

Veleučilište suvremenih informacijskih tehnologija

Darija Pešut

ENGLISH FOR ICT STUDENTS

Udžbenici Veleučilišta suvremenih informacijskih tehnologija

Zagreb, 2023.

Nakladnik

INTUS

Intus informatika d.o.o., Zagreb

ENGLISH FOR ICT STUDENTS

dr.sc. **Darija Pešut**, viši predavač

Za izdavača

Darija Pešut, viši predavač

Recenzenti

Gjurgjica Mimica Bezjak, prof., viši predavač

Lamia Kulenović, predavač, prof., viši predavač

Lektura i korektura: **Gjurgjica Mimica Bezjak**

Naslovna stranica Intus informatika d.o.o.

Veleučilište suvremenih informacijskih tehnologija

Klaićeva 7, Zagreb

www.vsite.hr

ISBN 978-953-7464-17-2

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Thanks and Acknowledgements

The author acknowledges the following sources of copyright materials and is very grateful for the permissions granted:

ComputerLanguage.com, Deutsche Welle, DZone, Encyclopedia Britannica, IBM Corporation, IGI Global Dictionary, Interaction Design Foundation, National Academies Press, Queensland Government, Totaljobs, Typesy, University Health Services at Princeton University, and Wiley – dummies.com.

The author sincerely thanks Gjurgjica Mimica Bezjak for her reviewing and proofreading contributions, and Lamia Kulenović for her reviewing contribution, which improved the quality and clarity of this work.

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Language and Learning Objectives

UNIT 1 – The Digital Era

READING	The Digital Age
VOCABULARY	Terminology related to the Digital Era; Definitions; General vocabulary
SPEAKING	Using everyday technologies
LANGUAGE WORK	Verb + noun collocations
VIDEO	Technology is replacing jobs – Are you ready?
LEARNING OBJECTIVES	<p>In this unit you will:</p> <ul style="list-style-type: none"> ✓ read about and define the Digital Era ✓ use terminology related to the Digital Era ✓ speak about using everyday technologies ✓ use verb + noun collocations ✓ watch and discuss a video about technology in the workplace

UNIT 2 – Computer Basics

READING	Inside Your PC's Console
VOCABULARY	Elements of a computer system; Computer classification
SPEAKING	Reporting on differences between devices
LANGUAGE WORK	Relative clauses
VIDEO	What's inside your computer? What is a CPU?
Additional skills	Researching differences (between devices) on the web
LEARNING OBJECTIVES	<p>In this unit you will:</p> <ul style="list-style-type: none"> ✓ read about and define the basic elements of a computer system ✓ classify computers by size, type and purpose ✓ research and report on differences between devices ✓ use relative clauses when describing parts of a computer ✓ watch videos and answer questions about the main parts of a computer and the CPU

UNIT 3 – Peripherals I

READING	Interesting Facts About Keyboarding; Computer mouse turns 50;
VOCABULARY	Defining peripheral devices; General vocabulary;
SPEAKING	Describing functions and features of peripherals
WRITING	Writing a summary
LANGUAGE WORK	Describing functions and features; Linking words and phrases
VIDEO	What are Peripheral Devices of a Computer – Definition, Examples & Types
LEARNING OBJECTIVES	<p>In this unit you will:</p> <ul style="list-style-type: none"> ✓ define computer peripherals

	<ul style="list-style-type: none"> ✓ read and study facts about the keyboard and computer mouse ✓ describe functions and features of computer peripherals ✓ watch a video about peripheral devices ✓ write a summary of a video using linking words and phrases
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UNIT 4 – Peripherals II

READING	Printer advertisements; Computer ergonomics
VOCABULARY	Types of printers; Printer specifications; General vocabulary
SPEAKING	Comparing printers; Giving instructions and advice
LANGUAGE WORK	Comparison of adjectives; SHOULD for advice; IMPERATIVE for instructions
VIDEO	How do touchscreens work?
LEARNING OBJECTIVES	<p>In this unit you will:</p> <ul style="list-style-type: none"> ✓ define types of printers ✓ define types of display technologies ✓ read printer advertisements and study the specifications ✓ compare printer specifications ✓ read about and define computer ergonomics ✓ give instructions and advice on correct computer placement ✓ watch a video about touchscreen displays

UNIT 5 – Data Storage

READING	Types of Storage Devices
VOCABULARY	Classification of computer storage; Storage devices
SPEAKING	Describing a tree diagram; Describing the operating principles of different storage devices
LANGUAGE WORK	Word building
VIDEO	Storage Categories: Magnetic, Optical, Solid-state
Additional skills	Creating a tree diagram
LEARNING OBJECTIVES	<p>In this unit you will:</p> <ul style="list-style-type: none"> ✓ read about the types of storage devices ✓ classify and define computer storage ✓ create and describe a tree diagram ✓ create new words by using prefixes, suffixes and compounding ✓ watch a video about different storage categories ✓ describe the operating principles of different storage devices

UNIT 6 – Introduction to Computer Software

READING	Types of Software
VOCABULARY	Definitions of different types of software
SPEAKING	Describing graphs; Explaining differences
WRITING	Writing a summary
LANGUAGE WORK	Countable and uncountable nouns; Articles
VIDEO	Database vs. Spreadsheet
LEARNING OBJECTIVES	In this unit you will: <ul style="list-style-type: none">✓ read about and define different types of software✓ describe graphs✓ study the usage of articles in a text on the Android OS✓ write a summary of a text✓ watch a video about and study the differences between databases and spreadsheets

EXTRA WORK - Presentations

VOCABULARY	Phrases and vocabulary useful for giving presentations
VIDEO	Presentations in English
LEARNING OBJECTIVES	In this unit you will: <ul style="list-style-type: none">✓ study the useful language for delivering presentations in English

UNIT 7 – The Internet and the Web

READING	E-mail
VOCABULARY	E-mail; Internet vs. WWW
SPEAKING	E-mail terminology; Internet and WWW
WRITING	Writing e-mails
LISTENING	Podcast (Tim Berners-Lee)
LANGUAGE WORK	Questions
VIDEO	History of the Internet; What is the World Wide Web;
Additional skills	Website Evaluation
LEARNING OBJECTIVES	In this unit you will: <ul style="list-style-type: none">✓ read about electronic mail and define e-mail terminology✓ form and answer questions✓ watch videos about the internet and the WWW✓ study the difference between the internet and the WWW✓ write e-mails✓ evaluate websites using the CRAAP test

UNIT 8 – Netiquette and Cybersecurity

READING	What is Cybersecurity? History of Cybercrime
VOCABULARY	Online discourse; Cybersecurity; General vocabulary
SPEAKING	Asking and answering questions; Discussion about netiquette
LANGUAGE WORK	Past Simple
VIDEO	What is the Dark Web?
Additional skills	Short presentation
LEARNING OBJECTIVES	In this unit you will: <ul style="list-style-type: none">✓ discuss online discourse✓ read about cybersecurity and the history of cybercrime✓ define common cybersecurity threats✓ study the Past Simple and talk about the history of cybercrime✓ ask and answer questions about cybercrime✓ create and deliver a short presentation✓ watch a video about the Dark Web

UNIT 9 – Computer Graphics and Web Design

READING	Computer Graphics; What is Web Design?
VOCABULARY	Basic computer graphics terminology
SPEAKING	Designing a website - brainstorming
WRITING	Taking notes
LANGUAGE WORK	The -ING form; Modals
VIDEO	Web Design Trends 2021
Additional skills	A short presentation
LEARNING OBJECTIVES	In this unit you will: <ul style="list-style-type: none">✓ read about computer graphics and web design✓ define basic concepts in computer graphics using the -ING form✓ use modal verbs to talk about graphics software✓ brainstorm a new website concept✓ give a short group presentation✓ take notes while watching a video on web design trends

UNIT 10 – Multimedia and Desktop Publishing

READING	What is desktop publishing?
VOCABULARY	E-publishing; Desktop publishing; Multimedia
SPEAKING	Discussing advantages and disadvantages
WRITING	Letter writing
LANGUAGE WORK	Conditional sentences
VIDEO	Multimedia in Education
LEARNING OBJECTIVES	In this unit you will: <ul style="list-style-type: none">✓ read about and define desktop publishing✓ discuss multimedia and its application in different fields

	<ul style="list-style-type: none"> ✓ discuss the advantages and disadvantages of e-textbooks ✓ use conditional sentences to express real and hypothetical situations ✓ write a formal letter ✓ watch a video about the application of multimedia in education
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UNIT 11 – Careers in ICT

READING	ICT Careers; Job advertisements; What is Software Development;
VOCABULARY	ICT jobs; Job profiles; Software development
SPEAKING	Job interview
WRITING	Job application letter
LANGUAGE WORK	Present Perfect (Simple and Continuous)
VIDEO	Job profile: IT Support Technician; Job interview: IT Interview Questions and Answers
Additional skills	CV example
LEARNING OBJECTIVES	<p>In this unit you will:</p> <ul style="list-style-type: none"> ✓ discuss and define ICT jobs ✓ read about careers in ICT ✓ read about and discuss job roles in software development ✓ talk about software development using -ED and INFINITIVE forms ✓ watch a job profile video ✓ study a job advertisement and use it in a job application letter ✓ write a job application letter and use the Present Perfect ✓ discuss job interview questions and answers, then simulate a job interview ✓ study an ICT CV example

UNIT 12 – Networking and Communications

READING	Telecommunications – an evolving definition
VOCABULARY	Communication(s); Network(ing); Telecommunications
SPEAKING	The benefits of new technology
WRITING	Breaking up text into sections with subtitles
LANGUAGE WORK	The Passive; Phrasal verbs
VIDEO	Forget Wi-Fi. Meet the new Li-Fi Internet.
LEARNING OBJECTIVES	<p>In this unit you will:</p> <ul style="list-style-type: none"> ✓ read about the history and development of telecommunications ✓ write subtitles for text sections ✓ define similar words and study their usage ✓ study the use of the Passive ✓ use common ICT phrasal verbs

	✓ watch a video about Li-Fi and discuss its benefits
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UNIT 13 – Beyond the Digital Era

READING	The Industrial Era Ended, and so Will the Digital Era
VOCABULARY	Emerging technologies; General vocabulary
SPEAKING	Predictions about new technology
WRITING	Taking notes
LANGUAGE WORK	Adverbs; Future tenses
VIDEO	The 10 Tech Trends that Will Transform Our World
LEARNING OBJECTIVES	<p>In this unit you will:</p> <ul style="list-style-type: none"> ✓ read about and discuss the end of the Digital Era ✓ discuss predictions about new technology using adverbs and future tenses ✓ watch a video about technology trends ✓ take notes while you watch a video and then check your facts in an article

E-TEXTBOOK version

This work is also published as an e-textbook with a permanent link:

<https://www.epubeditor.it/ebook2/?static=258132>

I. The Digital Era

PRE-READING

How to define the Digital Era?

- The 21st century shift from the industrial revolution to a new economic domination of information technology. (*Duane Windsor*)
- A period in human history characterized by the shift from traditional industry to an economy based on information and communications technology (ICT). (*Yulia Muchnik-Rozanov, Dina Tsybulsky*)
- The period where digital technologies play a prominent role in shaping up and regulating the behaviors, performances, standards, etc., of societies, communities, organizations, and individuals. (*Jayantha P. Liyanage*)
- Current era in which digitalization is predominant. (*Emre Türkmen and Ayberk Soyer*)
- Characterized by technology which increases the speed and breadth of knowledge turnover within the economy and society. (*Jill Shepherd*)
- A term used to describe today's era, in which digital technologies are used in almost every aspect of life. (*Yoram Eshet-Alkalai*)

(Reproduced from [IGI Global Dictionary](#) with permission)

DISCUSS

1. How is the digital age affecting you? (work, social life, studies...)
2. How does the digital age affect people who are not [digital natives](#)?
3. Which technologies do you use every day?

READING - AUTHENTIC TEXTS

The Digital Age: The Era We All Are Living In (by Anna Vorobiova)

The progression into the digital age has been inevitable; for businesses to survive and thrive in this era, an understanding of these innovations is key.

The way we live, work, and play has changed dramatically over the course of the past half-century. The 9-5 economies of years past have been replaced with globally integrated 24/7 service offerings. Consumers in the digital age have access to a host of services and products that would have previously been considered available only in the realms of science fiction.

This change has been a long time coming and while the industrial revolution helped start this transformation, it is only now in the information age that individuals are really able to embrace these changes. In this new digital age, access to knowledge is greatly improved. Data that was previously only accessible to scientists and government officials are now freely accessible to all.

In many ways, this is a double-edged sword, as merely having access to information is not a recipe for success. It is important to understand the context of the information and data and also how it can best be used to be successful. However, the pace of change is only increasing. New advancements in Artificial Intelligence (AI), machine learning (ML), and the Internet of Things (IoT) will only provide more information.

Along with these advances, changes in networking speeds with the launch of 5G and devices capable of accessing these speeds will further propel digital age technologies forward. When trying to

understand what the digital age is, it is important to realize that it is one driven by technology. These changes, when implemented within businesses to increase competitiveness, can help make businesses more efficient and profitable.

Development of the Digital Age

It is important to realize that the digital age is not just one monolithic thing — rather it is a sequence of progressive steps. Today we are probably only in the midst of the transformation between the pre-digital age and the post-digital age. To truly understand this progression, it is important to see where we came from, as well as where we are headed.

Pre-Digital

Though this phase was not too long ago, this period of technology is one that many look on with fond nostalgia. During this phase, retail was still the primary means of obtaining goods and services. While products gradually transitioned to be more digital with encyclopedias moving online and phone books becoming searchable repositories, it was still a simpler time.

Mid-Digital

The mid-digital phase is where we are now. Companies have embraced digital more and more in concept, but they've not yet fully grasped how expectations have changed. While TV cord-cutting continues to grow in popularity, a majority of the population still uses traditional cable services. There continues to be a disconnect where some transit agencies have shifted to card payments, while others still require cash. There is no continuity of experience across the board.

Post-Digital

In the post-digital age, digital itself will move into the background. Just like electricity and its impact on business and individual life, digital will also become ubiquitous. In this new digital age, the internet will be available everywhere and things like smart cars and smart homes will be the norm. The concept of restrictions based on location will be a thing of the past. There will be both new freedoms and new challenges to explore in this age, with a population born where digital is just a fact of life.

Factors of the Digital Age

Living with digital technologies and understanding them are two very different beasts. To be successful in this new digital age, companies need to embrace digital in all things. They need to champion it and focus on ways that it can be further enhanced to create even greater value for their businesses and their customers.

Reduce Friction

Products in the digital age need to be easy to obtain and also easy to return. The success of organizations like Amazon and Wayfair demonstrates the importance of this clearly. Similarly, the price needs to be a consideration for a business, as companies like Uber and Airbnb have both demonstrated. While price is definitely a factor for consumers, it is not the only factor.

Enhance the User Experience

Many of the most successful digital enterprises are aspirational in nature and product, and one key metric that they generally share in common is a focus on the customer and customer experience. Companies that understand digital age technologies know that customers have a choice. They know

that price and features can get them to the door, but if they expect business to walk in, service has to match.

Create Collaboration

Digital age organizations look to consumers for innovation and ideas and solicit feedback on products and services regularly. Their focus is not simply on the competition but also on what the users want and need and how they can best meet these needs in a cost-effective and efficient manner.

Threats and Challenges of the Digital Age

We've come to this point in time through a long and circuitous journey. The industrial revolution brought us to the industrial age, which eventually led to the digital revolution and the current information age we are now in. But if the industrial age ended, will the information age end also? And if so, what comes next?

Paralysis Through Analysis

Now that access to information is simple and newer tools continue to be developed to further the analysis, there exists a conundrum faced by many businesses. Do they have the right information they need to make their decisions or do they need more? Many businesses fall into the trap of constantly looking for additional details and validation before making a decision simply for a fear of a lack of due diligence.

Easy Access to Data Makes Us Intellectually Lazy

Too much data can be a bad thing. With access to "big data" and AI algorithms, companies in the digital age are able to make the data support almost any conclusion they need.

Impulsive and Flighty Consumers

The amount of attention paid to any one thing by a consumer is small and falling further daily. With smartphones, tablets, TV, and more all-consuming access to precious eyeballs, companies need to do more than ever to stand out and remain relevant.

A Little Learning Is a Dangerous Thing

Simply having access to information is not always helpful or relevant. Doctors, for example, have to frequently deal with patients that have self-diagnosed based on their symptoms from an online source. Without training, the information that a common layperson is able to grasp is very limited.

How to Embrace the Digital Age

While companies in the years preceding 2020 were slow to embrace digital, that is no longer the case. Considering what 2020 brought to the world in terms of the pandemic and global restrictions, the race to digital is now even more critical than ever.

Leverage Data to the Customer's Benefit

Data, when used correctly, can be a very powerful tool for growth. Coca-Cola, for example, used a digital loyalty program as early as 2015, which helped deliver targeted content to consumers based on the user data they'd gathered. This not only helped them create greater brand loyalty; it also helped drive additional sales.

Consumers are not averse to sharing personal information as long as there are direct benefits that they can embrace. In this digital age, information is king. As long as companies are transparent about their collection efforts and providing appropriate rewards, the data can be used to further propel growth.

Tech-train Your Team

Today's skills will not automatically translate to tomorrow's needs. While robots and AI will not replace workforces around the world, they will have an impact on jobs and roles. In this case, reskilling employees to meet new working requirements will be needed.

However, the training of your team is not only going to be required for those transitioning to new roles. Even those remaining in their existing roles will need training for the new digital age technologies that have been implemented. Without this training, they will only use a fraction of its capabilities and you will not gain the benefits you were expecting.

Enhance the Customer Experience

Customers now have more choices than ever before. Simply providing a product or service at a good price is not enough. Today's consumers are looking for phenomenal service and an overall effortless experience. Companies need to look at the roadblocks they are putting in the way of their customers and remove them by helping create a more seamless and pleasurable experience across the board.

In the digital age, companies need a guide to help them transition and grow. A reliable tech provider can help you successfully navigate a path forward, ensuring that you and your customers benefit from this new era.

(Reproduced from [DZone](#) with permission, 2022)

VOCABULARY AND COMPREHENSION

After reading the text, answer the questions.

1. Name two characteristics of the digital age.
2. Specify the three phases of the digital age and identify the differences between them.
3. What are the threats of data overanalysis and exposure to too much information?
4. How has the pandemic affected the digital age?
5. How will the digital age impact jobs in the future?

Match the terms in Table A with the terms in Table B.

Table A
Machine Learning
Internet of Things
TV cord-cutting
Digital loyalty program
Big data

Table B

1. Allows consumers to interact with businesses in order to receive rewards.
2. The networking capability that allows information to be sent to and received from objects and devices using the internet ¹.
3. Refers to viewers cancelling cable or satellite subscriptions and using available media over the internet.
4. Describes large, hard-to-manage volumes of data – both structured and unstructured ².
5. The process by which a computer is able to improve its own performance by continuously incorporating new data into an existing statistical model ³.

Complete the sentences from the text with the following words or phrases:

validation, conundrum, pace, grasp, layperson, ubiquitous, averse, across the board, due diligence

1. There is no continuity of experience _____.
2. The _____ of change is only increasing.
3. Just like electricity and its impact on business and individual life, digital will also become _____.
4. Now that access to information is simple and newer tools continue to be developed to further the analysis, there exists a _____ faced by many businesses.
5. Many businesses fall into the trap of constantly looking for additional details and _____ before making a decision simply for a fear of a lack of _____.
6. Without training, the information that a common _____ is able to _____ is very limited.
7. Consumers are not _____ to sharing personal information as long as there are direct benefits that they can embrace.

STUDY

Write down a list of all the technologies you use at home, work and/or school. In pairs, compare and discuss the technologies on your lists. Report back to the teacher/class.

How has technology made your life/job easier?

How has technology made your life/job more difficult?

Are you a digital native? If not, would it make a difference if you were?

¹ Merriam-Webster. (n.d.). Internet of Things. In Merriam-Webster.com dictionary. Retrieved February 15, 2023, from <https://www.merriam-webster.com/dictionary/Internet%20of%20Things>

² SAS Institute Inc. (n.d.). *Big data: What it is and why it matters*. SAS. Retrieved February 15, 2023, from https://www.sas.com/en_us/insights/big-data/what-is-big-data.html

³ Merriam-Webster. (n.d.). Machine learning. In Merriam-Webster.com dictionary. Retrieved February 15, 2023, from <https://www.merriam-webster.com/dictionary/machine%20learning>

LANGUAGE WORK

Collocations are words that often go together to form natural blocks of language and are most often formed from combinations of verbs, nouns, adjectives, adverbs, etc. It does not sound natural to collocate the verb MAKE with the noun RESEARCH, instead we use the verb DO + RESEARCH:

At my university we mainly **do research** in the field of ICT.

[Online Collocation Dictionary](#)

Match the verbs with the nouns to make common collocations (VERB + NOUN) and complete the sentences.

1. SEND	a. tasks
2. HAVE	b. drawings
3. WRITE	c. instructions
4. DOWNLOAD	d. meetings
5. DISPLAY	e. reports
6. CARRY OUT	f. emails
7. PERFORM	g. charts
8. MAKE	h. calls
9. READ	i. operations
10. CREATE	j. data

1. Nowadays it is easy to _____ on numbers using computers.
2. VoIP enables users to _____ over the internet.
3. There are numerous possibilities to _____ using digital art applications.
4. People often _____ online and they use communication platforms such as Microsoft Teams.
5. During face-to-face meetings people usually _____ on projector screens.
6. It used to be more common to _____ at work, today people use different apps and platforms for communication.
7. It is always better to _____ when you are not using a metered network.
8. Computers can _____ which are far too difficult for humans to solve.
9. Employees often have to _____ where they analyse an issue and recommend actions.
10. Before using new technology, it is advisable to _____.

VIDEO

Try to predict three jobs replaced by technology which you think will be presented in the video. Watch the video and discuss in class.

[Technology is replacing jobs. Are you ready?](#)

II. Computer Basics

What is a computer?

A computer is a machine that can store and process information. Most computers rely on a binary system that uses two variables, 0 and 1, to complete tasks such as storing data, calculating algorithms, and displaying information. Computer once meant a person who did computations, but now the term almost universally refers to automated electronic machinery. Computers come in many different shapes and sizes, from handheld smartphones to supercomputers weighing more than 300 tons.

Computer hardware

The physical elements of a computer, its hardware, are generally divided into the central processing unit (CPU), main memory (or random-access memory, RAM), and peripherals. The last class encompasses all sorts of input and output (I/O) devices: keyboard, display monitor, printer, disk drives, network connections, scanners, and more.

