest in the partnership, and their share of profits and losses depends on their percentage of ownership.

There can be two types of partners:

- **general partners**, who invest in the partnership, take part in the day-to-day operations and are liable for the debts and lawsuits of the partnership;
- **limited** or **sleeping partners**, who invest in the partnership but who have no participation in the day-to-day operations and have only limited liability, i.e. they only risk the capital invested.

There are three types of partnerships in the UK:

- **ordinary partnership**, with only general partners;
- **limited partnership,** with both general and limited partners;
- **limited liability partnership,** with all partners having limited liability.

Advantages	Disadvantages
• Shared responsibility and more specialisation. • More people can contribute capital. • Flexibility in running the business. • Less time pressure on individual partners.	• Shared responsibility and disputes when making decisions. • The distribution of profits can cause problems. • Unlimited liability.

deed of partnership: *atto costitutivo*
limited liability partnership: *no equivalente in Italia*
limited partnership: *(similar to) società in accomandita semplice (sas)*
loan: *prestito*
ordinary partnership: *(similar to) società in nome collettivo (snc)*
partnership: *società di persone*
sole trader: *ditta individuale*
unlimited liability: *responsabilità illimitata*

14 Read the table on the advantages and disadvantages of a sole trader and write a short text.

15 PAIR WORK **Match these pieces of information with the appropriate numbers.**

3% • 200,000 • 3.2 million • 5.6 million • in 2000 • between 2007 and 2012

1. The total number of private sector businesses in the UK in 2022. .....
2. The number of new sole trader start-ups in a year in the UK. .....
3. The total number of sole traders in the UK. .....
4. The percentage of one-person businesses with an employee in the UK. .....
5. When the most significant growth of sole traders took place in the UK. .....
6. The period of major expansion of sole traders in the UK. .....

16 PAIR WORK **Read this situation and decide on the most appropriate answer.**

Mary James is a recently qualified web designer and wants to open her own office, but she doesn't feel she knows enough about the business world to set up on her own. Her friend Jenny Clarke is an experienced accountant and has money that she would like to invest in a business venture. Mary is considering the possibility of asking Jenny to go into partnership with her. What would the advantages and disadvantages be for Mary?

Answer A
Mary could go into partnership with Jenny. She could concentrate on web design and Jenny could manage business affairs and also contribute with extra money. Mary and Jenny would share the profits.

Answer B
Mary could go into partnership with Jenny because they have different skills that are both necessary for the growth of the business. Mary could concentrate on web design and Jenny could deal with the business side. This would give Mary more time for herself and give her the chance to learn the business skills that she needs. Jenny would also contribute extra money. Mary would share the profits with Jenny. They could draw up a contract to make sure that all the profits and losses are shared fully.

Answer C
Mary should go into partnership with Jenny because they have different specialist skills, both of which would help the business grow. Mary could concentrate on web design and Jenny could deal with the business affairs. This would allow Mary more time for herself and give her the chance to learn the business skills that she needs. Jenny would also contribute extra capital which would give the business more flexibility. However, Mary would have to share the profits with Jenny and would have to consult her on any decisions concerning the business. They would draw up a deed of partnership to make sure the profits and losses are fairly shared. This is important because a partnership has unlimited liability and both Mary and Jenny would be personally liable for any business debts. They could consider setting up a limited liability partnership.

BUSINESS ORGANISATIONS: LIMITED LIABILITY COMPANIES AND COOPERATIVE SOCIETIES

Limited liability companies

Limited liability companies, or **joint-stock companies**, are business enterprises which have a special status according to the law. They are **incorporated**, which means that they have their own legal and tax identity and can sue or own assets in their own right. The ownership is divided up into equal parts called **shares** and whoever owns one or more share is called a **shareholder.** The minimum number of shareholders is two, while there is no limit to the maximum. The profits are usually distributed to shareholders in the form of **dividends** unless they are retained to increase the working capital. The shareholders have limited liability, i.e. they only risk the capital invested, and this is the major advantage of this type of business organisation.

In the UK there are two types of limited liability companies:

Private limited company (Ltd)	Public limited company (Plc)
• According to the Companies Act 2006, new limited companies do not have to specify the total share capital. • The company cannot advertise publicly or sell shares on the Stock Exchange. • Shares can be sold only with the permission of the other shareholders.	• The initial share capital must be at least £50,000. • The company can be quoted on the Stock Exchange. • Shares can be sold freely on the Stock Exchange.

During the **annual meeting,** which is the shareholders' general meeting, the board of directors is elected.

The **board of directors**, which may also be made up of shareholders, appoints managers and decisions are made by the chief executive officers (CEOs).

Cooperative societies

A **cooperative society**, or **co-op**, is an organisation owned, managed and used by its members who provide the capital, share the profits and liability. It is organised according to the **one member, one vote** system.

All the members work in the cooperative and choose the manager from among themselves. They decide how much they will earn, i.e. profits are distributed as a form of salary, or invested every year. Cooperatives can get tax rebates and low interest loans. However, it is difficult to get investments and find a qualified member for the role of manager.

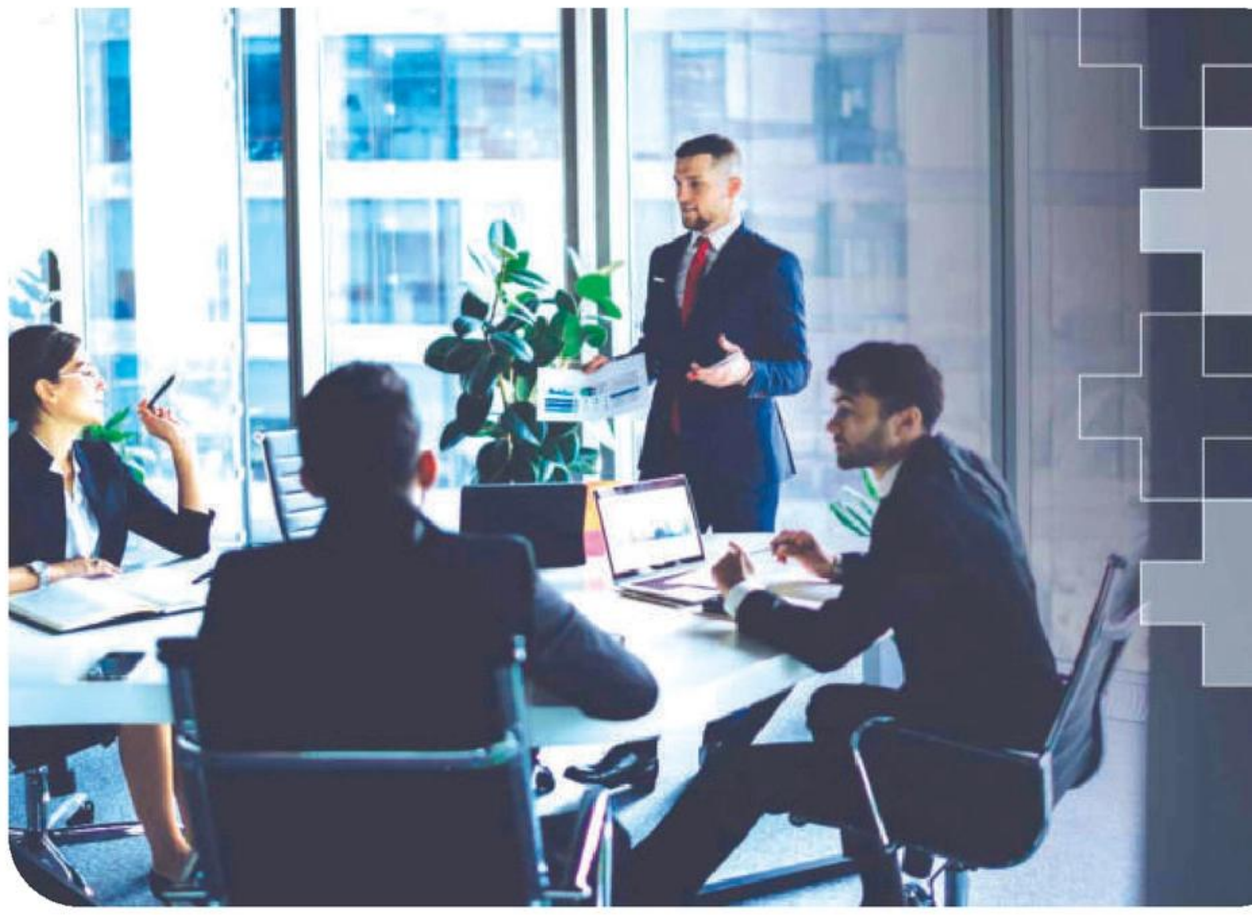
incorporated: *costituita (con personalità giuridica)*
shareholder: *azionista*

