Министерство образования Республики Беларусь
Учреждение образования
«Белорусский государственный университет
информатики и радиоэлектроники»

Инженерно-экономический факультет

Кафедра межкультурной профессиональной коммуникации

Н. Г. Касперович, Т. В. Булавская, М. В. Ладыженко

ПРАКТИЧЕСКИЙ КУРС АНГЛИЙСКОГО ЯЗЫКА В ОБЛАСТИ ИНФОРМАЦИОННЫХ ТЕХНОЛОГИЙ

PRACTICAL ENGLISH COURSE FOR INFORMATION TECHNOLOGY

Под общей редакцией доцента О. П. Дмитриевой

Рекомендовано УМО по образованию в области информатики и радиоэлектроники в качестве пособия для специальностей 6-05-0611-01 «Информационные системы и технологии», 6-05-0611-03 «Искусственный интеллект», 6-05-0611-05 «Компьютерная инженерия», 6-05-0713-02 «Электронные системы и технологии», группы специальностей 0612 «Производство программного и информационного обеспечения»

Минск БГУИР 2024

УДК 811.111:004(076)
ББК 81.2Англя73+32.972я73
К28

Р е ц е н з е н т ы:

кафедра профессионально ориентированной английской речи
учреждения образования
«Белорусский государственный экономический университет»
(протокол № 7 от 27.02.2023);

доцент кафедры языковой коммуникации
Института управленческих кадров
Академии управления при Президенте Республики Беларусь
кандидат педагогических наук, доцент О. В. Соколовская

Касперович, Н. Г.

К28 Практический курс английского языка в области информационных технологий = Practical English Course for Information Technology : пособие / Н. Г. Касперович, Т. В. Булавская, М. В. Ладыженко ; под общ. ред. О. П. Дмитриевой. – Минск : БГУИР, 2024. – 237 с. : ил.
ISBN 978-985-543-722-3.

Состоит из шести тем («Понятия ЭВМ», «Основы программного обеспечения», «Компьютерные сети», «Информационные системы», «Компьютерное программирование», «Цифровая безопасность») и ставит своей целью совершенствование иноязычной коммуникативной компетенции студентов в сфере профессионального общения. Включает систематизированный комплекс заданий и специально разработанных дидактических материалов. Подготовлено в соответствии с учебной программой по дисциплине «Иностранный язык».

УДК 811.111:004(076)
ББК 81.2Англя73+32.972я73

ISBN 978-985-543-722-3

Contents

Предисловие

Пособие «Практический курс английского языка в области информационных технологий = Practical English Course for Information Technology» разработано в соответствии с учебной программой по дисциплине «Иностранный язык».

Материал пособия рассчитан на организацию учебной аудиторной и самостоятельной работы обучающихся с уровнем владения английским языком не ниже B1 в соответствии с Общеевропейской системой оценки знания иностранных языков.

Основной целью пособия является совершенствование иноязычной коммуникативной компетенции студентов в сфере профессионального общения, а также овладение коммуникативными стратегиями и тактиками решения профессиональных задач.

Структура пособия представлена 18 предметными уроками, которые объединены шестью темами: Computer Concepts (Понятия ЭВМ); Software Fundamentals (Основы программного обеспечения); Computer Networks (Компьютерные сети); Information Systems (Информационные системы), Computer Programming (Компьютерное программирование); Digital Security (Цифровая безопасность). Все уроки содержат системный комплекс учебных заданий, направленных на решение задач по формированию межкультурной профессиональной компетентности обучающихся: развитие способности свободно выражать свои мысли на различные темы посредством английского языка; освоение студентами навыков восприятия и понимания иноязычной речи на слух; совершенствование различных видов чтения при работе с аутентичными текстами на английском языке; развитие умений письменной речи, в том числе реферирования, перевода текста с иностранного (английского) на родной (белорусский, русский) язык.

Материал каждого урока структурирован по семи разделам: Lead-in (Введение); Vocabulary Focus (Внимание к лексике); Language Box (Использование языка); Decision Bank (Принятие решения); Conclusion Worksheet (Подведение итогов); Web Search (Поиск в сети), Revision Point (Повторение).

Упражнения раздела «Введение» подготавливают студентов к заданной речевой ситуации через обсуждение вводных вопросов по теме, высказывание своего мнения в отношении предложенных фактов, цитат и изречений, статистических сведений, графического и иллюстративного материала.

В разделе «Внимание к лексике» содержатся упражнения на ознакомление с тематическим лексическим материалом и первичное закрепление лексики.

Упражнения в разделе «Использование языка» способствуют развитию у студентов умений и навыков применения изученной лексики в различных видах речевой деятельности.

Предложенные в разделе «Принятие решения» упражнения направлены на закрепление у обучающихся приобретенных ранее навыков и умений, формирование языковой компетенции в речевой ситуации заданного дискурса.

Для контроля знаний изученного материала и оценки степени сформированности иноязычной компетентности в разделе «Подведение итогов» студентам предложен мини-проект, выполнение которого предполагает демонстрацию сформированных лингвистических и профессиональных компетенций обучающихся.

В разделе «Поиск в сети» размещены ссылки на интернет-источники, изучение которых позволяет развить умения ознакомительного и изучающего чтения, способствует развитию самостоятельной поисковой деятельности, критическому мышлению, построению собственного углубленного знания.

Для выявления уровня овладения содержанием учебного материала в разделе «Повторение» студентам предложен комплекс упражнений для самостоятельной работы.

Тематический словарь терминов и профессионализмов представлен в разделе Wordlist (Список слов), основные IT-понятия с вариантами сокращений систематизированы в разделе List of Abbreviations (Список аббревиатур).

Пособие может быть использовано при обучении профессионально ориентированному английскому языку специалистов в области информатики и радиоэлектроники в высшей школе, а также рекомендовано широкому кругу читателей, желающих овладеть английским языком для профессиональных целей.

О. П. Дмитриева,
кандидат исторических наук, доцент, заведующий кафедрой
межкультурной профессиональной коммуникации

Book Map

Topic	Lesson	Vocabulary Focus	Language Box	Decision Bank
Computer Concepts	**Lead-in**			
	Lesson 1 ***Computers in Everyday Life***	Learn the vocabulary related to computer essentials	Practise speaking about the concept of ICT, digital revolution, and data representation	Consider the ways of ICT applications
	Lesson 2 ***Hardware Basics***	Learn the vocabulary related to the components and types of computers	Practise speaking about input, processing, output and storage devices	Consider the ways of choosing computers by specifications
	Lesson 3 ***Sustainable IT***	Learn the vocabulary related to sustainability in IT	Practise rendering information about e-waste	Consider the ways to implement sustainability in IT
	Conclusion Worksheet			
	Web Search			
	Revision Point			
Software Fundamentals	**Lead-in**			
	Lesson 1 ***Software Basics***	Learn the vocabulary related to system and application software	Practise speaking about the operating system and its tasks	Consider different operating systems and office suite versions
	Lesson 2 ***Software Licences***	Learn the vocabulary related to software licences	Practise speaking about open source and proprietary software	Consider the ways of incident management
	Lesson 3 ***Software Piracy***	Learn the vocabulary related to software piracy	Practise rendering information about software piracy	Consider the ways of tackling the problem of software piracy
	Conclusion Worksheet			
	Web Search			
	Revision Point			
Computer Networks	**Lead-in**			
	Lesson 1 ***Network Basics***	Learn the vocabulary related to network devices, topology, types	Practise speaking about network basics	Consider the ways different networks operate
	Lesson 2 ***Web and Internet Technology***	Learn the vocabulary related to the Web and the Internet	Practise speaking about the ways of connecting to the Internet	Consider the Web and its technologies
	Lesson 3 ***Internet of Things***	Learn the vocabulary related to the Internet of Things	Practise rendering information about the Internet of Things	Consider the implementation of the Internet of Things
	Conclusion Worksheet			
	Web Search			
	Revision Point			

Topic	Lesson	Vocabulary Focus	Language Box	Decision Bank
Information Systems	**Lead-in**			
	Lesson 1 ***Information System Basics***	Learn the vocabulary related to information system essentials	Practise speaking about the concept of SDLC and its phases	Consider the planning and analysis phases of SDLC
	Lesson 2 ***System Design and Implementation***	Learn the vocabulary related to system design and implementation	Practise speaking about design and implementation phases	Consider scope creep
	Lesson 3 ***System Maintenance***	Learn the vocabulary related to system maintenance	Practise rendering information about information systems risks and protection	Consider the advantages of electronic government
	Conclusion Worksheet			
	Web Search			
	Revision Point			
Computer Programming	**Lead-in**			
	Lesson 1 ***Programming Basics***	Learn the vocabulary related to programming essentials	Practise speaking about the main principles of object-oriented programming	Consider modern programming languages
	Lesson 2 ***Artificial Intelligence***	Learn the vocabulary related to artificial intelligence and its subsets	Practise speaking about artificial intelligence	Consider game programming
	Lesson 3 ***Robotics***	Learn the vocabulary related to robots and robotic system essentials	Practise rendering information about programming in robotics	Consider different ways of robots applications
	Conclusion Worksheet			
	Web Search			
	Revision Point			
Digital Security	**Lead-in**			
	Lesson 1 ***Computer Protection***	Learn the vocabulary related to digital security	Practise speaking about computer protection and maintenance	Consider the ways of creating a strong password
	Lesson 2 ***Malicious Software***	Learn the vocabulary related to malicious software	Practise speaking about antivirus software	Consider cyber weapons
	Lesson 3 ***Social Engineering***	Learn the vocabulary related to social engineering	Practise rendering information about threats and defences against social engineering	Consider security technology
	Conclusion Worksheet			
	Web Search			
	Revision Point			
Wordlist				
List of Abbreviations				
References				

Topic: Computer Concepts
Lesson 1: Computers in Everyday Life

Aim	Objectives
Master communication skills and competences in computer systems, ICT, and other digital devices	At the end of this lesson, students will be able to: • define ICT and areas where it can be applied • explain the difference between data and information • state phases of the digital revolution • define what role computers and ICT play in our life • present and discuss findings in pairs and small groups • write a summary based on different media

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

2. Read the abstract about what it is like to live with computers and work out the meaning of the words and word combinations 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, emails, and voice mails. With the help of a video camera and microphone, it has become possible to **set up a conference call** 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. They can enhance the speed and **efficiency**, save time, make the accurate data available to the business owners and related parties, help in the flow of information by supporting decision making within a business or organisation. Because of computers, concepts such as flexible working schedules and remote working have become possible. Manufactures can use new technology and computers to design and build products, carry out routine and complex tasks and procedures.

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

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.

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 at high rate. 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 a(n) *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(n) *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
✓ perform	✓ 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

3. Are ICT and IT the same?	a) ICT is sometimes used interchangeably with IT b) ICT is more comprehensive c) ICT includes components related to computers only d) ICT and IT are two different concepts
4. ICT components include …	a) data c) Internet access b) domestic appliances d) software and hardware
5. ICT has a big impact on …	a) people's life style c) entertainment b) education d) economic development
6. What are the benefits of ICT?	a) technologies have become more expensive b) ICT has stifled human interaction c) new market opportunities d) highly automated cost cutting business processes
7. What are ICT downsides?	a) new levels of crime b) workers displaced by robots c) cost saving opportunities and conveniences d) people become less human

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 a 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	**Communication** 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, emails, text messages, voice mails, etc.
Student C	**Technology** 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 imposssible 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) 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.

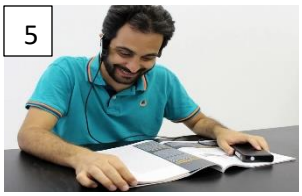
1. Data representation refers to the form in which data is stored.
2. Devices such as smartphones, iPods, and computers can store data in analog formats.
3. Digital data is the data that has been converted into an infinite number of digits.
4. Analog data is represented using a discrete scale of values.
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 firsthand 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 codes 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 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://witscad.com/course/computer-architecture/chapter/data-representation

https://www.diffen.com/difference/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. 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 👎

- Impact of computers 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: • define what a computer is and explain the tasks of computer devices • present and discuss characteristics of computers • state the differences between types of storage • understand speakers talking about ICT • present and discuss findings in pairs and small groups • write a summary based on different media

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 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 a 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 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

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

Display your ideas with perfect brilliance

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

It's quiet and invisible

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

Power and speed on the inside

Let your computer's brain do the work

Make a big impact on the production of text and graphics

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.

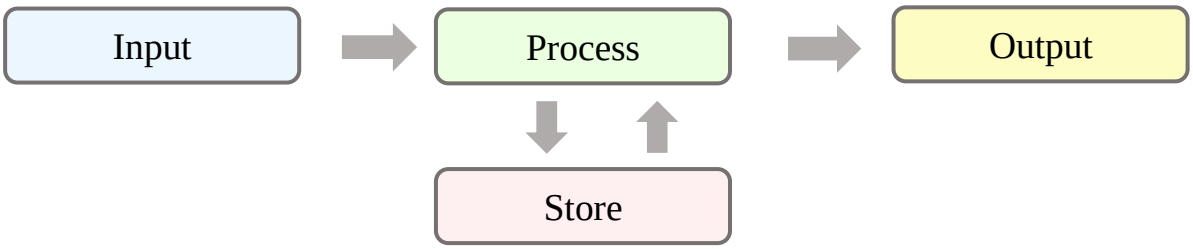
1.Workstation 2. Supercomputer 3. Mainframe computer 4. Desktop computer 5. Tablet 6. Laptop computer or notebook 7. Smartphone	a) It performs many of the functions of a personal computer and keeps users connected through messaging services, email, video calls and social networking apps, in addition 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

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 drive; 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.

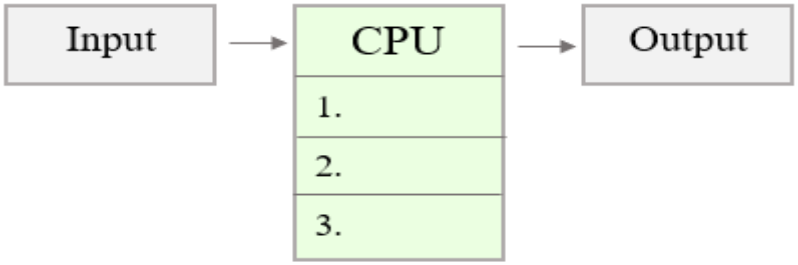
The mouse is widely used in graphics and design. When you want to move something, 5) _____ the mouse button, and 6) _____ the image to a new location on the screen. Similarly, the mouse is used to change the shape of a graphic object. For example, if you want to convert a square into a rectangle, you 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 control 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 unit. 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-centrical 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 5 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	3840×2400
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

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

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	4480×2520
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

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://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.

1. Cache memory	a) acts as a buffer between the CPU and RAM b) holds data and instructions which are used frequently c) stores programs that can be executed within a short period of time d) stores data and programs on permanent basis
2. A mouse can be used …	a) to control position of the cursor b) to enter text into the computer c) to copy text d) to select files and folders
3. Modern display devices can feature …	a) CRT c) LED b) LCD d) OLED/QLED
4. Factors that affect image quality are …	a) resolution c) response rate b) dot pitch (dp) d) memory
5. Memory or storage unit of the CPU …	a) controls the transfer of data b) transmits all inputs and outputs c) affects speed, power and capability by its size d) stores instructions, data, intermediate and final results of processing before these results are released to an output device
6. Control unit controls the operations of all parts of the computer, namely …	a) controls the transfer of data/instructions among units b) manages and coordinates all the units c) processes or stores data d) interprets instructions and directs the operation of the computer

7. The machine cycle of the CPU consists of such basic operations as …	a) fetching data b) decoding data c) operating and storing 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

- 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: • report on the issue of e-waste • utilise print and electronic media for information • conduct surveys and interviews • present and discuss findings in pairs and small groups • write a summary based on different media

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 follows 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 technotrash – 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 manufactures.
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 2024. That's almost triple the amount in 2020. 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 the 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 …	a) e-waste is becoming one of the biggest challenges for the future
2. As we buy more electronic goods and replace them more often, …	b) toxins as lead or cadmium can pollute the environment and cause irreversible harm

3. E-waste contains parts and materials …	c) it's far better to repair these gadgets
4. Instead of sending obsolete electronic gear to dump sites, …	d) that are sent to smoldering landfills
5. If e-waste is not managed carefully, …	e) that can be reused or recycled

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 👎

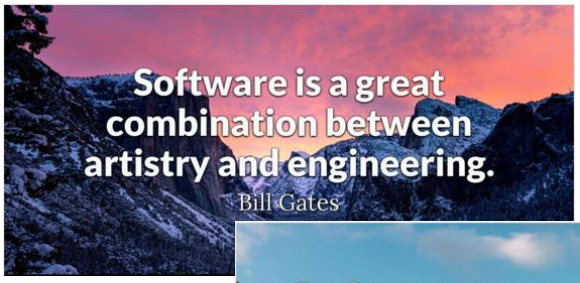
- Definition of sustainable IT, its core elements.
- Threats of e-waste.
- Obstacles for tackling the problem of e-waste.
- Solutions to implement sustainability in IT.

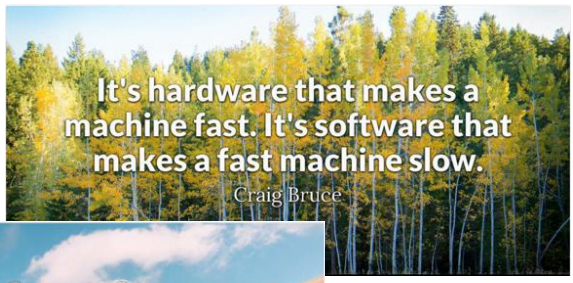
Topic: Software Fundamentals
Lesson 1: Software Basics

Aim	Objectives
Master communication skills and competences in software, types of software and the significance of operating systems	At the end of this lesson, students will be able to: • define software and its types • state the functions of operating systems • conduct interviews • present and discuss findings in pairs and small groups • make a summary based on different media

I. Lead-in

1. Share your opinion on the quotes. Justify your point of view.





2. Share your opinion on the questions. Work in groups of three or four people. Report your ideas to the rest of the group.

a) What is software?
b) What are the functions of software?
c) What software do you use?

II. Vocabulary Focus

1. Do the quiz to find out what you know on the topic of software. More than one option can be correct. Work out the meaning of the words in bold. Work with a groupmate.

1. Software	a) is a set of programs b) is **non-hardware** components of a computer c) is a program that **makes** hardware work d) is a network of computer devices
2. System software	a) is designed for **computer-centric** tasks b) runs independently of the applications

	c) is designed to operate, control, and **extend** the processing capabilities of the computer d) is generally created by the users
3. Application software	a) is designed to help people **accomplish** tasks b) is designed to **satisfy** a particular need of the environment c) is designed to help computers be more productive d) can't **run** without system software
4. Operating system	a) is a program that acts as an **interface** between software and computer hardware b) communicates directly with the user c) is specialised software that controls and **monitors** the **execution** of all programs d) runs user interface
5. Utility software	a) can't add functionality to your computer b) helps users configure, analyse, optimise and **maintain** a computer c) is a program to make the system's operations **smoother** and more efficient d) is usually used to support computer **infrastructure** and manage system resources
6. Programming software	a) is **compilers**, **debuggers**, **interpreters** b) is a programming tool or software development tool c) is programmer's instruments for writing a code d) helps users **interact** with a computer
7. Device driver	a) is a computer program that **operates** or controls a particular type of device that is attached to a computer b) provides interface for hardware c) provides interface for users d) is hardware dependent

2. Watch the video "How Software Is Made" [37] and mark the following statements as true or false. Correct the false ones.

1. We'll use something called object code when writing the binary.
2. In order for the computer to actually run the program, the source code must be turned into binary.
3. If there are any mistakes in the source code, the compiling corrects them, and runs the program.
4. All the source code for the software is stored on the machines of the developers, and they store a copy on a server.
5. The server stores a detailed list of what files were changed, what those changes were, and who submitted it.
6. Problems with the code are called mistakes.

7. When software is released to the public, the software developers install it and leave without any further changes.
8. Software can be made by two different ways: proprietary and open source.
9. The proprietary software is owned by a person or company and sold to make money.
10. The open source approach means that only programmers can get access to the source code.

3. Watch the video again and choose the correct answers to the questions. More than one option can be correct.

1. What is not true about the source code?
   a) It is a set of instructions to the computer.
   b) It is human readable.
   c) It is used only for simple programs.
   d) It can be written in different programming languages.
2. What is compiling?
   a) It's the process of displaying mistakes in the source code.
   b) It's the process of running a program.
   c) It's the process of displaying a computer screen.
   d) It's the process of turning the source code into binary.
3. How are big software projects carried out?
   a) They are divided into parts.
   b) They are built up of files.
   c) They require essential files.
   d) They exclude any collaboration.
4. What helps a group of developers work together over one project?
   a) A detailed list.
   b) The source code.
   c) Changed files.
   d) Revision control.
5. Why do programmers make updates?
   a) To release new versions to the public.
   b) To create newer software periodically.
   c) To meet public requirements.
   d) To fix bugs.
6. What is true about proprietary software?
   a) It is open source.
   b) It can be owned by a company.
   c) It is sold to make profit.
   d) It can be owned by a person.
7. What is not true about open source software?
   a) It is free.
   b) It can be accessed by anyone.
   c) It is hard to find such programs in use today.
   d) It is often created by volunteers who are not paid.

4. Study the main differences between system and application software. Then group the features below according to the type of software. Work with a groupmate.

Aspects	System software	Application software
Definition	It is designed to run a computer's hardware and application programs	Also known as an "app", it is software designed to help the user perform specific tasks
Interaction	Generally, users don't interact with system software as it works in the background	Users always interact with application software while doing different activities
Dependency	System software can run independently of the application software	Application software can't run without the presence of the system software
Types	- operating system; - device driver; - utility software; - programming languages	- web browser; - word processing; - spreadsheet software; - presentation software
Features		

- ✓ Close to the system.
- ✓ Bigger in size, requires large storage space.
- ✓ Fast in speed.
- ✓ Difficult to design.
- ✓ Easy to understand.
- ✓ Easy to manipulate and use.
- ✓ Slow in speed.
- ✓ Difficult to understand.
- ✓ More interactive.
- ✓ Smaller in size.
- ✓ Close to the user.
- ✓ Difficult to manipulate.

5. Match the most common features of Microsoft Word on the left with their functions. Then complete the statements below with the appropriate words.

1. Typeface 2. Formatting 3. Toolbar 4. Menu bar 5. Header 6. Footer 7. Indent 8. Bold 9. Italics 10. Underline	a) is a separate bit of text at the top of a printed page
	b) is the bar of icons (save, print, etc.) on the screen below the menu bar
	c) is the design of lettering that can include variations in size, weight, slope, width and so on; font
	d) draws a line under something printed
	e) is a thin, horizontal bar containing the labels of menus in a GUI
	f) makes characters slant upward to the right
	g) provides access to several text editing functions such as font size and colour, text alignment, lists, and the like
	h) is the increase or decrease of space between the left and right margin of a paragraph
	i) creates the appearance of darker text by applying a thicker stroke weight to the letters
	j) is a name or page number that can be automatically displayed at the bottom of each page of a printed document

1. The _____ provides the user with a place in a window to find program's essential functions.
2. The Standard _____ lists the icons to save or print a document, spell check, etc., the _____ Toolbar is the area for changing font, alignment, indentation, etc.
3. A font consists of three elements – _____, type style and type size. For example, Palatino bold at 10 points.
4. Type style refers to a visual characteristic of a typeface, for example, **B** for _____, *I* for _____ and U for _____.
5. If you need to change the space between the page margin and where the text aligns, you can click the Increase or Decrease _____ buttons.
6. The _____ and _____ commands allow you to specify customised texts at the top and bottom of every page.

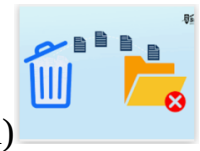
6. Consider the definitions of the terms "compiler" and "interpreter" to understand the key differences between them. Complete the statements below with the word "compiler" or "interpreter" or their derivatives.

Compiler – a program that translates the entire source code in a single run

Interpreter – a program that translates the entire source code line by line

1. A(n) _____ takes an entire program and a lot of time to analyse the source code, whereas a(n) _____ takes a single line of code and very little time to analyse it.
2. A(n) _____ code runs faster while that a(n) _____ code runs slower.
3. A(n) _____ displays all errors after translation. If your code has errors, it will not compile. But a(n) _____ displays errors of each line one by one.
4. _____ does not replace compilation completely.
5. A(n) _____ can contain a(n) _____ for optimisation reasons like faster performance and smaller memory footprint.

7. Look at some examples of utility software (a–h) and match them with their functions (1–8). Discuss in groups which of them you use more or less often and why.

a) 

b) 

c) 

d) 

e) 

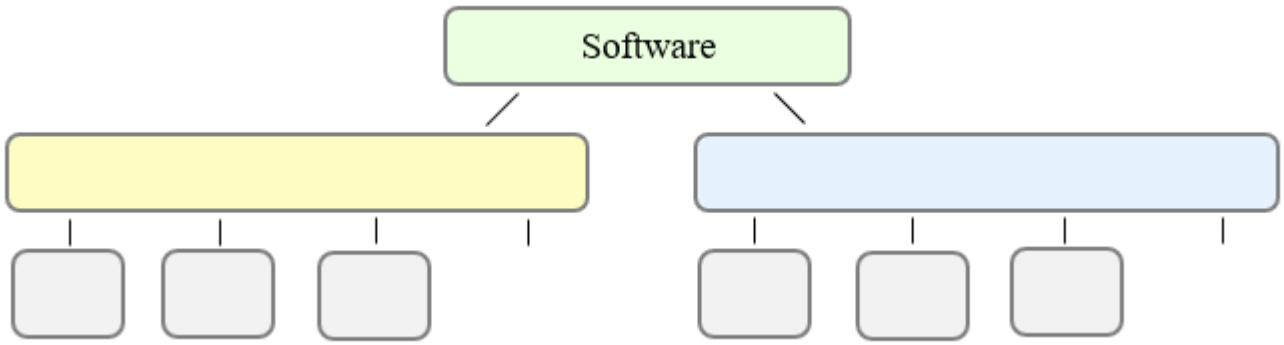
f) 

g) 

h) 

1. Formatting.
2. Disk defragmentation.
3. System clean-up.
4. Antivirus software.
5. User account and security.
6. Deleting data.
7. Software update.
8. Encryption/decryption.

8. Complete the diagram and explain how software is categorised and how it works. Use the ideas from this lesson.



III. Language Box

1. Read the abstract "Operating Systems" and consider the following key ideas.

Definition of OS	Tasks of OS	Types of OS

Operating Systems

An operating system (OS) gives your digital device a personality. It controls key elements of the user interface, which includes the visual experience as well as the keyboard, mouse, microphone, or touch screen that collects user commands. Behind the scenes, the operating system is busy supervising critical operations that take place within a device.

The term "user interface" refers to the standard procedures that the user follows in order to interact with a computer. In the late 1970s and early 1980s, the way users accessed computer system was very complex. They had to memorise and type a lot of commands just to see the contents of a disk, to copy files or to respond to a single prompt. It was known as a command-line interface (CLI). In fact, it was only experts who used computers, so there was no need for a user-friendly interface.

In 1984 Apple produced the Macintosh, the first computer with a mouse and a graphical user interface (GUI). Macs were designed with one clear aim: to facilitate interaction with the computer. A few years later, Microsoft launched Windows, another operating system based on graphics and intuitive tools. Nowadays, computers are used by all kinds of people, and as a result there is a growing emphasis on accessibility and user-friendly systems.

A GUI makes use of a WIMP environment: windows, icons, menus and pointer. The background of the screen is called the desktop, which contains labelled pictures called icons. These icons represent files or folders. Double-clicking a folder opens a window which contains programs, documents, or more nested folders. When you are in a folder, you can launch a program or document by double-clicking the icon, or you can drag it to another location. When you run a program, your PC opens a window that lets you work with different tools. All the programs have a high level of consistency, with similar toolbars, menu bars, buttons and dialog boxes. A modern OS also provides

access to networks and allows multitasking, which means you can run several programs or do various tasks at the same time. In some digital devices, such as smartphones and ebook readers, the entire operating system is small enough to be stored in ROM. For most other computers, the operating system program is quite large, so most of it is stored on a hard disk or SSD.

During the boot process, the operating system kernel is loaded into RAM. A kernel provides essential operating system services, such as memory management and file access. The kernel stays in RAM the entire time your computer is on. Other parts of the operating system, such as customisation utilities, are loaded into RAM as they are needed.

The most popular operating systems are as follows:

- the Windows Family – designed by Microsoft and used on most PCs;
- Mac OS – created by Apple and used on Macintosh computers;
- Unix – a multiuser system found on mainframes and workstations in corporate installation;
- Linux – open-source software developed under the General Public License. This means anybody can copy its source code, change it and distribute it. It is used in computers, appliances and small devices.

These computer platforms differ in areas such as device installation, network connectivity or compatibility with application software.

An operating system is a set of programs that lies between application software and the computer hardware. The most important program in the OS, the program that manages the OS, is the supervisor program, most of which remains in memory and is thus referred to as resident. The supervisor controls the entire OS and loads other programs (called nonresident) from disk storage into memory only as needed.

2. Find the key concepts in Task 1 that correspond to the following descriptions.

a) A set of instructions and statements written by a programmer using a computer programming language.
b) A folder stored within another folder; technically, it's a "subfolder".
c) Start instructions.
d) The ability to remain the same in behaviour or qualities.
e) A line of code instructing a computer.
f) A series of actions conducted in a certain order or manner.
g) An element of a computer program (such as a graphics application) that activates and controls a particular function.
h) Features through which users interact with the hardware and software of computers and other electronic devices.
i) A computer display area that represents the kinds of objects.

3. Mark the statements as true or false. Correct the false ones. Address Task 1 if necessary.

1. A user interface refers to the standard procedures that users follow in order to interact with each other.

2. In 1994 Apple produced the Macintosh, the first computer with a mouse and a graphical user interface (GUI).
3. The background of the screen is called the top desk, which contains labelled pictures called icons.
4. One click on a folder opens a window which contains programs, documents, or more nested folders.
5. When you are in a folder, you can launch a program or document by double-clicking the icon, or you can drag it to another location.
6. All the programs have a high level of consistency, with similar toolbars, menu bars, buttons and dialog boxes.
7. A modern OS can't provide access to networks and allow multitasking, which means you can't run several programs or do various tasks at the same time.
8. In smartphones and ebook readers, the entire operating system is small enough to be stored in ROM.

4. An OS performs a lot of tasks listed on the left below. Consider them and complete the statements with the words or collocations in the box. Explain how an OS performs these tasks. Discuss your ideas in small groups.

peripheral devices; hardware; application software; RAM; perform tasks; storage space; device drivers

- ✓ Manage processor resources to handle simultaneous input, output, and processing tasks.
- ✓ Manage memory by allocating space for all the programs and data that are in use during computing session.
- ✓ Keep track of storage resources so that files and programs can be found and manipulated.
- ✓ Ensure that input and output proceed in an orderly manner by communicating with peripheral devices.
- ✓ Establish basic elements of the user interface such as the appearance of the desktop, menus, and toolbars.

An operating system interacts with 1) _____, 2) _____, and 3) _____ to manage a set of resources. In the context of digital devices, the term resource refers to any component that is required to 4) _____.

The processor is a device's main resource. 5) _____, 6) _____, and 7) _____ are also resources. While you interact with application software, the operating system is busy behind the scenes performing resource management tasks, such as the ones mentioned on the list on the left.

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

1. What is a user interface?
2. How does a GUI differ from a CLI?
3. What is a WIMP environment?
4. Where is an OS stored?
5. What services does OS kernel provide?
6. What are the most popular OSs and how do they differ?

6. Consider the characteristics of the three types of OSs below and identify which one they belong to.

Desktop OS	Mobile OS	Server OS

1. It accommodates one user at a time but allows multiple accounts.
2. It provides connectivity to wireless local area networks.
3. It provides a utilitarian user interface.
4. It accommodates one user at a time.
5. It includes file management tools.
6. It includes integrated cellular communications.
7. It accommodates multiple simultaneous users.
8. It runs more than one application at a time.
9. It includes sophisticated network management and security tools.
10. It offers a GUI designed for touchscreen input.
11. It provides local area networking capabilities.
12. It offers a GUI designed for keyboard and mouse input.

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

1. Does only the hardware require the software?
2. In what cases do you install device drivers?
3. When and what for does a computer require utilities?
4. What are translation programs and how do they differ?
5. What is the role of OS? What types of OS do you often use?
6. What do you need a user interface for?

IV. Decision Bank

1. Share your opinion on the questions. Then listen to a podcast interview with Bill Thompson, a program developer [59], to compare your ideas.

a) Why is Windows so popular? Give the reasons.
b) Which Windows Vista edition is aimed at high-end PC users, gamers and multimedia professionals?

2. Listen again and complete the fact file.

Windows Vista editions	Other features	Internet and security	Windows programs
1) _____ is designed for users with basic needs, such as email and Internet access.	The user interface has been redesigned with new icons and a new 4) _____.	Internet Explore is more reliable and secure.	The most popular is still 8) _____, a suite that includes

Home Premium is for advanced home computing and 2) _____ . The Business Edition is ideal for 3) _____. The Ultimate Edition is the most complete	It offers support for the latest technologies, from DVD creation to 5) _____	The Security Centre includes an 6) _____ program called Windows Defender, and a firewall that protects your computer from 7) _____	the 9) _____, Word, an email program, the Excel spreadsheet program; and the 10) _____ program, Powerpoint

3. Study the five versions of Office Suite listed from the cheapest to the most expensive and decide which version provides the best value for the users below. Discuss your ideas in groups of four or five people.

OfficeSuite Standard	**OfficeSuite Small Business Edition**	**OfficeSuite Professional**	**OfficeSuite Premium**	**OfficeSuite Developer**
- word processor - spreadsheet - presentation program - email - PIM	- word processor - spreadsheet - DTP - email - PIM - small business tools	- word processor - spreadsheet - database - DTP - presentation program - email - small business tools	- word processor - spreadsheet - database - presentation program - email - PIM - small business tools - website editor - image editor	- word processor - spreadsheet - database - presentation program - email - PIM - small business tools - website editor - image editor - developer tools

1. A company that wants to produce its own in-house newsletter.
2. A salesperson who wants to make presentations at conferences.
3. An administrative assistant who needs to write office correspondence and send and receive emails.
4. A company that wishes to develop its own website.
5. A programmer who wants to develop applications tailored to a company's needs.
6. A company that wants to analyse all its sales records.
7. A promoter who wants to edit complex graphics and incorporates them in brochures.
8. A company that wants to share documents on a local area network.

4. Use the Internet to find out more about apps. Take notes using the chart. Summarise your findings and report to the group.

The example of an app	The purpose of an app	The main features of an app	The advantages of an app

V. Conclusion Worksheet

Summarise in writing the main ideas presented on the topic of computer software. Give reasons for your ideas and include any relevant examples from your own knowledge or experience. The main topic to consider is as follows:

In the digital world, anything that is not hardware is software. The realm of software "stuff" includes apps, Web applications, operating systems, and files. The core aim of each part of software (OS, DD, utilities, translation programs, etc.) and how it works with other components.

VI. Web Search

Explore the resources in the list to obtain additional information about software and its components. Report your findings to the group.

https://www.klientsolutech.com/what-is-computer-software-computer-software-basics

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

https://www.indeed.com/career-advice/career-development/types-of-software

VII. Revision Point

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

Jailbreaking

Jailbreaking is the process of exploiting the flaws of a locked-down electronic device to install software other than what the manufacturer has made available for that device. Jailbreaking allows the device owner to gain full access to the root of the operating system and access all the features. It is called jailbreaking because it involves freeing users from the "jail" of limitations that are perceived to exist.

Ipads, iPhones, and iPods are only allowed to download apps from the official iTunes App Store. Similar apps are available from other sources, but using them requires an unauthorised change to the device's software called a jailbreak. After downloading and installing the jailbreak software, your device will be able to install apps from a variety of sources other than the iTunes App Store. The jailbreak lasts until you accept a software update from Apple. Updates wipe out the jailbreak software, forcing you to reinstall it. Android phones are not limited to a single app store, so there is no need to jailbreak them to access more apps. There are various ways to make unauthorised modifications to any mobile device to overcome limitations imposed by

mobile service providers. The process is called rooting, but most consumers have no need to root their mobile devices.

2. Read the passage about Linux and choose the options from the ones given in italics to make true statements.

Linux is an *operating system/application software* and it was initially created as the hobby. Apart from the fact that it is *freely/fee-paying* distributed, Linux functionalily, *inflexibility/adaptability* and robustness have made it the main alternative for proprietary Unix and Microsoft operating systems. More than a decade after its *initial/final* releases, Linux is being adopted *locally/worldwide*, primarily as a server platform. The OS can also be *incorporated/separate* into the microchips in a process called embedding, and it is *less/increasingly* being used this way in appliances and devices.

3. Read the passage about databases and complete the gaps with the words in the box.

updated; sort; database management system; files; hyperlinks; search; records; index; database; field

A(n) 1) _____ is a collection of related data, and the software used in databases to store, organise and retrieve the data is called the 2) _____. A database can manage any type of data, including text, numbers, images sound, video and 3) _____. Information is entered into the database via a(n) 4) _____. Each holds a separate piece of information, and the fields are grouped together in 5) _____. They are grouped into 6) _____ which hold large amounts of information. Files can easily be 7) _____ – you can always change fields, add new records or delete old ones. A database program lets you create a(n) 8) _____ – a list of records ordered according to the content of certain fields. This helps you 9) _____ the database and 10) _____ records into numerical or alphabetic order very quickly.

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

Comprehensive	Rather confident	Limited

- Definition of software and how it is made.
- Categories of software.
- Types of software.
- Definition and types of operating systems.

Lesson 2: Software Licences

Aim	Objectives
Master communication skills and competences in software purchasing regulations, incident management, software maintenance and software licences	At the end of this lesson, students will be able to: • state software licences and explain key features of copyright • define pros and cons of open source and proprietary software • present basic incident management guidelines • present findings in pairs and small groups • write a summary based on different media

I. Lead-in

1. Conduct a survey among your groupmates about their prior behaviour in relation to buying and installing computer software. Complete the chart. Then report your findings to the group.

Computer device	What are the most essential applications?	What software do you download for free?	What software do you have to purchase?
Desktop computer			
Laptop			
Smartphone			

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

a) Why is most software licensed?
b) How does software licensing work?
c) What types of software licences do you know?

II. Vocabulary Focus

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

A.	B.
permissible	loan
warranty	guarantee
bound	agreement
treaty	obliged
lend	view
perspective	authorised

2. Read the abstract "Software Licencing" and work out the meaning of the words and word combinations in bold.

Software Licencing

In most countries, computer software is protected by copyright. Copyright is a form of **legal protection** that grants the author of an original work an **exclusive right** to copy, distribute, sell, and modify that work.

Purchasing software is not the same as buying **tangible goods**, such as mittens, chairs, and shoes. Once they've been purchased, tangible goods can be used, altered, loaned to friends, resold, or given away. In contrast, a software "purchase" is actually a licence agreement that may include certain **restrictions**.

From a legal perspective, there are two categories of software: public domain and proprietary. Public domain software is not protected by copyright because the copyright has expired or the author has placed the program **in the public domain**, making it available without any restriction. Public domain software may be freely copied, distributed, and even resold. The primary restriction on public domain software is that you are not allowed to apply for copyright on it. Proprietary software has restrictions on its use that are **delineated by** copyright, patents, or licence agreements. Some proprietary software is **distributed commercially**, whereas some of it is **free of charge**. Based on **licencing rights**, proprietary software is distributed as commercial software, freeware, demoware, shareware or open source software.

Licence (Br. E.) / License (Am. E.) – an official document that gives someone permission to do or use something

3. Complete the gaps with the appropriate words and word combinations in the box to make true sentences.

unauthorised parties; stand for; intellectual property; set of restrictions; legal contract; copyright law; used interchangeably

1. Software copyright protects the rights of the person or corporation that developed the _____.
2. A software licence, or licence agreement, is a _____ that defines the ways in which a computer program may be used.
3. Without copyright protection, software would be copied and distributed by _____ without compensation to its authors.
4. Copyright protects a software product by imposing a _____ on its use.
5. Although copyrights, trademarks, and patents are frequently _____, they offer different forms of protection for intellectual property.
6. Not all types of work can be copyrighted. Ideas, discoveries, concepts, or theories cannot be protected under _____.
7. Copyright protection varies from country to country and can _____ 50 to 100 years after the individual's death, depending on the country.

4. Read the definitions below and decide what concepts from Task 2 they refer to.

1. The exclusive right to produce copies and control an original work, granted by law for a specified number of years.
2. A real thing that exists in a physical way.
3. Connected with or allowed by the law.
4. It is available for everyone to see, to know, to use.
5. An official limit on something.
6. Used to describe a product that is made and sold by a particular company whose name, or a name it owns is on the product.

5. Read the descriptions (1–5) and decide which software licences in the box they refer to. Work with a groupmate.

shareware; freeware; demoware; commercial software; open source software

1. _____ is distributed for free and often comes preinstalled on new devices, but it is limited in some way until you pay for it.
2. _____ is usually sold in retail stores or on Web sites. Most of this software is distributed either under a single-user licence that limits use to one person at a time or multi-user licences to schools, organisations, and businesses.
3. _____ is copyrighted software that is available for free, it is fully functional and requires no payment for its use. This licence permits you to use the software, copy it, and give it away, but the licence does not permit you to alter or sell the software.
4. _____ makes source code available to programmers who want to modify and improve the software. It may be sold or distributed free of charge in a compiled form, but it must, in every case, also include the source code.
5. _____ is copyrighted software marketed under a try-before-you-buy policy. It is similar to demoware but typically does not have built-in limitations that are removed when a consumer switches to a paid version.

6. Present a short report on how different types of software licences work. Use online resources, the information from this lesson, and your prior experience. Work in groups of three or four people.

Software Licences	Main Features	Advantages and Disadvantages	Examples of Products
Commercial software			
Freeware			
Demoware			
Shareware			
Open source software			

7. Software licences are often lengthy and written in legalese, therefore, it is very important to understand the software licence for any software you use. Read the end-user licence agreement (EULA) below and answer the questions.

a) Is the consumer buying the software or licensing it?
b) When does the licence go into effect?
c) Under what circumstances is it legal to make copies?
d) Is it permissible to loan the software?
e) Is it permissible to sell the software?
f) Does the software publisher provide a warranty?

Legalese – the language used by lawyers in legal documents that is difficult for ordinary people to understand

Software Licence Agreement

This Licence Agreement (Agreement) is a legal agreement between you and eCourse Corporation for the software product. By installing, copying, or otherwise using the SOFTWARE, you agree to be bound by the terms of this Agreement. The SOFTWARE is protected by copyright laws and international copyright treaties. The SOFTWARE is licensed, not sold.

GRANT OF LICENCE. This Agreement gives you the right to install and use one copy of the SOFTWARE on a single digital device. The primary user of the device on which the SOFTWARE is installed may make a second copy for their exclusive use on a portable device.

OTHER RIGHTS AND LIMITATIONS. You may not reverse, engineer, decompile, or disassemble the SOFTWARE except and only to the extent that such activity is expressly permitted by applicable law.

The SOFTWARE is licensed as a single product; its components may not be separated for use on more than one device. You may not rent, lease, or lend the SOFTWARE.

You may permanently transfer all of your rights under this Agreement, provided you retain no copies, you transfer all of the SOFTWARE, and the recipient agrees to the terms of this Agreement.

You may receive the SOFTWARE in more than one medium. Regardless of the type of medium you receive, you may use only one medium that is appropriate for your single device. You may not use or install the other medium on another device.

WARRANTY. eCourse warrants that the SOFTWARE will perform substantially in accordance with the accompanying written documentation for a period of ninety (90) days from the date of receipt

8. Explain the following concepts. Work with a groupmate.

- ✓ copyright
- ✓ software licensing
- ✓ proprietary software
- ✓ public domain software
- ✓ types of licences
- ✓ licence agreement
- ✓ copyrighted products
- ✓ intellectual property

III. Language Box

1. Share your opinion on the questions.

a) What do you know about open source software?
b) How is it different from proprietary software? Consider cost, benefits, who writes it, and how many people use it.
c) Can you think of any disadvantages of using open source software?

2. Read the abstract "Open Source vs Proprietary Software" and list the key differences between them.

Open Source vs Proprietary Software

First, open source software comes with a great advantage since it can be installed for free. But this is not the only important thing. There is freedom from the software vendors. Many companies say that freedom is the number one reason to choose open source software. With open source software organisations do not have to follow the software vendor's decisions. With proprietary software vendors control software updates. Furthermore, it can be used and deployed again and again on multiple machines without the need of tracking the licence compliance and terms of use.

Second, open source software helps companies save time and money by providing ready to use software as a whole. Besides, many of these programs are created to work with almost any type of platform, which helps extend your hardware life and avoid the need to constantly replace them.

Also, with open source companies have more control of their data. Proprietary software stores data in such ways that when a company wants to change to different vendor's software, moving data to this new software can be very difficult. With open source software it is open and not a secret. Because of this, moving data is not a problem.

Sometimes people worry about the quality of open source software. But, open source software is usually developed by a group of talented and skillful experts. That is why most of the open source software is high-quality programs. Since anyone can access the code and fix a bug, you will notice continuous improvement and new versions or features added to the software every now and then. Users also think that their favourite software programs won't run on open source operating systems. However, it's not true, because there is a lot of office software for open source operating systems. It's only special areas, such as graphics design, where proprietary software is clearly better.

