

# Topic: Computer Concepts

## Lesson 1: Computers in Everyday Life

Aim	Objectives
Master communication skills and competences in computer systems, ICT, and other digital devices	<p>At the end of this lesson, students will be able to:</p> <ul style="list-style-type: none"> <li>• define ICT and areas where it can be applied</li> <li>• explain the difference between data and information</li> <li>• state phases of the digital revolution</li> <li>• define what role computers and ICT play in our life</li> <li>• present and discuss findings in pairs and small groups</li> <li>• write a summary based on different media</li> </ul>

### I. Lead-in

1. Share your opinion on the quotes. Do you agree or disagree? Justify your point of view.

*Computers will overtake humans with AI at some point within the next 100 years. When that happens, we need to make sure the computers have goals aligned with ours.*     Stephen Hawking

*Your computer is a backup of your soul, a multi-layered, menu-driven representation of who you are, who you care about.*     Alan Turing

*Computers are magnificent tools for the realisation of our dreams, but no machine can replace the human spirit, compassion, love, and understanding.*     Louis V. Gerstner, Jr

2. Conduct a survey among your groupmates about their behaviour with regard to using and applying computers. While conducting the survey, complete the chart. Then report your findings to the group.

Name	How do you use computers?	What computer devices do you use?	What software do you use to study, work, play?

### II. Vocabulary Focus

1. Match the words in Column A with their synonyms in Column B.

- |  |   |
|--|---|
| A. essential<br>facilitate<br>enhance<br>detrimental<br>perform<br>simultaneously<br>rate<br>versatile<br>characteristic<br>accurate | B. carry out<br>feature<br>at the same time<br>ease<br>important<br>destructive<br>precise<br>improve<br>all-purpose<br>speed |
|--|---|

2. Read the abstract about what it is like to live with computers and work out the meaning of the words in bold.

## Living with Computers

Computers have become an essential part of our life, and people are becoming increasingly dependent on them. Generally, the use of computers is **intended for** four major activities, such as education, entertainment, business, and service. Constant Internet advancements allow accessing tons of information worldwide. We can browse the Web to read news, to find information on a certain topic that we might need for education or for personal interest, to buy or **sell stock**, to shop for goods and services, to book tickets, and to communicate with people using messengers and conference calls, chat rooms, email, and voice mail. With the help of a video camera and microphone, it has become possible to **set up a conference** on the Web. The Internet allows us to download music, pictures, and programs. However, while computers enhance certain aspects of our lives, they may have a detrimental effect on others.

Computers play a key role in business today. The computers can enhance the speed and **efficiency**, save the time, make the accurate data available to the business owners and related parties, help in the flow of the information by supporting decision making within a business or organisation. Because of computers, concepts such as flexible working schedules and remote work forces have become possible. Manufactures can use new technology and computers to design and build products, carry out routine and complex tasks and procedures.

Due to **digital convergence**, which allows multiple tasks to be performed on a single device, businesses and manufactures can effectively **conserve space** and power. The most illustrative example is a smartphone, which includes the functions of a telephone, a photo and video camera, a music player, a navigation tool and a mobile computer that works both autonomously and with Internet access. Another good example is smart TV which can provide access to all information on a single screen. Digital convergence results in greater benefits both to people and businesses. It improves human performance, it is **cost-effective** and time-saving technology. It allows new ways to communicate. Therefore, businesses, manufacturers and customers can cooperate and work in different but coordinated ways. Convergence is also good for the environment as it reduces the number of devices that we need to manufacture and thus reduces the amount of waste that is created by dumping old technology.

Computers offer incredible benefits in education. They can help students study, perform mathematical operations, do research, etc. Computers facilitate the teaching process too. Teachers use interactive whiteboards to give presentations, teach sciences by giving students more hands-on experience. Computers can assist students and teachers with the testing process by stepping the student through a series of questions and **keep track of** the results.

*Convergence - the fact that two or more things, ideas, etc. become similar or come together*

Computers have changed the way we study, work, and play. That's why it is vital to have at least basic knowledge of computers. The **core characteristics** of a modern computer are as follows. First of all, computers are fast. They are capable of performing millions of tasks, calculations, or measurements per second. Secondly, computers are accurate. They perform various operations with precise results and no errors. Thirdly, computers are versatile. They can be used in almost every sphere – industry, business, education, entertainment, banking, tourism, etc.

Storage capacity is another **relevant feature** of a computer to consider. Today's computers can store large volumes of data. A piece of information once stored in a computer can never be forgotten and can be retrieved almost **instantaneously**. Multitasking is also an essential characteristic of a computer. It enables to accomplish several tasks simultaneously such as downloading files, preparing office documents, and participating in video conferences online – all at the same time!

3. Choose the options from the ones given in *italics* to make true sentences.

1. Computers have become an *essential/detrimental* part of people's life.
2. *Flexibility/multitasking* is an important characteristic of a computer as it enables users to accomplish several tasks simultaneously.
3. Computers *facilitate/assist* people in education, business, office, etc.
4. We can consider computers *accurate/versatile* machines because they can be used in almost every sphere of our life.
5. Digital convergence allows *simultaneous/multiple* tasks to be performed on a single device.
6. Computers *facilitate/retrieve* teaching process.
7. Computers may have a *detrimental/invaluable* effect on people.
8. Computers process information at extremely high *schedules/rates*.
9. Computers are very *accurate/relevant* machines.

4. While reading the abstract "Living with Computers" you have come across several common tech verb-noun collocations. Address Task 2 if necessary and answer the question "What can you ... ?".

- |            |              |          |
|------------|--------------|----------|
| ✓ store    | ✓ accomplish | ✓ browse |
| ✓ process  | ✓ give       | ✓ do     |
| ✓ download | ✓ retrieve   | ✓ design |

5. Complete the sentences with the appropriate verbs in the box.

perform; have; process; create; work; participate; share; do; produce

1. Computer technologies \_\_\_\_\_ a deep impact on education by facilitating information representation, quick communication between teachers and students and organising distant learning courses.

2. Internet users have an opportunity to \_\_\_\_\_ in online conferences.
3. With the help of computers we can \_\_\_\_\_ colourful presentations, calculate large numbers, prepare office documents.
4. Computers can help students study and \_\_\_\_\_ research online.
5. Multitasking enables users to \_\_\_\_\_ several tasks simultaneously.
6. Today's computers are very fast and can \_\_\_\_\_ information at extremely high rates.
7. Computers provide a way for people within an organisation to contact each other quickly and \_\_\_\_\_ work.
8. One common use of office computers is to record, find and \_\_\_\_\_ with information.
9. Businesses use new technology to \_\_\_\_\_ new ideas and designs.

6. Choose the odd one out in the word lines. Justify your choice.

a) vital	essential	invaluable	detrimental
b) transmit	access	encompass	download
c) elicit	store	manage	input
d) update	alter	retrieve	edit
e) carry out	launch	perform	accomplish
f) universal	prevalent	ubiquitous	comprehensive

7. Think over and write down five ideas describing how you use a computer device in your everyday life. Compare the results with the groupmates.

8. Share your opinion on the questions with a groupmate.

1. What role do computers play nowadays?
2. What computer characteristics do you consider the core ones?
3. Have computers changed our lives for better or worse?

### III. Language Box

1. Do the quiz to find out how much you know about ICT. More than one option can be correct. Then watch the video "What Is ICT?" [53] and check your ideas.

1. ICT stands for ...	a) information and communications technology b) information and communicative technology c) information and communication technique d) information and communications technologies
2. ICT generally refers to...	a) data and information b) the devices that facilitate interaction with the digital world c) networking devices, applications, and systems d) the devices that use electricity

2. Watch the video again and choose the correct options from the ones given in *italics* to make true sentences.

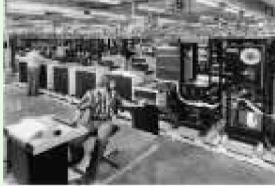
1. If it's *analog/digital*, it's part of ICT.
  2. ICT generally refers to all *devices/tools*, networking components, applications and systems that facilitate interaction with the digital world.
  3. ICT is more *selective/comprehensive*, including more components related to computers and digital technologies.
  4. ICT components include *information/data*, Internet access, cloud computing, software, hardware, transactions, and communications technology.
  5. ICT has *moderately/drastically* changed how people work, communicate, learn and live.
  6. ICT contributes greatly to our economic *decline/development*.
  7. The advancement of ICT capabilities has made the development and *retention/delivery* of various technologies cheaper.
  8. For businesses, advances within ICT have brought *lack/a slew* of cost saving opportunities and conveniences.
  9. However, ICT is not without its *strengths/downsides*.