17 Decide if these statements refer to Ltd, Plc, or Co-op.

	Ltd	Plc	Co-op
1. Each member has a single vote.	☐	☐	☐
2. It is incorporated.	☐	☐	☐
3. It requires a minimum of 2 shareholders.	☐	☐	☐
4. Profits can be distributed in the form of salary.	☐	☐	☐
5. Shareholders have limited liability.	☐	☐	☐
6. Shares are quoted on the Stock Exchange.	☐	☐	☐
7. Shares are sold on the Stock Exchange.	☐	☐	☐
8. Shares can be sold only with the permission of the other shareholders.	☐	☐	☐
9. Shares cannot be sold on the Stock Exchange.	☐	☐	☐
10. The owner pays taxes on profits.	☐	☐	☐
11. The share capital is not specified.	☐	☐	☐
12. The initial share capital must be at least £50,000.	☐	☐	☐

18 Answer the questions.

1. What does it mean if a company is incorporated?
2. What is a shareholder?
3. Why is the liability of a shareholder limited?
4. What change was introduced by the Company Act in 2006?
5. When is the Board of Directors elected?
6. What is the Co-op voting system like?



19 Look for the Italian equivalent of these business organisations. Note that because of different legislation systems, the structures may be slightly different.

UK	Italy
Sole trader	
Ordinary partnership	
Limited partnership	
Limited liability partnership	
Private limited company (Ltd)	
Public limited company (Plc)	
Co-operative society	

BUSINESS INTEGRATION AND MULTINATIONAL CORPORATIONS

In order to stay in the market or to grow and increase their market share, businesses have two options: internal growth through an increase of capital or different forms of i**ntegration** or external growth.

Business integration

The main ways to achieve business integration are:

- **Merger**, when two companies of similar size decide to combine to form a single entity;
- **Acquisition** or **friendly takeover**, when one company buys another one with the permission of the target company's board of directors. The acquirer can purchase 100% of the company shares or just more than 50% in order to control it;
- **Takeover** or **hostile takeover**, when a company takes control of another one without the acquired firm's agreement. The takeover takes place through a **tender offer**, which means purchasing the shares of the target firm directly from shareholders;
- **Joint venture**, when two or more companies cooperate on a specific project or business activity. The different companies retain their individuality and operate under a joint venture agreement in order to share the management, profits and losses.

Types of business integration

These are the main types of integration:

- **vertical**, when the two companies operate in the same field but at different stages of the supply or distribution chain. It can be backward or forward. **Backward vertical** is when a company acquires another one operating earlier in the supply chain, i.e. a retailer buys a wholesaler. **Forward vertical** means acquiring a company further up in the supply chain, i.e. a computer assembler buys a chain of computer shops;
- **horizontal**, when the two companies operate in the same field and at the same stage of the production or distribution chain, i.e. two companies both producing keyboards;
- **conglomerate**, when the two companies deal with unrelated business activities, i.e. a computer hardware producer and a tour operator.

Multinational corporations

A **multinational corporation (MNC)**, or **international** or **transnational corporation**, is a large company with the headquarters in one country and subsidiaries or other investments in one or more foreign countries. It often operates in developing countries to which it provides technology, finance, capital and marketing skills in return for profits, but it often has so much power that it can influence local governments.

merger: *fusione*

20 PAIR WORK **Decide what different type of integration these situations refer to.**

1. Two companies that produce computer monitors decide to work together.

   .....

2. A large company that produces scanners buys a smaller one dealing with 3D scanners.

   .....

3. A large software company buys a smaller one with its consent in order to stop competition and guarantee work to employees.

   .....

4. A small company producing antivirus software is acquired by a larger one which wants to control it because they produce a better product.

   .....

5. A software house acquires a company which produces hardware for its game consoles.

   .....

6. Two microchip farms decide to work together to reduce costs and produce in larger quantities.

   .....

7. A multiplex cinema buys a small company that produces pop corns and other snacks in order to sell them with the logo of the cinema.

   .....

8. A company that assembles desktop PCs decides to work together with a small retail chain which specialises in computer hardware.

   .....

21 **You are to take part in a discussion on the advantages and disadvantages of a MNC which produces system software. The teacher will assign you a role. Read the instructions below and take part in the discussion.**

Student A: You are a **journalist**. Your role is to introduce the topic, moderate the debate, take notes and come to a final conclusion.

Student B: You are the **Head of Personnel** of a large software house. You think that your company benefits the host country by providing jobs and reducing unemployment. It also provides work for other suppliers, as well as components and services. State your opinion, giving reasons and examples to defend your position.

Student C: You are the **Import/Export Manager** of a large software house. You think the company helps the local economy: imports can be reduced because your products are now available in the host country and exports increase because you can sell your products everywhere. State your opinion, giving reasons and examples to defend your position.

Student D: You are the **Research and Development Manager** of a large software house. You think that your company's presence is beneficial because it introduces new ideas and successful work practices, new technologies and expertise. State your opinion, giving reasons and examples to defend your position.

Student E: You are a **member of a centre-left party** in a host country. You think that multinationals are detrimental to the local economy: the profits are sent to the home country and nothing is left for the host country. Because of their size and power, multinational corporations can exert strong political influence. State your opinion, giving reasons and examples to defend your position.

Student F: You are a **member of a centre-right party** in a host country. You are in favour of free trade and think that the presence of a big multinational in a country can stimulate competition and improve the quality of the products.

Student G: You are a **member of an ecological movement**. You think that multinational corporations exploit the local labour force with low wages, poor health and safety protection, and inadequate pollution control. State your opinion, giving reasons and examples to defend your position.

Student H: You are a **trade unionist** and defend workers. In your opinion, multinational corporations can cause economic problems and local unemployment if they choose to close their business. State your opinion, giving reasons and examples to defend your position.

Student I: You represent a **consumer association**. You think that large multinational corporations in the field of system software have created a monopoly and are therefore imposing their products and prices. As a consequence, there is no place for smaller companies to get a market share for system software and no choice for consumers. State your opinion, giving reasons and examples to defend your position.

The other students: You are the **public** at the discussion. Be prepared to ask questions and interact with the guests.

BUSINESS CORRESPONDENCE

Business correspondence can take the form of letters, still used when we need to send original documents, emails or faxes. The layout is mainly the same.

1. **Letterhead or heading:** the printed name and address of the company (a logo may be included)	**Laptop World Ltd** 35, Oxford street Birmingham BL1 3SD Telephone 0123 89765 Fax 0123 89765 E-mail info.modernplastic@modernplastic.com
2. **References:** the initials of the sender and the typist (optional)	MG/dp
3. **Date:** dd/mm/yyyy (UK), mm/dd/yyyy (US)	23rd January, 20..
4. **Inside address**: the recipient's address	Commercial Bank 45, Baker street Manchester S23 5NE
5. **Attention line:** in capitals or underlined (optional)	FOR THE ATTENTION OF: MS Joanna NELSON
6. **Opening salutation**	Dear Ms Nelson,
7. **Subject line:** in capitals or underlined, it states the content	NEW LINE OF LAPTOP COMPUTERS
8. **Body:** the text of the letter (the main section) 8a. **opening**: the purpose of the letter or a reference to any previous correspondence 8b. **main points**: giving information or making requests 8c. **closing**: asking for a response, looking forward to future contact	I am writing in response to your enquiry of 15th January. I have the pleasure of promoting our new line of laptop computers in different sizes. I am enclosing a catalogue and a price list. I hope you find the products interesting and look forward to receiving an order from you. Please get in touch if you have any further enquiries about our products.
9. **Closing salutation**	Yours sincerely,
10. **Signature, sender's name and position in the company**	*Mary Grant* Mary Grant Marketing Manager
11. **Enclosures**	Encs. 2

SALUTATIONS	Opening salutation	Closing salutation
The letter is not sent to a specific person	Dear Sirs (UK) / Dear Gentlemen (US)	Yours faithfully (UK)/ Yours (very) truly (US)
The letter is sent to an unknown person	Dear Sir/Dear Madam Dear Sir or Madam	
The letter is sent to a person whose name is known	Dear Mr Smith Dear Ms Roberts	Yours sincerely (UK)/ Sincerely yours (US)
The letter is sent to a person the sender knows well	Dear Robert	Regards/Best regards Best wishes/All the best

22 Answer the questions by reading the letter on the previous page.

1. Who is the sender?
2. Who is the recipient?
3. Does the sender know the recipient? Why?
4. What is the purpose of the letter?
5. What does the sender expect from the recipient?
6. What does the sender enclose in the letter?