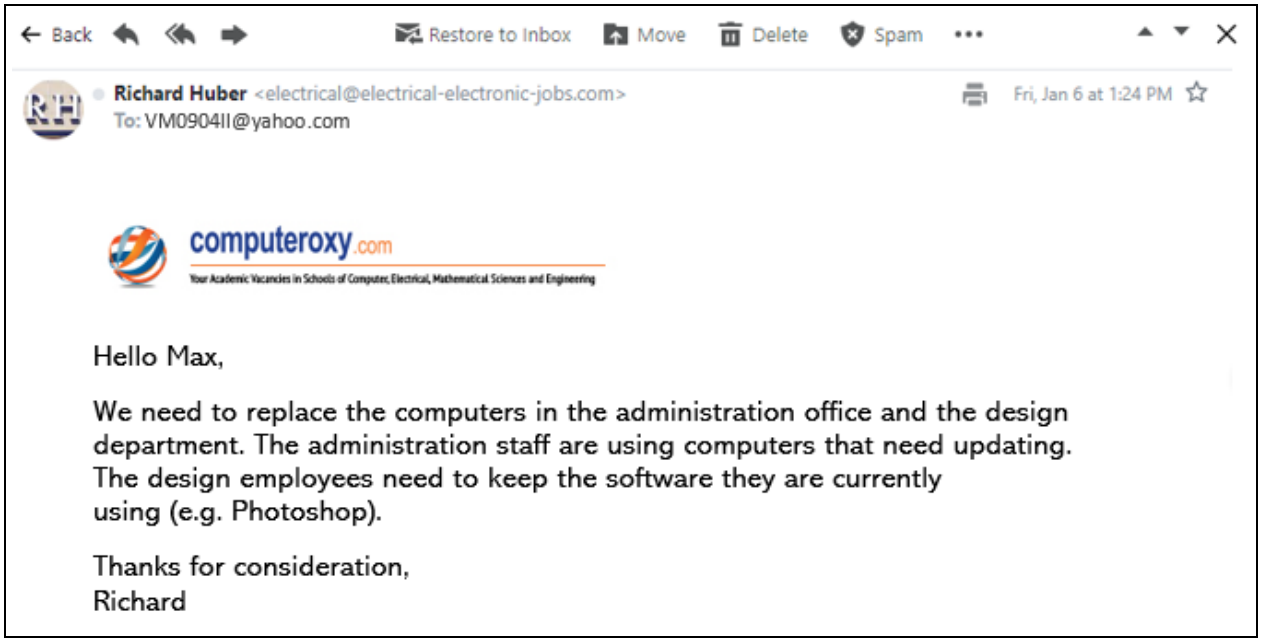
3. Listen to John Clark, the sales representative of a major operating system company, explaining why open source is a bad idea [60]. Match the beginnings of the sentences (1–7) with the appropriate endings (a–g).

1. John Clark thinks that companies are making a big mistake …	a) unfamiliar, so additional training is required
2. Many people think open source software is …	b) a better-looking interface and fewer bugs
3. Open source software is often …	c) using open source software
4. Open source operating system providers often …	d) pay salaries to their software developers
5. Companies that produce proprietary software can …	e) on open source operating systems
6. Proprietary software has more features, …	f) cheaper than proprietary software
7. Most commercial software doesn't run …	g) make money by charging for support

4. Listen to John Clark again and make a list of reasons he gives to use proprietary software.

5. Make a list of arguments in favour of using open source software. Compare it with the one in Task 4. Discuss pros and cons of using proprietary and open source software. Work with a groupmate.

6. Imagine that you work as a technician at the advertising company. Your job is to maintain operating systems and software. Read the email from your manager and decide whether to use open source, proprietary software, or some of each. Justify your choice. Work in groups of three or four people.



IV. Decision Bank

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

1. What was the last problem you had with software?
2. What software crashes are common with different types of devices?
3. When you have a problem with a device, what do you do?
4. How can people with a limited set of computer skills find help if problems occur?

2. Read the abstract "Steps to Take Before Calling Tech Support" and match the headings (1–9) with the appropriate paragraphs (A–I).

1. Search the Internet to find solutions.
2. Look for software patches.
3. Undo any recent hardware or software changes.
4. Free up RAM by closing other open programs.
5. Shut down and restart your computer.
6. Boot up in safe mode.
7. Uninstall the software, then reinstall it.
8. Restart the software.
9. Scan for viruses and malware.

Steps to Take Before Calling Tech Support

Unexplained software crashes and error messages can bring your work to a standstill. When this happens, it's tempting to call tech support immediately. But before you make the call, there are basic steps you can take to solve software problems on your own, or at least narrow down their causes.

A. Every piece of software uses RAM. The more software that's running on your computer, the more RAM it uses. So, if a software program refuses to load or is running slowly, the first thing to do is to close all other open applications.

B. Software problems can stem from a conflict with other programs or simply from difficulties the software encountered when starting up. Shutting the program down and restarting it can sometimes resolve these issues.

C. If restarting the problematic program doesn't resolve the issue, try rebooting your computer. Once the computer has fully restarted, relaunch the application in question and see if the problem has been resolved.

D. No matter what software problems you encounter, chances are it's happened to someone else. So, there's a good chance you can find help on the Internet.

E. Newly installed software may conflict with other software. For example, Symantec Norton Antivirus can conflict with competing antivirus products. So, if you recently installed another antivirus program and Norton Antivirus no longer works correctly, uninstalling the other antivirus product could solve your problem.

F. Sometimes, software problems occur because critical application files have been removed, updated, or deleted. If you've recently removed one program from your computer, it's possible you removed DLL (Dynamic Link Library) files that another program relied on. Similarly, adding a program could add or update DLL files.

G. Software vendors may also fix bugs by issuing patches – small software updates that address known problems. Even if you are using the most current version of the software, there may be a more recent patch available for that version.

H. Viruses, spyware, and other forms of malicious software (or "malware") can cause the software to freeze, crash, or quit working entirely. If the tips mentioned above haven't helped solve your software problem, you may also want to scan the computer using both antivirus and antimalware tools to find and remove viruses and malware. Use the most thorough scan mode available, and remember to restart your machine if the antivirus or antimalware programs found any threats.

I. Some software malfunctions can be caused by OS settings or other system problems. Windows and Mac operating systems both offer a troubleshooting environment known as safe mode. Safe mode disables non-critical applications and processes, which theoretically makes it easier to isolate problems.

If the tips listed above haven't solved your software problem, it may be time to call tech support. At least, you'll be able to help them narrow down the problems by describing the troubleshooting steps you've already taken on your own.

3. Consider the six situations where people are facing tech problems and identify the source of the issue. Share your opinion on how to fix them with a groupmate.

1. I can't see anything on the computer screen!
2. I've got a problem with my computer. After using it for a few hours, it just crashes. It gives me an error message and I have to restart it.
3. My computer is running slowly. It takes a few minutes just to open a document in the word processor!
4. My computer won't connect to the Internet. The browser window just says, "Connection error: unable to connect to the Internet".
5. When I try to save my work, nothing happens. The window goes grey, and I can't type anything.
6. I've got a problem with my email. Whenever I try to send a message, the program crashes.

4. Imagine that you are technicians discussing IT problems. Choose a problem from the list and roleplay the situation by following the steps in the table below.

- ✓ The smartphone is running really slowly.
- ✓ The app hasn't updated to the latest version.
- ✓ The computer keeps switching off by itself.
- ✓ The customer is having a problem with installing your company's accounting software.

Student A	Explain the problem to technician B
Student B	Ask what the technician A has already done
Student A	Answer the technician B's questions
Student B	Offer a solution

V. Conclusion Worksheet

Summarise the ideas on the question "Which software – proprietary or open source – is a better choice for a business, educational establishment and household?" Make a list of arguments in favour and against. Justify your choice and include any relevant examples from your own knowledge or prior experience.

Proprietary Software or Open Source Software	
Business	
Education	
Household	

VI. Web Search

Explore the resources in the list to obtain additional information on software installation and maintenance basics. Report your findings to the group.

https://www.techtarget.com/searchcio/definition/software-license

https://www.educative.io/blog/what-is-open-source-software-guide

https://www.techtarget.com/whatis/definition/troubleshooting

VII. Revision Point

1. Read the abstract "Pricing Models for Obtaining Software" and translate it into Belarusian or Russian. Use a dictionary if necessary.

Pricing Models for Obtaining Software

Software can be obtained under a variety of pricing models depending on the software vendor. One-time purchase. The traditional way to obtain software is through a one-time purchase in which the consumer pays a set amount to license and use the software without an expiration date. The advantage of the one-time purchase pricing model is that there are no additional fees, and with the exception of a few updates, the software remains basically the same as when it was purchased. Subscription. The subscription pricing model is an established distribution method in which consumers pay a monthly or an annual fee to use the software. Consumers benefit because updates and upgrades are usually included in the pricing. Consumers must remain alert while using subscription services. When a subscription lapses, the software may cease to function. Trial. A third type of pricing model offers consumers the use of a software

product during a free trial period. The trial version may be fully functional, or it may be limited in functionality. When the trial period ends, payment in the form of a one-time purchase or subscription is required. This pricing model is common for software applications, such as antivirus utilities, games, and weather apps, that are preinstalled on new devices. Freemium. Another popular pricing model provides free use of a stripped-down or basic version of the product but requires payment for upgraded features.

2. Match the terms with the definitions.

1. Commercial software 2. Shareware 3. Freeware 4. Demoware 5. Open source software	a) is distributed for free and often comes preinstalled on new devices, but it is limited in some way until you pay for it
	b) is in public domain. It is fully functional and requires no payment for its use
	c) is distributed under a single-user or multi-user licence that limits its use to either one person or organisation/business
	d) is copyrighted software marketed under a try-before-you-buy policy
	e) makes source code available to programmers who want to modify and improve the software

3. Complete the statements with the words in the box.

domain; open; requirements; piracy; shareware; proprietary; freeware; copyright; licence

1. When shopping for additional utilities and apps, check the system _____ to make sure your device has the correct operating system and necessary hardware capacity.
2. Software is protected by _____, and illegal copying is referred to as software _____.
3. _____ software, such as commercial software, is protected by copyright that grants to its author an exclusive right to copy, distribute, sell, and modify that work.
4. Public _____ software is not protected by copyright.
5. A software _____ can extend or limit the rights granted by copyright.
6. Demoware and _____ are distributed free of charge but require payment for continued use.
7. _____ source software is distributed with its source code and can be modified.
8. _____ is copyrighted software that can be used for free but cannot be altered or resold.

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

Comprehensive 👍	Rather confident ✋	Limited 👎

- Definition of copyright and licence agreement.
- Types of software licences.
- Pros and cons of using open source and proprietary software.
- Software troubleshooting basics.

Lesson 3: Software Piracy

Aim	Objectives
Master communication skills and competences in software piracy and its impact on individuals and communities in terms of social, economic, business, and professional development	At the end of this lesson, students will be able to: • report on the issue of software piracy • define different types of software piracy • state how companies try to prevent software piracy • conduct surveys and interviews • present and discuss findings in pairs and small groups • make a summary based on different media

I. Lead-in

1. Use your background knowledge and the word cloud on the right to define the term "software piracy". Work with a groupmate.

2. Interview your groupmate about pirated software usage according to the questionnaire. Then report your findings to the group.

Have you ever used pirated software?

Yes

- What pirated software have you used?
- When did you start using pirated software?
- Where did you get pirated software from?
- Why do you use pirated software?
- Will you continue using pirated software?

No

- Why do you use licensed software?
- Have you ever been offered to use pirated software?
- Do all your friends use licensed software?
- What are the benefits of using licensed software?
- Will you continue using licensed software?

II. Vocabulary Focus

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

A.	B.
unauthorised	forbid
purchase	legitimate
entitle	fake
authentic	sell
counterfeit	legal

2. Work out the meaning of the collocations in the box.

single licensed copy; extensive following; "warez" sites; cracked software; commit a crime; violate the terms; at no cost; retail shops

3. There are different forms of software piracy. To find out more about them, match the types on the left with the definitions. Work with a groupmate.

1. Softlifting 2. Hard disk loading 3. Client-server overuse 4. Counterfeiting 5. Online piracy	a) means producing fake copies of software, making it look authentic; this involves providing the box, CDs, and manuals, all designed to look as much like the original product as possible
	b) means sharing a program with someone who is not authorised by the licence agreement to use it; often involves purchasing a single licensed copy of software and then loading the software onto several computers, in violation of licencing terms
	c) is the fastest-growing form of piracy with the growing number of users online and rapidly increasing connection speeds which have attracted an extensive following to the exchange of software on the Internet through "warez" sites with cracked software
	d) is when too many people on a network use one main copy of the program at the same time; this becomes a type of software piracy if the licence doesn't entitle you to use it multiple times
	e) is often committed by hardware dealers; this form of piracy involves loading an unauthorised copy of software onto a computer being sold to the end user; this makes the deal more attractive to the buyer, at virtually no cost to the dealer

4. Test your detective skills. Can you suspect any cases of software piracy in the following situations or are they absolutely legal? Justify your point of view. Work with a groupmate.

a) You've bought a software product in the street corner retail shop with a substantial discount. You think it's a real bargain.

Bargain – something on sale at a lower price than its true value

b) Your roommate gave you some software to copy onto your computer and helped save some money.
c) You've been given a new laptop as a birthday present with preinstalled OS and some other programs which were included as a bonus in the shop.
d) Your friend often uses a peer-to-peer (P2P) file-sharing system to get the software he needs just for free.
e) Some business is on a local area network and downloads the software for all employees to use.
f) You've purchased a single licensed piece of software and aren't going to share it with anybody. You just plan to use it on your desktop computer and your laptop.

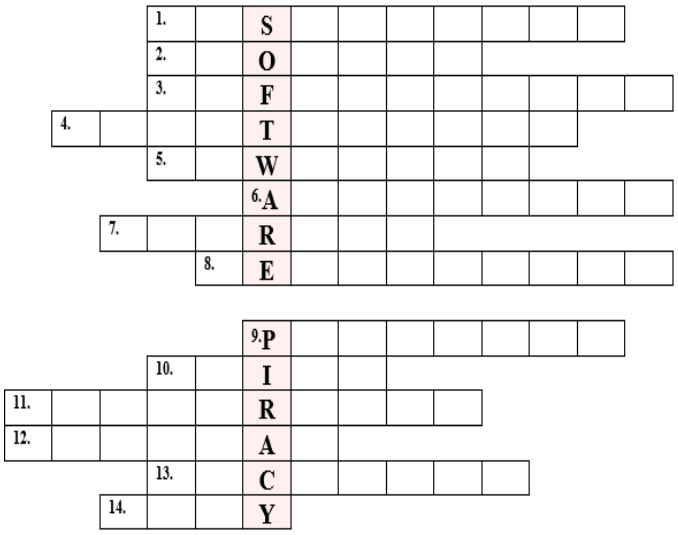
5. Match the words in Column A with the words in Column B to make collocations. Then complete the statement below using them.

A.		B.	
	criminal		time
	steady		lawsuits
	monetary		prosecution
	jail		fines
	stiff		damage
	civil		decline

In many countries to bring software piracy to a 1) _____ , software pirates are subject to 2) _____ for 3) _____ and 4) _____ , which can result in 5) _____ and 6) _____ .

6. Do the crossword and get the words related to software piracy from this lesson.

1. To give sth out to several people, or to spread or supply sth.
2. To act against sth, especially a law, agreement, or sth that should be treated with respect.
3. Sharing a program with someone who is not authorised by the licence agreement to use it.
4. Made to look like the original of sth, usually for dishonest or illegal purposes.
5. To copy or move programs or information into a computer's memory.
6. Real, true, genuine, original.
7. To use sth too often or too much.
8. Allowed by law.
9. To buy sth, to obtain sth.
10. Illegal activities.



11. Having official permission to do sth or for sth to happen.
12. Not allowed by law, unlawful.
13. Having an official document that gives you permission to own, do, or use sth.
14. To produce sth so that it is the same as an original piece of work.

7. Share your opinion on the questions in groups of three or four people.

1. What is software piracy? Why is it considered a crime?
2. What constitutes "unauthorised use"?
3. Who can be held liable for software piracy? What are the types of it?

III. Language Box

1. Read the ideas. Work out the meaning of the words and word collocations in bold.

a) The key reason for such **distasteful habits** is that many of these individuals complain about how expensive the cost of legitimate software is.
b) Just to **spruce up your knowledge**, in case you are unaware, software piracy is **a severe felony**.
c) This means that if you are found guilty, **hefty fines** can be imposed on you or you could even **face jail time**.
d) The online world is virtual and may appear to be **superficial**.
e) The company suffers significant losses in sales and has to **retrench** some of its employees.
f) Once the software is newly introduced, over time it becomes **susceptible to** bugs and other malware attacks.
g) This is because crackers use their time to try to navigate and **penetrate** the system.
h) Legitimate software guarantees you **a clean record**!

2. Read the article "Five Dangers of Using Pirated Software" published on the CodeCondo and consider the following aspects.

- ✓ The topicality of the article (the date of the publication).
- ✓ The reliability of the information provided in the article (the author, the place of the publication).
- ✓ The credibility of the information (references to any official researches, statistics, etc.).
- ✓ The style of the article (narrative, descriptive, directive, expository, argumentative).
- ✓ The functional style of the article (official, scientific, publicistic, newspaper, belles-lettres style).
- ✓ The main idea of the publication.

Five Dangers of Using Pirated Software

Written by Amy Lee
Jan 27, 2023

Software piracy has become a growing problem in recent years. More than a quarter of software installed globally is in fact pirated software, according to the Global Software Survey. This also means that these software companies and developers have also suffered a loss of nearly 50 billion dollars.

The key reason for such distasteful habits is that many of these individuals complain about how expensive the cost of legitimate software is. And the sad news is that both individuals and even business owners have developed this tendency to pirate software. Yet, software piracy does come with consequences.

Just to spruce up your knowledge, in case you are unaware, software piracy is a severe felony. This means that if you are found guilty, hefty fines can be imposed on you or you could even face jail time. This is because one can consider software piracy as cybercrime and theft as it results in abuse and misuse of property that you don't own. In fact, many firms have been raided and taken down simply for using unlicensed software.

So, if you are selfish enough not to be bothered by fines or jail time, malware attacks should scare you. Because this means that you are losing the very same thing you have been working on. Using pirated or unlicensed software puts you at risk of malware attacks.

Some of the common risks you are exposed to when using unlicensed software include credit card and banking info theft, identity theft, ransomware (being locked out of your system until you pay the ransom), ad fraud and even risk the quality of your work being compromised. In actuality, individuals that visit piracy sites or download unlicensed software are almost 50 % more likely to suffer from malware attacks on their devices or networks.

Yes, the online world is virtual and may appear to be superficial. However, legitimate software companies and developers do depend on the sales of these software. So, pirating and the use of unlicensed software does actually equate you to physically robbing a store. This does bring about losses to these companies and directly affects the individuals that work for it.

It's like a chain reaction – you and a million other pirate software, the company suffers significant losses in sales and has to retrench some of its employees. Turns out it the same company that your sister works for, and she is one of those retrenched. In another scenario, these legitimate software developers and companies are the ones that save us from deadly malware attacks thanks to their incredible software designs.

Because you have unlicensed and pirated software installed on your devices, this means that you will not be able to do the constant updating of the software. Once the software is newly introduced, over time it becomes susceptible to bugs and other malware attacks. This is because crackers use their time to try to navigate and penetrate the system.

However, for those with legitimate software, this is a worry they can push to the back of their minds as software developers provide constant updates to counter the problem and leave crackers a step behind.

Because they are acquired illegally, you may not know who developed the software and even where they came from. Thus, if the software malfunctions, you will not be able to know this. Thus, the use of such software can be detrimental to the quality of your work.

Because the pirated software is cracked and slightly altered to be available for free online, this process affects its performance, making it different from the original software. This means that pirated and unlicensed software is more likely to crash, lose files, and even corrupt files.

Therefore, as much as legitimate software appears to be expensive, it is always wise to go for it. This ensures that even your work and the durability of your devices are not compromised. Plus, legitimate software guarantees you a clean record!

3. Decide if the following statements render the main information or additional. Address the publication in Task 2 if necessary. Then match each idea with an appropriate part of the article.

1. Using pirated software can lead to losses of legitimate software developers and companies.
2. No updates for your software are provided in case of using software illegally.
3. A licensed software also works to its full capacity whilst protecting your data.
4. Legitimate software developers can limit their resources for more protective software designs.
5. The risk of malware attacks with illegal software is much higher.
6. Pirated software fails to download the legitimate updates from the actual software developer, thus, leaving your devices and networks vulnerable.
7. The consequences of pirating can even mean up to five years of jail time.
8. Pirated software may be malfunctioned.
9. Software piracy is illegal.
10. Pirated software is designed with backdoors which give easy access to your devices and even networks.

4. Complete the ideas. Address the article in Task 2 if necessary.

a) Software piracy is illegal and can lead to … .
b) Potential malware attacks can become … .
c) In case of piracy, the copyright holder incurs losses on their product(s) that can result in … .
d) No updates will be provided for … .
e) Using illegal software you should be ready for … .

5. Watch the video "Software Piracy in Asia Expands" [45]. Choose which concepts in the box are mentioned in it and explain how they are related to the topic.

law enforcement; open source; pirated stock; intellectual property; operating system; jailbreaking; copyright piracy; unlicensed copy; end-user piracy; legitimate software

6. Watch the video again and complete the sentences with the correct words.

a) This shop owner sells _____ copies of movies and music on a street filled with pirated CD and DVD shops.
b) Merchants in this shopping mall in Thailand employed the same tactic to protect pirated stock from law _____ raids.
c) Durrani Watchan Abuti Wang is an intellectual property rights lawyer. She says _____ is a multi-million-dollar business in Thailand.
d) In Hong Kong law enforcement has been key in _____ piracy.
e) Now we're looking more at issues of _____ piracy.
f) This man quit a piracy business in the Philippines that earned him $4,000 a month after authorities warned that registered computer shops faced huge _____ for selling illegal software.
g) Governments in Asia have gained some ground in the fight against _____ piracy.

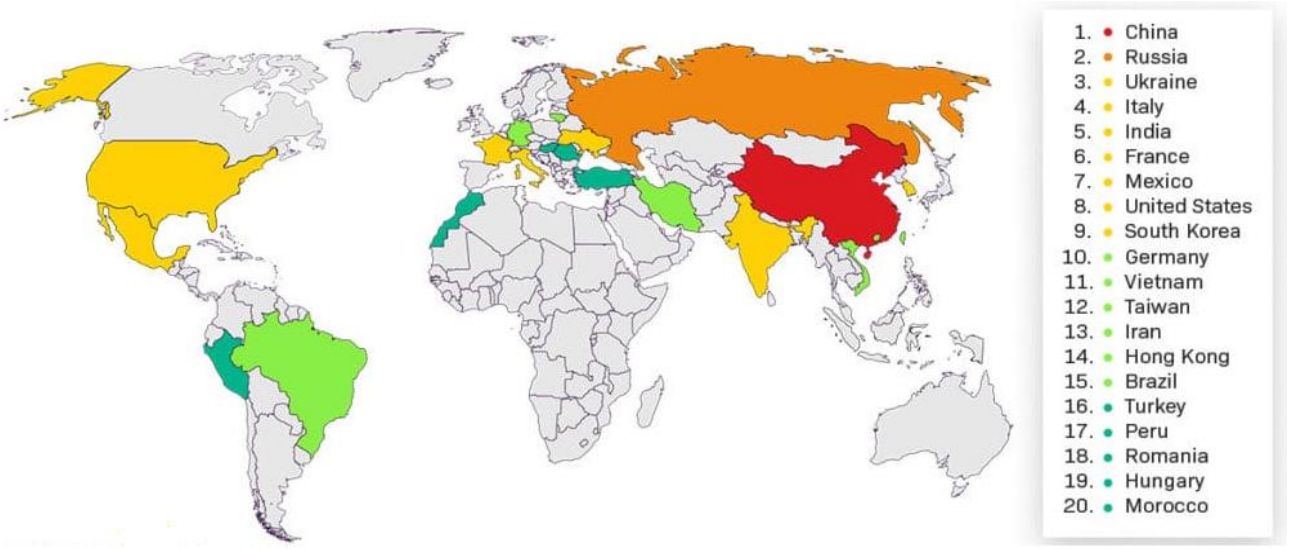
7. Consider the activities and rank them according to their contribution to wise software usage starting with the most essential one. Justify your choice.

1. Be aware of any software's terms and conditions.
2. Purchase software from authorised dealers only.
3. Buying a new device always check whether the preinstalled software is official.
4. Make sure you agree and adhere to the official guidelines and regulations for software installation.
5. Protect your device from any further threats with a reputable antivirus program suitable for your devices.
6. Do not trust big software sales and offered discounts.
7. Never use P2P file-sharing system.

IV. Decision Bank

1. Consider the information about software licence misuse provided by revenera.com on the map below. Do you find any facts surprising? How should Belarus be coloured in your opinion?

Top 20 Software Licence Misuse and Piracy Hotspots



2. Study anti-piracy protection methods and assess them in terms of their efficiency. Justify your point of view.

Legal protection	Most companies make sure their software is officially protected by a user agreement. Letting consumers know that making unauthorised copies is against the law helps prevent people from unknowingly breaking piracy laws
Product key	This is the most popular anti-piracy system, a unique combination of letters and numbers used to differentiate copies of the software. It ensures that only one user can use the software per purchase
Online verification	Companies like Adobe have moved their software into the cloud and require online authentication. Before using their software, you must log into your account, and if another computer or device is already using the program, it must be logged out
Tamperproofing	Some software programs have built-in protocols to shut down and stop working if the source code is modified. It prevents people from pirating the software through the manipulation of the program's code
Watermarking	Specific marks, company logos, or names are often placed on software interfaces to indicate that products are legitimately obtained and are not illegal copies

3. Summarise your ideas on the key aspects of software piracy and get ready to present them to the group. Work with a groupmate.

1. The issue of software piracy in the world today.
2. The state of the issue in Belarus.
3. The hotspots of software piracy nowadays.

4. The methods of protecting intellectual property.
5. Anti-piracy measures, their sufficiency and effectiveness.

V. Conclusion Worksheet

Complete the table to summarise all information about pirated software. Then get ready to present your ideas in a form of a short oral presentation to the group.

Factors, affecting software piracy	Ways of distributing software piracy	Countries with the lowest levels of software piracy	Countries with the highest levels of software piracy	Punishment for software piracy	Forms of software protection
1. 2. …					

VI. Web Search

Explore the resources in the list to obtain additional information on software piracy. Report your findings in a chart.

https://nordvpn.com/blog/what-is-software-piracy

https://cpl.thalesgroup.com/software-monetization/how-to-prevent-software-piracy

https://news.microsoft.com/download/archived/presskits/antipiracy/docs/piracy10.pdf

VII. Revision Point

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

legitimate; piracy; authentic; counterfeiting; peer-to-peer; fines; unauthorised; fake; purchased; prosecution; distribution; licence

Software 1) _____ takes many forms. 2) _____ piracy includes friends loaning distribution disks to each other and installing software on more computers than the 3) _____ allows. Although it is perfectly legal to lend a physical object to a friend, it is not 4) _____ to lend digital copies of software and music. 5) _____ is the large-scale illegal duplication of software 6) _____ media, and sometimes even its packaging. 7) _____ software is sold in retail stores and through online auctions – often the packaging looks so 8) _____ that buyers have no idea they have 9) _____ illegal goods.

Internet piracy uses the Web as a way to illegally distribute 10) _____ software. In many countries software pirates are subject to civil lawsuits for monetary damages and criminal 11) _____, which can result in jail time and stiff 12) _____.

2. Choose the options from the ones given in italics to make true statements.

1. More and more cases of software piracy today end up with criminal *resolution/prosecution*.
2. Several thousands of civil *lawsuits/claims* have been filed in courts since the beginning of this year.
3. End users are becoming more aware of restrictions related to intellectual *ownership/property*.
4. If you have a local area network and install programs on the server for several people to use, you have to be sure it's not client-server *abuse/overuse*.
5. Online *verification/personalisation* is one of the ways to fight against software piracy.
6. A product *key/lock* is used to certify that the copy of the program is original.
7. Law *forces/enforcement* can also provide public information and education support for authorised software distribution and usage.

3. Render the article "How Serious Software Piracy Is" published on the Harvard Business Review in writing.

How Serious Software Piracy Is

Written by Ben Devis
May 4, 2023

Software counterfeiting is the large-scale illegal duplication of software distribution media and sometimes even its packaging. According to Microsoft, many software counterfeiting groups are linked to organised crime and money-laundering schemes that fund a diverse collection of illegal activities, such as smuggling, gambling, extortion, and prostitution. Counterfeit software is sold in retail stores and through online auctions. Often the packaging looks so authentic that buyers have no idea they have purchased illegal goods.

Internet piracy uses the Web as a way to illegally distribute unauthorised software. In Net jargon, the terms *appz* and *warez* (pronounced as "wares" or "war EZ") refer to pirated software. Some warez have even been modified to eliminate serial numbers, registration requirements, expiration dates, or other forms of copy protection. Web sites, file sharing networks, and auction sites sell or distribute hundreds of thousands of pirated software products.

In many countries, including the United States, software pirates are subject to civil lawsuits for monetary damages and criminal prosecution, which can result in jail time and stiff fines. Nonetheless, studies seem to indicate that about 39 % of computer software is not properly licensed. According to the Business Software Alliance (BSA)

and IDC Piracy Study, $82 billion of software was legitimately purchased worldwide, but software worth whopping $52.2 billion was pirated. Piracy statistics seem to indicate a rampant problem, but aggregating the data worldwide hides the real story. A look at geographical regions and individual countries is much more revealing. For example, in the United States, software piracy has been in a steady decline.

The 2016 BSA Global Software Survey reveals that only 17 % of software used by US consumers was pirated. In Japan, the rate has reached an all-time low of 18 %, and the EU is not far behind with a 29 % rate. In contrast, Zimbabwe has a 90 % piracy rate. In Iraq the rate is 85 %, and in Ukraine it is 82 %. China has a piracy rate of 70 %.

Factors such as income levels, law enforcement, and educational outreach are likely to affect the discrepancies in piracy rates among regions and countries. Countries with the lowest income levels tend to have the highest piracy rates. Software priced for developed countries may be beyond the reach of consumers in emerging nations.

The industry, too, is changing. The price tag for consumer-level software rarely exceeds $100. Expensive software titles such as Microsoft Office and Adobe Creative Suite are offered via monthly subscriptions. Affordable software reduces one of the main incentives to seek pirated software.

The popularity of mobile devices also has had an effect on software piracy. Most mobile apps cost just a few dollars, and many of them are free. They are available primarily from app stores that make piracy difficult. Consumers who legitimately purchase low-cost apps for their mobile devices tend not to seek pirated applications for their full-size computers.

As piracy heads in new directions in developed countries, the issue of emerging nations still remains. Some industry analysts believe that productivity gains from using pirated software do not offset gains that might be made if software was legitimately licensed. That argument may be hard to justify, however, to cash-strapped consumers in emerging nations.

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

Comprehensive 👍	Rather confident ✋	Limited 👎

- Definition of software piracy.
- Types of software piracy.
- Dangers of software piracy.
- State of the issue globally nowadays.
- Preventive measures against using pirated software.

Topic: Computer Networks
Lesson 1: Network Basics

Aim	Objectives
Master communication skills and competences in the network basics, types of networks and networking technologies	At the end of this lesson, students will be able to: • describe networks and their main features • list the difference between PAN, LAN, MAN, WAN • state network topology, network channels, protocols • discuss and present findings in pairs and small groups • write a summary based on different media

I. Lead-in

1. Match the computing devices in the box with the pictures below.

terminal; cash machine (ATM); fitness tracker; self-service checkout; vending machine; self-service kiosk; headset; speaker; copy machine

2. In today's world it is highly impossible to perform daily tasks and communicate without a computer network. Share your opinion on the questions.

a) What computing devices do you use on a regular basis? Address Task 1 if necessary.
b) Do you think they are on a network? Is it wired or wireless?
c) What are the benefits of using networks for people, businesses?

Wire – a piece of thin metal thread with a layer of plastic around it, used for carrying electric current

II. Vocabulary Focus

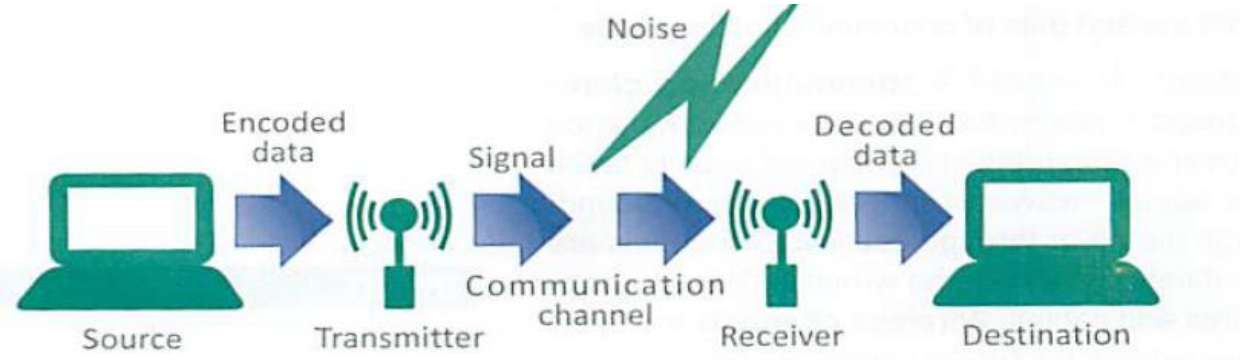
1. Do the quiz to find out what you know on the topic of computer networks. Work in groups of three or four people.

1. A computer network is … computers connected together	a) two or more b) three or more c) four or more
2. This network typically consists of two or more local area networks, covering a large geographical area	a) LAN b) WAN c) Intranet
3. This type of network does not have a dedicated server; all the computers are independent	a) peer-to-peer b) client-server c) metropolitan area network
4. In this network topology, all devices are connected to the same circuit, forming a continuous loop	a) star b) ring c) bus
5. Before sending data over a network it is divided into small chunks named …	a) packets b) blocks c) packages
6. The language used by computers to communicate with each other on the Internet is called …	a) Ethernet b) ADSL c) TCP/IP
7. What cables are used to transfer data to the Internet over long distances at high speed?	a) copper cables b) Ethernet cables c) fibre-optic cables
8. What device allows several computers in a local network to share an Internet connection?	a) an ADSL port b) a router c) an Ethernet port
9. What device serves as a common connection point for devices in a wireless network?	a) wireless access point b) wired router c) wireless adapter
10. Bluetooth is a wireless technology that uses radio waves to transmit data over …	a) long distances b) medium-range distances c) short distances

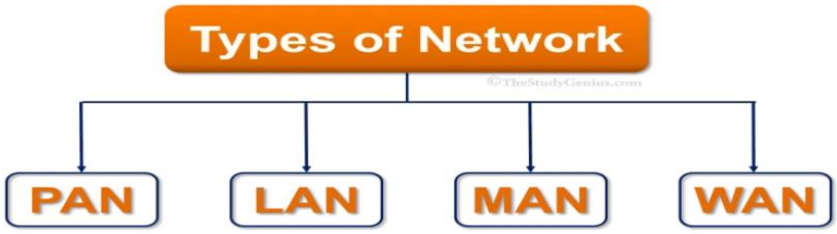
2. Look at the diagram below illustrating the essence of a typical network. Consider the questions using the key verbs in the box. Work with a groupmate. Present your ideas to the group.

a) How does a network link devices together?
b) How does a signal travel along a communication channel?

route; convert; transmit; carry; pass; forward; broadcast; flow; interface



3. Networks can be classified according to their size and geographic scope. Look at the abbreviations and complete the statements below with one of the four network types.



1. _____ connects smart devices or consumer electronics within a range of 10 meters and without the use of wires or cables.
2. _____ are data communication networks that connect personal computers within a very limited geographical area – usually a single building.
3. _____ covers a campus or a town and is widely used in cable television networks available in the whole city.
4. Schools, colleges, university computer labs and home networks are examples of _____.
5. _____ covers a large geographical area and usually consists of several smaller networks, which might use different computer platforms and network technologies.
6. Wi-Fi networks that you can access in airports, coffee shops, and other public places are _____.
7. _____ could be used to sync data from a handheld device to a desktop computer, ship data wirelessly to a printer, or transmit data from a smartphone to a wireless headset.
8. The Internet is the world's largest _____.

4. Complete the sentences about networking basics with the words and word combinations in the box.

Ethernet cables; Bluetooth networks; Wi-Fi; WANs; fibre-optic; cellular networks; cable; Internet

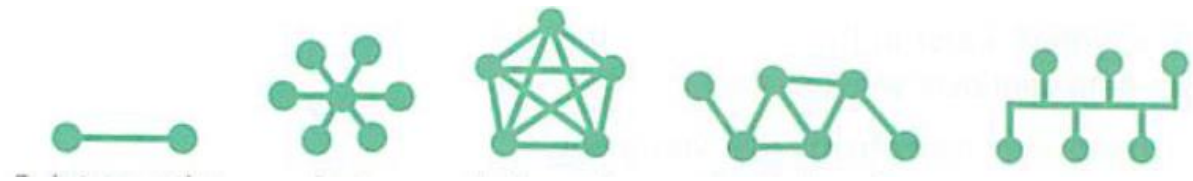
1. In a basic network, computers are connected by a _____ allowing file sharing.
2. _____ cover large geographic areas, like a country or even multiple countries.
3. They are built by large telecommunication companies. The largest WAN in existence is the _____.
4. In many homes, _____ are used to connect computers.
5. Much of the Internet uses high-speed _____ cables to send data over long distances.
6. _____ is a standard technology for building wireless LANs and public hotspots.
7. _____ allow handhelds, mobile phones and other devices to communicate over short distances.
8. _____ are used in mobile phone communications.

5. Match the network devices on the left with the descriptions.

1. Hub 2. Switch 3. Router 4. Modem 5. Bridge 6. Repeater 7. Wireless access point (WAP) 8. Node	a) connects two similar networks
	b) is a device that controls the flow of data within a network and also acts as a gateway to pass data from one network to another; it is used to direct traffic over major Internet trunk lines
	c) sends signals to individual nodes rather than broadcasting to all of them
	d) allows wireless devices to connect to a wired network
	e) extends the range of a network by restoring signals to maximum strength and retransmitting them
	f) extends a wired network by adding more ports
	g) contains circuitry that converts the data-carrying signals from a digital device to signals that can travel over various communication channels
	h) is any device in a network

6. The arrangement of devices in a network is referred to as its physical topology. Label the basic types of network topology below with the terms in the box. Then complete the statements with the appropriate types.

full mesh; point-to-point; star; bus; partial mesh



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

1. When peripheral devices connect to a host device using expansion ports, USB cables or Bluetooth, these connections are an example of _____ topology.
2. A network arranged as a _____ topology features a central connection point for all workstations and peripherals. The central connection point is not necessarily a server. More typically it is a network device called a hub.
3. A _____ topology uses a common backbone to connect all network devices. The backbone functions as a shared communication link, which carries network data.
4. A _____ topology connects each network device to many other network devices. Data travelling on this network can take any of several possible paths from its source to its destinations.
5. In a _____ topology, some of the devices are connected to many devices together, but other devices are connected only to one or two devices.

7. Read frequently asked questions (FAQs) about networks below and underline the words and word combinations that give you a view on the following concepts.

Communication Channel	Network Protocol	Network Architecture	Wired/Wireless Networking

FAQs About Networks

What is a communication channel? A communication channel is the medium used to transport information from one network device to another. Data transmitted over a communication channel usually takes the form of an electromagnetic signal – waves of light, electricity or sound. These waves can travel through the air or through cables, so channels are divided into two general classifications: wired and wireless. Wired channels transport data through wires and cables including twisted pair wires used for telephone land lines, coaxial cables for cable television networks and fibre-optic cables used for high-capacity trunk lines that provide main routes for telephone, cable and Internet communications. Wireless channels transport data from one device to another without the use of cables or wires.

What is a network protocol? This is the language or set of rules, that computers use to communicate with each other. Networks use different protocols. For instance, the Internet uses TCP/IP. Protocols set standards for encoding and decoding data, guiding data to its destination, and reducing the effects of interference. Networks use more than one protocol, and the collection of protocols for a network is referred to as a protocol stack.

What is network architecture? In a client-server network, a computer acts as a server and stores and distributes information to the other nodes or clients. In a peer-to-peer network, all the computers have the same capabilities – that is, share files and peripherals without requiring a separate server computer.

What is wireless networking? Wireless networks, however, use electromagnetic waves, such as radio waves and microwaves, to transmit data. Most wireless connections transport data as RF (radio frequency) signals. These are the main types of wireless networks:

- Satellites – for long distances;
- WiMAX – for connecting Wi-Fi hotspots;
- Wi-Fi – for medium-range distances;
- Bluetooth – for short distances;
- GSM – for mobile phones.

Ethernet – a system for connecting computers into networks

Which is better: a wired or wireless LAN? Wired LANs are more difficult to install, but they are cheaper, faster and more reliable. Wireless networks let you move or roam, from one access point to another, but they are less secure and subject to interference.

8. Perform the following tasks in groups of three or four people.

1. Give two examples of PANs, LANs and WANs.
2. Name the main types of wireless networks.
3. Consider the advantages of wired networks.
4. Explain when it is better to use a wired/wireless connection.
5. State five types of network topology. Compare and contrast the two of them.
6. Present four tasks that are handled by communication protocols.
7. Check the signal strength of a wireless connection on your device.

III. Language Box

1. Watch the video "What Is a Network?" [50] and decide if the following statements are true or false. Correct the false ones.

1. A network is a group of connected computers.
2. There are three basic components that make up a network.
3. Network devices are referred to as nodes or hosts.
4. Network media (cable or wireless media) connect the devices together.
5. Network interface is used to connect the protocol to the medium.
6. Network protocol is a set of rules used by the people to communicate.

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

a) A network is a group of devices that are connected in such a manner that they can 1) _____ information and 2) _____ with each other.
b) To create a network, we must have a number of basic components such as network 3) _____, network media, network 4) _____ and the network protocol.
c) When we talk about network devices, we may just think about a group of computers connected together, but the network can also include other items such as 5) _____, printers, game consoles, mobile phones, etc. Generally speaking, we call these devices nodes or 6) _____.
d) The network devices must be connected to each other in some way. The connection can be in the form of 7) _____ communicating through electrical signals, fibre-optic cables communicating through 8) _____ or wireless connection using 9) _____. The cables or signals used to connect the host to the network refer to as the network 10) _____.

e) As there are different types of network media the network host should be equipped with an appropriate 11) _____ in order to make the connection.
f) The function of the network interface card is to12) _____ the digital signals from the device into a signal that is suitable to be 13) _____ through the network medium.
g) A protocol is an agreed set of rules on how information is 14) _____ and sent onto the network. The protocol provides the rules of 15) _____ between the hosts.

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

1. What is a network?
2. What are the basic components of a network?
3. What do nodes/hosts refer to in a network?
4. What are the types of network media?
5. What is a network interface used for?
6. What is a protocol?

4. Watch the video "What Is the Cloud?" [58] and decide which ideas in the box are mentioned in it. Explain how they are related to the concept of "cloud computing".

virtualisation; servers; cloud vendors; Internet; virtual machine; Gmail; Dropbox; databases; hybrid cloud; software; data centre; operating system; private cloud; Google Drive; infrastructure

5. Watch the video again and choose the correct statements.

1.
a) The term "cloud" refers to data centres that are accessed over the Internet.
b) The term "cloud" applies to servers that are accessed over the Internet.
2.
a) Cloud servers are placed in data centres all over the world.
b) Cloud servers are tracked down in data centres all over the world.
3.
a) Businesses and users do not have to administer physical servers and launch software applications on their own machines thanks to cloud computing.
b) Businesses and users are to administer physical servers and launch software applications on their own machines due to cloud computing.
4.
a) The cloud enables users to manage computing and storage servers in a data centre instead of locally on the user device.
b) In the cloud the computing and storage is implemented on servers in a data centre instead of locally on the user device.
5.
a) Gmail users can't access their emails and files via any Internet-connected device.
b) Gmail users can retrieve their emails and files via any Internet-connected device.

6. Read the abstract "How Does Cloud Computing Work?" and consider the following key ideas afterwards. Work with a groupmate.

Virtualisation	Virtual Machine	Sandboxing	Data Centre	Cloud Server

How Does Cloud Computing Work?

Cloud computing is possible because of a technology called virtualisation. Virtualisation allows for the creation of a simulated, digital-only "virtual" computer that behaves as if it were a physical computer with its own hardware. The technical term for such a computer is virtual machine. When properly implemented, virtual machines on the same host machine are sandboxed from one another, so they do not interact with each other at all, and the files and applications from one virtual machine are not visible to the other virtual machines, even though they are on the same physical machine. Virtual machines also make more efficient use of the hardware hosting them. By running many virtual machines at once, one server can run many virtual "servers", and a data center becomes like a whole host of data centers, able to serve many organisations. Thus, cloud providers can offer the use of their servers to far more customers at once than they would be able to otherwise, and they can do so at a low cost. Even if individual servers go down, cloud servers in general should be always online and always available. Cloud vendors generally back up their services on multiple machines and across multiple regions.

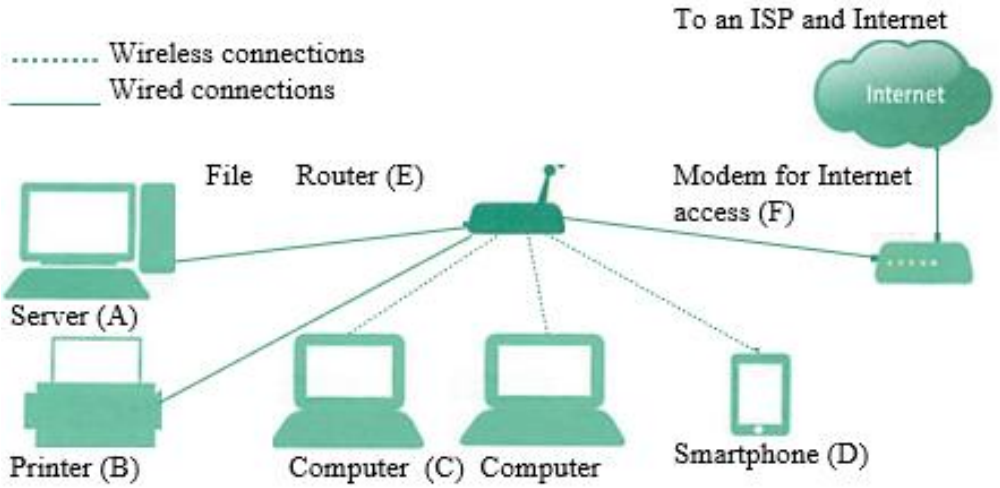
7. Think of 2-3 questions related to the text "How Does Cloud Computing Work?" in Task 6 and address them to your groupmates. Discuss the questions in groups of three or four people.

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

1. Networking technologies have changed the way people work and communicate.
2. Networks are an indispensable part of our lives. When there are outages, things go haywire. When there are slowdowns, we get frustrated.
3. Although the cloud offers apps, storage and connectivity, keeping some of your data local offers security that is not available at remote sites.
4. One of the ways we invite trouble into our digital lives is by careless file sharing.
5. Social networks are a foe.