Computer software

Software denotes programs that run on computers. John Tukey, a statistician at Princeton University and Bell Laboratories, is generally credited with introducing the term in 1958 (as well as coining the word bit for binary digit). Initially software referred primarily to what is now called system software—an operating system and the utility programs that come with it, such as those to compile (translate) programs into machine code and load them for execution. This software came with a computer when it was bought or leased. In 1969 IBM decided to “unbundle” its software and sell it separately, and software soon became a major income source for manufacturers as well as for dedicated software firms.

(Reproduced from Encyclopedia Britannica with permission⁴)

Elements of a computer system

Find the following elements in Figure 1:

printer, keyboard, monitor, CPU (Central Processing Unit), PSU (Power Supply Unit), speaker, HDD (Hard Disk Drive), main memory (RAM), mouse, scanner, expansion cards, external hard disk, application software, motherboard, system software, ODD (Optical Disc Drive)

- | | | | |
|----------|----------|----------|----------|
| 1 _____ | 2 _____ | 3 _____ | 4 _____ |
| 5 _____ | 6 _____ | 7 _____ | 8 _____ |
| 9 _____ | 10 _____ | 11 _____ | 12 _____ |
| 13 _____ | 14 _____ | 15 _____ | 16 _____ |

⁴ Pottenger, W. Morton, Swaine, Michael R., Freiburger, Paul A. and Hemmendinger, David (2022, April 7). computer. Encyclopedia Britannica. <https://www.britannica.com/technology/computer>

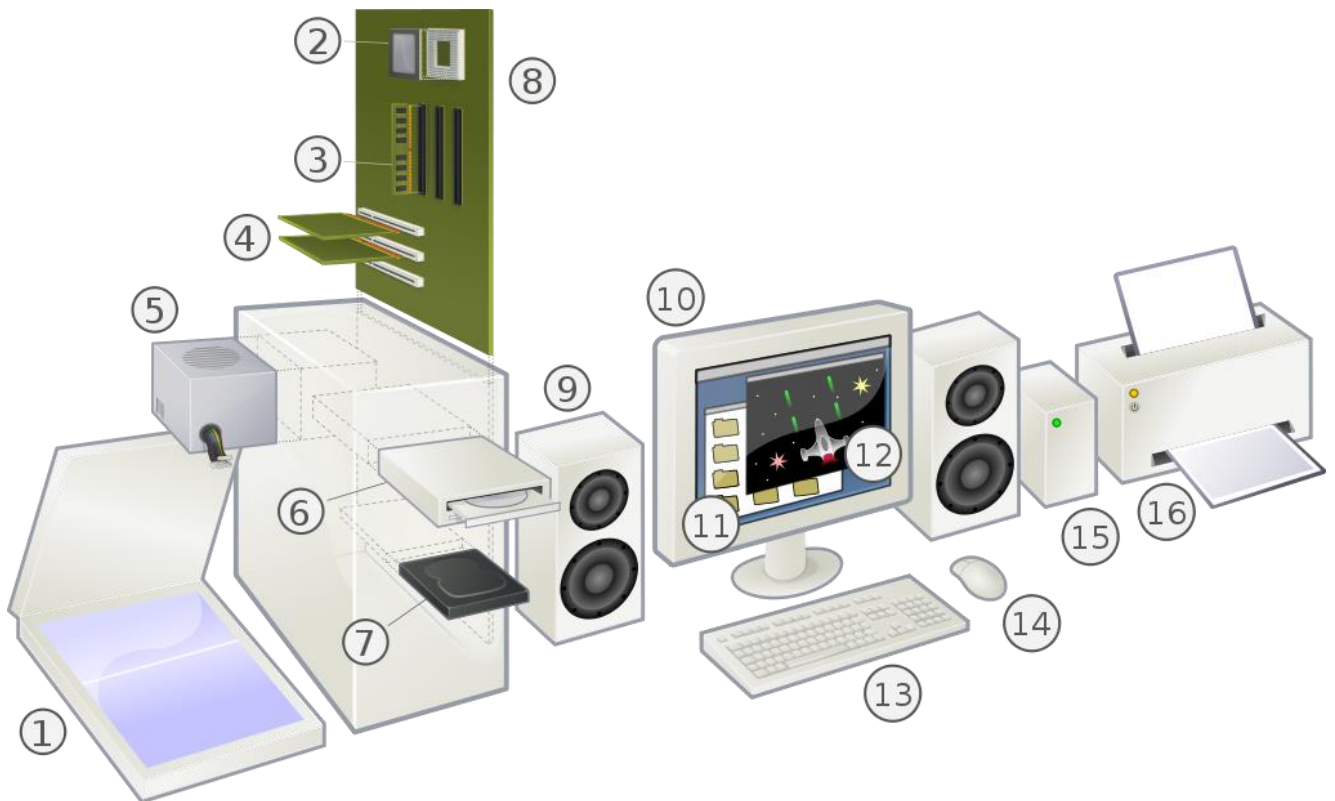


Figure 1 Personal computer (User:HereToHelp, CC BY-SA 3.0 via Wikimedia Commons)

Computer classification

Computers can be divided into three categories and are classified by size, type and purpose.

SIZE	TYPE	PURPOSE
1. Personal Computer (PC) or Microcomputer 2. Minicomputer 3. Mainframe 4. Supercomputer	1. Analogue 2. Digital 3. Hybrid	1. General 2. Special

Table 1 Classification by Khyberacademy

1. _____ computers are designed for a wide range of tasks.
2. _____ computers have characteristics of both analogue and digital computers.
3. Dedicated computers are another name for _____ computers that are not built to handle multiple problems and tasks.
4. A multi-user computer that supports hundreds or thousands of users and is used by large organizations is called a _____.
5. Desktops, tablets, laptops and PDAs are types of _____.

6. A single-user computer system which has a microprocessor is called a _____.
7. Analogue computers are used in scientific fields as opposed to _____ which are used in all fields.
8. _____ is an extremely powerful and fast computer that can process large amounts of data.
9. A _____ is almost powerful as the mainframe but smaller in size.



Figure 2 Supercomputer (OLCF at ORNL, CC BY 2.0 via Wikimedia Commons)

STUDY

Do a quick Google search and determine the differences between laptops and notebooks // PDAs and smartphones. Write notes and report back to the teacher/class.

READING – AUTHENTIC TEXTS

Inside Your PC's Console (by Dan Gookin)

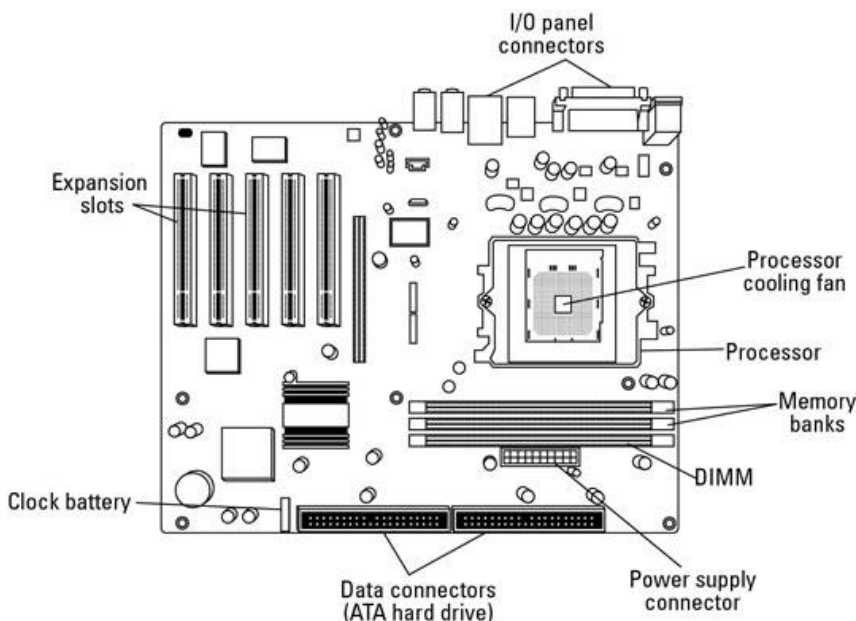
The inside of your computer may look scary. But rest assured: Anyone with relatively basic knowledge can update, fix, or maintain their computer. Not every computer looks the same inside, but every PC has similar components. Before you tinker inside the console, get to know the typical PC's innards.

Power supply: The easiest way to find it is to look for the location where the power plug connects to the console (usually, on the back). The power supply is right inside the case at that spot.

Cables: The power supply's colorful cables snake from the power supply outward. One or two clusters go to the motherboard, and others go to the disk drives. The majority of cables, however, may not be connected, waiting for future expansions. In addition to the power cables, various data cables run hither and thither.

Drive bay: Also known as the *disk drive cage*, the drive bay contains the hard drive and optical drive; plus, it has room to add other drives. The front side of the drive bay is the front of the console, where you can access removable storage.

Motherboard: The motherboard is the main circuitry board dwelling inside the console. It's probably difficult to see because it can be obscured by cables or the drive bay or both.



The following items are found on the motherboard:

I/O panel connectors: The I/O panel is where you connect peripherals to the PC, including USB gizmos, the keyboard and mouse, the monitor, and speakers. Sometimes, the I/O panel is on the motherboard, or a cable may connect the motherboard to the I/O panel elsewhere in the console.

Processor cooling fan: You may not see the processor directly. That's because today's processors run very hot and require direct cooling. So what you see rather than the processor is a cooling fan.

Processor: The processor rests beneath the cooling fan. You cannot see the processor unless you remove the fan, but don't remove the fan just to see the processor. Another term for the processor is *CPU*, or *central processing unit*.

Memory banks: A typical PC sports anywhere from two to eight memory banks on its motherboard, or sometimes on a tiny expansion card jutting from the motherboard. Memory banks are always in pairs of two. Essentially, they're tiny expansion slots into which memory cards, or *DIMMs*, are inserted.

DIMM: Your computer's memory comes on comb-size cards called DIMMs (Dual In-line Memory Modules).

Power supply connector: The motherboard needs power, so a specific connector exists on the motherboard for the power supply.

Data connectors: The motherboard is also home to various places where data cables connect like cables for the disk drives, speaker, I/O panel, and console lamps.

Clock battery: The clock battery helps the PC keep track of time when the computer is unplugged. The battery looks like a large coin.

Expansion slots: To help customize your computer, expansion slots allow bonus circuitry in the form of *expansion cards* to be plugged in. An expansion card can add features such as a new display adapter, more USB ports, fancy audio, wireless networking, and a whole host of options. You may not see the expansion slots inside your PC when expansion cards are plugged into them.

(Reproduced from dummies.com with permission)

VOCABULARY AND COMPREHENSION

After reading the text, answer the following questions.

1. What is the name of the main circuitry board?
2. Give another name for the disk drive cage.
3. Can the PC keep track of time when it's unplugged?
4. What can be used for adding features to customize a computer?
5. Why are many cables inside a PC not connected?

Find words/phrases in the text that mean:

- in various directions _____
- concealed _____
- attempt to repair something in a casual way _____
- internal workings of a device _____
- to display (or wear) _____

In pairs, define terms from the text *Inside Your PC's Console*.

Example: Student A: What are expansion cards?

Student B: Expansion cards are plugged into expansion slots and are used to add features to PCs.

LANGUAGE WORK - RELATIVE CLAUSES

Sentences can consist of one clause only (e.g. I work in Zagreb.) They are called simple sentences. We often make sentences with two or more clauses. If all the clauses in a sentence are independent, it is called a compound sentence. However, if a sentence contains one **main** (independent) **clause** and one or more **subordinate** (dependent) **clauses**, it is called a complex sentence.

There are many types of subordinate clauses. For example, defining relative clauses are used to define people or things.

A programmer is a person **who develops software**.

When we define **people**, we use the relative pronoun **WHO** or **THAT**.

A cyberstalker is a person **who/that** harasses or abuses people online.

When we define **things**, we use the relative pronoun **WHICH** or **THAT**.

A CD is a storage device **which/that** has a storage capacity from 650 MB to 700 MB.



Extra info:

Relative pronouns can be left out when they are the object of the relative clause.

This is the hard drive (THAT) I would like to buy.

(I would like to buy **THAT hard drive** – object)

Fill in the blanks with WHO, WHICH/THAT or nothing if possible.

1. A drive bay is the part of the computer _____ contains the hard drive and optical drive.
2. A motherboard is the main circuit board _____ contains the processor, the memory chips, expansion slots and controllers for peripherals.
3. The term *computer* once meant a person _____ did computations.
4. The laptop _____ I bought yesterday has a built-in digital camera.

VIDEO

[What's inside your computer?](#)

- Name the main components of a computer.
- What is an optical drive?
- What is a video card?
- What is RAM?

Further research: What is ROM (the difference between RAM and ROM), the difference between a graphics card and a video card).

[What is a CPU?](#)

- Define a CPU.
- What is a heatsink?
- What is an IC chip?
- What are the three main units of the CPU?
- What are the four basic operations of the machine cycle?

III. Peripherals I (describing)

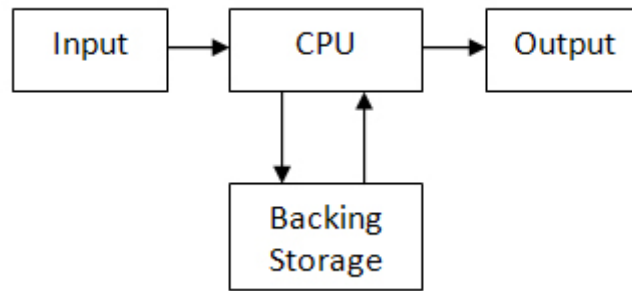


Figure 3 Aphonik~enwikibooks at English Wikibooks, Public domain, via Wikimedia Commons

PRE-READING

Before reading the definition of peripheral devices, mark the following statements as true (T) or false (F).

- | | | |
|---|---|---|
| 1. Peripherals are divided into three types: output devices, input devices and storage devices. | T | F |
| 2. Some devices provide both input and output. | T | F |
| 3. Wearable devices cannot be considered peripherals. | T | F |
| 4. A USB is a common serial bus. | T | F |

PERIPHERAL DEVICE, also known as peripheral, computer peripheral, input-output device, or input/output device, any of various devices (including sensors) used to enter information and instructions into a computer for storage or processing and to deliver the processed data to a human operator or, in some cases, a machine controlled by the computer. Such devices make up the peripheral equipment of modern digital computer systems.

Peripherals are commonly divided into three kinds: input devices, output devices, and storage devices (which partake of the characteristics of the first two). An input device converts incoming data and instructions into a pattern of electrical signals in binary code that are comprehensible to a digital computer. An output device reverses the process, translating the digitized signals into a form intelligible to the user. At one time, punched-card and paper-tape readers were extensively used for inputting, but these have now been supplanted by more efficient devices.

Input devices include typewriter-like keyboards; handheld devices such as the mouse, trackball, joystick, trackpad, and special pen with pressure-sensitive pad; microphones, webcams, and digital cameras. They also include sensors that provide information about their environment—temperature, pressure, and so forth - to a computer. Another direct-entry mechanism is the optical laser scanner (e.g., scanners used with point-of-sale terminals in retail stores) that can read bar-coded data or optical character fonts.

Output equipment includes video display terminals, ink-jet and laser printers, loudspeakers, headphones, and devices such as flow valves that control machinery, often in response to computer processing of sensor input data. Some devices, such as video display terminals and USB hubs, may provide both input and output. Other examples are devices that enable the transmission and reception of data between computers—e.g., modems and network interfaces.

Most **auxiliary storage devices**—as, for example, CD-ROM and DVD drives, flash memory drives, and external disk drives also double as input/output devices. Even devices such as smartphones, tablet computers, and wearable devices like fitness trackers and smartwatches can be considered as peripherals, albeit ones that can function independently.

Various standards for connecting peripherals to computers exist. For example, serial advanced technology attachment (SATA) is the most common interface, or bus, for magnetic disk drives. A bus (also known as a port) can be either serial or parallel, depending on whether the data path carries one bit at a time (serial) or many at once (parallel). Serial connections, which use relatively few wires, are generally simpler than parallel connections. Universal serial bus (USB) is a common serial bus.

(Reproduced with permission from *Britannica*⁵)



Asim18, CC BY-SA 3.0



© Marie-Lan Nguyen / Wikimedia Commons



Argox CC BY 1.0

⁵ T. Editors of *Encyclopaedia* (2020, May 27). Peripheral device. *Encyclopedia Britannica*. <https://www.britannica.com/technology/input-output-device>

LANGUAGE WORK – describing functions and features

When describing the functions and features of some device, there are certain structures and verbs that can be used.

Examples of describing FUNCTIONS are as follows:

A microphone is a device **FOR recording** the sound of your voice.

A microphone is **USED TO record** the sound of your voice.

A microphone is a device **WHICH enables** you to record the sound of your voice.

A microphone is a device **WHICH IS USED TO record** the sound of your voice.

A microphone **WORKS BY converting** sound energy into electricity.



Examples of common verbs used to describe FEATURES are as follows:

This tablet **HAS** an integrated camera.

This camera **FEATURES** night vision.

You **CAN** connect the mobile phone to the computer and save your images on the hard drive.

LCD TVs **OPERATE/WORK** without the cathode-ray tube.

Touchscreens **ALLOW** the user **TO** navigate through applications more easily.

- **Work in pairs. Choose one of the devices on page 2 and describe its functions and features to your partner who needs to guess the device you are describing. Use the language from the *Language Work* paragraph.**

READING – AUTHENTIC TEXTS

Interesting Facts About Keyboarding

If you take the time to think about it, we have been using keyboards way before we even knew what computers were. Some people will use at least one type of keyboard throughout their day on a daily basis. However, we are here to tell you some interesting and fun facts about keyboarding.



Figure 4 Keyboard (Image by Simon from Pixabay)

Fun Keyboarding Facts

- On your keyboard, the longest word that you can type using only the top row is typewriter.
- Christopher Sholes had designed the QWERTY keyboard that we use today for his typewriter in 1872.
- The same keyboard design has been used for about 150 years!
- The layout of the QWERTY keyboard was designed to slow people down so that the hammers on the typewriter would not jam — many people would not believe this because this keyboard layout is the most commonly used, however, nothing can be more inefficient. When the keys were placed in alphabetical order, people would type too fast and jam the arms of the typewriter. This is why this layout was chosen, to slow people down.
- On a Japanese keyboard, you will find the shortest space bar — this is because the Japanese language has so many different letters that they take up most of the space on a keyboard. Plus, Japanese keyboards require them to switch between Roman and Latin letters as well as Japanese characters. For this switching to occur, there must be additional keys. This is why the keyboard has such a small space bar.
- Studies have shown that a keyboard will be dirtier than your average toilet. This is why you must know how to clean them properly — in this study, 33 keyboards were tested. They were tested for potential health hazards. It was found that keyboards had levels of germs five times higher than those found on a toilet seat. Some keyboards located in office settings had mice droppings in them.
- Almost all keyboards will have bumps on the F and J keys. This is to allow those who do touch-typing to locate the base where they need to start. This is the starting position in which your hands rest on the keys. Plus, it makes it easier to navigate under poor lighting conditions.
- There is a monument for the QWERTY keyboard. It is located in Russia.
- You will hit the spacebar at the same time as 600,000 other people in the world — the space bar isn't only the longest and largest key on your keyboard, but it is also the most commonly used key. If you did not use the space key, reading would be a lot more difficult. 18 percent of all strokes on a keyboard is to the space key. Plus, when you type, you are not alone. Every 1/10th of a second, 600,000 people will hit the space bar.
- There are keys on the keyboard that are relatively useless today — the system request button dates back to 1980 when there were few operating systems being run. The print screen button was used to print the screen onto paper. However, today it is used to copy it to the clipboard.

(Reproduced from eReflect Inc (Typesy)⁶ with permission)

⁶ [Interesting Facts About Keyboarding | by Typesy | Medium](#)

Computer mouse turns 50: What you may not know



Figure 5 Computer mouse (Image by FelixMittermeier from Pixabay)

The computer mouse has come a long way since it was first presented in the US 50 years ago. It's now on the desks of hundreds of millions of PC users around the globe. Here's some things you may not know about it.

It was the late US engineer and inventor Douglas Engelbart who developed [the first prototypes of the computer mouse](#) in 1963 (Bill English constructed the first prototype using the engineer's sketches). Engelbart first revealed the concept to the public on December 9, 1968, in a presentation that later went down in history as "the mother of all demos."

It would take well over a decade for the computer mouse to become a standard part of commercial computer systems. The likes of Xerox, Apple, Microsoft and Logitech have spent millions on refining both the form and the function of mouse devices.

What's changed over the years has not just been the number of buttons, but also the interfaces needed to connect the device to desktop computers and laptops.

More and more experts are predicting the demise of the computer mouse as touch screens and speech recognition increasingly take over as ways of communicating with computers. Others point to the mouse's excellence at certain tasks, saying the device may be with us for much longer than some might believe.

Did you know?

On its 50th anniversary, here are five interesting facts about the mouse you might not be aware of:

- While the invention of the mouse is credited to Douglas Engelbart, a team of German researchers at radio and TV electronics company Telefunken also successfully worked on a PC pointing device at the same time, but unlike Engelbart the Germans never filed a relevant patent.
- Patent or not, Engelbart never earned anything from it. That's because his patent expired just before the computer mouse became a mainstream sales item and widely used. To be more precise, that happened back in 1983 when Apple's first commercial mouse hit the market as part of the company's Lisa computer system.
- Logitech, a Swiss provider of PC and mobile accessories and a major producer of pointing devices, sold its 1 billionth mouse in 2008, having started shipping them in 1982.
- To make people feel more aware of their mouse movements, some software providers have developed little programs (freeware) to measure the distances covered by your mouse during a given time span. Mousotron and Mousometer are among them. Using them, you might be surprised, or shocked, how little time it takes for a mouse in use to cover a couple of miles.

- Finally, beware of MRS, or Mouse Rage Syndrome. It's the terminal stage of a process that involves your frustration building up over websites loading too slowly, an online banking transaction not finalizing or too many pop-up ads driving you up the wall — against which you will eventually smash your wireless mouse. There's no known cure for the disease as yet.

(Reproduced from dw.com 7.12.2018. with permission⁷)

VOCABULARY AND COMPREHENSION

➤ Answer the questions about the text:

1. What do experts believe will happen to the computer mouse in the future?
2. When was the computer mouse invented and when did it enter the market?
3. Are QWERTY keyboard layouts efficient?
4. Which is the most used key on the keyboard?
5. Why do some keys have bumps?
6. What is special about Japanese keyboards?