*3. Work in groups of three people. Each student studies the meaning of one of the three original words of ICT and gets ready to explain it to the others. Then work out the definition of ICT and present it in class.*

**Student A** **Information** refers to facts about someone or something. In the context of ICT, information is data that is input, stored, processed, or transmitted. The information can be represented in different formats, for example as a text document, a spreadsheet, a picture, or a video file. Examples may be patient records in a hospital database, a web page

	advertising a new product, or the information that is stored in your car's GPS that gives you the directions and tells you when you've gone the wrong way
Student B	<b>Communication</b> means sharing information with others. Communication is a key component of the ICT mix. In recent years, the merging of various kinds of technology has been increasing the number of options that people and businesses have for making contacts and keeping in touch. So how does ICT help us do this? Some methods include “real-time” communication such as phones, teleconferencing, and Internet chat apps. Non-real time communication methods include fax, social media, e-mails, text messages, voice mails, etc.
Student C	<b>Technology</b> deals with the application of scientific knowledge to the practical aims of human life to control and adapt to its environment. A strict definition of “technology” is elusive: it can refer to material objects, such as machines, hardware or utensils, but can also encompass broader themes, including systems, methods, and techniques. Technology means the tools and machinery people use to deal with problems or do things effectively. Technology also refers to computers and other tech equipment used to handle information and communicate it with others. ICT is impossible without such technological components as cloud computing, software, hardware, Internet, etc.

4. *ICT is sometimes labelled as the fourth industrial revolution. Study the phases of the digital revolution and match them with the appropriate features.*

Phases	Features
1. Data processing 	a) This phase provided access to information, applications, communications, and storage over the Internet. Before this phase, most computers ran software based locally. Now you can use online applications and store your data in the cloud making it available on any of your digital devices that connect to the Internet
2. Personal computing 	b) This phase of the digital revolution is characterised by standalone computers powered by local software. Computers were used to enhance productivity. Computers were not connected to networks, so they were essentially self-contained units that allowed users to interact only with the installed software
3. Network computing 	c) During this phase, computers were huge, complex, and expensive devices that stored data on reels of magnetic tape. They existed in limited numbers, primarily housed in big corporations and government agencies. Computers were operated by trained technicians and required specialised software

4. Cloud computing 	d) This phase is characterised by a focus on manipulating real-world objects instead of data. Virtual reality, augmented reality, the Internet of Things, and automated vehicles are shaping a new digital era in which technologies bring computing beyond the screen and into the world of tangible objects
5. Ubiquitous computing 	e) During this phase, computers became networked, and the Internet was opened to public use. Though networks were mainly deployed to connect computers within a school or business, they were often unreliable. For the most part, these networks connected devices using cables; wireless networks were not available

5. Consider the definitions of the terms “data” and “information” to understand the key differences between them. Then read the characteristics and decide which term they refer to.

**Data** – any raw facts or observations that describe a particular phenomenon

**Information** – simply data that has a particular meaning within a specific context

- a) facts, statistics used for reference or analysis;
- b) knowledge derived from study, experience, or instructions;
- c) numbers, characters, symbols, images that can be processed by a computer;
- d) interpreted data;
- e) it is a representation of information;
- f) communication of intelligence;
- g) kind of knowledge exchanged among people about things, facts, etc.;
- h) interpreted by a human or machine to derive the meaning.

6. Read the abstract below devoted to data processing and get ready to answer the following questions.

- a) What is data representation?
- b) What are the ways to represent data?
- c) What is digitisation?
- d) How does binary code work?

## Data Representation

Data representation refers to the form in which data is stored, processed, and transmitted. Devices such as smartphones, tablets, iPods, and computers store data in digital formats that can be handled by electronic circuitry. Today, digital data representation has replaced the analog methods previously used for storing and transmitting photos, videos, and text. Digital data is text, numbers, graphics, sound,

and video that have been converted into discrete digits such as 0s and 1s. In contrast, analog data is represented using an infinite scale of values.

The process of converting information, such as text, numbers, photos, or music, into digital data that can be manipulated by electronic devices is called digitisation. Imagine that you want to send a message by flashing a light. Your light switch offers two states: on and off. You can use sequences of “ons” and “offs” to represent various letters of the alphabet. To write down the representation for each letter, you can use 0s and 1s. The 0s represent the off state of your light switch; the 1s indicate the on state.

The 0s and 1s used to represent digital data are referred to as binary digits. It is from this term that we get the word “bit”. A bit is a 0 or 1 used in the digital representation of data. Digital devices are electronic, and so you can envision bits flowing within these devices as pulses of light. Bits are grouped into eight-digit codes that typically represent characters (letters, numbers or symbols). Eight bits together are called a byte. Thus, each character on a keyboard has its own arrangement of eight bits. But digital signals can take many forms, and binary code is just one of them.

7. *Mark the statements as true or false. Correct the false ones.*

1. Data representation refers to the form in which data is stored.
2. Devices such as smartphones, iPods, and computers can store data in analog formats.
3. Digital data is the data that has been converted into an infinite number of digits such as 0s and 1s.
4. Analog data is represented using a discrete scale of values.
5. The 0s and 1s used to represent digital data are referred to as binary digits.
6. It is from this term that we get the word byte – binary digit.
7. Computers work with digital and analog data under the control of a computer program.

8. *Summarise the ideas on the following tasks with a groupmate and get ready to present them.*

1. Explain the concept of ICT, its core attributes, application and impact on people’s lives and businesses.
2. Name the five phases of the digital revolution and list at least three characteristics of each phase.
3. Consider the difference between data and information.
4. Describe how digital data works.

#### **IV. Decision Bank**

1. *Here are several first-hand computer users’ opinions on the role computer devices and technologies play in their lives. Match the pictures (1–8) with the corresponding points of view (A–H). Discuss the impact computers and ICT make on people.*



A. I am Professor Jackson. I am teaching at the University of York. Computer technology has a deep impact on education by facilitating information representation, creating more visual learning experience for students, providing quick communication between teachers and students, and organising distant learning courses.

B. Hi, my name is Bethany. I am 20. The upgraded wireless network at my university is great. We can connect our laptops, tablets, cell phones to Wi-Fi anywhere on campus. Communication is becoming much easier.

C. Hello, I am Daniel. Assistive technology, for people with disabilities, has helped me a lot. I can hardly see, so I use a screen reader, a program that reads aloud onscreen texts, menus, and icons.

D. I am Amanda. I have a GPS, Global Positioning System, fitted in my car. I travel a lot for work, so with this navigation system, I never get lost. And the embedded computer screen is perfect for my children's entertainment.

E. My name is Brayden. This new HMD, head-mounted display, allows me to watch films and enjoy virtual reality and the artificial environment of the video games.

F. I am Chris. I look after all the computers in the company's office. I set up new computers, install software, and generally keep everything working. And, if someone has trouble with their computer, it's me who has to diagnose the problem and fix it. Oh, I am a support technician.

G. Hello, I am Dr. Robin. ICT leads to an unhealthy lifestyle. Rather than going out and taking regular exercises, we spend a lot of time sitting at our computers or with our smartphones. In the long run, this lack of activity does not do the body any good.

H. I am Courtney. One of the biggest concerns of information technology is that it can be incredibly time-consuming. I work in an international company and have to read hundreds of emails every day. And my children spend hours chatting online. So, I assume this time could be better spent.

2. Read the experts' opinions on the use of ICT and list its pluses and minuses at the workplace.

a) Businesses of all sizes and types use computer-based systems because it is difficult to succeed without them, they offer a better way to work – one which can save time and money.

- b) ICT provides a faster and more efficient way for people within an organisation to contact each other and share work. It also means that they can work with people around the world.
- c) However, ICT systems can be very expensive. Companies have to choose solutions that suit their needs and are cost-effective before investing in ICT.
- d) ICT systems allow customers to do shopping fast and from the comfort of their homes. Many shops combine bar-coding with electronic point-of-sale (EPOS) systems.
- e) Manufacturers use computer-aided design (CAD) software to produce new ideas and designs. In the production stage, they use robots that can carry out routine, dangerous, and complex tasks.
- f) Firstly, it saves time. Secondly, ICT improves communication between people, speeds up business, improves decision-making, and opens new markets around the world. Thirdly, ICT solutions can replace people and consequently, companies can reduce the expenses. Finally, ICT increases the quality of goods produced, which may increase profits.
- g) Another issue is training staff which can be rather time-consuming.
- h) With ICT it takes less time and costs less to use office computers to record, find, store and work with information. So, businesses use word processing or desktop publishing packages to produce documents, and databases to store customer details.
- i) There is the cost of technical support to ensure that everything runs well on a daily basis.

*3. Look at the pictures and share your opinion on the questions below.*



1. How can people use ICT to communicate information?
2. Do you think computers make our life simpler or more complex?
3. How are computers used in families/at work/in education/in business?
4. Are people becoming more dependent on computers? Is it for better or for worse?
5. How do you think computers will be used in the future?

*4. Search the Internet to find more examples how work is being changed because of ICT. Make notes, summarise your findings and report back to the group using the following table.*

The example of a business and its main scope	ICT solutions/ systems used	Advantages of using ICT	Factors to consider before investing in ICT

## V. Conclusion Worksheet

Do an online research and get ready to speak about the role of ICT in the areas presented below. Consider the following key points. Work in teams.

✓ pluses

✓ downsides

✓ challenges

✓ perspectives

### Education

- *distance learning*
- *online classes*
- *quality*

### E-Commerce

- *customers*
- *product range*
- *fraud*

### Business

- *collaboration*
- *diverse markets*
- *cost-effectiveness*

### Industry

- *security*
- *talent pool*
- *different working models*

## VI. Web Search

Explore the resources in the list to obtain additional information on computer concepts and ICT. Report your findings to the group.