IV. Decision Bank

1. Look at the diagram illustrating a local area network. Match the features (A–F) of a network based on a centralised router with the descriptions (1–6) below.



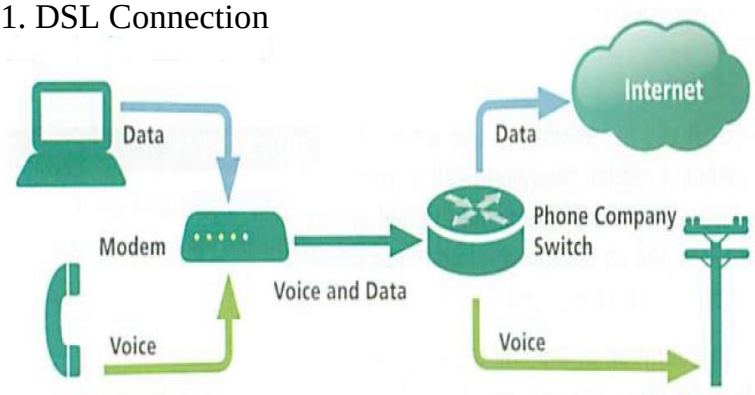
1. Connect a printer to a wired or wireless connection so that all devices on the network can access it.
2. All the devices in your LAN can access the Internet if you connect the router to a modem supplied by an ISP.
3. Connect computers wirelessly, so you can use them in various rooms.
4. Connect a computer to a wired connection for maximum speed. Use it for online games or as a file server where you store and back up your data.
5. The router is the centrepiece of your network. Most wireless routers support five wired devices and a maximum of 255 wireless devices.
6. Connect your smartphone and you'll be able to use the LAN's Internet connection instead of your expensive data plan.

2. Do the following self-assessment task and complete the sentences below with the target vocabulary of this lesson.

1. Networks can be classified as PANs, _____, MANs and WANs.
2. A communication _____ is the medium used to transport information from one network device to another.
3. There are two types of channels – wired and _____.
4. The Internet uses high-speed _____ cables to send data over long distances.
5. A network _____ is a set of rules that computers use to communicate with each other.
6. In a _____ network, a computer acts as a server and stores and distributes information to the other nodes or clients.
7. Networks can be configured in various _____, such as star, mesh or bus.
8. Any device in a network is referred to as a _____.
9. The _____ refers to servers that are accessed over the Internet, and the software and databases that run on those servers.
10. Cloud servers are located in _____ all over the world.

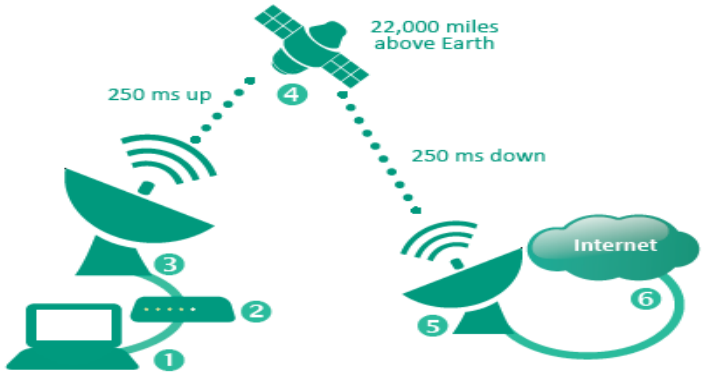
3. Study the diagrams and get ready to illustrate how these networks operate using the prompts. Work in groups of three or four people.

1. DSL Connection



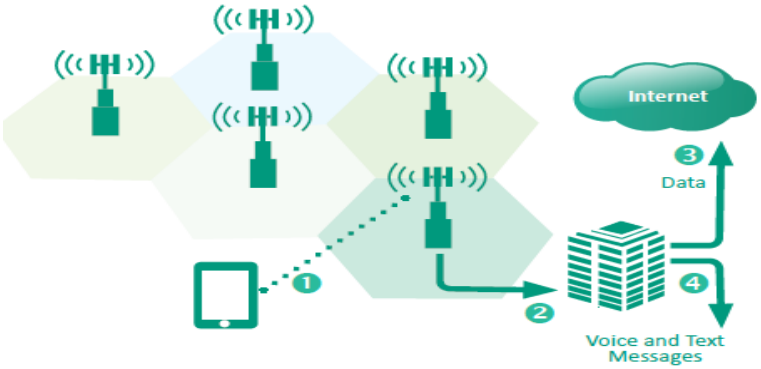
- *a DSL modem*
- *convert computer signals into*
- *high-frequency data signals*
- *voice signals/data signals*
- *travel over telephone lines*
- *telephone company switching station*
- *route to the regular telephone system*
- *route to the Internet*

2. Satellite Service



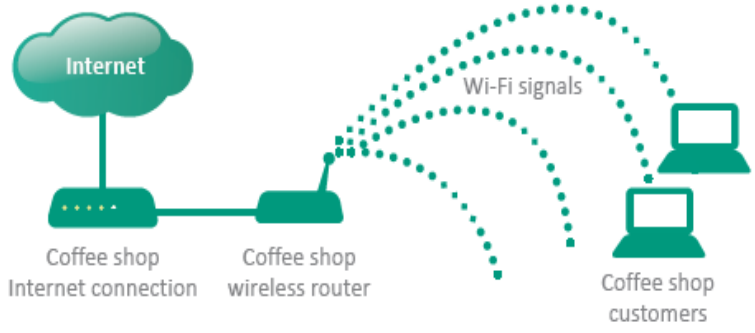
- *data from a customer's computer (1)*
- *convert into signals by*
- *the customer's modem (2)*
- *carried by cables to*
- *a personal satellite dish (3)*
- *broadcast to a communication satellite (4)*
- *rebroadcast to a ground-based ISP (5)*
- *forward to the Internet (6)*

3. Mobile Network



- *cell networks*
- *transmit voice and data*
- *use radio signals*
- *flow to a cellular radio tower (1)*
- *transmitters and receivers*
- *cover a specific area*
- *use a unique frequency*
- *pass to ground stations (2)*
- *forward to the Internet (3)*
- *route to a circuit-switched network (4)*

4. Wi-Fi Hotspot



- *a wireless local area network*
- *operated by a business*
- *offer Internet access to the public*
- *Internet connection*
- *a device called an access point*
- *broadcast Wi-Fi signals*
- *within a range of a building*
- *any device with Wi-Fi capability*
- *detect the signal*

4. Divide into two teams and prepare a quiz about networking basics that includes five challenging questions. Make sure you know the answers. Then take turns to ask and answer the questions to see which team scores the more.

V. Conclusion Worksheet

Build and diagram the components and connections of a network. Choose one of the options or choose your own one and present it to the group. Use the ideas from this lesson and your background knowledge. Work in groups of three or four people.

- ✓ home network
- ✓ university network
- ✓ bank network
- ✓ hospital network
- ✓ airport network
- ✓ company network

VI. Web Search

Explore the resources in the list to obtain additional information on network basics. Report your findings to the group.

https://www.techtarget.com/searchnetworking/definition/networking

https://www.softwaretestinghelp.com/computer-networking-basics

https://www.studytonight.com/computer-networks/network-topology-types

VII. Revision Point

1. Read the abstract "Different Types of Cloud Deployments" and get ready to translate it into Belarusian or Russian. Use a dictionary, if necessary.

Different Types of Cloud Deployments

There are five the most common cloud deployments. Private cloud is a server, data centre or distributed network wholly dedicated to one organisation. Public cloud is a service run by an external vendor that may include servers in one or multiple data centres. Unlike a private cloud, public clouds are shared by multiple organisations. Using virtual machines, individual servers may be shared by different companies, a situation that is called "multitenancy" because multiple tenants are renting server space within the same server. Hybrid cloud deployments combine public and private clouds and may even

include on-premises legacy servers. An organisation may use their private cloud for some services and their public cloud for others, or they may use the public cloud as backup for their private cloud. Multi-cloud is a type of cloud deployment that involves using multiple public clouds. In other words, an organisation with a multi-cloud deployment rents virtual servers and services from several external vendors – to continue the analogy used above, this is like leasing several adjacent plots of land from different landlords. Multi-cloud deployments can also be hybrid cloud and vice versa.

2. Complete the abstract about computer networks with the words in the box.

WAN; Internet; hardware; protocols; cables; enable; LAN; exist

A computer network comprises two or more computers that are connected either by 1) _____ (wired) or Wi-Fi (wireless) with the purpose of transmitting, exchanging or sharing data and resources. You build a computer network using 2) _____ (e.g. routers, switches, access points, and cables) and software (e.g. operating systems or business applications). A geographic location often defines a computer network. For example, a 3) _____ connects computers in a defined physical space, like an office building, whereas a 4) _____ can connect computers across continents. The 5) _____ is the largest example of a WAN, connecting billions of computers worldwide. You can further define a computer network by the 6) _____ it uses to communicate, the physical arrangement of its components, how it controls traffic and its purpose. Computer networks 7) _____ communication for every business, entertainment, and research purpose. The Internet, online search, email, audio and video sharing, online commerce, live-streaming and social networks all 8) _____ because of computer networks.

3. Do the quiz.

1. What type of network is a university that offers wireless Internet access to students and the local community operating?	a) PAN b) LAN c) MAN d) WAN
2. Does data travelling on a wired channel tend to be more secure than data travelling on a wireless channel?	a) yes b) no
3. Which of the following situations is the most suitable for a network that connects most devices with cables?	a) a university campus b) a bank branch office c) a private home d) a coffee shop
4. What type of wireless channels are most typically used for networks in homes and coffee shops?	a) RF b) coaxial c) microwave d) WiMAX

5. To extend the reach of your wireless network out onto your balcony, which of the following devices would be the best?	a) hub b) router c) repeater d) gateway
6. In the full mesh network how many possible paths are there between any two points?	a) 1 b) 4 c) 9 d) 10
7. What is cloud computing?	a) It is a facility composed of networked computers, storage systems and computing infrastructure that organisations use to assemble, process, store large amounts of data. b) System of storage that allows users to store private content on their hard-drives. c) It is on-demand access, via the Internet, to computing resources hosted at a remote data centre managed by a cloud services provider. d) The process of using computer technology to complete a given goal-oriented task
8. Cloud computing deployment models can be …	a) public b) private c) hybrid d) all of the above
9. Virtualisation enables cloud providers to make maximum use of their data centre resources	a) true b) false

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

Comprehensive 👍	Rather confident ✋	Limited 👎

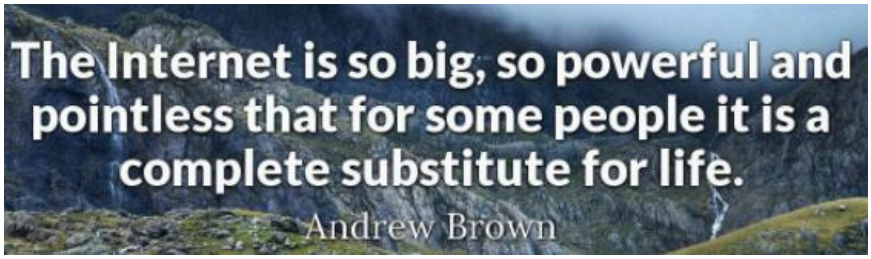
- Definition of a network and its main characteristics.
- Classification of networks based on size and scope.
- Communication channels and their main types.
- Network topology; network architecture.
- Network protocols.
- Cloud computing.

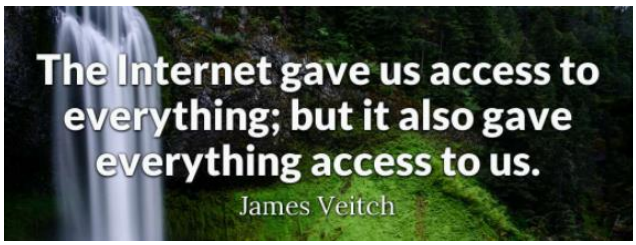
Lesson 2: Web and Internet Technology

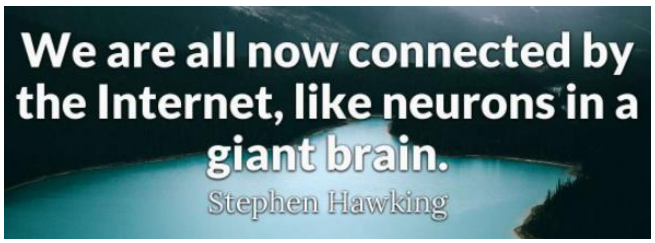
Aim	Objectives
Master communication skills and competences in the Web and Internet technology and their role in different spheres of people's life	At the end of this lesson, students will be able to: • define the Internet and the Web and their basic features • explain the difference between the Internet and the Web • state the technologies and services of the Web • present and discuss findings in pairs and small groups • write a summary based on different media

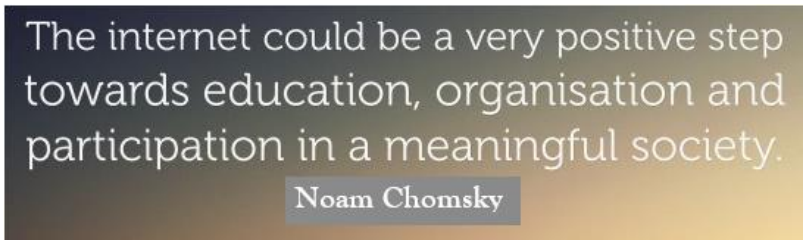
I. Lead-in

1. Share your opinion on the quotes. Justify your point of view.









2. Predict what questions ordinary users can ask about the Internet and the Web. Use the prompts below and make these questions. Then address them to your groupmate.

Internet – an international computer network that allows people to share information around the world

Web – a system for finding information on the Internet, in which documents are connected to other documents

to use the Internet; Internet connection; broadband access; mobile phone; Wi-Fi; type of connection; online games; public access

II. Vocabulary Focus

1. Match the terms on the left with the definitions. Translate the words and word combinations in bold.

1. Message 2. Latency 3. Email 4. Decryption 5. Hypertext 6. Twisted pair 7. Blog 8. Tag 9. Search engine 10. Bandwidth 11. Satellite 12. Microwave	a) a particular word or some keywords which define how web browser will format and display the content of a web page
	b) an informational website displaying information in **reverse** chronological order; it is a platform where a writer shares their views on an individual subject
	c) the change of electronic signals that were stored in the form of a secret code back into a form that you understand
	d) a method of exchanging messages between people using electronic devices over the network
	e) a verbal, written or recorded communication sent to or left for **a recipient** who cannot be contacted directly
	f) the length of time that it takes for a computer to get a signal
	g) a document on a computer with built in links to other texts that the reader can access immediately
	h) a cable consisting of two wires **twined** round each other, used especially for telephone or computer applications
	i) an artificial body placed in orbit round the earth or moon in order to collect information or for communication
	j) a program that searches for and identifies items in **a database**, used especially for finding particular sites on the Web
	k) a range of **frequencies** within a given band, in particular that used for transmitting a signal, can be **narrowband** (dial-up) or **broadband** (DSL)
	l) an electromagnetic wave with **a wavelength** in **the range** 0.001–0.3 m, shorter than that of a normal radio wave but longer than those of infrared radiation

2. Match the words in Column A with the words in Column B to make collocations. More than one option can be possible. Then make statements using them.

A.	B.
online	message
browse	the Internet
upload	a website
Internet	connection
hotspot	point
broadband	cable
surf	a web page
coaxial	service provider

3. Read the sentences and choose the options from the ones given in italics to make true statements about the Internet.

1. Once you are online, you can *browse/look up/investigate* the Web, visit chat rooms or send and receive emails.
2. *Fast/Current/Instant* messaging can be a great way to communicate with friends.
3. This software may not be fully *suitable/compatible/adaptable* with older operating system.
4. Most webcams *plug/connect/fill* into a USB port.
5. This highly *addictive/obsessive/dependent* game will keep you playing for hours.
6. The technology allows data to be *communicated*/*carried*/*transmitted* by mobile phones.

4. Match the types of the Internet protocols in the box with the definitions (1–10) below.

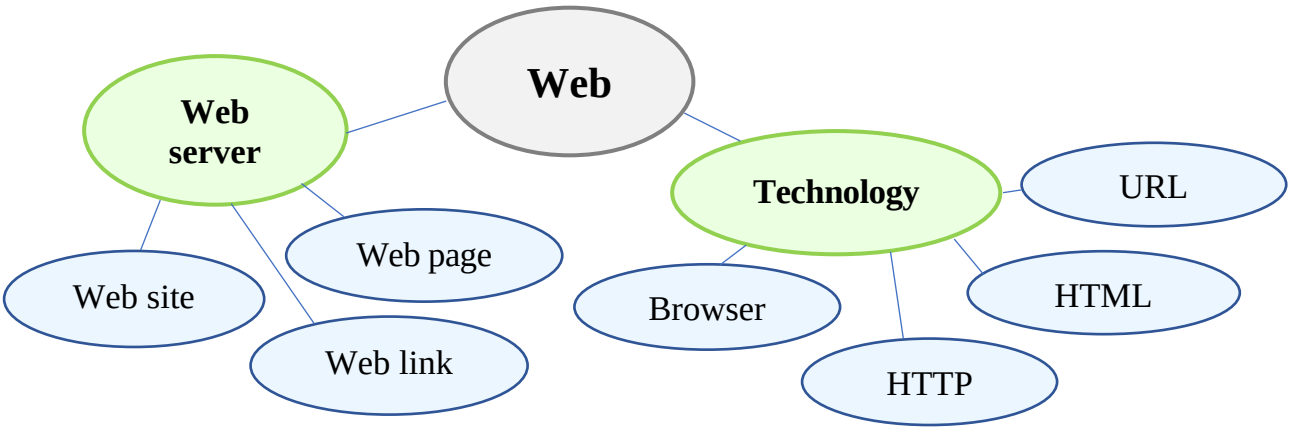
TCP (Transmission Control Protocol)	IP (Internet Protocol)
UDP (User Datagram Protocol)	HTTP (Hypertext Transfer Protocol)
FTP (File Transfer Protocol)	POP (Post Office Protocol)
SMTP (Simple Mail Transfer Protocol)	VoIP (Voice over Internet Protocol)
IRC (Internet Relay Chat)	BitTorrent

1. It transfers files between a local and remote host computer.
2. It transmits text messages in real time between online users.
3. It creates connections and exchanges packets of data.
4. An alternative data transport to TCP used for DNS, Voice over IP and file sharing.
5. It provides devices with unique addresses.
6. It exchanges information over the Web.
7. It transfers mail from an email server to a client inbox.
8. It transmits voice conversations over the Internet.
9. It distributes files using scattered clients rather than a server.
10. It transfers email messages from client computer to an email server.

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

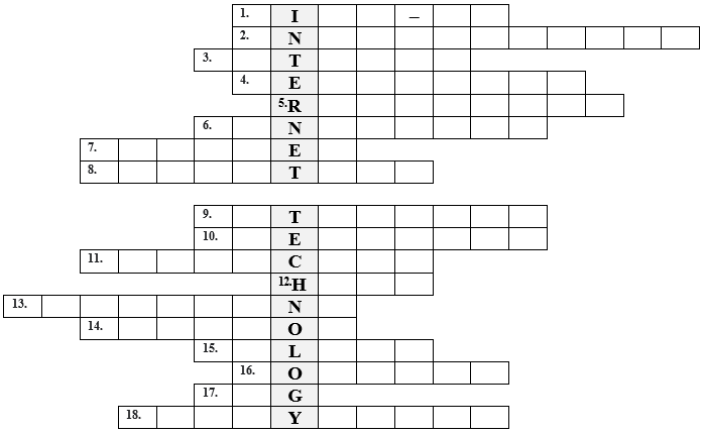
a) hypertext	link	webpage	host
b) coaxial	bandwidth	fibre-optic	twisted pair
c) POP	RF	IRC	UDP
d) browser	server	RAM	search engine

6. Look at the diagram with the target vocabulary of this lesson and match the terms related to the Web with the appropriate definitions below.



1. _____ is a unique identifier for a web page.
2. _____ is a set of connections between web pages.
3. _____ is the software used to get and display web pages.
4. _____ is a collection of HTML documents, images and sound files that can be linked to each other and accessed over the Internet using a protocol called HTTP.
5. _____ is a collection of web pages and related content that is identified by a common domain name. They are organised and formatted, so it can be accessed using a browser.
6. _____ is an Internet-based computer that stores website content and accepts requests from browsers.
7. _____ is a hypertext document provided by a website and displayed to a user in a web browser.
8. _____ is a standard protocol for communication between browsers and web servers. It exchanges information over the Web.
9. _____ is a set of elements for creating documents that a browser can display as a web page.

7. Do the crossword and get the words related to the Internet technology.



1. Used remotely via a phone line.
2. The act or process of blocking.
3. A measure of delay.
4. A person who receives sth.
5. An electromagnetic wave with radio frequency.
6. The maximum amount of data transmitted over an Internet connection in a given amount of time.
7. A computer program with a graphical user interface for displaying and navigating between web pages.
8. A text displayed on a computer display or other electronic devices with references.

9. An artificial body that revolves around a planet.
10. The rate at which sth occurs over a particular period of time.
11. Transmit by radio or television.
12. A computer that controls communications in a network or that administers a database.
13. A connection from a hypertext document to another location activated by clicking on a highlighted word or image.
14. A physical location where people can access the Internet typically using Wi-Fi.
15. Transfer (data) from a smaller computer to a larger computer.
16. A type of shielded and insulated copper cable that is used in computer networks to deliver cable TV services to end users.
17. A set of characters constituting a formatted command for a Web page.
18. A process that transforms encrypted information into its original format.

8. Explain the difference between the following concepts. Work with a groupmate.

1. The Internet and the Web.
2. Upload and download.
3. Broadband access and narrowband access.
4. Wi-Fi connection and cell connection.
5. FTP and BitTorrent.
6. Web page and blog.
7. Hypertext and text.

III. Language Box

1. Do the quiz to find out how much you know on the topic of the Internet. More than one option can be correct. Work with a groupmate.

1. The Internet was …	a) invented in the mid-90s b) popular in the 1960s c) probably created in the US
2. To be connected to the Internet, it is necessary to have …	a) a computer b) a modem c) connection software
3. Speaking about fast, high-bandwidth connection, we mean …	a) broadband connection b) dial-up connection c) cable connection
4. ADSL stands for …	a) Additional Digital Subscriber Line b) Audial Digital Subscriber Line c) Asymmetric Digital Subscriber Line

5. The device that converts computer data into the form that can be transmitted over phone lines is …	a) ADSL b) a modulator/demodulator c) a modem
6. The standard protocol that allows a computer to communicate over the Internet is called …	a) HTTP b) IP c) TCP
7. The geographical region covered by one or several access points is called …	a) a wireless access point b) a hotspot c) a wireless network device
8. The way(s) of wireless connection is (are) …	a) Wi-Fi b) satellite c) GSM

2. Match the following Internet FAQs (1–10) with the answers (a–j) below and check your ideas in Task 1.

1. How old is the Internet (the Net)? When was it created?
2. Who created the Internet?
3. Did the Internet become popular quickly?
4. How do you get online?
5. How fast are today's Internet connections?
6. How long has broadband existed?
7. How much does broadband access cost?
8. Why do you need a modem?
9. What does TCP/IP mean?
10. Are there other ways of accessing the Internet?

a) Other methods include Wi-Fi, satellite, mobile phones and TV sets equipped with a modem. Wi-Fi enabled laptops allow you to connect to the Net if you are near a WAP, in locations called hotspot (parks, cafes or campus). Satellite services are used in places where terrestrial access is not available (on ships at sea). High end mobile phones provide access through the phone network.

b) A modem (modulator/demodulator) converts digital signals into analogue ones so that data can be transmitted across the phone or cable network.

c) Since the late 1990s.

d) Today, ISPs offer a broadband, high-speed connection. The common types are cables offered by local cable TV companies and ADSL (Asymmetric Digital Subscriber Line), which work through phone lines. They are both faster than the traditional dial-up connection. Broadband access is also offered by some electricity networks.

e) It took many years for the Internet to become popular around the world. It's only really since the mid-90s that the Internet has been a part of our daily lives.

f) It is hard to say exactly. The research that led to what we now know as the Internet began in the 1960s.

g) Again, it is hard to say exactly who created it. The initial research was carried out by the Advanced Research Projects Agency in America, funded by the US government.

h) To get connected, you need a computer, the right connection software and a modem connected to the phone line. You also need an account with an ISP, which acts as a gateway between your PC and the rest of the Net.

i) The language used for data transfer on the Internet is known as TCP/IP (transmission control protocol/Internet protocol). This is like the Internet operating system. Every computer connected to the Net is identified by a unique IP address.

j) It depends on which company you choose. Nowadays some companies even offer free broadband.

3. Distribute the characteristics below between the four types of Internet connections. One can match several types. Then watch the video "Connecting to the Internet" (from 0:01 till 1:26) [30] and check if you were right.

Dial-up	DSL	Cable	3G/4G

a) It uses your cable TV connection.
b) It is much slower than other types.
c) It is a wireless Internet connection.
d) It may be the only option available in some areas.
e) It plugs into your phone line.

f) It is often used by smartphones.
g) It is known as broadband Internet connection.
h) It offers much faster speeds.

4. Watch the video (from 1:26 till the end) and mark the options (a–e) as true or false.

You can buy Internet service from:
a) your cable company;
b) a local technician;
c) your phone company;
d) an Internet Service Provider;
e) shops around.

5. Restore the process of connecting to the Internet by matching the beginnings of the statements (1–10) with the appropriate endings (a–j). Watch the video (from 1:26 till the end) again and check if you were right.

1. Your ISP will guide you …	a) a modem and set it up for you
2. They'll usually need to …	b) need to buy one
3. Your ISP may also give you …	c) choose a strong password
4. You can also …	d) create a wireless home network
5. Once you have everything set up, you can …	e) the Internet connection from your modem and broadcasts it throughout your home
6. If you want to connect several devices, you can …	f) through the entire process of connecting to the Internet
7. To do this, you'll need a wireless router, which takes …	g) buy a modem from a computer store and use the included instructions to set it up yourself
8. Your modem may already have a wireless router built-in, so you may not …	h) the instructions included with your router
9. To set up your wireless connection, follow …	i) send a technician to your home to turn on your connection
10. You should also turn on WPA or WPA2 encryption and make sure you …	j) open your Web browser and begin using the Internet

6. To sum up the information you have just obtained, present your ideas according to the plan. Work in groups of three or four people.

1. The history of the Internet.
2. The hardware for the connection to the Internet.
3. The ways of connection to the Internet.
4. The speed of the today's Internet.
5. The main Internet protocols.

IV. Decision Bank

1. Name and list the key features of today's popular browsers in the pictures (1–5). Mingle with the groupmates to elicit their preferable web search options with the reasoning.





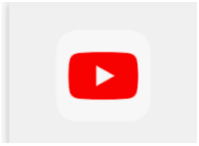
1. _____ 2. _____ 3. _____ 4. _____ 5. _____

2. Look at the logos (a–l) of the most famous websites. How many do you recognise? What are they used for? Work with a groupmate.

a)


b)


c)


d)


e)


f)


g)


h)


i)


j)

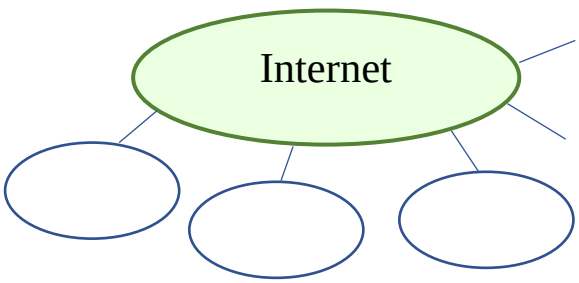

k)

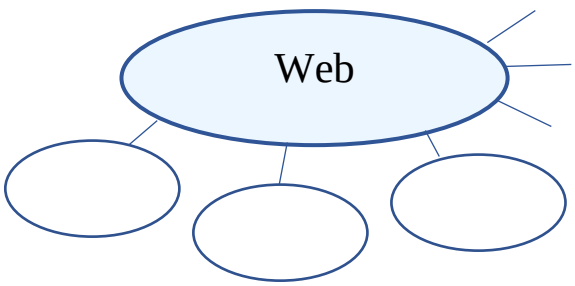

l)


3. Share your ideas on the following statements. Work in groups of two or three people.

1. The Internet isn't just about email or the Web anymore.
2. Thanks to new technologies people are getting together to take collective action like never before.
3. E-commerce has become a practical reality for many people throughout the world.
4. The Internet was initially used for contact with strangers, now it is a platform where people develop and cultivate their already existing relationships.
5. The Internet is a phenomenon that has transformed life as we know it.

4. Complete the concept map and explain the difference between the Internet and the Web, their components and features. Work in groups of three or four people.





V. Conclusion Worksheet

Make a web page of your group. Consider its content, options of page navigation and some essential links. Name the URL of your page and the parts of it, present the toolbar of the page and recommend a browser for faster access to the page. Work in groups of three or four people.

VI. Web Search

Explore the resources in the list to obtain additional information on Internet and Web technology. Report your findings to the group.

https://www.geeksforgeeks.org/basics-computer-networking

https://www.ibm.com/cloud/learn/networking-a-complete-guide

https://www.geeksforgeeks.org/the-internet-and-the-web

VII. Revision Point

1. Read the abstract "Network Features" and translate it into Belarusian or Russian. Use a dictionary if necessary.

Network Features

ISPs control connection speeds based on the service plan you have selected. Your bandwidth cap is the top speed allowed by your plan. During peak times, ISPs can place further limits on speed, a process called bandwidth throttling.

When Internet upload speed differs from download speed, you have an asymmetric connection. When upload and download speeds are the same, you have a symmetric connection.

Most Internet connections are asymmetrical, with upload speeds considerably less than download speeds. Asymmetric connections discourage subscribers from setting up Web and email servers that would transmit lots of outgoing data.

Ping is utility software designed to measure responsiveness. Ping rate indicates how quickly data can reach a server and bounce back to you. Ping was named after the sound that a submarine's sonar makes when it bounces off an undersea object. Technically, Ping measures latency. Latency is the elapsed time for data to make a round trip from point A to point B and back to point A.

Speed and latency are not the only factors that affect your Internet experience. Jitter measures the variability of packet latency. Network traffic and interference can delay some packets and create erratic data flow.

2. Complete the abstract about finding a Web page with the words in the box.

set of numbers; DNS server; path; request; URL; Web server; data packets; link; IP address; router computer; browser; Web page

To find the Web page you want, you have to click on a Web page 1) _____ or enter a(n) 2) _____, a uniform resource locator into a browser. The URL is the address of the page. When you do that, the browser sends the URL to a(n) 3) _____. The DNS server is the Domain Name Server. It uses a look-up table to find the 4) _____ of the web server referred to in the URL. The IP address is a unique, 32-bit 5) _____. Every computer on the Web has its own IP address. Once the DNS server has found the IP address, it sends it back to the browser. The browser then uses this IP address to send a(n) 6) _____ to the Web server. The request is sent as a series of separate 7) _____ which include both the IP address of the Web server and the IP address of the browser computer. These data packets are first sent to a(n) 8) _____, which uses the IP address of the Web server to determine the best available route to each packet. The packets are passed from router to router until they reach the 9) _____. They may travel by different routes before reaching the server.

As the individual packets reach the Web server, they're put back together again. The Web server now services the request by sending the requested 10) _____ back to the browser computer. It travels as a series of separate data packets from router to router. This time the router uses the IP address of the browser computer to work out the best available 11) _____ for each packet. As the packets arrive at the browser computer, they're combined to form the Web pages you requested and are displayed in your 12) _____.

3. Match the beginnings of the statements (1–5) with the appropriate endings (a–e).

1. The code behind most Web pages is …	a) to tell the Web browser how to display texts or pictures
2. Tags are placed around pieces of text …	b) it is called a Web browser, which lets you search, view and print Web pages
3. A hyperlink is any clickable text, …	c) HTML, which consists of commands called tags
4. You navigate through the Web using a program, …	d) image or button that takes you to another place on the Web
5. A text-based chat system (IRC) for instant messaging is designed …	e) for group communication in discussion forums, called channels

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

Comprehensive 👍	Rather confident ✋	Limited 👎

- The Internet and the Web.
- Types of the Internet protocols.
- Technologies and components of the WWW.
- Types of communication media: dial-up, DSL/ADSL, cable, 3G/4G.

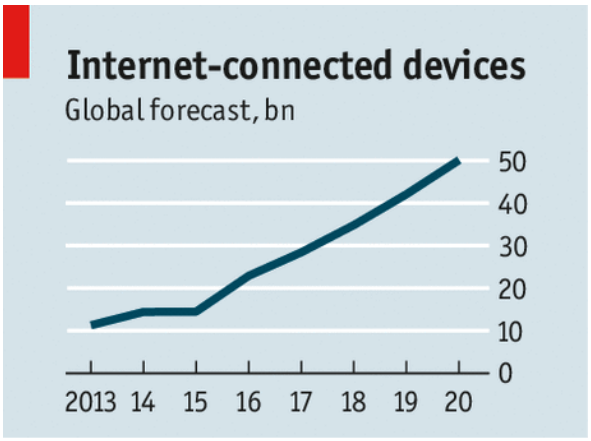
Lesson 3: Internet of Things

Aim	Objectives
Master communication skills and competences in the Internet of Things and its effect on people's lives, communities, global economy, businesses and consumer choices contributing to this phenomenon	At the end of this lesson, students will be able to: • define the IoT and areas of its application • consider IoT applications, benefits, problems and offer solutions to them • conduct surveys and interviews • present and discuss findings in pairs and small groups • write a summary based on different media

I. Lead-in

1. The Internet of Things (IoT) is supposed to revolutionise the way we interact with technology and fundamentally change our lives. Look at the diagram on the right and give your definition of the IoT. Work with a groupmate.

2. Analyse the line graph. What does it illustrate? What predictions about the near future can you make?



II. Vocabulary Focus

1. Look at several definitions (1–7) of the IoT below. Work out the meaning of the words in bold. Then answer the following questions.

a) What do all these definitions have in common?
b) Which one is the closest to the option that you offered?
c) Which definition is the most comprehensive? Why?

1. The Internet of Things, commonly abbreviated as IoT, is a computing concept that describes the idea of **diverse** everyday physical objects being connected to the Internet and being able to **discern** each other.
2. The IoT refers to the **enormous** network of devices and physical objects ("things") that can connect to the Internet, recognise other devices and objects, and **securely** communicate with them.
3. The IoT describes a world where just about anything can be connected and communicate in an **intelligent** fashion due to **embedded** chips.
4. The IoT is a system of interrelated computing devices, mechanical and digital machines, objects, animals or people that are provided with unique **identifiers** (UIDs) and the ability to transfer valuable data over a network without requiring human-to-human or human-to-computer **synergy**.
5. The IoT is the network of devices such as vehicles and home appliances that **apply** electronics, software, **sophisticated** sensors, **actuators**, and connectivity which allows these things to connect, interact and exchange data and use **analytics**.
6. The IoT refers to the connection of devices (other than typical **ware** such as computers and smartphones) to the Internet that can change the way we get energy or **purchase** goods.
7. The IoT refers to the billions of **tangible** devices around the world that are now connected to the Internet, collecting and sharing data.

2. Match the words in the box with the synonyms from the words in bold in Task 1.

utilise; obtain; safely; interaction; detectors; various; physical; drivers; devices; analysis; intelligent; huge; built into; smart; identify

3. Watch the video "How It Works: The Internet of Things" [36] and find out what elements the IoT includes and where it can be implemented effectively. Choose the options in the table that are mentioned.

IoT Elements			IoT Applications		
sensors	the Web	chips	medicine	education	shopping
devices	cloud storage	platform	transportation	sport	entertainment
apps	controllers	analytics	business	fashion	smart home
nodes	gateway	database	energy production		industry

4. Watch the first part of the video (from 0:01 till 1:01) again and complete the gaps with the missing words.

How exactly do all these devices 1) _____ such large quantities of data and how do we put that information to work?

Whether we're 2) _____ the production of a factory, giving city residents real-time 3) _____ on where to park or monitoring our personal health it's the common

Internet of Things 4) _____ that brings us diverse information together and 5) _____ the common language for the devices and 6) _____ to communicate with each other.

The process starts with the 7) _____ themselves which securely communicate with an Internet of Things platform. This platform 8) _____ the data from many devices and 9) _____ analytics to share the most valuable data with applications that address industry specific 10) _____.

5. Watch the rest of the video (from 1:02 till the end) again and match each element of the IoT ecosystem on the left with the function it performs.

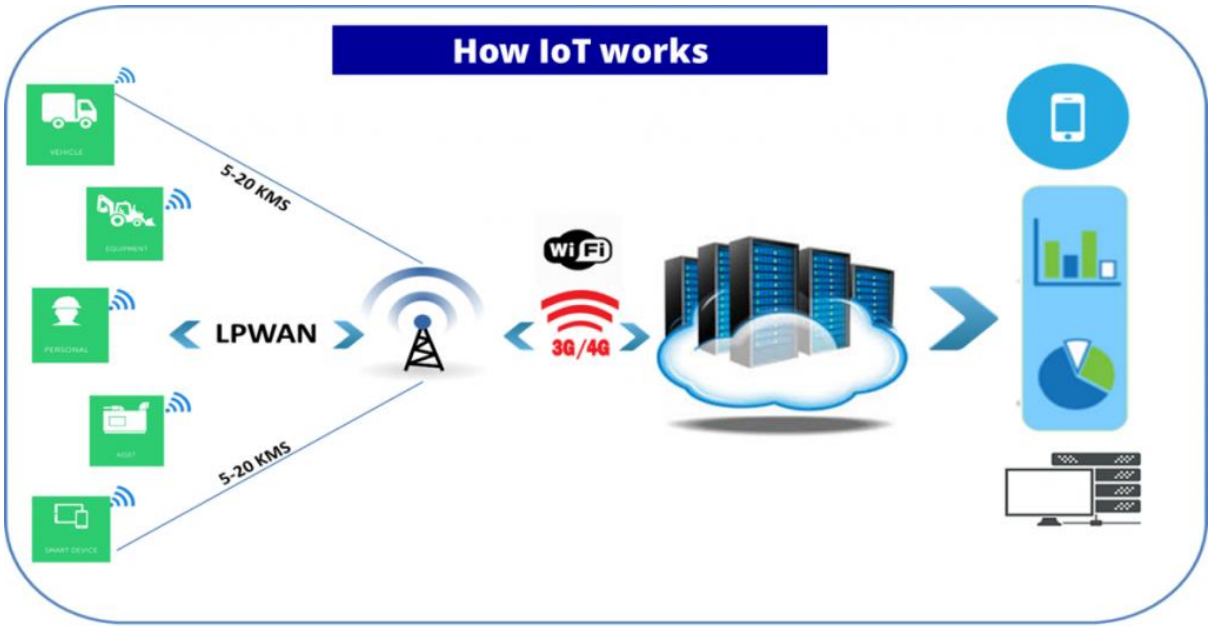
1. Sensors	a) is built with a historical record on a network server
2. Gateway	b) monitor particular characteristics communicating with each other
3. Platform	c) gathers and stores information
4. Database	d) solve specific issues
5. Applications	e) integrates and sorts the data from the sensors

6. Read a passage about the IoT. Complete the gaps with the words in the box. There are synonyms in brackets to help you.

multilateral; engender; notable; vigilance; stem; holistic; pervade; implications

As IoT devices start to 1) _____ (prevail) on the market today some related problems may 2) _____ (derive) from this. They can 3) _____ (cause) rather serious 4) _____ (consequences) when 5) _____ (international) measures are required. Eventually, 6) _____ (integrated) approach on the one hand, and every person's 7) _____ (watchfulness) on the other is the only way to get 8) _____ (significant) results.

7. The diagram illustrates how the IoT works. Describe it. Use the target vocabulary from this section.



8. Address the table and add facts with regard to the IoT. Work in groups of three or four people. Report your ideas to the rest of the group.

IoT Ecosystem	IoT Applications

III. Language Box

1. Read the title "A Reasonable Approach to the IoT" and predict what the article will be about.

2. Work out the meanings of the words in bold from the context given.

a) The system should **feature** mechanisms and tools for regular internal performance assessment.
b) Such transactions can **occur** only between two connected devices.
c) The effective **implementation** of new software was the solution to the problem.
d) Can you **spot** the difference between these two devices?
e) The best way would be to flash the BIOS and **swap out** the cooked CPU.
f) E-government policies can **facilitate** access to information infrastructure by promoting connectivity and networking.

3. Skim the article "A Reasonable Approach to the IoT" and find the paragraphs (A–G) where the following questions (1–7) are answered.

1. How big is the IoT?
2. Does the IoT have any development perspective?
3. What elements does the IoT ecosystem include?
4. What are the benefits of the IoT for consumers?
5. What device is regarded as an IoT one?
6. What are the benefits of the IoT for business?
7. What is the IoT?

A Reasonable Approach to the IoT

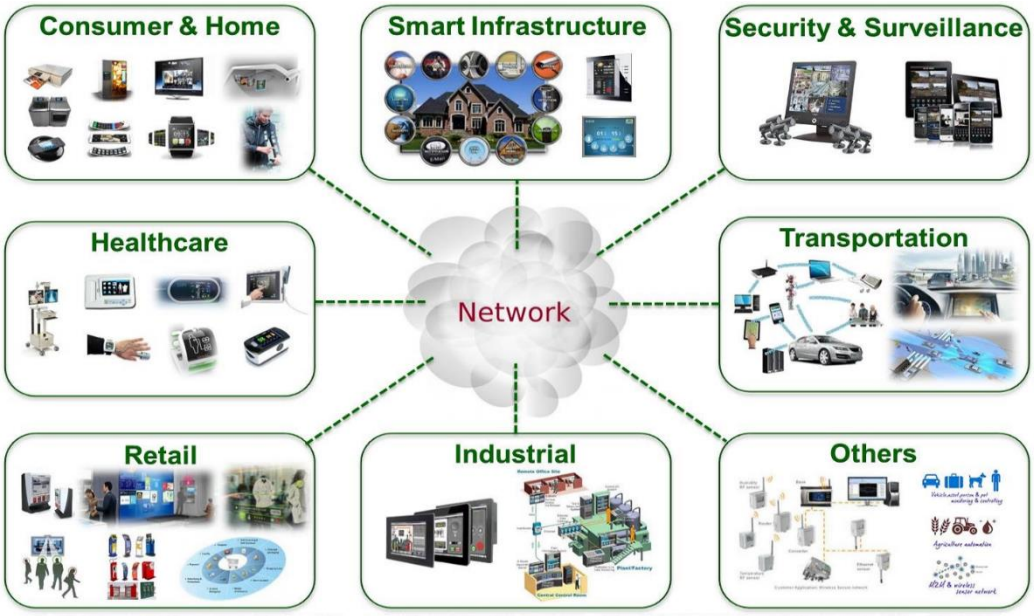
A. Simply put, the Internet of Things (IoT) is the concept of basically connecting any device featuring an on/off switch to the Internet (and/or to each other). This includes everything from mobile phones, coffee makers, washing machines, headphones, lamps, wearable devices and almost anything else. This also applies to components of machines, for example a jet engine of an airplane. The IoT is a giant network of connected "things".

Wearable device – the device that can be worn, such as clothing or glasses

B. The IoT refers to the ever-growing network of physical objects that feature an IP address for Internet connectivity, and the communication that occurs between these objects and other Internet-enabled devices and systems. In simple words, the IoT is an ecosystem of connected physical objects that are accessible through the Internet. All the

components that enable businesses, governments, and consumers to connect to their IoT devices, including remotes, dashboards, networks, gateways, analytics, data storage, and security are parts of this ecosystem.

C. Any stand-alone Internet-connected device that can be monitored and/or controlled from a remote location is considered to be an IoT device. With smaller, more powerful chips, virtually all products can be IoT devices covering almost every sphere of our life.



D. The IoT is big and getting bigger. There are already more connected things than people in the world. Experts calculate that more than 23 billion IoT devices were in use in 2018, up 35 percent from 2015, and this will likely reach 75 billion by 2025. Out of those 43 billion devices, more than half are consumer products like smart TVs and smart speakers.

E. Occasionally known as the Industrial IoT, the benefits of the IoT for business depend on the particular implementation, but the key is that enterprises should have access to more data about their own products and their own internal systems, and a greater ability to make changes as a result. Manufacturers are adding sensors to the components of their products so that they can transmit back data about how they are performing. This can help companies spot when a component is likely to fail and to swap it out before it causes damage. Companies can also use the data generated by these sensors to make their systems and their supply chains more efficient, because they will have much more accurate data about what's really going on.

F. The IoT also promises to make our environment – our homes and vehicles – smarter, more measurable, and chattier. Already today smart speakers like Amazon's Echo and Google Home facilitate playing music, setting timers, or getting information. Home security systems make it easier to monitor what's going on inside and outside. Smart car parking systems help you find a parking lot much quicker. Meanwhile, smart thermostats can help us heat our homes before we arrive back, and smart lightbulbs can make it look like we're home even when we're out.

G. Looking beyond the home, in future, autonomous cars and smart cities could change how we build and manage our public spaces. Sensors can help us understand how noisy or polluted our environment is. Health control devices will be able to monitor person's state 24 hours a day collecting, storing and analysing data to be ready to alert about a coming heart attack or stroke. The most used enterprise IoT devices will be smart electric meters and security cameras.

4. Complete the ideas. Address the article in Task 3 if necessary.

a) The IoT refers to … .
b) The Internet of Things includes … .
c) The IoT is an ecosystem of … .
d) An IoT device is … .
e) Enterprises benefit from using the IoT when … .
f) The leading domestic applications of the IoT today are … .
g) Our future belongs to … .

5. While the idea of the IoT has been in existence for a long time, a collection of recent advances in a number of technologies has made it practical. Consider what technologies have made the IoT possible and which of them are the most essential. To expand your ideas, match each technology on the left with the explanation. Work with a groupmate.