➤ Find the words or phrases in the text that mean:

1. a lever which swings and hits the paper when typewriting _____
2. to make something change from one thing to another _____
3. something dangerous or that causes damage _____
4. an act of showing or explaining how something works _____
5. end or failure of an idea _____
6. believe somebody is responsible for doing something _____
7. to present something so that it can be officially recorded _____
8. ideas and opinions that are most accepted and shared
by most people _____
9. making someone crazy or angry _____

STUDY

Do a Google search and try to determine if QWERTY keyboard layouts were truly designed to slow down typists. Try to determine what the Dvorak keyboard layout is.

LANGUAGE WORK – Linking words and phrases

Linking words and phrases are used to organize our text when writing by linking two clauses, sentences or ideas.

Giving examples: for example, for instance, such as, including, namely

A smart home is a home where all the systems, such as security, lights, appliances, etc., are interconnected.

Listing or sequencing: first(ly), second(ly), finally, to begin with, then, next, after that, at the end, in conclusion, to summarise

First, I would like to say something about operating systems in general and then I'm going to get into detail with Windows 10.

⁷ Author Hardy Graupner, Courtesy of Deutsche Welle

Giving a reason or cause: since, because, as, seeing (that), considering

I should start saving money for a new PC since I had this one for over 5 years.

Indicating addition: furthermore, besides, and, in addition, moreover, too, as well, also, further, on top of that

In addition to having a comfortable chair, you should also have a larger monitor.

Making contrasts: however, although, on the other hand, whereas, but, nevertheless, even though, in spite of, despite, while

Even though he is disabled, new technologies enable him to easily read and write.

Expressing result: so, therefore, as a result (of), in consequence (of), consequently

Printers vary in many factors (e.g., cost, speed, print quality). Therefore, I need to spend some time researching.



➤ **Fill in the gaps with suitable linking words or phrases.**

1. When the keys were placed in alphabetical order, people would type too fast and jam the arms of the typewriter. _____ this layout was chosen, to slow people down.
2. This is the starting position in which your hands rest on the keys. _____, it makes it easier to navigate under poor lighting conditions.
3. Some devices, _____ video display terminals and USB hubs, may provide both input and output.

VIDEO

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

[What Are Peripheral Devices of a Computer – Definition, Examples & Types](#)

1. Define the computer peripheral.
2. Explain the difference between the external and internal peripheral.
3. What is an integrated peripheral?
4. Name two different ways of connecting external peripherals.
5. Are peripherals essential to the computer system?

IV. Peripherals II (comparing and ergonomics)

Types of printers

- Laser Printer⁸
A printer linked to a computer producing good-quality printed material by using a laser to form a pattern of electrostatically charged dots on a light-sensitive drum, which attract toner (or dry ink powder). The toner is transferred to a piece of paper and fixed by a heating process.
- Solid Ink Printers⁹
A laser-class printer that uses solid wax inks that are melted into a liquid before being used. Instead of jetting the ink onto the paper directly as inkjet printers do, solid ink printers jet the ink onto a drum. A better registration of color is obtained by transferring the ink to the drum first and then to the printer, because the drum can be more tightly controlled than moving paper. (Courtesy of ComputerLanguage.com)
- LED Printers¹⁰
An electrophotographic printer that uses a matrix of LEDs as its light source. The LED mechanism is much simpler than its laser printer counterpart. A stationary array of LEDs is used instead of numerous moving parts, and the LEDs are selectively beamed onto the drum. (Courtesy of ComputerLanguage.com)
- Inkjet Printers¹¹
A printer that propels droplets of ink directly onto the medium. Today, most inkjet printers are color printers that use four inks packaged in separate cartridges: Cyan, Magenta, Yellow and black. The four "CMYK" cartridges are individually replaced, but beware single CMY cartridges, because when any one color runs out, the entire cartridge must be replaced. (Courtesy of ComputerLanguage.com)
- Dot Matrix Printers¹²
The dot matrix printer uses one or two columns of dot hammers that are moved across the paper. The hammers rapidly press the ribbon into the paper, which causes the ink to be deposited. The more hammers, the higher the resolution. (Courtesy of ComputerLanguage.com)

⁸ "laser printer." lexico.com. 2021. https://www.lexico.com/definition/laser_printer (29 June 2022).

⁹ "solid ink printer." pcmag.com 2022. <https://www.pcmag.com/encyclopedia/term/solid-ink-printer> (29 June 2022).

¹⁰ "LED printer." pcmag.com 2022. <https://www.pcmag.com/encyclopedia/term/led-printer> (29 June 2022).

¹¹ "inkjet printer." pcmag.com 2022. <https://www.pcmag.com/encyclopedia/term/inkjet-printer> (29 June 2022).

¹² "dot matrix printer." pcmag.com 2022. <https://www.pcmag.com/encyclopedia/term/dot-matrix-printer> (29 June 2022).

- Multifunction Printers¹³

A computer printer that includes scanning and copying functions. It may also provide faxing, fax to email and network scanning capabilities.

(Courtesy of ComputerLanguage.com)

- 3D Printers¹⁴

A machine allowing the creation of a physical object from a three-dimensional digital model, typically by laying down many thin layers of a material in succession.

- **Read the Key Features and Product Overviews in these PRINTER ADVERTISEMENTS from *Printerland.co.uk* and choose the right printer for your home use. Explain your choice.**



[Xerox B225 A4 Mono Multifunction Laser Printer](#)

[Epson EcoTank ET-2750 A4 Colour Multifunction Inkjet Printer](#)

¹³ "multifunction printer." pcmag.com 2022. <https://www.pcmag.com/encyclopedia/term/multifunction-printer> (29 June 2022).

¹⁴ "3D printer." lexico.com. 2021. https://www.lexico.com/definition/3d_printer (29 June 2022).

LANGUAGE WORK – Comparison of Adjectives

There are three degrees of comparison: positive, comparative and superlative. The **comparative** is used to compare two objects, while the **superlative** is used to compare one with a group of objects. When we use the comparative, it is important to use the word **THAN** after the comparative adjective (e.g., bigger than). When we use the superlative, it is important to put **THE** in front of the superlative adjective (e.g., the biggest).

We can distinguish between three types of comparison:

- Adding -ER and -EST to the positive form
- Adding words MORE/LESS and MOST/LEAST before the positive form
- Irregular comparison



-ER and -EST comparison

One-syllable adjectives and most two-syllable adjectives are compared by adding – ER and -EST to the positive form. The suffix -ER is added to make the comparative form and -EST is added to make the superlative form.

Positive	Comparative	Superlative
strong	stronger	strongest
big	bigger	biggest
happy	happier	happiest

MORE/LESS and MOST/LEAST

Positive	Comparative	Superlative
expensive	more/less expensive	most/least expensive
tired	more/less tired	most/least tired
careful	more/less careful	most careful

IRREGULAR

Positive	Comparative	Superlative
good	better	best
bad	worse	worst
little	less	least
much	more	most
many	more	most

Extra info:

When we want to compare equal qualities, we use the comparative structure **as + adjective + as**.

This printer is **as GOOD as** the one I have at work.

To express a difference, we can use **not as + adjective + as**.

This printer is **not as GOOD as** the one I have at work.

➤ **Complete the sentences with the appropriate form of the adjective in brackets (comparative or superlative). Add THE and THAN where appropriate.**

1. This laser printer is _____ the inkjet one. (MODERN)
2. The cameras I saw in the web shop are _____ the ones in the store. (CHEAP)
3. If you want _____ scanner, you should buy the ColourScan XR 1000. (FAST)
4. _____ design will be chosen for the new project. (INNOVATIVE)
5. It is good to buy _____ (FAST) scanner with _____ (HIGH) resolution.

➤ **Compare the Xerox and Epson printers on page 2 using both the comparative and the superlative form. Use the additional information provided in the table below.**

Xerox B225	Epson EcoTank ET-2750
<ul style="list-style-type: none"> • <i>Print/Scan/Copy</i> • <i>Up to 34ppm Mono Print</i> • <i>Up to 600 x 600 dpi Print</i> • <i>Automatic Double-Sided Printing</i> • <i>USB, Network, Wireless & Wi-Fi Direct</i> • <i>As Fast as 6.4 Seconds First page</i> • <i>PCL 5/6, PostScript 3</i> • <i>250 Sheet Input Tray</i> • <i>1 Sheet Manual Feed</i> • <i>1GHz Dual Core Processor</i> • <i>512MB RAM</i> • <i>Windows & Mac Compatible</i> • <i>Up to 600 x 600 dpi Copy</i> 	<ul style="list-style-type: none"> • <i>Print/Scan/Copy</i> • <i>Up to 33ppm Mono Print</i> • <i>Up to 5,760 x 1,440 dpi Print</i> • <i>Up to 15ppm Colour Print</i> • <i>Automatic Double-Sided Printing</i> • <i>USB, Wireless & Wi-Fi Direct</i> • <i>As Fast as 10 Seconds First page</i> • <i>100 Sheet Input Tray</i> • <i>Windows & Mac Compatible</i> • <i>3.7cm Colour LCD Control Panel</i>

Table 2 Information from Printerland.co.uk

READING – AUTHENTIC TEXTS

Computer ergonomics is the study of how we interact with our computers. Scientists that study computer ergonomics, attempt to find solutions to strain, fatigue, and injuries caused by poor product design or workplace arrangement. Their goal is to create an overall comfortable and relaxed workplace environment.¹⁵

- Look at the figure [Correct computer monitor placement](#) and in pairs comment the advice given.

Ergonomics & Computer Use

Most Princeton students use laptops **perched** on the basic, institutional desks found in all dorm rooms. Many continue to use the simple wooden chairs as well. Typically, there's nothing wrong with using a basic workstation, but when you spend most of your **waking hours** sitting at that desk, you may want to consider making it a more comfortable space, for short-term and long-term health. If you have pain or fatigue in your hands, wrists, arms, shoulders, upper back or neck it may be related to using a computer. Perhaps you cannot afford to significantly change the work area in your room, but you can probably make small adjustments to promote comfort. Additionally, there are computers all over campus. Surely you can find a place where you can work comfortably.

Without proper computer set-up and use, there are many injuries that may result. **Tendonitis** is the most common problem, involving tendon inflammation and localized pain in the elbow, forearm, wrist or hand. Bad posture can cause fatigue, **muscle strain**, and, in later stages, pain. Back pain, one of the most common complaints of older men and women, is usually the result of years of **faulty posture**. In addition, poor posture can affect the position and function of your vital organs, particularly those in the abdominal region. Stand up straight to promote health and good appearance. You will **exude** confidence and dignity as you hold your back up straight using abdomen and back muscles.

Keyboard and Mouse Position

When positioning your keyboard and mouse, you should keep in mind that you want to reduce unnecessary strain in your fingers, wrists, arms, and shoulders, keeping them in as neutral and relaxing a position as possible. While you're typing, your wrists should not be resting, but held up in line with the backs of your hands. This reduces strain to your wrist that may result from holding it at an unnatural angle and allows you to move your arms to reach the keys, rather than stretching your fingers to reach them. Use a foam pad or towel in front of your keyboard to rest your wrists and forearms while you're not typing. Because you want your arms free to move your hands around the keyboard while typing, you should only use armrests on your chair when you're not typing. Holding your wrists up is not very tiring because most people are not actually typing continuously for long periods, so you'll have plenty of time to rest your arms while you think about what to type next.

¹⁵ Rodzinak, D. (2022, July 8). The Science Computer Ergonomics. The Joint Chiropractic. <https://www.thejoint.com/washington/renton/renton-42004/192602-science-computer-ergonomics>

Your fingers should be in a straight line with your forearm. This is made easier by **tilting** the back edge of the keyboard down (the reverse of typical keyboard tilts). The keyboard should ideally be just above your lap so your elbows are bent at least 90°. If you can't move your keyboard, try adjusting the height of your chair, though this may cause problems if you can't adjust your monitor accordingly. If your wrists ache or **tire**, look into buying an ergonomic keyboard that **angles out** from the center, making it easier for you to keep your hand and forearm in a straight line. Aching and strain caused by typing may be reduced by typing more gently – avoid banging the keys. Hold the mouse lightly, don't grip hard or squeeze it, and position it close to the keyboard so you don't have to reach. If you're troubled by pain in your wrist and forearm, use an ergonomic mouse that's moved with a finger instead of the wrist. Keep your arms and hands warm – cold muscles and tendons are at greater risk of injury.

Monitor Position

Your monitor should be slightly below eye level and straight ahead, not to one side. It should be about **arm's length** away from your face so you can easily read the screen, not leaning your head forward, which puts strain on your neck. To protect your eyes, reduce the **glare** from the monitor's screen by turning off overhead lights or closing the window blind. Glare screens are also available.

Chair Position

The position of your chair is important to help you maintain good posture. Good posture involves keeping your bones and muscles in line, which promotes efficiency, **endurance**, and an overall feeling of well-being. If you **slouch**, your bones are not properly aligned, and your muscles, joints, and ligaments take more strain than they were meant for.

Your chair should support your back in an upright and relaxed **arch position**. If the back of your chair doesn't provide enough support, try putting a rolled towel or cushion between the **small of your back** and the chair. The height of the chair should allow you to have your feet resting firmly on the ground, with your thighs roughly parallel to the floor. If your chair is too high, use a footrest to keep your knees and hips level. To make sure your posture is correct, sit with a neutral spine position, with your hips at about 90°. If your back is straight, supported by back and abdomen muscles, you can relax your shoulders without slouching.

Repetitive Strain Injury (RSI)

Repetitive Strain Injury results from forceful, awkward, and/or repetitive use of your limbs, producing damaged muscles, tendons, and nerves. The severity of RSI cases varies widely. Tendonitis is the most common example of RSI, while **carpal tunnel syndrome** is a more rare and serious disorder. RSI occurs frequently among computer users, musicians, lab workers, and other people with occupations requiring repetitive movements.

Although RSI is a broad term that encompasses several disorders, general symptoms include tingling or loss of sensation in fingers, inability to grasp objects between thumb and fingers, decrease in the size of hand muscles, and pain in the wrist, elbow, shoulder, or neck. If you're suffering from these symptoms, get immediate medical attention to increase the chances of quick and total recovery. Discontinue the activities that cause you pain. If using a computer is painful, but necessary, try to vary your work activities so you're not using the keyboard and mouse for long periods of time. You can make adjustments to your workstation to make yourself more comfortable.

In order to prevent RSI, adjust your desk and computer area to promote good posture. Remember that the human body is not made to sit still for long periods of time, so get up and move around as

much as you can. This may involve taking 30-60 second breaks every ten minutes or so, and getting up to walk around and stretch your muscles every hour. You can also **vary** your motions by changing tasks. Type for a while, then read, take notes by hand, or organize papers. Stretching your wrists, shoulders, and neck will help reduce muscle tension. Roll your shoulders, rotate your head from one side to the other, massage your shoulders, and stretch your wrists by pulling the fingers back toward the wrist. When you're typing, be sure not to bang on the keyboard, and avoid **lazy wrists**. Using a brace or taking pain relievers doesn't deal with the primary cause of RSI and may lead to further injury.

(Reproduced from University Health Services at Princeton University with permission¹⁶)

LANGUAGE WORK – Instructions and advice

INSTRUCTIONS

The imperative form of the verb is used to give instructions.

Open the cartridge door and **remove** the cartridge.

Don't use imagesetters for everyday printing.

Sometimes it's good to use words like *first, next, then, after that and finally* to indicate a sequence.

First, turn on the computer.

Then, enter the password.

After that, open the browser and search for the store.

Finally, close the browser and turn off your computer.



ADVICE

The modal verb SHOULD is used to give advice. Infinitive must follow SHOULD.

You **should** back up your files.

You **shouldn't** spend too much time online.

Set phrases:

Instead of using SHOULD, certain set phrases can be used to give advice.

It's a good idea to lock your computer when you leave your office.

It's a bad idea to leave your disks unprotected.

¹⁶ Ergonomics and Computer Use. University Health Services. (2022 July 8) <https://uhs.princeton.edu/health-resources/ergonomics-computer-use> The University Health Services (UHS) web site is maintained for the purpose of providing informational resources to students, faculty, and staff of Princeton University and its contents are not intended to be used as a substitute for the advice or services of medical professionals. Consult your medical provider regarding matters related to health including diagnosis and treatment. Princeton University and UHS will have no liability for any individual's use of or reliance upon any material contained or referenced herein.

Extra info:

SHOULD is also used to talk about what we think is right or wrong, as a precaution or warning.

You **should** keep your files backed up.

You **shouldn't** cover your PC while it's working.

- Work in pairs. Think about what you would need to organize an ergonomic workplace. Give **advice and instructions** to your partner so that they can arrange their work environments.



Figure 6 Desk vector created by pch.vector - www.freepik.

VIDEO

DISPLAY TECHNOLOGIES

“In the early 1990s, the modern display industry emerged with the adoption of LCD technology in laptop computers. LCDs provided a thin form factor and a portability that was impossible with the incumbent CRT technology. Over the next 20 years, LCDs diffused beyond laptops and niche devices to dominate the display landscape, displacing CRT in TVs and monitors and enabling new devices such as smartphones. We are now at the start of the next technology replacement wave as OLED displays are emerging to replace LCDs in consumer devices. There are other interesting technologies forthcoming, including mini-LEDs, micro-LEDs and micro-OLEDs. While these names sound similar and are easy to confuse, these are very distinct technologies with different strengths, challenges, applications and time horizons.”

(by Max McDaniel Apr 04, 2021¹⁷)

CRT Cathode Ray Tube

LCD Liquid Crystal Display

OLED Organic Light-Emitting Diodes

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

[How do Touchscreens Work?](#)

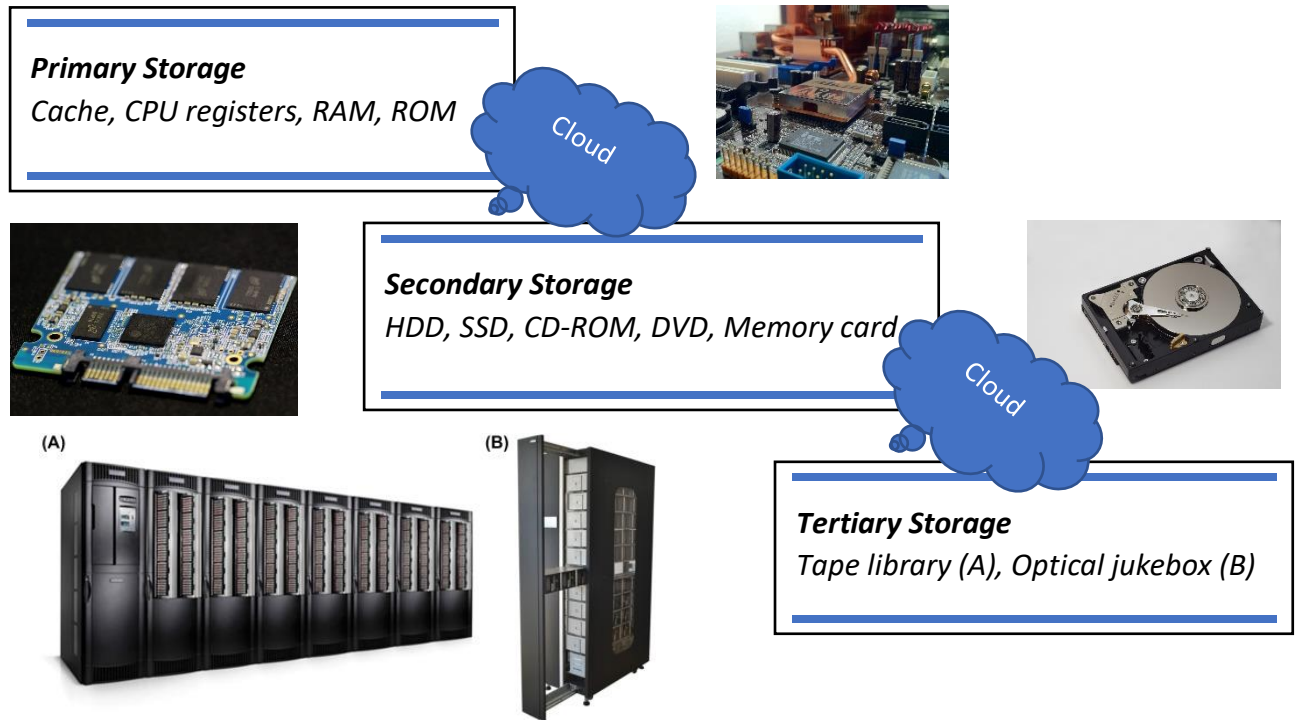
1. Name the three technologies in the touchscreen display.
2. Why is the glass used for smartphones 5 times stronger than normal glass and how is this accomplished? Why is plastic not used?
3. How many layers does the capacitive touchscreen have? What are they?
4. How does the processor register a touch? What conductive material is used?
5. What kind of intricate grid is the OLED display?

¹⁷ McDaniel, M. (2022 July 08). Display Technology. The OLED Wave and Other Exciting Trends. Applied Materials. <https://www.appliedmaterials.com/us/en/blog/blog-posts/display-technology--the-oled-wave-and-other-exciting-trends.html>

V. Data Storage

What is data storage?

Data storage refers to magnetic, optical, or mechanical media that records and preserves digital information for ongoing or future operations. *(Reprint Courtesy of IBM Corporation©)*



➤ Choose one definition for each of the following terms:

ONLINE STORAGE

NEARLINE STORAGE

OFFLINE STORAGE

- Stored data is available for on-demand access (online as well)
- It cannot be immediately accessed but doesn't need manual intervention

Examples: Tape and disk libraries, etc.

- Permanently connected to the computer/system
- Can be stored remotely
- Stored data is immediately available

Examples: Cloud, SSD, DRAM, etc.

- Storage medium that must be physically inserted for input/output
- Any storage (internal or external) that can be removed from the computer

Examples: portable HDD, CD, DVD, SD card, etc.

READING AUTHENTIC TEXTS

Types of storage devices

Storage capacity is no longer dependent on the physical capacity of your computer. Many options exist to hold your files while saving storage space on your computer, phone, or tablet. If your devices are slow and running out of space, you can offload files onto a physical storage device. Or better yet, use the best storage technology and save your files to the cloud.

I. Storage in computer systems

A storage device is a piece of hardware that is primarily used for storing data. Every desktop computer, laptop, tablet, and smartphone will have some kind of storage device within it. There are also standalone, external storage drives that you can use across devices. Storage is not only necessary for saving files, but also for running tasks and applications. Any file you create or save on your computer saves to your computer's storage device. This storage device also stores any applications and your computer operating system. As technology has advanced over time, data storage devices have also evolved in a major way. Nowadays, storage devices come in many shapes and sizes, and there are a few different types of storage device that cater to different devices and functions. A storage device is also known as a storage medium or storage media. Digital storage is measured in megabytes (MB), gigabytes (GB), and, these days, terabytes (TB). Some computer storage devices are able to hold information permanently while others can only hold information temporarily. Every computer has both primary and secondary storage, with primary storage acting as a computer's short-term memory, and secondary as a computer's long-term memory.

