МІНІСТЕРСТВО ОСВІТИ І НАУКИ УКРАЇНИ
НАЦІОНАЛЬНИЙ УНІВЕРСИТЕТ «ЧЕРНІГІВСЬКА ПОЛІТЕХНІКА»

COMPUTER ENGINEERING
Методичні вказівки до практичних занять та для самостійної роботи студентів денної форми навчання спеціальностей 121 – Інженерія програмного забезпечення та 123 - Комп'ютерна інженерія
з дисципліни «Іноземна мова»

Обговорено і рекомендовано
на засіданні кафедри іноземних мов
професійного спрямування

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ЗМІСТ

Вступ

Методичні вказівки призначені для студентів вищих навчальних закладів денної форми навчання спеціальності 123 Комп'ютерна інженерія.

Мета даних методичних вказівок – забезпечити формування у студентів навичок усного та писемного мовлення у професійному дискурсі.

Методичні вказівки складаються з двох модулів (4 розділи – по 2 у кожному модулі). Кожен розділ містить тематичний текст для опрацювання та посилання на онлайн-ресурси з певним завданням, завдання для самостійного вивчення а також фінальні комунікативні завдання.

Матеріал, розміщений у методичних вказівках, сприятиме формуванню англомовної компетентності студентів та створює основу для їх успішної комунікації у англомовному професійному середовищі та виконання робочих завдань у сфері комп'ютерної інженерії.

MODULE 1
I. Digital revolution
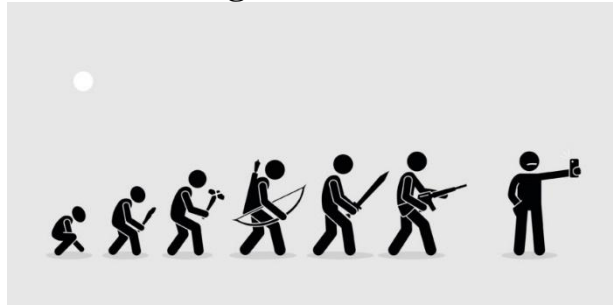
Questions for group discussion:
What do you think represents the picture above?

Oxford debates

Make two groups. *Group A.* Write arguments for the digital revolution.
Group B. Write arguments against the digital revolution.
Give your arguments and counterarguments, reacting to what the other group says.
Your aim is to prove the point of your group!

Remember the phrases for effective debates:

Reacting	Adding more points
It's true that ... However, ...	In addition to that,...
While you might say that ..., it's important to remember that ...	You also have to consider...
	Furthermore,...
I agree with you that ... On the other hand, ...	Moreover,...
Although it is true that... I believe that...	What is more,...
I agree that... , but we must remember that...	I might also add that...
	Not to mention the fact that...
I can understand that... Nevertheless, ...	

Go out of your group. What do you personally think of the matter?

Exercise 1. Read the text "Digital Revolution" and say which of your ideas are mentioned.

Digital revolution

An explosion in information technology is remaking the world, leaving few aspects of society untouched. In the space of 50 years, the digital world has grown to become crucial to the functioning of society. The revolution has proceeded at breakneck speed — no technology has reached more people in as short a space of time as the Internet — and it has not finished yet.

Digitization is generally seen as a positive force. The governments of countries such as Estonia, for instance, are embracing digital technology to become more efficient and transparent to their citizens.

However, emerging technologies such as artificial intelligence (AI) are sometimes greeted with fear. For example, as self-driving cars near fruition, the public's willingness to ride in them is declining. And concern over the impact of AI on people's jobs is growing, even though economists say that occupations are likely to adapt to technological change, rather than be lost altogether.

There are also worries about the effects of smartphones, video games and social media on our mental well-being. These concerns are so prominent that the tech giants of Silicon Valley are already starting to take steps to address them. But many researchers contend that evidence of harm — and of the effectiveness of corrective interventions — is notably lacking.

An increasing amount of our culture exists only in digital form. Archivists around the world are taking action to preserve what they can for future generations. However, the content of the Internet does not represent everybody. If the Internet is to realize its democratizing potential, it must better represent and serve people who are currently marginalized by their gender or their skin colour.

[Reference: https://www.nature.com/articles/d41586-018-07500-z]

Exercise 2. Write down 10 key words of this article:

_____

_____

_____

Exercise 3. Do you think issues brought up in this article are worth attention? Why?

Exercise 4. Look at the history of digital revolution. Work in groups and decide top 5 inventions that affected our world the most. Explain your choice.
[Reference: https://stfc.ukri.org/news-events-and-publications/features/rise-of-the-machines/]

A BRIEF HISTORY OF THE DIGITAL REVOLUTION

We're all living in the information age. From healthcare to education, technology has transformed our lives, and the digital revolution shows no sign of slowing down

Present Day

2016 — The virtual reality headset, Oculus Rift, becomes available to consumers

2012 — Google begins testing driverless cars

2011 — Bitcoin becomes the first widely accepted fully digital currency

2010 — Apple's launch of the iPad propels tablet computers into the mainstream

2009 — Commercial introduction of 3D printers

2007 — The iPhone is launched and smartphones usage explodes

2005 — YouTube launches with a video of the site's co-founder at the zoo: a clip that has garnered almost 40 million views

2004 — Facebook is born, and a new age of social media begins

2003 — Skype launches instantly connecting people around the world via video

2000 — Broadband is introduced to the UK, providing much faster internet access

1999 — Bluetooth technology is introduced to the world

1997 — Launch of first modern social media site – Six Degrees

1994 — Smartphone is released, supporting calls, email and fax

1992 — Commercial dial up internet becomes available, cue screeching noises

1991 — CERN's web browser software is released for public use

1990 — 0.05% of people are using the internet

1989 — Tim Berners Lee invents the World Wide Web whilst working at CERN

1988 — A fully digital camera is released, offering storage for up to 10 photos

1984 — First mobile phone launched, costing ~$4,000. A 10-hour charge provides 30 minutes use

1982 — ABBA become the first artists to have an album produced on CD

1981 — The laptop computer is born, sporting a screen little bigger than a matchbox

1972 — Games console released, along with precursor to the iconic game Pong

1971 — First email is sent, reading something along the lines of: QWERTYUIOP

1969 — APRANET network established: an early precursor to the internet

1951 — First commercially available computer released, for simple arithmetic and data handling

1950 — An early pager is launched for physicians in New York City

1947 — The transistor is invented: data transfer devices that underpin digital tech

Science & Technology Facilities Council

Exercise 5. Read the abstract from the article "Future technology: 25 ideas about to change our world" from BBC Science Focus Magazine. In which of the ideas would you invest and why?

1. Artificial eyes look to the future

A raft of technologies is coming to market that restore sight to people with different kinds of vision impairment. In January 2021, Israeli surgeons implanted the world's first artificial cornea into a bilaterally blind, 78-year-old man. When his bandages were removed, the patient could read and recognise family members immediately. The implant also fuses naturally to human tissue without the recipient's body rejecting it.