1. Access to low-cost, low-power sensor technology 2. Connectivity 3. Cloud computing platforms 4. Machine learning and analytics 5. Conversational AI	a) The increase in the availability of these platforms enables both businesses and consumers to access the infrastructure they need to scale up without actually having to manage it all
	b) Affordable and reliable detectors are making the IoT technology possible for more manufacturers
	c) Advances in neural networks have brought natural-language processing (NLP) to IoT devices (e.g. personal digital assistants Alexa, and Siri) and made them appealing, affordable, and viable for home use
	d) With advances in these technologies, along with access to vast amounts of data stored, businesses can gather insights faster and more easily. These allied technologies continue to push the boundaries of the IoT, and the data produced by the IoT also feeds these technologies
	e) A host of network protocols for the Internet has made it easy to connect sensors to the cloud and to other "things" for efficient data transfer

6. Consider the ideas below and anticipate the future of the IoT. Work in groups of two or three people.

The IoT will continue to form the backbone of many technologies that will change the way we all live

The potential of the IoT is not just in enabling billions of devices simultaneously but leveraging the huge volumes of actionable data which can automate diverse business processes

As networks and IoT platforms evolve to overcome these challenges, through increased capacity and AI, service providers will edge furthermore into IT and Web scale markets – opening entire new streams of revenue

Advances to the industrial Internet will be accelerated through increased network agility, integrated artificial intelligence (AI) and the capacity to deploy, automate, orchestrate and secure diverse use cases at hyperscale

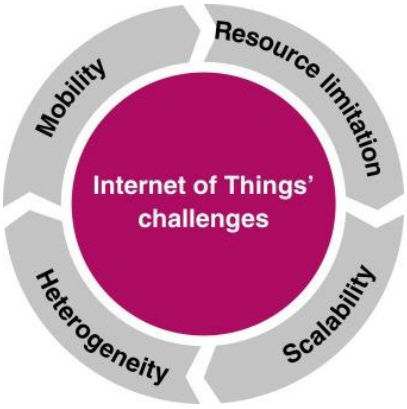
IV. Decision Bank

1. Skim the article "The IoT Implementation Challenges and Solutions" below and identify what parts of the article the ideas refer to.

1. It could be years before the market settles enough to crown a single universal standard for home IoT.
2. For consumers to make use of the Internet and all that the IoT has to offer, it is essential to work upon their awareness of the changes taking place within the IoT to make it more efficient.
3. With such strong competition in the IoT market, customers whose expectations aren't met won't hesitate to go elsewhere.
4. In cybersecurity terms, IoT devices greatly expand the "attack surface" or the amount of potential areas for cybercriminals to penetrate a secure network.
5. Quality control in the IoT can be tricky from a regulatory perspective.

The IoT Implementation Challenges and Solutions

In a few short years, the Internet of Things (IoT) has gone from the technologies that were cutting edge to the situation today where connected household items or automobiles are common. And its growth is only really gathering speed now and can comprise as many as 75 billion connected devices by 2025. In fact, according to the researchers and experts, in the future, devices without IoT capabilities may be more expensive because they'll lack data that can be harvested by manufacturers.



That data, though, comes with risks, along with a number of other notable IoT risks and problems that stem directly from this that enterprises will have to overcome in the coming years. If the IoT has a problem, or is exposed to weaknesses, then the users that are connected to it are equally threatened. And here are five major problems connected with the IoT.

Cloud attacks. First of all, since a large amount of data running the IoT will be stored in the cloud, it is likely that cloud providers will be one of the principle targets in this kind of war. While there is growing awareness of this problem, cybersecurity is still under-resourced in comparison to the potential scale of the threat. To get some kind of idea of the problem, the World Economic Forum report cites the analysis suggesting that the takedown of a single cloud provider could

cause $50 billion to $120 billion of economic damage – a loss somewhere between Hurricanes Sandy and Katrina.

Lack of regulation about IoT. Another problem is that government regulation often takes a long time to catch up with the current state of technology. With the rapid evolution that's happening every day in the IoT, the government is taking its time in providing standards and regulations and businesses are often left without crucial information they need to make decisions.

Limited AI. The experts also point out that most of the current AI offerings on the market have substantial limits. After all, the machine learning and big data-based AI that currently pervade are powerful tools for identifying associations in large quantities of data, but don't have much on humans in terms of working out the complex phenomena of cause and effect or to identify modifiable factors that can engender desired outcomes.

Challenges with compatibility. Moreover, the researchers have found that home mesh networks are one area where compatibility trouble is looming. Bluetooth has long been the compatibility standard for IoT devices. In fact, it was named after an ancient king, Harald Bluetooth, known for unifying warring tribes. But when it comes to home automation using mesh networking, several competitors have sprung up to challenge Bluetooth's mesh network offerings, including protocols such as Zigbee and Z-Wave.

Understanding IoT. Finally, in 2018, the real issue was how to increase the ability for people to understand the changes and their implications more clearly, and to take concrete actions to take advantage of the potential upside. The IoT is moving into its adolescence as connected devices become smarter and more immersive. Algorithms and data visualisation templates have evolved greatly. All these changes arise the need to provide the public with up-to-date IoT literacy to increase people's flexibility to adopt to fast changing reality.

In fact, while security is undoubtedly one of the major concerns impacting the development of the IoT today, businesses and consumers agree that there should be strong IoT security regulation which will lead to the solution of many other related problems. As it is a multilateral issue it requires a comprehensive, holistic approach. The Internet of Things Security Foundation (IoTSF) is a non-profit body founded by a group of technology companies that will be responsible for vetting connected devices for vulnerabilities and flaws and will offer security assistance to technology providers, system adopters, and end users. But, on the other hand, the latter should remember that vigilance is a key if you want your data to stay yours. You shouldn't simply believe all marketing talks. And it is wise to check reviews of the IoT product and if the manufacturer has a decent track record in advance.

2. Here are some quotes made by the experts in the IoT. Guess which problem from the article in Task 1 each of them addresses. Which one/ones are you ready to support? Why?

1. "The sad thing about AI is that it lacks artifice and therefore intelligence."
2. "The pace of change has exceeded the rate of human capability to absorb."

3. “Some might welcome a move towards a less hyper-globalised online world, but many would not, resistance would be likely, as would the rapid growth of illegal workarounds.”
4. “The flood of information that swamps us daily produces more pain than gain.”
5. “Users need different apps for different devices, and it becomes overwhelming, causing mental overload.”

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

1. Which problem does the author of the article in Task 1 consider the most serious? Why?
2. Do you agree with the author?
3. What other challenges concerning the issue can you think of?
4. What are the solutions to the IoT problems?
5. What is the future of the IoT?

4. Study the following home applications of the IoT. Consider their benefits, possible problems related to them, and how they can be solved. Which one would you like to obtain? Report to the group. Justify your choice.

Hiku Shopping Button

This device lets consumers use it in the home as a quick way to manage shared grocery lists. In addition to scanning barcodes, this gadget can also accept voice commands and even place grocery delivery orders to save you a trip to the store. Hiku is much more than a chunky fridge magnet. As you scan or tell it which groceries you need, it can integrate with a number of third-party shopping lists. Planned updates will add online price comparisons and online ordering.
Price: $49

AeroGarden Harvest Elite

This smart device allows you to do just that. Driven by low energy and high-powered LEDs, aquaponic pods will soon substitute ordinary plant soil pots.
It can grow up to 6 plants in soilless pods. You will receive reminders to add water and nutrients.
Most plants germinate within 7–14 days and are ready for harvesting in 46 weeks. You can use non-GMO seeds.
And it consumes only 8 watts of power.
Price: $139.95

Hapifork

This device uses data and immediate feedback to help us be more mindful of what we're eating and drinking. One of the best and simplest ways to lose weight – while still enjoying your food – is to eat a little bit slower. Using a capacitive sensor and a built-in vibration motor, Hapifork ("happy fork") will send out gentle physical notifications or flash small indicator lights when it detects that you're shoveling food in faster than you can digest.
Price: $60

Echo

It's an advanced home assistant. It produces rich, detailed sound that automatically adapts to any room. You can stream songs from Amazon Music, Apple Music, Spotify, SiriusXM, and more. It has a built-in hub to voice control compatible lights, locks, and sensors in your home. It sets timers, reminders, and alarms. Alexa answers questions like "Alexa, what time is it?" It can connect to other hands-free devices. It is built with multiple layers of privacy controls including a mic off button.
Price: $49.99

V. Conclusion Worksheet

Consider the following key points and get ready to speak about the IoT in the areas presented below. Work in teams.

✓ applications ✓ tech solutions ✓ challenges ✓ perspectives

Industry	**Health care**
Transportation	**Agriculture**

VI. Web Search

Explore the resources in the list to obtain additional information on the IoT, including topical IoT applications. Report your findings in writing.

https://www.iotworldtoday.com/subject/iiot

https://www.itransition.com/blog/iot-history

https://builtin.com/internet-things/iot-examples

VII. Revision Point

1. Choose the odd one out in the word lines.

a) various	diverse	ubiquitous	miscellaneous
b) recognise	discern	identify	understand
c) varied	integrated	embedded	fixed into
d) driver	ware	actuator	tangible
e) allot	apply	utilise	implement

2. Complete the sentences with the words from Task 1.

a) Such _____ is used by the majority of IT companies today.
b) Due to security concerns, most enterprises have to _____ extra resources to defence schemes.
c) Devices can't _____ each other without specific fixed into chips.
d) Issues surrounding the IoT are _____ and complicated.
e) Firefox can now adjust images with _____ colour profiles.

3. Read the article "How Will the Future IoT Industry Look Like?" published on the 101 Blockchains and get ready to render it orally. Record your speech and send it to your groupmate for assessment according to the checklist below. Your overall mark will be provided at the end of the table.

How Will the Future IoT Industry Look Like?

Written by Georgia Weston
Mar 8, 2023

The rapid growth in the IoT industry, with a gradual rise in the number of IoT devices by 2030, is a favorable indicator for the industry. However, it is also important to learn about the implications of IoT in the future. The following trends could provide an effective answer for understanding the prospects for future of IoT.

Circular Economy and IoT

IoT companies have opened up avenues for minimising waste and improving personal autonomy alongside energy efficiency. However, IoT projects can be sustainable only if it has access to rich sources of data. The responsiveness of IoT networks and their actions would depend on the network's effectiveness in data connectivity. The recommended actions for achieving a responsive and high-performance IoT system focus on increasing use of IoT devices alongside extension in the use cycle through predictive maintenance.

5G Networks and IoT

The highlights of predictions for future of IoT would also include the plans for adoption of 5G networks. 5G broadband cellular networks could offer support for

higher data transfer rates with considerably minimal latency. The arrival of 5G could increase the number of IoT-connected devices by 2030 as it can power real-time network performance requirements for IoT applications. At the same time, low-latency benefits of 5G networks can improve connectivity and performance of IoT networks.

Empowering IoT with Artificial Intelligence

The next prominent expectation in the future of IoT would point to possibilities for a combination of AI and IoT. Artificial intelligence is one of the prominent strategic technology trends and has significant implications for transforming IoT. Artificial intelligence and IoT complement each other and help in accessing highly valuable insights. Artificial intelligence can help in extracting viable insights from the massive volume of data generated by IoT devices.

Giving Users What They Want

The IoT forecasts for 2030 would also emphasise the necessity for introducing user-centric functionalities in IoT platforms. Spending on IoT solutions would continue growing. However, the major share of IoT spending would go towards IoT software development.

The number of companies dealing with IoT devices would need effective methods for managing the software associated with different devices. Therefore, developers could look up to containerised applications as a solution for the future of IoT software ecosystem. Containers could help IoT companies introduce beneficial functionalities for improving user experiences.

Foundations of Industry 4.0

The domain of technology is in the most dynamic phase right now, with many innovative developments ranging from blockchain to machine learning. Internet of Things can serve as one of the prominent entries among revolutionary technologies which can transform manufacturing and industrial applications.

The IoT-connected devices forecast estimates point out how IoT would become a mandatory requirement for data collection and improvement of operational efficiency. Industries believe that IoT is the most important component of Industry 4.0, alongside big data analytics, cloud infrastructure and AI.

Strengthening the IoT Security Landscape

The adoption of IoT would increase the amount of user data at risk of unprecedented vulnerabilities. According to Palo Alto Networks, around 57 % of IoT devices are vulnerable to malicious attacks. In addition, the findings of Palo Alto Networks also suggest that 83 % of medical IoT devices use unsupported operating systems.

The growth in the number of IoT devices by 2030 calls for integration of blockchain as an important IoT security tool. Blockchain could offer the benefits of cryptographic security for IoT data alongside identity management for IoT networks.

Decentralisation of the IoT Landscape

Decentralisation of IoT through blockchain technology not only improves security but also reduces the burden of computing on the IoT network. Decentralisation could offer significant advantages for helping IoT platforms in making better decisions with comprehensive data analytics.

Summary checklist	*Yes*	*Undecided*	*No*
1. The origin of the publication was mentioned			
2. The date of the column was provided			
3. The style of the script was defined and justified			
4. The genre of the post was indicated and justified			
5. The author of the article was called			
6. The title of the post was given			
7. The main idea of the article was identified			
8. The important points were included			
9. The unnecessary details were left out			
10. The personal opinion/impression of the article was given			
11. The personal view on the topic/problem was provided			
12. The summary included own vocabulary not citations			
13. The summary was full of varied grammar structures			
The overall mark (excellent/good/satisfactory/below average/bad)			

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

Comprehensive 👍	Rather confident ✋	Limited 👎

- Definition and applications of the IoT.
- IoT ecosystem.
- Benefits that the IoT brings.
- Problems related to the IoT and their solutions.
- Future of the IoT.

Topic: Information Systems
Lesson 1: Information System Basics

Aim	Objectives
Master communication skills and competences in information system basics and planning and analysis procedures within system development life cycle	At the end of this lesson, students will be able to: • define the concept of the information system • describe information systems' goals, applications, and types • state the concept of SDLC and define its main phases • list core activities of the planning and analysis phases and their main goals • discuss and present findings in pairs and small groups • write a summary based on different media

I. Lead-in

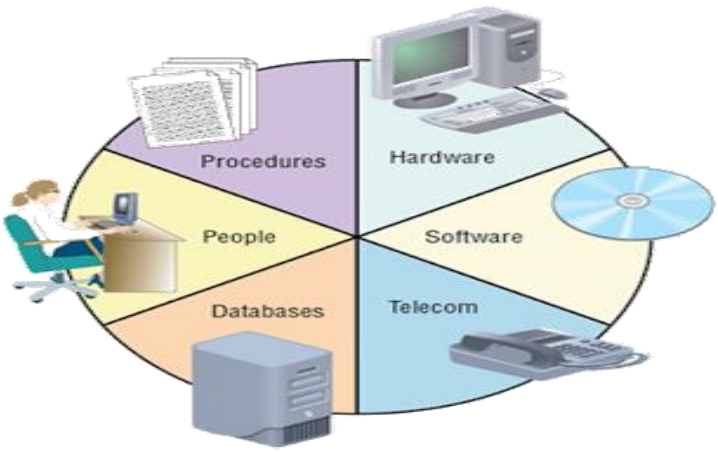
1. Study the definitions of the terms "information" and "system" in relation to IT in the box and share your opinion on the ideas below.

a) Computer-based information systems have spread rapidly and are now an essential component of every business, organisation, and enterprise.
b) Just about any type of enterprise can benefit from an information system, from a small start-up to an established multinational corporation.
c) Not everyone in an organisation uses an information system in the same way.
d) A wide variety of enterprise software can be included in information systems to help owners, managers, and executives monitor all aspects of a business.

Information – news, facts, or knowledge about a person, company, product.

System – computer equipment and programs used for a particular purpose

2. Look at the picture illustrating the components of a computer-based information system. Work out your definition of an information system and present it to the group. Work in groups of three or four people.



II. Vocabulary Focus

1. Study the definitions of an information system below. Work out the meaning of the words in bold. Then answer the following questions.

a) What do these definitions have in common?
b) How do they differ?
c) Which definition is the most comprehensive? Why?

1. An information system collects, stores, and processes data to provide useful, accurate, and **timely** information, typically within the context of an organisation.
2. An information system can be defined as a set of **interrelated** components that collect, process, store, **retrieve**, and distribute information to support decision-making, coordination, and control in an organisation.
3. An information system must support the needs of people who **engage in** many different organisational activities.
4. An information system can help people perform their jobs more quickly and effectively by automating routine tasks, such as reordering **inventory**, taking customer orders, or sending out renewal **notices**.
5. One of the major functions of an information system is to help people make decisions **in response to** problems.
6. Business firms and other organisations rely on information systems to **carry out** and manage their operations, interact with their customers and suppliers, and **compete** in the marketplace.
7. Nothing is more central to an organisation's effectiveness than its ability to transmit **accurate**, **relevant**, and understandable information amongst its employees.

2. Match the words in the box with the synonyms in bold in Task 1.

participate in; connected; correct; extract; notifications; concerning; at the right time; items; appropriate; perform; try to beat other companies

3. Do the quiz to find out what you know on the topic of information systems. More than one option can be correct.

1. Different information requires to be …	a) searched c) sorted b) categorised d) stored
2. Why do people depend on information systems?	a) they help us manage all massively stored data b) they retrieve databases c) they control information d) they compete with end users

3. An information system is a set of …	a) computers for collecting, storing, and processing data b) collected computers storing and processing data c) computer-based tools for collecting, storing, and processing data d) uninterrelated components working together
4. The main components of a typical information system are …	a) hardware b) software c) networks d) data
5. Information systems are widely used by …	a) government b) business c) health care d) education

4. There are the four major types of information systems. Match the types with the appropriate definitions (a–e). One definition is extra.

Transaction processing system (TPS)	Management information system (MIS)	Decision support system (DSS)	Expert system

a) It helps people make decisions by directly manipulating and accessing data from external sources, generating statistical projections, and creating data models of various scenarios.
b) It provides a way to collect, process, store, display, modify, or cancel transactions. Most of these systems allow many transactions to be entered simultaneously.
c) It uses computer circuitry to simulate the way a brain might process information, learn, and remember. Based on the evidence, it begins to establish its own criteria, its own rules about the data.
d) It's sometimes referred to as a "knowledge-based system"; it's a computer system designed to analyse data and produce a recommendation, diagnosis, or decision based on a set of facts and rules.
e) It is used to derive various reports from transaction data. Managers depend on these reports to make routine business decisions in response to structured problems.

5. Complete the passage about an information system with the words and word collocations in the box.

clients; procedures; people; software; feature; database; information system; devices; data; support

The information system is made up of five fundamental components: hardware, 1) _____, data, networks, and people. Hardware resources consist of all physical

2) _____ and materials used for input, output, and processing of data. Software resources not only include the programs to control and coordinate the hardware but also the 3) _____, which are operating instructions for the people who will use an information system. The third component is 4) _____. By itself, data is not really very useful. But aggregated, indexed, and organised together into a(n) 5) _____, data can become a powerful tool for businesses. Technically, communications networks are made up of hardware and software, but they are such a core 6) _____ of today's information systems that they have become its own category. Network resources include communications media, networks and network 7) _____. The final and probably the most essential component of an information system is 8) _____, without whom the previous four components can not function. Human resources include two types of people – the end users, also called users or 9) _____, who use an information system or the information it produces, and the 10) _____ specialists like computer operators, analysts, programmers, etc. who develop and operate information systems.

6. Different types of information can be stored on a blockchain. Watch the video "What Is the Blockchain?" [57] and choose the options from the ones given in italics to make correct sentences.

a) A blockchain is a *public/private* ledger.
b) Think of it as a full history of banking *records/transactions*.
c) Bitcoin isn't regulated by a central *audience/authority*.
d) The completed transaction is publicly recorded into the blockchain where it is *verified/varied* by other Bitcoin users.
e) It can review transaction histories to determine how much *volume/value* a particular address owned at any time.

7. Watch the video again and complete the abstract with the missing words.

A blockchain is a public ledger that records all Bitcoin transactions 1) _____ the need for a third party to process payments. Think of it as a full history of banking transactions. Blocks with the most recent transactions being recorded are like an individual banking 2) _____. Each completed block is 3) _____ to the chain and another block begins forming the constantly growing blockchain. Bitcoin isn't regulated by a central authority. Instead, its users dictate and 4) _____ transactions when one person pays another for goods or services. The completed transaction is publicly recorded into the blockchain where it is verified by other Bitcoin users. Blockchain is seen as 5) _____ main technological innovation. Since it provides 6) _____ of each transaction, it can review transaction histories to determine how much value a particular address owned at any time. Each computer that's connected to the Bitcoin network 7) _____ a copy of the blockchain upon joining the network. Blockchain.info provides 8) _____ to the entire Bitcoin blockchain.

8. Share your opinion on the questions. Work in groups of three or four people.

1. What is an information system? Who uses information systems?
2. What are the essential components of an information system?
3. Can you describe the characteristics of TPS, MIS, DSS, and expert systems?
4. What is blockchain technology?
5. Why is blockchain important?

III. Language Box

1. Information systems can serve different kinds of enterprises. Match the pictures with the core areas of their application. Can you add other fields of application?

1. _____ 2._____ 3. _____ 4._____ 5._____ 6._____ 7._____

- ✓ Travel and Hospitality
- ✓ Local Government
- ✓ Communication
- ✓ Retail
- ✓ Manufacturing
- ✓ Education
- ✓ Health Care

2. Read about the core business activities the information systems can help various kinds of enterprises monitor and improve their performance. Find the words and word combinations in the sentences (1–7) that are similar to the ones in the box. Decide which areas of application in Task 1 the activities refer to.

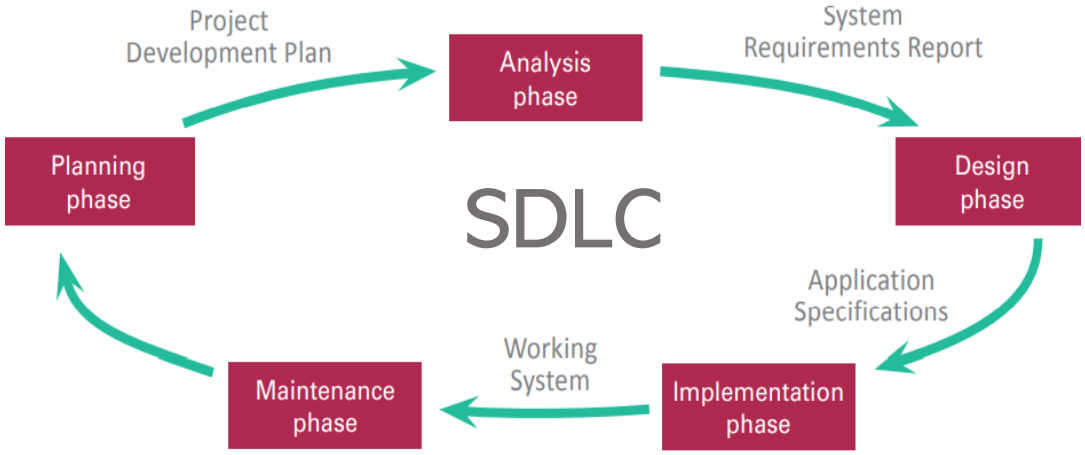
checkouts; power cuts; manage; obeying a law; checklist; payment; arrange; employees

1. Manage patient records, deal with insurance claims, and schedule appointments.
2. Provide an online platform for customers to make reservations, schedule facilities and equipment, and schedule employees.
3. Manage customer subscriptions and billing, track service area, contact customers with special offers, monitor the network for power outages and track service and repair crews.
4. Automate the design process, schedule suppliers, track orders, manage inventory, sales, and shipments, and monitor safety.
5. Operate point-of-sale systems in stores and online, process payments, and maintain inventory.
6. Manage student records, maintain data on instructors and staff, handle course registration, and schedule courses and facilities.
7. Manage local tax compliance, improve financial management and reporting, maintain property records, and store employee data.

3. Search the Internet to find the mission statement for three businesses or nonprofit organisations that you respect. Predict what information systems they can use. Report your findings to the group.

4. There is a particular process for creating an information system. Look at the diagram below and discuss the following questions. Work with a groupmate.

1. What does SDLC stand for?
2. How many phases does it consist of?
3. Which phase comes first?
4. What is the goal of each phase?
5. What activities does each phase encompass?



5. Decide which of the following goals (a–d) correspond to the main phases of the SDLC in Task 4. What phase is missing? Then watch the video "System Development Life Cycle" [46] and check your ideas.

a) It is aimed at the building of a new software system according to the gathered requirements and design specifications.
b) It refers to devising a detailed plan that includes a short description of the project, strategic scheduling, budget and resources required.
c) It deals with studying system requirements and project goals.
d) It refers to producing a plan for building the system and defining the architecture, interfaces and data structures.

6. Watch the video again and change the words in italics to make correct sentences.

1. The SDLC has a set of four fundamental phases: planning, analysis, design and *maintenance*.
2. Different projects might *execute* different parts of the SDLC or approach the SDLC phases in different ways, but all projects have elements of these four phases.
3. In the SDLC, planning refers to the phase of creating a detailed plan for how the project will be *launched* including the scheduled budget and resources required.

4. The analysis phase in the SDLC is the process of gathering and evaluating information about the *goals* of the system being developed to produce a clear understanding of the problem and requirements.
5. In the SDLC design refers to the phase of creating a plan for building the system, including defining the *requirements*, interfaces, and data structures.
6. Implementation in the SDLC refers to the phase of actually building and developing the software system according to the design *resources* created in the previous phases.

7. Choose the options from the ones given in italics to make correct sentences.

1. An information system is an *essential/optional* component of every business, organisation, or enterprise.
2. An information system is a set of computer-based tools for collecting, storing, and *scheduling/processing* data.
3. An information system is essentially made up of five components: hardware, software, *data/queries*, networks, and people.
4. A standard SDLC *begins/proceeds* with the planning phase and then it continues to analysis, design, implementation, and maintenance.
5. The SDLC provides a *general/rigid* outline of how an information system evolves.
6. The phases in an SDLC are *always/not always* separate steps.
7. The SDLC is a formal multi-stage process through which information systems are *implemented/justified*.

8. Distribute the activities below between the following phases of the SDLC.

Planning phase	Analysis phase	Design phase	Implementation phase	Maintenance phase

a) Identify potential solutions.
b) Fix bugs.
c) Obtain approval to implement the new system.
d) Write a code using the chosen programming language.
e) Assemble the project team.
f) Create applications.
g) Test the functionality of the entire system.
h) Determine system requirements.
i) Study the current system.
j) Justify the project.
k) Convert to the new system.
l) Evaluate solutions and select the best.
m) Choose a development methodology.
n) Develop a project schedule.
o) Upgrade the application to the newer versions of the software.
p) Finalise documentation.

Methodology – a system of ways of doing, teaching, or studying something

q) Write a requirements report.
r) Develop application specifications.
s) Add some new features into the existing software.

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

1. What is the SDLC and what is its main goal?
2. What are the phases of it?
3. What phase is the most time-consuming? Why?
4. What phase would you like to be involved in? Why?

IV. Decision Bank

1. Read the abstract "SDLC: Planning Phase" and indicate the parts (A–C) where the following ideas are mentioned.

1. The content of the project development plan.
2. Project team direction.
3. The objective of the planning phase.
4. Project rationale.
5. Planning phase tasks.

SDLC: Planning Phase

A. The planning phase for an information system project includes the activities listed in the box on the right. The goal of these activities is to create a Project Development Plan. Before the project proceeds beyond the planning phase, the Project Development Plan is usually reviewed and approved by management.

This planning document includes:

- a short description of the project, including its scope;
- a justification for the project, which includes an estimate of the project costs and potential financial benefits;
- a list of project team participants;
- a schedule for the project, including an outline of its phases.

Planning Phase Activities:
- ✓ Assemble the project team
- ✓ Justify the project
- ✓ Choose a development methodology
- ✓ Develop a project schedule
- ✓ Produce a project development plan

B. Depending on the scope of the problem and the expertise of the professional staff, an information systems project can be managed by an in-house information technology department or outsourced to a development firm. A system development project team, or project team for short, is assigned to analyse and develop an information system. The project team has a leader, sometimes referred to as the project manager, who supervises the project team's workflow and output.

C. Justifying a project often involves identifying problems and opportunities within an organisation's current information system. By eliminating problems and taking advantage of opportunities, an organisation can become more competitive. Project team members can identify problems and opportunities using a variety of techniques, such as interviews and data analysis.

2. Share your opinion on the ideas with a groupmate.

1. Identify the goal of the planning phase.
2. Name core activities that are completed during the planning phase.
3. List the documents that a Project Development Plan includes.
4. Explain what project justification means.

3. Read the abstract "SDLC: Analysis Phase" and consider the following key ideas.

Phase Goal	Core activities	System requirements	Requirements report

SDLC: Analysis Phase

The goal of the analysis phase is to produce a list of requirements for a new or revised information system. Tasks for the analysis phase are listed in the box below.

Analysis Phase Activities:
- ✓ Study the current system
- ✓ Determine system requirements
- ✓ Write a requirements report

Most new information systems are designed to replace a system or process that is already in place. It is important to study the current system to understand its strengths and weaknesses before designing a new system.

Some members of the project team might have firsthand experience with the current system. They can often provide an overview of the system and identify key features, strengths, and weaknesses. To obtain additional information about the current system, project team members can observe the system in action and interview people who use it.

System requirements are the criteria for successfully solving problems identified in an information system. These requirements guide the design and implementation for a new or updated information system. They also serve as an evaluation checklist at the end of the development project; because of this, they are sometimes called success factors. A new or updated information system should always meet the requirements defined by the project team.

The project team determines requirements by interviewing users and studying successful information systems that solve problems similar to those in the current system. Another way to determine requirements is to construct a prototype as a trial version of an information system. Often the prototype is not a fully functioning system

because it is designed to demonstrate only selected features that might be incorporated into a new information system. A systems analyst shows the prototype to users, who evaluate which features of the prototype are important for the new information system.

After the project team studies the current system and then determines what the new system should do, system requirements are incorporated into a document called a System Requirements Report that describes the objectives for an information system.

4. Look at the key ideas of this lesson and report on the topic "Information System Basics".

main components; information system types; SDLC; core activities; planning phase; financial benefits; problem identification; project scope; project development plan; trial version; prototype; project schedule; project justification; team participants; analysis phase; system requirements; success factors; selected features; revised system; requirements report

V. Conclusion Worksheet

Complete the assignment "Project Development Plan" following the instructions below. Present it to the group. Work in groups of two or three people.

- ✓ Identify and briefly describe an information system at university, work, or local business that needs improvement.
- ✓ Make a list of problems and opportunities that exist in that system.
- ✓ Develop a list of activities your team would perform, design, construct, and implement for a new information system.
- ✓ Incorporate all your findings into a document that would serve as the Project Development Plan.

VI. Web Search

Explore the resources in the list to obtain additional information on information systems. Report your findings to the group.

https://www.britannica.com/topic/information-system

https://www.techopedia.com/definition/24142/information-system-is

https://www.investopedia.com/terms/c/cloud-computing.asp

VII. Revision Point

1. Read the abstract "How to Document System Requirements" and translate it into Belarusian or Russian. Use a dictionary if necessary.

How to Document System Requirements

The System Requirements Report is one of the most important products of the SDLC. It documents key business practices in the current system and contains a list of success factors for a new or updated information system. If these factors have not been correctly identified, the information system will be a failure. The System Requirements Report must contain clear, complete, and detailed documentation, including diagrams and descriptions. The project team can use a variety of tools to diagram the current system and produce documentation that is also useful in later phases of the SDLC. Documentation tools vary depending on the development methodology. For example, a project team following a structured methodology will use different documentation tools than a project team using object-oriented methodology. To understand some of the most popular documentation tools, consider a project to develop an information system for a for-profit organisation that offers business seminars and workshops throughout the world. The new information system must keep track of workshop schedules and student enrollments. Students have to be able to select workshops, and instructors must be supplied with a roster of students.

2. Match the types of information systems (1–6) with the appropriate descriptions (a–f).

1. Online transaction processing system (OLTPS).
2. Management information system (MIS).
3. Decision support system (DSS).
4. Executive information system (EIS).
5. Expert system.
6. Transaction processing system (TPS).

a) It uses batch processing to collect and hold a group of transactions until the end of a day or pay period; generates detailed reports, which provide a basic record of the completed transaction.
b) It uses a real-time method in which each transaction is processed as it is entered.
c) It consolidates data collected by a transaction processing system by grouping and summarising it; provides more sophisticated reports to help analyse data.
d) It makes decisions without direct guidance from an experienced decision-maker; uses a technique called fuzzy logic, it deals with imprecise data by working with confidence levels or with problems that have more than one solution.
e) It helps people make decisions by directly manipulating data, analysing data from external sources, generating statistical projections, and creating data

models of various scenarios, but the final choice remains the responsibility of the human decision-maker; it is not a substitute for human judgment.

f) It is designed to provide senior managers with information relevant to strategic management activities based on information from internal and external databases.

3. Complete the gaps choosing from the options given to make correct sentences.

1. The goal of the analysis phase is to _____ a list of requirements for a new or revised information system.
   a) produce b) revolve c) disrupt
2. A new information system is designed to _____ a system or process that is already in place.
   a) restrict b) verify c) replace
3. A new or updated information system should _____ the requirements the project team defines.
   a) exploit b) implement c) fulfil
4. The project team can use a variety of _____ to diagram the current system and specify what it does.
   a) tools b) media c) metrics
5. A System Requirements Report describes the _____ for a new information system.
   a) breaches b) objectives c) methodology
6. System requirements are the criteria for successfully _____ the problems identified in an information system.
   a) solving b) satisfying c) retrieving

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

Comprehensive	Rather confident	Limited

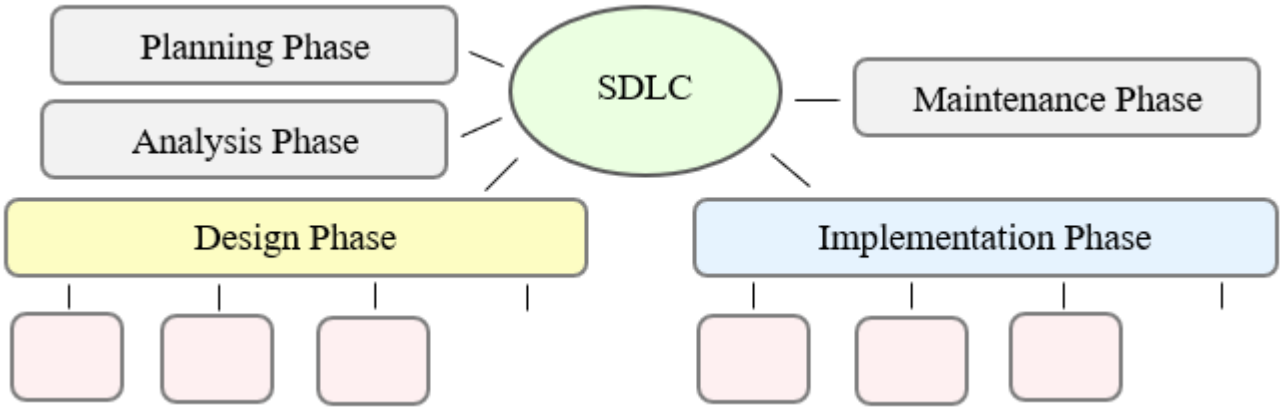
- Definition of an information system, its goals, and examples of applications.
- Types of information systems and their main characteristics.
- Blockchain technology.
- SDLC and its core phases.
- Planning phase, its goal, and main activities.
- Analysis phase, its goal, and main activities.

Lesson 2: System Design and Implementation

Aim	Objectives
Master communication skills and competences in the design and implementation phases within system development life cycle	At the end of this lesson, students will be able to: • define the goals of the design and implementation phases • explain the technical criteria of software/hardware in the design phase • state software and hardware alternatives in the design phase • list types of testing and system conversion • present and discuss findings in pairs and small groups • write a summary based on different media

I. Lead-in

1. Complete the diagram with the activities of the design and implementation phases of the SDLC. Address Lesson 1 if necessary. Work with a groupmate.



2. Share your opinion on the quotes. Justify your point of view.

a) "The design process is about designing and prototyping and making. When you separate those, I think the final result suffers." (Jonathan Ove)
b) "The designer does not begin with some preconceived idea. Rather, the idea is the result of careful study and observation, and the design is a product of that idea." (Paul Rand)
c) "When I'm working on a problem, I never think about beauty, but when I've finished, if the solution isn't beautiful, I know it's wrong." (R. Buckminster Fuller)

II. Vocabulary Focus

1. Match the key terms related to the design and implementation phases of system development on the left with the appropriate definitions.

1. Implementation 2. Requirement 3. Manual 4. Creep 5. Turnkey 6. Specification 7. Conversion 8. Request 9. In-house	a) complete product or service that is ready for immediate use
	b) the process of putting a decision or plan into effect; execution
	c) something that's mandatory or necessary
	d) an act of asking politely or formally for something
	e) a book giving instructions or information
	f) an act of identifying something precisely or of stating a precise requirement
	g) done or existing within an organisation
	h) the increase of something in a way that was not expected or wanted
	i) the process of deactivating an old information system and activating a new one

2. A myriad of hardware options are available for information systems. The project team has to consider the overall architecture based on device requirements, network technology, types of hosting, and level of automation. Match the four options with the appropriate descriptions (A–D).

Device requirements	Network technology	Types of hosting	Level of automation

A. Virtually every information system requires a network, so the project team must examine different alternatives, such as LANs, extranets, intranets and the Internet. Many information systems require a complex mixture of networks, such as a LAN in each branch office connected to a company intranet, with customers accessing selected data via the Internet

B. The availability of these services offers yet another hardware option that can be addressed during the design phase. Rather than install an information system on costly in-house equipment, a viable alternative might be to install it in the cloud on equipment that is maintained by a cloud hosting company such as Amazon.com, Microsoft or Google

C. The project team should consider the pros and cons of different levels of automation because they affect all aspects of the planned information system. A point-of-sale system, a magnetic strip reader, a pressure-sensitive digitising pad, "tap-and-pay" systems, such as Apple Pay, are the examples

D. Servers and personal computers are the most commonly used components in information systems, but handheld devices, mainframes, and even supercomputers can also play a role. Systems analysts have to consider if users are accessing the system at the office or in the field. How much mobility is required? How much processing power and storage are required? Will screen size be an issue? These are some of the hardware questions that will be answered in the design phase

3. Software solutions can be explained through the cake analogy. Look at the pictures (1–4) and guess which of the following software alternatives they correspond to. Then read the cake preparation methods (a–d) below and match them with the pictures.

Application development tool	System from scratch	Application software	Turnkey system

1. 

2. 

3. 

4. 

a) It is the so called “cake mix,” which contains many of the ingredients necessary for quick and easy baking.
b) It is equivalent to buying a pre-made cake that you simply slice and serve.
c) Baking a cake allows you some flexibility in the ingredients you choose-margarine instead of shortening, for example. It requires a lot of time and work to sift the flour; mix the sugar, eggs, shortening, and milk.
d) It is like going out to dinner and simply ordering your choice of cake for dessert.

4. Read the characteristics of software solutions and define which type in Task 3 they refer to.

1. It is costly, but you devise everything on your own and can choose how to do it.
2. It contains system blocks that optimise the process of development.
3. It saves your time, money, and resources.
4. You can get constant updates from a software publisher in the future to meet system requirements better.
5. It is significantly long.
6. You can almost immediately start using this software.
7. It needs evaluation to determine how well it meets the system requirements.
8. It contains ingredients necessary for quick and easy development of the modules for an information system.
9. It has some customisation options, but it cannot be modified to exactly meet every system requirement.

5. There might be more than one way to meet the requirements identified in the analysis phase of the SDLC. Complete the abstracts (A–D) below with the words in the box to learn more about the four potential software solutions.

turnkey; requirements; extensively; tool; satisfy; flexibility; kit; customisation; preprogrammed; adjustments; shells

A. Creating an information system from scratch with programming tools using a programming language can take many months or years. It is usually costly but offers the most 1) _____ for meeting the system 2) _____ .

B. An application development 3) _____ is essentially a type of software construction 4) _____ containing building blocks that can be assembled into a software product. Expert system 5) _____ and database management systems are included. It usually speeds up the development process but might not offer the same level of flexibility as a programming language.

C. Application software for an information system is usually a series of 6) _____ software modules supplied by a software developer. It eliminates much of the design work required with programming languages or application development tools. Although most application software has some 7) _____ options, in many cases, it cannot be modified to exactly meet every system requirement, which necessitates 8) _____ in an organisation's procedures.

D. A 9) _____ system is essentially an "information system in a box," which consists of hardware and application software designed to offer a complete information system solution. It might seem like a quick and easy solution, and it looks attractive to many project teams. However, it must be 10) _____ evaluated to determine whether it can 11) _____ system requirements.

6. Make collocations with the words in the boxes. Make up some sentences with them in relation to the SDLC.

A. programming	turnkey	cloud	B. manual	conversion	creep
customisation	system	user	system	software	tool
application	scope		option	hosting	

7. Find 15 words related to the design and implementation phases in the wordsearch below. Use the definitions. The first letter of each word is given in brackets. Copy the words into your notebook.

1. The process of changing from one form to another (c).
2. The process of putting a decision into execution (i).
3. To make decisions about sth or to create potential solutions (d).
4. Sth that you must do, or sth that is needed (r).
5. Servers that are accessed over the Internet, and the software and databases that run on those servers (c).

6. A type of testing that verifies a component of the system or the entire system under a real-time operating condition (p).
7. A particular stage in a process or in the gradual development of sth (p).
8. The excessive ongoing expansion or addition of new features in a product (c).
9. A book giving instructions or information (m).

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

10. The process of finding and fixing errors or bugs in the source code of any software (d).
11. A testing technique performed to determine whether or not the information system has met the requirement specifications (a).
12. A sheet of information in the form of a table, graph, or diagram (c).
13. Ready to be used immediately (t).
14. The action of making or changing something according to the buyer's or user's needs (c).
15. The processing of writing instructions for a computer (c).

III. Language Box

1. Watch the video "Design Phase in SDLC" [32] and choose the options from the ones given in italics to make true statements.

1. A system is a combination of components that when combined create a *finished/initial* product.
2. The design phase can be referred to as the *transformation/creation* phase.
3. The design phase begins once the customer has *planned/signed off* on the system.
4. Data is formed into *charts/files*.
5. The book that explains how the system can be installed, its components and system requirements is known as the *maintenance/user* manual.
6. The user manual explains how to *fix bugs/operate the new system*.
7. At the end of this phase the design team should be sure that they met the *resources/requirements*.

2. Watch the video again and match the beginnings of the statements (1–6) with the appropriate endings (a–e).

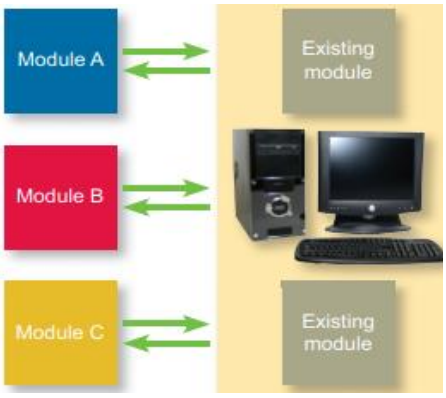
1. The design phase can be referred to as the transformation phase …	a) the requirements and is on track to fulfilling the customer's needs
2. Data is formed into charts and the design team uses those charts …	b) the customer again needs to sign off
3. All of the components and security pieces of the system are …	c) also determined during the design phase
4. Along with the system there needs to be the book that explains …	d) because this is when an idea is actually transformed into a real working system
5. Before the system can move on to the fourth phase …	e) how the system can be installed, its components, and system requirements
6. This allows assurance that the design team met …	f) to decide the best way for the data to move and be stored

3. One of the activities in the implementation phase is testing. Identify which types of testing correspond to which descriptions. Then put them into the correct order.

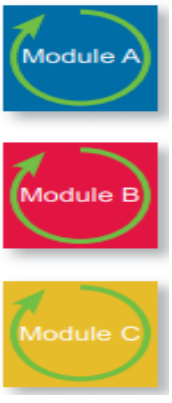
1. System testing 2. Acceptance testing 3. Unit testing 4. Integration testing 5. Business Level testing	a) ensures that all the modules work together correctly
	b) ensures that each module of the new system works correctly
	c) is designed to verify that the new information system works as required; it is done by users or systems analysts often with real data
	d) ensures that new modules work with the rest of the system hardware and software
	e) is done by business analysts or professional testers to ensure it complies with requirements and predict expected result

4. Analyse the diagrams (A–C), name the types of testing each of them illustrates and list the differences between them.

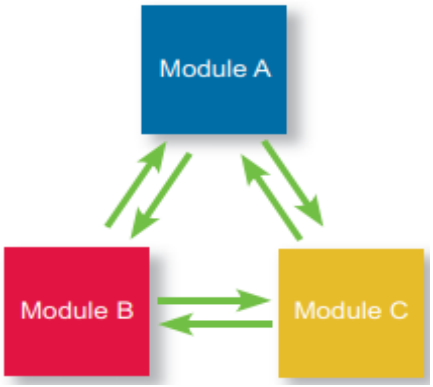
A.



B.



C.



5. One more activity in the implementation phase is converting data to a new system. There are several strategies to do it. Read the abstracts (A–D) below and decide which of the following options each of them corresponds to and name their key characteristics.

Direct conversion	Parallel conversion	Phased conversion	Pilot conversion

A. It avoids some of the risk of direct conversion because the old system remains in service while some or all of the new system is activated. Both the old and new systems operate in parallel until the project team can determine whether the new system is performing correctly. It often requires that all entries be made in both the new and old systems, which is costly in terms of time, computer resources, and personnel. It offers a good safety net in case a new information system fails to operate reliably or accurately

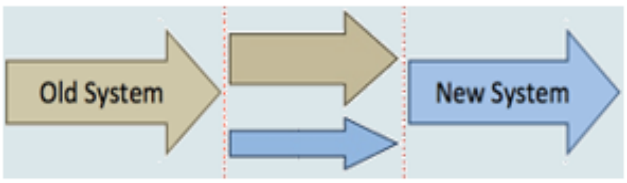
B. It works well in organisations with several branches that have independent information processing systems because the new information system is activated at one branch at a time. If the new system works correctly at one branch, it is activated at the next branch. To prepare for it, system developers must devise methods to integrate information from branches using the new system with information from branches still using the old system

C. It works well with large, modularised information systems because the new system is activated one module at a time. After the project team determines that one module is working correctly, the next module is activated, and so on, until the entire new system is operational. In it, however, each module of the new system must work with both the old and new systems, which greatly increases the complexity and cost of application development

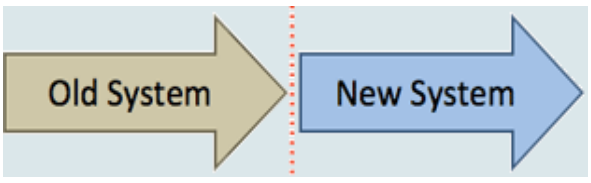
D. It means that the old system is completely deactivated, and the new system is immediately activated. It usually takes place during non-peak hours to minimise disruption to normal business routines. It's risky, however, because if the new system doesn't work correctly, it might need to be deactivated and undergo further development or testing. In the meantime, the old system must be reactivated, and transactions that were entered into the new system must be reentered into the old one

6. Look at the diagrams and identify which type of conversion in Task 5 they illustrate. Make a list of their advantages and disadvantages. Work in groups of three or four people. Then share your ideas with the rest of the group.