Primary Storage: Random Access Memory (RAM)

Random Access Memory, or RAM, is the primary storage of a computer. When you're working on a file on your computer, it will temporarily store data in your RAM. RAM allows you to perform everyday tasks like opening applications, loading webpages, editing a document or playing games. It also allows you to jump from one task to another without losing your progress. In essence, the larger the RAM of your computer, the smoother and quicker it is for you to multitask. RAM is a volatile memory, meaning it cannot hold onto information once the system turns off. For example, if you copy a block of text, restart your computer, and then attempt to paste that block of text into a document, you'll find that your computer has forgotten the copied text. This is because it was only stored temporarily in your RAM. RAM makes it possible for a computer to access data in a random order, and thus reads and writes much faster than a computer's secondary storage.

Secondary Storage: Hard Disk Drives (HDD) & Solid-State Drives (SSD)

In addition to RAM, every computer also has another storage drive that's used for storing information on a long-term basis. This is secondary storage. Any file you create or download saves to the computer's secondary storage. There are two types of storage device used as secondary storage in computers: HDD and SSD. While HDDs are the more traditional of the two, SSDs are fast overtaking HDD as the preferred tech for secondary storage. Secondary storage devices are often removable, so you can replace or upgrade your computer's storage, or move your storage drive to a different computer. There are notable exceptions, like MacBooks, which don't offer removable storage.

Hard Disk Drives (HDD)

The hard disk drive (HDD) is the original hard drive. These are magnetic storage devices that have been around since the 1950s, though they've evolved over time. A hard disk drive is comprised of a stack of spinning metal disks known as platters. Each spinning disk has trillions of tiny fragments that can be magnetized in order to represent bits (1s and 0s in binary code). An actuator arm with a read/write head scans the spinning platters and magnetizes fragments in order to write digital information onto the HDD, or detects magnetic charges to read information from it. HDDs are used for TV recorders, servers, and laptop and PC storage.



Solid-State Drives (SSD)

Solid-state drives emerged far more recently, in the '90s. SSDs don't rely on magnets and disks, instead they use a type of flash memory called NAND. In an SSD, semiconductors store information by changing the electrical current of circuits contained within the drive. This means that unlike HDDs, SSDs don't require moving parts to operate. Because of this, SSDs not only work faster and smoother than HDDs (HDDs take longer to gather information due to the mechanical nature of their platters and heads), they also generally last longer than HDDs (with so many intricate moving parts, HDDs are vulnerable to damage and wear). Outside of newer PCs and high-end laptops, you can find SSDs in smartphones, tablets, and sometimes video cameras.

II. External storage devices

In addition to storage media contained within a computer, there are also digital storage devices that are external from computers. These are commonly used to expand storage capacity on a computer, allow more portability, or provide easy file transfers from one device to another.

External HDDs and SSDs

You can get both HDD and SSD devices as external drives. These generally offer the largest storage capacity among external options, with external HDDs offering up to 20 TB of storage and (reasonably priced) external SSDs offering up to 8 TB of storage. External HDDs and SSDs work in the exact same way that their internal counterparts do. Most external drives can connect to any computer; they're not tied to one device, so they're a decent solution for transferring files across devices.

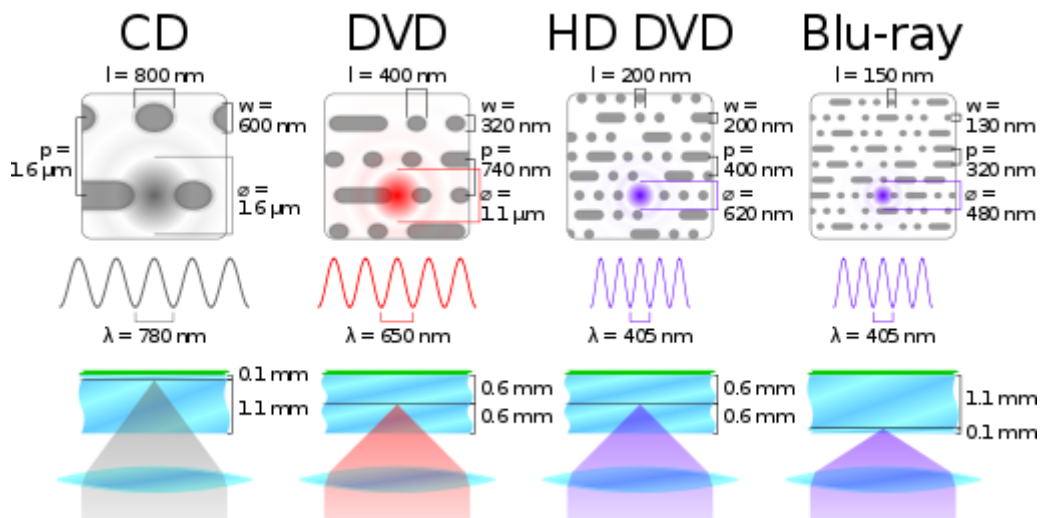
Flash memory devices

We mentioned flash memory earlier when discussing SSDs. A flash memory device contains trillions of interconnected flash memory cells that store data. These cells hold millions of transistors that when switched on or off represent 1s and 0s in binary code, allowing a computer to read and write information. One of the most recognizable types of flash memory device is the USB flash drive. Also known as a thumb drive or a memory stick, these small, portable storage devices have long been a popular choice for extra computer storage. Before it was quick and easy to share files online, USB-flash drives were essential for easily moving files from one device to another. However, they can only be used on devices with a USB port. Most older computers have a USB port, but newer ones may require an adapter. These days, a USB flash drive can hold up to 2 TB of storage. They're more expensive per gigabyte than an external hard drive, but they have prevailed as a simple, convenient solution for storing and transferring smaller files. Aside from USB drives, flash memory devices also include SD and memory cards, which you'll recognize as the storage medium used in digital cameras.

Optical Storage Devices

CDs, DVDs, and Blu-Ray discs are used for a lot more than playing music and videos—they also act as storage devices. Collectively they're known as optical storage devices or optical media. Binary code is stored on these discs in the form of minuscule bumps along a track that spirals outwards from the center of the disc. When the disc is in operation it spins at a constant speed, while a laser contained within the disc drive scans the bumps on the disc. The way the laser reflects or bounces off a bump determines whether it represents a 0 or 1 in binary.

A DVD has a tighter spiral track than a CD, allowing it to store more data despite being the same size, and a finer red laser is used in DVD drives than CD drives. DVDs also allow dual layering to increase their capacity further. Blu-Ray took things to another level, storing data on multiple layers with even smaller bumps that require an even finer blue laser to read them.



Difference between CD, DVD, HD DVD and Blu-ray Disc (Cmglee, CC BY-SA 3.0 <<https://creativecommons.org/licenses/by-sa/3.0/>>, via Wikimedia Commons)

- CD-ROM, DVD-ROM, and BD-ROM refer to read-only optical storage discs. The data written on them is permanent and cannot be removed or overwritten. This is why they can't be used as a personal storage. Instead, they are typically used for software installation programs.
- CD-R, DVD-R, and BD-R format discs are recordable, but cannot be overwritten. Whatever data you save on a blank recordable disc will then be permanently stored on that disc. So, they can store data, but they're not quite as flexible as other storage devices.
- CD-RW, DVD-RW, and BD-RE are re-writable. This allows you to write new data on them and erase unwanted data from them as much as you want. They've been overtaken by newer technology like flash memory, but CD-RWs were once the top choice for external storage. Most desktop computers and many laptops have a CD or DVD drive.

CD can store up to 700 MB of data, DVD-DL can store up to 8.5 GB, and Blu-Ray can store between 25 and 128 GB of data.

Floppy Disks

While they may be obsolete at this point, we can't discuss storage devices without at least mentioning the humble floppy disk, aka diskette. Floppy disks were the first widely available portable, removable storage devices. This is why most "Save" icons look the way they do; they're

modeled after the floppy disk. They work in the same way as hard disk drives, although at a much smaller scale. The storage capacity of floppy disks never exceeded 200 MB before CD-RW and flash drives became the favored storage media. The iMac was the first personal computer released without a floppy disk drive in 1998. From here, the over 30-year reign of the floppy disk very quickly declined.

III. Cloud storage

While not exactly a device per se, cloud storage is the newest and most versatile type of storage for computers. “The cloud” is not one place or object, but rather a huge collection of servers housed in data centers around the world. When you save a document to the cloud, you’re storing it on these servers.

Because cloud storage stores everything online, it doesn’t use any of your computer’s secondary storage, allowing you to save space. Cloud storage offers significantly higher storage capacities than USB flash drives and other physical options. This saves you from having to sift through each device to find the right file. While external HDDs and SSDs were once favored for their portability, they, too, fall short compared to cloud storage. There aren’t many pocket-friendly external hard drives. While they’re smaller and lighter than a computer’s internal storage drive, they are still tangible devices. The cloud, on the other hand, can go with you anywhere without taking up any physical space, and without the physical vulnerabilities of an external drive.

External storage devices were also popular as a quick solution for transferring files, but they’re only useful if you can access each physical device. Cloud computing is thriving as many businesses now operate remotely. It’s likely that you wouldn’t mail a USB drive overseas to send a large file to a colleague. Cloud storage acts as a bridge between remote workers, making collaboration from afar a breeze.

If you forget to bring a hard drive containing important documents to a meeting, there’s not much you can do other than go back and grab it. If you break or lose a hard drive altogether, it’s unlikely you’ll ever get that data back. These risks don’t exist for cloud storage—your data is backed up and accessible whenever and wherever you are so long as you have access to the internet.

The best way to store large amounts of data

If you’re running out of space on your devices, it’s time to look into an alternative storage device. Even external storage devices such as flash drives can run out of space, break, or get lost. That’s why the best way to store all your files is in the cloud. It’s safer, faster, and easier to access.

(Reproduced from <https://experience.dropbox.com/get-organized/storage-devices>¹⁸)

VOCABULARY AND COMPREHENSION

Find the answers to the following questions after reading the text:

1. What is the name for the storage used as computer’s short-term memory/long-term memory?
2. What technology is used in HDDs/SSDs/floppy disks?
3. Why are SSDs not as vulnerable as HDDs?
4. Explain how flash memory works.

¹⁸ The author of this book is not affiliated with or otherwise sponsored by Dropbox, Inc.

5. Which type of storage is best for remote work?
6. Why can DVDs store more data than CDs?

Find the words in the text that mean the following:

1. to transfer data from one digital device to another _____
2. the circular plate that rotates on a spindle within a hard disk drive _____
3. the part that moves the read/write head in HDDs _____
4. individual pieces of data stored in noncontiguous sectors on a disk drive _____
5. a substance that conducts electricity as great as metal at high temperatures _____
6. a type of flash memory that resembles a “NOT AND” gate _____
7. an electronic device that controls the electric current through a circuit _____
8. a small (usually rectangular) memory device _____

STUDY

Use the information from the text to draw a tree diagram of the types of storage devices, and then use the following useful language to describe the tree diagram.

- ...is/are classified into X types/categories
- ...are divided into X types/categories
- ...include(s)...
- ...consist(s) of...

VIDEO – STORAGE TECHNOLOGY

[Storage Categories: Magnetic, Optical, Solid-State](#) (the first 12 min)

1. Describe the principles of operation of an HDD.
2. Where is magnetic storage used?
3. Describe the principles of operation of an optical disc.
4. How is a DVD-RAM different from a DVD-R?
5. Describe the principles of operation of SSDs.
6. Where is solid-state technology used?
7. What are the disadvantages of magnetic/optical and solid-state technology in storage devices?

NOTE

- ❖ DISC (optical media)
- DISK (magnetic storage media)
- ❖ DRIVE = a device for reading or writing on magnetic, optical, or electronic media
- ❖ FRAGMENTED, individual pieces of data are referred to as fragments. DEFRAGMENTATION, then, is the process of un-fragmenting or piecing together, those fragmented files so they sit closer, physically, on the drive or other media, potentially speeding up the drive's ability to access the file.

LANGUAGE WORK – Word building

Word building is creating new words from existing ones. There are three main ways to do this:

1. by adding a prefix or suffix
2. by converting words from one word class into another
3. by putting two or more words together

Adding a PREFIX

fragmented → **defragmented**

connect → **disconnect**

take → **overtake**



Some of the most common prefixes are as follows:

anti-, auto-, de-, dis-, extra-, hyper-, il-, im-, in-, inter-, non-, pre-, re-, sub-, un-, up-, etc.

Adding a SUFFIX

wire → **wireless**

magnet → **magnetic**

Adding a suffix usually changes the word class of the original word.

Common noun suffixes are: -ment, -ion, -tion, -ation, -ition, -sion, -ance, -ence, -ty, -ity, -ness, -ing, -er, -or, -ist, -ant, -ent, -an, -ian, -ess, -ee, -logy, -y, -ure

Common adjective suffixes: -al, -ic, -ive, -ful, -less, -ous, -y, -ly, -able, -ible, -ing, -ed

Common verb suffixes: -ate, -en, -ify, -ise/-ize, etc.

Common adverb suffixes: -ly, -ward, -wise, etc.

Converting words

mail (noun) → to mail (verb)

fragment (noun) → to fragment (verb)

Compounding words

near + line → **nearline**

hyper + media → **hypermedia**

solid + state → **solid-state**

Compound words can be found in all word classes. Some compound words can be separated by a hyphen, but a dictionary should be consulted when one is not sure.

- Write the word class(es) of each word (adjective, noun, verb, adverb) and then use them in the following sentences.

WRITE	REWRITE	REWRITABLE	OVERWRITE
REMOVE	REMOVABLE	MOVABLE	MOVE
TAKE	OVERTAKE	UNDERTAKE	TAKEOVER
MAGNET	MAGNETIC	MAGNETIZE	MAGNETICALLY
FRAGMENT	DEFRAGMENT	FRAGMENTATION	FRAGMENTED

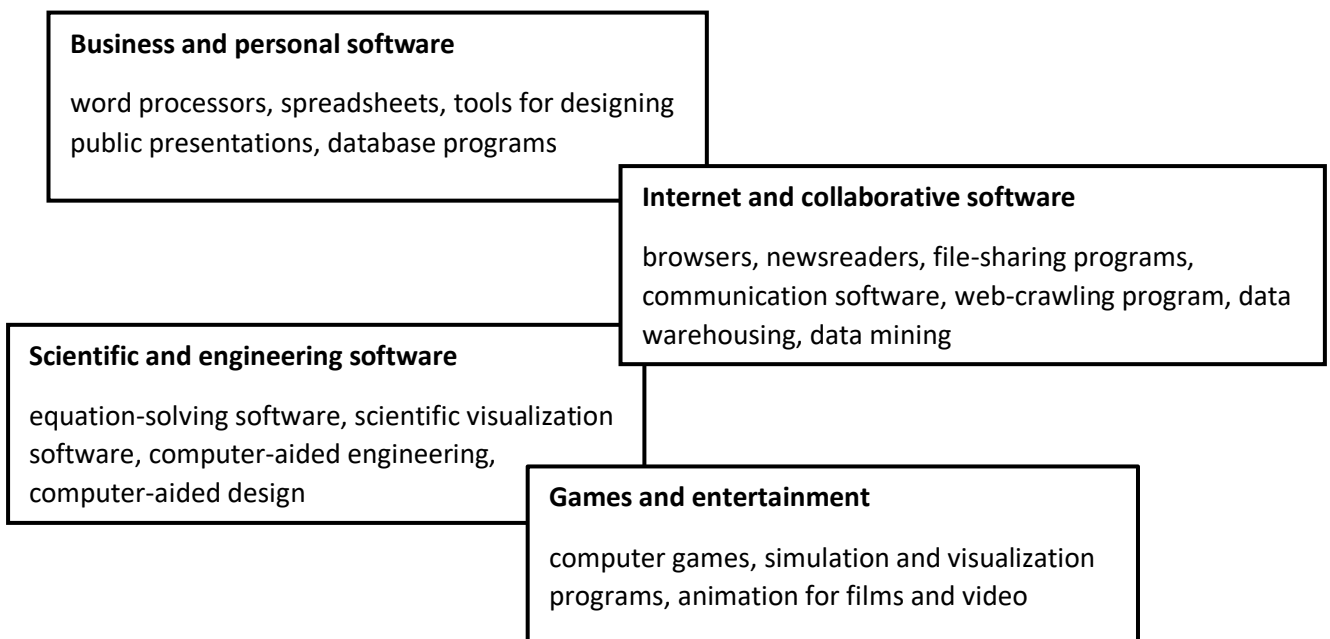
- I. In a _____ disk, a file is stored in noncontiguous sectors.
- II. The hard disk drive is a _____ storage device.
- III. Cloud storage might _____ other types of secondary storage.
- IV. The film was shot in a single, continuous _____.
- V. CD-RW and DVD RW are _____.
- VI. Some types of secondary storage devices are _____, so you can replace your computer's storage or move it to a different computer.
- VII. The actuator arm is one of the _____ parts inside a hard disk drive.

VI. Introduction to Computer Software

SOFTWARE comprises the entire set of programs, procedures, and routines associated with the operation of a computer system. The term was coined to differentiate these instructions from hardware—i.e., the physical components of a computer system.

(Encyclopedia Britannica¹⁹)

- **Look at the following examples of software according to Encyclopedia Britannica and discuss with your partner which of the mentioned software you have used. Give examples for the types of software you mention.**



- **Complete the following sentences with the types of software above.**

1. A _____ displays information in the form of a table with many columns and rows.
2. You can input, output, edit and format text with a _____.
3. With _____ software you can create, modify, analyze, or optimize a design.
4. _____ software allows the user to read articles on Usenet.
5. _____ software is used by a search engine to index content across the web to help users find relevant queries faster.
6. The applications that facilitate collaboration and file transfer are called _____.
7. With _____ software we can simulate performance to improve product design.
8. _____ software retrieves, aggregates, and stores data from internal and external data sources.
9. The purpose of _____ software is to graphically illustrate scientific data.

¹⁹ Britannica, T. Editors of Encyclopedia (2021, January 14). *software*. *Encyclopedia Britannica*. <https://www.britannica.com/technology/software>

READING – AUTHENTIC TEXTS

- **Read the text *Types of Software* and then do the following Vocabulary and comprehension exercises.**



<https://www.webopedia.com/definitions/software/#types>

VOCABULARY AND COMPREHENSION

- **Write a summary of the text *Types of Software*. Read the text again and underline the key points. Break the text down into sections and write notes for each one. Form sentences from the notes giving a concise overview of the key points in the text.**

- **Scan the text for the following terms and then write definitions in your own words:**

1. Application software _____
2. Internet browser _____
3. Operating system _____
4. Programming software _____
5. Driver software _____
6. Cloud computing _____
7. System software _____

LANGUAGE WORK – Countable and Uncountable Nouns

Nouns can either be countable (C) or uncountable (U).

Countable nouns denote people or things that we can count and that have a singular and plural form. Many countable nouns are concrete, such as *computer, disc, etc.*, but there are also abstract nouns like *idea, description, etc.* In the singular, the nouns must have a determiner (a/an, my, this, his, ...etc.). The usage of the articles (a/an, the) depends on the rules.

a computer /one computer/two computers

Uncountable nouns denote things and notions that cannot be counted and are neither singular nor plural. Many uncountable nouns are abstract such as *physics, networking, etc.*, but they can also be concrete, such as *storage, equipment*. Article a/an is not used with uncountable nouns.

Examples: piracy, phishing, freeware, cyberspace, software

Phishing is an everyday occurrence.

Expression of quantity

Countable and uncountable nouns take different determiners.

When we want to talk about **large quantities**, we can use:

MANY for countable nouns in affirmative and negative sentences and questions.

There are **many** empty DVDs on my desk.

MUCH for uncountable nouns in negative sentences and questions.

We don't have **much** equipment in the new lab.

A LOT OF for both countable and uncountable nouns in an informal context.

There are **a lot of** empty DVDs on my desk.

We don't have **a lot of** equipment in the new lab.

NOTE

Some nouns can be both countable and uncountable depending on the context.

TECHNOLOGY

They have invested in the latest technology. (U)

They are developing cutting-edge technologies to improve their business. (C)

SECURITY

Network security is of great importance. (U)

A financial security is a document of monetary value. (C)

When we want to talk about **small quantities**, we can use:

FEW for countable nouns in affirmative sentences.

There are **a few** empty DVDs on my desk. (several)

There are **few** files in this folder. (not many)

LITTLE for uncountable nouns in affirmative sentences.

We have **little** equipment in the new lab. (not much)

She has **a little** storage left on her hard disk. (some, a small amount)

NOT MANY for countable nouns in questions and negative sentences.

There **aren't many** empty DVDs on my desk.

NOT MUCH for uncountable nouns in questions and negative sentences.