23 Read this list of expressions taken from business letters and put each of them in the right category.

1. We are writing to inform you that.../to confirm.../to request.../to enquire about...
2. We would appreciate it if you would.../I would be grateful if you could...
3. We are pleased to announce that.../I'm delighted to inform you that...
4. Thank you for your letter about... (regarding...)/ Thank you for contacting us.
5. We regret to inform you that...
6. I'm contacting you for the following reason.../I would be interested in...
7. With reference to our telephone conversation.../ Further to our meeting last week…
8. Could you possibly tell us.../Could you please send me...
9. I'm writing to express my dissatisfaction with.../I'm writing to complain about...
10. Having seen your advertisement in... I would like to...
11. Should you wish any further information, please get in touch./Please do not hesitate to contact us.
12. We look forward to your reply/to doing business with you in the future.

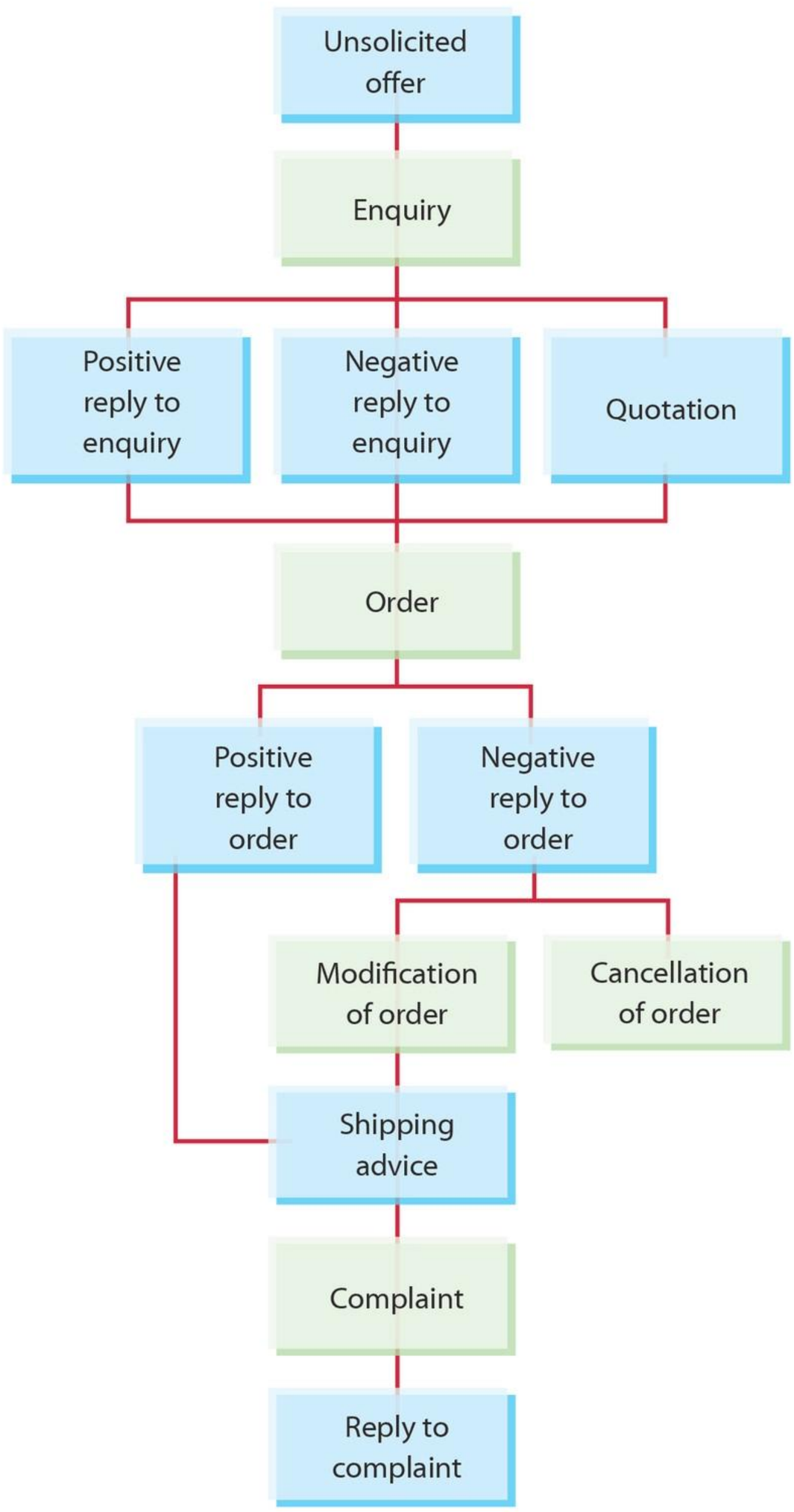
Starting		**Referring to previous contact**	
Making a request		**Complaining**	
Giving good news		**Giving bad news**	
Waiting for a reply/ future contacts		**Offering assistance**	

24 Read these letters. Put the paragraphs into the correct order and identify their function according to the previous activity and the layout of the letter on the previous page.

1	Dear Sirs,	Opening salutation
4	I look forward to receiving your prompt reply.	Waiting for a reply
	Having seen your advertisement in the *Daily Mail*, I am interested in your cordless keyboards.	
	Yours faithfully,	
	I would appreciate it if you could send me your catalogue together with your price list.	
	Ron Palmer	

	John Taylor	
	Thank you for contacting us.	
	Yours sincerely,	
	We are sorry to inform you that our catalogue is not available at the moment, but we will send you a copy as soon as possible.	
	Dear Mr Palmer,	
	We look forward to hearing from you soon.	
	Please do not hesitate to contact us for further information.	

BUSINESS TRANSACTIONS THROUGH CORRESPONDENCE



We can analyse business transactions through the correspondence exchanged between the buyer and the seller. A transaction can be started either by the buyer or the seller.

The initial contact

Imagine that a potential buyer is interested in the products or services of a company. The buyer can take the initiative and write an **enquiry** to the seller, asking for a catalogue, price list, samples and information about payment and delivery terms. In this case, as soon as the seller receives the enquiry, he **replies** giving all the information requested. However, the seller can also take the initiative and send **unsolicited offers** to old customers or prospective buyers.

Buying

If satisfied with the information received or with the offer, the buyer then places an order. The order is an important document because it contains the sale conditions that must be agreed upon between the seller and the buyer.

When the seller receives the order and all the articles are available, he gives **confirmation** to the buyer and then writes another letter to inform the buyer of the **shipment** of the goods. The goods are sent with the appropriate **transport documents** and the **invoice**, if it has not already been sent as is the case with payment in advance. However, if the goods required are not available, the seller could make a **counteroffer** proposing, for example, a similar article with a discount. Sometimes, the seller cannot agree with the delivery terms required by the buyer. At this point, the buyer can **modify** the order or **cancel** it. When the buyer receives the goods, he sends an **acknowledgement of receipt**.

Problems

If there are problems, such as a delay in delivery, damaged or missing goods, extra goods, wrong articles or a mistake in the invoice, the buyer sends a **complaint** to the seller, explaining the problem. The seller replies, explains the reasons for the problem and finds a solution.