[https://www.techprevue.com/  
ict-in-education](https://www.techprevue.com/ict-in-education)



[https://witscad.com/course/computer-  
architecture/chapter/data-representation](https://witscad.com/course/computer-<br/>architecture/chapter/data-representation)



[https://www.diffen.com/difference/  
Data\\_vs\\_Information](https://www.diffen.com/difference/<br/>Data_vs_Information)

## VII. Revision Point

1. Read the abstract “Convergence” and translate it into Belarusian or Russian. Use a dictionary if necessary.

### Convergence

The expansion of cloud computing is due in part to convergence, a process by which several technologies with distinct functionalities evolve to form a single product. Convergence was important to the digital revolution because it created sophisticated mobile devices whose owners demanded access to the same services available from a full-size desktop computer. Those services became available in the cloud.

Your computer plays movies. Your cell phone has a camera. Your clock has a radio. Your watch functions as a communications device. You can store data on your iPod Touch. All these are examples of technological convergence. Convergence

worked its magic on cell phones, computers, portable media players, televisions, digital cameras, GPSs, watches, and e-book readers. Now you get features from all of them by purchasing a single digital device, such as a smartphone or tablet computer.

2. Complete the gaps with the words in the box.

circuits; versatile; task; devices; perform; word processing; memory

Early “computers” were no more than calculating devices, designed to carry out a specific mathematical 1) \_\_\_\_\_. To use one of these 2) \_\_\_\_ for a different task, it was necessary to rewire its 3) \_\_\_\_\_. In a modern computer, the idea of a stored program means that a series of instructions for a computing task can be loaded into a computer’s 4) \_\_\_\_\_. These instructions can be easily replaced by a different set of instructions when it is time for the computer to 5) \_\_\_\_\_ another task.

The stored program concept allows you to use your computer for one task, such as 6) \_\_\_\_\_, and then easily switch to a different type of computing task, such as editing a photo or sending an email message. It is the single most important characteristic that distinguishes a computer from other simpler and less 7) \_\_\_\_\_ devices, such as calculators.

3. Mark the statements as true or false. Correct the false ones.

1. Data representation refers to the form in which data is stored, processed, and transmitted.
2. Both analog and digital devices work with continuous data.
3. The binary system allows computers to represent any number or symbol.
4. The process of digitising is used to transform digital data into analog one.
5. The interchange of the terms “data” and “information” is widespread.
6. Character data is composed of letters, symbols, and numerals that are not used in arithmetic operations.
7. The 0s and 1s used to represent digital data are referred to as binary digits.

4. Get ready to speak on the topics below and assess your performance according to the following scale.

Comprehensive 	Rather confident 	Limited 
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- Impact of ICT on individuals and communities in terms of social, economic, business, and professional development.
- Core characteristics of a modern computer.
- Nature of ICT, its application and core attributes.
- Phases of the digital revolution and the main features of each.
- Difference between data and information, data representation.

## Lesson 2: Hardware Basics

Aim	Objectives
Master communication skills and competences in the basic structure of a computer and the differences between types of computers and computer devices	At the end of this lesson, students will be able to: <ul style="list-style-type: none"><li>• define what a computer is and explain the tasks of computer devices</li><li>• present and discuss characteristics of computers</li><li>• state the differences between types of storage</li><li>• understand speakers talking about ICT</li><li>• present and discuss findings in pairs and small groups</li><li>• write a summary based on different media</li></ul>

### I. Lead-in

1. Give your definition of a computer using the prompts in the box.

**Computer is ...**

send; browse; play; create; type; input;  
process; store; manipulate; output

2. Look at some definitions of hardware below and answer the following questions.

- a) What is computer hardware?
- b) How is computer hardware controlled?
- c) What is the difference between hardware and software?

1. Hardware represents the tangible components of a computer, i.e. the components that can be seen and touched.
2. Hardware, which is abbreviated as HW, refers to all physical components of a computer system, including the devices connected to it.
3. Quite simply, computer hardware is the physical components that a computer system requires to function. It encompasses everything with a circuit board that operates within a PC or laptop.
4. Hardware is typically directed by the software to execute any command or instruction. A combination of hardware and software forms a usable computing system, although other systems exist with only hardware.
5. Computer hardware is the collection of all the parts you can physically touch. Computer software, on the other hand, is not something you can touch. Software is a set of instructions for a computer to perform specific operations. You need both hardware and software for a computer system to work.

## II. Vocabulary Focus

1. Name and write down the hardware components in the pictures (1–9) and match them with the appropriate functions below.

1. \_\_\_\_\_

2. \_\_\_\_\_

3. \_\_\_\_\_

4. \_\_\_\_\_

9. \_\_\_\_\_



5. \_\_\_\_\_

6. \_\_\_\_\_

7. \_\_\_\_\_

8. \_\_\_\_\_



- a) inputs data through keys like a typewriter;
- b) performs all types of data processing operations;
- c) displays an output;
- d) stores and reads data permanently;
- e) stores the OS, apps and documents that your computer uses;
- f) connects your home network to your Internet service provider;
- g) controls the cursor on the screen;
- h) records or streams to a computer or a network;
- i) takes the electronic data stored on a computer and generates a hard copy.

2. Consider these acronyms (abbreviations). What do they stand for?

CPU    SSD    HDD    USB    ROM    PC    RAM    BIOS    ALU    CU

3. Before watching the video “Computer Basics: Inside a Computer” [29] choose the options from the list which should be mentioned in it. Justify your choice.

- a) circuit board;
- b) built-in battery;
- c) processor;
- d) solid state drive;
- e) power supply unit;
- f) keyboard;
- g) magnetic platter;
- h) expansion slot;
- i) hard drive;
- j) motherboard;
- k) computer types;
- l) heat sink;
- m) video card;
- n) RAM.

4. Watch the video and choose the correct options from the ones given in italics to make true sentences.

1. The CPU is also known as the central processing unit or *processor/process node*.
2. Since the CPU tends to get hot, it's covered by a piece of metal called a *heat haze/heat sink* which draws heat away from the processor.
3. The motherboard also contains the computer's *RAM/ROM*.
4. The hard drive provides *short-term/long-term* storage keeping all of the computer's data even when it's turned off.
5. Many hard drives use a *magnetic platter/circuit board* to store data.
6. You can add a video card to get better graphics and *efficiency/performance*.

5. Watch the video again and complete the sentences with the missing words.

1. Whether it's a desktop computer or a laptop, every computer has a large \_\_\_\_\_ board, called a motherboard.
2. The CPU can be considered the brain of the computer because it processes information and \_\_\_\_\_ commands.
3. This is the short-term memory that the computer uses whenever it's performing \_\_\_\_\_.
4. However, you cannot store your files there because the RAM is cleared when you \_\_\_\_\_ the computer.
5. But many newer computers have solid state drives which are faster and more \_\_\_\_\_ but also more expensive.
6. Most laptops, however, don't have expansion \_\_\_\_\_.
7. The power supply unit is designed to take power from the wall \_\_\_\_\_ and send it to all of the different components that need power.

6. Read the advertising slogans and say which computer element each pair refers to. Then find the words in the slogans with the following meanings: to press the mouse button, clear/easy to see, to make an extra copy of something, selection, to show.

Point and click here  
for power

Display your ideas  
with perfect brilliance

It's quiet and invisible

Obeys every impulse as if it  
were an extension  
of your hand

See the difference – sharp  
images and a fantastic  
range of colours

It is easy to back up your  
data before it's too late

Power and speed on the inside

Make a big impact on the  
production of text and graphics

Let your computer's brain  
do the work

Just what you need:  
a laser powerhouse

7. Find out what you know about the types of computers. Match the terms with the definitions and give extra details that you know about them.

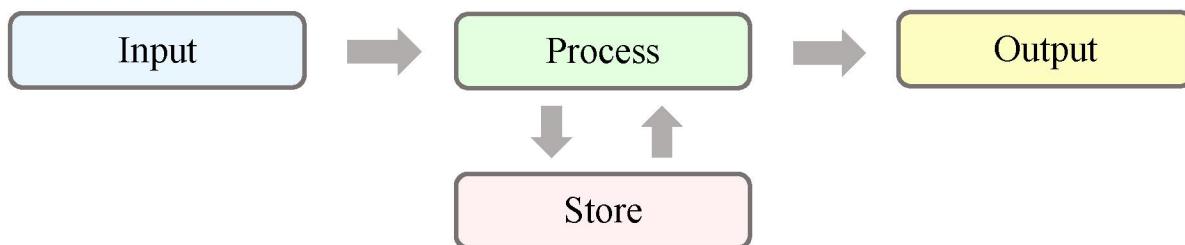
1. Workstation 2. Supercomputer 3. Mainframe computer 4. Desktop computer 5. Tablet 6. Laptop computer or notebook 7. Smartphone	a) It performs many of the functions of a personal computer and keeps users connected through messaging services, email, video calls and social networking apps, in addition to standard text messaging and phone calls. b) It is designed for portability and enables people to work on their projects from virtually anywhere. c) It is a mobile device, typically with a mobile operating system and a touchscreen display, a processing circuitry, and a rechargeable battery in a single thin, flat package. d) It is used for engineering applications (CAD/CAM), desktop publishing, software development, and other types of applications that require a moderate amount of computing power and relatively high-quality graphics capabilities. e) It is used for casual and commercial purposes and designed to stay at one location and fits on or under a desk. It typically has a separate monitor, keyboard, mouse, and a system unit. f) It is a high-performance computer used for large information processing jobs. Primarily used in institutions, academics, health care, stock brokerage firms and large businesses. g) A powerful computer that can process large amounts of data and do a great amount of computation very quickly
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8. Share your opinion on the questions with a groupmate.