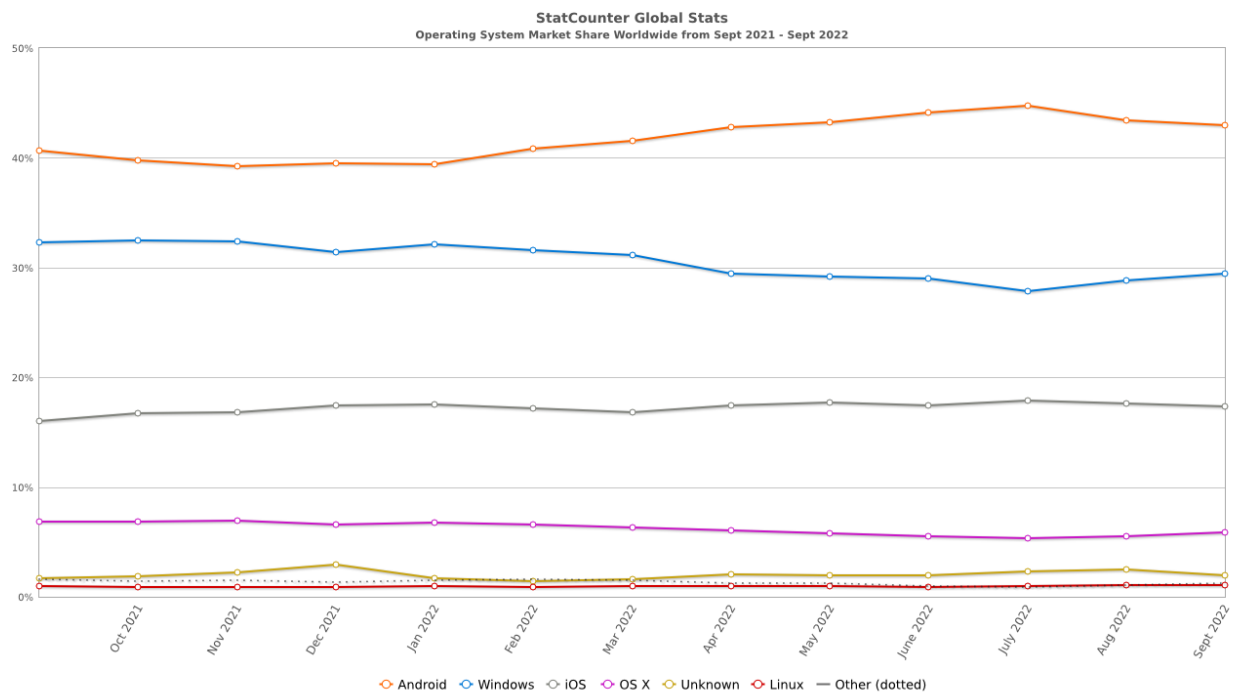
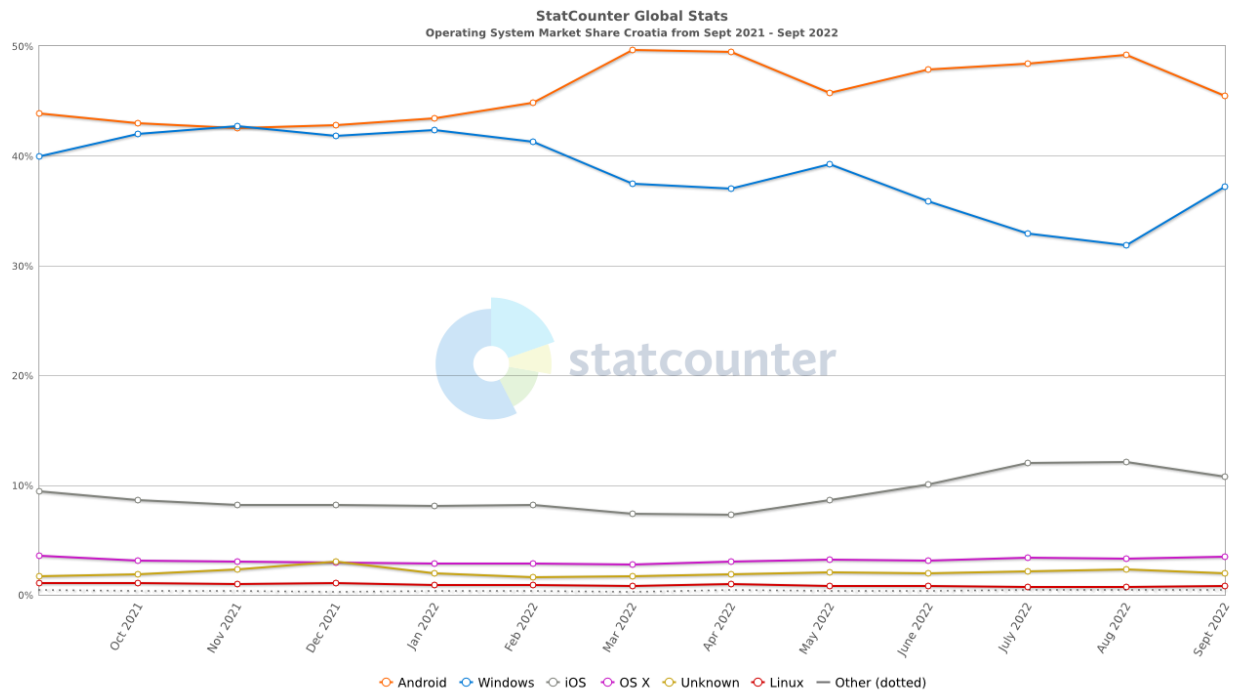
There is **not much** equipment in the new lab.

➤ **Complete the following sentences with one determiner (many, much, a lot of, (a) few, (a) little, not many, not much).**

1. There are _____ servers in a high tier data center.
2. We still need to remove _____ equipment from the lab.
3. How _____ cyberattacks do you deal with each day?
4. This device doesn't feature _____ functions.
5. Software vendors generate _____ revenue from licenses, maintenance services, subscription fees, and support fees.
6. Application suites have _____ related programs in a package.
7. _____ security breaches happen if security protocols are not followed.
8. We haven't done _____ networking at the last IT conference.
9. _____ data can be stored on a CD.
10. There are still _____ users logged in on the site.

STUDY

- Study the graphs presenting the market share of operating systems in Croatia and worldwide from Statcounter GlobalStats²⁰. Which operating systems are the most/least popular?



²⁰ <https://gs.statcounter.com/>

LANGUAGE WORK – Articles

There are two types of articles: definite and indefinite.

The definite article is THE and the indefinite articles are A/AN. The article A is used with the words that begin with a consonant sound (e.g., a car), while the article AN is used with the words that begin with a vowel sound (e.g., an icon).

The main difference between definite and indefinite articles is that we use THE when it's clear what we are talking about.

I bought **a computer** yesterday.

(any computer, we do not know exactly which one)

The computer I bought yesterday is in my room.

(we know that we are talking about the computer that was bought yesterday)

A/AN cannot be used with uncountable nouns such as *firmware*, *multitasking*, *graphics*, etc. It is used with singular countable nouns.

I think you should buy **a new monitor**.

THE is used for generalizations but not when the noun is uncountable or plural countable.

The computer is a very useful invention.

Computers are very useful inventions. (plural countable noun)

THE is used when there is only one of something.

You can find that information on **the internet**.

When we mention something for the first time, we use the indefinite article A/AN for singular nouns and no article for plural nouns. When we mention it again, we use the definite article THE.

I installed **a new operating system** on my home PC. **The operating system** I chose is Windows 10.

- **Complete the text about the Android Operating System²¹ with missing articles or nothing if an article is not necessary (A, AN, THE or blank).**



ATT. Google, CC BY 3.0 via
Wikimedia Commons

Android is ___ mobile operating system based on a modified version of ___ Linux kernel and other open-source software, designed primarily for ___ touchscreen mobile devices such as smartphones and tablets. Android is developed by ___ consortium of developers known as the Open Handset Alliance and commercially sponsored by Google. It was unveiled in November 2007, with ___ first commercial Android device, the HTC Dream, being launched in September 2008.

Most versions of Android are proprietary. ___ core components are taken from the Android Open-Source Project (AOSP), which is ___ free and open-source software (FOSS) primarily licensed under the Apache License. When Android is installed on ___ devices, ability to modify the otherwise FOSS software is usually restricted, either by not providing the corresponding source code or preventing reinstallation through technical measures, rendering the installed version proprietary. Most Android devices ship with additional proprietary software pre-installed, most notably Google Mobile Services (GMS) which includes core apps such as Google Chrome, ___ digital distribution platform Google Play, and the associated Google Play Services development platform.

Android has been the best-selling OS worldwide on ___ smartphones since 2011 and on tablets since 2013. As of May 2021, it has over three billion monthly active users, the largest installed base of any operating system, and as of January 2021, the Google Play Store features over 3 million apps. Android 13, released on August 15, 2022, is ___ latest version.

VIDEO

[Database vs Spreadsheet – Advantages and Disadvantages](#)

1. What is a spreadsheet?
2. What kind of data can be stored in a spreadsheet cell?
3. What kind of data is stored in databases?
4. Where is data stored in a spreadsheet and where in a database?
5. What can different spreadsheet cells contain?
6. Can spreadsheets contain relations between tables/worksheets?
7. Explain data integrity.
8. What does data integrity and data consistency eliminate?
9. What are spreadsheets/databases used for?
10. Explain what tabular data is.

²¹ Android (operating system). [https://en.wikipedia.org/wiki/Android_\(operating_system\)](https://en.wikipedia.org/wiki/Android_(operating_system)) (September 2022)

EXTRA WORK - Presentations in English



VIDEO LESSON -watch the video lesson and do the quiz.

- After watching the video, your teacher will give you the following handout:

USEFUL PHRASES AND VOCABULARY - Grussendorf, M. (2008). *English for Presentations*.

Oxford University Press, pp. 78-80.

VII. The Internet and the Web

VIDEO

- Watch the following video and answer the questions.

History of the Internet

1. Do we know the exact year when the Internet was created?
2. What did J.C.R. Licklider propose in 1962?
3. Explain what happened in 1969.
4. What is the ARPANET?
5. What was Ray Tomlinson developing in 1971?
6. Who invented the Transmission Control Protocol?
7. When was the World Wide Web invented?
8. What is ERWISE and when was it created?
9. Which browser popularized surfing the Web?
10. What is Dial-up internet access and when was it first used?



LANGUAGE WORK - Questions

Questions can be divided into two categories according to the type of answer that can be given: open and closed questions.

CLOSED questions

Answers to closed questions are either *yes* or *no*.

If the verb tense has an auxiliary verb in its original form, the question is then formed by placing the auxiliary verb before the subject which forms an inversion. Inversion of the subject and auxiliary is found in most questions.

Q: **Have you seen** the new Microsoft OS? (Present Perfect)

A: Yes, I have. OR No, I haven't.

If the verb tense does not have an auxiliary verb in its original form, the question is then formed by adding the appropriate auxiliary to make a question.

Q: **Do you have** a new email address? (Present Simple)

A: Yes, I do. OR No, I don't.

When the main verb is the verb TO BE, we do not add an auxiliary verb to form a question, but we do make an inversion.

Q: Are there many active newsgroups?

A: Yes, there are. OR No, there aren't.



OPEN questions

Answers to open questions are not limited like those in closed questions. Open questions start with a question word depending on which information we want to find out.

Question words:

WHO, WHOM, WHAT, WHICH, WHOSE, WHERE, WHEN, WHY, HOW

Who invented the first digital computer?

We do not add an auxiliary if “who” is the subject of a question.

Who did you contact?

We add the auxiliary when “who” is the object of a question.

Which anti-virus software **do you use?**

How fast is this CPU?

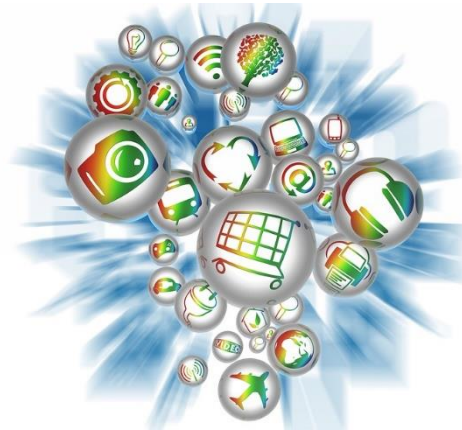
We do not use the auxiliary because of the verb TO BE.

When did he buy the new computers?

VIDEO

- **Watch the following video and make notes. Then, form 5 questions about the video and give answers using full sentences.**

[What is the world wide web?](#)



READING - AUTHENTIC TEXTS

- Read the text on <https://www.computerhope.com/jargon/e/email.htm#difference> and then define the following terms:

1. E-MAIL _____
2. DOMAIN _____
3. E-MAIL CLIENT _____
4. WEBMAIL _____
5. CC field _____
6. BCC field _____
7. MESSAGE BODY _____
8. FILE ATTACHMENT _____

WRITING - Emails

Hi Mark,

I've got a bit of a problem. I must write an essay for my IT class, but frankly I got stuck at one point. We are writing about the history of the Internet and apparently it seems that I don't understand the difference between the Internet and the World Wide Web. Could you please help me understand it better?

Please email me when you get the chance.

All the best,

John

- Write a reply to John's email. Use friendly and informal language. As a reference use the Phrase bank from Paul Emmerson's Email English.

PODCAST

- Listen to the podcast by Tim Berners-Lee and fill in the missing words in the transcript below.

30 years on, what's next #ForTheWeb?

Today, 30 years on from my original proposal for an information management system, half the world is online. It's a moment to celebrate how far we've come, but also an opportunity to reflect on how far we have yet to go.

The web has become a public square, a library, a doctor's office, a shop, a school, a design studio, an office, a cinema, a bank, and so much more. Of course, with every new feature, every new website, the divide between those who are online and those who are not increases, making it all the more _____¹ to make the web available for everyone.

And while the web has created opportunity, given _____² groups a voice, and made our daily lives easier, it has also created opportunity for abuse, given a voice to those who spread hatred, and made all kinds of crime easier to commit. _____³ of news stories about how the web is misused, it's understandable that many people feel afraid and unsure if the web is really a force for good. But given how much the web has changed in the past 30 years, it would be _____⁴ and unimaginative to assume that the web as we know it can't be changed for the better in the next 30 years. If we give up on building a better web now, then the web will not have failed us. We will have failed the web.

To tackle any problem, we must clearly outline and understand it. I broadly see three sources of dysfunction affecting today's web:

1. Deliberate, _____⁵ intent, such as state-sponsored hacking and attacks, criminal behaviour, and online harassment.
2. System design that creates perverse incentives where user value is sacrificed, such as ad-based revenue models that commercially reward _____⁶ and the _____⁷ of misinformation.
3. Unintended negative consequences of benevolent design, such as the outraged and polarised tone and quality of _____⁸.

While the first category is impossible to _____⁹ completely, we can create both laws and code to minimize this behaviour, just as we have always done offline. The second category requires us to redesign systems in a way to change incentives. And the final category calls for research to understand existing systems and model possible new ones and find out ways to tweak the ones we already have.

You can't just blame one government, one social network or the human spirit of mass. Simplistic narratives risk exhausting our energy as we chase the symptoms of these problems instead of focusing on their root causes. To get this right, we will need to come together as a global community.

At _____¹⁰ moments, generations before us have stepped up to work together for a better future. With the Universal Declaration of Human Rights, diverse groups of people have been able to agree on essential principles. With the Law of the Sea and the Outer Space Treaty, now too, as the web reshapes our world, we have a responsibility to make sure it is recognised as a human right and built for the public good. That is why the Web Foundation is working with governments, companies and citizens to build a new [Contract for the Web](#). The contract was launched in Lisbon at the Web Summit, bringing together a group of people who agree we need to establish clear norms, laws and standards to _____¹¹ the web. Those who support it endorse its starting principles and together are working out the specific commitments in each area. No one group should do this alone,

and all input will be appreciated. Governments, companies and citizens are all contributing, and we aim to have a result later this year.

Governments must translate laws and regulations for the digital age. They must ensure markets remain competitive, innovative and open. And they have a responsibility to protect people's rights and freedoms online. We need open web champions within government — civil servants and elected officials who will take action when private sector interests threaten the public good and who will stand up to protect the open web. Companies must do more to ensure their pursuit of long-term profit is not at the expense of human rights, democracy, scientific fact or public safety. Platforms and products must be designed with privacy, diversity and security in mind. This year, we've seen a number of _____¹² employees stand up and demand better business practices from their employers. We need to congratulate them and encourage more of that.

And most important of all, citizens must hold companies and governments _____¹³ for the commitments that they make, and demand that both respect the web as a global community with citizens at its heart. If we don't elect politicians who defend a free and open web, if we don't do our part to foster constructive healthy conversations online, if we continue to click _____¹⁴ without demanding our data rights be respected, we walk away from our responsibility to put these issues on the priority agenda of our governments.

The fight for the web is one of the most important causes of our time. Today, half the world is online. It is more urgent than ever to ensure that the other half are not left behind offline, and that everyone contributes to a web that drives equality, opportunity and creativity.

[The Contract for the Web](#) must not be a list of quick fixes but a process that signals a shift in how we understand our relationship with our online community. It must be clear enough to act as a guiding star for the way forward but flexible enough to be able to adapt to the rapid pace of change in technology. It's our journey from digital adolescence to a more mature, responsible and _____¹⁵ future.

The web is for everyone and collectively we hold the power to change it. It won't be easy. But if we dream a little and work a lot, we can get the web we want.

VIDEO

[CRAAP test for Website Evaluation](#)

- **Watch the video about using the CRAAP test for website evaluation. Imagine you have to write an assignment about *E-commerce* and you search for information on the following websites:**
 1. [Website No. 1](#)
 2. [Website No. 2](#)
 3. [Website No. 3](#)

To evaluate these websites, use the *CRAAP Test Evaluation Criteria* on the next page and give each criteria a grade from 1 (not acceptable as a source) – 5 (excellent source).

NOTE

The **prefix E-** (meaning electronic) is used to form words that imply a connection to computers or the internet.

e-book, e-commerce, e-learning, e-reader, e-wallet, email

The **prefix CYBER-** is used to form words which signify a connection to the internet, computer networks or virtual reality.

cyberspace, cyberpunk, cybersecurity, cybercitizen, cyberattack

These words are sometimes written with or without a hyphen, therefore it is good to consult a dictionary. The hyphen is being left out more often in words that originally had one, like email, ebook, etc.

CRAAP Evaluation Criteria ²²

CURRENCY:

The timeliness of the information.

- When was the information published or posted?
- Has the information been revised or updated?
- Does your topic require current information, or will older sources work as well?
- Are the links functional? (for the Web)

RELEVANCE:

The importance of the information for your needs.

- Does the information relate to your topic or answer your question?
- Who is the intended audience?
- Is the information at an appropriate level (i.e. not too elementary or advanced for your needs)?
- Have you looked at a variety of sources before determining this is the one you will use?
- Would you be comfortable citing this source in your research paper?

AUTHORITY:

The source of the information.

- Who is the author/publisher/source/sponsor?
- What are the author's credentials or organizational affiliations?
- Is the author qualified to write on the topic?
- Is there contact information, such as a publisher or email address?
- Does the URL reveal anything about the author or source? examples: .com .edu .gov .org .net (for the Web)

ACCURACY:

The reliability, truthfulness and correctness of the content.

- Where does the information come from?
- Is the information supported by evidence?
- Has the information been reviewed or refereed?
- Can you verify any of the information in another source or from personal knowledge?
- Does the language or tone seem unbiased and free of emotion?
- Are there spelling, grammar or typographical errors?

PURPOSE:

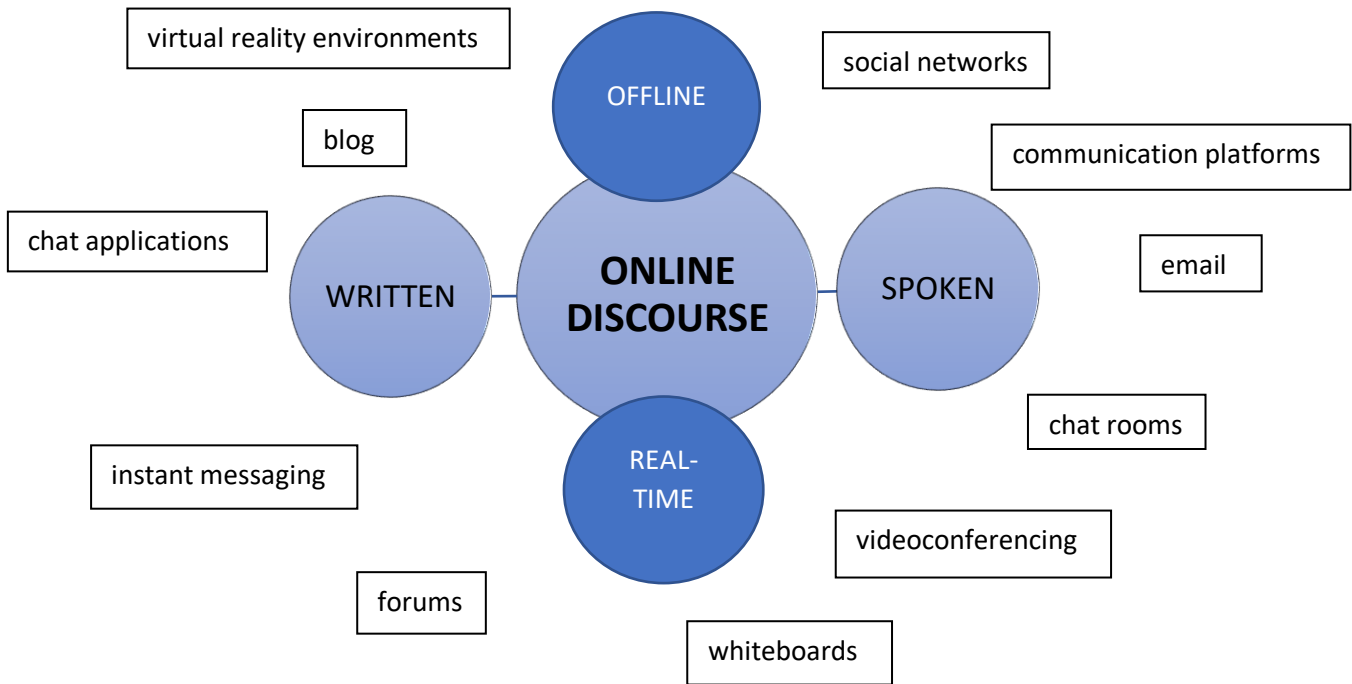
The reason the information exists.

²² Adapted from the Evaluation Criteria shared by Meriam Library at California State University Chico under the Creative Commons License CC BY 4.0.

- What is the purpose of the information? Is it to inform, teach, sell, entertain or persuade?
- Do the authors/sponsors make their intentions or purpose clear?
- Is the information fact, opinion or propaganda?
- Does the point of view appear objective and impartial?
- Are there political, ideological, cultural, religious, institutional or personal biases?

VIII. Netiquette and Cybersecurity

- **Study the graphical representation of online discourse and discuss it with your partner. How do you communicate online?**



NETIQUETTE → abbreviation of Internet etiquette or network etiquette, guidelines for courteous communication in the online environment. It includes proper manners for sending e-mail, conversing online, and so on. Much like traditional etiquette, which provides rules of conduct in social situations, the purpose of netiquette is to help construct and maintain a pleasant, comfortable, and efficient environment for online communication, as well as to avoid placing strain on the system and generating conflict among users.

(Reproduced from Britannica with permission²³)

- **Study the netiquette rules on the next page and give examples of good and bad online manners and/or behaviour.**

²³ Chen, Shing-Ling Sarina. "netiquette". *Encyclopedia Britannica*, 11 Jan. 2022, <https://www.britannica.com/topic/netiquette>. Accessed 14 November 2022.

NETIQUETTE RULES (by Virginia Shea²⁴)

Rule 1: Remember the Human.

Rule 2: Adhere to the same standards of behaviour online that you follow in real life.

Rule 3: Know where you are in cyberspace.

Rule 4: Respect other people's time and bandwidth.

Rule 5: Make yourself look good online.

Rule 6: Share expert knowledge.

Rule 7: Help keep flame wars under control.

Rule 8: Respect other people's privacy.

Rule 9: Don't abuse your power.