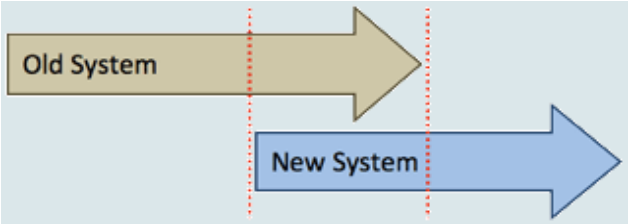
1.



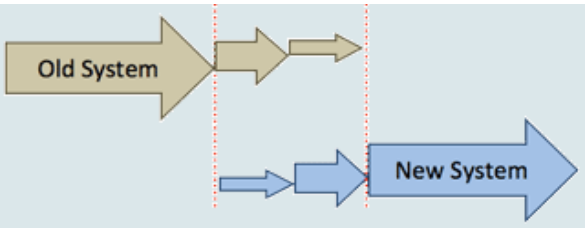
2.



3.



4.



7. Group the advantages and disadvantages according to the type of conversion they refer to in Task 5.

Advantages	Disadvantages
1. Risk is reduced. 2. Small minor errors can be easily seen. 3. It is less costly. 4. It is not very time consuming. 5. As the system is tested at every stage, there is very little chance of error. 6. Companies are able to fix any problems with the new system before ending the previous system. 7. This strategy is more user friendly. The IT staff are able to draw their attention to training one department at a time. 8. It allows to see whether the new system meets the organisations needs in one department/location before using it throughout the entire organisation	1. It is very costly as two systems are being operated simultaneously. 2. It is very difficult to detect small errors in the new system. 3. It is also very time consuming and can be stressful. 4. Too much time is involved in testing in one location, there is also increased development and labour costs. 5. It takes a lot of time to implement the whole new system to the entire organisation. 6. If the system has not been implemented properly, the new system may fail to work and this will affect the whole organisation

8. To sum up your knowledge about the design and implementation phases, think of five questions related to the topic and address them to your groupmates.

IV. Decision Bank

1. Watch the video "Project Management Scope Creep" [39] and mark the statements as true or false. Correct the false ones.

1. Scope creep is controlled changes to the scope due to the interference from stakeholders.
2. When things are moving away from what you originally thought, you should get an additional budget.
3. When people ask for additional stuff, ask them to explain the reasons.
4. Change control is the way to understand the benefits and impact of the change.
5. When people fill out a change control form, very often they understand that their changes are important.

6. Priority matrix, it is the simplest and the most powerful tool, that you do at the end of the project with your team.
7. Priority matrix is around scope and time.
8. Priority matrix is an amazing powerful tool to ensure that scope creep doesn't even happen.
9. In ordinary life changes are rare.

2. Watch the video again and name three most important tools to avoid scope creep.

3. Make a list of potential solutions how to avoid scope creep. Use the following prompts. Work with a groupmate.

- ✓ stakeholders and users
- ✓ conflicts
- ✓ requirements
- ✓ changes
- ✓ scope
- ✓ management plan
- ✓ schedule
- ✓ project team members

4. Study the real examples of scope creep. Work out the best ways of preventing such situations.

A. A significant delay in completing a project due to clients' consistent change requests, as was seen in the lawsuit between the contractor responsible for building Kitchener's main library extension and the city. The root cause of such scope creep is making too many last-minute changes on a project, causing unseen delays

B. The Chrysler Corporation had everything in check for the introduction of the Chrysler PT Cruiser, from the design, production, and promotion. However, they did not take note of dealer showroom delivery times when drafting the project requirement. This threw them off guard, with the top heads trying as much as possible to deal with the problem while responding to angry dealership owners who had their ideas. The root cause of such project scope creep is the failure to involve the client throughout the project. Chrysler did not take time to determine what the dealers wanted and had to suffer angry dealership owners who had their ideas

C. The luggage handling system in the Denver International Airport failed as a result of ignoring warnings from several parties. The set deadlines for the projects were never achieved. The keyholders were also not involved in decisions, making this one of the most expensive scopes creeps in the world. The root cause of this project scope creep was failing to prioritise features. Remember, the whole project failed because the airport ignored warnings from different parties

V. Conclusion Worksheet

Design an information system by completing the activities below. Form a group of three or four students as the project team. Present your information system to the group.

- ✓ Identify and briefly describe a type of information system that you have chosen.
- ✓ Make a list of hardware options for your system.
- ✓ Choose software solutions for the system.
- ✓ Define type(s) of testing of the system.
- ✓ Identify type(s) of converting data that is (are) the most suitable for your system.
- ✓ Finally, advertise your product to your groupmates.

VI. Web Search

Explore the resources in the list to obtain additional information on the SDLC, including issues of data security. Report your findings in writing.

https://ecomputernotes.com/mis/system-development-approaches/system-development-life-cycle

https://www.britannica.com/topic/information-system

https://doit.maryland.gov/SDLC/Documents/SDLC%20Phase%2008%20Implementation%20Phase%20Multiple%20Hardware.pdf

VII. Revision Point

1. Read the abstract "How to Avoid Feature Creep" and translate it into Belarusian or Russian. Use a dictionary if necessary.

How to Avoid Feature Creep

Feature creep, more commonly known as scope creep, refers to when you add excessive features to a product that make it too complicated or difficult to use. Any additional features you introduce into your product add to the complexity of your design. In turn, this can diminish the usability of your product. Feature creep is typically the result of poor planning, insufficient product strategy, and misaligned priorities. Typically, requests for new features are added after the project has started, are out of scope, and the changes are not properly reviewed. If you're building a product for your own business, such as an app, it's important to stay focused on creating a strong minimum viable product (MVP) and ship it. You can always add features later

on after you get feedback from your merchants and/or users. To help focus your project on core features, you need to: start with user and market research; identify your target audience, their needs, and their wants; know what problem you are solving, and for what user. Prioritise all features in your product according to the needs of your users. It's recommended to use the jobs-to-be-done framework to identify the key features that offer the most value to your target audience.

2. Do the quiz.

1. What is the main goal of the design phase?	a) to make system requirements report b) to evaluate hardware and software solutions c) to make a Project Development Plan d) to create, test and convert a system
2. What do hardware alternatives include?	a) network technology b) processing methodology c) level of automation d) all of the above
3. What is not a software alternative?	a) turnkey system b) system from scratch c) cloud hosting d) application software
4. What is the main goal of the implementation phase?	a) to create, test and convert a system b) to make a system requirements report c) to train users d) to fix bugs
5. Which type of testing ensures that new modules work with the rest of the system?	a) unit testing b) acceptance testing c) integration testing d) system testing
6. Which type of conversion involves complete deactivation of an old system?	a) direct b) phased c) parallel d) pilot
7. What is scope creep?	a) it is what happens when changes are made under developer's control b) it is what happens when changes are made without any control c) it is an additional function at the request of the customer d) it is function changes

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

1. *Direct/Parallel* conversion is less costly.
2. *Integration/Unit* testing is the phase in software testing in which individual software modules are combined and tested as a group.
3. Approval in the *implementation/design* phase is necessary to see if the information system meets the system requirements.
4. In *pilot/direct* conversion the old system has stopped being used and the new system is immediately being set up.
5. In a *turnkey system/system from scratch* you can almost immediately start using the product.
6. Employing a s*ystem from scratch/turnkey system* is significantly long.
7. *System/Integration* testing is a type of testing that is performed on a complete integrated system to evaluate the compliance of the system with the corresponding requirements.

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

Comprehensive 👍	Rather confident ✋	Limited 👎

- Definition of the design phase; its purpose and activities.
- Hardware and software solutions.
- Definition of the implementation phase; its purpose and activities.
- Types of testing.
- Types of conversion.
- Scope creep.

Lesson 3: System Maintenance

Aim	Objectives
Master communication skills and competences in the maintenance phase within system development life cycle and the aspects of system security	At the end of this lesson, students will be able to: • state the goal and main activities of the maintenance phase • describe the possible modification types and quality of service • analyse threats against information systems and security measures • discuss and present findings in pairs and small groups • write a summary based on different media

I. Lead-in

1. Analyse the three lists of activities describing the design, implementation and maintenance phases. Match each of them with the appropriate phase of the SDLC. Work with a groupmate.

A.
- ✓ Purchase and install hardware and/or software
- ✓ Create applications
- ✓ Test applications
- ✓ Finalise documentation
- ✓ Train users
- ✓ Convert data
- ✓ Convert to the new system

B.
- ✓ Operate equipment
- ✓ Make backups
- ✓ Provide help to users
- ✓ Fix bugs
- ✓ Optimise for speed and security
- ✓ Revise software as necessary to meet business needs

C.
- ✓ Identify potential solutions
- ✓ Evaluate solutions, select the best ones
- ✓ Select hardware and software
- ✓ Develop application specifications
- ✓ Obtain approval to implement the new system

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

a) What is the main goal of the maintenance phase? Address the word cloud on the right and the list of activities in Task 1 if necessary.
b) How long does it last?
c) Who is responsible for this phase?
d) What does QoS stand for?

II. Vocabulary Focus

1. The maintenance phase of the SDLC has particular features. Decide which of the statements (a–g) characterise this phase. Match the words in bold with their synonyms in the box. Work in groups of three or four people. Then watch the video "SDLC: Maintenance Phase" [42] and check if your ideas were right.

fixed; check; unimportant; stops; modified; satisfy; evaluation; bugs; implemented

a) As soon as the new system is in place, the work of the project team **ceases**.
b) This is the shortest and **insignificant** phase.
c) The maintenance phase can also be called monitoring and **assessment**.
d) The purpose of this phase is to **verify** whether the new system is satisfying the goals identified during the design phase.
e) If any **errors** are found, they are **corrected** in the maintenance phase.
f) The new system can't be **altered** during this phase.
g) A new system should be **deployed** to **accommodate** specific needs.

2. Complete the gaps with the missing words. Then watch the video again and check.

1) _____ the new system is in place the work 2) _____ stop. The maintenance phase continues until the system is 3) _____ in place. During this phase the system is monitored to 4) _____ that it's working properly and is meeting the goals 5) _____ during the analysis phase. If any errors or bugs are 6) _____, they are fixed in the maintenance phase. In addition, the system may be 7) _____ to accommodate new needs that 8) _____. If the new need cannot be met by the 9) _____ system, the cycle starts over to design a 10) _____ modification to the system or to 11) _____ a new system. It continues until a new system is in place that 12) _____ the needs of its users.

3. While evaluating the performance of a new information system there are three main considerations that should be taken. Distribute the questions (a–i) between the three categories.

Efficiency	Usability	Appropriateness

a) Are all the users able to use the system easily?
b) Does the new system operate quicker?
c) Can all users enter and delete data safely?
d) Is the new system suitable for the business?
e) Does the new system reduce staff time?
f) Does the software meet the needs of the clients and customers?
g) Can the staff use the system with minimal training?

h) Does the new system match the original requirements?
i) Does the new system reduce costs?

4. In the maintenance phase, management should establish change controls that address major, routine, and emergency software modifications, and software patches. Match each type with the appropriate description (A–D) below to find out their features.

Major modifications	Routine modifications	Emergency modifications	Software patches

A. They are periodically needed to correct software problems or restore processing operations quickly. Although the changes must be completed quickly, they should also be implemented in a well-controlled manner

C. They are program modifications involving externally developed software. Their standards should include identifying, evaluating, approving, testing, installing, and documenting changes

B. They include significant functional changes to an existing system, converting to a new system, and introducing new systems or data. They should be implemented following a well-structured process similar to the SDLC

D. They involve making changes to application or OS software to improve performance, correct problems, or enhance security. They can be simple or complex, but are not of the magnitude of major modifications, and can be deployed in the normal course of business

5. Match the beginnings (1–6) of the statements with the appropriate endings (a–f) to understand what happens in the maintenance phase.

1. The maintenance phase involves making changes to hardware, software, and documentation …
2. It includes making changes …
3. To ensure modifications do not disrupt operations or degrade a system's performance or security, organisations should …
4. Change management (sometimes referred to as configuration management) involves …
5. Change controls should address all aspects of an organisation's technology environment …
6. Management should …

a) … establish appropriate change management standards and procedures.
b) … carefully document all modifications to ensure accurate system inventories.

c) … to improve system's performance, correct problems, enhance security, or address user requirements.
d) … including software programs, hardware and software configurations, operational standards and procedures, and project management activities.
e) … to support system's operational effectiveness.
f) … establishing baseline versions of products, services, and procedures and ensuring all changes are approved, documented, and disseminated.

6. The level of performance of any information system defines its quality of service (QoS) and can be measured with the help of quality-of-service metrics. To understand how they work, match the QoS metrics on the left with the appropriate definitions.

Metrics – a set of numbers that give information about a particular process or activity

1. Throughput 2. Accuracy 3. Downtime 4. Capacity 5. User levels 6. Response time	a) is the number of users at peak, average, and low times
	b) is the amount of time during which a system isn't available for processing
	c) is the number of errors occurring in a particular time interval for a particular function
	d) is the amount of data processed in a particular time interval
	e) is a time period between when a user initiates a request for information and when the request is fulfilled
	f) is available storage space, number of users, number of connections, or number of packets

7. Read the three passages (A–C) and learn who is responsible for technical support in the maintenance phase. Complete the gaps with the words in the boxes.

installing; performance; operator; charged with; backups; applications; programmer; troubleshoots; maintenance; manager

A. In an information system that revolves around a mainframe computer or network servers, the task of operating the mainframe or servers on a day-to-day basis is usually the responsibility of a computer 1) _____. The computer operator performs system 2) _____ and data recovery, monitors system traffic, and 3) _____ operational problems. Additional responsibilities might include 4) _____ new versions of the operating system and software 5) _____; but in some organisations, these responsibilities are delegated to a systems 6) _____, whose responsibilities include installing new versions of the operating system and modifying operating system settings to maximise 7) _____. In an information system structured as a LAN, a network 8) _____ is responsible for day-to-day operations and system 9) _____. Some maintenance activities might also fall on the shoulders of individual users, who are often 10) _____the responsibility of backing up their workstations and installing new software.

keep; in-depth; handbook; staffed; hesitate; turn to; familiar; encounter; tolerance; handle

B. Even after 1) _____ training, employees sometimes forget procedures or have difficulty when they 2) _____ a new set of circumstances. These employees 3) _____ the IT department for help. Many organisations establish a help desk to 4) _____ end-user problems. The help desk is 5) _____ by technical support specialists who are 6) _____ with the information system's software. Support specialists 7) _____ records of problems and solutions. Help desk personnel have little 8) _____ for people who ask questions that are clearly answered in the procedure 9) _____ or user manual. You should not 10) _____, however, to ask about procedures or problems that are not covered in the documentation.

cost-effective; remain; retired; costly; obsolete

C. The maintenance phase is the longest SDLC phase and lasts until the system is 1) _____. Although the analysis, design, and implementation phases of the SDLC are 2) _____, for many organisations, the maintenance phase is the most expensive because it is the longest. The maintenance phase continues until an information system is no longer 3) _____ or until changes in the organisation make the information system 4) _____. It is not unusual for an information system to 5) _____ in operation for 20 years or more.

8. Share your opinion on the questions.

1. What characterises the maintenance phase?
2. What should be considered during this phase?
3. What are the four possible types of modifications in the maintenance phase?
4. What does QoS stand for? What does it include?
5. Who is responsible for system maintenance?
6. Why do maintenance activities include user support?
7. How long does the maintenance phase last?
8. When does the maintenance phase end?

III. Language Box

1. With the opening of information systems to the global Internet, information security has moved to the forefront of concerns about global well-being. Make a list of key concepts related to the topic. Use the ideas on the right.

2. Identify which types of threats to the stored data on the left correspond to which descriptions. Choose the three most serious ones. Justify your choice.

1. Natural disasters 2. Power outages 3. Equipment failures 4. Human errors 5. Software failures 6. Security breaches 7. Acts of war 8. Malware	a) can occur in any hardware component of a computer system; the risk increases as a hardware component ages, but they can occur in brand-new hardware
	b) include stolen data, physical intrusions, and deliberate sabotage
	c) can be caused by bugs or flawed software design
	d) can be caused by natural disasters, overloaded power grids, planned brownouts, and rolling blackouts
	e) can cause physical damage to computer systems; cyberterrorism can also cause damage, using viruses and worms to destroy data and otherwise disrupt computer-based operations, which now include critical national infrastructures such as power grids and telecommunications systems
	f) can damage just about any computer system; you might have experienced the nuisance of rooting out a virus from your personal computer; that inconvenience pales when compared to the potential effect of a virus on a corporate information system
	g) can completely shut down a computer system, cut off service to customers, and potentially destroy the system completely
	h) are mistakes made by computer operators. Common ones within an information system include entering inaccurate data and failing to follow required procedures

3. Distribute the threats in Task 2 between the two groups. Then choose the most and least serious ones in each group for Belarus. Justify your point of view. Work with a groupmate.

Naturally happened	Human inflicted

4. No computer system can be completely risk-free, but several proactive measures can protect information systems from threats. These measures can be grouped into the four categories: deterrents, preventive countermeasures, corrective procedures, and detection activities. Distribute the measures (a–i) between the categories. Work with a groupmate.

Deterrents	Preventive countermeasures	Corrective procedures	Detection activities

a) 

b) 

c) 

d) 

e) 

f) 

g) 

h) 

i) 

5. To ensure secure and efficient operation of information systems, an organisation institutes a set of procedures and technological measures called controls. To learn more about them match the beginnings of the statements (1–7) with the appropriate endings (a–g).

1. Information systems are safeguarded …
2. General controls apply …
3. The most important general controls are …
4. General controls include administrative measures …
5. Fault-tolerant computer systems installed in critical environments are …
6. Backup systems, often in remote locations, may be …
7. Application controls are …

a) … that restrict employees' access to only those processes directly relevant to their duties.
b) … the measures that control access to computer systems and the information stored.
c) … designed to control and isolate problems so that the system can continue to function.
d) … to information system activities throughout an organisation.
e) … through a combination of general and application controls.
f) … specific to a given application and include such measures as validating input data, logging the accesses to the system, regularly archiving copies of various databases, and ensuring that information is disseminated only to authorised users.
g) … activated in the case of failure of the primary information system.

6. Read the abstract "Information Systems Security" and underline the core characteristics that give you a view of this concept. Compare your ideas with the groupmates.

Information Systems Security

Information systems security is responsible for the integrity and safety of system resources and activities. Most organisations in developed countries are dependent on the secure operation of their information systems. Multiple infrastructural grids – including power, water supply, and health care – rely on it. Information systems are at the heart of intensive care units and air traffic control systems. Financial institutions could not survive a total failure of their information systems for longer than a day or two. Electronic funds transfer systems (EFTS) handle immense amounts of money that exist only as electronic signals sent over the networks or as spots on storage disks.

Information systems are vulnerable to a number of threats and require strict controls, such as continuing countermeasures and regular audits to ensure that the system remains secure.

Although instances of computer crime and abuse receive extensive media attention, human error is estimated to cause greater losses in information systems operation. Disasters such as earthquakes, floods, and fires are the particular concern of disaster recovery planning, which is a part of a corporate business continuity plan. A contingency scheme is also necessary to cover the failure of servers, telecommunications networks, or software.

7. Look at the places in the pictures. What do they all have in common? Analyse the vulnerabilities of one of them and offer protective measures that should be taken to secure data. Work with a groupmate. Then report your ideas to the group.

8. Natural disasters and flaws in critical software that controls air traffic or nuclear power plants can be deadly. Other bugs and human errors may cause security leaks that allow unauthorised access to corporate servers. Consider all aspects of information system maintenance and data security and make a short presentation to the group.

IV. Decision Bank

1. In the age of digitisation think of the advantages of electronic government. Consider the objectives in the box and list the activities that electronic government can provide in each case. Work in groups of three or four people.

Objectives of Electronic Government

- ✓ Better delivery of public services to people
- ✓ Enhancing business and industry collaborations
- ✓ Citizen empowerment through access to information
- ✓ More effective governance

2. Choose the facts from the list that are essential for electronic government. Justify your point of view.

1. Electronic government (or e-government) encompasses all government roles and activities, shaped by information and communications technologies.
2. E-government has been employed to mean everything from online government services to exchange of information and services electronically with citizens, businesses, and other arms of government.
3. Because of its advantages, electronic government has the potential to attract net-savvy young citizens who have traditionally tried to avoid the paper-based system.
4. The e-government's ultimate objective is to offer enhanced portfolio of public services in an efficient and cost-effective way to citizens.
5. It also simplifies the process of getting services for elderly and homebound citizens.
6. E-government can satisfy transparency expectations of their citizens.
7. Security issues and data protection are still the main concerns of official digital services.

3. Read the article "Electronic Government and Digital Public Services" and define its main message. Complete the following ideas.

1. Electronic government or e-government is … .
2. This definition demonstrates how e-government … .
3. The appropriate application of e-government allows for … .
4. E-government could be classified as two types: … .
5. The primary benefit of e-government would be … .
6. E-government and its capacity could be available to … .
7. The primary disadvantages of e-government are … .

Electronic Government and Digital Public Services

Electronic government (or e-government) is the application of Information and Communication Technologies (ICTs) to government functions and procedures with the purpose of increasing efficiency, transparency and citizen participation. This definition demonstrates how e-government uses ICTs as a support tool in the development of good governance. The appropriate application of e-government allows for higher levels of effectiveness and efficiency in governmental tasks, improvement of processes and procedures, increases the quality of public services, also improves the use of information in the decision-making processes and allows for better communication among different governmental offices.

Types of E-Governance

Some people believe that e-government is merely a website that could deliver public services through the Internet. This is however an oversimplification of the capacity of e-government. E-government could be classified as two types:

- E-services: digital provision of services, programs and information by governments.
- E-collaboration: Internet or digital communications which could boost participatory public activities like voting or even paying tax.

Advantages of E-government

The e-government's ultimate objective is to offer enhanced portfolio of public services in an efficient and cost-effective way to citizens. The e-government also could provide more transparency for the government because it enables the public to be informed about what government is working on and the policies which are enforced.

The primary benefit would be replacing and optimising the paper-based system while implementing electronic government. That could save lots of time, money and also environment in return due to reducing paper consumption.

The implementation of e-government could also promote better communications between government and business sectors. Hence the benefit of e-government could be creating open and transparent market and a stronger economy. Nowadays, companies and people can get information quicker and at any moment of the day in comparison to the past. E-government and its capacity could be available to all people regardless of their place or social level.

In summary, more efficiency, enhanced services to better serve citizens, better accessibility of public services, more transparency and accountability of government are the expected advantages of e-government.

Disadvantages of E-government

E-government is not all about advantages, but it also has some disadvantages, too. The primary disadvantages of e-government are the absence of public Internet access for all citizens, protection of the published information on the web by the governmental agencies, and also capabilities of government and its agencies which can potentially affect public activities.

4. Some experts are still very critical about electronic government. Can you agree with their statements (a–c)? Bring your arguments for e-government. Work in groups of three or four people.

a) Higher surveillance and monitoring: once government implements e-government, people will be compelled to communicate with it on a wider scale electronically. As the government receives more and more information about its citizens, this could possibly lead to a lack of privacy for civilians.
b) Being too costly: implementing, maintaining and optimising e-government is not cheap and requires spending lots of money.
c) Inaccessibility for all: e-government couldn't be accessible by all including those who are living in distant regions or have low rates of literacy and income on the poverty line.

V. Conclusion Worksheet

In Belarus the system "Electronic government" was created in 2003 within the framework of the state program "Electronic Belarus". Today information technologies are actively used in all spheres of the public life, and they give a powerful incentive to economic and social development of the country.

https://mfa.gov.by/en/press/news_mfa/dcf3c0efcf43a87a.html

Address the national centre of electronic services – nces.by – and list the options that electronic government offers today. Consider the challenges of e-services in Belarus including the ones listed below and get ready to report your findings to the rest of the group.

НЦЭУ

✓ Network security.
✓ Identification and access control.
✓ Usability.

VI. Web Search

Explore the resources in the list to obtain additional information on the SDLC, including issues of data security. Report your findings in writing.

https://ecomputernotes.com/mis/implementation-and-evaluation

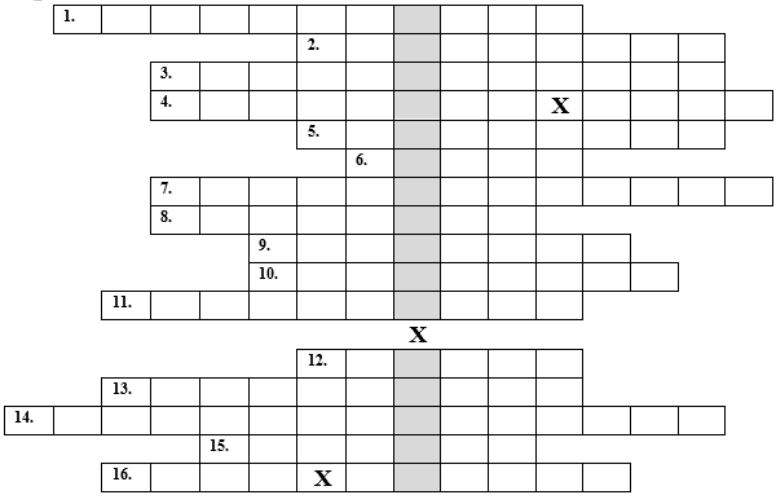
https://www.aaas.org/epi-center/internet-online-voting

https://www.cisco.com/c/en/us/solutions/data-center-virtualization/what-is-a-data-center.html

VII. Revision Point

1. Do the crossword and get the key terms of this lesson.

1. Sth that you must do, or sth you need.
2. The fact of sth being easy to use, or the degree to which it is easy to use.
3. A change to sth, usually to improve it.
4. Time period between when a user initiates a request for information and when the request is fulfilled.
5. To start a company or organisation that will continue for a long time.
6. To stop, halt, terminate sth.
7. Small or not noticeable, and therefore not considered important.



8. Number of errors occurring in a particular time interval for a particular function.
9. Amount of time a system is not available for processing.
10. A set of actions that is the official or accepted way of doing sth.
11. The quality of working well in an organised way, without wasting time or energy.
12. To use sth or sb, especially in an effective way; to launch.
13. Amount of data processed in a particular time interval.
14. The quality of being suitable or right for a particular situation or occasion.
15. To please sb by giving them what they want or need; meet the needs.
16. Number of users at peak, average, and low times.

2. Complete the gaps with the appropriate words.

The most common threats to corporate information systems include natural disasters, power 1) _____, equipment failure, human errors, software failures, 2) _____ breaches, acts of war, and malware. These threats can be handled in several ways. 3) _____ reduce the likelihood of a deliberate attack. 4) _____ countermeasures shield vulnerabilities to render an attack unsuccessful. 5) _____ procedures reduce the effect of an attack. 6) _____ activities recognise attacks and trigger a corrective response. To protect hardware, software, and data, corporate systems are often housed in a protective facility called a data centre. Most companies have a disaster 7) _____ plan that describes how to secure data against disaster, reconstruct lost data, and restore normal operations after a disaster.

3. Render the article "What Is a Data Centre?" published on the PaloAlto Networks orally. Record your speech and send it to your groupmate for assessment according to the checklist below. Your overall mark will be provided at the end of the table.

What Is a Data Centre?

Written by Tim Edvards
Mar 16, 2023

A data centre is a facility that centralises an organisation's shared IT operations and equipment for the purposes of storing, processing, and disseminating data and applications. Because they house an organisation's most critical and proprietary assets, data centres are vital to the continuity of daily operations. Consequently, the security and reliability of data centres and their information are among any organisation's top priorities.

In the past, data centres were highly controlled physical infrastructures, but the public cloud has since changed that model. Except where regulatory restrictions require an on-premises data centre without Internet connections, most modern data centre infrastructures have evolved from on-premises physical servers to virtualised infrastructure that supports applications and workloads across multi-cloud environments.

Data centres are an integral part of the enterprise, designed to support business applications and provide services such as: data storage, management, backup and recovery; productivity applications, such as email; high-volume e-commerce transactions; powering online gaming communities; big data, machine learning and artificial intelligence.

Today, there are reportedly more than 7 million data centres worldwide. Practically every business and government entity builds and maintains its own data centre or has access to someone else's, if not both models. Many options are available today, such as renting servers at a colocation facility, using data centre services managed by a third party, or using public cloud-based services from hosts like Amazon, Microsoft, Sony and Google.

Data centre architectures and requirements can differ significantly. For example, a data centre built for a cloud service provider like Amazon satisfies facility, infrastructure and security requirements that significantly differ from a completely private data centre, such as one built for a government facility that is dedicated to securing classified data.

Regardless of classification, an effective data centre operation is achieved through a balanced investment in the facility and the equipment it houses. In addition, since data centres often house an organisation's business-critical data and applications, it's essential that both facility and equipment are secured against intruders and cyberattacks.

The primary elements of a data centre break down as follows: facility – the usable space available for IT equipment; design to optimise space and environmental control to keep equipment within specific temperature/humidity ranges are both emphasised; core components – equipment and software for IT operations and storage of data and applications including servers, network infrastructure, such as switches and routers, and various information security elements, such as firewalls; support infrastructure –

equipment contributing to securely sustaining the highest availability possible including Uninterruptible Power Sources (UPS), environmental control, physical security systems, operations staff.

Data centres have evolved significantly in recent years. As enterprise IT needs continue to move toward on-demand services, data centre infrastructure has shifted from on-premises servers to virtualised infrastructure that supports workloads across pools of physical infrastructure and multi-cloud environments.

Summary checklist	*Yes*	*Undecided*	*No*
1. The origin of the publication was mentioned			
2. The date of the column was provided			
3. The style of the script was defined and justified			
4. The genre of the post was indicated and justified			
5. The author of the article was called			
6. The title of the post was given			
7. The main idea of the article was identified			
8. The important points were included			
9. The unnecessary details were left out			
10. The personal opinion/impression of the article was given			
11. The personal view on the topic/problem was provided			
12. The summary included own vocabulary not citations			
13. The summary was full of varied grammar structures			
The overall mark (excellent/good/satisfactory/below average/bad)			

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

Comprehensive	Rather confident	Limited

- Goal, key activities, considerations of the maintenance phase.
- Types of modifications during the maintenance phase.
- Quality of service and the metrics being used to measure it.
- Potential threats to information systems.
- Measures to protect data and information systems.
- Advantages of electronic government.

Topic: Computer Programming
Lesson 1: Programming Basics

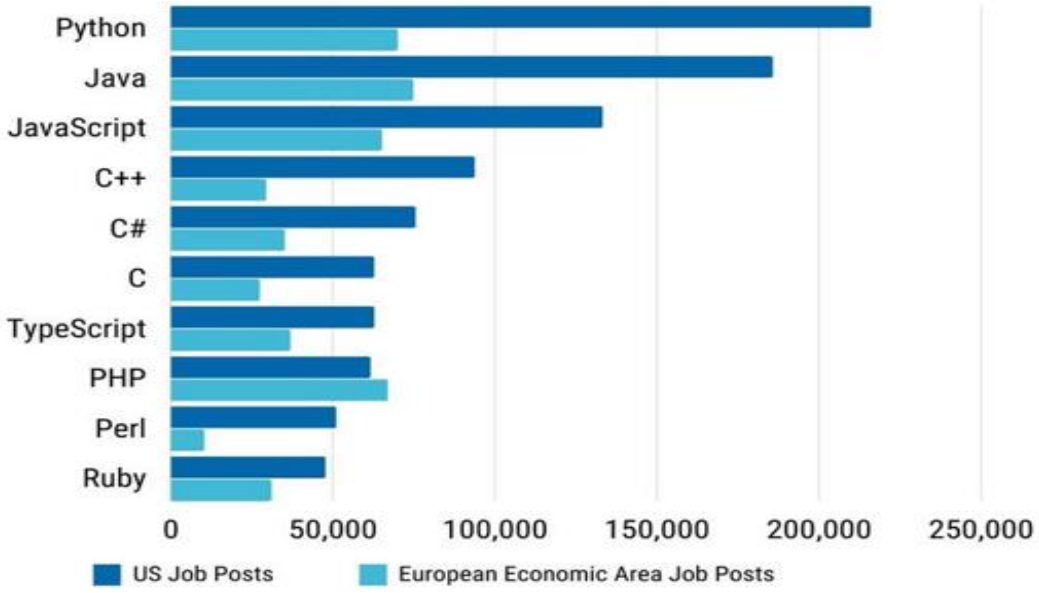
Aim	Objectives
Master communication skills and competences in computer programming, programming paradigms and the essence of object-oriented programming	At the end of this lesson, students will be able to: • define the concept of computer programming • describe the main programming paradigms • state characteristics of different programming languages • understand the concept of object-oriented programming • discuss and present findings in pairs and small groups • write a summary based on different media

I. Lead-in

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

a) What is computer programming?
b) What is a programming language?
c) What is a computer program?
d) Can you program? If yes, share your experience.
e) Is it difficult to learn to code?
f) What programming languages are you going to learn? Why?
g) What is the best way to learn programming languages?

2. Consider the bar chart illustrating the most in-demand programming languages for 2023 based on LinkedIn job postings in the USA and Europe and say why particular programming languages are more popular today than the others.



II. Vocabulary Focus

1. Match the words related to programming on the left with the definitions.

1. Instruction	a) a single line of code that performs a specific task
2. Sequence	b) having everything that is needed and vitally important within itself
3. Self-contained	c) the order in which the statements are executed
4. Statement	d) the set of rules that defines the combinations of symbols
5. Syntax	e) a system of notation for writing computer programs
6. Language	f) a single operation of a processor

2. Watch the first part of the online lecture "Software Development Tutorial – The Fundamentals of Programming" [44] (from 0:01 till 2:52) and complete the facts with the missing words or word combinations.

1. A computer program is … .
2. Each instruction is … .
3. The art of programming is … .
4. The sequence here is … .
5. With programming we are … .

3. Watch the second part of the online lecture (from 2:52 till the end) and match the beginnings of the statements with the endings.

1. In programming languages we write …	a) words, numbers, and punctuation to express one thought, one individual piece
2. Statements in programming languages use …	b) these instructions by writing what are called statements
3. Most programming statements are …	c) understanding the syntax of a programming language
4. What words, numbers, and punctuation you use …	d) pretty short, just a few words
5. Understanding the rules of each language is …	e) depends on the programming language

4. Computer programming involves a broad set of activities. Complete the passage with the words and word combinations in the box to learn more about them.

testing; problem statement; output; scope; assumption; supply; programmers; coding; manipulated; encompasses

Computer programs are developed by computer 1) _____ or software engineers. Computer programming 2) _____ a broad set of activities that include planning, 3) _____, testing, and documenting. Most programmers participate in all of these phases of program development, but focus on the coding process. Software engineers tend to focus on designing and 4) _____ activities.

The programming process begins with a(n) 5) _____ that helps you clearly define the purpose of a computer program. In the context of programming, it determines certain elements that must be 6) _____ to achieve a goal. A good problem statement for a computer program has three characteristics: it specifies any assumptions that define the 7) _____ of the problem; it clearly specifies the known information; it specifies when the problem has been solved.

In a problem statement, a(n) 8) _____ is something you accept as true in order to proceed with program planning. The known information in a problem statement is the information that you 9) _____ to the computer to help it solve a problem. After identifying the known information, a programmer must specify how to determine when the problem has been solved. Usually, this step means specifying the 10) _____ you expect.

5. A programming paradigm refers to a way of conceptualising and structuring the tasks a computer performs. Study the table to learn about the most popular programming paradigms and match each type with the description below. Name the programming languages belonging to each paradigm.

Paradigm	Key concept	Program
Procedural	command	Sequence of commands
Functional	function	Collections of functions
Logical	predicate	Logic formulas: axioms and a theorem
Object-oriented	object	Collections of classes of objects

a) It formulates programs as a series of objects and methods that interact to perform a specific task.
b) It employs functions as the main driving force behind the development.
c) It is built around the idea that programs are sequences of instructions to be executed.
d) It has its foundation in math logic so program statements express facts and rules about problems within a system.

6. To write instructions programmers use different programming languages which are described below. Before reading about them, complete the following sentences. Then read the abstract and check your ideas.

1. The programming language that uses just 0s and 1s is called a(n) _____.
2. The programming language utilising simple English words is called a(n) _____.
3. A(n) _____ is a program written in one of the high-level languages.
4. A program written in a high-level language must be interpreted into _____ before the computer will read and process it.
5. The _____ is the program produced when the original program has been converted into machine code.
6. A(n) _____ is a program that converts a high-level language into machine code.
7. A program designed to perform a specific task is called a(n) _____.

Thousands of different programming languages have already been created, with many more being created every year. Before 1952, the only available programming language was machine language, now called a low-level language, that consists of nothing but 0s and 1s with which the computer works. In 1952, a new low-level programming language called assembly language was introduced. It operates with short letter codes that stand for specific machine operations. A program called an assembler then translates these codes into machine language to be executed. In the 1960s, high-level programming languages emerged, and now programmers can use simple English words and familiar mathematical expressions to code.

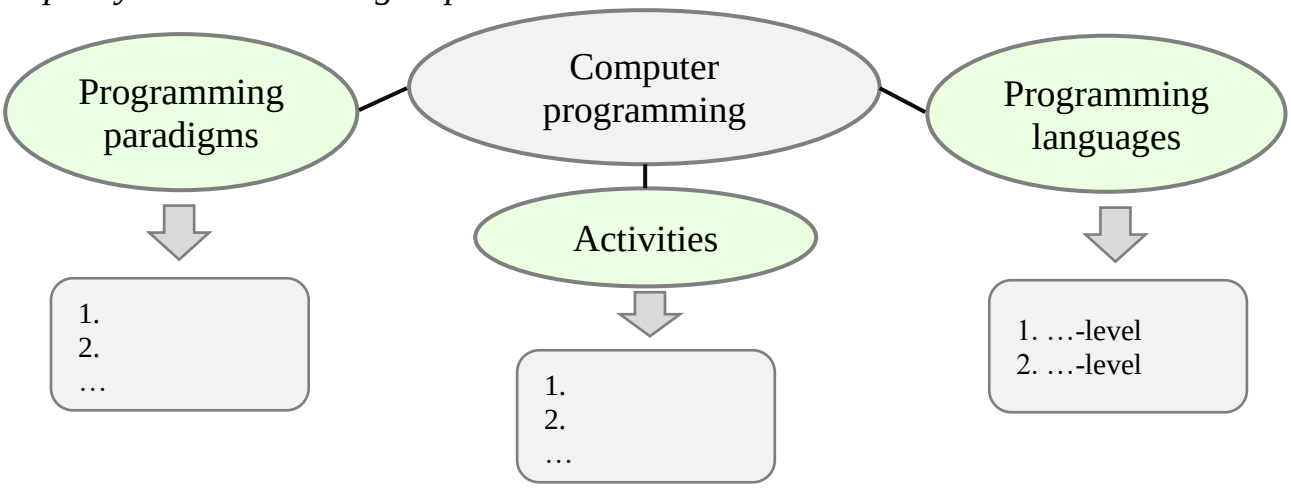
A program written in one of high-level programming languages is often called a source program, and it can't be directly processed by the computer until it has been compiled, which means interpreted into machine code. The program produced after the source program has been converted into machine code is referred to as an object program. This is done by a computer program called the compiler, which is unique for each computer. When a program written in one of the high-level languages is designed to do a specific task such as calculate a company's payroll, it is called an application program.

7. A computer program must be tested to ensure that it works correctly. When a program does not work properly, it is usually the result of a syntax, logic, or runtime error. Match each type of error with the description.

Syntax error | Logic error | Runtime error

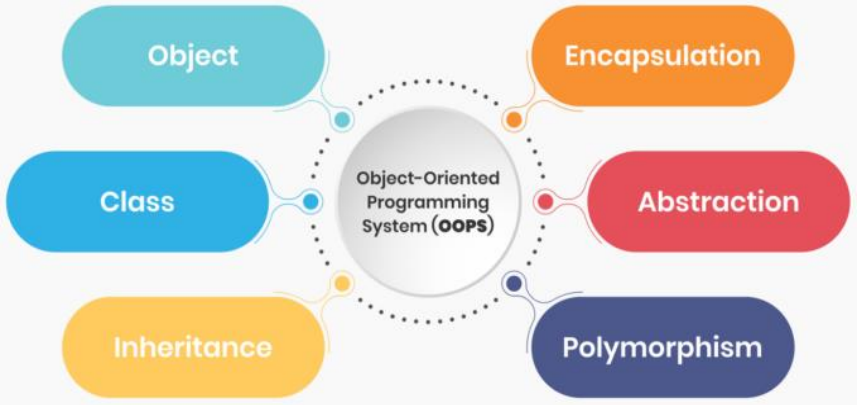
a) It occurs when a program is executed and can result from instructions that the computer can't execute.
b) It occurs when an instruction doesn't follow the grammar of the programming language.
c) It's a type of runtime error in the coherence and design of a program. It can be caused by an inadequate definition of the problem or an incorrect formula for a calculation.

8. Complete the concept map and summarise the facts about computer programming. Report your ideas to the group.



III. Language Box

1. Look at the diagram on the right that illustrates the main concepts of object-oriented programming (OOP). Can you define or explain each of them?



2. Look at the notions related to OOP and identify which descriptions correspond to them.

1. Object 2. Class 3. Instance 4. Template 5. Method 6. Encapsulation 7. Abstraction 8. Inheritance 9. Polymorphism	a) It is the mechanism of basing an object or class upon another object or class, retaining similar implementation
	b) It is the concept of object-oriented programming that "shows" only essential attributes and "hides" unnecessary information
	c) It is a specific realisation of any object
	d) It binds data and its related methods together within a class. It also protects the data by making fields private and giving access to them only through their related methods
	e) It is a template for a group of objects with common characteristics
	f) It is the ability of an object to take on many forms
	g) It is a blueprint or formula for creating a generic class
	h) It is a unit of data that represents an abstract or a real-world entity
	i) It can modify a class state that would apply across all the instances of the class

3. Complete the sentences with the words in the box. Each gap is followed by a synonym for the missing word.

instance; entities; attributes; variable; pillars

a) An object can be defined as a data field that has unique _____ (characteristics) and behaviour.

b) Object-oriented programming allows programmers to think of software development as if they are working with real-life _____ (objects).

c) There are four _____ (main principles) of object-oriented programming: Encapsulation, Abstraction, Inheritance, and Polymorphism.

d) Object is a(n) _____ (example) of a class.

e) The process of encapsulation states that classes cannot communicate or change along with any particular _____ (parameter) and function of an object.

4. Read the abstract "The Main Principles of OOP" below and answer the following questions.

a) What is the main idea of OOP?
b) How does OOP treat software development?
c) What is the difference between Object and Instance in OOP?
d) What can Method do? What activates Method?
e) What are the main principles of OOP?
f) What do Abstraction and Encapsulation have in common?
g) What does Inheritance help avoid?
h) What does Polymorphism allow to do?
i) What are the main benefits of OOP?

The Main Principles of OOP

Object-oriented programming is one of the main programming methodologies, which is based on the idea that a program is a cluster of objects, each belonging to a certain class and the classes build up an inheritance hierarchy. OOP model organises software design around data, or objects, rather than functions and logic. An object can be defined as a data field that has unique attributes and behaviour.

Object-oriented programming allows programmers to think of software development as if they are working with real-life entities. In your everyday life, people have the knowledge and can do various tasks. In OOP, objects have fields to store knowledge, state, data and can do various methods. Before diving into the four pillars of OOP, there are some basic terms to go over.

Object. The instance of a class. It's the working entity of a class. It's a unit of data that represents an abstract or a real-world entity.

Class. This is the model or standard about the capability of what an object can do. It is a template for a group of objects with common characteristics.

Method. It is a segment of code that defines an action. It can modify a class state that would apply across all the instances of the class.

Message. It activates Method.

Instance. It is like Object, however, within specific realisation.

Now let's jump into the four pillars of object-oriented programming: Encapsulation, Abstraction, Inheritance, and Polymorphism.

Encapsulation. Diverse objects that are present under one program can automatically communicate with each other. If the developer wishes to stop this interaction, they will encapsulate every object individually in the form of classes. The process of encapsulation states that classes cannot communicate or change along with any particular variable and function of an object.

Abstraction. Abstraction is just like the extension of encapsulation as it can hide some properties and methods from being shared with outer code for making the interface of the object easy to understand. Developers specifically make use of

Abstraction for different beneficial causes. In short, we can say that Abstraction helps in isolating the impact of changes made on the code for securing the inside code if something wrong happens and the particular change will only affect the present variables, not the whole outer code.

Inheritance. Inheritance is the process of extending the existing code functionality for removing the repetitive coding work. The elements of HTML code contain a text box, a checkbox and a select field with some properties that are common with particular methods. In this, there is no need of redefining all the properties and methods for each HTML element as you can define all of them at once in a general object. Giving a name to the object like "HTMLElement" will help other objects inherit all of its properties and methods and you can avoid the unnecessary work of repetitive coding.

Polymorphism. Polymorphism means "one name many forms" that allows developers to provide multiple elements depending on the object type. This will permit developers to redefine the whole work and define how it can be done by updating the parts in which it was previously performed. Polymorphism terms are known as "overriding" and "overloading".

This approach to programming is well-suited for programs that are large, complex and actively updated or maintained. The organisation of an object-oriented program also makes the method beneficial to collaborative development, where projects are divided into groups. Additional benefits of OOP include code reusability, scalability, and efficiency. Even when using microservices, developers should continue to apply the principles of OOP.

Scalability – the ability of a system to grow larger

5. Identify the parts of the text in Task 4 the additional facts (a–g) belong to.

a) Private: data that can only be accessed within the class.
b) Protected: data that can only be accessed within the class, and its subclasses.
c) Public: data or functions (methods) which can be accessed outside the class.
d) It gives us a way to use a class exactly like its parent so there is no confusion with mixing types. This being said, each child subclass keeps its own functions/methods as they are.
e) It is the process of selecting data from a larger pool to show only the relevant details to the object.
f) It is accomplished when each object maintains a private state, inside a class. Other objects cannot access this state directly, instead, they can only invoke a list of public functions. The object manages its own state via these functions and no other class can alter it unless explicitly allowed.