If the seller does not receive the settlement of an invoice, he writes a first **reminder** to the buyer. If the buyer does not answer, he writes a second and even a third reminder, in which he threatens to take legal action. The buyer has to **reply**. If he is unable to pay, he may ask for extra time or to pay in instalments.

acknowledgement of receipt: *avviso di ricevimento*
complaint: *reclamo*
enquiry: *richiesta di informazioni*
instalment: *rata*
invoice: *fattura*
reminder: *sollecito (di pagamento)*

25 **Look at the structure and phraseology and write an email of enquiry, using the prompts to help you.**

By browsing online, you have found the website of Baltimax (www.baltimax.com), a German software developer that produces SoftMaker Office 2023 for Windows, an office suite perfectly compatible with MS Office. Write an enquiry requesting a price list and a trial version of TextMaker. Specify that you are interested in buying 50 copies and ask for a discount.

Source of information and reference to product	• *We have seen your advertisement in the...* (newspaper/magazine) *and would like to enquire about your line of...* (product). • *I'm writing in response to your advertisement of...* (date) *in the...* (newspaper/magazine). • *We have visited your website and would like further information on your products.*
Information about the company (optional)	• *We are dealers/wholesalers/retailers in...* (product) *and I think there is a promising market in our area for the articles you manufacture/produce.* • *Our company is the market leader in the field of...* (product) *and would like to introduce your line of...* (product) *into our country.*
Requests	• *Please send us your catalogue/a price list/a sample/a brochure together with information on delivery times and payment terms.* • *We are interested in receiving a full colour catalogue, a price list and two posters for our shop in...* (place). • *Could you please let us have all the technical details of item No. ... together with any promotional material?* • *We would be grateful if you could send us information about your delivery terms/your discount rates (on trial orders).*
Closing	• *We look forward to hearing from you soon.* • *If we find your terms competitive and your products satisfactory, we will send you a trial order shortly/we will place regular orders with you in the future.*

26 **Look at this phraseology and write an unsolicited offer email. Start with: *Dear Customer, … .***

You are the Sales Manager of Panda Security. Write an email in which you offer Panda Antivirus Pro 2023 to your current customers, who are already using Panda Antivirus products, with a 40% discount if they buy the new version by 31st May.

Introducing the offer	• *We are pleased/glad to inform you about/contact you with a very special offer for our best customers.*
Giving the details of the offer	• *We can offer you... at the price of...* • *We are willing to grant you a ...% discount.* • *This offer is valid until/expires...*
Expressing hope for an order or contact	• *We hope you will take advantage of our exceptional offer.* • *We look forward to your order...*

MARKETING AND THE MARKETING PLAN

Marketing

Marketing means:

- identifying customers' needs and wants;
- creating a product or service that satisfies their requirements;
- deciding on the strategies to use for selling the product or service;
- coordinating the marketing mix.

Marketing plan

A **marketing plan** is the document in which the marketing process and strategies are described. It includes:

1	**Situational analysis**	**Market research** and **SWOT analysis**
		Market research is the study of the market in order to obtain data and information about the geographical location and size of potential markets, market trends, customers' profiles, needs and preferences. The two main methods of research are: – **Primary research**, which involves the collection of new information gathered by contacting the customers directly through market surveys or other forms or interviews, carried out specifically for the product that a business wants to launch on the market; – **Secondary research**, which means processing data that has already been collected for similar products. This may involve the study of statistics or other types of publications. **SWOT analysis** is a situation analysis in which the internal strengths and weaknesses of an organisation, and the external opportunities and threats faced by it are closely analysed, taking into account the role of competitors and the environment.
2	**Objectives**	**SMART** objectives
		The objectives set must be **s**pecific, **m**easurable, **a**chievable, **r**ealistic and **t**imed, i.e. with a realistic time scale.
3	**Strategy**	**Market segmentation** and **targeted marketing**
		Market segmentation is the identification of portions of the market, called **market segments**, with the purpose of satisfying homogeneous groups of people. Consumers are divided into different market segments according to different variables which are geographic (e.g. geographical position), demographic (e.g. age, gender) psychographic (e.g. social class, lifestyle) and behavioural (e.g. attitudes). **Targeted marketing** means adapting the marketing strategy to a particular group of people.
4	**Marketing mix**	**Coordination** of the **4 Ps:** the right **product** at the right **price** using the right **promotional** techniques in the right **place**
		Product: everything that makes the product special, such as brand name, packaging, design and shape, colour and size. **Price**: calculated with different methods. **Place**: the choice of the distribution channel. **Promotion**: a series of activities to make the consumer buy the product using the appropriate medium.
5	**Strategy evaluation**	**Verification** of the achievement of objectives.
6	**Executive summary**	A quick **reference** to the marketing plan.

27 **Read the text on market research and complete the table.**

Primary or Field Research

Primary data can be gathered through qualitative as well as quantitative research methods.

Qualitative market research mainly takes into account the opinions and feelings of customers. This type of analysis tries to understand what consumers really think about a product. It includes:

- **focus groups**: groups of consumers brought together to discuss a series of questions; they can give an opinion or agree or disagree with others;
- **consumer panels:** groups of consumers in specific market sectors who have agreed to provide information during the various stages of the life cycle of products;
- **in-depth interviews**: there is interaction between customers and a moderator and questions are not restricted to a set pattern.

Quantitative market research is based on hard facts and statistical data. Some common types include:

- **surveys and questionnaires**: survey is the broad term that includes questionnaires but also survey forms, survey interviews and customer satisfaction cards;
- **observation**: to evaluate and measure the behaviour of prospective customers with or without interaction with a researcher;
- **trial and experimentation**: scientific tests in which hypotheses and variables are used.

Secondary or Desk Research

In this case the sources may be either internal or external.

Internal sources i.e. information already collected and saved for future projects. The most common are:

- **balance sheets and inventory records**: to find statistics and figures useful for evaluation;
- **profit and loss statements**: to show which products resulted in profits;
- **sales figures**: data from previous sales.

External sources refer instead to data collected outside the company. The main sources are:

- **government resources**: data collected for statistical reasons (e.g. ISTAT statistics in Italy);
- **universities and colleges**: information collected and files that can be used by businesses;
- **the Internet**: the most used secondary market research source, although not always reliable;
- **competitor data**: information collected and filed by other business organisations and competitors.

Primary or		.....	
Qualitative research	.....	.....	**External sources**
• Focus group	•	•	• .....
•	•	•	• .....
•	•	•	• .....
			• Competitor data

28 **Read this extract of the marketing mix from a marketing plan for a portable DVD player and write a similar one for a phone tablet.**

DVD Makers' approaches to product, price, distribution and promotion are the following:

Product: an extended 2-year guarantee is offered to our customers.

Price: a penetration price has been chosen, i.e. a very low price to beat the competition.

Distribution: our DVD players will be offered both to wholesalers and retailers.

Promotion: a mix of online and in-print (hi-tech magazines) will be used.

THE SWOT ANALYSIS AND THE EVOLUTION OF MARKETING

■ The SWOT analysis

SWOT stands for **Strengths**, **Weaknesses**, **Opportunities**, and **Threats**. Strengths and weaknesses are internal to a company, things that they have some control over and can change. Examples include who is in the team, the patents and intellectual property, and the location.

Opportunities and threats are external, things that are going on outside a company, in the larger market. You can take advantage of opportunities and protect against threats, but you can't change them. Examples include competitors, the price of raw materials and customer shopping trends.

A SWOT analysis organises the top strengths, weaknesses, opportunities and threats into an organised list and is usually presented in a simple two-by-two grid.

■ The extended marketing mix

One of the major evolutions of marketing strategies in recent years has concerned the extended marketing mix. In fact, three new elements have been added to the traditional 4Ps of the marketing mix, making a combined 7Ps. They are:

- **People**, the people who make contact with customers in selling the products;
- **Process**, the system and processes that deliver a product to a customer;
- **Physical evidence**, the elements of the physical environment the customer experiences.