Rule 10: Be forgiving of other people's mistakes.



Liannadavis, Modified by DigiMedCult, CC BY-SA 4.0



Further reading: <https://medium.com/the-magazine/everybody-knows-youre-a-dog-805a6d99fd67>

²⁴Shea, V. (1994). Netiquette. San Francisco: Albion Books.

READING - AUTHENTIC TEXTS

- Read the following text in pairs so that both of you read the introductory paragraph (A), but one of you reads about domains and myths (B) and the other reads about cyberthreats (C). After reading, each of you make a short presentation about the information you read and present to your partner (using the language for presentations uploaded to your Course page).

A. What is cybersecurity?

(Student 1 and 2)

Cybersecurity is the practice of protecting critical systems and sensitive information from digital attacks. Also known as information technology (IT) security, cybersecurity measures are designed to combat threats against networked systems and applications, whether those threats originate from inside or outside of an organization. In 2020, the average cost of a data breach was USD 3.86 million globally, and USD 8.64 million in the United States. These costs include the expenses of discovering and responding to the breach, the cost of downtime and lost revenue, and the long-term reputational damage to a business and its brand. Cybercriminals target customers' personally identifiable information (PII) - names, addresses, national identification numbers (e.g., Social Security numbers in the U.S., fiscal codes in Italy), credit card information - and then sell these records in underground digital marketplaces. Compromised PII often leads to a loss of customer trust, regulatory fines, and even legal action. Security system complexity, created by disparate technologies and a lack of in-house expertise, can amplify these costs. But organizations with a comprehensive cybersecurity strategy, governed by best practices and automated using advanced analytics, artificial intelligence (AI) and machine learning, can fight cyberthreats more effectively and reduce the lifecycle and impact of breaches when they occur.

B. Cybersecurity domains

(Student 1)

A strong cybersecurity strategy has layers of protection to defend against cyber crime, including cyber attacks that attempt to access, change, or destroy data; extort money from users or the organization; or aim to disrupt normal business operations. Countermeasures should address:

- *Critical infrastructure security* - practices for protecting the computer systems, networks, and other assets that society relies upon for national security, economic health, and/or public safety. The National Institute of Standards and Technology (NIST) has created a cybersecurity framework to help organizations in this area, while the U.S. Department of Homeland Security (DHS) provides additional guidance.
- *Network security* - security measures for protecting a computer network from intruders, including both wired and wireless (Wi-Fi) connections.
- *Application security* - processes that help protect applications operating on-premises and in the cloud. Security should be built into applications at the design stage, with considerations for how data is handled, user authentication, etc.
- *Cloud security* - specifically, true confidential computing that encrypts cloud data at rest (in storage), in motion (as it travels to, from and within the cloud) and in use (during processing) to support customer privacy, business requirements and regulatory compliance standards.
- *Information security* - data protection measures, such as the General Data Protection Regulation or GDPR, that secure your most sensitive data from unauthorized access, exposure, or theft.

- *End-user education* - building security awareness across the organization to strengthen endpoint security. For example, users can be trained to delete suspicious email attachments, avoid using unknown USB devices, etc.
- *Disaster recovery / business continuity planning* - tools and procedures for responding to unplanned events, such as natural disasters, power outages, or cybersecurity incidents, with minimal disruption to key operations.
- *Storage security* - IBM FlashSystem® delivers rock solid data resilience with numerous safeguards. This includes encryption and immutable and isolated data copies. These remain in the same pool so they can quickly be restored to support recovery, minimizing the impact of a cyber attack.

Dangerous cybersecurity myths (Student 1)

The volume of cybersecurity incidents is on the rise across the globe, but misconceptions continue to persist, including the notion that:

- *Cybercriminals are outsiders.* In reality, cybersecurity breaches are often the result of malicious insiders, working for themselves or in concert with outside hackers. These insiders can be a part of well-organized groups, backed by nation-states.
- *Risks are well-known.* In fact, the risk surface is still expanding, with thousands of new vulnerabilities being reported in old and new applications and devices. And opportunities for human error - specifically by negligent employees or contractors who unintentionally cause a data breach - keep increasing.
- *Attack vectors are contained.* Cybercriminals are finding new attack vectors all the time - including Linux systems, operational technology (OT), Internet of Things (IoT) devices, and cloud environments.
- *My industry is safe.* Every industry has its share of cybersecurity risks, with cyber adversaries exploiting the necessities of communication networks within almost every government and private-sector organization. For example, ransomware attacks (see below) are targeting more sectors than ever, including local governments and non-profits, and threats on supply chains, ".gov" websites, and critical infrastructure have also increased.

C. Common cyber threats (Student 2)

Although cybersecurity professionals work hard to close security gaps, attackers are always looking for new ways to escape IT notice, evade defense measures, and exploit emerging weaknesses. The latest cybersecurity threats are putting a new spin on “known” threats, taking advantage of work-from-home environments, remote access tools, and new cloud services. These evolving threats include:

- Malware: The term “malware” refers to malicious software variants—such as worms, viruses, Trojans, and spyware—that provide unauthorized access or cause damage to a computer. Malware attacks are increasingly “fileless” and designed to get around familiar detection methods, such as antivirus tools, that scan for malicious file attachments.
- Ransomware: Ransomware is a type of malware that locks down files, data or systems, and threatens to erase or destroy the data - or make private or sensitive data public - unless a ransom is paid to the cybercriminals who launched the attack. Recent ransomware attacks have targeted state and local governments, which are easier to breach than organizations

and under pressure to pay ransoms in order to restore applications and web sites on which citizens rely.

- Phishing / social engineering: Phishing is a form of social engineering that tricks users into providing their own PII or sensitive information. In phishing scams, emails or text messages appear to be from a legitimate company asking for sensitive information, such as credit card data or login information. The FBI has noted about a surge in pandemic-related phishing, tied to the growth of remote work.
- Insider threats: Current or former employees, business partners, contractors, or anyone who has had access to systems or networks in the past can be considered an insider threat if they abuse their access permissions. Insider threats can be invisible to traditional security solutions like firewalls and intrusion detection systems, which focus on external threats.
- Distributed denial-of-service (DDoS) attacks: A DDoS attack attempts to crash a server, website or network by overloading it with traffic, usually from multiple coordinated systems. DDoS attacks overwhelm enterprise networks via the simple network management protocol (SNMP), used for modems, printers, switches, routers, and servers.
- Advanced persistent threats (APTs): In an APT, an intruder or group of intruders infiltrate a system and remain undetected for an extended period. The intruder leaves networks and systems intact so that the intruder can spy on business activity and steal sensitive data while avoiding the activation of defensive countermeasures. The recent Solar Winds breach of United States government systems is an example of an APT.
- Man-in-the-middle attacks: Man-in-the-middle is an eavesdropping attack, where a cybercriminal intercepts and relays messages between two parties in order to steal data. For example, on an unsecure Wi-Fi network, an attacker can intercept data being passed between guest's device and the network.

(Reprint Courtesy of IBM Corporation²⁵)

²⁵ <https://www.ibm.com/topics/cybersecurity>

VOCABULARY AND COMPREHENSION

➤ **Match the terms (1-10) with the explanations (a-n).**

1. Data breach	a. type of a computer virus that spreads across a network by copying itself
2. Downtime	b. a means by which a hacker illegally enters a computer network to deliver a malicious outcome
3. PII	c. a period from malicious attack discovery to resuming usual activities
4. Machine learning	d. a malicious software that hides on a computing device and steals information about a person or a company
5. In-house expertise	e. a security violation where information is illegally copied, transmitted, viewed, etc.
6. Dark web marketplace	f. a period when a machine or computer is out of action or unavailable for use
7. Data breach lifecycle	g. a type of malicious software that uses legitimate programs to infect a computer system
8. Worm	h. illegal e-commerce platform not indexed by conventional search engines
9. Trojan	i. information that can identify an individual
10. Spyware	j. malicious code or software that deceives the user into executing it
11. Operational technology	k. practice of using hardware and software to control industrial equipment
12. Attack vector	l. a branch of artificial intelligence where computer algorithms improve by experience and use of data
13. Fileless malware	m. skills and knowledge of employees inside a company or organization
14. Data resilience	n. ability of an IT system or data to survive potential failures and issues

➤ **Answer the following questions about the text.**

1. How can companies reduce the negative impact of breaches?
2. What is the process of creating a system of prevention and recovery from potential threats to a company called?
3. Who are cybercriminals?
4. What are the new methods of malicious attacks?
5. Why are ransomware attacks targeting state and local governments?
6. What kind of threats have been on the rise during the pandemic?

➤ **Find the words in the text that mean the following.**

Introduction

1. so different that they cannot be compared or work together _____
2. to increase or add to _____

The “domains” part

3. an organizations adherence to laws, standards, regulations, etc. _____
4. that cannot be changed _____

In the “myths” part

5. acting jointly _____
6. supported _____

In the “threats” part

7. escape or avoid _____
8. enter a place or organization secretly _____
9. to stop something from being delivered _____

LANGUAGE WORK – Past Simple

The Past Simple is used to express complete actions or events that happened at a specific time in the past.

I **bought** a new laptop last year.

Regular and irregular verbs

The Past Simple of regular verbs is formed by adding -ED or -D to the infinitive.

play → played

download → downloaded



The Past Simple of irregular verbs is found in the second column of the irregular verbs list.

buy → bought

draw → drew

Questions and negatives

Questions and negatives are formed using the auxiliary verb DID. **(Important!!! DID + INFINITIVE)**

I **didn't add** (did not add) more memory to your PC.

Did you **subscribe** to that service?

An exception to this rule occurs when the main verb is the verb TO BE, then we do not add DID.

I **wasn't** aware of the problem.

Were you on call last night?

AGO and UNTIL

AGO is used with the past simple to state the time period that passed from the moment when something happened.

I bought that computer **three years ago**.

UNTIL is used to mean up to a certain time.

I worked as a developer **until** I was promoted.

Past Simple Passive

It is formed with the past simple of the verb TO BE and the past participle.

The company **was paralysed** by ransomware.

- **Read the landmarks in the history of cybercrime and prepare questions in the Past Simple. Ask and answer the questions in pairs using the Past Simple.**

A Brief History of Cybercrime

1971 – John Draper, hacks phone systems using a toy whistle from a Cap'n Crunch cereal box and makes free long-distance calls.

1979 – Kevin Mitnick, gains unauthorized access to a computer system at the age of 16.

1981 – Ian Murphy (aka Captain Zap) breaks into AT&T and changes the internal clocks which enables people to get unauthorized discount rates.

1988 - Robert Tappan Morris, a graduate student, releases a self-replicating worm that brings down one-tenth of the ARPANET.

1990 – Two cyber gangs, The Legion of Doom and Masters of Deception engage in online warfare.

1993 – Kevin Poulsen (aka Dark Dante) is arrested for hacking into phone systems.

1995 – Kevin Mitnick is caught by the FBI and convicted of numerous criminal actions on computer networks.

1999 – A macro-virus Melissa which takes over email accounts is released.

2000 – The number of online attacks grows. A Canadian kid (aka MafiaBoy) launches a denial-of-service attack that brings down large websites like Yahoo!, eBay and Amazon. The *I Love You* virus spreads quickly.

2002 – A message board and forum for black hat hackers is launched.

2007 – Cybercrime skyrockets. China is accused of hacking into the US government system.

2010 – Eastern European cyber criminals use the Zeus Trojan virus and steal \$70 million dollars from cracked US bank accounts.

2013 – Five men in the US commit a credit card fraud that costs companies over \$300 million dollars.

2014 – A cyberattack exposes personal information of 145 million eBay users.

2017 – Ransomware WannaCry locks out tens of thousands of businesses out of their own systems and the attackers demand \$300 dollars per computer to remove the worm.

2019 – Personal information of 530 million Facebook users is exposed by an unknown black hat.

2020 – A ransomware attack is performed on INA Group in Croatia.

Hacker vs. Cracker

The term hacker originated in the 1960s and was used for people who are skilled at overcoming technical problems in computer systems.

Ethical hacker and white hat are also terms for people who use their hacking skills for defense purposes as opposed to crackers who are malicious hackers, also called black hats. Crackers access computer systems illegally, without authorization.

In the media and colloquially, the term hacker is also used instead of cracker.

VIDEO

[What is the Dark Web?](#)

IX. Computer Graphics and Web Design

PRE-READING

- **Have a group discussion about the following questions.**
1. Which jobs require the use and knowledge of computer graphics?
 2. What are the benefits of using computer graphics? Have new professions developed because of it?
 3. Do you use any graphics software? If you don't use any, where do you most get in contact with computer graphics and how does it improve your life or make it easier?

READING – AUTHENTIC TEXTS

COMPUTER GRAPHICS is the production of images on computers for use in any medium. Images used in the graphic design of printed material are frequently produced on computers, as are the still and moving images seen in comic strips and animations. The realistic images viewed and manipulated in electronic games and computer simulations could not be created or supported without the enhanced capabilities of modern computer graphics. Computer graphics is also essential to scientific visualization, a discipline that uses images and colours to model complex phenomena such as air currents and electric fields, and to computer-aided engineering and design, in which objects are drawn and analysed in computer programs. Even the windows-based graphical user interface, now a common means of interacting with innumerable computer programs, is a product of computer graphics.



Image display

Images have high information content, both in terms of information theory (i.e., the number of bits required to represent images) and in terms of semantics (i.e., the meaning that images can convey to the viewer). Because of the importance of images in any domain in which complex information is displayed or manipulated, and also because of the high expectations that consumers have of image quality, computer graphics has always placed heavy demands on computer hardware and software.

In the 1960s early computer graphics systems used **vector graphics** to construct images out of straight line segments, which were combined for display on specialized computer video monitors. Vector graphics is economical in its use of memory, as an entire line segment is specified simply by the coordinates of its endpoints. However, it is inappropriate for highly realistic images, since most images have at least some curved edges, and using all straight lines to draw curved objects results in a noticeable “stair-step” effect.

In the late 1970s and '80s **raster graphics**, derived from television technology, became more common, though still limited to expensive graphics workstation computers. Raster graphics represents images by bitmaps stored in computer memory and displayed on a screen composed of tiny pixels. Each pixel is represented by one or more memory bits. One bit per pixel suffices for black-and-white images, while four bits per pixel specify a 16-step gray-scale image. Eight bits per pixel specify an image with 256 colour levels; so-called “true color” requires 24 bits per pixel (specifying more than 16 million colours). At that resolution, or bit depth, a full-screen image requires several megabytes (millions of bytes; 8 bits = 1 byte) of memory. Since the 1990s, raster

graphics has become ubiquitous. Personal computers are now commonly equipped with dedicated video memory for holding high-resolution **bitmaps**.

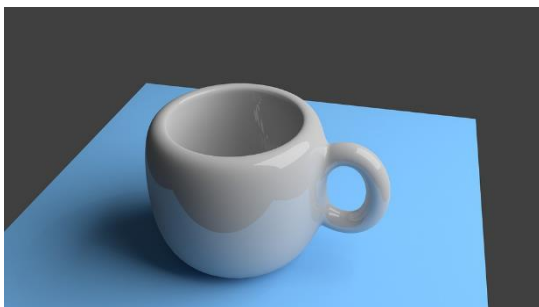
3-D rendering

Although used for display, bitmaps are not appropriate for most computational tasks, which need a three-dimensional representation of the objects composing the image. One standard benchmark for the rendering of computer models into graphical images is the [Utah Teapot](#), created at the University of Utah in 1975. Represented skeletally as a **wire-frame image**, the Utah Teapot is composed of many small polygons. However, even with hundreds of polygons, the image is not smooth. Smoother representations can be provided by Bezier curves, which have the further advantage of requiring less computer memory. Bezier curves are described by cubic equations; a cubic curve is determined by four points or, equivalently, by two points and the curve's slopes at those points. Two cubic curves can be smoothly joined by giving them the same slope at the junction. Bezier curves, and related curves known as B-splines, were introduced in computer-aided design programs for the modelling of automobile bodies.

Rendering offers a number of other computational challenges in the pursuit of realism. Objects must be transformed as they rotate or move relative to the observer's viewpoint. As the viewpoint changes, solid objects must obscure those behind them, and their front surfaces must obscure their rear ones. This technique of "hidden surface elimination" may be done by extending the pixel attributes to include the "depth" of each pixel in a scene, as determined by the object of which it is a part. Algorithms can then compute which surfaces in a scene are visible and which ones are hidden by others. In computers equipped with specialized graphics cards for electronic games, computer simulations, and other interactive computer applications, these algorithms are executed so quickly that there is no perceptible lag—that is, rendering is achieved in "real time."

Shading and texturing

Visual appearance includes more than just shape and colour; texture and surface finish (e.g., matte, satin, glossy) also must be accurately modelled. The effects that these attributes have on an object's appearance depend in turn on the illumination, which may be diffuse, from a single source, or both. There are several approaches to rendering the interaction of light with surfaces. The simplest shading techniques are flat, Gouraud, and Phong. In flat shading, no textures are used and only one colour tone is used for the entire object, with different amounts of white or black added to each face of the object to simulate shading. The resulting model appears flat and unrealistic. In Gouraud shading, textures may be used (such as wood, stone, stucco, and so forth); each edge of the object is given a colour that factors in lighting, and the computer interpolates (calculates intermediate values) to create a smooth gradient over each face. This results in a much more realistic image. Modern computer graphics systems can render Gouraud images in real time. In Phong shading each pixel takes into account any texture and all light sources. It generally gives more realistic results but is somewhat slower.



Example of ray tracing

The shading techniques described thus far do not model specular reflection from glossy surfaces or model transparent and translucent objects. This can be done by ray tracing, a rendering technique that uses basic optical laws of reflection and refraction. Ray tracing follows an imaginary light ray from the viewpoint through each point in a scene. When the ray encounters an object, it is traced as it is reflected

or refracted. Ray tracing is a recursive procedure; each reflected or

refracted ray is again traced in the same fashion until it vanishes into the background or makes an insignificant contribution. Ray tracing may take a long time—minutes or even hours can be consumed in creating a complex scene.

In reality, objects are illuminated not only directly by a light source such as the Sun or a lamp but also more diffusely by reflected light from other objects. This type of lighting is re-created in computer graphics by radiosity techniques, which model light as energy rather than rays and which look at the effects of all the elements in a scene on the appearance of each object. For example, a brightly coloured object will cast a slight glow of the same colour on surrounding surfaces. Like ray tracing, radiosity applies basic optical principles to achieve realism—and like ray tracing, it is computationally expensive.

(Reproduced from Britannica.com with permission²⁶)

VOCABULARY AND COMPREHENSION

➤ **Read the text and answer the following questions:**

1. Where is computer graphics used?
2. Name two categories of computer graphics image display.
3. Which type of graphics uses less memory when stored?
4. Which type of graphics has become universal in use since the 1990s?
5. Name the rendering technique with which you can model advanced reflection and radiant objects.
6. How is realism achieved in computer graphics?

➤ **Match the terms with the definitions.**

1. radiosity	a. the process of generating a realistic image from a 2D or 3D wireframe model by means of a computer program
2. rendering	b. a technique that imitates lighting in the real world
3. stucco	c. a visual presentation of a 3D object used as a skeleton presenting the structure of the object
4. polygon	d. graphics stored as a collection of pixels
5. ray tracing	e. a visual and tactile quality of a surface
6. raster graphics (bitmaps)	f. a two-dimensional shape that has three or more straight sides
7. pixel	g. type of exterior finish made with cement, plaster and similar
8. wire-frame model	h. the total radiation from surfaces, emitted and reflected
9. texture	i. the smallest element of an image

²⁶ Hemmendinger, D. (2014, August 1). *computer graphics*. *Encyclopedia Britannica*. <https://www.britannica.com/topic/computer-graphics>

LANGUAGE WORK – The -ING form

The -ing form is used for forming:

- gerunds
- Present Participle
- adjectives



GERUND

A simple gerund is a verb with the suffix -ING that functions as a noun.

Playing computer games is my hobby.

Some verbs are followed by a gerund, not the infinitive: avoid, complete, consider, involve, propose, recommend, etc.

They should consider **buying** new graphics software.

Use gerund after a preposition.

Realistic images are achieved **by rendering**.

PRESENT PARTICIPLE

Present Participle is used to form continuous tenses and participle clauses.

He has been **playing** computer games since he was 4 years old.

(bold - Present Participle, underlined - Present Perfect Continuous)

Images **presenting** three-dimensional objects are complex to create.

(The images *which present* ...)

ADJECTIVE

Designers use **drawing** programs like Adobe Illustrator.

- **Find the underlined -ING forms in the text on computer graphics and decide whether the form is a gerund, present participle, or an adjective.**
- **Fill the gaps with -ING forms of the verbs in brackets.**
 1. (scale) _____ up or down means enlarging or diminishing objects respectively.
 2. (photo-edit) _____ programs include Adobe Photoshop, Affinity Photo, Capture On Pro and similar.
 3. (composite) _____ is combining parts of different images to make one single image.
 4. (design) _____ cars involves (use) _____ CAD software by mechanical engineers.
 5. Solid (model) _____ is the most complicated CAD technology that simulates the object internally and externally ensuring that the object is geometrically correct.

GRAPHICS SOFTWARE

Graphics software is a program or set of programs that enable users to visually manipulate images or models on a computer.

Types: paint programs, illustration and design programs, photo/image editors, animation software, GIS software, computer aided design software (CAD), and some desktop publishing software

Job titles of people who use it: visual designer, user experience (UX) designer, user interface (UI) designer, architect, web designer, illustrator, interaction designer, app designer, photo retoucher, multimedia artist and animator, surface and pattern designer, type designer, product developer, art director, mechanical engineer

- ✚ With CAD software you **can** design detailed 3D engineering models.
- ✚ You **should** use GIS software if you want to create and edit geographic data.
- ✚ Visual designers **might** use Photoshop to create a brand image.
- ✚ Surface pattern designers **must** have some foundational artistic skills.
- ✚ Mechanical engineers **may** use CAD software.
- ✚ Photo retouchers **don't have** to use desktop publishing software.

LANGUAGE WORK – Modals

A modal verb is a type of auxiliary verb. By adding a modal verb to the main verb, we can express possibility, ability, obligation or necessity, ask for permission or give advice. Modal verbs do not have proper past tenses and are always followed by bare infinitive. Past forms are not only used for the past, sometimes they are used to sound more polite (e.g., COULD you please open the window?).

Past forms:

CAN → COULD

MAY → MIGHT

MUST → HAD TO

HAVE TO → HAD TO

POSSIBILITY - could, may, might

COULD expresses a stronger possibility than MAY and MIGHT.

The web designer COULD tell you what else needs to be done.

The boss MAY/MIGHT give you a better performing laptop for that job.