1. What are the main components of a computer?
2. What functions can a computer perform?
3. How does a computer work?
4. How does a desktop computer differ from a workstation?
5. How do a supercomputer and a mainframe differ?
6. What types of computers are used for entertainment?

### III. Language Box

1. The following diagram illustrates IPOS (input, processing, output, storage) cycle of any computer. Group the devices in the box below according to the phase of IPOS.



a keyboard; a printer; an SSD; a mouse; a CPU; a joystick; cache memory;  
a scanner; a graphic tablet; a USB flash; a microphone;  
a bar code reader; a monitor; an HDD; a webcam

2. Complete the gaps in the abstract about a computer mouse with the words in the box.

click; double-click; drag; grab; selects; move; press; control



A mouse allows you to 1) \_\_\_\_\_ the cursor and move around the screen very quickly. Making the same movements with the arrow keys on the keyboard would take much longer. As you 2) \_\_\_\_\_ the mouse on your desk, the pointer on the screen moves in the same direction. The pointer usually looks like an I-bar, an arrow, or a pointing hand, depending on what you are doing.

A mouse has one or more buttons to communicate with the computer. For example, if you want to place the insertion point or choose a menu option, you just

3) \_\_\_\_\_ (press and release) on the mouse button, and the option is chosen.

The mouse 4) \_\_\_\_\_ text and items on the screen. You can highlight text to be deleted, copied or edited in some way.

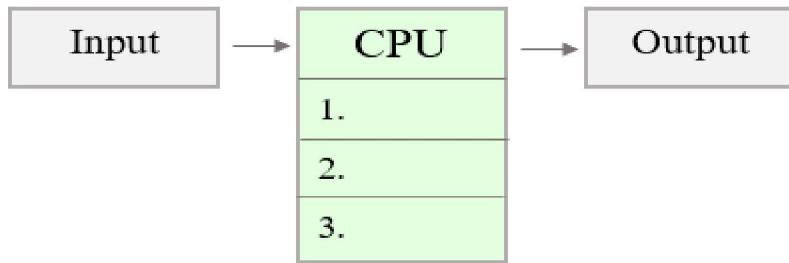
The mouse is widely used in graphics and design. When you want to move something, 5) \_\_\_\_\_ the mouse button, and 6) \_\_\_\_\_ the image to a new location on the screen. Similarly, the mouse is used to change the shape of a graphic object. For example, if you want to convert a square into a rectangle, you 7) \_\_\_\_\_ one corner of the square and stretch it into a rectangle.

The mouse is also used to start a program or open a document: you put the pointer on the file name and 8) \_\_\_\_\_ on the name – that is, you rapidly press and release the mouse button twice.

3. Watch the video “Central Processing Unit” [31] and get ready to answer the questions.

1. What operations does a CPU perform?
2. What instructions go through a CPU?
3. How many components does a CPU include?
4. What is a microprocessor?
5. Where are CPUs located?
6. What does a CPU need to keep with heat?

4. Watch the video again and complete the diagram with the appropriate information. Explain how a CPU works.



5. Complete the sentences with the abbreviations SSD or HDD to learn more about secondary storage.

1. \_\_\_\_\_ contains one or more platters and their associated read-write heads.
2. \_\_\_\_\_ (also called flash memory) stores data in erasable, rewritable circuitry.
3. The platters of \_\_\_\_\_ rotate, making thousands of rotations per minute.
4. There is no question that \_\_\_\_\_ are gaining in popularity for use in laptops, desktop PCs and servers.
5. \_\_\_\_\_ is a storage medium that, unlike \_\_\_\_\_, uses non-volatile (flash) memory to hold and access data.
6. Each platter of \_\_\_\_\_ has a read-write head that hovers just a few micro inches above the surface.
7. Each data bit of \_\_\_\_\_ is held in a gate-like circuit that can be open or shut.
8. \_\_\_\_\_ is a magnetic storage that represents data by magnetising microscopic particles on a disk or tape surface.
9. \_\_\_\_\_ has been limited by its larger size. \_\_\_\_\_, on the other hand, is available in a variety of sizes.
10. The smaller size allows \_\_\_\_\_ to weigh less than larger \_\_\_\_\_ with its magnetic heads and metallic disks.

6. Read the abstract “What Is Inside a PC System?” to get more information about the computer components and identify what the words in bold refer to.

1. **It** is built into a single chip ... (paragraph 1).
2. ... **which** executes program instructions ... (paragraph 1).
3. ... **that** is being executed (paragraph 2).
4. ... is partly determined by the speed of **its** processor (paragraph 3).
5. ... the CPU looks for **it** on the hard disk ... (paragraph 4).
6. **It** is the “waiting room” for the microprocessor (paragraph 4).
7. ... until **they** are needed (paragraph 5).
8. So, **it** is used to synchronise with ... (paragraph 6).
9. ... inside the computer to communicate with **each other** (paragraph 8).

## **What Is Inside a PC System?**

The nerve centre of a PC is a processor, also called a CPU or central processing system. It is built into a single chip which executes program instructions and coordinates the activities that take place within a computer system. The chip itself is a small piece of silicon with a complex electrical circuit called an integrated circuit. The processor consists of three main parts.

The control unit examines the instructions in the user's program, interprets each instruction and causes the circuit, and the rest of the components (monitor, disk drives, etc.) to execute the functions specified. The arithmetic logic unit performs mathematical calculations and logical operations. The registers are high speed units of memory used to store and control data. One of the registers (the program counter) keeps track of the next instruction to be performed in the main memory. The other (the instruction register) holds the instruction that is being executed.

The power and performance of a computer is partly determined by the speed of its processor. A system clock sends out signals at fixed intervals to measure and synchronise the flow of data. Clock speed is measured in gigahertz (GHz).

The programs and data which pass through the processor must be loaded into the main memory in order to be processed. Therefore, when the user runs a program, the CPU looks for it on the hard disk and transfers a copy into the RAM chips. RAM is volatile, that is, its information is lost when the computer is turned off. It is the "waiting room" for the microprocessor. It holds operating system, raw data waiting to be processed as well as the program instructions for processing that data and the results of processing.

If a program exceeds its allocated space, the operating system uses an area of the hard disk or other storage medium as virtual memory to store parts of programs or data files until they are needed. By selectively exchanging the data in RAM with the data in virtual memory, your computer effectively gains almost unlimited memory capacity.

Cache memory is a high-speed memory, which is small in size but faster than the main memory (RAM). The CPU can access it more quickly than the primary memory. So, it is used to synchronise with high-speed CPU and to improve its performance. Cache memory is an extremely fast memory type that acts as a buffer between RAM and the CPU. It holds frequently requested data and instructions so that they are immediately available to the CPU when needed.

However, ROM is non-volatile memory, containing instructions and routines for the basic operations of the CPU. The BIOS (basic input output system) uses ROM to control communication with peripherals. RAM capacity can be expanded by adding extra chips, usually contained small circuit boards called dual in-line memory modules (DIMMs).

The main circuit board inside your system is called the motherboard and contains the processor, memory chips, expansion slots, and controllers for peripherals connected by buses, electrical channels which allow devices inside the computer to communicate with each other. For example, the front side bus carries all data that passes from the CPU to other devices. The size of a bus called bus width, determines how much data

can be transmitted. It can be compared to the number of lanes on a motorway – the larger the width, the more data can travel along the bus. Expansion slots allow users to install expansion cards adding features, like sound, memory and network capability.

*7. Mark the statements as true or false. Correct the false ones.*

1. The chip itself is a small piece of silicon with a simple electrical circuit called an integrated circuit.
2. One register keeps track of the next instruction to be performed in the main memory, the other holds the instruction that has been executed.
3. A system clock sends out signals at fixed intervals to measure and synchronise the flow of data.
4. The instructions are loaded into RAM every time you turn on a computer, and they remain there until you turn off the device.
5. By selectively exchanging the data in RAM with the data in virtual memory, your computer effectively gains limited memory capacity.
6. Cache memory holds rarely requested data and instructions.
7. ROM is non-volatile memory containing instructions and routines for all operations of the CPU.
8. Electrical channels inside the computer allow devices to communicate with each other.

*8. Look at the characteristics and decide whether they relate to RAM, ROM or Cache.*

RAM

ROM

Cache

1. It is faster than RAM.
2. It is non-volatile in nature.
3. It stores data, programs, and program results for a short period of time.
4. It works while the power is on.
5. It can't be accidentally changed.
6. Its content is always known and can be verified.
7. It consumes less access time as compared to RAM.
8. It is hard-wired and stores software used in the start-up process.
9. It is temporary.
10. It stores frequently used data and programs.

*9. Share your opinion on the questions with a groupmate.*

1. What are the main parts of the CPU?
2. What does ALU stand for? What does it do?
3. What is the function of the system clock?
4. What is the difference between RAM, ROM and cache? What is virtual memory?
5. What is the main circuit board? What does it contain?

## IV. Decision Bank

1. Imagine that you work in an IT department of a company and your task is to upgrade the hardware. Choose one of the options and offer how it is possible to upgrade it. Work in groups of three or four people.