■ The evolution of marketing

The old type of marketing, or **outbound marketing**, pushes products and services to customers, while new marketing, or **inbound marketing**, relies on earning people's interest instead of buying it. Here are their main characteristics:

Inbound marketing	Outbound marketing
• Communication is interactive and two-way.	• Communication is one-way.
• Customers come to you (via search engines, social media, etc.).	• Customers are sought out (via print, TV, radio, banners, etc.).
• Marketers provide value.	• Marketers provide little to no added value.
• Marketers seek to entertain and/or educate.	• Marketers rarely seek to entertain or educate.

Two examples of inbound marketing are content marketing and guerrilla marketing.

- **Content marketing** is a type of marketing that involves the creation and sharing of online material, such as videos, blogs, and social media posts, that does not explicitly promote a brand but is intended to stimulate interest in its products or services;
- **Guerrilla marketing** is a marketing tactic in which a company uses surprise and/or unconventional interactions in order to promote a product or service.

patent: *brevetto*
grid: *griglia*

29 **Here is a list of elements to be taken into account in a SWOT analysis. Put them in the right place in the SWOT grid.**

capabilities • competitors • experience • financial limits • global influences • knowledge • lack of reputation - legislative effects -good location • new markets • new taxes – skilled people • quality • resources • seasonality • positive trend toward the product - vulnerabilities

Strengths	Weaknesses
Opportunities	**Threats**

30 **Look at the table on the previous page and compare inbound and outbound marketing.**

31 **Watch a video on guerrilla marketing and complete the table.**

▸ What is Guerrilla Marketing? *posted by* Clayton Branche

1. Definition of guerrilla marketing: .....
.....
.....
2. Types: .....
.....
3. Origin of the name: .....
.....
4. How it is used today: .....
.....
5. A prominent example of guerrilla marketing: .....
.....
6. Keys to success with guerrilla marketing:
   a. .....
   b. .....
   c. .....
   d. .....
   e. .....

Some examples of guerrilla marketing (product, brand, object used, etc.): .....
.....

32 **Use the Internet to find examples of content marketing.**

ADVERTISING

Advertising is the most common type of promotion. It is the way in which the seller or producer communicates with consumers using a medium or different media.

Advertising media

Here are the most common types of advertising media.

Medium	Advantages	Disadvantages
Television	Very powerful, high impact	Very expensive
Radio	Cheaper than television	Low impact
Press	Fairly large audience, sometimes for a specific target, cheaper than radio and TV, more permanent	Lower impact
Internet	Highly effective, cheap, suitable for any type of product	A lot of competition
Posters and billboards	For the general public, eye catching, relatively cheap, high impact	Fixed location

Types of adverts

Depending on their purpose, adverts can be divided into different categories.

- **Product advertising** focuses on a product or service on sale. It can be:
  - **Pioneering advertising,** when we want to launch a new product or service on the market;
  - **Competitive advertising,** when we want to claim the superiority of a product or service;
  - **Comparative advertising,** when a competitor product is mentioned by name (this type of advertising is prohibited in Italy);
  - **Reminding advertising,** just to remind consumers that a product is available rather than informing or persuading.

- **Institutional advertising** focuses on the company or organisation as a whole. It can be:
  - **Enhancing corporation identity,** when the company wants to improve its image;
  - **Advocacy advertising**, when it supports a matter of common interest (a cause or point of view) and gives the company's opinion;
- **Public service advertising,** when governmental bodies or non-profit organisations deal with social causes or health problems (campaigns against drugs, smoking, an unhealthy diet, etc.).

The structure of a printed advert

A printed advert may be composed of these different parts:

- **Logo**: a picture or a way of writing that is the symbol of the company or organisation;
- **Brand name**: the name of a particular product;
- **Headline** or **tagline**: the major aspect of an advert, often at the top or in the middle.
- **Sub-headline** or **slogan**: it is usually the length of a sentence and contains an easily remembered phrase;
- **Body copy** or **text**: it contains a description of the product or service such as uses and benefits;
- **Image**: a photograph of the product in order to grab the consumer's interest;
- **Call-to-action**: it usually appears at the end of an advertisement and is used to add a sense of urgency.

33 GROUP WORK **Discuss the advantages and disadvantages of different types of media and choose the most appropriate one for the following products.**

1. A laptop computer
2. A new type of processor
3. A multifunction printer
4. A revolutionary 3D scanner
5. Low-cost compatible cartridges
6. A cordless mouse

34 **Look at the adverts below. Decide what category each one belongs to, then establish what product or service is being advertised. Next, identify the different parts of the advert and comment on the strategies used or on the message the advert conveys.**

35 PAIR WORK

Read these instructions and create your own advert for a new smart phone. Remember to include all the parts and follow the instructions for a catchy slogan. You can use whichever software you prefer.

Creating an advert

Writing an advertisement

a. Write a catchy headline of no more than six or seven words and a catchy slogan.

b. Make your advert memorable by avoiding familiar phrases that might recall other products.

c. Use a persuasive technique, including: common sense, humour and repetition.

d. Keep your target customer in mind and choose the appropriate tone for your advert.

e. Make sure that all the relevant information is included in the body copy and in the call-to-action.

f. Decide where and when to advertise and choose a memorable image, simple but unexpected.

g. If your logo and brand name are easily recognisable, use this to your advantage.

Tips for writing good slogans

- Appeal to the reader by using the 2nd person (*you, your, yours*) or use verbs in the imperative form.
- Use the modal *will* to describe the benefits and do not use verbs in the negative form.
- Include adjectives stressing the novelty and qualities and comparative and superlative forms.
- Use words that have different meanings but sound the same, or proverbs.
- Use different spellings or foreign words or include new words created by adapting existing ones.
- Use poetical devices such as alliteration, repetition, assonance, metaphors and similes.

2 CAREERS

WHERE TO LOOK FOR A JOB

There are many different ways to find out about job opportunities.

■ The press

Recruitment ads can be found in local, national and international newspapers and magazines. Some papers have a specific day dedicated to job adverts, while there are also magazines which specialise in job hunting.

■ Websites

There are websites dedicated to job hunting where job seekers can look for work, such as monster.com, indeed.com and simplyhired.com. In addition, there are also professional social networks like linkedIn.com which allow employers to connect with people looking for work, especially 'silent' job seekers, i.e. qualified people who already have a job. Some companies advertise their vacancies on their websites and sometimes they offer the opportunity to send a curriculum online or to complete an online form.

■ Job centres

A job centre is a government-funded employment agency. Its aim is to help people find employment. It provides resources to enable job seekers to find work, write a CV, prepare for a job interview, etc. They offer information about training opportunities for people who have been unemployed for a long time.

■ Recruitment firms

A recruitment firm, or agency, is a type of company which recruits workers and employees for open positions by matching these positions with job seekers in their database and then managing the job interview. The word agency is also used for companies which offer a wide variety of services from recruitment to temporary staffing needs, like Adecco.

■ Search firms or head hunters

Companies which recruit primarily at the executive and mid-level are called search firms or head hunters. They make a list of potential high-profile candidates to whom they can propose a position. Sometimes they can use aggressive methods and look for professionals in competitors' companies.

■ Direct application

Candidates can apply directly to a company by sending a CV with a cover letter.

job centre: *centro per l'impiego*

JOB ADVERTS

Job adverts are different from other kinds of adverts because they usually have a simpler layout. Newspaper ads are usually written in black and white and only sometimes include the company logo, while magazine and online ads may include pictures and a more colourful layout. The language used is also different from other kinds of ads because they avoid addressing the reader directly and use a more impersonal style.