ABILITY - can, could

You CAN create 3D objects with this application.

You COULD save your conversation with the last version of this app.

OBLIGATION or NECESSITY - must, have to

You HAVE TO save your work if you don't want to lose it.

I MUST buy a new graphics card for my laptop, this one is too slow.

PERMISSION - can, could, may

COULD is more polite than CAN but MAY is more formal than both CAN or COULD.

CAN/COULD/MAY I use your tablet?



ADVICE - should

They SHOULD update the website regularly.

The negative of modal verbs:

The negative is formed by adding NOT. Contracted forms such as CAN'T, COULDN'T are used with the exception of MAYN'T. MAY NOT is the form that is usually used instead of MAYN'T.

Extra info:

MUST and HAVE TO are usually interchangeable when in the positive form, but in the negative form, they mean completely the opposite.

You DON'T HAVE TO turn off the computer.

(There is a choice; if you want to you are allowed to turn it off)

You MUSTN'T turn off the computer.

(There is no choice; it is forbidden to turn off the computer)

DESIGNING A WEBSITE

What is Web Design?



Web design refers to the design of websites that are displayed on the internet. It usually refers to the user experience aspects of website development rather than software development. Web design used to be focused on designing websites for desktop browsers; however, since the mid-2010s, design for mobile and tablet browsers has become ever-increasingly important.

A web designer works on the appearance, layout, and, in some cases, content of a website. Appearance, for instance, relates to the colors, font, and images used. Layout refers to how information is structured and categorized. A good web design is easy to use, aesthetically pleasing, and suits the user group and brand of the website. Many webpages are designed with a focus on simplicity, so that no extraneous information and functionality that might distract or confuse users appears. As the keystone of a web designer's output is a site that wins and fosters the trust of the target audience, removing as many potential points of user frustration as possible is a critical consideration.

Two of the most common methods for designing websites that work well both on desktop and mobile are responsive and adaptive design. In responsive design, content moves dynamically depending on screen size; in adaptive design, the website content is fixed in layout sizes that match common screen sizes. Preserving a layout that is as consistent as possible between devices is crucial to maintaining user trust and engagement. As responsive design can present difficulties in this regard, designers must be careful in relinquishing control of how their work will appear. If they are responsible for the content as well, while they may need to broaden their skillset, they will enjoy having the advantage of full control of the finished product.

(Reproduced from Interaction Design Foundation with permission²⁷)

²⁷ Interaction Design Foundation. (2022). *What is Web Design?* <https://www.interaction-design.org/literature/topics/web-design>

STUDY

- **In pairs, discuss the following steps for designing a website taken from wix.com.**
- Set your goal
 - Choose a website builder
 - Define your layout
 - Claim your domain name
 - Gather your content
 - Add the right pages
 - Design your website elements
 - Pick the professional tools you need
 - Make it accessible to everyone
 - Optimize for mobile
 - Strengthen your SEO
 - Engage with visitors
 - Ask for feedback
 - Publish and update
- **In pairs, talk about website design and name some good websites that you have seen. What elements do you think a good website should have? After making a list of the elements, plan a website with your partner by following these steps and decide on:**
- the content and structure (talk about the target audience)
 - the style of presentation (how will the information be presented, talk about visual design also)
 - computer graphics and multimedia you should use
 - the level of interaction
 - the time of updating the website
- Present your website to the rest of the class.**

VIDEO

[Web Design Trends 2021](#)

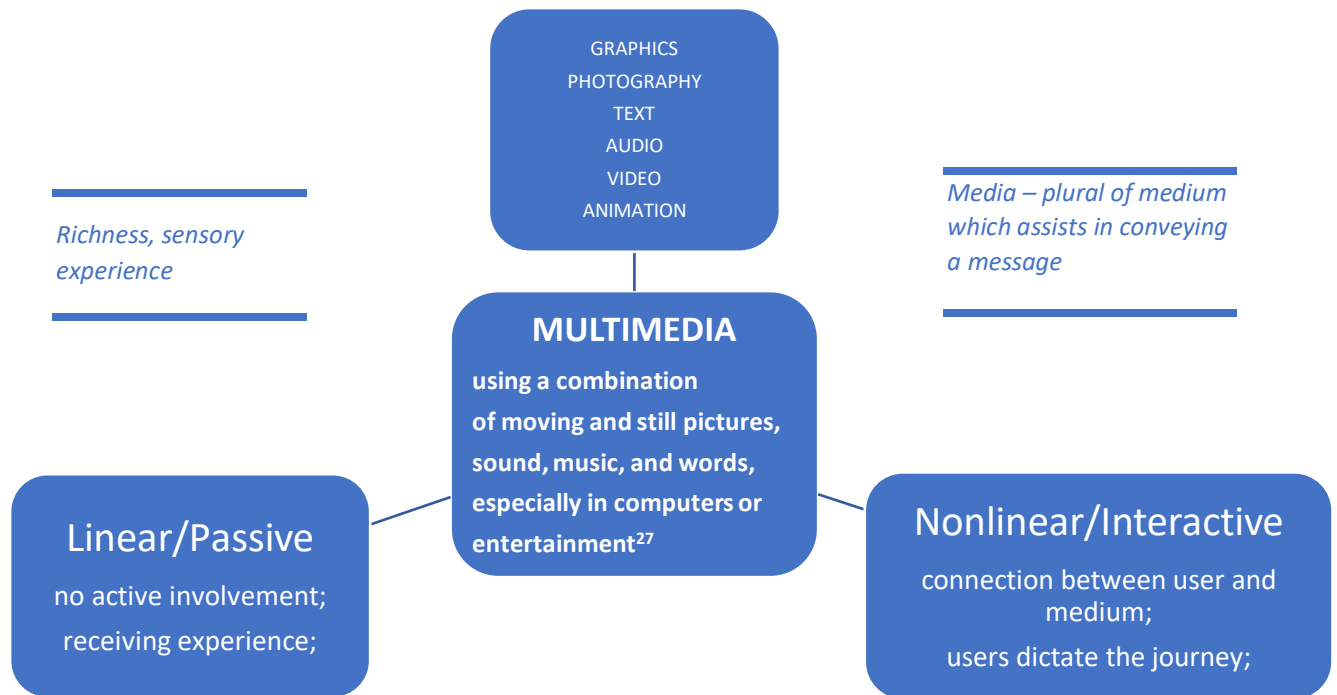
Write one sentence for each of the mentioned trends:

1. Dark Mode
2. Collage & Mixing Mediums
3. Anti-Design
4. Minimalism
5. Organic Design
6. Illustration
7. Functionality, Inclusivity & Accessibility
8. Motion & Interactivity
9. 3D & Geometric Design
10. WordPress Page Builders & Template Kits

X. Multimedia and Desktop Publishing

DISCUSS

- Look at the following graphical representation of Multimedia and discuss the difference between linear and nonlinear multimedia.



²⁸Definition of multimedia

- Look at the following images from *Freepik* and discuss how multimedia is used in each example.



²⁸ <https://dictionary.cambridge.org/dictionary/english/multimedia>

➤ **Fill the gaps in the text about multimedia that your teacher gives you and then look at the graphical representation on the previous page and discuss the following.**

1. Explain the complexity of multimedia and how it offers a comprehensive experience. How is the versatile experience achieved in interactive multimedia?
2. Give examples of passive/linear multimedia.
3. Give examples of interactive/nonlinear multimedia.
4. How is interactivity achieved in multimedia?
5. Why is interactive multimedia called nonlinear?

➤ **In pairs, think about the application of multimedia in the following fields and give examples:**

1. Education
2. Entertainment
3. Business
4. Technology
5. Science
6. Engineering
7. Medicine
8. Fine Arts
9. Communication



VIDEO – Multimedia in Education

[Reimagining education | Michael Bodekaer | TEDxCERN](#)

1. What did the Labster team create to make learning science more interesting to students?
2. What is the learning impact of virtual laboratories as opposed to traditional ones?
3. According to the speaker Michael Bodekaer, what is the next big leap in science education?
4. What is your opinion on virtual learning techniques?

LANGUAGE WORK – Conditional sentences

Conditional sentences are made of two clauses: the MAIN CLAUSE and the IF-CLAUSE. They express a condition that must be fulfilled for something to happen or take place. The **first conditional** sentence is used to express **real or possible situations**, while the **second conditional** is used for **less probable and not real situations** (hypothetical).



The first conditional

IF CLAUSE	MAIN CLAUSE
Present Simple	will + infinitive

If they **buy** a computer, I **will help** them start it up.

In the main clause, instead of will, you can use other modals e.g., *may* or *might* (for less certain situations) and *can*.

The second conditional

IF CLAUSE	MAIN CLAUSE
Past Simple	would + infinitive

If it **worked**, there **would be** no need to buy new software.

In the main clause instead of would, other modals can be used e.g., *should*, *might*, *could*.

Note:

Instead of *If*, we can sometimes use *Unless*, *As long as*, *In case*, etc.

➤ **Fill in the gaps with the correct form of the verbs in brackets, forming the first or second conditional sentence.**

1. The cameraman cancelled at the last minute. If they _____ (buy) a professional video camera tomorrow, they _____ (record) the whole ceremony on their own.
2. If the musician _____ (be) any good, he _____ (sell) his records fast.
3. Unless the school _____ (receive) a donation, we _____ (not be able to) organize the virtual event.
4. If the hospital _____ (have) enough funding, it _____ (organize) online training for surgeons.
5. If you _____ (choose) our online classes, you _____ (be + offer) a multimedia experience.

STUDY

- Read the article [What is desktop publishing?](#) and then write two/three sentences in your own words to define desktop publishing.



www.freepik.com

E-publishing: a link between multimedia and education

Multimedia is used in the production of educational materials. E-publishing has increased the usage of multimedia in education through e-textbooks and various digital educational media.

- In pairs, discuss advantages and disadvantages of e-textbooks and multimedia in education. You can use the useful phrases in the box.

Useful phrases

In my opinion, ...
In my view, ...
I definitely think that ...
I disagree entirely.
I'm afraid I can't agree.
I'm afraid you're wrong.
That's a good idea, but...
That's a good point, but...
What's wrong with ...?
What do you mean by ...?
Could you tell me?
Would you prefer...?
The main thing is...
The most important thing is...
Primarily...
Most importantly,...

*“Electronic publishing is the dissemination of information in electronic formats and its distribution to potential users either on electronic networks such as the Internet and intranet or in stand-alone formats such as CD ROMs. E-publishing has been defined as any non-print media material that is published in digitized form to an identifiable public. The media in electronic publishing can be text, numeric, graphic, still or motion pictures, video, sound or as infrequently the case a combination of any or all of these. E-publishing may be broadly divided into two categories: online and offline publishing. **Online publishing** uses computer and communication networks including the Internet, intranet, and extranet for delivery of the content. **Offline publishing** uses storage media such as CD ROM, DVD, memory card, etc. for distributing the content. By definition, an electronic publication (e-publication) is the publication of any form of electronic media.”²⁹*

- After the discussion, imagine that the government in your country wants to go through with an education reform and they want to discontinue the use of print textbooks and start using all the study materials in digital form, e.g., e-textbooks and other digital educational materials. Write a formal letter giving your opinion, stating the disadvantages and advantages of completely switching to e-publications.

²⁹ LISBDNETWORK. (2022). *Electronic Publishing*. <https://www.lisedunetwork.com/electronic-publishing/>

LETTER WRITING



A letter should have the following sections:



GREETING (depends on style -formal/informal)

e.g., *Dear Jane, Dear Mr Bernard, Dear Mr and Mrs Brown, Dear Madam/Sir, Dear Sirs.*



INTRODUCTORY PARAGRAPH (1 paragraph)

Explain the reason for writing; (*I am writing to inform you / with regard to / in connection with...*)



MAIN BODY (2-3-4 paragraphs)

Development of the subject; explain the main objective; give your opinion say why you agree or disagree and support your arguments.



CONCLUSION (1 paragraph)

Closing remarks; summarize the subject and suggest a solution if needed.
(*I hope/trust..., I would be pleased..., I trust this information will be of some assistance..., I hope that these suggestions..., I am looking forward to...*)



ENDING (depends on style - formal/informal)

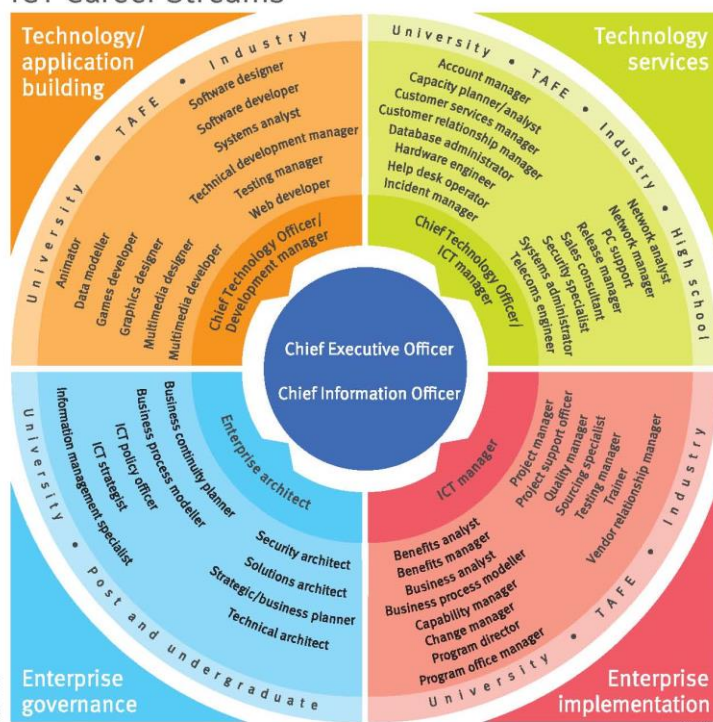
e.g., *Yours faithfully/sincerely, Best regards, Kind regards, Best wishes, Love;*

XI. Careers in ICT

STUDY

- Study the diagram and then fill in the sentences below with the appropriate ICT jobs.

ICT Career Streams



The ICT career streams diagram highlights the key roles available in an ICT career, so informed decisions can be made when considering study and career options and pathways.

Streams

Technology/application builders are responsible for all aspects of building ICT systems, applications and technologies.

Technology services covers all areas of the delivery of ICT services to users, from helpdesk to network management, systems administration to account management.

Enterprise implementation covers aspects of ICT that relate to changes to the management or operation of the enterprise.

Enterprise governance includes all aspects of policy and strategy including strategic information management and enterprise architecture.

The diagram:

- identifies entry points from high school, industry, TAFE and university
- includes a variety of roles depending on qualifications and experience
- lists roles alphabetically—it is not necessary to work through each role to progress.

Suggested use

The diagram can assist in:

- considering study options
- considering career pathways and training requirements.

For more information, visit www.qgcio.qld.gov.au



Figure 7 ICT Career Streams (reproduced with permission from Queensland Government³⁰)

1. A _____ is responsible for ensuring that data stored in the database is available and that security of the data and the database is maintained at all times.
2. A _____ is responsible for the coordination and contribution to a range of activities in support of projects.
3. A _____ is responsible for graphically representing how business is done (as-is) or how business is to be done (to-be) across a business unit, organisation or between organisations.
4. A _____ is involved in the planning, design, commissioning and monitoring of telecommunications networks.
5. A _____ is responsible for building and maintaining relationships with each company that the organisation has a commercial relationship with.



Also have a look at the [STEM Career Wheel](#).

³⁰ <https://www.qgcio.qld.gov.au/information-on/digital-and-ict-careers/ict-careers-and-skills-framework>

- **After filling the gaps in the text your teacher gives you, check your answers on <https://www.iitpsa.org.za/careers-in-ict-info/> and discuss in pairs what is on offer for ICT students and practitioners.**

JOB PROFILES AND JOB ADVERTISEMENTS

VIDEO [IT Support Technician](#)

- **Read the following advertisement³¹ and write a Letter of application for the Desktop support technician job.**

DESKTOP SUPPORT TECHNICIAN / STOKE-ON-TRENT / COMPETITIVE PAY + BENEFITS

Rapiscan Systems is an industry leader in detection technology, providing cargo and vehicle inspection systems and services for ports, borders, military, high-threat facilities, and checkpoints to help customers combat terrorism, drug smuggling, illegal immigration, and trade fraud. We offer a broad array of scanning system configurations that leverage low-, medium-, and high-energy X-ray technology—or multiple X-ray technologies—to address each customer’s unique security application requirements. Our commitment to excellence in imaging performance, innovative design, and uncompromising quality ensures our solutions consistently deliver best-in-class imaging, high reliability, and operator satisfaction, to help customers find threats and contraband with ease and confidence.

Role Overview:

The Desktop Support Technician will be based at the Stoke-on-Trent site but will provide effective IT desktop support to all European Sites.

Responsibilities of the Desktop Support Technician:

- Desktop support in a multi-user environment
- Configure, maintain, and provide Desktop support to all users to ensure they can always work
- Provide support for all applications running on servers and desktops and all hardware associated with the applications
- Actively participate in team discussions
- Help develop IT solutions to meet the business objectives
- Create and maintain documentation on all IT systems
- Uphold the company’s core values of Integrity, Innovation, Accountability, and Teamwork.
- Demonstrate behaviour consistent with the company’s Code of Ethics and Conduct.
- It is the responsibility of every employee to report to their manager or a member of senior management any quality problems or defects for corrective action to be implemented and to avoid recurrence of the problem.
- Duties may be modified or assigned at any time to meet the needs of the business.

Candidate Requirements:






- MCP, MCSA or MCSE qualification preferred
- Desktop support experience
- Advanced knowledge of Microsoft Windows 7, 10
- Competent knowledge of Microsoft Office 2010 and newer (ideally including O365)
- Experience in writing work instructions
- Capable of working with minimum supervision
- Knowledge of Backup Exec and/or Comm Vault back up software
- Networking experience (for desktop troubleshooting)
- Ability to be a self-starter and finisher
- Knowledge of iPhone / Android handsets
- Possess a positive attitude
- Previous experience in a customer support role
- Highly motivated
- Excellent written and oral communication skills
- Full Clean UK Driving License
- Working understanding of Lotus Notes preferred but not vital (Version 8 and above)

³¹ Used with permission from Totaljobs.com.

LETTER OF APPLICATION



Write a letter of application using the following structure:

-  **GREETING (depends on whether you know the name of the addressee)**
e.g. Dear Mr Bernard, Dear Mrs Smith, Dear Dr Green, Dear Sir/Madam, Dear Sirs,
Dear Sir or Madam, To whom it may concern;
-  **INTRODUCTORY PARAGRAPH (1 paragraph)**
Explain the reason for writing (*I am writing to apply for the position of...*);
-  **MAIN BODY (2-3 paragraphs)**
Write about your education/training, work experience and personal skills; Explain why you think you are a good candidate for the job;
-  **CONCLUSION (1 paragraph)**
Closing remarks; mention your availability for an interview;
-  **ENDING**
e.g., Yours faithfully, Yours sincerely (if you have addressed the person by name),
Sincerely, Sincerely Yours, Yours truly;

LANGUAGE WORK – Present Perfect

The **Present Perfect Simple** is used to express past states and actions that started in the past and continue to the present or that stopped recently but have an influence on the present. We do not use the Present Perfect with specific time expressions; we use unspecific expressions such as *ever, never, yet, so far, already*, etc. We also use Present Perfect for a time frame that is not finished and use words like *today, this year, this month*, etc.

I **have written** many programmes in C#.

FORM: HAVE/HAS + PAST PARTICIPLE

Past participle:

regular verbs: VERB + (E)D

irregular verbs: 3rd column in the list of irregular verbs



Questions and negatives

The negatives are formed by adding NOT between the verb TO HAVE and the PAST PARTICIPLE. The questions are formed by inverting the subject and the auxiliary (have).

They **haven't (have not) worked** with the new software.

Have you **tried** the new iPhone?

Where **has** he **worked** before?

The **Present Perfect Continuous** is used to express actions that started in the past and are still going on or that stopped recently, and we want to emphasize duration.

FORM: **HAVE/HAS BEEN + PRESENT PARTICIPLE** (verb + -ing)

I **have been working** on this problem all morning.

Questions and negatives

The negatives are formed by adding NOT between the verb TO HAVE and BEEN (Past Participle of the verb TO BE). The questions are formed by inverting the subject and the auxiliary (have).

They **haven't (have not) been working** all morning.

What **have** they **been doing** all morning?

FOR and SINCE

FOR is used to refer to a period of time, and SINCE is used to refer to a point in time.

I've been a software developer **for** 10 years.

I've been working on this problem **since** Monday.

➤ **Fill in the sentences with the correct Present Perfect tense (Simple or Continuous) or Past Simple.**

1. For the last 15 years, I _____ (work) as a graphic designer.
2. He _____ (learn) programming in Python since May.
3. I _____ (complete) a course in strategic thinking in 2018.
4. After graduation, she _____ (do) an internship at Amazon.
5. I _____ (never program) in C++.
6. They _____ (win) several awards for their online programs.
7. He _____ (work) on the project all day.
8. Five years ago, I _____ (spend) six months in Austria working as an IT technician.
9. Since 2010, I _____ (be) a database administrator.
10. They _____ (already + interview) 10 candidates today. I am the last one.

JOB INTERVIEW

- **Watch the video that gives advice on answering five IT job interview questions and write down notes that would help you deliver a presentable answer. Then, practice asking and answering the questions in pairs. Add more questions if you can think of some.**

IT Interview Questions and Answers

1. Tell me about yourself and why you will be a strong fit for this IT position?
2. Why do you want this particular IT job and what has attracted you to our company?
3. What are the most important skills in IT and why?
4. How would you begin a newly assigned IT project?
5. How would you ensure a difficult IT task or project is delivered on time and budget?

READING – AUTHENTIC TEXTS

What is software development?

According to IBM Research: “Software development refers to a set of computer science activities **dedicated** to the process of creating, designing, deploying and supporting software.”

Software itself is the set of instructions or programs that tell a computer what to do. It is independent of hardware and makes computers programmable. There are three basic types: **System software** **to provide** core functions such as operating systems, disk management, utilities, hardware management and other operational necessities.

Programming software **to give** programmers tools such as text editors, compilers, linkers, debuggers and other tools **to create** code.

Application software (applications or apps) **to help** users perform tasks. Office productivity suites, data management software, media players and security programs are examples. Applications also refers to web and mobile applications like those used **to shop** on Amazon.com, socialize with Facebook or post pictures to Instagram.

A possible fourth type is **embedded software**. **Embedded** systems software is **used** to control machines and devices not typically considered computers — telecommunications networks, cars, industrial robots and more. These devices, and their software, can be **connected** as part of the Internet of Things (IoT).