### Sun workstation

Two ADM Opteron processors at 3.0GHz  
4GB RAM; 32GB maximum  
1 terabyte hard drive and dual DVD drive  
19'' Sun TFT flat-panel LCD  
Support several graphics formats  
Allows you to handle your toughest technical, scientific, and business-centric applications  
Supports Solaris, Windows and Linux



### Dell Inspiron 531 desktop PC

AMD Athlon 64 X2 Dual Core Processor  
3072MB DDR2 SDRAM  
Dell 22'' Wide Flat Panel  
356MB NVIDIA GeForce 8600GT video card  
1.0TB Hard Drive  
16x DVD+/- RW Drive  
Integrated 7.1 Channel High-Definition Audio  
Windows Vista Home Premium



### Sony Vaio AR laptop

Intel Core 2 Duo Processor at 2GHz  
2GB DDR2 SDRAM  
200GB hard drive  
DVD+/- RW optical drive  
17'' WXGA high-definition LCD screen  
Memory Stick slot  
Three USB 2.0 ports  
Integrated wireless LAN  
Built-in 'Motion Eye' digital camera  
Lithium-ion battery  
Windows Vista Ultimate

2. Analyse the computer needs of the four people and choose the most suitable computer for each person using the descriptions from the computer shop website below. Justify your choice. Work with a groupmate.

1. I'm still at university and I need an ultra-light computer that I can easily take to class. I need to write essays and web-based projects, and I'd also like to be able to take notes and draw directly on the screen. What would you recommend?
2. I manage an advertising company, so I need a powerful system that'll work with multimedia applications, integrating text and pictures with animation and voice annotations. Digitised images and sound occupy a lot of disk space, so I imagine I should get something powerful. What can you offer?
3. I work as a CAD engineer and my job involves computer-aided design, simulations, geoscience and engineering. Those applications obviously require a lot of memory and a large drive. What is the best option in my case?

4. I'm a sale representative for a paper company, and I'm always travelling. I'm looking for a lightweight machine which I can use to process orders and communicate with head office while I'm on the road. Is there anything to recommend?

#### The Dell XPS 13 (2021) laptop

Processor	Intel Core i5 GHz core i7 family
Processor count	4
SDRAM	16GB LPDDR4X
Hard drive interface	Solid State
Capacity	512 GB SSD
Operating system	Windows 11 Home
Type of display	13.3-inch UltraSharp QHD+ InfinityEdge display
Resolution	3840x2400
Slots/ports	2 USB 4 Type-C/Thunderbolt 4+ 1 USB 3.0 Type -A
Camera	RGB webcamera
Battery	4-cell "smart" lithium ion (60 WHr)
Price	\$1,824

#### iMAC M1 desktop PC

Processor	Apple M1 chip
Processor count	8-core CPU and 7-core GPU
SDRAM	8 GB
Hard drive interface	Solid State
Capacity	256 GB
Operating system	Mac OS
Type of display	24-inch 4.5K Retina display with P3 wide color gamut and 500 nits of brightness
Resolution	4480x2520
Slots/ports	Two Thunderbolt/USB 4 ports and up to two USB 3 ports
Camera	1080p FaceTime HD camera with M1 ISP for amazing video quality
Included components	Magic Mouse, Power Cord and Power Adapter, Magic Keyboard, USB-C to Lightning Cable
Price	\$1,249

#### Lenovo Yoga 9i convertible notebook

Processor	Intel 3 GHz core_i7_family
Processor count	4
RAM	16 GB DDR4
Hard drive interface	Solid State
Capacity	1 TB SSD
Operating system	Windows 11 Pro
Type of display	14" UHD 4K
Resolution	3840 x 2160 pixels
Connectivity and ports	Intel Wi-Fi 6 (AX201) 2x2 (Gig+) and Bluetooth 5.1; 2 x USB 3.2 Gen 2 Type-C with Thunderbolt 4.0, DisplayPort and Power delivery; 1 x USB 3.2 Gen 2 Type-A; Headphone/Microphone Combo
Average battery life	9 hours
Camera	Built-in HD webcam with TrueBlock Privacy Shutter
Price	\$1,315

#### HP ZBook Fury Workstation

Processor	2.3 GHz core_i7
Processor count	1
SDRAM	32 GB DDR4
Hard drive interface	Solid State
Capacity	512 GB
Operating system	Windows 11 Pro
Type of display	4K UHD display
Resolution	1920 x 1080 pixels
Card Description	RTX A2000,UHD Graphics
Graphic card	NVIDIA RTX A2000 4 GB
Included components	Spill-resistant Keyboard
Price	\$2,585

3. Suggest specifications for the following computer and hardware requirements. Work with a groupmate.

- a) You are a system administrator, and you have to buy computers for administration staff. Advise on peripheral devices for their purposes as well.
- b) You are a shop assistant in a computer shop, advise on a computer for a designer. Describe the features that are necessary for this purpose.
- c) You want to buy a computer and additional gadgets for games. What gadgets will you use more/less often?
- d) You want to buy a computer for yourself. Think of three basic features that will make a big difference to your choice.
- e) You are in a computer shop. Choose five things that would improve your digital life.

- f) A friend has asked you to recommend a computer that suits his needs. He needs to access the Internet and work with graphics.
- g) Your school is considering buying tablets to use in the classroom. Advise them on what they should pay attention to.

*4. Consider the future possible breakthroughs with regard to hardware development with a groupmate and share your ideas with the group.*

## V. Conclusion Worksheet

*Find out as much as you can about your groupmates' computers and complete the table. Work in groups of three people. Then report your findings to the rest of the group.*

Feature	Student A	Student B
Type of computer		
Peripheral devices		
Input devices		
RAM		
Disk type (HDD/SSD)		
Capacity of HDD/SSD		
Cache size		
Output devices		
CPU		

## VI. Web Search

*Explore the resources in the list to obtain additional information about types of computers and their components. Report your findings to the group.*



<https://openlab.citytech.cuny.edu/com-basics/hardware-guide>



[https://www.tutorialspoint.com/computer\\_fundamentals/computer\\_hardware.htm](https://www.tutorialspoint.com/computer_fundamentals/computer_hardware.htm)



<https://witscad.com/course/computer-architecture/chapter/fundamentals-of-architectural-design>

## VII. Revision Point

*1. Read the abstract "Cloud Storage" and translate it into Belarusian or Russian. Use a dictionary if necessary.*

### Cloud Storage

The term cloud storage refers to a set of technologies for transporting, synchronising, and managing data stored on platters of high-performance hard disk drives housed in the service provider's data centre. Most cloud services offer a

generous amount of free storage space, so the price is right. If you regularly use several digital devices and want to access your files from all of them, then cloud storage is an excellent solution. In addition, if you procrastinate about backing up your devices, files stored in the cloud remain there even if a local device malfunctions.

That being said, cloud storage has several drawbacks. Security and privacy risks. The more places your data is stored and the more networks it travels over, the more susceptible it becomes to intercept from hackers and government spying agencies. Consider what you store in the cloud carefully. Service outages. When a cloud storage site has an outage, all the data stored there becomes temporarily inaccessible. If you have a term paper due in two days, it would be best not to trust the only copy to cloud storage where a two-day outage could make your files inaccessible until after the due date. Discontinuation of service. Some cloud storage providers have shuttered their storage services with little warning to customers. Cloud storage may offer a convenient option for backing up your files, but don't depend on it as the only backup.

*2. Do the quiz to find out what you know about input, processing, storage and output devices. More than one option can be correct.*

7. The machine cycle of the CPU consists of such basic operations as ...	a) fetching data b) decoding data c) operating and store the instruction d) functioning as a micro switch to represent on/off states
8. RAM (random access memory) ...	a) stores data b) stores OS c) stores instructions how to process data d) stores the result of processing permanently
9. ROM (read only memory) ...	a) stores data b) stores a bootstrap program c) stores instructions how to process data d) stores the result of processing permanently
10. BIOS (bootstrap program) ...	a) performs self-testing b) finds OS in hard disk c) stores instructions how to process data d) loads OS into RAM

3. Complete the sentences with the words and word collocations in the box.

colour depth; LCD; adapter; resolution; aspect ratio; plasma screen; screen size

1. For widescreen LCD displays, the \_\_\_\_\_ is 16:9, very useful for viewing movies, playing games and displaying multiple windows side by side.
2. In a \_\_\_\_\_, images are created by energising a gas, increasing the number of electrons within the gas.
3. \_\_\_\_\_ refers to the number of dots of colour contained in a picture.
4. My laptop MacBook Air, required extra setup: an additional \_\_\_\_\_, two dongles and a cable, plus a driver download, because the computer only natively supports one external monitor.
5. \_\_\_\_\_ displays don't just look different than bulky CRT monitors, the way they operate is significantly different as well.
6. The app now automatically adjusts the \_\_\_\_\_ of most smartphones.
7. The scrolling speed depends on the area and on the \_\_\_\_\_ of a display.

4. Get ready to speak on the topics below and assess your performance according to the following scale.

Comprehensive 	Rather confident 	Limited 
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- Definition and types of computers.
- Basic components of a computer.
- Input and output devices.
- Processing device.
- Definition and types of storage.