Researchers at Montash University in Australia are working on trials for a system whereby users wear a pair of glasses fitted with a camera. This sends data directly to the implant, which sits on the surface of the brain and gives the user a rudimentary sense of sight.

2. Human-powered wearables

Scientists have found a way to harvest some of the energy you spend when you exercise and turn it into electricity. No one will be plugging themselves into the grid any time soon, but researchers at the University of Colorado, Boulder, believe their technology could power a heart-rate monitor or fitness tracker. The team was able to fit thermoelectric generators into stretchable film bands that can be worn around the wrist. They cost less than $10 to make, and because they're made from a liquid metal and polymer, they are both self-healing and easy to recycle.

3. Airports for drones and flying taxis

Our congested cities are in desperate need of a breather and relief may come from the air as opposed to the roads. Plans for a different kind of transport hub – one for delivery drones and electric air-taxis – are becoming a reality, with the first Urban Air Port receiving funding from the UK government.

It's being built in Coventry. Powered completely off-grid by a hydrogen generator, the idea is to remove the need for as many delivery vans and personal cars on our

roads, replacing them with a clean alternative in the form of a new type of small aircraft, with designs being developed by Huyundai and Airbus, amongst others.

4. Smart sutures that detect infections

How does a doctor know when a patient's wound is infected? Well, they could wait for the patient to start displaying signs of an infection, or they could talk to a high school student from Ohio who has developed an ingenious and lifesaving invention.

At the age of 17, Dasia Taylor invented sutures that change colour from bright red to dark purple when a wound becomes infected, detecting a change in the skin's pH level. When a wound from an injury or surgery becomes infected, its pH rises from 5 to 9. Taylor found that beetroot juice naturally changes colour at a pH of 9, and used that as a dye for suture material.

While other solutions are available – smart sutures coated with a conductive material can sense the status of a wound by changes in electrical resistance and send a message to a smartphone – these are less helpful in developing countries where smartphone use is not widespread.

5. Energy storing bricks

Researchers led by Washington University in St Louis, in Missouri, US, have developed a method that can turn the cheap and widely available building material into "smart bricks" that can store energy like a battery.

Although the research is still in the proof-of-concept stage, the scientists claim that walls made of these bricks "could store a substantial amount of energy" and can "be recharged hundreds of thousands of times within an hour".

The researchers developed a method to convert red bricks into a type of energy storage device called a supercapacitor. This involved putting a conducting coating, known as Pedot, onto brick samples, which then seeped through the fired bricks' porous structure, converting them into "energy storing electrodes".

6. Robotic guide dogs

A student at Loughborough University has designed a "robotic guide dog" that will help support visually impaired people who are unable to house a real animal. The product, designed by Anthony Camu, replicates the functions of a guide dog as well as programming quick and safe routes to destinations using real-time data.

Theia, named after the titan goddess of sight, is a portable and concealable handheld device that guides users through outdoor environments and large indoor spaces with very little input. Using a special control moment gyroscope (CMG), Theia moves users' hands and physically "leads" them – much like holding the brace of a guide dog. It will have a fail-safe procedure for high-risk scenarios, such as crossing busy roads – pushing the user back into a "manual mode", similar to using a cane.

7. Sweat powered smartwatches

Engineers at the University of Glasgow have developed a new type of flexible supercapacitor, which stores energy, replacing the electrolytes found in conventional

batteries with sweat. It can be fully charged with as little as 20 microliters of fluid and is robust enough to survive 4,000 cycles of the types of flexes and bends it might encounter in use.

The device works by coating polyester cellulose cloth in a thin layer of a polymer, which acts as the supercapacitor's electrode. As the cloth absorbs its wearer's sweat, the positive and negative ions in the sweat interact with the polymer's surface, creating an electrochemical reaction which generates energy.

8. Self-healing 'living concrete'

Scientists have developed what they call living concrete by using sand, gel and bacteria. Researchers said this building material has structural load-bearing function, is capable of self-healing and is more environmentally friendly than concrete – which is the second most-consumed material on Earth after water.

The team from the University of Colorado Boulder believe their work paves the way for future building structures that could "heal their own cracks, suck up dangerous toxins from the air or even glow on command".

9. Living robots

Scientists create 'living robot'. Tiny hybrid robots made using stem cells from frog embryos could one day be used to swim around human bodies to specific areas requiring medicine, or to gather microplastic in the oceans.

10. Tactile virtual reality

Researchers from Northwestern University have developed a prototype device which aims to put touch within VR's reach, using a flexible material fitted with tiny vibrating components that can be attached to skin.

The system, known as epidermal VR, could be useful in other cases as well, from a child touching a display relaying the gesture to a family member located elsewhere, to helping people with amputations renew their sense of touch. In gaming, it could alert players when a strike occurs on the corresponding body part of the game character.

The team's design features 32 vibrating actuators on a thin 15cm by 15cm silicone polymer which sticks on to the skin without tape or straps and is free of large batteries and wires.

Scientists hope that the technology could eventually find its way into clothing, allowing people with prosthetics to wear VR shirts that communicate touch through their fingertips.

Exercise 6. Summarise the text from Ex. 5 in 10 sentences. Mention the upcoming inventions and their effects.

Exercise 7. Work in groups. Think of the spheres where you see opportunities for digital transformations. Make a list of them. Note what kind of new technology is needed there.

Present your group discussion results. On which of the suggested technology you would like to work on in the future?

Focus on Grammar

The <u>real</u> condition

0 Conditional:
(if + Present Simple, ... Present Simple)
If you heat water to 100 degrees, it boils.

1st Conditional:
(if + Present Simple, ... will + infinitive)
If you study hard, you will pass all exams.

The <u>unreal</u> condition

2nd Conditional:
(if + past simple, ... would + infinitive)
If I had a lot of money, I would travel around the world. – talking of the <u>present</u>

3rd Conditional
(if + past perfect, ... would + have + past participle)
If I had studied English at school, I would have passed the entry test better. – talking of the <u>past</u>

Mixed (3rd + 2nd)
(if + past perfect, ... would + infinitive)
If I had studied English at school, I would have less problems now. – <u>past</u> situation, <u>present</u> result.

Exercise 8. Write 5 conditions of safe usage of digital technologies.
E.g. If you spend less than 2 hours in front of the computer, your eyes won't hurt.

Exercise 9. Write 5 conditions of what our life would be like without digital revolution.

E.g. If scientists hadn't invented computers, we would still write everything with our hands.

Final task

Write an opinion essay (150 – 200 words) to the university magazine on the topic "Digital revolution – pros and cons".

Note:

Remember to start your essay with a short introduction into the topic and your opinion on it, and to finish with a conclusion.