Software development is primarily **conducted** by programmers, software engineers and software developers. These roles interact and overlap, and the dynamics between them vary greatly across development departments and communities.

Programmers, or coders, write source code to program computers for specific tasks like merging databases, processing online orders, routing communications, conducting searches or displaying text and graphics. Programmers typically interpret instructions from software developers and engineers and use programming languages like C++ or Java **to carry** them **out**.

Software engineers apply engineering principles **to build** software and systems **to solve** problems. They use modeling language and other tools **to devise** solutions that can often be **applied** to problems in a general way, as opposed to merely solving for a specific instance or client. Software engineering solutions adhere to the scientific method and must **work** in the real world, as with bridges or elevators. Their responsibility has grown as products have become increasingly more intelligent with the addition of microprocessors, sensors and software. Not only are more products relying on software for market differentiation, but their software development must **be coordinated** with the product’s mechanical and electrical development work.

Software developers have a less formal role than engineers and can **be** closely **involved** with specific project areas — including writing code. At the same time, they drive the overall software development lifecycle — including working across functional teams **to transform** requirements into features, managing development teams and processes, and conducting software testing and maintenance.

The work of software development isn't **confined** to coders or development teams. Professionals such as scientists, device fabricators and hardware makers also create software code even though they are not primarily software developers. Nor is it confined to traditional information technology industries such as software or semiconductor businesses. In fact, according to the Brookings Institute, those businesses “account for less than half of the companies performing software development.” An important distinction is custom software development as opposed to commercial software development. Custom software development is the process of designing, creating, deploying and maintaining software for a specific set of users, functions or organizations. In contrast, commercial off-the-shelf software (COTS) is **designed** for a broad set of requirements, allowing it to be **packaged** and commercially **marketed** and **distributed**.

(Reprint Courtesy of IBM Corporation³²)

VOCABULARY AND COMPREHENSION

➤ **Match the terms (1-10) from the text with the definitions (a-j).**

1. SOFTWARE DEPLOYMENT	a. any artificial language that enables the design and construction of structures and models by a set of predefined rules
2. DISK MANAGEMENT	b. helps to recognize the errors of a program and fix them
3. UTILITIES	c. a special program that turns programming language into machine code
4. COMPILER	d. composed of organizational members from several vertical levels of the organizational hierarchy
5. LINKER	e. a mass-produced product that is used “as-is”
6. DEBUGGER	f. a collection of software containing a word processor, spreadsheet and presentation program, etc. for office workers
7. OFFICE PRODUCTIVITY SUITES	g. all the processes required to make a software system or update available to its users
8. MODELLING LANGUAGE	h. system software that analyses and maintains a computer
9. FUNCTIONAL TEAM	i. a system utility which enables users to perform advanced storage tasks
10. COTS	j. a program that takes one or more object files and combines them into one executable file, library file or another object file

➤ **Answer the questions after reading the text.**

1. What is embedded systems software and how is it different from the other three types of software?
2. Explain the differences and similarities between the roles of programmer, software engineer and software developer. Is the distinction the same in your country?
3. Which professionals also create software code?

³² IBM (2022.) *What is software development?* <https://www.ibm.com/topics/software-development#citation1>

LANGUAGE WORK – INFINITIVE and -ED FORMS

THE INFINITIVE

The infinitive is the base form of a verb.

The infinitive has two forms: TO-INFINITIVE and ZERO (bare)-INFINITIVE.

TO-INFINITIVE is used:

- to express a purpose
I use Adobe **to read** PDF files.
- after adjectives
Programming isn't easy **to learn**.
- after certain verbs (agree, appear, choose, decide, expect, invite, etc.)
I decided **to buy** a new laptop.
- after the object of certain verbs
This application enables us **to create** electronic books.



ZERO INFINITIVE is used:

- after modal verbs (can, may, might, must, will, should, could, etc.)
You must **save** your work before you close the application.
- after the object with the verbs make and let
You can make your PC **work** faster.

THE -ED FORM

The -ED form is used for forming:

- the Past Simple
- the Past Participle
- adjectives

The -ED is used to make the **Past Simple** of regular verbs.

PLAY → PLAYED

WATCH → WATCHED

Sometimes we just add -D if the verb ends in -E.

PHONE → PHONED

COMPILE → COMPILED

The Past Participle

The -ED is also used to make the Past Participle of regular verbs.

The Past Participle of regular verbs has the exact form as the Past Simple.

I have **worked** here since 2001.

Adjectives

The -ED is also used to make the adjectival form of some verbs.

DIGITIZE → DIGITIZED

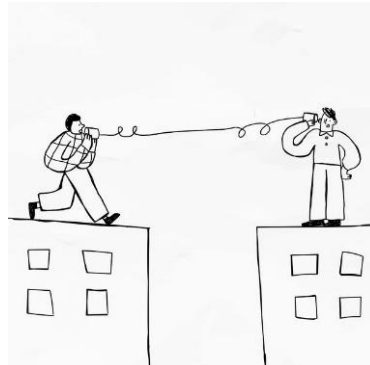
The application enables access to a collection of **digitized** books.

- Look at the **red** and the **red underlined** words in the text on software development. Decide on what they are consulting the Language work.

- Fill in the gaps with appropriate **-ED** or **INFINITIVE** form.
 1. A programming language is _____ (convert) into machine code by a compiler.
 2. A debugger is used _____ (test) other programs.
 3. Machine code is too difficult _____ (write), which is why we use high-level languages.
 4. Programmers should _____ (plan) before they start coding.
 5. Python was _____ (design) by Guido van Rossum in 1991 and _____ (develop) by the Python Software Foundation.

- Look at the **Software Engineer CV** example that your teacher gives you and simulate a job interview in pairs, Student A as the potential employer and Student B as Charles McTurland.

XII. Networking and Communications



STUDY

- Think about the meaning of the words **NETWORK**, **NETWORKING**, **COMMUNICATION** and **COMMUNICATIONS** and then consult the entries from the *Cambridge dictionary* below, to see if you were right.

Communication³³

1. the act of communicating with people
2. the process by which messages or information is sent from one place or person to another, or the message itself

Communications³⁴

1. the various systems used for sending esp. electronic information, such as radio, television, telephone, and computer networks
2. methods, or the activity, of communicating and sending messages

Network³⁵

1. a large system consisting of many similar parts that are connected together to allow movement or communication between or along the parts, or between the parts and a control centre
2. a number of computers that are connected together so that they can share information

Networking³⁶

1. the activity of meeting people who might be useful to know, especially in your job
2. the process of connecting computers together so that they can share information



[Extra information on the usage of Communication vs. Communications](#)

³³ "communication." *Cambridge dictionary (n.d.)*. Retrieved from <https://dictionary.cambridge.org/dictionary/english/communication> (November 22, 2022).


³⁴ "communications." *Cambridge dictionary (n.d.)*. Retrieved from <https://dictionary.cambridge.org/dictionary/english/communications> (November 22, 2022).

³⁵ "network." *Cambridge dictionary (n.d.)*. Retrieved from <https://dictionary.cambridge.org/dictionary/english/network> (November 22, 2022).

³⁶ "networking." *Cambridge dictionary (n.d.)*. Retrieved from <https://dictionary.cambridge.org/dictionary/english/networking> (November 22, 2022).

READING – AUTHENTIC TEXTS

TELECOMMUNICATIONS—AN EVOLVING DEFINITION

1. Before the emergence of the Internet and other data networks, telecommunications had a clear meaning: the telephone (and earlier the telegraph) was an application of technology that allowed people to communicate at a distance by voice (and earlier by encoded electronic signals), and telephone service **was provided** by the public switched telephone network (PSTN). Much of the U.S. network **was owned and operated** by American Telephone & Telegraph (AT&T); the rest consisted of smaller independent companies, including some served by GTE.
- 
2. Then in the 1960s, facsimile and data services **were overlaid** on the PSTN, adding the ability to communicate documents and data at a distance—applications still considered telecommunications because they enabled new kinds of communication at a distance that **were** also **carried** over the PSTN. More recently, of course, communication at a distance has expanded to include data transport, video conferencing, e-mail, instant messaging, Web browsing, and various forms of distributed collaboration, enabled by transmission media that have also expanded (from traditional copper wires) to include microwave, terrestrial wireless, satellite, hybrid fiber/coaxial cable, and broadband fiber transport.
 3. Today consumers think of telecommunications in terms of both products and services. Starting with the Carterphone decision by the Federal Communications Commission in 1968, it has become permissible and increasingly common for consumers to buy telecommunications applications or equipment as products as well as services. For example, a customer-owned and customer-installed WiFi local area network may be the first access link supporting a voice over Internet Protocol (VoIP) service, and a consumer may purchase a VoIP software package and install it on his or her personally owned and operated personal computer that connects to the Internet via an Internet service provider.
 4. The technologies used for telecommunications have changed greatly over the last 50 years. Empowered by research into semiconductors and digital electronics in the telecommunications industry, analog representations of voice, images, and video **have been supplanted** by digital representations. The biggest consequence has been that all types of media **can be represented** in the same basic form (i.e., as a stream of bits) and therefore handled uniformly within a common infrastructure (most commonly as Internet Protocol, or IP, data streams). Subsequently, circuit switching **was supplemented** by, and will likely ultimately **be supplanted** by, packet switching. For example, telephony **is** now routinely **carried** at various places in the network by the Internet (using VoIP) and cable networks. Just as the PSTN is within the scope of telecommunications, so also is an Internet or cable TV network carrying a direct substitute telephony application.

5. Perhaps the most fundamental change, both in terms of technology and its implications for industry structure, has occurred in the architecture of telecommunications networks. Architecture in this context refers to the functional description of the general structure of the system as a whole and how the different parts of the system relate to each other. Previously the PSTN, cable, and data networks coexisted as separately owned and operated networks carrying different types of communications, although they often shared a common technology base (such as point-to-point digital communications) and some facilities (e.g., high-speed digital pipes shared by different networks). How are the new networks different? First, they **are integrated**, meaning that all media— be they voice, audio, video, or data—**are increasingly communicated** over a single common network. This integration offers economies of scope and scale in both capital expenditures and operational costs, and also allows different media to be mixed within common applications. As a result, both technology suppliers and service providers are increasingly in the business of providing telecommunications in all media simultaneously rather than specializing in a particular type such as voice, video, or data. Second, the networks **are built** in layers, from the physical layer, which **is concerned** with the mechanical, electrical and optical, and functional and procedural means for managing network connections to the data, network, and transport layers, which **are concerned** with transferring data, routing data across networks between addresses, and ensuring end-to-end connections and reliability of data transfer to the application layer, which **is concerned** with providing a particular functionality using the network and with the interface to the user. Both technology (equipment and software) suppliers and service providers tend to specialize in one or two of these layers, each of which seeks to serve all applications and all media. As a consequence, creating a new application may require the participation and cooperation of a set of complementary layered capabilities. This structure results in a horizontal industry structure, quite distinct from the vertically integrated industry structure of the Bell System era.

All these changes suggest a new definition of telecommunications: *Telecommunications is the suite of technologies, devices, equipment, facilities, networks, and applications that support communication at a distance.*

6. The range of telecommunications applications is broad and includes telephony and video conferencing, facsimile, broadcast and interactive television, instant messaging, e-mail, distributed collaboration, a host of Web- and Internet-based communication, and data transmission. Of course, many if not most software applications communicate across the network in some fashion, even if it is for almost incidental purposes such as connecting to a license server or downloading updates. Deciding what is and is not telecommunications is always a judgment call. Applications of information technology range from those involving almost no communication at all (word processing) to simple voice communications (telephony in its purest and simplest form), with many gradations in between. As supported by the horizontally homogeneous layered infrastructure, applications of various sorts increasingly incorporate telecommunications as only one capability among many. For example telephony, as it evolves into the Internet world, is beginning to offer a host of new data-based features and integrates other elements of collaboration (e.g., visual material or tools for collaborative authoring). Another important trend is machine-to-machine communication at a distance, and so it **cannot be assumed** that telecommunications applications exclusively involve people.

(National Research Council. 2006. *Renewing U.S. Telecommunications Research*. <https://doi.org/10.17226/11711>. Reproduced with permission from the National Academy of Sciences, Courtesy of the National Academies Press, Washington, D.C.)

VOCABULARY AND COMPREHENSION

➤ Read the text about telecommunications and give each of the six sections a subtitle.

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____

➤ Find the words in the text that mean:

1. information converted into a particular form (sect. 1) _____
2. added as a quality (sect. 2) _____
3. scattered/dispersed group work (sect. 2) _____
4. the transmission of wide bandwidth data over
a high-speed internet connection (sect. 2) _____
5. operating by using equipment on the surface
of the earth (sect. 2) _____
6. acceptable according to the law/rules (sect. 3) _____
7. complemented and improved (sect. 4) _____
8. replaced (sect. 4) _____
9. a permanent direct communication link
between two parties (sect. 5) _____
10. funds used by a company to acquire, upgrade,
and maintain physical assets (sect. 5) _____
11. happening in connection with something else, but not
as important as it, or not intended (sect. 6) _____
12. a method of producing content using more
than one author (sect. 6) _____

LANGUAGE WORK – The Passive

The passive is used in formal, scientific and technical writing, when describing procedures, experiments and similar, to sound objective. Each verb tense has a passive voice. The passive is formed by:

TO BE + PAST PARTICIPLE

The verb TO BE is put into the tense of the active verb and the PAST PARTICIPLE is formed from the active verb. The object of the active sentence becomes the subject of the passive sentence.

Nowadays, we **use computers** on a daily basis. (computers - object) ACTIVE
(active verb in Present Simple)

Nowadays, **computers are used** on a daily basis. (computers – subject) PASSIVE
(passive verb in the Present Simple: are - plural form of the verb to be in the Present Simple; used - past participle of the verb to use)



If you want to mention the agent in the sentence, you have to use BY.

Computers **are used BY** people on a daily basis.

THE VERB TO BE

When forming the passive, the verb TO BE changes its form depending on the verb tense:

Present Simple:	am, is, are
Present Continuous:	am being, is being, are being
Past Simple:	was, were
Past Continuous:	was being, were being
Present Perfect:	has been, have been
Past Perfect:	had been
Future simple:	will be

PAST PARTICIPLE

The past participle of regular verbs is formed by adding -ED or -D to the infinitive of the verb.

The past participle of irregular verbs is found in the third column of the irregular verbs list.

- Find examples of the passive in the text on telecommunications (*in bold*) and decide which tense they are in. Then, turn the sentences into the active form, where possible.

- Read the text, that your teacher gives you, about Networks from BBC's Bitesize and complete the gaps with missing words you fill find in the box. After reading, take the [QUIZ](#).

VIDEO

[Forget Wi-Fi. Meet the new Li-Fi Internet.](#)

- Watch the video and answer the following questions.
 - Why is this breakthrough important?
 - How is data transmitted over Li-Fi?
 - Think about the benefits of Li-Fi and how it can complement the existing Wi-Fi technology.



LANGUAGE WORK – Phrasal Verbs

Phrasal verbs are verbs that consist of a VERB + PARTICLE.

Some of the typical particles are as follows: on, at, in, into, for, off, up, out, to, over, through, away, back, down, about, etc.

Turn on the computer.

Look at the photos.

TWO TYPES OF MEANING:

1. the meaning can be easily understood from its two parts:
Please, **look at** the photos. (**view**)
2. idiomatic meaning, not predictable from its parts:
He **takes after** his father. (**resemble**)



TYPES OF PHRASAL VERBS:

1. Intransitive – no object
My computer **broke down** yesterday. (**stopped working**)
2. Transitive (separable) – you can separate the verb from the particle
Turn on the computer.
Turn the computer **on**.
Turn it on. (If the object is a pronoun the particle must follow it. ~~Turn on it.~~)
3. Transitive (inseparable)
You can **look for** information on the Web.
~~You can look information for on the Web.~~

EXTRA INFO:

- ✓ some phrasal verbs have three parts: verb + adverb + preposition
They **came up with** some great ideas at the meeting. (**brainstormed**)
- ✓ some phrasal verbs have more than one meaning
When you come to the office you should **take off** your hat. (**remove**)
He **took off** without saying goodbye. (**left**)
- ✓ many verbs are followed by a preposition but are not phrasal verbs
All the computers are **connected // to** the same printer.

➤ **Fill in the gaps with the appropriate phrasal verb.**

back up	type/key in	zoom in/out	switch on/off	turn on/off
turn up/down	charge up	cut out	scale up/down	print out
log in/on	log off/out	pick up	scroll across/down/up	plug in

1. Sometimes you need to _____ your smartphone and then turn it back on to resolve some issues.
2. My laptop _____ while I was writing the last page of my essay.
3. I need to buy a new smartphone because I need to _____ it _____ every day.
4. After using a public computer, you should always _____.
5. We should _____ the fonts so people can read easier.
6. Anytime I connect to a Wi-Fi, my smartphone _____ my email.
7. I am going to _____ my laptop as soon as I get home, because my battery is dead.
8. I don't like to _____ passwords. Instead, I prefer to use the fingerprint login.
9. You should _____ all your files if you don't want to lose any work.
10. Sometimes we have to _____ documents, but we prefer to keep everything in electronic format.
11. If you want to see the details in this picture, you should _____.
12. When I go to sleep I always _____ my mobile phone.
13. I don't like the modern websites where I have to _____ endlessly to find some information.
14. While I'm working, I like to _____ the music.
15. If you want to use the webshop, you will have to _____.

XIII. Beyond the Digital Era

PRE-READING

1. Have digital technologies become a necessity?
2. Which technologies are going to mark future innovations?
3. What might the new period after the Digital Era be called?



READING – AUTHENTIC TEXTS

Read the text and then do the **Vocabulary & Comprehension exercises.**



[The Industrial Era Ended, and So Will the Digital Era](#)



VOCABULARY AND COMPREHENSION

➤ **Match the terms in A (1-10) with the definitions in B (a-j).**

A	B
1. GENOMICS	a. any device that uses physical artificial neurons (made from silicon) to do computations
2. SILICON WAFER	b. the action of making something accessible to everyone
3. MOORE'S LAW	c. allows non-technical users to program without writing lines of code
4. NO-CODE PLATFORM	d. the number of transistors in a dense integrated circuit (IC) doubles about every two years
5. MATERIALS SCIENCE	e. performing calculations based on the probability of an object's state before it is measured (storing data in qubits)
6. QUANTUM COMPUTING	f. the action or process of treating something as a product that can be bought and sold
7. NEUROMORPHIC CHIPS	g. energy that comes from renewable sources that do not pollute
8. COMMODITIZATION	h. the study of the properties of solid materials and their application
9. DEMOCRATIZATION	i. a thin disk of semiconductor material that serves as a substrate for a microelectronic device
10. CLEAN ENERGY	j. the study of the full genetic complement of an organism

➤ **Answer the questions about the text.**

1. What happens to every new technology that is discovered?
2. Explain the three reasons the author gives to support his belief that the digital era is ending.
3. What will happen to future innovations and technologies? Explain the difference when compared to digital technologies.

LANGUAGE WORK - Adverbs

Adverbs are used to modify verbs, adjectives and other adverbs and they tell you **how**, **when** or **where** something happens.

HOW: You can **easily** download it from that website.

WHEN: I need to get up **early** when I go to work.

WHERE: Gamers can also play **internationally**.

The form:

Adverbs are usually formed by adding **-ly** to an adjective.

complete (adjective) → completely

easy (adjective) → easily



EXTRA INFO:

- adverb from *good* is *well*
- some adjectives also end in **-ly**: friendly, lovely, lonely
- some words have the same form as an adjective and an adverb:
This is a very **fast** processor. (adjective)
You can do this really **fast** if you concentrate. (adverb)

- **Find adverbs (that end in -ly) in the text *The Industrial Era Ended, and So Will the Digital Era* and put them into three groups: HOW, WHEN and WHERE.**

VIDEO



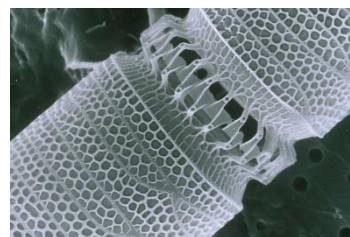
Watch the video and write down the ten technology trends in the video and take notes for each trend. After watching the video, check your facts in the [ARTICLE](#).

[The 10 Tech Trends That Will Transform Our World](#)

DISCUSSION

- **Discuss these predictions in pairs and decide whether you agree or disagree. Give reasons for your answer.**

1. There will be no personal computers.
2. Artificial intelligence will dominate the workplace.
3. Deliveries will be made by delivery drones.
4. Smartphones will become obsolete.
5. Self-driving vehicles will be mandatory.
6. We will rely entirely on renewable energy.
7. All households will have robots.
8. Virtual reality will be linked to our brains.
9. We will be able to use space-based solar power.
10. We will be using objects made from utility fogs³⁷.



LANGUAGE WORK - The Future

There are many verb tenses in English that can be used to express the future.

The four future tenses are:

FUTURE SIMPLE (will/won't + verb)

- predictions without having present evidence
It **will come** to an end, sooner or later.
- hopes and promises
I hope I **will get** a job by the end of this month.
- instant decision
No problem, I'll **help** you with that.



GOING TO FUTURE (be going to + verb)

- intention
I am **going to buy** a new laptop next week.
- prediction with having present evidence
Be careful or you're **going to delete** all the files with just one click.

FUTURE CONTINUOUS (will be + -ing)

- actions in progress at a specific time in the future
In ten years time, children **will be carrying** their own tablets to school.

FUTURE PERFECT (will have + past participle)

- actions finished at a specific time in the future
By that time, I **will have** already **finished** the game.

³⁷ trillions of interlinked microscopic 'foglets', each equipped with a tiny computer - nanobots

The future can also be expressed with some present tenses:

PRESENT CONTINUOUS (be + verb-ing)

- future arrangement
I'm **meeting** the web designers tomorrow.

PRESENT SIMPLE (bare infinitive + (e)s -3rd person)

- scheduled event
The updates **start** at 1:00 AM on Sunday.

➤ **Complete the sentences with the correct future form in brackets.**

1. By this time next month, they _____ (fix) my laptop.
2. I've finally decided, I _____ (install) Windows 11.
3. In twenty years, we _____ (not use) smartphones.
4. I hope we _____ (learn) how to preserve more energy in the years to come.
5. In the future, customers _____ (expect) all products to feature some kind of artificial intelligence.
6. By 2050, space tourism _____ (be) the most usual leisure offer.
7. Gene editing and synthetic biology _____ (probably + change) the way we produce products.
8. According to everything we have seen so far, nanotechnology _____ (deliver) major breakthroughs.
9. Don't do that or you _____ (delete) all the data we have gathered today.
10. I _____ (have) the online meeting on Friday.