## Lesson 3: Sustainable IT

Aim	Objectives
Master communication skills and competences in the disposal of information technology in a way that minimises its impact on the environment, business, and society	At the end of this lesson, students will be able to: <ul style="list-style-type: none"> <li>• report on the issue of e-waste</li> <li>• utilise print and electronic media for information</li> <li>• conduct surveys and interviews</li> <li>• present and discuss findings in pairs and small groups</li> <li>• write a summary based on different media</li> </ul>

### I. Lead-in

1. There are the three core elements of sustainable IT: sustainability, e-waste, and green computing. Match them with the appropriate definitions.

- |  |  |  |
|--|--|--|
| A. The practice of implementing eco-friendly tactics into the use of computers | B. The quality of causing little or no damage to the environment | C. Computers and other electronics products that are thrown away |
|--|--|--|

2. Conduct a survey among your groupmates about their behaviours with regard to purchasing and discarding electronic gadgets. While conducting the survey, complete the table. Then get ready to report your findings to the group.

Name	What kind of electronic devices do you have?	What new gadgets do you want to get?	Why and how often do you buy new gadgets?	What do you do with obsolete gadgets?

### II. Vocabulary Focus

1. Read the facts related to the concept of sustainable IT below. Find the synonyms to the words in the box.

dangerous; old; use; dump; thrown away; usefulness

- a) Sustainable IT covers the manufacturing, management and disposal of information technology in a way that minimises its hazardous impact on the environment.
- b) Discarding a perfectly functional device that has not exhausted its utility value can build up the carbon footprint.
- c) Every day 160 thousand obsolete laptops are disposed of in the EU alone.
- d) 70 % of discarded laptops could be reused that can reduce raw materials and energy consumption as well as cut waste production.
- e) The percentage of e-waste that end up in landfill is too great.

2. Do the quiz to find out what you know on the topic of sustainable IT. More than one option can be correct. Then watch the video “What Is E-Waste?” [52] and check your ideas.

1. E-waste is short for ...	a) environmental waste b) electrical waste c) electronic waste d) ecological waste
2. What is e-waste?	a) high tech trash b) discarded electrical devices c) electronic scrap d) anything that used electricity
3. What contributes to the increase of e-waste?	a) availability of new devices b) tech boom c) great number of landfills d) growing consumerism
4. What forces people to buy new gadgets?	a) latest models are advertised a lot b) planned obsolescence c) new products are widely available d) repair costs are high
5. E-waste contains hazardous materials such as ...	a) copper b) chromium c) lead d) cadmium
6. Improper e-waste disposal leads to ...	a) health issues b) air pollution c) water pollution d) soil contamination
7. Something valuable can be obtained from e-waste such as ...	a) copper b) chromium c) gold d) cadmium
8. To solve the e-waste problem people should ...	a) mend obsolete gadgets b) get replacement parts c) upgrade the devices they have d) care about proper scrap disposal

3. Watch the video again and complete the ideas.

- a) E-waste can also be described as ... .
- b) Rapid advances in technology, lower prices for new gadgets and throwaway culture are ... .
- c) Fast advancing technology means ... .
- d) E-waste contains harmful materials including ... .

- e) Inefficient ways of recycling expose . . .
- f) You can now find websites and workshops which . . .
- g) If you do have to throw something away, make sure . . .

4. Complete the sentences with the words in the box.

hazardous; discarded; scrap; irreversible; improper; notorious;  
banned; mammoth; landfills; obsolescence; cancer

- a) \_\_\_\_\_ must be properly managed, or they can destroy an environment.
- b) This is a crime of \_\_\_\_\_ proportion.
- c) E-waste that is managed in a(n) \_\_\_\_\_ way poses a serious threat to human health.
- d) It is usually the government's job to treat \_\_\_\_\_ wastes because it is so dangerous to handle.
- e) Current rate of technological development risks causing \_\_\_\_\_ environmental damage.
- f) Built-in \_\_\_\_\_ has increased the proportion of all units sold to replace defective appliances.
- g) \_\_\_\_\_ devices produce large quantities of electronic waste.
- h) Tons of used electronics are shipped illegally to developing countries as \_\_\_\_\_.
- i) There is one of the most \_\_\_\_\_ dump sites for e-waste in Africa.
- j) People risk getting serious health problems such as \_\_\_\_\_ and brain damage.
- k) Officially the export of e-waste has been \_\_\_\_\_ for more than 30 years.

5. Watch the video “The E-Waste Tragedy” [48] and write down any facts, comments, or scenes that you have found particularly shocking. Share your reactions with the group.

6. Watch the video again and share your opinion on the questions.

- a) What happens to the electronic waste produced by developed countries?
- b) What happens to e-waste after it arrives in developing countries?
- c) What are the negative effects of dumping e-waste?
- d) Why does so much e-waste get shipped to Asia and Africa?
- e) Why is it so difficult to stop illegal traffic of e-waste?

7. Find 20 words related to e-waste in the wordsearch below. Use the definitions. The first letter of each word is given in brackets. Copy the words into your notebook.

1. A place where large amounts of waste are taken, usually outside a town (d).
2. Made to be destroyed after use (t).
3. Something that has been broken (b).
4. The act of getting rid of something, especially by throwing it away (d).
5. The state of an advanced industrial society in which a lot of goods are bought and sold (c).
6. Dishonest and against a law or a rule (i).

7. To use all of something so that there is none left (e).
8. A situation in which something is unnecessary because it is more than is needed (r).
9. Dangerous (h).
10. Thrown away because you no longer want or need it (d).
11. Old metal parts that can be used to make other things (s).
12. Not possible to change; impossible to return to a previous condition (i).
13. Famous for something bad (n).
14. Forbid something, especially officially (b).
15. Extremely large (m).
16. A place where rubbish is buried (l).
17. Process of becoming no longer useful or needed (o).
18. A serious disease when cells in the body grow in a way that is not normal, killing normal cells and often causing death (c).
19. A chemical element that is a very heavy, soft, dark grey, poisonous metal (l).
20. The process of making something dirty or poisonous, containing dangerous substances (c).

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	t	i	w	a	c	d	d	m	l	f	q	d	o	i	s	i
2	h	r	s	c	t	i	d	a	l	l	x	i	d	m	p	a
3	r	r	c	o	n	s	u	m	e	r	i	s	m	p	b	c
4	o	e	r	n	o	c	m	m	a	e	h	p	x	r	z	e
5	w	v	a	t	t	a	p	o	d	d	p	o	h	o	v	x
6	a	e	p	a	o	r	u	t	s	u	l	s	k	p	e	h
7	w	r	v	m	r	d	a	h	o	n	q	a	i	e	h	a
8	a	s	h	i	i	e	j	y	b	d	m	l	d	r	o	u
9	y	i	v	n	o	d	h	a	z	a	r	d	o	u	s	s
10	u	b	n	a	u	f	g	l	a	n	d	f	i	l	l	t
11	l	l	x	t	s	u	c	a	n	c	e	r	c	r	a	q
12	k	e	y	i	t	t	p	o	l	y	c	i	n	b	a	n
13	o	b	s	o	l	e	s	c	e	n	c	e	l	u	j	e
14	t	m	w	n	y	i	s	h	b	r	e	a	k	a	g	e

8. Share your opinion on the questions with a groupmate.

1. Have you been aware of the issue of sustainable IT before?
2. What is the state of the problem in the world today?
3. What is your attitude to the situation with e-waste disposal?

### III. Language Box

1. Complete the following facts about e-waste with the words in the box and explain their meaning.

smoldering; mucky; haze; gear; leach; emit; exposed; dump; defile; casualties

- a) In Ghana piles of discarded computers form a \_\_\_\_\_ river, polluted beyond recovery.
- b) Emerging countries tend to ignore human \_\_\_\_\_.
- c) Villagers in developing countries are \_\_\_\_\_ to toxic chemicals as they attempt to reclaim resalable metals from discarded equipment.
- d) Electronic \_\_\_\_\_ contains toxic substances such as lead, cadmium, and mercury.
- e) Discarded but working electronics is shipped to developing countries as “donations” and follow a shadowy route to \_\_\_\_\_ sites.
- f) \_\_\_\_\_ piles of discarded electronics end up in landfills.
- g) Toxic substances from discarded computers can \_\_\_\_\_ into groundwater.

- h) Ugly e-waste dumps \_\_\_\_\_ the landscape and have yet unknown health effects.
- i) Children play in a toxic \_\_\_\_\_.
- j) When burned, electronic components can \_\_\_\_\_ toxic dioxin.

2. Read the title of the article in Task 3 and predict what it is about.

3. Skim the article. Note down the main idea, key points and essential vocabulary completing the following ideas.

- a) The article touches upon the topic ... .
- b) The purpose of the author is ... .
- c) According to the publication ... .
- d) The following key ideas are considered ... .
- e) A great number of words belong to the topic such as ... .

## Where Does All E-Waste Go?

A. In the West African nation of Ghana, smoldering piles of discarded computers and monitors form a mucky river, polluted beyond recovery. Teenage boys play soccer in a toxic haze. When their break is over, they get back to work smashing monitors, ripping out the innards, and tossing the plastic cases into a smoking fire of oozing plastic.