Between the introduction and conclusion, there are usually 2-3 paragraphs.

There are two standard variants of a paragraph structure in English.

1. Statement (1 sentence) – supporting facts and figures (1-3 sentences).

E.g. University is a huge structure. Apart from the university administration and usual subject departments, there is also a network of administrative offices, like International Relations Office or Academic Office, as well as sport facilities, library, campus grounds etc.

2. Facts and figures (1-3 sentences) – main statement (1 sentence).

E.g. Last year I managed to visit two countries and participate in several projects. Moreover, I published an article in Web of Science series and started writing one for a Ukrainian journal. So, I must say that 2020 turned out to be not that bad.

Google for the recent articles on the new inventions in the digital sphere. Write an overview of the article, including:
1. the name of the author(s)
2. the title of the article
3. the link to the resource
4. the main idea of the invention
5. its short description
6. your opinion on the matter

Remember to avoid direct citation where possible, using paraphrasing instead.

II. Hardware
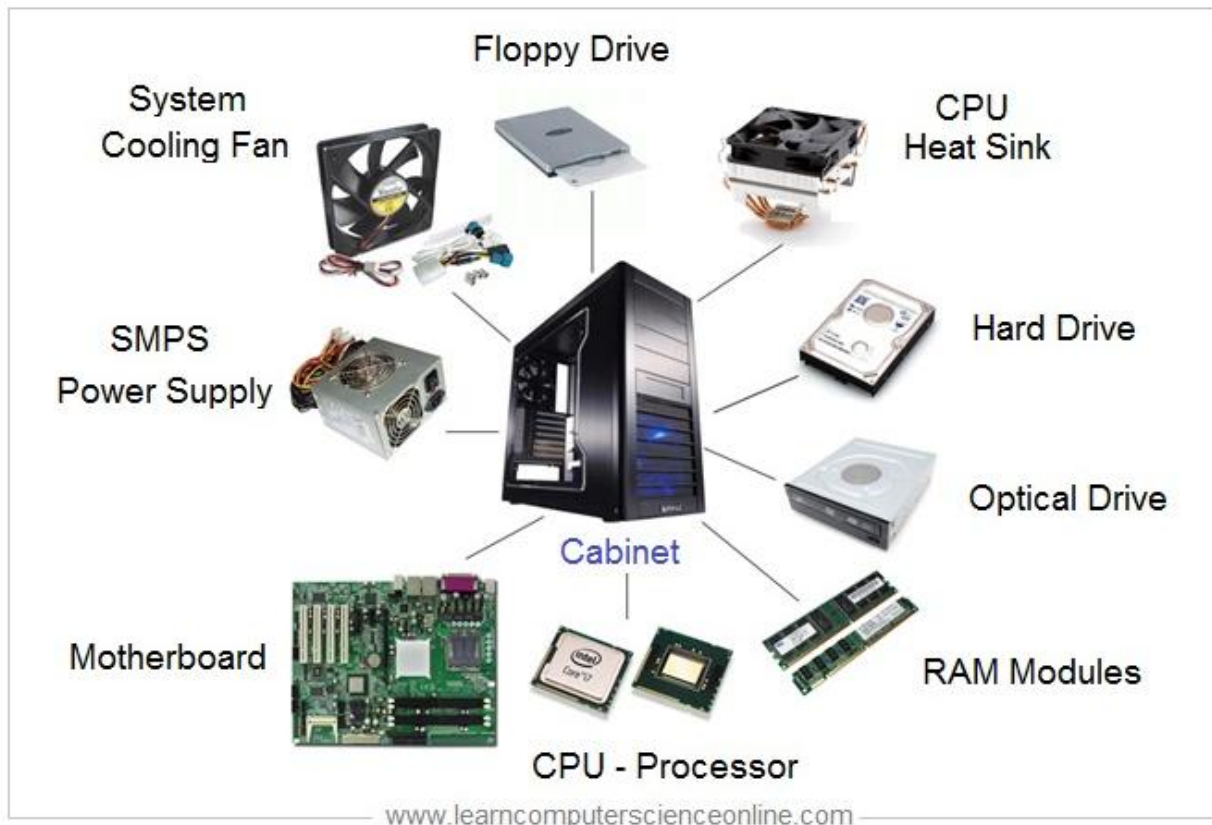
Exercise 1. Translate the terms in the picture above. How would you define what is the hardware?

Exercise 2. Read the text and fill in the chart after it.

Computer hardware is a collective term used to describe any of the physical components of an analog or digital computer. The term hardware distinguishes the tangible aspects of a computing device from software, which consists of written instructions that tell physical components what to do.

Computer hardware can be categorized as having either internal or external components. Internal components include items such as the motherboard, central processing unit (CPU), random access memory (RAM), hard drive, optical drive, heat sink, power supply, transistors, chips, graphics processing unit (GPU), network interface card (NIC) and Universal Serial Bus (USB) ports. These components collectively process or store the instructions delivered by the program or operating system (OS).

External components, also called peripheral components, are those items that are often connected to the computer in order to control either its input or output. Common input components include a mouse, keyboard, microphone, camera, touchpad, stylus, joystick, scanner, USB flash drive or memory card. Monitors, printers, speakers, headphones and earphones/earbuds are all examples of output computer hardware components. All these hardware devices are designed to either provide instructions to the software or render results from its execution.

Types of hardware include the following:

Motherboard: The motherboard is the computer's central communications backbone connectivity point through which all components and external peripherals connect. The motherboard is the main printed circuit board in a computer. Also called the mainboard, the motherboard holds important components, including the CPU, RAM, power supply, graphics card and sound card.

CPU: The CPU is responsible for processing most of the computer's data, turning input into output.

RAM: The hardware in a computer where the OS, application programs and data that are being used are kept so the device's processor can quickly reach them. As the main memory of a computer, RAM is much faster to read from and write to than other types of storage, including a hard disk drive (HDD), solid-state drive (SSD) and optical drive. RAM is volatile, meaning that data remains in RAM if the computer is on, but it's lost when the computer is turned off. The OS and other files are reloaded into RAM, usually from an SSD or HDD, when the computer is rebooted.

Display screen: A display screen may be an external monitor, or it may be built into the computer. A touchscreen display is sensitive to pressure. As such, a user interacts with the device by touching pictures or words on the screen.