Structure

Business name + information about the company	• *Computer World Ltd* • *... is a leading company in computer hardware…*
Position available	• *Computer programmer, system analyst, web designer, etc.*
Type of contract offered expected hours, salary and main benefits, etc.	• *Permanent full-time position / Temporary full-time position / Part-time job* • *… hours per week / The hours to be worked will be from… to… pm, Monday to Friday.* • *… euros per year / … euros per month + Christmas bonus* • *City location, close to public transport/canteen/luncheon vouchers*
Job description	• *The... will report to the team leader and will be responsible for... including* (examples): *writing code, debugging, writing documentation*
Desirable skills, qualifications and experience required	• *Successful applicants/candidates must have* (examples): • relevant previous experience in the sector, *advanced programming skills, strong communication and interpersonal skills, strong organisational skills and attention to detail.* • *A Diploma in ICT or equivalent qualification is desirable.*
Instructions on how to apply and contact details	• *If you are interested in this job, please email your CV to Ms… / fill in our form on the web or call… for further information.*
Reminder of the expiry date (if any)	• *Applications close on…* • *Applications received later than ... will not be accepted.*

An example

Career opportunity	**MT Computers Ltd**
	Junior programmer Head office – Manchester
Responsibilities Designing and developing new applications Debugging and testing Producing documentation	**Skills:** Java and object- oriented programming HTML, Javascript and web services Oracle, MySQL **Qualifications required:** Diploma in ICT or equivalent Minimum 2 years of experience in programming
Candidates should send their CVs to recruitment@mt-computers.com by 30th June 20.. at the latest.	
MT Computers Ltd	www.mt-computers.com

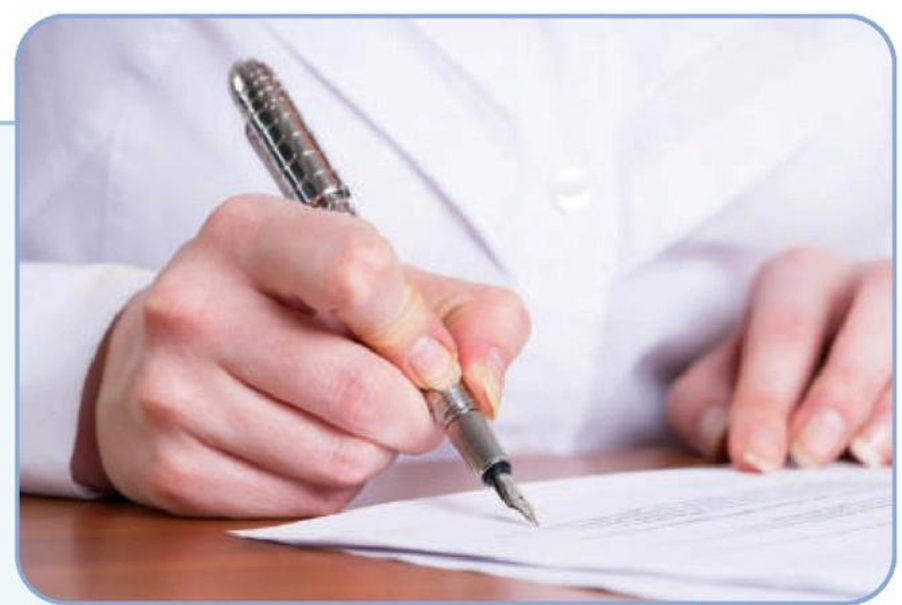
COVER LETTERS

A **cover letter** can be written in response to an advertisement (conservative style) or it can be an unsolicited letter to enquire about vacancies (speculative style).

Structure of a cover letter

Sections	Conservative style	Speculative style
Reference to the position and source of information (if any)	• *I found your advert for… on… and would like to apply for the position.* • *I would like to apply for the position of… advertised in...* • *I am writing in response to your advertisement in… for the position of…*	• *I am writing to enquire if you have any vacancies in your company.*
Education, work experience and skills	• *As my CV shows / As you can see from my CV, I have a diploma/degree in... / I graduated in Economics in…* • *I have been employed as... for... years./ I have... yeasr's experience in...* • *I have had extensive work experience in office environments.* • *I have attended a course on…* • *I have a Computer Driving Licence which I obtained in…* • *Although I have no office experience, I am familiar with...*	
Personal qualities and motivation	• *I am a conscientious and accurate person who works hard and pays attention to detail.* • *I am flexible, quick to pick up new skills and eager to learn from others. I also have lots of ideas and enthusiasm/determination.* • *My previous work experience has helped me develop the skills you require.*	
Enclosures	• *You will find my CV attached below. / Please find enclosed my CV.*	
Closing	• *Thank you for taking the time to consider this application and I look forward to hearing from you in the near future.*	• *I have excellent references and would be delighted to discuss any possible vacancy with you at your convenience.* • *I would be grateful if you would keep my CV on file for any future possibilities.*

An example of a cover email



Dear Sirs,

Re: Post of junior programmer

I am writing in response to your advertisement for the position of Junior Programmer that I saw on your website and would like to apply for the job.

As you can see from my CV, I have a Diploma in Applied Computer Science as well as 3 years of experience in the field, I have good communication skills and enjoy working in a team.

I am available for an interview at your convenience, and I look forward to hearing from you soon.

Yours faithfully,
Michael Smith

THE CURRICULUM VITAE (CV)

A **curriculum vitae (CV)** is a document that job applicants use to show their academic and professional accomplishments when they apply for a position. In the USA, it is called a **resumé.**

The Europass CV

The Europass CV has become a standard in Europe. It includes the following sections:

- personal information
- desired employment/occupational field
- work experience
- education and training
- personal skills and competences.

Europass Curriculum Vitae	
Personal information	
First name(s)/Surname(s) *or* Forename(s)/Last name(s)	Jason CLARK
Address	10, Bristol Street – Liverpool CD 34DE
E-mail	j.clark@linken.uk
Nationality	British
Date of birth	1 January 1994
Gender	Male
Desired employment/ Occupational field	Programmer, Web Designer
Work experience	
Dates	2014-2023
Occupation or position held	Programmer (since 2020), Junior Programmer (2014-2020)
Main activities and responsibilities	Software development
Name and address of employer	LT Computers Ltd
Type of business sector	System and application software
Dates	2013-2014
Occupation or position held	Junior programmer
Main activities and responsibilities	Software development
Name and address of employer	Computer World
Type of business sector	Application software
Education and training	
Dates	2008-2013
Title of qualification awarded	A-levels in Computer Science, Mathematics and Physics
Principal subjects/occupational skills covered	Computer Science, IT, Telecommunications, Networks
Name and type of organisation providing education and training	Alan Turing High School - Liverpool

Personal skills and competences										
Mother tongue(s)	English									
Other language(s) Self-assessment European level	Understanding				Speaking				Writing	
	Listening		Reading		Spoken interaction		Spoken production			
French	C1	Proficient user	C1	Proficient user	C1	Proficient user	C1	Proficient user	C1	Proficient user
German	A1	Basic user	A1	Basic user	A1	Basic user	A1	Basic user	A1	Basic user
Computer skills and competences	**Programming:** C++, PHP, Java, Python, Visual Basic, HTML Professional **Database:** MS SQL, MySQL, Oracle **Operating systems:** Linux, Unix, Windows, Mac OS, Android, iOS									
Other skills and competences	Technical drawing Internet and mobile technology									
Driving licence(s)	B									
References										

A video CV

A video CV is a short recording, of no more than 90 seconds, used by a candidate to apply for a job. It is used to supplement a traditional written application rather than replace it. The purpose of a CV in this format is to highlight a candidate's skills and experience while giving employers an insight into their personality. In fact, it can provide concrete examples of the candidate's capabilities without listing or exaggerating them. A video CV can either be uploaded to a video hosting site, such as YouTube, or sent as a video file directly to employers via email.

Personal statements

Some companies ask candidates for a **personal statement** as part of the selection process. A personal statement is a brief personal summary to demonstrate a candidate's suitability for a role or position. It is much more than a CV, which focuses on objective data, or than a cover letter, which is centred on personal qualities. In the personal statement, candidates express their enthusiasm for a particular company, show that they have the right background and refer to personal skills such as hobbies or special achievements that make them unique. This statement is usually included in the CV, soon after the personal information.

JOB INTERVIEWS

Traditional job interviews are formal meetings in which the examiner, usually the HR (Human Resources) manager or someone on their staff, interviews the candidate. The interview generally follows a script previously agreed by the HR staff and, after the greetings and a little conventional small talk, includes the following steps.