**Innards** - the organs inside a person/animal, or the inside parts of a machine

B. It is called e-waste, e-garbage, or technottrash – all the unwanted and outdated computers, monitors, printers, cell phones, disk drives, disks, CDs, and DVDs. According to the Environmental Protection Agency (EPA), three million tons of it is discarded every year. Computers and other electronic gear contain toxic substances such as lead, cadmium, and mercury. When discarded equipment is buried in landfills, these substances can leach into groundwater and streams. When burned, electronic components can emit toxic dioxin.

C. E-waste is a global problem. Dealing with discarded electronic components, an alarming amount of e-waste is shipped to developing countries where villagers, working for pennies a day, are exposed to toxic chemicals as they attempt to reclaim resalable metals from discarded equipment. Throughout the emerging world, ugly e-waste dumps defile the landscape and have yet unknown health effects.

D. Where does all this e-waste originate? Every country generates e-waste, but the bulk of it comes from prosperous, technology-forward countries such as the US, Germany, the UK, Japan, France, and China. Despite laws that ban e-waste transshipping, loopholes allow discarded but working electronics to be shipped as “donations”. Tons of donations arrive every day in port cities, such as Hong Kong, where they follow a shadowy route to unregulated workshops and dump sites.

E. Some illegal e-waste originates in legitimate recycling centres, where consumers assume electronic components will be handled in environmentally friendly ways. Many recycling centres do not process materials on site. Instead, they ship the

e-waste to third parties. Without careful monitoring, that e-waste can be diverted to offshore locations where it piles up, waiting to be disassembled by backstreet labourers.

F. Developed countries have strict environmental regulations designed to prevent toxic substances from polluting air, land, and water. Proper disposal is expensive, however. In countries with high labour costs and strict environmental regulations, the value of compounds retrieved from e-waste does not cover the cost of extraction.

G. The high cost of properly processing e-waste makes grey market options attractive. E-waste can be handled more cost-effectively in emerging countries where environmental regulations are ignored, wages are pitiful, and workers are not covered by health and safety laws.

H. So, who is responsible for e-waste sweatshops and pollution? Is it consumers in developed countries who deposit unwanted gear at recycling stations that don't carry out the recycling process in-house, or is it the recycling firms that ship e-waste to third parties? Perhaps the responsibility lies with emerging countries that are unable to control e-waste sweatshops and ignore the resulting environmental and human casualties. Wherever the blame lies, consumers who are aware of the problem can become more responsible in the way they dispose of unwanted gear to keep it out of landfills at home and offshore.

*4. Identify the parts of the article (A–H) in Task 3 where the following ideas (1–7) are discussed. Express the same ideas in a different way.*

1. Some countries adopted severe laws to protect public health and the environment from pollution by industry and development.
2. Discarded electronic equipment contains various poisonous substances.
3. Users should be more responsible in the way they treat obsolete devices.
4. Developed countries are the main contributors to the e-waste issue.
5. Developing economies can be responsible for the amount of e-waste sweat factories and disregard the consequential environmental and human losses.
6. This includes working and broken items that are thrown in the garbage or donated to a charity reseller.
7. Processing e-waste properly in many cases is still not cost-efficient.

*5. Match the beginnings (1–5) of the statements with the appropriate endings (a–e) to understand what sustainability in IT refers to.*

1. Sustainable IT is an umbrella term that describes an environment-focused ...
2. The term also extends to activities such as ...
3. Sustainable IT also includes topics ...
4. Technology has the ability to positively ...
5. This footprint is currently growing, with contributing factors including rising demand for computing ...

- a) power and data storage as well as the production and disposal of electronic devices.
- b) responsible mining of the rare metals used to develop IT hardware, water conservation, and e-waste disposal.

- c) impact many environmental issues; however, it also has unintended consequences.
- d) approach to the design, use and disposal of computer hardware and software applications.
- e) such as waste reduction, managing end of lifecycle for products, and topics related to sustainable sourcing.

6. Share your opinion on the questions with a groupmate.

1. What five facts about e-waste were presented in the article in Task 3?
2. What questions and concerns does the article raise?
3. Has your understanding of the problem changed? If yes, how?
4. What is the current state of the problem globally and in Belarus?
5. Who is to take responsibilities for the appalling situation?

#### **IV. Decision Bank**

1. Watch the video “The Problem with E-Waste” [49] and choose the solutions that are suggested in it from the options given.

- a) Use your mobile longer than one year.
- b) Discard redundant devices on your own.
- c) Learn online how to repair obsolete gadgets.
- d) Monitor recycling options available from the manufacturers.
- e) Obtain devices that can be recharged.
- f) Take outdated electrical gadgets to the places where they can be treated properly.

2. Look at the actions in the box, explain how they are related to e-waste and offer some ways of tackling the problem of e-waste. Work with a groupmate.

get rid of; recycle; dump; ship; dismantle; fix; donate

3. Read the abstract “A Guide for Sustainability in IT” and match the questions (1–5) with the answers (A–E) below.

#### **A Guide for Sustainability in IT**

***Buy or repair? Recycle or donate? What are the greener options?***

**1. Should I upgrade or repair?** First question to ask yourself: “Do I really need that new device?” Repairing old electronics or upgrading certain components instead of buying a whole new machine is the easiest way to cut down on e-waste.

**2. How do I find less toxic products?** Certain electronics tend to be more harmful than others. For example, cathode-ray tube (CRT) monitors and televisions are filled with many toxic materials, including lead and brominated fire retardants, which are extremely

difficult to recycle. On the other hand, some flat-screen monitors and other newer types of TVs contain high levels of mercury.

**3. How can I safely donate my old electronics for reuse?** Donating your old computers can help low-income families, schools and nonprofit groups access equipment they might otherwise not be able to afford. Before donating, make sure your electronics are in working order and that your hard drive is wiped clean.

**4. How can I recycle my old electronics?** Many electronics manufacturers will allow you to return old products for recycling. Contact the manufacturer to see if they provide this service. Some companies offer it for free, while some require consumers to pay, but it often depends on the type of product.

**5. What if my only option is to throw my computer into the trash?** Not only does trashing your old electronics mean that they will rot in a landfill and leach toxins, but it's also illegal in many countries. Some optimal solutions can be always found.

A. The Electronics Takeback Coalition provides information about the individual recycling programs of various manufacturers and retailers and also publishes links to some local recycling programs

B. Contact your local government office about local and state requirements, and your local environmental groups for alternative solutions

C. Before you make a purchase, make a short survey to find out what it is made from, the potential level of ecological threat your future new gadget may bring, and what harmful substances are found in its components

D. According to the Environmental Protection Agency, nearly 180 million desktop and portable computers were disposed of in 2022. That's almost triple the amount in 2018. Many environmental groups believe that manufacturers are reducing the life span of electronics and encouraging consumers to buy new devices, such as desktop computers, even when their old ones work perfectly well

E. Be especially wary of companies that claim to donate computers overseas for charitable reasons. Often, it's a front for shipping computers to developing countries to be dismantled for scrap. For example, 50 % of the computers shipped to Ghana labeled as "donations" are, in fact, broken beyond repair

*4. The first step to advancing a green and sustainable digital world is to assess the sector's environmental footprint. Analyse what environmental concerns the following technologies arise and what measures should be taken to eliminate negative impact to provide sustainable IT development.*

- ✓ data centres
- ✓ electric vehicles
- ✓ sensor technologies
- ✓ solar panels
- ✓ computer networks
- ✓ wind turbines

## V. Conclusion Worksheet

*Discuss the ways to implement sustainability in IT in groups and work out your collaborative approach to efficient tackling of the issue of e-waste in Belarus. Take into consideration the following factors:*

- ✓ the level of country development;
- ✓ governmental policies in this sphere;
- ✓ cultural traditions and mentality.

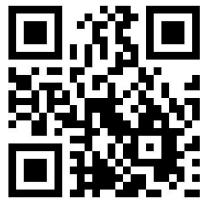


## VI. Web Search

*Explore the resources in the list to obtain additional information on e-waste, including its characteristics, causes and consequences. Report your findings in a chart.*



<https://www.greenpeace.org/global>



<https://earth911.com>



<https://greencitizen.com>

## VII. Revision Point

1. Complete the gaps with the words in the box.

outdated; gear; recycling; hazardous; pitiful; obsolete; discarded

As a tech-hungry nation flush with cash gets ready to upgrade to the next generation of lightning-fast 5G 1) \_\_\_\_, there is a surprising environmental cost to be reckoned with: a fresh mountain of 2) \_\_\_\_ gadgets. About 6 million lb of 3) \_\_\_\_ electronics are already processed monthly at 4) \_\_\_\_ plant. Pallets of once beloved but now 5) \_\_\_\_ devices, like smartphones with only an 8-megapixel camera, arrive here daily. Workers with hammers hack at the bulkiest devices, while others remove 6) \_\_\_\_ components like lithium-ion batteries. The scene is like a twisted Pixar movie, with dumped gadgets riding an unrelenting conveyor belt into a machine that shreds them into piles of copper, aluminum and steel to create a new 7) \_\_\_\_ world.