HDD: A nonvolatile memory (NVM) hardware device, an HDD stores OS files, application problems, media and other documents. The HDD can store data permanently even in the event of a power failure.
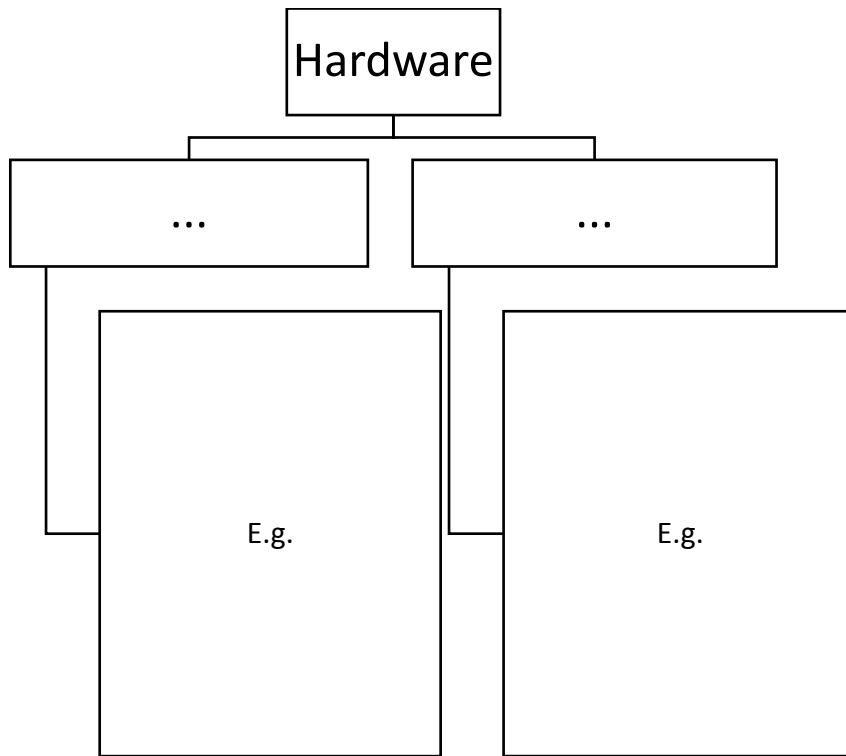
SSD: A type of nonvolatile storage device that stores persistent data on solid-state flash memory. An SSD consists of a flash controller and NAND flash memory Unlike an HDD, an SSD doesn't have any moving parts. SSDs use flash-based memory, which is significantly faster than traditional mechanical hard disks. Since they're nonmechanical, SSDs use less power, which means longer battery life when they're built into laptop computers.

Graphics card: Responsible for rendering graphics in a computer and projecting information onto a screen, a graphics card aims to remove the processing strain from the processor or RAM.

Removable drives: Any type of storage device that can be removed from a computer while the system is running, including USB cards and optical discs, such as compact discs (CDs), Blu-ray discs and digital versatile discs (DVDs).

Power supply: The power supply converts the power from the outlet into usable power for the other components inside the computer. Typically, more power is needed to run more complex systems. For example, a desktop computer with a high-end motherboard, a custom liquid cooling loop and dual GPUs will need a higher wattage computer power supply than a system that is not so complex.

[Reference: https://searchnetworking.techtarget.com/definition/hardware]

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                    ┌──────────────┐
                    │   Hardware   │
                    └──────┬───────┘
            ┌──────────────┴──────────────┐
    ┌───────┴───────┐             ┌────────┴──────┐
    │      ...      │             │      ...      │
    └───────┬───────┘             └───────┬───────┘
     ┌──────┴──────────┐          ┌───────┴─────────┐
     │                 │          │                 │
     │                 │          │                 │
     │      E.g.       │          │      E.g.       │
     │                 │          │                 │
     │                 │          │                 │
     └─────────────────┘          └─────────────────┘
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Exercise 3. Read the text again and answer the questions:
1. What is the difference between hardware and software?
2. What are the functions of peripherals?
3. What is the key element of the hardware?
4. What does "volatile" mean?
5. What is the difference between HDD and SSD?
6. When is a higher wattage computer power supply needed?

Exercise 4. Use the chart and your answers in Ex. 3 to tell about the hardware.

Exercise 5. Work in groups. Discuss what are the best computer characteristics nowadays and fill in the table. You may use the links to consult:
https://www.microsoft.com/en-us/store/b/pc
https://www.walmart.com/browse/electronics/all-desktop-computers/3944_3951_132982

Characteristic	Value
Memory	
Hard drive capacity	
Processor speed	
Screen size	
Ports	
Battery	
Camera	
other	

Exercise 6. Describe your computer, giving its characteristics and functionality.

Exercise 7. If you could buy a new laptop, which one would you choose? Look at the suggestions and select 1. Explain your choice.

	This item 2020 Premium HP 24 All-in-One Desktop Computer 23.8" FHD WLED Anti-Glare Display AMD Athlon Silver 3050U Processor 16GB RAM 1TB SSD Pop-Up Webcam DVD-Writer HDMI WiFi Win 10 + iCarp HDMI	Acer Aspire C27-962-UA91 AIO Desktop, 27" Full HD Display, 10th Gen Intel Core i5-1035G1, NVIDIA GeForce MX130, 12GB DDR4, 512GB SSD, 802.11ac Wi-Fi, Wireless Keyboard and Mouse, Windows 10 Home	HP 27 Pavilion All-in-One PC, 10th Gen Intel i7-10700T Processor, 16 GB RAM, Dual Storage 512 GB SSD and 1TB HDD, Full HD IPS 27 Inch Touchscreen, Windows 10 Home, Keyboard and Mouse (27-d0072, 2020)
	Add to Cart	Add to Cart	Add to Cart
Customer Rating	★★★★½ (149)	★★★★½ (785)	★★★★½ (472)
Price	$899⁰⁰	$799⁹⁹	$1,739.98
Sold By	Cardinal Pro Electronics	Amazon.com	Rocket Computer
Computer Memory Size	16 GB	12 GB	16 GB
CPU Model	AMD A Series	Core i5	Intel Core i7
CPU Model Manufacturer	AMD	Intel	Intel
CPU Speed	2.30 GHz	3.6 GHz	2 GHz
Screen Size	23.80 inches	27 inches	27 inches
Graphics Coprocessor	Integrated AMD Radeon Graphics	—	Intel UHD Graphics 630
Hard Disk Size	1 TB	512 GB	1 TB
Hardware Platform	all in one desktop computer	—	—
Item Dimensions	21.29 x 8.05 x 16.12 inches	24.21 x 0.27 x 17.72 inches	24.12 x 8.19 x 18.73 inches
Operating System	Windows 10	Windows 10 Home	Windows 10 Home
Processor Count	2	4	—

Exercise 8. Imagine you work in a computer store. You have received a unique computer. Think what it is like. Do your best to sell it at the computer fair with the best price.

Focus on Grammar

Passive voice

Read the text from Ex. 2 and find examples of the passive voice usage. Why is it used there?

Use the verb "store" in different tenses, passive voice, as in the example:

Subject	be (changed)	past participle	the rest
Present Simple			
The computer	is	used	every day.
Past Simple			
The computer	was	used	yesterday.
Future Simple			
The computer	will be	used	tomorrow.
Present Continuous			
The computer	is being	used	now.
Past Continuous			
The computer	was being	used	for 6 hours yest.
Present Perfect			
The computer	has been	used	several times today.
Past Perfect			
The computer	had been	used	before I came.
Present Conditional			
The computer	would be	used	if we had electricity
Past Conditional			
The computer	would have been	used	if the electricity hadn't gone off.