Topics	Typical questions	Suggestions
Motivation	• *Why do you want to work for this company?* • *Why are you interested in this job?*	Say something positive about the company, show interest in their products, explain how the position fits your career goals.
Job experience	• *Have you done this kind of work before?* • *What type of companies have you worked for previously?* • *What positions have you held?*	Refer to: – past work experience; – education and training related to the job; – volunteer work that may relate to the job; – any transferable skills; – your ability to learn quickly.
Education, training and skills	• *What kind of training or qualifications do you have?* • *What about your school career?* • *Can you speak any foreign languages?* • *What computer skills do you have?*	– If you have a lot of experience, but no formal qualifications: • *I didn't get formal school training for this job, but I have… years of experience in the field. I'm willing to learn new skills and get a formal qualification if I'm offered the job.* – If you have just completed a training course: • *I completed a one-year training program in… at… which is related to the job I'm applying for. I look forward to working in the field and putting into practice what I have learned.*
Personal qualities	• *Tell me about yourself. Why should we hire you?* • *What do you do in your free time?*	Do not refer to personal issues, state your best qualifications for the job and provide examples to support your statements, e.g. *I'm punctual, reliable, precise…*
Work habits	• *What do you think of working in a team?* • *Are you willing to work overtime? Nights? Are you willing to travel abroad?* • *How do you react to instructions and criticism?* • *How well do you work under pressure or deadlines?*	Outline the advantages and provide specific examples; say that you appreciate constructive criticism, and provide examples of past experience, both at work and school.

JOBS IN ICT

Type of job	SYSTEM PROGRAMMER
Qualifications	Degree in Computer Science, Mathematics or Information Systems
Skills	• Familiarity with hardware specifications, design, memory management and structure. • Knowledge of the main programming languages. • Programming, critical thinking, information organisation, deductive reasoning.
Personal qualities	Ability to help other programmers
Job description	Making program changes that affect how the network and the CPU work.

Type of job	APPLICATION PROGRAMMER
Qualifications	Degree in Computer Science, Mathematics or Information Systems
Skills	• Familiarity with standard user interface protocols and data structure. • Knowledge of the main programming languages. • Programming, critical thinking, information organisation, deductive reasoning.
Personal qualities	Ability to work long hours
Job description	• Writing, testing and maintaining software programs. • Converting project specifications and statements of problems and procedures into logical and detailed flowcharts for coding into computer language. • Developing and writing computer programs to store, locate and retrieve specific documents, data and information.

Type of job	SYSTEM ANALYST
Qualifications	Degree in Computer Science or Information Systems, business related qualifications (optional)
Skills	Strong analytical and problem-solving skills
Personal qualities	• Figuring out how to solve problems. • Working in a team.
Job description	• Studying the design, the specifications, the feasibility, the costs and implementation of new computer systems in business. • Communicating with customers and stakeholders to learn and document requirements in order to create a technical specification, interacting and coordinating with developers and implementers, helping perform system testing, deploying the system, helping with technical documentation, deliberating over post-project assessment.

Type of job	TECHNICAL WRITER
Qualifications	Degree in English, Communication or Journalism
Skills	Knowledge of Engineering, Computing or IT
Personal qualities	Working with tight deadlines
Job description	Writing hardware and software documentation

Type of job	WEB MASTER
Qualifications	Degree in Business and IT
Skills	• Good technical knowledge of HTML, other programming languages and graphics. • Ability to identify the appropriate tools for the web designing process. • Ability to adapt tools and ideas to the client.
Personal qualities	• Good communication and interpersonal skills. • Working with tight deadlines.
Job description	• Creating and managing the content and organisation of a website. • Managing the computer server and the technical programming aspects of a website.

Type of job	WEB DEVELOPER
Qualifications	Degree in Computer Science or IT (preferable)
Skills	Knowledge of Internet protocols and programming languages (HTML, PHP, etc.)
Personal qualities	Natural curiosity and patience
Job description	• Developing applications for the www or distributed networks. • Dealing with the programming aspects of a website.

Type of job	DATABASE ADMINISTRATOR (DBA)
Qualifications	Degree in Computer Science or training with a particular database program
Skills	• Knowledge and experience with the main database management software. • Analytical skills and logical thinking.
Personal qualities	• Good interpersonal skills
Job description	• Designing, implementing and maintaining a database system. • Establishing policies and procedures for the management, security and use of the database management system. • Training employees in database management and use.

Type of job	NETWORK ADMINISTRATOR
Qualifications	Degree in Computer Science or IT certificates related to networking
Skills	• Excellent knowledge of specific software or hardware related to the network. • Problem solving skills.
Personal qualities	• Attention to detail and initiative skills
Job description	• Managing an organisation's network (installing, maintaining and upgrading software or hardware required by the network). • Assigning network addresses. • Configuring the authorisation and authentication of individuals or groups to access a network.

Type of job	SOCIAL MEDIA MANAGER
Qualifications	Degree in Marketing, Communication or Journalism
Skills	• Excellent writing and communication skills. • Good knowledge of traditional and digital marketing.
Personal qualities	Creativity
Job description	• Overseeing a company's interactions with the public by implementing social media platforms' content strategies. • Analysing engagement data, identifying trends in customer interactions and planning digital campaigns to build community online.

Type of job	SEO SPECIALIST
Qualifications	Professional diploma in Search Marketing
Skills	• Critical thinking, technical and programming skills. • Experience with website analytic tools.
Personal qualities	Motivation and adaptability
Job description	• Monitoring search algorithms set by search engines. • Developing and integrating content marketing strategies. • Using social media to distribute content and encourage external sites to link back to the organisation's website.

Type of job	SEM SPECIALIST
Qualifications	Degree in Marketing or Communication
Skills	• Strong organisational skills. • Good understanding of search engine ranking.
Personal qualities	Good communication skills.
Job description	Devising a strategy that will bring a website to the top of both organic and paid search engine rankings.

3 TECHNICAL GLOSSARY

A

abstraction: astrazione /æb'stræk ʃn/
to actuate: azionare
adware: materiale pubblicitario non richiesto
aerial: antenna
to air: mandare in onda
algorithm: algoritmo /'ælgərɪðəm/
amplifier: amplificatore
analogue: analogo
angle bracket: parentesi angolata
app: programma per smartphone
application: applicazione
array: matrice
asynchronous: asincrono
authentication: autentificazione
authorisation: autorizzazione
avatar: immagine grafica che identifica un utente in rete
average: media

B

backbone: dorsale
backdoor: accesso non documentato a un sistema di sicurezza
backing store: memoria secondaria
bandwidth: larghezza di banda /bændwɪdθ/
barcode: codice a barre
beam: raggio
benchmark: standard di riferimento
binary: binario
blog: diario online
blogger: chi crea un blog
bookmark: segnalibro
branch: ramo
bridge: ponte
brightness: luminosità
broadband: banda larga
to broadcast: trasmettere
brush: pennello
to burn: masterizzare

C

canvas: tela
captive: bloccato
cell: cella
chain: catena
channel: canale
chunk: pezzo
circuit: circuito
cladding: rivestimento
class: classe
clock: orologio
coax: cavo coassiale
coded: codificato
column: colonna /'kɒləm/
compass: bussola
to compress: comprimere
conditional formatting: formattazione condizionale
construct: costrutto
copper: rame
contrast: contrasto
to convert: convertire
coordinate: coordinata
to crawl: cercare in maniera sistematica
to cripple: bloccare
to crop: tagliare
cryptocurrency: criptovaluta
cryptography: crittografia
customisable: personalizzabile

D

dashboard: cruscotto
database: banca dati
denial of service: negazione di servizio/ servizio non disponibile
to debug: individuare e correggere errori
to decrypt: decriptare
deletion: cancellazione
digital: digitale
digital signature: firma digitale
digital wallet: portafoglio digitale
to digitise: digitalizzare
diode: diodo
to discontinue: cessare la produzione
to disseminate: diffondere
documentation: documentazione
domain: dominio
domotics: domotica
dot: punto
dotcom company: azienda di e-commerce
to drag: trascinare
drum: tamburo
dynamic: dinamico

E

electronic diary: diario elettronico
email: posta elettronica
to encrypt: criptare
end recipient: utente finale
end user: utente finale
engine: motore
enhacement: miglioramento
to etch: incidere

F

fan: ventola
fibre optics: fibra ottica /'faɪbər 'ɒpɪks/
field: campo
finite: limitato
flat-panel: schermo piatto
flaw: difetto
flexibility: flessibilità
flowchart: diagramma di flusso
folder: cartella
footer: piè di pagina
formatting: formattazione
formula: formula (pl. formulae)
to foster: promuovere
frame: struttura, cornice