Explicitly – in a way that is clear and exact

g) It is the ability of one object to acquire some or all properties of another object.

6. Watch the video "Object-Oriented Programming" [38] devoted to understanding the difference between OOP and procedural code explained through cooking and mark the statements as true or false. Correct the false ones.

a) Object-oriented paradigm is very popular and widespread today.
b) OOP is always beneficial.
c) Procedural programming offers a straightforward approach.
d) It's easy to present simple programs in terms of object-oriented approach.
e) Object-oriented code allows to create several mini programs where each object contains its own data and logic.
f) The end result of procedural approach and object-oriented one is not always the same.
g) OO approach is better than procedural one.
h) Code reusability is one of the main pluses of object-oriented paradigm.
i) Logic and functional programming languages are used today mainly for creating web, mobile and desktop apps.

7. Watch the video again and match the beginnings of the sentences (1–7) with the appropriate endings (a–g).

1. In procedural code, the program is …	a) it's easy to think of simple programs in terms of sequential steps
2. Programmers have a tendency to write code in this procedural manner because …	b) similar to objects in the real world
3. Instead of writing a single large program, my object-oriented code is …	c) written as a long series of operations to execute
4. We can talk about and use these programmed objects …	d) code reusability
5. One of the main advantages of using an object-oriented approach is …	e) use them to write code in an object-oriented way or in a procedural way
6. Object orientation is referred to …	f) split apart into several self-contained objects
7. Multiple paradigms mean you can …	g) as a programming paradigm supported by many languages

8. Complete the table and get ready to speak about OOP. Work with a groupmate.

Object vs Class in OOP	
Method vs Message in OOP	
Main concepts of OOP	
Benefits of OOP	
Pitfalls of OOP	
Suitable tasks for OOP	

IV. Decision Bank

1. Each programming language has its recognisable logo. Here are the logos of the most popular object-oriented languages. Name them and say what you know about each of them.

a)  b)  c) 

2. Watch the video "What Is Python?" [54] and complete the ideas.

a) Python is … .
b) People from different disciplines use Python for … .
c) You don't have to be a software developer to … .
d) With Python you can solve … .
e) Python makes a lot of trivial things … .
f) It's cross platform which means you can … .
g) It has a large ecosystem of … .

3. Read about the top three most popular object-oriented languages today. List their main features. Which one would you learn first? Why?

Java is a general-purpose programming language that is class-based, object-oriented, and designed to have as few implementation dependencies as possible. It allows developers to write once and run anywhere which means the compiled Java code has all the capabilities to run on every single platform that has the support of Java without extra recompilation.

Benefits of Java	Drawbacks of Java
• Java is an easy-to-learn language with clear syntax to understand. • It is platform-independent, so you can write once and run anywhere. • Java is a highly secure language. • The multithreading feature allows us to write the program and perform multiple tasks simultaneously. • A portable platform that has no implementation-dependent features. • It is a high performing, interpreted language	• It's slow and has poor performance because of the compilation and abstraction level of virtual machine. • It offers an unattractive look and feel of the GUI. • Java has no backup facility. • It always requires a huge memory space. • The codes of Java are verbose and complicated

Python is an interpreted, general-purpose, high-level programming language. The design philosophy of Python focuses on code readability with the use of significant indentation. Its language constructs and object-oriented approach allow developers to write clear code for small and large-scale projects.

Benefits of Python	Drawbacks of Python
• Python is easy to code and learn. • It is a free and open-source language that you can easily get from the official website. • Python is the best option for crafting graphical apps. • Python is a high-level language with extensible feature support. • It is an integrated and portable language	• The speed of Python is slow as compared to C and C++. • It does not provide a good choice for mobile development. • You should avoid selecting Python in memory-intensive tasks. • It has limitations with database access. • Python gives more runtime errors and that's why requires focusing on testing

Ruby is an interpreted, general-purpose, high-level programming language. It can be dynamically typed and makes use of garbage collection. Also, it provides full support for programming paradigms that covers object-oriented, procedural, and functional programming. The language is specially focused on faster software development and that's why it's called a "startup technology".

Benefits of Ruby	Drawbacks of Ruby
• Ruby is a time-efficient language that reveals its potential in a very short time. • It has many various helpful tools and libraries. • It has a strong and active community. • Ruby has a strong adherence to standards	• Ruby is less flexible in managing simple tasks. • It provides no support for continuous updates and evolvement. • The performance time of Ruby is rather slow especially when the project is big

4. Choose a programming language and get ready to describe its main features, pluses and minuses, sphere of implementation. Work in groups of three or four people. Then report your ideas to the group.

V. Conclusion Worksheet

Coding is an extremely useful skill to possess nowadays. There are an increasing number of businesses that rely on computer code, not just those in the technology sector. A person who learns how to code will have the advantage in life with more employment opportunities available to them in the future, no matter which industry they decide to enter whether it be in the technology

sector, finance, retail, health or other. This is an important reason why coding should be learnt.

Imagine you were asked to persuade teenagers who are choosing their career path to learn coding. Make a short presentation considering the following questions.

- ✓ What is coding in simple terms and how does it work?
- ✓ What are the ways to write a code?
- ✓ Why is it important to learn to code?
- ✓ What is the most suitable age to start learning to code?
- ✓ What are the benefits of coding?
- ✓ Why is coding important for the future?

VI. Web Search

Explore the resources in the list to obtain additional information on computer programming, including OOP. Report your findings in writing.

https://sphero.com/blogs/news/coding-concepts

http://www.cs.ucf.edu/~leavens/ComS541Fall97/hw-pages/paradigms/major.html

https://www.educative.io/blog/object-oriented-programming

VII. Revision Point

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

Encapsulation

In object-oriented computer programming languages, the notion of encapsulation refers to the bundling of data, along with the methods that operate on that data, into a single unit. Many programming languages use encapsulation frequently in the form of classes. A class is a program-code-template that allows developers to create an object that has both variables (data) and behaviours (functions or methods). A class is an example of encapsulation in computer science in that it consists of data and methods that have been bundled into a single unit.

Encapsulation may also refer to a mechanism of restricting the direct access to some components of an object so users cannot access state values for all of the variables of a particular object. Encapsulation can be used to hide both data members and data functions or methods associated with an instantiated class or object.

Encapsulation in programming has a few key benefits. It hides data: users will have no idea how classes are being implemented or stored; all that users will know is that values

are being passed and initialised. It gives more flexibility: enables you to set variables as read or write-only. It's easy to reuse: it's easy to change and adapt to new requirements.

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

language; high-level; instructions; syntax; paradigms; compiler; developments; low-level

1. A computer program is a set of _____.
2. A program that converts a high-level language into a machine code is called _____.
3. Programming _____ include procedural, event-driven, and declarative.
4. Omitting a keyword, such as THEN, or required punctuation, such as a period or using incorrect punctuation are common _____ errors.
5. A _____ language includes commands specific to a particular CPU, while a _____ language uses commands, words, and grammar based on human languages.
6. C and C++ remain popular today for system and application software _____.
7. Objective-C is the programming _____ used to develop iPhone and iPad apps.

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

1. The abbreviation OO, which stands for object-oriented, is used to describe a programming *trend*/*paradigm* as well as a variety of programming languages.
2. In OO programming, a class is a template for a group of objects with similar *methods/attributes*.
3. The process of producing new classes with *public/inherited* attributes creates a class hierarchy that includes a superclass and subclasses.
4. A concept called *inheritance/polymorphism* allows programmers to create a single name for a procedure that behaves in unique ways for different classes.
5. *Procedural/Declarative* programming focuses on a step-by-step algorithm that instructs the computer how to arrive at a solution.
6. If you can envision a problem as a set of *objects/classes* that pass messages back and forth, the problem is suitable for the OO approach.
7. A segment of code that defines an action and can modify a class state is a *method/message*.

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

Comprehensive 👍	Rather confident ✋	Limited 👎

- Computer programming and the activities it involves.
- Programming paradigms.
- The types of programming languages.
- Object-oriented programming.
- Programming languages in demand.

Lesson 2: Artificial Intelligence

Aim	Objectives
Master communication skills and competences in artificial intelligence and its subsets and issues related to game programming	At the end of this lesson, students will be able to: • explain the essence of Artificial Intelligence • define the difference between Artificial Intelligence, Machine Learning and Deep Learning • state the difference between Virtual and Augmented Realities • list the components of game development • present and discuss findings in pairs and small groups • write a summary based on different media

I. Lead-in

1. Look at the pictures. Consider what technology they have in common and how your life is impacted by it.




2. Share your opinion on the questions.

a) Computers get faster and better every year. Is it just a matter of time before they become more intelligent than humans?
b) Where are artificial intelligence (AI) apps used in your daily life today?
c) What are the latest advances in the sphere of game programming?

II. Vocabulary Focus

1. Look at the word cloud with the target vocabulary of this lesson on the right below and find the terms to match the definitions.

1. It describes algorithms that analyse data with a logic structure similar to how a human would draw conclusions.
2. It is a machine learning technique that teaches computers to learn by example.
3. The use of data, statistical algorithms and machine learning techniques to identify the likelihood of future outcomes based on historical data.

4. A branch of computer science concerned with building smart machines capable of performing tasks that typically require human intelligence.
5. It's a simulated experience, it can be similar to or totally different from the real world.
6. It is the ability of a machine or program to identify words spoken aloud and convert them into a readable text.

7. It's a branch of artificial intelligence based on the idea that systems can learn from data, identify patterns and make decisions with minimal human intervention.
8. It is an enhanced version of the real physical world that is achieved through the use of digital visual elements, sound, or other sensory stimuli delivered via technology.
9. It is a computer system specially made for playing video games.
10. It is a series of algorithms that endeavours to recognise underlying relationships in a set of data through a process that mimics the way the human brain operates.
11. It represents a set of methods for detecting and analysing images to enable the automation of specific tasks such as identifying places, people, objects, etc. within an image.
12. It is the newly vast amount of data that can be studied to show patterns, trends, and associations.

2. Machine Learning (ML) is a subset of AI. It helps computers learn without direct instructions. Distribute the characteristics between the two technologies.

Artificial Intelligence	Machine Learning

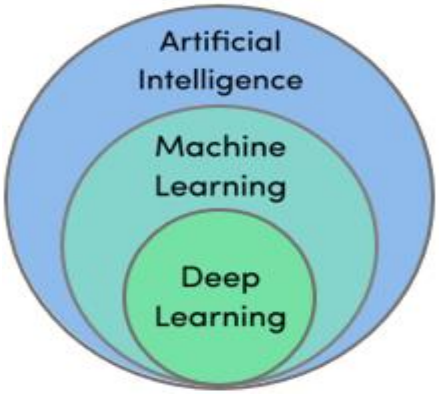
a) It enables a machine to simulate human behaviour.
b) Its goal is to make a smart computer system like humans to solve complex problems.
c) Its goal is to allow machines to learn from data, so that they can give accurate output.
d) It's a subtechnology which allows a machine to automatically learn from past data without programming explicitly.
e) With the help of it we make intelligent systems to perform any tasks like a human.
f) With the help of it we teach machines with data to perform a particular task and give the accurate result.
g) The main applications are Online recommender system, Google search algorithm, Facebook auto friend tagging suggestions.
h) The main applications are Siri, Online game playing, intelligent humanoid robot.
i) It has a limited scope.
j) It has a very wide range of scope.

3. Study the key attributes of machine learning and deep learning (DL). Work out the meanings of the words in bold. Summarise how ML and DL differ.

Attributes	Machine Learning	Deep Learning
Definition	It is a sub-branch of artificial intelligence; it allows the machines to train with **diverse** datasets and make predictions basing on their experiences	It is a subset of machine learning with the constant focus on achieving greater flexibility by **contemplating** the whole world as a hierarchy of concepts
Working mechanism	It **utilises** automated algorithms to predict the decisions for the future and to model the functions based on the data it receives	Neural networks help in **interpreting** the features of data and their relationships in which important information is processed through some stages
Management	All the analysis is managed by analysts to evaluate different **variables** under the multiple datasets using ML algorithms	All the algorithms are self-directed after the implementations for result **fetching** and data analysis
Practical examples	Practical examples are speech recognition, medical diagnosis, statistical arbitrage, classification, prediction, and **extraction**	Practical examples are virtual assistants, shopping and entertainment, facial recognition, translations, pharmaceuticals, and vision for driverless **vehicles**
Data points	Data points are used for analysis usually numbered in thousands	Data points are used for analysis usually numbered in millions

4. Today the terms artificial intelligence, machine learning, and deep learning are often confused. Look at the diagram and identify which of the three the following features refer to.

a) It provides the ability to automatically learn and improve from experience without being explicitly programmed.
b) It uses the neural networks to analyse different factors with a structure that is similar to the human neural system.
c) It studies ways to build intelligent programs and machines that can creatively solve problems.
d) It's a program that can sense, reason, act, adapt.
e) Its algorithms improve their performance as they are exposed to more data over time.
f) It learns from a vast amount of data.
g) It's the study of training your computer to mimic human brains.



5. Machine learning has become a key player in solving problems in various areas due to the rise of big data. Match the five V's of big data with the appropriate descriptions.

1. Volume 2. Velocity 3. Variety 4. Veracity 5. Value	a) refers to the wide range of data formats; big data may be structured, semi-structured, or unstructured, and can present as numbers, text, images, audio, and more
	b) refers to the amount of data; big data deals with high volumes of data
	c) refers to the quality and accuracy of data
	d) refers to the usefulness that big data can provide for organisations
	e) refers to the rate at which the data is received; big data streams at a high velocity, often streaming directly into memory as opposed to being stored onto a disk

6. Augmented reality (AR) and virtual reality (VR) are the technologies that either enhance or replace a real-life environment with a simulated one. Read the abstract about them and complete the gaps with the words in the box.

coin; enhanced; immersive; headsets; vision; blend; tracking; simulated

Augmented Reality (AR) is a perfect 1) _____of the digital world and the physical elements to create an artificial environment. AR uses computer 2) _____, mapping as well as depth 3) _____. This functionality allows cameras to collect, send, and process data to show digital content appropriate to what any user is looking at. In AR, the user's physical environment is 4) _____ with contextually relevant digital content in real-time. You can experience AR with a smartphone or with special hardware.

Virtual Reality (VR) is the use of computer technology to create a(n) 5) _____ environment. It is used in 3D movies and video games. It helps create simulations close to the real world and "immerse" the viewer using computers and sensory devices like 6) _____ and gloves. By simulating as many senses as possible, such as vision, hearing, touch, even smell, VR is also used for training, education, and science.

VR and AR are two sides of the same 7) _____. AR simulates artificial objects in the real environment, VR creates an 8) _____ artificial environment.

7. Complete the lists of advantages and disadvantages with the appropriate derivatives of the words in brackets. Guess which type of reality, AR or VR, they refer to.

Advantages	Disadvantages
1. It offers _____ learning. (individuality) 2. People can share experiences over a long _____. (distant) 3. It creates an _____ environment. (interact) 4. It helps you create a realistic world so that the user can _____ the world. (exploration) 5. It allows users to experiment with an _____ environment. (artifice) 6. It offers innovation and _____ improvement. (continue) 7. It provides _____ learning. (immerse)	a) It features the lack of _____. (private) b) People start living in the _____ world instead of dealing with real-world issues. (real) c) It has a low level of _____. (perform) d) If somebody did well with _____ tasks, there is still no guarantee that a person is doing well in the real world. (simulate) e) Extreme _____ with technology can lead to major health care issues such as eye problems and obesity. (engage)

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

1. What is the difference between AI, ML and DL?
2. Why is big data important?
3. How can AR and VR change the physical environment?
4. What are the pros and cons of AR and VR?
5. Is AI a threat or an opportunity for your future career?

III. Language Box

1. Watch the video "What Is Artificial Intelligence?" [51] and mark the statements as true or false. Correct the false ones.

1.Thanks to books and movies, each generation has formed its own fantasy about robots that can entertain people.
2. When you order a pizza using a virtual assistant Alexa or browse movie suggestions using Netflix help centre, you are interacting with artificial intelligence.
3. It is clear that a person commands AI.
4. Machines seem like they have human intelligence thanks to a computer science area – AI.
5. AI allows a computer only to drive a car.
6. Dartmouth professor John McCarthy invented the term "artificial intelligence" in 1965.
7. AI is a science to make machines that can use language, form abstractions and concepts, solve a variety of problems.

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

1. AI is designed, so you don't realise there's a computer _____ the shots.
2. The term "artificial intelligence" was first _____ by Dartmouth professor John McCarthy.
3. And now thanks to _____ in processing speeds, computers can actually make sense of all this information more quickly.
4. Tech giants and _____ capitalists have bought into AI and are infusing the market with cash and new applications.
5. That means AI can manifest itself in many different ways. Let's _____ down the options.
6. Natural language processing makes these bots a bit more _____.

3. Complete the sentences (1–8) below with the synonyms to the words in brackets from the box.

intelligent; ethical; bunch; mimic; intervention; assumption; forecast; recap

1. We'll just _____ (resume) briefly on what we did.
2. The company _____ (foresee) reduced profits.
3. Your arguments are faulty because they are based on erroneous _____ (hypothesis).
4. There is still some hope that the economic blockade will work and make military _____ (intrusion) unnecessary.
5. Transplantation of organs from living donors raises _____ (righteous) issues.
6. She can _____ (replicate) the various people in our office.
7. He is highly _____ (bright) person who can think outside the box.
8. He left a huge _____ (pile) of papers in his office.

4. Read the abstract "The Rise of Artificial Intelligence" and get ready to answer the questions.

1. What is AI essentially?
2. What things can a machine program do with AI?
3. What is the basic difference between AI and ML?
4. Is AI a part of our lives? Give the examples of intelligent gadgets that we use.
5. What is the future of AI? Give the examples of using AI in future.

The Rise of Artificial Intelligence

The term "artificial intelligence" dates back to 1956 and belongs to John McCarthy, a researcher who coined the term and defined the key mission of AI as a sub-field of computer science. Basically, artificial intelligence (AI) is the ability of a machine or a computer program to think and learn. The concept of AI is based on the

idea of building machines capable of thinking, acting, and learning like humans. There are certain things a machine/computer program must be capable of to be considered AI.

First, it should be able to mimic human thought process and behaviour. Second, it should act in a human-like way – intelligent, rational, and ethical.

AI is not the same as machine learning. Although the two terms are often used interchangeably, they are different. Artificial intelligence is a broader concept, while machine learning is the most common application of AI. We should understand machine learning as a current application of AI that is focused on development of computer programs that can access data and learn from it automatically, without human assistance or intervention. The entire machine learning concept is based on the assumption that we should give machines access to information and let them learn from it themselves.

Artificial intelligence, in its turn, is a bunch of technologies that include machine learning and some other technologies like natural language processing, inference algorithms, neural networks, etc.

Many people associate AI with the distant future. They incorrectly believe that despite all the buzz around artificial intelligence, the technology is not likely to become a part of their lives anytime soon. Little do they know how many aspects of their lives have already been affected by AI.

What is remarkable (and a little scary) about such assistants is that they continuously learn about their users until the point at which they are able to accurately anticipate users' needs. Spotify, Pandora, and Apple Music are some other touching points between AI and you. These services are capable of recommending music based on your interests. These apps monitor the choices you make, insert them into a learning algorithm, and suggest music you are most likely to enjoy. This particular use of AI is probably one of the simplest among all, but it does a good job helping us discover new songs and artists.

AI is making headway in areas you might least expect it. The current state of artificial intelligence already allows for some basic robot writing. It might be not yet ready to compose in-depth articles or creative stories but does a pretty good job writing short and simple articles like sport recaps and financial summaries. Other examples of artificial intelligence in use today include smart home devices like Google's NEST, self-driving cars like those produced by Tesla, and online games like Alien: Isolation.

Some people claim that AI is still in its infancy. Others assure us that we are only a few years away from AI gaining control over humanity. The truth, however, lies somewhere in between. According to the most trustworthy forecasts out there, AI will outsmart humans at virtually everything in the following 45 years.

Experts predict that within the next decade AI will outperform humans in relatively simple tasks such as translating languages, writing school essays, and driving trucks. More complicated tasks like writing a bestselling book or working as a surgeon, however, will take machines much more time to learn. AI is expected to master these two skills by 2050.

5. Mark the statements as true or false. Correct the false ones. Address Task 4 if necessary.

1. Artificial intelligence is a relatively new field of cognitive science.
2. AI is identical to machine learning.
3. The entire machine learning concept is based on the assumption that we can't give machines access to information and let them learn from it themselves.
4. AI is already capable of composing in-depth articles and creative stories.
5. Intelligent gadgets analyse information and can anticipate users' needs.
6. AI has limited application.

6. As every bright side has a darker version in it, artificial intelligence is not an exception. Consider some of its disadvantages and complete the gaps with the words in the box. Add any other drawbacks that are not mentioned. Which one is the most serious? Why?

efficiency; crash; addicted; maintenance; replace; automating; interference; bond; requirements; backdrop; updating; qualified

a) High costs of creation. As AI is 1) _____ every day the hardware and software need to get updated with time to meet the latest 2) _____. Machines demand repairing and 3) _____ which mean plenty of expenses. Their creation requires huge costs as they are very complex.
b) Making humans lazy. AI is making humans lazy with its applications 4) _____ the majority of the work. Humans tend to get 5) _____ to these inventions which can cause a problem to future generations.
c) Unemployment. As AI is replacing the majority of the repetitive tasks and other works with robots, human 6) _____ is becoming less which will cause a major problem in the employment standards. Every organisation is looking to replace the minimum 7) _____ individuals with AI robots which can do similar work with more 8) _____.
d) No emotions. There is no doubt that machines are much better when it comes to working efficiently but they cannot 9) _____ the human connection that makes the team. Machines cannot develop a 10) _____ with humans which is an essential attribute when comes to team management.
e) Lacking out of the box thinking. Machines can perform only those tasks which they are designed or programmed to do, anything out of that they tend to 11) _____ or give irrelevant outputs which could be a major 12) _____.

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

1. How does Artificial Intelligence impact our life today?
2. How could the artificial intelligence technology be used in the future?
3. What are the key advantages of this technology in your opinion?

4. How worried should we be about AI replacing our jobs?
5. What aspects of AI can make it dangerous?
6. Why might some people think that too much technology can cause problems?

IV. Decision Bank

1. AI programming is a highly specialised area of game development, it should be seamless and invisible to the player, but it provides the game with "a brain" that works instinctively and independently based on the individual player's gameplay. Gaming is one of the most widespread pastimes, share your opinion on the questions with a groupmate.

1. What kind of video games have you played?
2. Are you a video game aficionado or is it just not your cup of tea?
3. What's the most remarkable or the most memorable game you have ever played?
4. They say that video gamers are isolated loners. Do you agree? Are there any other stereotypes of a gamer?

Aficionado
[əˌfɪsjəˈnɑːdəʊ] –
a person who likes, knows about, and appreciates an interest or activity

2. There are different genres of video games such as simulation, strategy, role-playing, adventure or puzzle. Read each description and decide what genre it corresponds to. Elicit the main features of each genre. Which one would you like to design? Why?

1. Players in this genre of video games assume the roles of characters in a fictional setting. Players take responsibility for acting out these roles within a narrative, literal acting or through a process of structured decision-making regarding character development. Actions taken within many games succeed or fail according to a formal system of rules and guidelines.
2. Various riddles can test problem-solving skills, including logic, pattern recognition, sequence solving, spatial recognition, and word completion.
3. This genre of video games describes a diverse super-category of video games, designed to imitate real world activities. This game attempts to copy different activities from real life in the form of a game for such purposes as training, analysis, prediction, or simply entertainment. Well-known examples are war games and business games imitation.
4. This is a video game genre in which the player assumes the role of a protagonist in an interactive story driven by exploration and/or puzzle-solving. The genre's focus on story allows it to draw heavily from other narrative-based media, literature and film, encompassing a wide variety of literary genres. Many these games are designed for a single player, since this emphasis on story and character makes multiplayer design difficult.
5. This genre of video games focuses on skillful thinking and planning to achieve victory. It emphasises planned, tactical, and sometimes logistical challenges.

3. This is the list of the most popular video games. Define what genre in Task 2 they belong to. Discuss what made these games popular with regard to the video game components listed below. Work with a groupmate.

- ✓ Heavy Rain
- ✓ Batman: Arkham City
- ✓ War Thunder
- ✓ The Witcher 3: Wild Hunt
- ✓ World of Tanks
- ✓ Heroes V

Art. Normally in video games it can include various things like the game texture, game lighting, 3D modeling of characters / objects, particle systems to create fire, fog, snow

Characters. It's a fundamental part of any video game. You choose the looks and personalities, how fast they move, what manners and characteristics they should possess

Level. All good video games have various degrees that increase the difficulty as time goes on. They can be denoted in games by multiple floors, different buildings, or even different countries and each degree can have many potential paths that eventually lead to the next layer. And such design is a big factor in game development

Audio. It is the backbone of video games. That means it should support the game and yet not be too obvious. You have to decide the various sounds in the game world like player sounds, background music, etc. that together create a lifelike and believable video game

Lighting. It's very important for mood setting. When there's less of it, it's an association with horror games while increased one can denote more adventure or fun games. Also, it can be an important factor in stealth challenges with darker areas providing cover to characters

Story. It can have a linear structure which is relatively easy, or it can even have a non-linear structure with various plot changes according to the character's actions. The main point is that there should be something interesting to hook your players

4. Imagine you are to design a video game. Consider the genre, game components, technologies. Choose a programming language that you are going to use from the options below. Work with a groupmate. Present your game to the group.

C++. This language allows you to develop games across various platforms, including Windows, Mac, Linux, Android, and iOS. You need a game engine to create games, and this language is used in numerous 2D game engines and 3D game engines. It is fast, powerful, and flexible

Java. This language is widely used by Indie game development companies and for creating mobile games. Many of the world's top mobile games have been developed in this language. Minecraft, Mission Impossible III, and Asphalt 6 are just a few popular names you are probably familiar with

Unreal Engine. A state-of-the-art engine and editor with photorealistic rendering, dynamic physics and effects, lifelike animation, robust data translation, and much more – on an open, extensible platform
Unity 3D. It is the world's most popular game engine. It packs a ton of features together and is flexible enough to make almost any game you can imagine. It's been used to create games like Pokémon Go, Hearthstone, RimWorld, Cuphead, and plenty more
Lua. It is a simpler, multi-platform language, but highly compatible with more complex languages. It is considered lightweight and easy to learn, and is useful for different types of gaming, as well as web applications and image processing. It's the language behind popular games like Angry Birds and Age of Conan

V. Conclusion Worksheet

The Olympic Committee regularly makes changes to the sports program. Imagine that you have been assigned to prepare a report on whether to include e-sports in the program of the Olympic Games or not. Watch the video "E-Sport at the Olimpics" [33], read the comments about e-sports below, summarise all your ideas and prepare arguments for and against e-sports as a part of the Olympics.

- ✓ "Obviously the physical aspect is less in video games than it is in football, but everything else: strategising, team play, the will to win, the thrill of winning, the fear of losing. It's all the same thing, it's not much different from traditional sports." – *Ralf Reichart, CEO of ESL Gaming*
- ✓ "In the digital era, e-sports will not just be established as a major sport, but also the most beloved sport." – *Jun Byung Hun, president of the Korean eSports Association*
- ✓ "Watching people play video games isn't like watching people play football. It's like watching people play fantasy football. It is one more step removed from human activity." – *Jimmy Kimmel, American television host*
- ✓ "It's not a sport – it's a competition. Chess is a competition. Checkers is a competition," – *John Skipper, ESPN President – global sport broadcasting network*

VI. Web Search

Explore the resources in the list to obtain additional information on artificial intelligence. Report your findings in writing.

https://www.javatpoint.com/difference-between-artificial-intelligence-and-machine-learning

https://www.oracle.com

https://www.investopedia.com/terms/b/big-data.asp

VII. Revision Point

1. Read the abstract "Machine Learning Methods" and translate it into Belarusian or Russian. Use a dictionary if necessary.

Machine Learning Methods

Supervised learning algorithms are trained using labelled examples, such as an input where the desired output is known. For example, a piece of equipment could have data points labelled either "F" (failed) or "R" (runs). The learning algorithm receives a set of inputs along with the corresponding correct outputs, and the algorithm learns by comparing its actual output with correct outputs to find errors. It then modifies the model accordingly. Through methods like classification, regression, prediction and gradient boosting, supervised learning uses patterns to predict the values of the label on additional unlabelled data. Supervised learning is commonly used in applications where historical data predicts likely future events.

Unsupervised learning is used against data that has no historical labels. The system is not told the "right answer". The algorithm must figure out what is being shown. The goal is to explore the data and find some structure within. Unsupervised learning works well on transactional data. For example, it can identify segments of customers with similar attributes who can then be treated similarly in marketing campaigns. Or it can find the main attributes that separate customer segments from each other. Popular techniques include self-organising maps, nearest-neighbour mapping, k-means clustering and singular value decomposition.

2. Use the words given in capitals at the end of the statements and the suffixes in the box to make new words and complete the gaps.

-ment; -ion; -ive; -y; -ity; -ous; -able; -ed

1. Many times researchers study some areas to satisfy their _____, but as a result new things are invented. CURIOUS
2. Recent _____ in machine learning has allowed us to create machines that can compete with humans in some areas. DEVELOP
3. Engineers can now apply _____ technological solutions to automate many tasks that required human input. ADVANCE
4. Machines are not always _____ and sometimes break down, so we should limit our dependence on them in everyday life. RELY

5. There are _____ reasons why we should create artificial intelligence. NUMBER
6. Some people believe that AI is such a _____ technology that it will change our lives just as the Internet or TV did. TRANSFORM
7. The _____ of gunpowder was one of the most significant achievements of the Middle Ages in China. INVENT
8. Their _____ was quickly confirmed, making it the first confirmation of planets outside our Solar System. DISCOVER

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

1. Story, Characters, Audio, Art, Lighting, Level are the components of a video game.
2. The genre of a video game that focuses on skillful thinking and planning to achieve victory is called adventure.
3. In game platform we define the type of game from mini 2D game, casual 2D/3D game, mid-core 3D game or hardcore 3D game.
4. With artificial intelligence, when the decisions are taken from the previously gathered information applying a certain set of algorithms the errors are reduced.
5. The term “artificial intelligence” was invented in 1996 by John McCarthy.
6. The main applications of AI are Online recommender system, Google search algorithm, Facebook auto friend tagging suggestions.
7. Machine learning is the key to voice control in consumer devices like phones, tablets, TVs, and hands-free speakers.
8. Augmented reality is used in 3D movies and video games.
9. Augmented reality is used to enhance both real and virtual worlds.

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

Comprehensive 👍	Rather confident ✋	Limited 👎

- Artificial Intelligence, its usage, advantages and disadvantages.
- Machine Learning, Deep Learning, Big Data.
- The difference between Virtual Reality and Augmented Reality.
- Game programming, genres, components, programming languages.

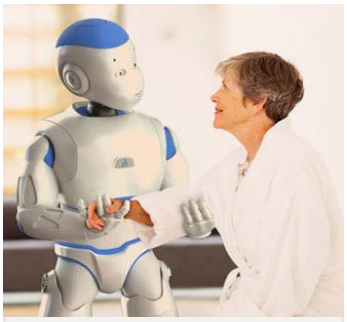
Lesson 3: Robotics

Aim	Objectives
Master communication skills and competences in robotics basics, types of robots and robotic system technologies	At the end of this lesson, students will be able to: • state the goals, capabilities and applications of the robotic systems • describe the building blocks of robotic systems and their types • discuss and present findings in pairs and small groups • write a summary based on different media

I. Lead-in

1. Share your opinion on the questions.

a) How are robots better than the human workforce?
b) If you could have a robot, what tasks would you use it for?
c) What threats do robots present to mankind?
d) Would you ever trust a robot to watch your children or walk your dog?
e) What ideas in the pictures on this page do you support?



Robots are reflections of ourselves

2. Read the most stunning robotics industry statistics. What do they illustrate? What surprised you the most?

Robots already run most of our world

- ✓ Since 2000, around 1,7 million manufacturing jobs have already been replaced by robots all over the world.
- ✓ Oxford economics has found that around 1,6 manufacturing employees' jobs are replaced by the installation of each new robot.
- ✓ Global spending on military robotics will be $16,5 billion in 2025.
- ✓ The robotics industry employs about 150,000 people worldwide in engineering and assembly jobs.
- ✓ The robotics industry market projects a growth of $16,78 billion in 2022 to $35,68 billion by 2029.
- ✓ 90 % of businesses worldwide plan to adopt robotic automation into their infrastructure by 2030.
- ✓ By 2030, robots could potentially take over approximately 20 million manufacturing jobs worldwide.

II. Vocabulary Focus

1. Match the pictures with the types of robots in the box. Then complete the abstract below with the missing types.

virtual robots; rolling robots; stationary robots; autonomous robots; walking robots; remote-control robots

Mobile robots are of two types. 1) _____ have wheels to move around. They can quickly and easily search. However, they are only useful in flat areas. 2) _____ have legs and are usually brought in when the terrain is rocky. Most robots have at least four legs; usually they have six or more. Robots are not only used to explore areas or imitate a human being. Most robots perform repetitive tasks without ever moving an inch. Most robots are "working" in industry settings and are known as 3) _____. 4) _____ are self-supporting or in other words, self-contained. In a way they rely on their own "brains". 5) _____ are guided by a person with the help of a remote control. A person can perform difficult and usually dangerous tasks without being at the spot where the tasks are performed. 6) _____ don't exist in real life. They are just programs, building blocks of software inside a computer.

2. Match the words related to robotics on the left with the appropriate definitions.

1. Bot 2. Innovation 3. Flip 4. Recognise 5. Companion 6. Adapt 7. Grab	a) a new method or idea
	b) a person you spend time with
	c) know someone or something because you have seen or heard of them/it before
	d) take hold of something (e.g. an object) suddenly
	e) an informal word for "robot"
	f) turn something around
	g) change to suit different uses or conditions

3. Watch the video "Robot Butler" [41] and choose which ideas in the box are mentioned in it. Explain how they are related to robotics.

resemble a human; AI technology; robotic assistant; unhealthy environment; Bot Handy; machine learning; robotics; industrial robots; home robot; computer science; Bot Care; innovation; humanoid robots; companion

4. Watch the video again and explain what the expressions in bold mean.

a) … you are **at the centre of** all our innovations.
b) Bot™ Care uses AI technology to take care of all **the little details** in your life … .
c) … **becoming an extension** of you in the kitchen, in the living room and anywhere else you may need that extra hand … .
d) Bot™ Handy uses AI to understand objects like a glass cup or ceramic plate, taking note of their shape and materials to work as your **trusted partner**.
e) It **flips the script** on what a robot in your home could look like.
f) Each of these robots are **built with you in mind**.
g) We're hard at work to bring you next-generation innovation with AI as **the core enabler** for your better tomorrow.

Bot – a computer program that works automatically

5. Read the article "An Introduction to Robotics". Complete the table with the key words and word combinations.

Concepts	Target Vocabulary
Robot	
Robotics	
Robots' components	

An Introduction to Robotics

Robotics is an interdisciplinary branch of computer science and engineering that involves the conception, design, construction and use of robots. The objective of the robotics field is to create intelligent machines that can help and assist humans. With the advancements in machine learning, artificial intelligence, and manufacturing processes, the applications of robotics and the demand for robotics engineers is tremendous. Robotics develops machines that can substitute for humans and replicate human actions. Today, robotics is a rapidly growing field, as technological advances continue; researching, designing, and building new robots serve various practical purposes, whether domestically, commercially, or military.

A robot is a type of automated machine that is programmed to execute specific tasks with little or no human intervention and with speed and precision. Today, industrial robots, as well as many other types of robots, are used to perform repetitive tasks. They may take the form of a robotic arm, robotic exoskeleton or traditional humanoid robots. Robotic systems are coveted in many industries because they can increase accuracy, reduce costs and increase safety for human beings. In fact, safety is arguably one of robotics' greatest benefits, as many dangerous or unhealthy environments no longer require the human element. Examples include the nuclear industry, space, defence, maintenance and more.

The term **"robot"** is derived from the Czech word "robota", which means "forced labour" or "serve"

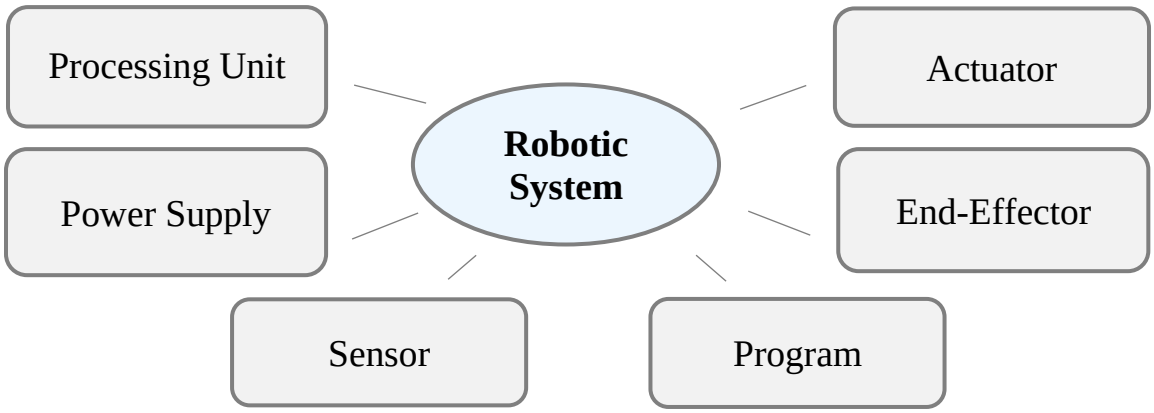
Robots are made up of six major components: a motor of some sort, a sensory system, a movable physical structure, a power supply, a program and a computer "brain" that controls all of these elements. Basically, robots are machines that replicate human behaviour. First of all, almost all robots have motors or actuators that provide the physical power to move the structure. Some robots use hydraulic systems, while others pneumatic or electric motors to facilitate movement. Another essential component of a robot is a sensory system that gives the robot the information about its surroundings. Important sensor types include light, sound, temperature, contact, distance, pressure, and positioning sensors. Some robots only have motorised wheels or legs, and others have dozens of movable parts (end-effectors), typically made of metal or plastic that perform the actual work and interact with the environment. These may be specialised tools, such as screwdrivers, rivet guns, paint sprayers, grippers, shovels, drills, hammers, cameras, lights, scalpels, etc. These precise tools allow robots to carry out their specific tasks with precision. All robots require a source of power. Almost all robots receive it from electricity but it can take different forms. A robot might be electrically powered, battery powered or solar powered. A robot's program isn't a physical component, but it's still an essential part of the whole. Humans write computer programs that tell the robot how to do certain physical tasks. Most robots are reprogrammable – to change the robot's behaviour, you simply write a new program to its computer. Finally, the main component of a robot is the central processing unit (CPU). It acts as the "brain" of the robot as it functions similarly to the human brain. Data comes in through sensors just as information comes to the neurons in your brain through your body's senses, then the CPU interprets it and acts accordingly.

6. Restore the correct order of the letters in the words in the box. Match them with the words in bold in the sentences below to make true statements. Address Task 5 if necessary.

chaimne; dtinuysr; perow; mtrsoo; eyssmt; brosot; itnu; rgomspra; ouhavirbe

1. Robots are machines that replicate **human** _____.
2. A robot is a **computer-controlled** _____ that is programmed to move, manipulate objects, and perform work while interacting with its environment.
3. Robots can be used in the **automotive** _____ for the assembly of engines, transmissions, as well as car body painting and welding.
4. **Industrial** _____ relieve human operators of dangerous, difficult, highly repetitive tasks.
5. The main component of a robot is the **central processing** _____ which acts as the "brain" of the robot.
6. A **sensory** _____ gives robot the information about its surroundings.
7. Robots need motors or actuators that provide the **physical** _____ to move the structure.
8. Robots use either hydraulic systems, or pneumatic or **electric** _____ to facilitate the movement.
9. Humans write **computer** _____ that tell robot how to do certain physical tasks.

7. To understand how robots actually work, distribute the functions (a-m) below between the components of a robotic system listed in the diagram.



a) They are small motors attached directly to the structure of the machine that facilitate movement.
b) It acts as the "brain" of the robot. In other words, it is the robot component that provides feedback to outside stimuli.
c) It can take different forms. Stationary robots, like those in factories, receive it directly just like any other appliances. Mobile robots typically sport high-capacity batteries while robotic probes and satellites are generally equipped with solar panels for harvesting energy from the sun.
d) They function like muscles.
e) They act as eyes and ears to help a robot take in information about its surroundings.
f) The term refers to the tools aboard the robot – the parts that perform the actual work and interact with the environment or a workpiece. They allow robots to carry out their specific tasks with precision.
g) Robots need energy to function. Almost all robots receive it from electricity.
h) It contains "logic trees" that gather and analyse task and environmental data, and then choose an appropriate response.
i) Robots typically incorporate a wide range of them. Important types include light, sound, temperature, contact, distance, pressure, positioning ones.
j) Some robots use hydraulic systems which use oil to facilitate movement, others – pneumatic motors which use air or electric motors which use electric current and magnets to facilitate movement.
k) It isn't a physical component, but within a robot it provides the logic that drives its behaviours.
l) It functions similarly to the human brain. Data comes in through sensors just as information comes to the neurons in your brain through your body's senses, then this component interprets it and acts accordingly.
m) The examples of such tools might include screwdrivers, rivet guns, paint sprayers, grippers, shovels, drills, hammers, cameras, lights, scalpels, etc.

8. Think of two-three questions related to this section and discuss them with a groupmate.

III. Language Box

1. Watch the video "What Is Robotics?" [55] and choose the options from the ones given in italics to make correct sentences.

a) Robotics is the intersection of science, *telecommunication/engineering* and technology.
b) A little bit more common term than robotics is *robot/machinery*.
c) Robots were originally built to handle *monotonous/repetitive* tasks.
d) In 2005 90 % of all robots could be found *creating/assembling* cars in automotive factories.
e) These robots consist mainly of mechanical arms tasked with welding or *screwing/sanding* on certain parts of a car.
f) Today we're seeing an evolved and *extended/expanded* definition of robotics.
g) While the overall world of robotics is expanding, a robot has some *contributing/consistent* characteristics.
h) The mechanical aspect of a robot helps it *carry out/complete* tasks in the environment for which it's designed.
i) A battery, for example, is needed to *perform/power* the machinery.
j) *Without/With* a set of code telling it what to do, a robot would just be another piece of simple machinery.
k) Robots are largely used to perform *various/variety of* tasks and to make human life easy.

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

a) Robotics is the intersection of science, engineering and technology that produces machines called robots that substitute for or 1) _____ human actions.
b) A robot is the product of the robotics field where 2) _____ machines are built that can 3) _____ humans or mimic human actions.
c) Robots were originally built to handle monotonous tasks like building cars on an assembly line but have since expanded well beyond their initial uses to perform tasks like fighting fires, cleaning homes and assisting with incredibly 4) _____ surgeries.
d) Today we're seeing an evolved and expanded definition of robotics that includes the development, creation and use of bots that explore earth's 5) _____ conditions, robots that assist law enforcement and even robots that assist in almost every 6) _____ of health care.
e) All robots consist of some sort of 7) _____ construction.
f) Robots need 8) _____ components that control and power the machinery.
g) Robots contain at least some 9) _____ of computer programming.
h) Inserting a program into a robot gives it the 10) _____ to know when and how to carry out a task.

i) They are widely used in manufacturing, assembly and packing, transport, earth and space 11) _____, surgery, weaponry, laboratory research, and mass production of 12) _____ and industrial goods.

3. Share your opinion on the key ideas. Work in groups of three or four people.

1. Robotics is the intersection of several scientific areas.
2. All robots have some consistent characteristics.
3. Robots are largely used to perform various tasks and to make human life easier.

4. Read the article "A Look at Robotics" and define the topic, aim and style of it using the following prompts.

Theme (topic)	- The subject (matter) of this paper is … - The article deals with the topic … - The article touches upon the topic of … - The paper discusses/considers/reports on …
Aim (purpose)	- This paper aims at … - The purpose of the article is to give the reader some information on ... - The aim of the article is to provide the reader with …
Style	- Narrative/descriptive/directive/expository/argumentative

A Look at Robotics

Robots are powered through a combination of powerful technologies from the software and hardware world. While advanced engineering and robotics are an obvious must to develop all these robots, the software development community hasn't reached an agreement as to which is the best language to power these robots.

There are various types of languages that you can learn to start working in robot programming. That's because robots are programmed either by guiding or by off-line programming. The first one refers to how a robot is programmed to be guided from one point to another to cover all of the steps of an operation. Robots programmed like this follow a preloaded set of instructions. Off-line programming implies that a robot can receive instructions through a computer to act according to that input. These kinds of robots are mostly defined by tasks or objectives, so they need to be programmed through a combination of some high-level languages.

C/C++ is considered to be the best starting point for developers new to the robotics industry, these general-purpose languages allow interaction with low-level hardware and provide real-time performance. Also, they are imperative and object-oriented as well as mature, which means that the learning curve will be gentler.

Python is a high-level language that's great to automate, teach, and post-process robotic applications. Its main strength resides in its capability to write scripts that calculate and simulate the entire robot program. This saves you from manually teaching every statement to the robot. This also helps in testing and refining the program's underlying logic. Python can write sophisticated software with fewer lines of code and it has a lot of robotic frameworks that can save you a lot of time.

Java is another popular choice to work in robotics. It offers you a series of APIs (Application Programming Interfaces) that were specifically created for robotics. From command-and-control recognisers to speech synthesisers, there are a lot of components that can be used to build complex robotic systems. Besides, Java is one of the preferred languages to develop artificial intelligence systems, including machine learning algorithms and neural networks that can be crucial for the development of advanced robots.

Though presented as options here, it's best if you see all of these languages as complementary when jumping into the robotics development world. That's because each of these languages has its strengths, weaknesses, and uses, so different applications will call for knowledge in different programming languages. Of course, the more languages you know, the better, as robot programming uses a lot of different types that take care of different aspects of a robot.

5. Underline the statements in the article in Task 4 that render topical information. Tick the information that you consider additional. Report your ideas to the group.