Infinitive			
The computer	must be	used	carefully.

Write down 5 things that are done every year.
E.g. The New Year tree is placed in the city square every winter.

_____
_____
_____
_____
_____

Write down 5 things that are being done now.
E.g. The city park is being repaired now.

_____
_____
_____
_____
_____

Write down 5 things that you believe will be done soon.
E.g. I think more trees will be planted in the city soon.

_____
_____
_____
_____
_____

Watch the video "Everything around you can become a computer" at TED (youtube.com). What do you think of the idea? Write your feedback (≈100 words).
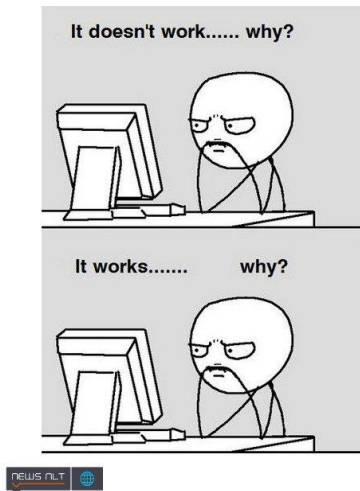
Final task

Work in a group of 3-4 persons. Google the latest achievements, developments in the hardware world. Choose 1 topic and make a short presentation, including:

- the history of research/development
- who made the invention
- what is the essence of it
- who will benefit from it, where it will be used
- what do you think about it

Questions for group discussion:
What is developing faster – hardware or software? Why?

Task 1. Read the quotes of engineers and developers below. Which one is close to you? Why?

"The test of the machine is the satisfaction it gives you. There isn't any other test. If the machine produces tranquillity, it's right. If it disturbs you, it's wrong until either the machine or your mind is changed." ― Robert M. Pirsig

"The computer programmer is a creator of universes for which he alone is the lawgiver. No playwright, no stage director, no emperor, however powerful, has ever exercised such absolute authority to arrange a stage or field of battle and to command such unswervingly dutiful actors or troops." ― Joseph Weizenbaum

"Developer is the one who creates bugs/defects mostly and working code rarely" ― Nipun Varma

"Software testing is not only ensuring absence of bugs, but also ensuring presence of value." ― Amit Kalantri

"People who are really serious about software should make their own hardware" ― Alan Kay

"Automation is no longer just a problem for those working in manufacturing. Physical labor was replaced by robots; mental labor is going to be replaced by AI and software" ― Andrew Yang

Task 1. Work in groups. Read your part of the text. Make a list of 8-10 key words/phrases for your part with translation. Get ready to share the main points with your groupmates.
What Does Software Mean?

Software, in its most general sense, is a set of instructions or programs instructing a computer to do specific tasks.

Software is a generic term used to describe computer programs that run on PCs, mobile phones, tablets, or other smart devices.

Software is often used to describe all the functional aspects of a computer that do not refer to its physical components (hardware). Scripts, applications, programs and a set of instructions are all terms often used to describe software.

Everything that "runs" on a computer, from an operating system, to a diagnostic tool, video game, or app can be defined as software.

The theory of software was first proposed by Alan Turing in 1935 in his essay: Computable numbers with an application to the Entscheidungs problem. However, the word software was coined by mathematician and statistician John Tukey, in a 1958 issue of American Mathematical Monthly in which he discussed electronic calculators' programs.

The Four Categories of Software

Programming software

Programming software is a set of tools to aid developers in writing programs. The various tools available are compilers, linkers, debuggers, interpreters and text editors.

System software

System software serves as a base for application software. System software includes device drivers, operating systems (Oss), compilers, disk formatters, text editors and utilities helping the computer to operate more efficiently.

It is also responsible for managing hardware components and providing basic non-task-specific functions. The system software is usually written in the C programming language.

Application software

Application software is intended to perform certain tasks. Examples of application software include office suites, gaming applications, database systems and educational software.

Application software can be a single program or a collection of small programs. This type of software is what consumers most typically think of as "software."

Malicious software (malware)

Malicious software is intentionally developed to damage computers and/or disrupt other software. Harm is often caused unbeknownst to users who inadvertently installed malware since this type of software usually acts in secret.

Examples of malware are: Spyware, Computer viruses, Trojan horses, Worms, Adware.

Conclusion

In a nutshell, without software, a computer won't perform any function and will simply be a useless, inert machine. Different types of software also exist in direct mutual relations.

For example, an application software such as a word processing software cannot work unless an operating system runs it, and the OS cannot be developed unless a programming software was used in the first place.

Software needs to be installed before it can function, usually by copying it on a computer or smartphone drive from a physical support (CD, DVD, floppy disk, etc.) or by downloading it over the Internet.

When the user operating the computer doesn't want the software anymore, it can be permanently removed by uninstalling it (although some malware may require other software, like an antivirus, to be removed).

Software can be purchased online or in shops, or come for free. Trial versions or shareware allow the users to test the software for free for a limited number of uses or a certain time, after which they can choose to buy it.

Freeware and open source software, instead, can be used without paying anything — the latter even providing the source code used to make the program so that anyone can modify or improve it.

[Reference: https://www.techopedia.com/definition/4356/software]

Share information with other groups. Complete your list of key words/phrases with the ones suggested by your groupmates:

What types of software are interesting for you professionally?

The Infinitive

*The Infinitive is a non-finite form of the verb. It is the **basic form** of a verb which is normally used with the particle 'to'. In the negative infinitive 'not' comes before 'to':* not (to) do, not (to) have done. *The infinitive without 'to' is called a **bare infinitive**.* Let me go. *If there is a word between the 'to' and the verb, it's called a **split infinitive**.* It would take ages to really master the subject.

The infinitive of transitive verbs has 4 active forms and 2 passive ones.

	Simple	Continuous	Perfect	Perfect Continuous
Active	*to do*	*to be doing*	*to have done*	*to have been doing*
Passive	*to be done*	_____	*to have been done*	_____

The infinitive of intransitive verbs has only active forms:
to work   to be working   to have worked   to have been working

*Read about transitive and intransitive verbs at Walden University platform: *https://academicguides.waldenu.edu/writingcenter/grammar/verbs*

A simple infinitive refers to the same time as in the main clause. *e.g.: You were lucky* ***to win***. (The luck & the victory were both in the past.)

A perfect infinitive is used for something before the time in the main clause. *e.g.: I'd like **to have seen** that program yesterday.* (The desire is in the present, but the program is in the past.)

A continuous infinitive is used for something happening over a period. *e.g.: You're lucky **to be winning**.* (You're winning at the moment.)