G

gateway: passaggio
glitch: errore, problema tecnico
graphic: grafico

graphic tablet: tavoletta grafica
grid: griglia

H

to handle: gestire
haptic: aptico
harmless: innocuo
hashtag: tag usato nei microblog
head: testina
header: intestazione
headset: sistema cuffia e microfono
hierarchy: gerarchia /'haɪərɑːki/
to hightlight: evidenziare
hub: hub, dispositivo che unisce più linee di comunicazione
hypertext: ipertesto /'haɪpərˌtɛkst/

I

identification: identificazione
identity theft: furto d'identità /aɪ'dɛntɪti θɛft/
indentation: rientro tipografico
index: indice
to infect: infettare
inheritance: ereditarietà
inkjet printer: stampante a getto d'inchiostro
inspection: ispezione
instant message: messaggio istantaneo
instruction: istruzione
insulator: isolante
integer: numero intero
integrated circuit: circuito integrato
interactive whiteboard (IW): lavagna LIM
italic: corsivo
to italicise: mettere in corsivo

K

kernel: nucleo
keyboard: tastiera
knot: nodo

L

laptop: computer portatile
latency: latenza
layer: strato
line: linea
logic: logica
loop: ciclo

M

machine cycle: ciclo macchina
machine language: linguaggio macchina
magnetic strip: banda magnetica
megaphone: megafono
mesh: reticolo
method: metodo
microprocessor: microprocessore
motherboard: scheda madre
multifunction printer: stampante multifunzione

N

network: rete
notebook: blocco appunti

O

operand: operando
operating system: sistema operativo
operator: operatore
optical fibre: fibra ottica
optical mark reader: lettore ottico
outcome: risultato
to overload: sovraccaricare

P

padlock: lucchetto
payroll: busta paga
peripheral: periferica
phishing: truffa informatica (per ottenere dati sensibili)
pin: puntina
pipeline: canale
pitch: tono
platform: piattaforma
port stealing: furto di porta
power supply: alimentazione
presentation: presentazione
to print: stampare
printer: stampante
process: processo
processor: processore
programming language: linguaggio di programmazione
proprietary: brevettato e di proprietà /prə'praɪətəri/
prosthetic: artificiale /prɒs'θɛtɪk/
punched card: scheda perforata

Q

query: interrogazione (al database)

R

ransom: riscatto
to rebrand: cambiare marchio
receiver: ricevente
relational: relazionale
relationship: relazione
reminder: promemoria
remote control: telecomando
repeater: ripetitore
to replicate: riprodurre, ripetere
report: resoconto
resilience: resilienza
retrieval: recupero
ribbon: nastro
ring: anello
rogue: disonesto
root: radice
row: riga
run time: tempo di esecuzione

S

satellite dish: antenna parabolica
scalability: scalabilità (possibilità di ingrandire o ridurre un'immagine)
to scan: scannerizzare
to scramble: mescolare
search engine: motore di ricerca
session: session
to share: condividere
shell: interprete dei comandi
sitemap: mappa del sito
snapshot: immagine
to snoop: spiare
to sort: ordinare
socket: spina
source code: codice sorgente
spam: messaggio non richiesto

to spin: ruotare
spoofing: falsificazione d'identità
to spray: spruzzare
to spread: diffondere
spreadsheet: foglio di calcolo
to spy on: spiare
star: stella
static: statico
string: stringa, sequenza
supervisor: supervisore
switch: interruttore, commutatore
synchronous: asincrono
syntax: sintassi

T

tech-savvy: esperto di tecnologia /tɛk 'sævi/
template: modello
testing: testare
threat: minaccia
toolbox: cassetta degli attrezzi
topology: topologia
track: traccia, tracciare
trait: tratto
transceiver: ricetrasmittente
transducer: trasduttore
trash can: cestino
tray: cassetto, vassoio
tree: albero
to trick: ingannare

U

to undermine: indebolire
unsolicited: non richiesto, indesiderato
utility: utilità

V

vacuum tube: valvola termoionica
validation: validazione
value: valore
variable: variabile
vector: vettore
vector-based: vettoriale
verification: verifica
videogame: videogioco
virtual: virtuale
volatile: volatile

W

walkthrough: spiegazione passo per passo
wave: onda
wavelength: lunghezza d'onda
web page: pagina web
website: sito web
word processor: elaboratore di testo
worm: verme (tipo di virus)

4 ACRONYMS

A

ADC: Analogue to Digital Converter

AI: Artificial Intelligence

ALU: Arithmetic Logic Unit

AR: Augmented Reality

ARPANET: Advanced Research Project Agency Network

ATM: Automated Teller Machine

B

BCI: Brain Computer Interface

BIOS: Basic Input/Output System

C

CAD: Computer-Aided Design

CAM: Computer-Aided Manufacturing

CAN: Campus Area Network

CBT: Computer-Based Training

CD-R: Compact Disc – Recordable

CD-ROM: Compact Disc Read Only Memory

CD-RW: Compact Disc – Rewritable

CIM: Computer Integrated Machinery

CLI: Command Line Interpreter

CLI: Common Language Infrastructure

CPS: Cyber Physical System

CPS: Classroom Performance System

CRM: Customer Relationship Management

CPU: Central Processing Unit

CRT: Cathode Ray Tube

CS: Computer Science

CU: Control Unit

D

DAC: Digital to Analogue Converter

DAW: Digital Audio Workstation

DBMS: Database Management System

DDE: Direct Data Entry

DOS: Denial of Service

DTP: Desktop Publishing

DVD-R: Digital Versatile/Video Disc – Read Only

DVD-RAM: DVD Random Access Memory

DVD-RW: DVD Read Write

E

EO: Erasable Optical

EPOS: Electronic Point of Sale

F

FOLDOC: Free On-Line Dictionary of Computing

FTP: File Transfer Protocol

G

GAN: Global Area Network

GDRP: General Data Protection Regulation

GPS: Global Positioning System

GUI: Graphical User Interface

H

HAN: Home Area Network

HDD: Hard Disk Drive

HTML: Hypertext Markup Language

HTTP: Hypertext Transfer Protocol

I

IaaS: Infrastructure as a Service

IAS: Immediate Access Store

IC: Integrated Circuit

ICT: Information & Communication Technology

IDE: Integrated Development Environment

IoT: Internet of Things

IP: Internet Protocol

ISP: Internet Service Provider

IT: Information Technology

IWB: Interactive Whiteboard

J

JIT: Just-in-Time

JVM: Java Virtual Machine

L

LAN: Local Area Network

LCD: Liquid Crystal Display

LED: Light Emitting Diode Display

LMS: Learning Management System

M

MAN: Metropolitan Area Network

MFP: Multifunction Printer

MICR: Magnetic Ink Character Reader

MOOC: Massive Open Online Course

N

NFS: Network File Sharing

NIC: Network Interface Card

O

OLED: Organic Light Emitting Diode

OMR: Optical Mark Reader

OOP: Object Oriented Programming

P

PaaS: Platform as a Service

PAN: Personal Area Network

PC: Personal Computer

PCB: Printed Circuit Board

PDA: Personal Digital Assistant

PID: Process Identifier

P2P: Peer-to-Peer

R

RAM: Random Access Memory

RF: Radio Frequency

RFID: Radio Frequency Identification

ROM: Read Only Memory

S

SaaS: Software as a Service

SAN: Storage Area Network

SCM: Supply Chain Management System

SMS: Short Message Service

SMTP: Simple Mail Transport Protocol

SQL: Structured Query Language

SSD: Solid State Drive

T

TCP: Transmission Control Protocol

TFT: Thin Film Transistor

U

USB: Universal Serial Bus

URL: Uniform Resource Locator

V

VoIP: Voice Over Internet Protocol

VPL: Visual Programming Language

VPN: Virtual Private Network

VPS: Virtual Private Server

VR: Virtual Reality

VRML: Virtual Reality Modelling Language

W

WAN: Wide Area Network

WBT: Web-Based Training

WORM: Write Once Read Many

WWW: World Wide Web