6. Address the article in Task 4 again and get ready to discuss the following key ideas.

Guiding programming in robotics	Off-line programming in robotics	Programming languages in robotics

7. Read the statements about robotics. Do you agree with their message? Share your ideas in the group.

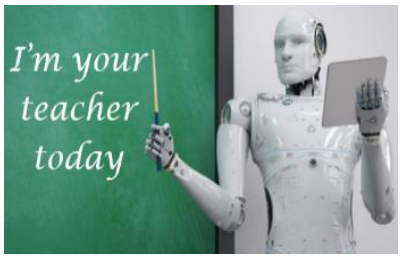
a) Hardware is the most essential component in a robotic system.
b) Any programming language is suitable for robot programming.
c) Robotics is a highly demanded area for IT specialists.

IV. Decision Bank

1. Read the article "Robot Teachers" and share your opinion on the questions.

1. What is the central idea of the publication?
2. What key points are presented in it?
3. What is your opinion of the article?
4. What is your view on the topic identified in it?
5. Would you like to have a robot as a teacher? Why or why not?

Robot Teachers



If you think of the jobs, robots could never do, you would probably put doctors and teachers at the top of the list. It's easy to imagine robot cleaners and factory workers, but some jobs need human connection and creativity. But are we underestimating what robots can do? In some cases, they already perform better than doctors at diagnosing

illnesses. Also, some patients might feel more comfortable sharing personal information with a machine than a person. Could there be a place for robots in education after all?

British education expert Anthony Seldon thinks so. And he even has a date for the robot takeover of the classroom: 2027. He predicts robots will do the main job of transferring information and teachers will be like assistants. Intelligent robots will read students' faces, movements and maybe even brain signals. Then they will adapt the information to each student. It's not a popular opinion, and it's unlikely robots will ever have empathy and the ability to really connect with humans like another human can.

One thing is certain, though. A robot teacher is better than no teacher at all. In some parts of the world, there aren't enough teachers and 9–16 % of children under the age of 14 don't go to school. That problem could be partly solved by robots because they can teach anywhere and won't get stressed, or tired, or move somewhere for an easier, higher-paid job.

Those negative aspects of teaching are something everyone agrees on. Teachers all over the world are leaving because it is a difficult job, and they feel overworked. Perhaps the question is not "Will robots replace teachers?" but "How can robots help teachers?". Office workers can use software to do things like organise and answer emails, arrange meetings, and update calendars. Teachers waste a lot of time doing non-teaching work, including more than 11 hours a week marking homework. If robots could cut the time teachers spend marking homework and writing reports, teachers would have more time and energy for the parts of the job humans do better.

2. Share your opinion on the following ideas.

3. Distribute the ideas (a–j) about robots between the two categories. What other options can be added to each category?

Advantages	Disadvantages

a) They can go to far away planets.
b) They need a supply of power.
c) They give us information that humans can't get.
d) They need maintenance to keep them running.
e) They work at places 24/7 without any salary and food.
f) It costs money to make or buy a robot.
g) They can perform tasks faster, more consistently and accurately than humans.
h) Most of them are automatic, so they can go around by themselves without any human interference.
i) People can lose jobs in factories.
j) They can go far down into the unknown waters and mines where humans can't.

4. Mingle with the groupmates. Discuss the following situations. Give arguments.

1. Robots are already an integral part of manufacturing in factories. Do you believe that one day there will be little need for humans in manufacturing?
2. Robots are used to sweep for landmines and bombs. What are the advantages of these practices? Do you see any other uses for robots in combat and police work?
3. Do you think that one day robots will replace teachers?
4. What threat do robots present to mankind?
5. Do you believe robots will ever outsmart people and take over the planet?
6. Robotic surgery is a method to perform surgery using very small tools attached to a robotic arm where a surgeon controls the robotic arm with a computer. How beneficial do you think this is now and for the future of medicine?
7. What do you think would happen to the world's economy if robots began replacing people in the workforce?

V. Conclusion Worksheet

Prepare a three-minute report about the most advanced robotic systems used in one of the following areas according to the presentation structure below. Work in groups of three or four people. What can Belarus be proud of?

- ✓ manufacturing
- ✓ automotive industry (self-driven cars)
- ✓ space/earth exploration
- ✓ medicine
- ✓ security
- ✓ nanotechnology (nanobots)
- ✓ education



Stage	Aim
Introduction	Communicate the purpose and structure of the talk
Body	Cover the main points of the talk
Conclusion	Summarise and highlight the significance of the talk

VI. Web Search

Explore the resources in the list to obtain additional information on robotics. Report your findings to the group.

https://builtin.com/robotics

https://whatis.techtarget.com/definition/robotics

https://www.bairesdev.com/blog/everyday-life-robots/

VII. Revision Point

1. Complete the passage with the derivatives of the words in the box.

reduction; requirement; interaction; devise; robot; repeat; hazard; combination; apply; employ

A robot is a computer that outputs motion instead of information. Robotics involves developing mechanical or computer 1) _____ than can paint cars, make precision welds, and perform other tasks that 2) _____ a high degree of precision or are tedious or hazardous for human. In general, 3) _____ systems can do precise tasks accurately and consistently. Contemporary robotics 4) _____ high-precision machine capabilities with sophisticated controlling software and sensors. The controlling software in robots is what is the most important in terms of artificial intelligence. Robots have many 5) _____ in industry. Manufactures use robots to assemble and paint products. Robots do 6) _____ tasks without getting bored and careless. Robots are expensive, they work 24 hours per day, do not go on strike and do not require health insurance and pensions. Robots have enabled firms to manufacture quality products and 7) _____ labour costs while shortening delivery time to customers. For these reasons, companies like robots very much. As robots grow more capable, the opportunity for unskilled and semi-skilled 8) _____ is sure to decline. Although robots are essential components of today's automated manufacturing systems, future robots will find applications outside the factory in banks, restaurants, homes and 9) _____ working environments such as nuclear stations. A robot must not only execute tasks programmed by the user but also be able to 10) _____ with its environment through its sensors and actuators, sense and avoid unforeseen obstacles, and perform its duties much the same way humans do.

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

a) A robot is a computer that outputs information instead of motion.
b) Robotic systems don't do precise tasks accurately.
c) Robots have few applications in industry.
d) Robots are used to assemble and paint cars.
e) Robots are essential components of today's automated manufacturing systems.
f) Future robots must be able to perform their duties much the same way humans do.

3. Render the article "OpenAI and Figure Develop Humanoid Robots for the Workforce" published on Fox News orally. Record your speech and send it to your groupmate for assessment according to the checklist below. Your overall mark will be provided at the end of the table.

OpenAI and Figure Develop Humanoid Robots for the Workforce

Written by Kurt Knutsson
May 7, 2023

Two companies are coming together to develop humanoid robots with AI that will be able to perform jobs from manufacturing to health care professions.

Do you ever find yourself glued to the screen watching a movie like "Terminator" and think, "Phew! Good thing it's just fiction!" Well, time for a reality check. Movies like this are getting closer to becoming a reality with each passing day.

OpenAI, the cutting-edge artificial intelligence research organisation behind the all-mighty and extremely popular ChatGPT, has made a chilling breakthrough with its latest project. In a partnership with a robotics company, Figure, the two tech powerhouses have joined forces to create an extremely creepy robot that might one day do all your chores for you. Imagine a world where robots can learn complex tasks by observing humans. Well, that's precisely the kind of technology that OpenAI has programmed within this robot. It's a neural network designed to understand and replicate human movements, taking robotics to a whole new level.

The magic behind the OpenAI/Figure robot lies in its ability to analyse data from motion capture systems. These systems record human movements and convert them into digital data. The "brain" within the bot then uses this data to teach itself to perform the same tasks. It's like the robots are learning by watching us! This groundbreaking technology can potentially revolutionise industries like manufacturing, construction and even health care. Imagine robots assisting in surgeries or helping build skyscrapers – all while minimising human error.

There is a flip side to this exciting progress. As these robots become more advanced and capable of doing tasks that humans used to do, there's this nagging concern about how it might affect job security for many people. If a robot can do your job faster, more accurately, and without needing a lunch break, it's natural to worry about being replaced, right?

However, it’s not just about jobs. There’s also the ethical side of things to consider. As robots and AI systems become smarter and more autonomous, we have to ask ourselves some tough questions: What kind of responsibilities do we have toward these AI systems? How do we ensure that they are developed and used ethically and safely? And what happens if they become too smart for their own good – or ours?

It’s essential to consider the potential consequences while we continue to develop and embrace AI technology. After all, we want to ensure that these advancements ultimately benefit humanity.

Summary checklist	*Yes*	*Undecided*	*No*
1. The origin of the publication was mentioned			
2. The date of the column was provided			
3. The style of the script was defined and justified			
4. The genre of the post was indicated and justified			
5. The author of the article was called			
6. The title of the post was given			
7. The main idea of the article was identified			
8. The important points were included			
9. The unnecessary details were left out			
10. The personal opinion/impression of the article was given			
11. The personal view on the topic/problem was provided			
12. The summary included own vocabulary, not citations			
13. The summary was full of varied grammar structures			
The overall mark (excellent/good/satisfactory/below average/bad)			

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

Comprehensive 👍	Rather confident ✋	Limited 👎

- Robotics, types of robots.
- Robotic system and its consistent components.
- Robot programming, its main approaches and languages.
- Robots’ applications, their benefits and threats.

Topic: Digital Security
Lesson 1: Computer Protection

Aim	Objectives
Master communication skills and competences in basic security measures, computer protection and maintenance	At the end of this lesson, students will be able to: • state the main digital threats related to password and hardware security • describe the main attributes of password security • analyse assaults related to hardware security • speak about hardware maintenance • discuss and present findings in pairs and small groups • write a summary based on different media

I. Lead-in

1. What should be taken into consideration while dealing with security in IT? Share your opinion with the group.

2. Work out the meaning of the words and phrases in the box. Then watch the video "Security Awareness: Passwords" [43] and discuss the questions.

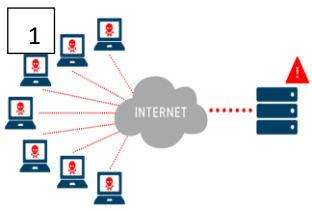
a) What is the video purpose?
b) What security assaults are illustrated in the video?
c) What password security guidelines are recommended?
d) How secure is your password? What can you do to make it stronger?

- ✓ new hires
- ✓ to sugarcoat sth
- ✓ to be up to code
- ✓ to be at liberty to discuss
- ✓ to compromise security
- ✓ dude
- ✓ to drag on
- ✓ to hide sth in plain sight
- ✓ better safe than sorry

II. Vocabulary Focus

1. Restore the correct order of the letters in the words and word combinations about security assault types. Capital letters go first. Then match the types with the pictures below.

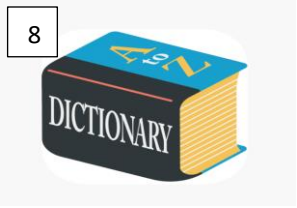
a) enalDi fo icervse _____
b) ssPwdaor hingack _____
c) tiyIndet eftht _____
d) euBl eecrns of eadth _____
e) ctnaioryDi aacktt _____
f) eyK oerggl _____
g) mpCteour eftth _____
h) eowPr userg _____



5 

6 

7 

8 

2. Decide if the words below have a "protective" or "destructive" meaning in relation to security and distribute them between the two categories. Work with a groupmate.

Protective		Destructive
✓ erase	✓ password	✓ malicious
✓ copy	✓ shield	✓ theft
✓ steal	✓ censor	✓ attack
✓ pirated	✓ defence	✓ malware
✓ infect	✓ detect	✓ infosec
✓ hacker	✓ protect	✓ countermeasures

3. Make a list of 10 key terms that are related to security. Use the word cloud on the right. Share your ideas with the group.

4. Read the abstract, name the methods hackers employ to steal passwords and underline the words and word combinations that give you a view on each method.

Password hacking is a big serious problem nowadays. When someone gains unauthorised access to your personal data and uses it illegally, it is called identity theft.

Password thieves can easily find your password if you write it down on a yellow sticky note hidden under your keyboard or in plain sight on top of your monitor. If a hacker doesn't have physical access to your work area, but your computer is connected to a network, your password can be discovered by a hacker using a remote computer and software tools that systematically guess your password, intercept it, or trick you into revealing it.

A dictionary attack helps hackers guess your password by stepping through a dictionary containing thousands of the most commonly used passwords. Password dictionaries can be found on black hat sites and packaged with password-cracking software, such as John the Ripper. Unfortunately, dictionary attacks are often enough to break a password because many users choose passwords that are easy to remember and likely to be in the most commonly used list.

A brute force attack uses password-cracking software but its range is much more extensive than a dictionary attack. Because it exhausts all possible combinations of letters to decrypt a password, a brute force attack can run for days to crack some passwords.

Sniffing is a process of monitoring and capturing all data packets passing through a given network. Sniffers are used by a network/system administrator to monitor and troubleshoot network traffic. Attackers use sniffers to capture data packets containing sensitive information such as passwords, account information, etc.

As users became better at identifying phishing messages, password thieves resorted to the use of key loggers. Short for keystroke logging, a key logger is software that secretly records a user's keystrokes and sends the information to a hacker. A key logger is a form of malicious code called a Trojan horse, or Trojan. Trojans are computer programs that seem to perform one function while actually doing something else. They can be embedded in email attachments, software downloads, and even files.

5. Read the passage about authentication below and answer the questions.

a) What is user authentication?
b) What are the pros of two-factor authentication?
c) How does it work?

In the context of digital security, user authentication is any technique used to verify or confirm a person's identity. Authentication techniques such as passwords, PINs, fingerprint scans, and facial recognition can prevent unauthorised access to the data on Web sites or stolen devices. Two-factor authentication increases security by verifying identity based on two components, such as a password and a verification code. It is most useful for verifying logins initiated from a device that was not used previously to log in. After a valid password is entered, a verification code is sent to a secondary device, such as a mobile phone, known to belong to the user. The verification code is then entered, in addition to the password, as the second authentication component.

6. Complete the sentences with the words and word combinations in the box.

authentication protocol; biometrics; identity theft; brute force attack; password; password manager

1. A(n)_____ is a method of breaking encryption code by trying all possible encryption keys.
2. A special set of symbols used to restrict access to a user's computer or network is referred to as _____.
3. A(n) _____ is software that keeps track of sites at which a user has registered and the password that corresponds to each site.

4. _____ is the use of physical attributes, such as a fingerprint or retinal scan, to verify a person's identity.
5. _____ is an illegal practice in which a criminal obtains enough information to masquerade as someone.
6. A(n) _____ is passwords, user IDs and biometric measures used to verify a person's identity.

7. Complete the passage with the target vocabulary of this section.

Passwords and user IDs are the most common authentication 1) _____. Password theft has become a serious security problem that has led to many cases of 2) _____ theft, when unauthorised individuals gain access to personal data. Hackers guess, discover and steal passwords using a variety of techniques. A(n) 3) _____ attack tries passwords from a list of commonly used ones. A(n) 4) _____ force attack tries every possible combination of letters and numbers. 5) _____ intercepts information sent out over computer networks. A(n) 6) _____ is software that secretly records a user's keystrokes and sends them to a hacker. To keep passwords safe, you should consider using tiered passwords or standalone password 7) _____ software that generates secure passwords and keeps track of which password corresponds to each site you access.

8. Choose one of the tasks and summarise information on it. Work in groups of three or four people. Report your ideas to the rest of the group.

1. Name and analyse the types of security assaults.
2. Describe how two-factor authentication works when you log in to a gmail account from a device you have never used before.
3. List the techniques hackers employ to get your password and explain how they work.

III. Language Box

1. What should be taken into consideration while dealing with computer protection and maintenance? Use the word cloud to get some ideas.

2. Read the abstract "Digital Security Basics" and consider the following key ideas. Work with a groupmate.

Security in IT	Physical security	Information security	Application security	Counter-measures

Digital Security Basics

Security in information technology (IT) is the defence of digital information and IT assets against internal and external, malicious and accidental threats. This defence includes detection, prevention and response to threats through the use of security policies, software tools and IT services.

Security is critical for enterprises and organisations of all types and sizes and in all industries. Weak security can result in compromised systems or data, either by a malicious threat actor or an unintentional internal threat.

Physical security is the protection of personnel, hardware, software, networks and data from physical actions, intrusions, and other events that could damage an organisation. This includes natural disasters, fire, theft and terrorism, among others. Physical security for enterprises often includes employee access control to the office buildings as well as specific locations, such as data centres. An example of a common physical security threat is an attacker gaining entry to an organisation and using a USB storage device to either copy and remove sensitive data or physically deliver malware directly to systems. Threats to physical security may require less tech-savvy on the part of the attacker, but physical security is just as important as information security.

Information security, also known as infosec, encompasses a broad set of strategies for managing the process, tools and policies that aim to prevent, detect and respond to assaults to both digital and non-digital information assets. Infosec includes several specialised categories, including application security – the protection of applications from threats that seek to manipulate application and access, steal, modify or delete data. These protections use software, hardware policies and are referred to as countermeasures. Common countermeasures include application firewalls, encryption programs, patch management, and biometric authentication systems.

3. Work out the meaning of the words and phrases in the box. Then watch the video "Security Awareness: Computer Theft" [43] and discuss the questions.

a) What is the video purpose?
b) What security mistakes has David made?
c) What security tips from the list below are mentioned in the episode?

- ✓ to grab a churro
- ✓ a gal
- ✓ to wipe sth remotely
- ✓ to turn up
- ✓ to be kidding sb
- ✓ to order a tank top
- ✓ to shop frisky
- ✓ asap

- ✓ Never leave your portable computer unattended, especially when you are at a coffee shop, the library or the airport.
- ✓ Use tracking and recovery software, such as CyberAngel and LoJach for Laptops which secretly sends a message as soon as a thief uses a stolen computer to log on to the Internet.
- ✓ If your computer got stolen, get IT department to wipe it remotely.
- ✓ If you have to leave your portable computer in your car, never leave it in plain view. Lock it up in the boot or cover it up.
- ✓ Use Apple's Find My iPhone system to track missing iPhones, iPods, and iPads.
- ✓ Record your portable computer's make, model, and serial number and store them away from the computer.
- ✓ If your computer got stolen, call IT to change your logins asap.
- ✓ Use STOP (Security Tracking of Office Property) plates which contain a unique ID number. Each plate ID number is registered in the international STOP database, thereby making it virtually impossible for a thief to resell a computer that has a STOP label.
- ✓ Secure your portable computers with anti-theft devices such as security locks

4. Study the guidelines about hardware protection below and share your opinion on the questions with a groupmate.

a) What is a power surge? What danger can it bring?
b) How can a computer be protected from power surges?
c) How does a surge strip work?
d) What is a UPS?

To ensure that your computer stays in good running condition, it is essential to protect it from power surges. A power surge is a sudden increase in electrical energy affecting the current that flows to electrical outlets. Power surges often occur before or after power failures.

Computer and peripheral devices require stable current and are particular sensitive to sudden bursts of electricity energy. Smaller surges can slowly damage your computer's circuit board and other electrical components.

You can protect your computer equipment from power surges by plugging it into a surge suppressor, instead of directly into a wall outlet. For added protection during thunderstorms, shut down your computer, turn off all your

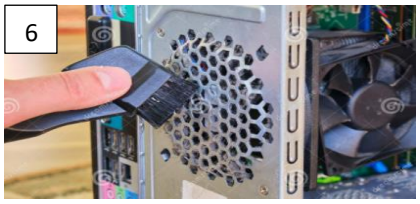
A surge strip (also called a surge suppressor or surge protector) is a device that contains electrical outlets protected by circuitry that blocks surges. Some surge strips also have sockets for modem connections that prevent surges from travelling down telephone or cable lines and into your computer.

A UPS (uninterrupted power supply) is a device that not only provides surge protection, but also furnishes desktop computers and network devices with battery backup power during a power outage.

If your desktop computer is connected to a UPS when a power outage occurs, the battery backup allows you to save what you're doing and properly shut down your computer.

peripheral devices, and unplug the surge suppressor and all computer-related cables from wall outlets, including the cable for your modem	A UPS with high-performance battery might give you enough backup power to keep your computer running for several hours

5. Preventive hardware maintenance can save more than the cost of repairs. Look at the pictures and say what you should and should not do to prolong hardware lifespan.



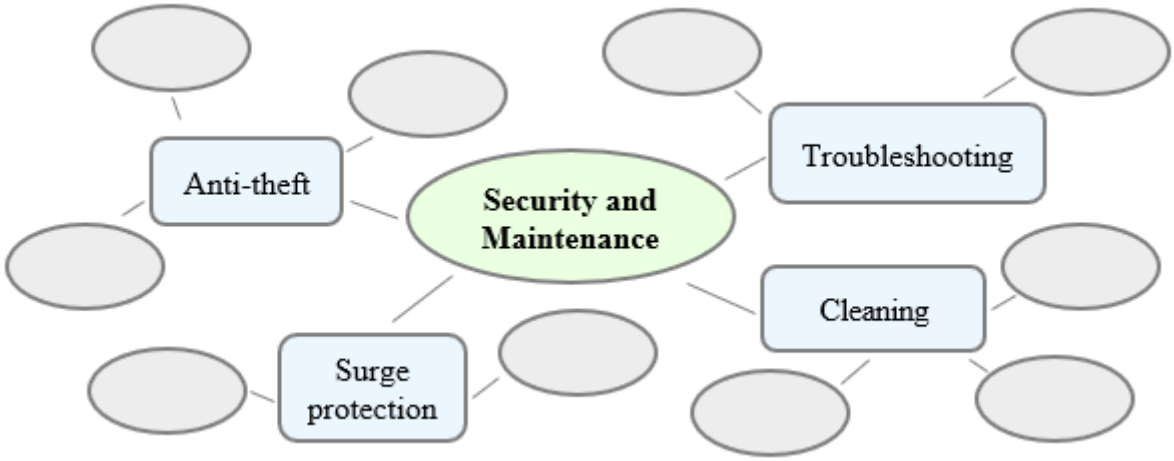
6. Say what you do with regard to a computer maintenance routine. Use the ideas in the box if necessary. Add any other recommendations to the list. Work with a groupmate.

- ✓ Back up your files regularly, particularly those that are most important to you. Test your back up procedures periodically.
- ✓ Run utilities that ensure peak performance for your hard disk drive.
- ✓ Delete your browser's history and cache files on a monthly basis in order to free up space for your temporary files. The free space results in faster downloads from the Internet.
- ✓ Apply the latest operating system, driver and security updates.
- ✓ Scan your computer for viruses and spyware once a week.
- ✓ Keep antivirus and spyware definitions updated

7. Study the steps for troubleshooting hardware problems and restore the best sequence of your actions. Work in groups of three or four people.

- ✓ Write down all error messages and any other information that goes with them.
- ✓ Make sure all components are plugged in and that there are no loose cables.
- ✓ Try to duplicate the problem by going through the same steps that led you to it.
- ✓ Look for troubleshooting tips in your user's manual, on your vendor's website.
- ✓ Run your antispyware and antivirus software.
- ✓ A simple reboot of your computer might clear up the problem.
- ✓ While in Safe Mode you can use the Control Panel's Add/Remove Programs to uninstall recently added programs or hardware that might be interfering with the operation of other components

8. Complete the concept map and get ready to speak about hardware security and maintenance. Work in groups of three of four people.



IV. Decision Bank

1. Do the quiz to find out whether you stay up to date with regard to password security.

1. Which of the following is the most commonly used (and therefore weakest) password?	a) 123456 c) Iloveyou b) Asdf d) Monkey
2. Ideally, what characters should you use in a password to make it strong?	a) letters and numbers b) mixed case (upper and lower) characters c) special symbols d) all of the above
3. How long should a strong password be?	a) 8 characters c) as long as possible b) 15 characters d) it does not matter
4. Strong passwords can be difficult to remember. What can you do to avoid forgetting them?	a) use mnemonics (acronyms or phrases that are easy for you to remember) b) develop a password strategy c) use password management software with encryption d) all of the above

2. Look at the tips below and distribute them between those that can compromise or enhance password security. Then watch the video "Tech Tips: How to Create a Strong Password" [47] to check how close your ideas were to the real ones.

Weak Password	Strong Password
✓ use eight or twelve characters	✓ indicate your phone number
✓ make common passwords	✓ change the formula/your passwords
✓ use upper and lowercase letters	✓ use your social security number
✓ include personal info	✓ provide your personal contact info
✓ use different passwords for every site	✓ do an overhaul

- ✓ provide kids' or pets' names
- ✓ mix all up
- ✓ employ a password manager app
- ✓ create a unique password formula
- ✓ use common words
- ✓ save passwords in web browsers
- ✓ combine numbers and symbols
- ✓ create something unique

3. Watch the video again and consider the key ideas. Work with a groupmate.

1. No password is a hundred percent secure.
2. The best passwords are hard to crack but easy to remember.
3. The way a strong password should look like.
4. Hot tech tips that help create a strong password.

4. Using the summary of the guidelines below create a secure multi-task password. Compare it with a groupmate's one and explain what makes it unique, strong and easy to remember.

- ✓ Start with the first letters of a phrase that generates a password containing numbers and proper nouns.
- ✓ Aim for a length of 8 to 12 characters.
- ✓ Use uppercase letters somewhere other than at the beginning of the password.
- ✓ Add the site name to create a unique way to remember the site it is used for.
- ✓ Create a password using four or more words to achieve good entropy.

V. Conclusion Worksheet

Everyone who uses the Internet needs to know how to do it safely. Do online research and gather information on the following aspects. Report your findings to the group. Work in groups of three or four people.

- ✓ The warning signs of a weak password.
- ✓ What you can do to protect yourself from such a danger.
- ✓ What you should do if you become a victim of identity theft.
- ✓ What Web site services exist to protect consumers from identity theft.

VI. Web Search

Explore the resources in the list to obtain additional information on computer protection and digital security basics. Report your findings to the group.

https://legaldictionary.net/identity-theft

https://www.investopedia.com/best-password-managers-5080381

https://www.security.org/how-secure-is-my-password

VII. Revision Point

1. Read the abstract "How a Password Manager Works" and translate it into Belarusian or Russian. Use a dictionary if necessary.

How a Password Manager Works

The core function of a password manager (sometimes called a keychain) is to keep track of passwords so users don't have to memorise them. Some password managers also have the ability to fill in forms with stored address and credit card data. Password managers are available as operating system utilities, browser extensions, and standalone utilities. Most password managers can generate unique passwords composed of random letters, numbers, and symbols. These passwords have very good entropy and do not have to be memorised because they are stored and automatically retrieved by the password manager as needed. When you initially register for an account with a Web site or app, the password manager may display the user ID you typically use; usually it is your email address. You are then asked if you would like to enter a password or use an auto-generated password. Password managers may display a strength meter that indicates password security – a feature that is useful if you create a custom password rather than using one generated by the password manager.

2. Read the abstract related to the most common authentication protocols and complete the gaps with the words and word collocations in the box.

biometrics; ATMs; login; IDs; password; PINs; two-factor; authentication protocol; verifies; retinal pattern; legitimate

User 1) _____, passwords, and personal identification numbers or 2) _____ are a fact of everyday life in the information age. They are required for activities such as using 3) _____ and debit cards, logging in to Windows, accessing wireless networks, making an iTunes purchase, instant messaging, and reading email. Many Web sites encourage you to sign up for membership by choosing a user ID and 4) _____. Security experts use the term 5) _____ to refer to any method that confirms a person's identity using something the person knows, something the person possesses, or something the person is. For example, a person might know a password or PIN, possess an ATM card or a credit card. A person can also be identified by 6) _____, such as a fingerprint, facial features, or a(n) 7) _____.

Authentication protocols that use more than one means of identification are more secure than others. Computer-related security is primarily based on passwords associated with user IDs. The level of protection depends on good password selection and management on the part of users. A user ID is a series of characters – letters, numbers or special symbols – that becomes a person's unique identifier. It is also referred to as a user name, 8) _____, screen name, or online nickname. User IDs are public. Because they are not secret, they do not offer any level of security. The rules for creating a user ID are not consistent throughout all applications, so it is important to read instructions carefully before finalising your user ID.

A password is a series of characters that 9) _____ a user ID and guarantees that you are the person you claim to be. Login screens for many applications provide a "forgot my password" link. A personal question provides an alternative authentication protocol to ensure that you are not a hacker pretending to be a(n) 10) _____ user who has lost a password. Both passwords and PINs are classified as something-the-user-knows authentication methods.

In practice, PINs tend to be a short sequence of numbers that can be entered using a numeric keypad, whereas passwords tend to be longer sequences of letters, numbers and special characters that require a full qwerty keyboard for entry. PINs are commonly used with 11) _____ authentication protocols, whereas passwords are used in conjunction with single-factor authentication protocols.

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

There are several *indistinct/clear* signs that your computer is in trouble. The most *obscure/obvious* sign is failure to power up. A loud beep at startup time can also *indicate/disguise* a problem. If your computer's screen remains blank or error messages *appear/disappear*, you might have a hardware problem. Hardware problems can also show up as unexpected restarts at *regular/random* intervals, or as a peripheral device that stops working. Windows users might *face/overlook* the blue screen of death (also called BSoD). The blue screen of death indicates that the operating system has *missed out/encountered* an error from which it cannot recover. And in this case the computer no longer *ignores/accepts* any commands.

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

Comprehensive	Rather confident	Limited

- Digital security basics.
- Computer protection and maintenance.
- Types of password assaults.
- Password security, authentication.

Lesson 2: Malicious Software

Aim	Objectives
Master communication skills and competences in malicious software, its types and ways to secure a computer	At the end of this lesson, students will be able to: • define malicious software and its types • explain different malware threats • state ways to protect your computer from viruses • list types of antivirus software • present and discuss findings in pairs and small groups • write a summary based on different media

I. Lead-in

1. Consider the definition of a biological virus. Does it resemble a computer virus? Give the definition of a computer virus.

Biological virus – a very small organism that infects living cells, known as the host by attaching itself to them and using them to reproduce itself; this often causes harm to the host cells

2. Work out the meaning of the words and phrases in the box. Then watch the video "Security Awareness: Removable Media" [43] and discuss the questions.

a) What is the video purpose?
b) What security assault is illustrated in the video?
c) What security guidelines can be recommended in this situation?

- ✓ a terabyte
- ✓ a little fella
- ✓ to take sb/sth over there

II. Vocabulary Focus

1. Consider the definition of "malicious" on the right and define what malicious software or malware is. Use the following collocations and phrases.

- ✓ a computer program
- ✓ enter surreptitiously
- ✓ cause disruption
- ✓ interfere unknowingly
- ✓ gain unauthorised access
- ✓ lead to private information leakage
- ✓ deprive user's access to

Malicious [məˈlɪʃ.əs] – intended to cause damage to a computer system, or to steal private information from a system

2. Match the types of malware on the left with the appropriate definitions.

1. Virus 2. Trojan horse 3. Worm 4. Bot 5. Spyware 6. Key logger 7. Adware 8. Ransomware 9. Rootkit	a) is a type of malware that is disguised as a legitimate program; it seems to perform one action but actually does something else
	b) is any software that installs itself on your computer and starts covertly monitoring your online behaviour without your knowledge or permission. It relays this data to other parties
	c) is software that displays unwanted pop-up ads which can appear on your computer
	d) is a program that, when executed, replicates itself by modifying other computer programs
	e) is malware that prevents or limits users from accessing their system
	f) is a program that masks its or other software existence
	g) is a program that records every keystroke made by a computer user to gain fraudulent access to passwords
	h) is a program that performs automated, repetitive, pre-defined tasks
	i) can replicate itself without any human interaction, it can be transmitted via software vulnerabilities or could arrive as attachments in spam emails or instant messages

3. Read the statements about malware and replace the words in bold with the synonyms in the box. Make any changes if necessary.

payload; replicate; lurk; inadvertently; disrupt; unleash; devastating; contract; trigger

1. The worm's **haul** is a connection proxy that allows the attacker to initiate network connections through an infected computer.
2. Trolls **hide** on sites like Twitter, YouTube and Facebook.
3. I **accidentally** pressed the wrong button.
4. The hacker has **released** the virus he can't control.
5. The effect of this virus is **destructive**.
6. Because of malware, you might not even know that your computer has **agreed with** a virus.
7. These settings **copy** everyday activities but are scaled-down to be accessible to even the youngest visitors.
8. If it succeeds, the technology has the potential to **alter** seriously the current market of IoT devices.
9. It was not clear what malware **caused** such damage.

4. Read the abstract "What Is a Virus?" and choose the options from the ones given in italics to make true statements.

What Is a Virus?

A computer virus is a set of program instructions that *separates/attaches* itself to a file, reproduces itself, and *joins/spreads* to other files. A common misconception is that viruses spread themselves from one computer to another. They don't. Viruses can *replicate/originate* themselves only on the host computer.

A key characteristic of viruses is their ability to *emerge/lurk* in a computer for days or months, replicating themselves. While this replication takes place, you might not even know that your computer has *contracted/obtained* a virus; therefore, it's easy to *deliberately/inadvertently* spread infected files to other people's computer. A virus also *keeps/delivers* a payload, which can be as harmless as displaying a pesky message or as devastating as trashing the data on your computer's storage device. It can *corrupt/upgrade* files, destroy data, or otherwise *disrupt/arrange* computer operations. A trigger event, such as a specific date, can *hold/unleash* some viruses. Viruses that deliver their payloads on a specific date are sometimes referred to as *logic/time* bombs. Viruses that deliver their payloads in response to other system event are referred to as *time/logic* bombs.

5. Read the passage about a Trojan horse. Match the words in bold with the synonyms in the box.

ignorant; disguise; infamous; reproduce; harmful; propagate

It is not designed to **spread** itself to other computers and it doesn't **replicate** itself. Trojans are stand-alone programs that **masquerade** as useful utilities or applications, which victims download and install **unaware** of their **destructive** nature. They are **notorious** for stealing passwords using a key logger that records your keystrokes as you log in to your computer and various online accounts.

6. Read the statements about different types of malware. Restore the correct order of the letters in the words in bold.

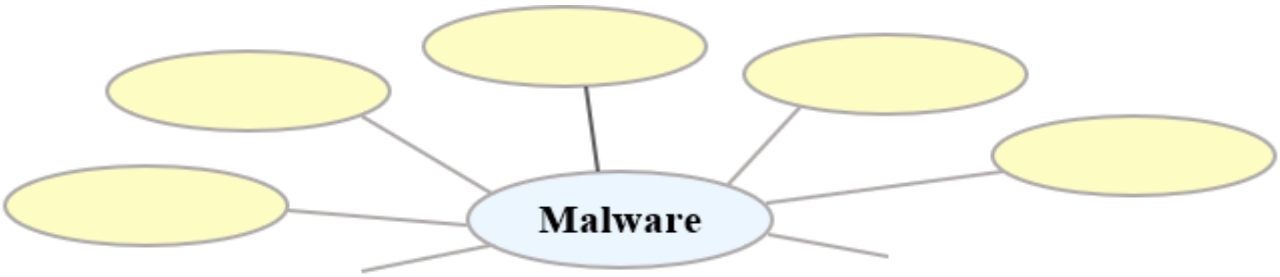
1. **arswepy** is a type of program that secretly gathers personal information without the victim's knowledge, usually for advertising and other commercial purposes.
2. Clicking the attachment activates the **owmr**.
3. Because an intelligent agent behaves somewhat like a **tboor**, it is often called a bot.
4. Just like a **jtnaor**, spyware can monitor keystrokes and relay passwords and credit card information to cybercriminals.
5. **wareda** is sponsored by an advertiser and is used to make money.
6. Since this software has administrative access, it means a **itkorot** can modify any software, including any that may be used to detect or circumvent it.

7. To get **erramnswao** on your computer or devices, a **licybcerrmain** tricks you into downloading a program that looks legitimate.
8. To steal personally identifiable information cybercriminals use a **ygregolek**.
9. This **svuri** is triggered when a program capable of executing a macro is run.

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

1. *Trojan horse/Bot* is not designed to replicate itself.
2. *Worm/Spyware* secretly gathers personal information without the victim's knowledge, usually for advertising or other commercial purpose.
3. *Bot/Spyware* initiates communication with central server on the Internet to receive instructions.
4. *Worm/Spyware* monitors your web-surfing and purchasing behaviour and sends a summary to third parties.
5. *Spyware/Worm* has the capability to travel without any help from a person.
6. *Trojan horse/Bot* can be used in groups of computers to be controlled by a third party for Distributed Denial-of-Service (DDoS) attacks.
7. *Spyware/Trojan horse* can give a malicious party remote access to an infected computer.
8. *Adware/Ransomware* displays pesky messages and pop-up ads.
9. *Spyware/Ransomware* encrypts your data and demands ransom for the encryption key.
10. *Key logger/Spyware* gets every your keystrokes to steal your password or credit card number.
11. *Worm/Virus* causes network traffic jams.
12. *Virus/Bot* allows hackers to take control of your device and turn it into a zombie.
13. *Bot/Spyware* links your computer to others in a botnet that can send millions of spam emails.

8. The days when viruses were the greatest threat to computers are long gone. Today, there are lots of types of malware. Complete the concept map and summarise the facts about the types of malware. Report your ideas to the group.



III. Language Box

1. What are the signs to watch out if the device is infected? Use the prompts. Share your ideas with a groupmate.

- ✓ Irritating messages or sounds.
- ✓ Frequent pop-up ads, at times with some provocative content.
- ✓ The sudden appearance of a new Internet toolbar on your browser's home page.
- ✓ An addition to your Internet favourites list that you didn't put there.
- ✓ Prolonged system startup.
- ✓ Slower than usual response to mouse clicks and keyboard strokes.
- ✓ Browser or application crashes.
- ✓ Missing files.
- ✓ Your computer's security software becomes disabled and cannot be restarted.
- ✓ Periodic network activity when you are not actively browsing or sending emails.
- ✓ Your computer reboots itself frequently.

2. Work out the meaning of the words/phrases in the box. Then watch the video "Security Awareness: Internet Downloads" [43] and discuss the questions.

- ✓ to spruce up sth
- ✓ a pitch deck
- ✓ to figure sth out
- ✓ to look super sketchy

a) What infection method is shown?
b) How can you avoid computer infection?
c) Are there any other ways to avoid security threats? Use the ideas in the box below.

- ✓ Install and activate security software on any digital device that is at risk.
- ✓ Keep software patches and OS service packs up to date.
- ✓ Do not open suspicious email attachments.
- ✓ Obtain software only from reliable sources; and before running it, use security software to scan for malware.
- ✓ Do not click pop-up ads – to make an ad go away, right-click the ad's taskbar button and select the Close option.
- ✓ Avoid unsavory Web sites.
- ✓ Disable the option *Hide extensions for known file types in Window* so you can avoid opening files with more than one extension, such as a file called *game.exe.zip*

3. Read the statements related to protection from malware and work out the meaning of the collocations in bold from the context.

1. Criminals use malware to steal personal information and **commit fraud**.
2. Hackers use malware to **hijack your computer** and use it to send spam.
3. Scammers send messages to **trick people into** buying worthless software.
4. Use a **pop-up blocker** and don't switch it off.
5. Don't **open attachments** in e-mails unless you know what they are.
6. Free stuff may **sound appealing** but free downloads can hide malware.

7. If you don’t **take precautions**, malware can find its way onto your computer.
8. If you **suspect malware** on your computer, the first thing to do is to disconnect from the Internet.
9. Delete the files that a system scan **flags as malware**.

4. Watch the video “Protect Your Computer from Malware” [40] and put the ideas into the correct order.

1. Steps for initial computer protection.
2. Definition of malware.
3. Signs of computer infection.
4. Ways to deal with computer infection.
5. Purposes of using malware.

5. Watch the video again. Match the beginnings (1–7) of the statements with the appropriate endings (a–g).

1. Install security software from a reliable company and …
2. If you’re not sure how, …
3. Use a pop-up blocker, and …
4. Download software only from …
5. If you suspect malware, …
6. Update your security software and …
7. The most important thing you can do …

a) … don’t click on links and pop-ups.
b) … websites you know and trust.
c) … set it to update automatically.
d) … stop doing things that require passwords or personal info, such as online shopping or banking.
e) … use the Help function and search for automatic updates.
f) … to prevent malware is to keep your computer software up to date.
g) … run a system scan.

6. One of the ways to secure computers is installing and updating robust antivirus software. Read the abstract “Antivirus Software” and answer the questions.

1. What type of software is antivirus?
2. What devices does antivirus software run on?
3. How does it identify malware?
4. What is the process of searching for malware called?
5. What are the two techniques to look for a virus?
6. What is a virus signature?

Antivirus Software

The best defence against malware is antivirus software. It is a type of utility software that looks for and eliminates viruses, Trojans, worms, and other malware. It is available for all types of computers and data storage devices, including smartphones, tablets, personal computers, USB flash drives, servers, PCs, and Macs. Popular robust antivirus software includes Norton AntiVirus, Kaspersky AntiVirus, F-Secure AntiVirus, Windows Defender, and Avast.

Modern antivirus software runs as a background process and attempts to identify malware that exists on a device or is entering a device as a download, email message, attachment, or Web page. The process of searching for malware is sometimes referred to as scanning or performing a virus scan. To identify malware, antivirus software can look for a virus signature or perform heuristic analyses.

A virus signature is a section of program code that contains a unique series of instructions known to be part of a malware exploit. Although they are called virus signatures, the unique code may identify a virus, worm, Trojan, or other malware exploit.

Heuristic analyses – techniques that detect malware by analysing the characteristics and behaviour of suspicious files

Virus signatures are discovered by security experts who examine the bit sequences contained in malware program code. When discovered, virus signatures are added to a collection of virus definitions, which form a database that is used by antivirus software as it works to scan files that may harbour malware.

7. Mark the statements as true or false. Correct the false ones. Address Task 6 if necessary.

1. Antivirus software is a type of utility software that looks for and eliminates a virus.
2. Antivirus software is available only for personal computers but not for smartphones.
3. Modern antivirus software identifies malware that is entering a device as you download something.
4. The process of searching for malware is sometimes referred to as scanning.
5. To identify malware, antivirus software can examine the length of the program.
6. A virus signature is a section of program code with a common series of instructions.
7. Virus signatures are discovered by users who examine if the program is loading or not.
8. When virus signatures are discovered, they are deleted.

8. Consider the examples of computer disasters. Discuss how you could prevent them or limit their effects. Work in groups of three or four people. Then compare your ideas with the other groups.

1. You open an email attachment which contains a very destructive virus.
2. Someone guesses your password and copies your sensitive data.
3. Your hard disk crashes and much of your data is lost permanently.
4. Someone walks into your computer lab and steals the memory chips from your PC.
5. Your backup USB flash fails to restore properly.
6. A software bug erases necessary pictures, documents, and videos on your hard drive.

IV. Decision Bank

1. Look at the examples of cyberwarfare attacks. How do they affect the world? Have you ever encountered any of them? Do you know how to deal with them?

2. Read the two definitions of cyber weapons, consider which one is done by a security expert and which is done by a legal expert. List their similarities and differences.

A device or any set of computer instructions intended to unlawfully damage a system acting as a critical infrastructure, its information, the data or programs therein contained or thereto relevant, or even intended to facilitate the interruption, total or partial, or alteration of its operations.
Cyber weapon could be defined as a computer code that is used or designed to be used with the aim of threatening or causing physical, functional, or mental harm to structures, systems, or living beings.

3. Read the abstract "Cyber Weapons – New Weapons of Mass Destruction" and discuss the questions.

1. What is cyberspace?
2. What illegal activities do people commit in cyberspace?
3. What parameters can cyber weapons be classified by?
4. What makes cyber weapons so attractive?
5. What economic spheres do cyber weapons strike most often?
6. What are the most dangerous effects of the use of cyber weapons?

Cyber Weapons – New Weapons of Mass Destruction

Information and Communication Technology has created a virtual world with no boundaries. This virtual world is called "cyberspace". Worldwide, people and, in some cases, the governments are engaged in the exploitation of the cyberspace for illegal activities like espionage, theft of technology, financial frauds and so on. They have, accordingly, developed means and methods to carry out such activities by way of viruses, rootkits, and malware. These are the initial steps in the evolution of cyber weapons which till date do not have a formal definition.

Cyber weapons may span, in theory, a wide range of possibilities: from Denial-of-Service attacks (which typically have a low level of penetration) to "tailored" malware like the Stuxnet characterised by high intrusiveness and a low rate of collateral damages.

Cyber weapons can be classified according to the following four parameters such as precision that is the capability to target only the specific objective and reduce

collateral damages; intrusion that is the level of penetration inside the target; visibility that is the capability to remain undetected; ease of implementation that is a measure of the resources needed to develop the specific cyber weapon.

The use of cyber weapons is complementary to conventional military strikes. It could be possible to support offensive operations by destroying enemy's defence/critical infrastructure. In this way, cyber weapons are more efficient and less expensive, and the attack is carried out at the speed of light. The preparation phase of this attack is easy to hide from prying eyes and the development of cyber weapon is hard to identify.

The above advantages make cyber weapons very attractive to those "small" states that despite having reduced funds for military expenses can compete with the most powerful countries in the new domain. At present, nearly 140 countries in the world are engaged in the development of an offensive cyber warfare capability.

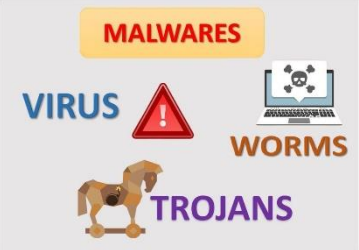
Likely targets of cyber weapons are electronic national defence systems, hospitals, water supplies, fully-automated transportation control systems, air traffic controls, electricity grid management, systems communication and data networks. In general, cyber weapons could hit every critical infrastructure and vital systems of any country.

One of the most dangerous effects of the use of a cyber weapon is the difficulty to predict its diffusion since cyber space has no boundaries. This means that cyber weapons could hit in unpredictable ways other systems and networks that are not considered targets. In extreme cases, there is a possibility that it attacks the systems of host nation in a sort of "boomerang effect". Besides, the presence of cyber weapons in cyberspace could open up the possibility of reverse engineering of its source code by ill-intentioned individuals. Foreign governments, cyber terrorists, hacktivists and cyber criminals could be able to detect, isolate and analyse the agents, designing and spreading new cyber threats that are difficult to mitigate.

4. Cyberattacks are one of the biggest dangers in the world of IT. Give your arguments why it is so. Work in group of three or four people.

V. Conclusion Worksheet

Imagine that you want to enter someone's computer system. List as many ways or techniques as possible that you can use to gain access. Consider what harm can be caused by your actions. Consider the following techniques. Work with a groupmate. Then report your ideas to the group.