Ex. 1. Give all the possible forms of the infinitives:

to write, to drive, to break, to jump, to speak about, to look at

*Ex. 2. Paraphrase the sentences using passive infinitives: e.g.: They will **not deliver** the sofa on Friday. – The sofa will **not be delivered** on ...*
1. You can use this saucepan for cooking spaghetti. 2. I have to finish my homework tonight. 3. You ought to have put these clothes away. 4. We should eat this cake immediately.

Ex. 3. Translate the quotations. Find examples of different infinitives: bare, negative, passive, perfect, continuous, perfect continuous.

1.'Politics are too serious a matter to be left to the politicians.' (Ch. de Gaulle) 2. 'When it is not necessary to change, it is necessary not to change.' (a royalist politician) 3. No society can surely be flourishing and happy, of which the far greater part of the members are poor and miserable. (A. Smith) 4. 'It is better to have loved and lost than never to have loved at all. (A. Tennyson) 5. A great mistake you can make in your life is to be continually thinking you are always right. 6. Never tell a young person that anything cannot be done. God may have been waiting centuries for someone ignorant enough of the impossible to do that very thing. (J.A.Holmes)

Ex. 4. Complete the sentences:
1. It's difficult ……………………………………………………………..
2. It can be dangerous …………………………………………………….
3. It was such fun …………………………………………………………
4. To write the first lab ……………………………………………..
5. It's time …………………………………………………………………..
6. My aim is ……………………………………………..…………………
7. My greatest desire has always been ……………..……………………
8. The task was ……………………………………………………………
9. The most difficult thing will be …………………………………………
10. I entered the university ………………………………………………….
11.I'm old enough ……………………………………..……………………
12.Would you be so good as ………………..…………………………….

Ex. 5. Read the text in Task 2. Find examples of infinitive.

Task 2. Read the text and fill in the missing words from the list:
unfamiliar, memory, open-source, preloaded, upgrade, featured, expensive, customize

The operating system's job

Your computer's operating system (OS) manages all of the software and hardware on the computer. Most of the time, there are several different computer programs running at the same time, and they all need to access your computer's central processing unit (CPU), _____, and storage. The operating system coordinates all of this to make sure each program gets what it needs.

Types of operating systems

Operating systems usually come preloaded on any computer you buy. Most people use the operating system that comes with their computer, but it's possible to _____ or even change operating systems. The three most common operating systems for personal computers are Microsoft Windows, macOS, and Linux.

Modern operating systems use a graphical user interface, or GUI (pronounced gooey). A GUI lets you use your mouse to click icons, buttons, and menus, and everything is clearly displayed on the screen using a combination of graphics and text.

Each operating system's GUI has a different look and feel, so if you switch to a different operating system it may seem _____ at first. However, modern operating systems are designed to be easy to use, and most of the basic principles are the same.

Microsoft Windows

Microsoft created the Windows operating system in the mid-1980s. There have been many different versions of Windows, but the most recent ones are Windows 10 (released in 2015), Windows 8 (2012), Windows 7 (2009), and Windows Vista (2007). Windows comes _____ on most new PCs, which helps to make it the most popular operating system in the world.

macOS

macOS (previously called OS X) is a line of operating systems created by Apple. It comes preloaded on all Macintosh computers, or Macs. Some of the specific versions include Mojave (released in 2018), High Sierra (2017), and Sierra (2016).

According to StatCounter Global Stats, macOS users account for less than 10% of global operating systems—much lower than the percentage of Windows users (more than 80%). One reason for this is that Apple computers tend to be more _____. However, many people do prefer the look and feel of macOS over Windows.

Linux

Linux (pronounced LINN-ux) is a family of _____ operating systems, which means they can be modified and distributed by anyone around the world. This is different from proprietary software like Windows, which can only be modified by the

company that owns it. The advantages of Linux are that it is free, and there are many different distributions—or versions—you can choose from.

According to StatCounter Global Stats, Linux users account for less than 2% of global operating systems. However, most servers run Linux because it's relatively easy to_____.

Operating systems for mobile devices

The operating systems we've been talking about so far were designed to run on desktop and laptop computers. Mobile devices such as phones, tablet computers, and MP3 players are different from desktop and laptop computers, so they run operating systems that are designed specifically for mobile devices. Examples of mobile operating systems include Apple iOS and Google Android.

Operating systems for mobile devices generally aren't as fully _____ as those made for desktop and laptop computers, and they aren't able to run all of the same software. However, you can still do a lot of things with them, like watch movies, browse the Web, manage your calendar, and play games.

[Reference: https://edu.gcfglobal.org/en/computerbasics/understanding-operating-systems/1/]

Task 3. Work in groups Use information from the text, as well as your personal experience:

	Pros (+)	Cons (-)
Windows		
Linus		

**Present your findings to the group. Which of the OS do you personally prefer and why?**
Use the phrases to show contrast:
- *unlike (e.g. Unlike pupils, students have a lot of self-study)*
- *in contrast to (e.g. In contrast to pupils, students are already adults)*
- *as opposed to (e.g. As opposed to pupils, students often miss classes)*
- *different from (e.g. Students are different from pupils as they are more mature)*
- *whereas (e.g. Pupils go to a school, whereas students go to a university)*

Self-study task

Watch the video "The mind behind Linux" at TED (youtube.com). What are the main messages/ideas of Linus Torvalds for you? Write your feedback (≈100 words).