2. Match the beginnings of the sentences (1–5) with the appropriate endings (a–e).

- |   |   |
|---|---|
| 1. E-waste is unwanted electronic goods | 2. As we buy more electronic goods and replace them more often, |
|---|---|

- |  |
|--|
| a) e-waste is becoming one of the biggest challenges for the future. |
|--|

3. E-waste contains parts and materials 4. Instead of sending obsolete electronic gear to dump sites, 5. If e-waste is not managed carefully,	b) toxins as lead or cadmium can pollute the environment and cause irreversible harm. c) it's far better to repair these gadgets. d) that are sent to smoldering landfills. e) that can be reused or recycled
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3. Render the article “Sustainability in IT” published on the ITSG Global in writing.

## Sustainability in IT

Written by Andrzej Wodnicki, Managing Director at ITSG Global  
 Apr 3, 2023

Sustainability in IT is integrally connected with environmental aspects of business practices. It's a subject that is talked about a lot in a production context, while IT in general has always seemed to be relatively green in comparison with other industries. There's no digging, no building massive factories, and no drastic changes to the landscape caused by IT processes. The point was, especially in the 2019 pandemic, that going remote was an eco-friendly decision in itself because it limited time spent in commute and therefore translated into less fuel being used. And that was it – the big benefit that made IT operations look sustainable.

What is more, sustainability is a nice buzzword that comes with every business initiative ever made. The meaning of sustainability changes from industry to industry, so if we make people interested in the negative impacts of factory farming, fossil fuels overuse, or recycling programs going wrong, green computing doesn't sound that intriguing. If something is already portrayed as ecological going deeper into the subject looks radical or complicates the whole concept to the point of making people feel guilty about not being sustainable enough when they already make a big difference.

There are some almost philosophical questions, like, can we ever become truly sustainable or it's more of a continuous improvement kind of thing? Or: what level of sustainability is actually possible to an average person and which aspects are correlated with having some specific privileges, like access to knowledge or particular (and usually costly) solutions? Or: who and how should keep companies accountable for their engagement?

The first thing that has to be understood is that IT relies on a constant energy supply. It varies from company to company, depending mostly on the infrastructure, yet IT companies have to charge their computers almost constantly and in many cases, they have to keep their devices at their maximum capacity, or someone somewhere will complain that their stuff is not working fast enough. It's safe to assume that the majority of equipment used in IT processes generates heat which, once again, requires more energy, this time to cool it down.

It's a never-ending story when you think about it. The new equipment will generally work faster and not overheat as quickly, but then there is the energy needed to produce that piece of machinery and then transport it, pack, store it, and so on. While

recycling is obviously a thing, having obsolete hardware is annoying at best and a deal breaker for our customers at worst. Which still doesn't change the fact, that 81 % of all of the energy used by a computer is used at the production stage.

What can be done however is using the already-owned devices as long as it's practical, taking good care of them, and automating some of the components to turn off automatically if they're not being used at that moment. Another solution is considering moving to the cloud and therefore reducing the cost of having a server that requires power and maintenance processes to be done.

Another no-brainer is to recycle materials, so re-purpose or donate your old laptops and make sure that some of the components like lead or mercury don't go straight to the landfill. Circular computing estimated that 160 000 laptops are thrown away in the EU on a daily basis while approx. 70 % of them could be reused. Some of the e-trash is shipped to developing countries where people are exposed to toxins and other substances that might lead to death and environmental damage.

Going solar is another idea, that has been implemented by Apple for instance, yet it's an expensive investment, not necessarily practical for most companies, particularly, if their workers tend to work remotely, so they use their own energy at home. But the real issue here is that while going green doesn't have to be crazy expensive, it's almost never the cheapest option. As a business owner, you should be aware, that you might be seen as sustainable, responsible, and generally attractive among potential talents and clients, but as long as you don't find other ways to cut your costs, those values will come with a price.

I stated that sustainability is a buzzword, which is true, but it's also a trend. The thing that has to be understood about trends is that companies can try to create them, but the last word belongs to customers and customers like to feel responsible and ethical. Some of the influencers might even find the time to check how different companies define their sustainability, so if you think that you can get away with greenwashing – think again. Whatever changes, ideas, and goals you are implementing, they're probably worth showing off. Therefore, you can present yourself as a company that grows and cares about sustainability simultaneously.

*4. Get ready to speak on the topics below and assess your performance according to the following scale.*

Comprehensive		Rather confident		Limited	
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- Definition of sustainable IT, its core elements.
- Threats of e-waste.
- Obstacles for tackling the problem of e-waste.
- Solutions to implement sustainability in IT.

## Wordlist

### Topic: Computer Concepts

Accurate <i>adj</i>	Output <i>n, v</i>
Advancement <i>n</i>	Perform <i>v</i>
Allocated <i>adj</i>	Peripheral <i>n, adj</i>
Analog <i>adj</i>	Platter <i>n</i>
Bit <i>n</i>	Precise <i>adj</i>
Buffer <i>n</i>	Process <i>n, v</i>
Bus <i>n</i>	Rate <i>n, v</i>
Byte <i>n</i>	Register <i>n, v</i>
Cache <i>n</i>	Resolution <i>n</i>
Capacity <i>n</i>	Retrieve <i>v</i>
Carry (out) <i>v</i>	Scanner <i>n</i>
Casualties <i>n, pl</i>	Scrap <i>n</i>
Circuitry <i>n</i>	Sequence <i>n, v</i>
Click <i>n, v</i>	Simultaneously <i>adv</i>
Copper <i>n</i>	Slot <i>n, v</i>
Defile <i>v</i>	Smartphone <i>n</i>
Desktop <i>n, adj</i>	Smolder <i>v</i>
Detrimental <i>adj</i>	Store <i>n, v</i>
Digital <i>adj</i>	Supercomputer <i>n</i>
Discard <i>v</i>	Surface <i>n</i>
Discrete <i>adj</i>	Tablet <i>n</i>
Drag <i>v</i>	Tangible <i>adj</i>
Drive <i>n, v</i>	Transmit <i>v</i>
Dump <i>n, v</i>	Versatile <i>adj</i>
Efficiency <i>n</i>	Virtual <i>adj</i>
Eject <i>v</i>	Volatile <i>adj</i>
Emit <i>v</i>	Workstation <i>n</i>
Encompass <i>v</i>	
Exceed <i>v</i>	<i>Collocations:</i>
Exhaust <i>n, v</i>	Bar code reader
Expose <i>v</i>	Binary digit
Flash <i>n, v</i>	Circuit board
Gear <i>n, v</i>	Cloud computing
Hardware <i>n</i>	Data processing
Hazardous <i>adj</i>	Data representation
Haze <i>n, v</i>	Dot pitch
Hover <i>v</i>	Electronic waste (e-waste)
Infinite <i>adj</i>	Network computing
Input <i>n, v</i>	Personal computing
Instantaneously <i>adv</i>	Planned obsolescence
Invaluable <i>adj</i>	Power supply unit
Landfill <i>n</i>	Raw data
Leach <i>v</i>	Response rate
Lead <i>n</i>	Storage capacity
Magnetise <i>v</i>	Sustainable IT
Mainframe <i>n</i>	Ubiquitous computing
Mucky <i>adj</i>	

## List of Abbreviations

- ADSL – Asymmetric Digital Subscriber Line  
AI – Artificial Intelligence  
ALU – Arithmetic Logic Unit  
API – Application Programming Interface  
AR – Augmented Reality  
ATM – Automated teller machine (Cash-point)  
BIOS – Basic Input Output System  
BSoD – Black screen of death  
CPU – Central Processing Unit  
CU – Control Unit  
DDoS - Distributed denial-of-service  
DIMM – Dual in-line memory modules  
DL – Deep learning  
DNS – Domain Name Server  
DoS – Denial of service  
dp – dot pitch  
DSL – Digital subscriber line  
DSS – Decision support system  
FTP – File Transfer Protocol  
GSM – Global System for Mobile Communication (Groupe Spécial Mobile)  
GUI – Graphical User Interface  
HDD – Hard Disk Drive  
HTML – Hypertext Markup Language  
HTTP – Hypertext Transfer Protocol  
ICT – Information and Communications Technology/Technologies  
ID – Identity document  
InfoSec – Information security  
IoT – Internet of Things  
IRC – Internet Relay Chat  
IS – Information System  
ISP – Internet Service Provider  
LAN – Local Area Network  
MAN – Metropolitan Area Network  
MIS – Management information system  
ML – Machine learning  
OOP – Object-oriented programming  
PAN – Personal Area Network  
PC – Personal computer  
PDA – Personal digital assistant  
PIN – Personal identification number  
POP – Post Office Protocol  
P2P – Peer-to-peer  
P2P – Point-to-point  
QoS – Quality of service  
RAM – Random Access Memory

ROM – Read Only Memory  
RSS – Really Simple Syndication  
SDLC – System development life cycle  
SDSL – Symmetric Digital Subscriber Line  
SMTP – Simple Mail Transfer Protocol  
SSD – Solid State Drive  
STOP – Security Tracking of Office Property  
SU – System Unit  
TCP/IP – Transmission Control Protocol/Internet Protocol  
TelNet – Telecommunication Network  
TPS – Transaction processing systems  
UDP – User Datagram Protocol  
UID – Unique identifier  
URL – Uniform Resource Locator  
USB – Universal Serial Bus  
VoIP – Voice over Internet Protocol  
VR – Virtual Reality  
WAN – Wide Area Network  
WAP – Wireless access point  
Wi-Fi – Wireless Fidelity  
WWW – World Wide Web  
XML – Extensible Markup Language