- ✓ using keylogging software
- ✓ using spyware
- ✓ using Trojans
- ✓ using ransomware
- ✓ using email worms

VI. Web Search

Explore the resources in the list to obtain additional information on security software and its components. Report your findings to the group.

https://www.welivesecurity.com/category/malware

https://www.techopedia.com/definition/4536/security-software

https://www.techtarget.com/searchsecurity/definition/malware

VII. Revision Point

1. Read the abstract "Heuristic Analysis" and translate it into Belarusian or Russian. Use a dictionary if necessary.

Heuristic Analysis

Antivirus software can use techniques called heuristic analysis to detect malware by analysing the characteristics and behaviour of suspicious files. These techniques are especially useful for detecting new malware for which signatures have yet to be collected and added to the virus database. One method of heuristic analysis allows the suspicious file to run in a guarded environment called a sandbox. If the file exhibits malicious behaviour, it's treated like a virus and quarantined or deleted. A second method involves inspecting the contents of a suspicious file for commands that carry out destructive or surveillance activities. Heuristic based antivirus tools use a number of different scanning techniques, including file analysis when the scanning software will closely inspect a file to determine its purpose, destination and intent; file emulation, also known as dynamic scanning or sandbox testing, file emulation tests a file in a controlled virtual environment to see what happens; genetic signature detection designed to locate different variations of a virus.

2. Do the quiz.

1. What is used to find out browsing habits, keystrokes, or passwords for the purposes of identity theft?	a) Trojan horse b) adware	c) virus d) spyware
2. When a computer starts performing repetitive tasks it can be due to …	a) rootkit b) spyware	c) bot d) spam
3. How is a worm different from a virus?	a) It does more harm b) It can't spread without a user doing sth c) It can spread without a user doing sth d) It doesn't do any harm	

4. What most defines a computer virus?	a) It crashes computers b) It can spy on what you do c) It can copy and spread itself d) It cannot be fixed
5. Trojan is a virus that …	a) is easy to detect due to its suspicious signs b) can multiply quickly into copies of itself c) is similar to human viruses d) is difficult to detect because it replicates itself as a safe program
6. It is a set of software tools that enable an unauthorised user to gain control of a computer system without being detected	a) ransomware b) Trojan horse c) rootkit d) adware
7. It generates revenue for its developers by automatically generating adverts on your screen, usually within a web browser	a) spyware b) ransomware c) rootkit d) adware

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

Nowadays, it is a big challenge to protect our *sensitive*/*available* data from unwanted and unauthorised sources. There are various tools and devices that can provide different *security*/*danger* levels and help keep our *private/public* data secure. One such tool is a firewall that *prevents/encourages unauthorised/legitimate* access and keeps our computers and data safe and secure.

A firewall can be defined as a special type of network security device or a software program that *monitors/ignores* and filters incoming and outgoing network traffic based on a *defined/undefined* set of security rules. It acts as a barrier between internal private networks and external sources such as the public Internet. The primary purpose of a firewall is to allow *non-threatening/damaging* traffic and prevent *malicious/ridiculous* or unwanted data traffic for protecting the computer from viruses and attacks. A firewall is a cybersecurity tool that filters network traffic and helps users *block/open* malicious software from accessing the Internet on infected computers.

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

Comprehensive 👍	Rather confident ✋	Limited 👎

- Malware, types, ways to be infected.
- Practices to avoid computer infection.
- Antivirus software, techniques.
- Cyberwarfare attacks, cyber weapons.

Lesson 3: Social Engineering

Aim	Objectives
Master communication skills and competences in social engineering methods and protection procedures in the sphere of IT	At the end of this lesson, students will be able to: • define the concept of social engineering • describe the main methods of social engineering • list measures of protection against social engineering scam • explain how encryption work • discuss and present findings in pairs and small groups • write a summary based on different media

I. Lead-in

1. What is social engineering in terms of IT? Consider the three definitions and choose the appropriate one.

A. It refers to applying engineering approach and innovation to the field of social relations

B. It refers to the ethical issues which arise in the process of interaction between people and different devices

C. It is a manipulation technique that exploits human errors to gain private information, access, or valuables

2. Share your opinion on the statement. Justify your point of view.

Security is all about knowing who and what to trust. Ask any security professional and they will tell you that the weakest link in the security chain is the human who accepts a person or scenario at face value.

II. Vocabulary Focus

1. Consider the facts about social engineering. Work out the meaning of the words in bold. Then make a list of key terms and collocations related to the topic.

In the context of cyber security, social engineering is a **deceptive** practice that **exploits** human psychology.

Its goal is to **induce** victims to interact with a digital device and get financial **gain** or cause service **disruption**.

The types of information these **scammers** are seeking can **vary**.

When individuals are targeted, the criminals are trying to **trick** you **into** giving them your **credentials**, bank information or access your computer.

Social engineer is a **judgement-neutral** term for a person who **devises** and carries out an **exploit**.

The **bait** that is set forth in various such exploits is based on one or more **incentives** designed to **compel** individuals to participate in the **scam**.

Social engineering attacks **prey on** human **vulnerabilities**, for example, **gullibility**, curiosity, greed. None of us is **infallible**.

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

A.	B.
deceptive	javelin, pike
spear	fake, false
bait	reward
gain	catch, take
solicitation	misleading
fraudulent	simulate, pretend
spoof	decoy
nab	extortion

3. Match the most common methods of social engineering on the left with the definitions.

1. Shouldering (shoulder surfing) 2. Pharming 3. Phishing 4. Baiting 5. Spear Phishing 6. Vishing 7. Tailgating 8. Rogue Antivirus	a) This tactic includes deceptive emails to steal information
	b) A spoofed email is used to carry out targeted attacks against individuals or businesses
	c) It's an online and physical social engineering attack that promises the victim some gain
	d) Victims are tricked into believing that malware is installed on their computer and that if they pay, the malware will be removed
	e) It relies on human trust to give the criminal physical access to a secure building or area
	f) It redirects website traffic to fraudulent websites that distribute malware, collect personal data, sell counterfeit products, and perpetrate other scams
	g) It occurs when someone surreptitiously watches over your shoulder to nab valuable information
	h) It is voice solicitation over the phone (voice + phishing)

4. Complete the passage about one more type of social engineering with the words in the box. What is it? How does it work?

convince; targeted; spoofing; perpetrate; baiting; relies; solicitation; quo

A quid pro 1) _____ attack is a low-level form of 2) _____ hacking that 3) _____on human trust. It is also known as a "something-for-something attack". It is a case of 4) _____, as attackers 5) _____ victims to get a service or benefit and the latter performs specific tasks or gives out information or access. An example would be a case of voice 6) _____ when an attacker calls your phone 7) _____ to be from one of your service providers' technical support representatives. They will offer you some assistance that is used to 8) _____ a scam.

5. Before watching the video from "Security Awareness" series look at the picture on the right and say what is going on in the office today. Predict what can go wrong this time. Work out the meaning of the words and phrases below.

- ✓ on behalf of
- ✓ a cyber vigilance and security award
- ✓ to run an influencer blog
- ✓ an engraving
- ✓ a plaque

6. Savvy cybercriminals know that social engineering works best when focusing on human emotions. Watch the video "Security Awareness: Episode 6" [43] and identify the type of social engineering in Task 3 it illustrates. Then choose which emotions/traits have been exploited from the ones given in the box.

helpfulness; curiosity; fear; gullibility; urgency; greed

7. Look through the examples of social engineering attacks and decide which emotion/trait from the ones listed in Task 6 is exploited in each case.

A. You receive a voicemail that says you're under investigation for tax fraud, and that you must call immediately to prevent arrest and criminal investigation

B. Imagine if you could simply transfer $10 to an investor and see this grow into $10,000 without any effort on your behalf. A carefully worded baiting email tells victims to provide their bank account information and the funds will be transferred

C. Cybercriminals pay attention to events capturing a lot of news coverage. For example, after the second Boeing MAX8 plane crash, cybercriminals sent emails with attachments that claimed to include leaked data about the crash. In reality, the attachment installed a version of the worm RAT on the victim's computer

D. Cybercriminals target two or three employees in the company with an email that looks like it comes from the targeted individuals' manager. The email asks them to send the manager the password for the accounting database urgently stressing that the manager needs it to make sure everyone gets paid on time

E. You receive an email from an online shop that you frequently buy from telling you that they need to confirm your credit card information to protect your account. The email language urges you to respond quickly, or your credit card information can be stolen

8. Use the ideas to make questions that can be asked considering the main issues of this section. Then discuss these questions in groups of three or four people.

- ✓ Spread of social engineering.
- ✓ Types of social engineering attacks.
- ✓ Red flags of such scams.
- ✓ Typical victims of phishing, vishing, smishing.
- ✓ Emotions being exploited in such attacks.

III. Language Box

1. Watch the video "Hack Attack – Vishing" [34] which shows a sample vishing call from the inside and answer the questions.

a) What does a deceptive scammer use to perpetrate a scam?
b) Why is voice solicitation so quick and successful?
c) What red flags can indicate that it's a fraudulent phone call?
d) What information was compromised?
e) What further actions should be taken to protect information after being compromised?

2. Aside from knowing how social engineering works and looking for red flags, there are some ways how you can protect yourself from such scams. Distribute the tips below between the two categories.

Protection against phishing

Protection against vishing

a) Be cautious about all communications you receive. If it appears to be a suspicious one, do not respond. Delete it.

b) Don't pick up the phone, simply let it go to voicemail. Caller IDs can be faked, which means you might not know who's calling. Later decide whether to call back.
c) Don't press buttons or respond to prompts. Scammers often use these tricks to identify potential targets for more robocalls. And the record of your voice can be used to navigate voice-automated phone menus.
d) Don't enter personal information in a pop-up screen. Legitimate companies and organisations don't ask for personal information via pop-up screens.
e) Do not click on any links listed in the email message, and do not open any attachments contained in a suspicious email.
f) Install a special spam filter on your email application and your web browser. These filters will not keep out all fraudulent messages, but they will reduce their number.
g) Hang up. The moment you suspect it's a fraudulent phone call, don't feel obliged to carry on a polite conversation. Simply hang up and block the number.
h) Verify the caller's identity. If the person provides a call-back number, it may be part of the scam, so don't use it.

3. Explain the words in bold. Use the following facts and work out the definition of what smishing is. Keep in mind it is a portmanteau word.

a) As users grow more **overwhelmed** by constant emails and suspicious of spam, text messages have become a more attractive attack vector.
b) In addition, people are often less **watchful** for suspicious messages on their phones than on their computers.
c) Smishers may try to convince you to give up a username password **combo** or other confidential information and use it for **nefarious** purposes later.
d) Bank's mission is one of the most **lucrative** and common types of this category of attack.
e) A smishing scam can convince users to download an app **purporting** to be from the nation's postal service.
f) Attackers can **plunder** your bank account, install malware on your phone that gains access to your finances or your location information, or trick you into spending money needlessly.

Portmanteau word
[pɔːtˈmæn.təʊ ˌwɜːd] – a word formed by combining two other words

4. Watch the video "What Is Smishing?" [56]. Write down what the following words, collocations and figures refer to:

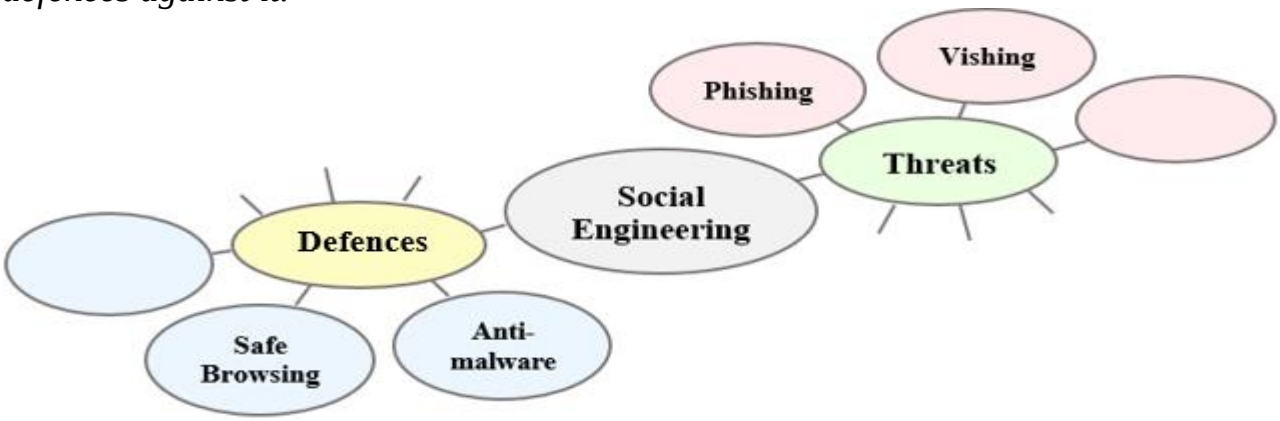
a) misleading text messages;
b) since the 1990s;
c) 98 % and 45 %;
d) 20 % and 6 %;
e) intimate relationships;
f) credentials;
g) the Czech Republic;
h) a few hundred dollars;
i) clergyman.

5. Watch the video again and provide the following information.

a) Give a proper definition to smishing.
b) Explain why it is becoming so widely spread today.
c) Name its main categories.
d) List the emotions that are mainly exploited.

6. Work out a list of measures how to be protected from smishing. Work in groups of three or four people. Then report your ideas to the rest of the group.

7. Use the information from this section and your background knowledge to complete the concept map. Then get ready to speak about social engineering, its threats and defences against it.



8. Interview some of your groupmates to elicit responses on the following questions. Then share the most interesting information gathered with the group.

a) Why do scammers use social engineering rather than hacking?
b) Why are people so gullible?
c) How can we avoid taking the bait and becoming victims of such scams?

IV. Decision Bank

1. Since ancient times people have been trying to protect sensitive information. Do you recognise the person in the picture? How is he related to the issues of cyber security? Can you break the cipher and read the secret message below? Is it a hard cipher to break?

Secret Message

c	v	v	c	e	m	c	v	f	c	y	p

Original Message

2. Choose the options from the ones given in italics to make true statements. Watch the video "How Encryption Works" [35], check your ideas and get ready to explain how encryption functions.

Encryption – the process of converting plain text to cipher text

a) Keeping your text messages protected against *eavesdroppers/interlocutors* has become a major issue today.
b) Your text messages are protected using *end-to-end/open* encryption.
c) Your phone has two *versatile/unique* keys that encrypt and decrypt messages.
d) Two people use the other person's public key combined with their own private key to create a *permanent/temporary* shared key.
e) They then use the shared key to encrypt messages to each other and their public keys are used to confirm that those shared keys are *fake/authentic*.
f) Some people believe that tech and telecom companies should provide what's called *backdoor/doorway* access to these encrypted messages.
g) The first type of backdoor is a list of *public/private* keys that allow the company access to encrypted messages.
h) But if the list of private keys is hacked or compromised, every person's private key is up for *leaves/grabs*.
i) The second type of backdoor is for tech companies to *deliberately/unintentionally* build a weakness or flaw into the encryption formula.
j) At the core of this whole debate is the very *simple/thorny* issue of personal privacy versus national security.

3. Watch the video again and complete the ideas.

1. The government says it occasionally needs access to some of these messages … .
2. End-to-end encryption happens whenever you send … from your smartphone.
3. Your public key is shared with other people, and it's used as … .
4. Your private key is only on your device and … .
5. When two people want to securely chat they use a combination of … .
6. The shared keys are being … constantly which ensures that people's conversation cannot be decrypted in the future.
7. The first type of backdoor access to the encrypted messages is a list of private keys that allow the company … .
8. The second type of backdoor is for tech companies to … into the encryption formula.

4. Read the article "Why Encryption Matters" published on the NortonLifeLock and decide whether the sentences in italics render the main or additional information. Give your view on the issues discussed in the article. Address the key ideas below.

Encryption for Internet privacy	Cybercrime as a big business	Encryption to commit cybercrime	Protection from ransomware

Why Encryption Matters

Written by Dan Rafter
Updated on Jun 12, 2023

Encryption helps protect your online privacy by turning personal information into "for your eyes only" messages intended only for the parties that need them and no one else. You should make sure that your emails are being sent over an encrypted connection, or that you are encrypting each message.

Cybercrime is a global business, often run by multinational outfits. Many of the large-scale data breaches that you may have heard about in the news demonstrate that cybercriminals are often out to steal personal information for financial gain.

Encryption is designed to protect your data, but it can also be used against you. Targeted ransomware is a cybercrime that can impact organisations of all sizes, including government offices. Ransomware can also target individual computer users. Attackers deploy ransomware to encrypt the various devices, including computers and servers, of victims. *The attackers often demand a ransom before they will provide a key to decrypt the encrypted data.* The goal is to persuade victims to pay out as a way to recover access to their important files, data, video and images. *Ransomware attacks against government agencies can shut down services, making it hard to get a permit, obtain a marriage licence, or pay a tax bill, for instance.*

But ransomware attacks can also happen to you. *Here are some tips to help protect your devices from ransomware attacks and the risk of having your data inaccessible.*

Install and use trusted security software on all your devices, including your mobile phone. Keep your security software up to date. It can help protect your devices from cyberattacks. Update your operating system and other software. This can patch security vulnerabilities. *Avoid reflexively opening email attachments.* Why? Email is one of the principal methods for delivering ransomware. Be wary of any email attachment that advises you to enable macros to view its content. *If you enable macros, macro malware can infect multiple files.* Back up your data to an external hard drive. If you're the victim of a ransomware attack, you'll likely be able to restore your files once the malware has been cleaned up. Consider using cloud services. This can help mitigate a ransomware infection, since many cloud services retain previous versions of files, allowing you to "roll back" to the unencrypted form. Don't pay the ransom. You could pay a ransom in hopes of getting your files back, but you might not get them back. *There's no guarantee the cybercriminal will release your data.*

Encryption is essential to help protect your sensitive personal information. But in the case of ransomware attacks, it can be used against you.

V. Conclusion Worksheet

Split into teams. Roll the dice in turns – use the one online https://freeonlinedice.com – and play the game. Appoint your lecturer to judge you. Every wrong answer returns your team to Start. The first team to reach Finish are the winners.

The *Can you … ?* Game

START	1. … define social engineering (SE)?	2. … name the goal of SE?	3. … name the weakest link in the security chain?
7. … list vulnerabilities scammers exploit? (at least 4)	6. … name the methods of SE? (at least 5)	5. … describe what the bait can be?	4. … explain what a social engineer does?
8. … explain what shouldering is?	9. … explain what pharming is?	10. … explain what phishing is?	11. … explain what baiting is?
15. … explain what rogue antivirus is?	14. … explain what tailgating is?	13. … explain what vishing is?	12. … explain what spear phishing is?
16. … explain what quid pro quo is?	17. … explain what smishing is?	18. … name the red flags of phishing? (at least 5)	19. … list the ways of protection against phishing? (at least 3)
23. … explain the difference between public and private keys?	22. … define encryption?	21. … recall the first person who encrypted a message?	20. … list the ways of protection against vishing? (at least 3)
24. … explain what symmetric encryption means?	25. … explain what asymmetric encryption means?	26. … prove why encryption matters?	FINISH

VI. Web Search

Explore the resources in the list to obtain additional information on social engineering and encryption. Report your findings in writing.

https://theconversation.com/us/search?q=social+engineering

https://www.welivesecurity.com/category/cybersecurity

https://theconversation.com/us/topics/encryption-241

VII. Revision Point

1. Use the key vocabulary of this lesson and find the terms that match the definitions.

1. It involves an attacker directly targeting a specific organisation or person with tailored phishing communications.
2. It's a type of social engineering attack where a scammer uses a false promise to lure a victim into a trap.
3. It is a form of cyberattack that sends you to a fake website that looks like the real thing.
4. Such attack describes a situation where the attacker can physically view the device screen and keypad to obtain personal information.
5. It is the fraudulent practice of making phone calls or leaving voice messages purporting to be from reputable companies in order to induce individuals to reveal personal information.
6. It happens when someone sneaks into a restricted area by using someone else.
7. It's a type of malware that pretends to have found an infection on the victim's computer.

2. Use the opposite words to the ones given in italics to correct the information.

When transmitting electronic data, the most common use of cryptography is to encrypt and decrypt email and other 1) *cipher* text messages. The simplest method uses the 2) *asymmetric* or secret key system. Here, data is 3) *decrypted* using a secret key, and then both the encoded message and secret key are sent to the 4) *sender* for decryption. But, if the message is intercepted, a third party has everything they need to decrypt and read the message. To address this issue, cryptologists devised the 5) *symmetric* or 6) *private* key system. In this case, every user has two keys: one public and one private. Senders 7) *offer* the public key of their intended recipient, encrypt the message and send it along. When the message arrives, only the recipient's 8) *public* key will decode it.

3. Render the article "Think Before You Scan" published on WeLiveSecurity by ESET orally. Record your speech and send it to your groupmate for assessment according to the checklist below. Your overall mark will be provided at the end of the table.

Think Before You Scan
How fraudsters can exploit QR codes to steal money

Cecilia Pastorino
Updated May 4, 2023

QR codes are having a moment. The humble squares may have been around since 1994, but it wasn't until the COVID-19 era that they became a truly household name. These days, you can spot them all over the place, with the codes put to use for everything from displaying restaurant menus to facilitating contactless transactions to being built into contact tracing apps. Much like any other popular technology, however, the widespread use of QR codes has also caught the attention of scammers, who have co-opted them for nefarious purposes.

Short for "Quick Response", a QR code is a type of machine-scannable barcode that, as implied by its name, is designed to be read and interpreted instantly by a digital device. A QR code can store up to 4,296 alphanumeric characters, although the commonly used ones tend to contain fewer characters and so allow for easy decoding by a smartphone's camera.

The text strings that are encoded within a QR code may contain a variety of data. The action prompted by reading a QR code depends on the application that is interacting with said code. The codes may be used to open a website, download a file, add a contact, connect to a Wi-Fi network, and even make payments.

It can redirect you to a malicious website to steal sensitive information. Phishing attacks don't spread only by emails, instant messages, or text. Just as attackers can use malicious ads and other techniques to direct victims to fraudulent sites, they can do the same with QR codes. This is especially a concern if the codes are put up in adverts in busy areas or near banks or other financial institutions.

QR code can download a malicious file on your device. Many bars and restaurants use QR codes to download a PDF-format menu or install an app enabling patrons to place an order. Attackers could easily tamper with the QR code to try to trick the potential victim into downloading a malicious PDF file or a rogue mobile app.

QR codes can trigger actions directly on your device. However, there are some basic actions that any basic QR reader is capable of interpreting. These include connecting the device to a Wi-Fi network, sending an email or SMS message with a predefined text, or saving contact information on the device.

Most financial apps today allow making payments through QR codes that contain data belonging to the recipient of the money. However, attackers could modify these QR codes with their own data and receive payments into their accounts. It could also generate codes with money collection requests to deceive buyers.

Many QR codes are used as a certificate to verify a person's information, such as their ID or vaccine pass. In these cases, the QR codes may contain information that

is as sensitive as the information contained in their ID or medical records, which an attacker could easily obtain by scanning the QR code.

In most scenarios, the attacker will need to generate a malicious QR code that will replace the original one. In other words, the attacks involve social engineering and rely on duping the victim into taking an ill-fated action.

Here's what to consider before scanning a QR code. Before scanning a QR code, check that it has not been tampered with; for example, verify that it doesn't cover up another QR code. Refrain from scanning randomly found QR codes or codes in unsolicited messages. Be very careful when it comes to using a QR code to pay a bill or conduct another kind of financial transaction. Consider using another payment option. Disable the option to perform automatic actions when scanning a QR code, such as visiting a website, downloading a file, or connecting to a Wi-Fi network. After scanning, look at the URL to check that it's legitimate. Do not share QR codes containing sensitive information. When generating a QR code, use a reputable service. Such a service can also verify that the QR is genuine and performs the desired action. Keep your apps up to date and use security software.

Summary checklist	*Yes*	*Undecided*	*No*
1. The origin of the publication was mentioned			
2. The date of the column was provided			
3. The style of the script was defined and justified			
4. The genre of the post was indicated and justified			
5. The author of the article was called			
6. The title of the post was given			
7. The main idea of the article was identified			
8. The important points were included			
9. The unnecessary details were left out			
10. The personal opinion/impression of the article was given			
11. The personal view on the topic/problem was provided			
12. The summary included own vocabulary not citations			
13. The summary was full of varied grammar structures			
The overall mark (excellent/good/satisfactory/below average/bad)			

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

Comprehensive 👍	Rather confident ✋	Limited 👎

- Social engineering, state of the issue.
- Methods of social engineering.
- Protection techniques against phishing, vishing, smishing.
- Encryption, its types, usage, importance.

Wordlist

Topic: Computer Concepts

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

Topic: Software Fundamentals

Accomplish *v*	Tamperproofing *n*
Application *n*	Toolbar *n*
Authentic *adj*	Typeface *n*
Bar *n, v*	Underline *v*
Bargain *n*	Unauthorised *adj*
Bold *v, adj*	Unlawful *adj*
Bug *n, v*	Update *n, v*
Circumstance *n*	Vendor *n*
Compiler *n*	Warranty *n*
Compiling *n*	Watermarking *n*
Consistency *n*	
Copyright *n*	*Collocations:*
Counterfeit *n, adj*	
Debugger *n*	Clean record
Defragmentation *n*	Client-server overuse
Demoware *n*	Command-line interface
Distasteful *adj*	Commercial software
Entitle *v*	Commit a crime
Fake *n, v, adj*	Computer-centric
Feature *n, v*	Copyright law
Footer *n*	Customisation utilities
Formatting *n*	Device driver
Freeware *n*	Extensive following
Header *n*	Hard disk loading
Hefty *adj*	Intellectual property
Indent *n, v*	Law enforcement
Interface *n, v*	Legal protection
Interpreter *n*	Licence agreement
Italics *n*	Licence compliance
Jailbreaking *n*	Multi-user licence
Kernel *n*	Nested folder
Legitimate *adj*	Online verification
Liable (for) *adj*	Open source software
Modify *v*	Operating system
Monitor *n, v*	Presentation software
Permissible *adj*	Product key
Procedure *n*	Proprietary software
Proprietary *adj*	Public domain
Purchase *n, v*	Single-user licence
Restriction *n*	Software crash
Retrench *v*	Software product
Shareware *n*	Source code
Softlifting *n*	User-friendly interface
Spreadsheet *n*	Utility software
Spruce (up) *v*	Violate the terms
Stock *n, v*	Warez site
Superficial *adj*	Web browser
Susceptible (to) *adj*	Word processing

Topic: Computer Networks

Allot *v* Analytics *n* Artificial *adj* Bandwidth *n* Bridge *n, v* Broadband *adj* Broadcast *v, n* Browser *n* Cellular *adj* Compatible *adj* Demodulator *n* Dial-up *adj* Discern *v* Diverse *adj* Driver *n* Download *n, v* Engender *v* Enormous *adj* Ethernet *n* Extend *v* Extension *n* Fibre-optic *adj* Frequency *n* Gateway *n* Holistic *adj* Host *n, v* Hotspot *n* Hub *n* Hyperlink *n, v* Hypertext *n* Identifier *n* Immersive *adj* Implication *n* Instant *n, adj* Interference *n* Jitter *n* Latency *n* Link *n, v* Medium (media *pl*) *n* Modem *n* Modulator *n* Multilateral *adj* Narrowband *adj* Node *n*	Notable *adj* Packet *n* Pervade *v* Ping *n, v* Range *n, v* Recipient *n* Repeater *n* Router *n* Sandboxing *n* Satellite *n* Securely *adv* Sophisticated *adj* Spot *n, v* Stem *n, v* Swap *n, v* Synergy *n* Tag *n, v* Terrestrial *adj* Upload *n, v* Utilise *v* Viable *adj* Vigilance *n* Ware *n* Wavelength *n* Wire *n, v* Wired *adj* Wireless *adj* *Collocations:* Client-server network Cloud computing Cloud storage Coaxial cable Data centre Domain name IoT ecosystem Full/Partial mesh Network topology Search box Search engine Signal interference Twisted pair Wearable device Virtual machine

Topic: Information Systems

Acceptance *n* Accommodate *v* Accuracy *n* Adjustment *n* Alter *v* Analysis *n* Appropriateness *n* Assessment *n* Assurance *n* Bitcoin *n* Blockchain *n* Cease *n, v* Chart *n, v* Coding *n* Compete *v* Cost-effective *adj* Creep *n, v* Customisation *n* Debugging *n* Deploy v Derive *v* Design *n, v* Determine *v* Deterrent *n, adj* Devise *v* Downtime *n* Eliminate *v* Encounter *n, v* Engage *v* Ensure *v* Evaluation *n* Expansion *n* Extensively *adv* Handbook *n* Implementation *n* In-house *adj* Insignificant *adj* Integration *n* Interrelated *adj* Inventory *n* Kit *n* Maintenance *n* Manual *n, adj* Methodology *n* Metrics *n, pl* Objective *n, adj* Ongoing *adj*	Outsource *v* Requirement *n* Scope *n, v* Shell *n, v* Sign (off) *v* Supervise *v* Throughput *n* Tool *n* Turnkey *n, adj* Unit *n* Usability *n* Verify *v* Workflow *n* *Collocations:* Application development tool Application specifications Business level testing Construct a prototype Corrective procedure Detection activity Development methodology Direct/parallel/phased/pilot conversion Emergency/major/routine modifications Evaluation checklist Feature/scope creep Fix a bug Meet the goal/need/requirement Power outage Preventive countermeasure Project costs Project development plan Project justification Project schedule Project team Response time Revised information system Security breach Software patch Success factor System from scratch System requirements report Tax compliance Trial version User levels

Topic: Computer Programming

Abstraction *n*	Threat *n*
Actuator *n*	Variable *n, adj*
Aficionado *n*	Variety *n*
Assemble *v*	Veracity *n*
Assist *n, v*	Welding *n*
Assumption *n*	
Attribute *n, v*	*Collocations:*
Backdrop *n*	
Bond *n, v*	Application program
Bunch *n, v*	Automated algorithms
Class *n, v, adj*	Autonomous/Semi-autonomous robot
Consistent *adj*	Big data
Contemplate *v*	Digital assistance
Crash *n, v*	End-effectors
Declarative *adj*	Game platform
Encapsulation *n*	Guiding programming
Entity *n*	High-level language
Ethical *adj*	Human intelligence
Expand *v*	Hydraulic/pneumatic/electric motor
Explicitly *adv*	Image recognition
Extraction *n*	Inference algorithms
Facilitate *v*	Literal acting
Forecast *n, v*	Logic error
Grab *n, v*	Low-level language
Inheritance *n*	Machine code
Instance *n*	Neural network
Intelligent *adj*	Object program
Intervention *n*	Off-line programming
Method *n*	Pattern recognition
Mimic *n, v*	Predictive analytics
Object *n*	Problem statement
Object-oriented *adj*	Remote-control robot
Outsmart *v*	Robotic arm
Polymorphism *n*	Rolling robot
Procedural *adj*	Runtime error
Recap *n, v*	Sequence solving
Robotics *n*	Source program
Self-contained *adj*	Speech recognition
Sensor *n*	Stationary robot
Simulate *v*	Supervised (unsupervised) learning
Statement *n*	algorithms
Substitute (for) *n, v*	Virtual assistant
Syntax *n*	Virtual robot
Template *n*	Walking robot

Topic: Digital Security

Adware *n*	Rootkit *n*
Appealing *adj*	Scam *n, v*
Assault *n, v*	Scan *n, v*
Attachment *n*	Shield *n, v*
Authentication *n*	Shouldering *n*
Baiting *n*	Smishing *n*
Bot *n*	Sniffing *n*
Compel *v*	Spoof *n, v*
Compromise *v*	Spyware *n*
Confirm *v*	Surreptitiously *adv*
Conventional *adj*	Suspect *n, v*
Countermeasure *n*	Tailgating *n*
Credentials *n, pl*	Trick (into) *v*
Current *n, adj*	Unaware *adj*
Cyberspace *n*	Unintentional *adj*
Deceptive *adj*	Unleash *v*
Devastating *adj*	Virus *n*
Disruption *n*	Vishing *n*
Encryption *n*	Worm *n, v*
Espionage *n*	
Exploit *n, v*	*Collocations:*
Fraud *n*	
Fraudulent *adj*	Be on the lookout
Gain *n, v*	Brute force attack
Hacktivist *n*	Collateral damage
Hijack *n, v*	Cyber weapon
Inadvertently *adv*	Denial of service
Induce *v*	Dictionary attack
Infallible *adj*	Heuristic analyses
Intercept *v*	Identity theft
Leakage *n*	Key logger
Lucrative *adj*	Password manager
Lurk *v*	Pop-up ads
Malicious *adj*	Power surge
Malware *n*	Private key
Mitigate *v*	Public key
Nefarious *adj*	Quid pro quo
Notorious *adj*	Retinal pattern
Outlet *n*	Rogue antivirus
Overhaul *n, v*	Spear phishing
Payload *n*	Surge strip/suppressor
Penetration *n*	Third party
Pharming *n*	Trigger event
Phishing *n*	Trojan horse
Precaution *n*	Verification code
Prey (on) *v*	Virus signature
Ransomware *n*	Voice solicitation
Replicate *v*	

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 machine)
BIOS – Basic Input Output System
BSoD – Blue 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

References

Publications

1. Esteras, S. Infotech English for Computer Users / S. Esteras. – UK : Cambridge University Press, 2008. – 168 p.

2. Evans, V. Information Technology / V. Evans, J. Dooley, S. Wright. – Express Publishing, 2018. – 130 p.

3. Fitzgerald, P. English for ICT Studies / P. Fitzgerald. – UK : Garnet Publishing Ltd, 2011. – 140 p.

4. Glendinning, E. Oxford English for Information Technology / E. Glendinning, J. McEwan. – UK : Oxford University Press, 2002. – 225 p.

5. Hill, D. English for Information Technology / D. Hill. – UK : Pearson Education Ltd, 2012. – 82 p.

6. Longman Dictionary of Contemporary English / ed.: D. Summers. – UK : Pearson Education Ltd, 2007. – 1949 p.

7. Parsons, J. J. New Perspective on Computer Concepts: Comprehensive / J. J. Parson, D. Oja. – Boston : Cengage Learning, 2018. – 810 p.

Online Publications

8. A Simple Explanation of the Internet of Things [Electronic resource] // Linkedin. – Mode of access: https://www.linkedin.com/pulse/20140619200816-9548162-a-simple-explanation-of-the-internet-of-things. – Date of access: 11.09.2023.

9. Artificial Intelligence in Your Everyday Life [Electronic resource] // ESL Brains. – Mode of access: https://eslbrains.com/lesson_category/technology/page/3. – Date of access: 02.09.2023.

10. Different Types of Robot Programming Languages [Electronic resource] // Plant Automation Technology. – Mode of access: https://www.plantautomation-technology.com/articles/different-types-of-robot-programming-languages. – Date of access: 22.10.2023.

11. Eleven Tips for Troubleshooting Software [Electronic resource] // Techsoup. – Mode of access: https://www.techsoup.org/support/articles-and-how-tos/eleven-tips-for-troubleshooting-software. – Date of access: 18.08.2023.

12. ESL Worksheets [Electronic resource] // iSLCollective. – Mode of access: https://en.islcollective.com/english-esl-worksheets/vocabulary/future/history-robots-reading/40306. – Date of access: 08.10.2023.

13. Five Challenges Still Facing the Internet of Things [Electronic resource] // IoTNow. – Mode of access: https://www.iot-now.com/2020/06/03/103228-5-challenges-still-facing-the-internet-of-things. – Date of access: 17.11.2023.

14. Five Dangers of Using Pirated Software in Emerging Businesses [Electronic resource] // CodeCondo. – Mode of access: https://codecondo.com/5-dangers-of-using-pirated-software-in-emerging-businesses. – Date of access: 13.09.2023.

15. How Apps Work [Electronic resource] // ESL Brains. – Mode of access: https://eslbrains.com/lesson_category/technology/page/1. – Date of access: 11.09.2023.

16. How Video Games Change the World [Electronic resource] // ESL Brains. – Mode of access: https://eslbrains.com/lesson_category/technology/page/3. – Date of access: 27.10.2023.

17. IoT Connectivity Industry Forecast by 2023 [Electronic resource] // 101 Blockchains. – Mode of access: https://101blockchains.com/iot-connectivity-industry-forecast/#:~:text=IoT%2C%20or%20Internet%20of%20Things,reach%20%24621%20billion%20by%202030. – Date of access: 08.09.2023.

18. Learn Computer Fundamentals [Electronic resource] // Tutorialspoint. – Mode of access: https://www.tutorialspoint.com/computer_fundamentals/computer_hardware.htm. – Date of access: 24.08.2023.

19. Object-Oriented Programming [Electronic resource] // TechTarget. – Mode of access: https://www.techtarget.com/searchapparchitecture/definition/object-oriented-programming-OOP. – Date of access: 17.11.2023.

20. Online Safety Tips [Electronic resource] // LearnEnglish Teens. – Mode of access: https://learnenglishteens.britishcouncil.org/sites/teens/files/online_safety_tips_-_transcript.pdf. – Date of access: 09.10.2023.

21. OpenAI and Figure Develop Humanoid Robots for the Workforce [Electronic resource] // Fox News. – Mode of access: https://www.foxnews.com/tech/openai-figure-develop-terrifyingly-creepy-humanoid-robots. – Date of access: 09.09.2023.

22. Robot Teachers [Electronic resource] // LearnEnglish. British Council. – Mode of access: https://learnenglish.britishcouncil.org/skills/reading/b1-reading/robot-teachers. – Date of access: 24.08.2023.

23. The Good Recycling Guide [Electronic resource] // FrontlineWorld. – Mode of access: https://www.pbs.org/frontlineworld/stories/ghana804/resources/faq.html. – Date of access: 03.10.2023.

24. Think Before You Scan: How Fraudsters Can Exploit QR Codes to Steal Money [Electronic resource] // WeLiveSecurity. – Mode of access: https://www.welivesecurity.com/2022/02/04/think-before-scan-how-fraudsters-exploit-qr-codes. – Date of access: 09.10.2023.

25. What Are the Main Components of Robots? [Electronic resource] // Science. – Mode of access: https://rehack.com/trending/science/what-are-the-main-components-of-robots. – Date of access: 29.08.2023.

26. What Is Data Center [Electronic resource] // Paloalto. – Mode of access: https://www.paloaltonetworks.com/cyberpedia/data-center-security. – Date of access: 15.09.2023.

27. What Is Encryption and How Does It Protect Your Data? [Electronic resource] // Norton. – Mode of access: https://us.norton.com/internetsecurity-privacy-what-is-encryption.html. – Date of access: 09.10.2023.

28. Sustainability in IT [Electronic resource] // ITSG Global. – Mode of access: https://itsg-global.com/category/advanced-team-extension. – Date of access: 02.10.2023.

Video Resources

29. Computer Basics: Inside a Computer [Electronic resource] // YouTube. – Mode of access: https://www.youtube.com/watch?v= HB4I2CgkcCo. – Date of access: 04.10.2023.

30. Connecting to the Internet [Electronic resource] // YouTube. – Mode of access: https://www.youtube.com/watch?v=93-3zmVvGU&t=65s. – Date of access: 11.09.2023.

31. Central Processing Unit [Electronic resource] // YouTube. – Mode of access: https://www.youtube.com/watch?v=FB8bphbLuX0. – Date of access: 05.11.2023.

32. Design Phase in SDLC [Electronic resource] // YouTube. – Mode of access: https://www.youtube.com/watch?v=rAR5sbaphwU&t=123s. – Date of access: 19.09.2023.

33. E-Sport at the Olimpics [Electronic resource] // YouTube. – Mode of access: https://www.youtube.com/watch?v=3xXOP8tWMJE. – Date of access: 21.09.2023.

34. Hack Attack – Vishing [Electronic resource] // YouTube. – Mode of access: https://youtu.be/BEHl2lAuWCk. – Date of access: 02.10.2023.

35. How Encryption Works – and How It Can Be Bypassed [Electronic resource] // YouTube. – Mode of access: https://youtu.be/TImdsUglGv4. – Date of access: 04.11.2023.

36. How It Works Internet of Things [Electronic resource] // YouTube. – Mode of access: https://youtu.be/Mpe651AdmZA. – Date of access: 12.10.2023.

37. How Software Is Made [Electronic resource] // YouTube. – Mode of access: https://www.youtube.com/watch?v=bWdeGTJxMQc&t=32s. – Date of access: 10.10.2023.

38. Object-Oriented Programming [Electronic resource] // YouTube. – Mode of access: https://www.youtube.com/watch?v=08Ww_VD45w. – Date of access: 07.11.2023.

39. Project Management Scope Creep [Electronic resource] // YouTube. – Mode of access: https://youtu.be/_c-qzFV5yM4. – Date of access: 19.10.2023

40. Protect Your Computer from Malware [Electronic resource] // YouTube. – Mode of access: https://www.youtube.com/watch?v=XU8PHihT_P4. – Date of access: 19.10.2023.

41. Robot Butler. Samsung's First-ever Personal Robots [Electronic resource] // YouTube. – Mode of access: https://www.youtube.com/watch?v=VemqlfpctM0&t=5s. – Date of access: 18.09.2023.

42. SDLC Maintenance Phase [Electronic resource] // YouTube. – Mode of access: https://youtu.be/3KWVMbyAGCI. – Date of access: 18.10.2023.

43. Security Awareness Episodes [Electronic resource] // YouTube. – Mode of access: https://youtube.com/playlist?list=PL7QHbjPSF0r6qJonaROIxVaMLzwDnZyOL. – Date of access: 16.10.2023.

44. Software Development Tutorial – The Fundamentals of Programming [Electronic resource] // YouTube. – Mode of access: https://youtu.be/YCDTYlUWkQE. – Date of access: 21.10.2023.

45. Software Piracy in Asia Expands [Electronic resource] // YouTube. – Mode of access: https://youtu.be/jn4Ybq98aSk. – Date of access: 16.11.2023.

46. System Development Life Cycle [Electronic resource] // YouTube. – Mode of access: https://youtu.be/hXVlVRooAx4. – Date of access: 26.10.2023.

47. Tech Tips. How to Create a Strong Password [Electronic resource] // YouTube. – Mode of access: https://yandex.by/video/preview/2807246367286557753. – Date of access: 21.09.2023.

48. The E-Waste Tragedy [Electronic resource] // YouTube. – Mode of access: https://youtu.be/_1NlUd-XM7M. – Date of access: 10.11.2023.

49. The Problem with E-Waste [Electronic resource] // YouTube. – Mode of access: https://youtu.be/FmJFVmtWf-I. – Date of access: 12.10.2023.

50. What Is a Network? [Electronic resource] // YouTube. – Mode of access: https://www.youtube.com/watch?v=GqRwpFKBbPM&t=6s. – Date of access: 10.11.2023.

51. What Is Artificial Intelligence? [Electronic resource] // YouTube. – Mode of access: https://www.youtube.com/watch?v=mJeNghZXtMo&t=21s. – Date of access: 24.10.2023.

52. What Is E-Waste? [Electronic resource] // YouTube. – Mode of access: https://www.youtube.com/watch?v=HQZjouMTH07. – Date of access: 10.11.2023.

53. What Is ICT (Information and Communications Technology)? [Electronic resource] // YouTube. – Mode of access: https://www.youtube.com/watch?v=5PDQKu2-bAc. – Date of access: 11.11.2023.

54. What Is Python? Why Python Is so Popular? [Electronic resource] // YouTube. – Mode of access: https://youtu.be/Y8Tko2YC5hA. – Date of access: 19.10.2023.

55. What Is Robotics? Robotics Explained [Electronic resource] // YouTube. – Mode of access: https://www.youtube.com/watch?v=htjRUL3neMg&t=114s. – Date of access: 11.10.2023.

56. What Is Smishing? How Phishing via Text Message Works [Electronic resource] // YouTube. – Mode of access: https://youtu.be/ZOZGQeG8avQ. – Date of access: 17.10.2023.

57. What Is the Blockchain? [Electronic resource] // YouTube. – Mode of access: https://www.youtube.com/watch?v=ALCGEDZOH88. – Date of access: 07.11.2023.

58. What Is the Cloud? [Electronic resource] // YouTube. – Mode of access: https://www.youtube.com/watch?v=xz8Fy-LQjVk. – Date of access: 10.11.2023.

Audio Tracks

59. Infotech English for Computer Users Students Book 4th Edition CD [Electronic resource] // YouTube. – Mode of access: https://www.youtube.com/watch?v=4uk1qrCPlts. – Date of access: 15.10.2023.

60. English for Information Technology CD 2 [Electronic resource] // YouTube. – Mode of access: https://www.youtube.com/watch?v=vZAzbF3MKr0. – Date of access: 23.10.2023.

Online Dictionaries

61. Cambridge Dictionary [Electronic resource] // Cambridge. – Mode of access: https://dictionary.cambridge.org/ru. – Date of access: 07.11.2023.

62. Macmillan Dictionary [Electronic resource] // Macmillan. – Mode of access: https://www.macmillandictionary.com. – Date of access: 01.11.2023.

63. Merriam Webster [Electronic resource] // An Encyclopedia Britannica Company. – Mode of access: https://www.merriam-webster.com. – Date of access: 24.10.2023.

64. Oxford Learners' Dictionaries [Electronic resource] // Oxford. – Mode of access: https://www.oxfordlearnersdictionaries.com. – Date of access: 22.10.2023.

Св. план 2023, поз. 29

Учебное издание

Касперович Наталия Григорьевна
Булавская Татьяна Владимировна
Ладыженко Марина Владимировна

ПРАКТИЧЕСКИЙ КУРС АНГЛИЙСКОГО ЯЗЫКА В ОБЛАСТИ ИНФОРМАЦИОННЫХ ТЕХНОЛОГИЙ

PRACTICAL ENGLISH COURSE FOR INFORMATION TECHNOLOGY

ПОСОБИЕ

Редакторы *Е. С. Юрец, С. Г. Девдера*
Компьютерная правка, оригинал-макет *Е. Г. Бабичева*
Дизайн обложки *К. И. Трубач*

Подписано в печать 16.05.2024. Формат 60×84 1/8. Бумага офсетная. Гарнитура «Таймс».
Отпечатано на ризографе. Усл. печ. л. 27,9. Уч.-изд. л. 14,8. Тираж 150 экз. Заказ 170.

Издатель и полиграфическое исполнение: учреждение образования
«Белорусский государственный университет информатики и радиоэлектроники».
Свидетельство о государственной регистрации издателя, изготовителя,
распространителя печатных изданий №1/238 от 24.03.2014,
№2/113 от 07.04.2014, №3/615 от 07.04.2014.
Ул. П. Бровки, 6, 220013, г. Минск