IV. Programming
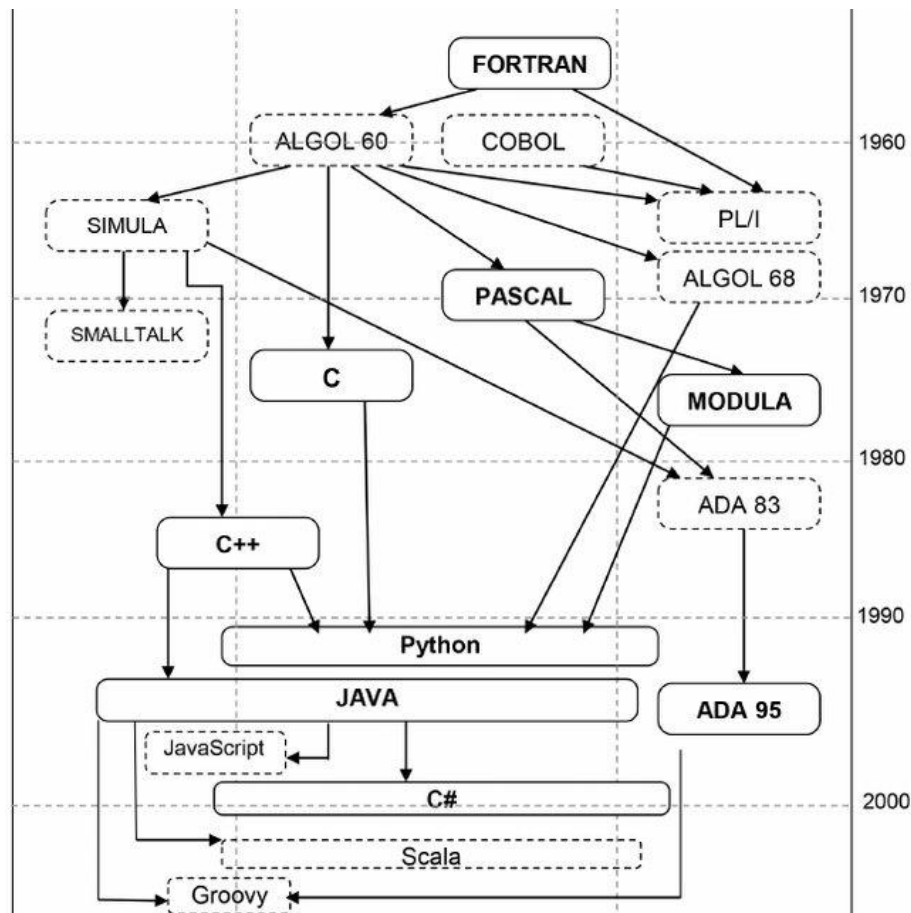
Questions for group discussion:

Rank your interest in programming from 0 (not interested at all) to 10 (extremely interested). Explain.

Can you comment on the picture above? What does it show? What conclusions can we make?

Task 1. Read an extract from the text "Coding vs Programming" by Thinkful. Translate the words in bold.

Coding vs Programming

Anyone with even a remote interest in the world of computers and technology must have encountered the words 'coding' and 'programming'. These terms have become part of our lexicon through pop culture such as TV, movies, and video games. People now use them liberally without understanding their meaning, and often use them **interchangeably**.

But coding and programming are distinct from each other, even though they both refer to software engineering. In short, coding is a **subset** of programming.

While coding and programming have a lot of overlap, there's one main difference. Coding describes one particular skill: the act of writing computer code. Programming involves coding, as well as a range of other, related web development skills.

In the simplest of terms, coding means translating logic or instruction into a language a machine understands. Computers react to strings of ones and zeroes known as the **binary language**. In order to give a computer instructions, we have to speak its own language. So a coder serves as a translator for the computer.

English has to be converted into a computer language like Java in order for a computer to execute any task. This is what's called coding.

Programming, on the other hand, involves a more complex set of processes of which coding is just one. A machine or software is programmed to perform certain tasks using a set of instructions. For instance, a social media platform like Facebook is programmed by a software developer who has to create its different **features** like messaging, like/unlike, status update, image upload, and so on.

The tools used in both coding and programming are also different. A simple text editor would suffice for the purposes of coding. In the case of programming though, a web developer needs analysis tools, modeling programs, code generators, testing frameworks, and the list goes on.

In terms of work methodology, coding follows a **trial-and-error approach** without needing any prior groundwork, while programming is more methodical and requires much more attention to detail.

Different sets of skills and knowledge are required for careers in coding and programming. To become a coder, you'll need **in-depth knowledge** of computer languages such as Java, BASIC, C, C++, COBOL, and a variety of other frontend and backend languages. One or two languages is enough to build a website, but having a broad range of computer vocab at your fingertips will put you ahead in the job market, and help you bring in higher salaries.

To be an expert programmer, you'll need to be a skilled coder but also excellent at math and science, and be able to apply that knowledge in the field of software development. Newbie developers start off by learning advanced programming techniques and mastering a few different languages. Once they've got a few years of experience under their belt, they typically move up the ranks to **senior developer** roles.

Whether you choose to go for coding or take up programming as your ideal career path, you will need to be excellent at math and logic, and fairly adept at science. If you enjoy learning these subjects, you'll relish the challenge of using code to bring your ideas to life in websites and apps.

A programmer usually takes several weeks to deliver a project. The finished product, whether it's a new website, software or app feature, requires thorough, meticulous work from the planning and coding stages, through testing and final launch.

Coding may only take a few hours, since it doesn't typically require research, preparation or **quality testing**.

Another major difference between coding and programming is that programming constitutes high levels of complex thinking and problem solving. While developing a software, programmers have to come up with solutions to potential problems before the process of coding has even begun. Once the groundwork is laid by the programmers, coders simply have to fill in the **blueprint** using their codes.

If you're new to the web development field, you'll likely get hired as an entry-level programmer, rather than a "coder." Coding will be one aspect of your work, but it doesn't capture everything that a developer does to be successful.

Whether your end goal is a Programmer, Developer or Engineer title, you can build a career based on code. You'll enjoy fulfilling work that offers new challenges every day, and puts you in position to build a company's success.

[Reference: https://www.thinkful.com/blog/coding-vs-programming/]

Task 2. Make a 5 sentence conclusion of the information given in Task 1.

Task 3. What career path is more attractive to you: coding or programming? Give reasons.

Task 4*. Can you think of other meanings for coding outside software engineering?

Gerund

The gerund is a non-finite form of the verb which means that it doesn't have the category of person, number, tense and mood. Besides it doesn't have the category of aspect as it is always an 'ing-form'.

Ex. 1. Translate the examples:
*My hobby is **collecting** stamps.*
*He admitted **having been** in the bank at that time but he denied **having robbed** it. I hate **being lied to**.*
*How about **going out** for a meal tonight?*
*She is good at **cooking**.*
***Smoking** is bad for you.*

Ex. 2. Read the quotations and identify 'ing-forms' as gerunds, verbal nouns or continuous verb forms. Explain your choice.

1. One reason I don't drink is that I want to know when I am having a good time. (N.Astor) 2. Thinking is the talking of the soul with itself. (Plato) 3. The secret to creativity is knowing how to hide your sources. (A.Einstein) 4. A witty saying proves nothing. (Voltaire) 5. A celebrity is a person who works hard all his life to become well known, then wears dark glasses to avoid being recognized. (F.Allen) 6. Good breeding consists of concealing how much we think of ourselves and how little we think of the other person. (M. Twain) 7. Having been poor is no shame, but being ashamed of it, is. (B.Franklin)

Ex. 3. Read the text in Task 1 again. Find examples of gerund.

Ex. 4. Complete the sentences with gerunds.
1. _____ is very exciting.
2. _____makes me laugh.
3. _____ gives me a headache.
4. _____ is not my idea of fun.
5. _____ is popular in my country.
6. Not _____ can be dangerous.
7. What I hate most is _____.
8. We are all for _____.
9. I can't stand _____.
10. I sometimes miss _____.
11. Working as a teacher involves _____.
12. That was a new experience for me. I'll never forget_____.

Gerund or Infinitive?

The gerund is more usual in subject position, but the to-infinitive is more usual after introductory 'it'. *E.g.: Heating a big house is expensive. It's expensive to heat a big house.*

Only a gerund is used after 'it's no use/ good' and 'it's worth'. Only an infinitive is used after 'it's useless/ important/ necessary' *E.g.: It's no use arguing with him. It's useless to argue with him.*

After *easy, experience, nuisance* and *fun* both the gerund and a to-infinitive can be used. *E.g.: It wasn't easy finding the money. (пошук) It wasn't easy to find the money. (знайти)*

The gerund is more usual for habitual actions, but the to-infinitive is more usual to introduce an aim, objective, plan, goal, purpose, strategy, task, or idea. *E.g.: Her favourite pastime is watching talk shows. Our main task is to improve the economy.*

Choosing between a gerund and an infinitive, take into account the necessity to make a balanced sentence structure. *E.g.: Seeing is believing. To love is to receive a glimpse of heaven. (K. Sunde)*

'Stop + a gerund' forms an aspect predicate, an infinitive after 'stop' functions as an adverbial modifier of purpose:
stop + doing smth = перестати виконувати дію;
stop + to do smth = зупинитись для того, щоб виконати дію
E.g.: He stopped eating junk food because it's unhealthy. He stopped to drink some tea and then continued working.

When advise, recommend, allow or permit has another object, it takes a to-infinitive, if not – a gerund.
I advised taking a taxi.   They don't allow sunbathing here.
I advised her to take a taxi. They don't allow us to sunbathe here.

Would like, would love, would hate and *would prefer* normally take a to-infinitive, but *like, love, hate* usually take a gerund.
I'd love to go for a swim. It's such a lovely day.
I love swimming. I swim nearly every day.

We use *remember* and *forget* with a to-infinitive to talk about necessary actions and whether we do them or not. We use a gerund to talk about memories of the past.
Did you remember to turn off the electricity? I don't know. I can't remember turning it off.

We use *regret* + to-infinitive for a present action, especially when giving bad news. We use a gerund to express regret about the past

We regret to inform you that your application has been unsuccessful.
I regret wasting / regret having wasted so much time last year.

- ✓ **smb used + to-infinitive** = він робив це раніше
  smb is / was used to + gerund = він звик до цього
  I <u>used to have</u> a cat. = У мене раніше був кіт.
  I <u>am used to living</u> in town. = Я звикла жити у місті.
- ✓ **smb is / was afraid + to-infinitive** = він боїться виконати дію
  smb is / was afraid of + gerund = він боїться наслідків
  He <u>is afraid to clime</u> the tree. = Він боїться лізти на дерево.
  He <u>is afraid of falling</u> down. = Він боїться впасти.
- ✓ **smb is anxious + to-infinitive** = він дуже хоче це зробити
  smb is anxious about + gerund = він переживає через подію
  He <u>is anxious to recover</u> from a heart attack = Він хоче одужати
  He <u>is anxious about having</u> an operation.= Він хвилюється через
- ✓ **smb is keen / interested + to-infinitive** = він зацікавлений у тому, щоб виконати дію
  smb is keen on / interested in + gerund = він цікавиться цим
  He <u>is keen to play</u> in the match. = Він хоче зіграти у матчі.
  He <u>is keen on playing</u> tennis. = Він любить грати в теніс.
- ✓ **smb is sorry + to-infinitive** = йому сумно через це
  smb is sorry + gerund = він вибачається за свій вчинок
  <u>I'm sorry to hear</u> you are leaving. = Мені сумно чути, що ти їдеш.
  <u>I'm sorry for coming</u> late. = Я вибачаюсь, що спізнився.

Ex. 5. Use gerunds or infinitives to complete the story. Add particle 'to' or a preposition if necessary.

Eli Bilston always enjoyed ...tell… us about his life, and we were always afraid …interrupt… him because he had a very hot temper. He had left school at thirteen, and he had managed …avoid… …look… for a real job …work… for his father in the family scrap yard. He was supposed …check… the weight of scrap metal leaving the yard, but he always preferred …sit… around and …make… cups of tea for the other workers instead. You won't be surprised …hear… that Eli's father didn't like his …waste… time, and asked him …find… another job.

Task 5. Work in groups. Choose one of the programming languages. Prepare its short presentation, speaking of its advantages and disadvantages, spheres of usage and recommendations for those who want to master it.

Listen to your groupmates' presentations and fill in the table:

Programming language	Spheres of usage	Advantages	Disadvantages	Recommendations

Which of the programming languages would you choose as your major?

Self-study task

Watch the video "3 reasons why you shouldn't become a full-stack developer…" at Devslopes (youtube.com).

Interpret in your own words the terms: full-stack developer, front-end developer, back-end developer.

React on what you hear in the video (≈100 words).

Task 6. Put the steps in programming into their logical order:
- Testing the program
- Planning the solution
- Defining the problem
- Documenting the program
- Coding the program

Group project

Work in groups. Discuss what issues you have in the learning process.

Imagine you are member of the team on developing a software solution to one of the issues. Focus on the "Defining the problem" stage – think what it is that you're trying achieve.

Work on the Requirements:

E.g. *if we were asked to write a calculator program, we could choose many different ways for the user to enter calculations - from entering equations, pressing buttons or even writing them on the screen - but if the software can't add up correctly then it won't have solved the problem. Therefore our first few requirements must be that:*

- *the user can enter sums (we don't care how they do this)*
- *and that the program will then evaluate those sums correctly and display the result for the user.*

We also have to decide what sort of sums our calculator will be required to evaluate. Again, we have a fair amount of choice - we could be ambitious and ask it to solve simultaneous equations or complex expressions, however since this is our first program we should probably make the requirements more simple. So the third requirement is that:

- *The calculator must be able to evaluate sums made up of two whole numbers (integer operands) and one addition (+), subtraction (-), multiplication (*) or division (/) sign (operator).*

Work on <u>Specification </u>(what it is your final program will do)

E.g. for the calculator, we've already decided that the program must allow us to enter simple sums and then must evaluate them correctly and display an answer. We must now tie down exactly what this means.

Therefore, we have to decide which method of entering sums to use. We should also specify what other behaviour we're expecting the program to have:

- *When the program runs it will display a welcome message, followed by some simple instructions.*
- *The program will then display a prompt sign ([number]>) and the user can then type the first number of their sum at the keyboard followed by the RETURN (<-') key.*
- *The program will display a second prompt sign ([+-/*]>) and the user can then enter the operator that they wish to use, followed by RETURN.*
- *A third prompt sign will be displayed ([number]>) and the user will then enter the second number, again followed by RETURN.*
- *The calculator program will then display the mathematically correct answer to the sum on the screen and end.*

[Examples are taken from: <u>https://www.cs.bham.ac.uk/~rxb/java/intro/2programming.html</u>]

Present your ideas to the whole group.

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