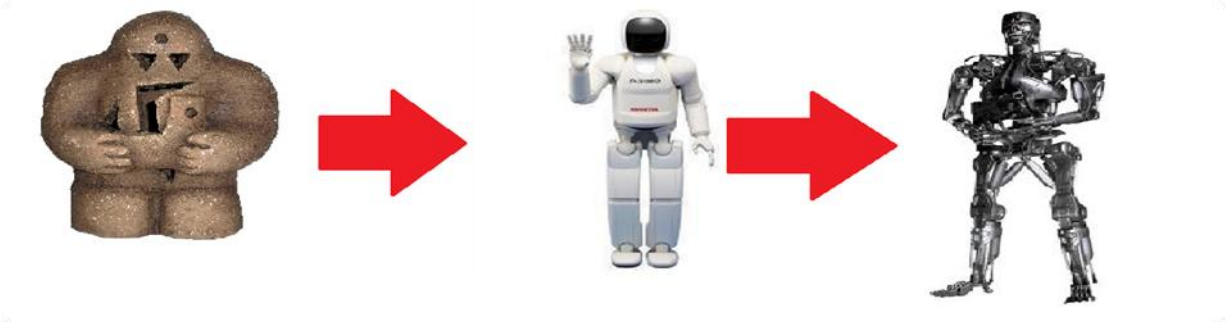
MODULE 9
ROBOTS AND ROBOTICS



"Don't think of robots as replacements for humans, think of them as things that will help make us better at tackling many of the problems we face".

Eoin Treacy – an analyst, fund manager, lecturer and author.

Learning points for Module 9:

Reading:

Text A. The Invention of the Robot

Text B. Robot Teachers

Text C. Advances in Underwater Robots

Vocabulary in context: word definitions, collocations, synonyms, word forms.

Grammar: Participle I, Participle II, Perfect Participle, Participle Clauses.

Speaking: Presentations and discussions of the topic 'Robots in our life'.

Learning aims:

- to practise reading and speaking about robots and robotics;
- to learn and practise active vocabulary related to the topic of the module;
- to learn about participles and participle clauses and practise how to understand and use them;
- to prepare for Module 9 test

Lead-in

Try to write the definition of a robot. Compare your definition with the definitions of an industrial robot given below. Which of them do you like the most? Explain why.

A robot is…

- a machine that can move and do some of the work of a person, and is usually controlled by a computer.
- a computer that moves itself or other objects in three-dimensional space under automatic control.
- a device which can be programmed to carry out certain manufacturing or other tasks which are similar to tasks carried out by people.

READING

Part 1

1. ***In mini groups try to complete the list of top ten facts about robots. Then read text 9A and check your answers. (Three facts are not given in the text. Try to find the answers by yourself).***

1. The word robot comes from …
2. The concept of a robot dates back…
3. The first working robots were …
4. Robots are unable …
5. The first accident involving a robot occurred …
6. The great benefit of robotisation is that …
7. The average annual production rate of industrial robots is…
8. The great fear people have of robots is that …
9. The smallest robot is…
10. The number of robots in use is…

Text 9 A

THE INVENTION OF THE ROBOT

(1) The history of robotics initially began in the ancient world. Concepts of artificial servants and companions[1] date at least as far back as the ancient legend of Cadmus*, who is said to have sown[2] dragon teeth that **turned into** soldiers. Another example is Pygmalion** whose statue of Galatea came to life. Among the first **verifiable** automatons (mechanical devices that function automatically) is a **humanoid** drawn by Leonardo da Vinci (1452–1519) in around 1495. Leonardo's notebooks, rediscovered in the 1950s, contained detailed drawings of a mechanical knight in armour[3] which was able to sit up, wave its arms and move its head and jaw.

(2) The **actual** word 'robot' was invented in 1922 by Karel Capek, a Check writer and playwright. It was used in a play about an army of industrial robots that became so intelligent that they were able **to take over** the world. Robots developed a **powerful** presence in fiction and film in the twentieth century, long before they were created in reality. It was a case of science fiction propelling[4] scientists forward until it became **science fact**.

(3) The popular idea is that a robot is a machine, **preferably** made of shiny[5] metal, that acts and **looks like** a human being. The real robots that were **actually** built to work on the production line in a car factory were far from humanoid. Most industrial robots are the equivalent of a mechanical arm that can pick things up, lift them, **extend**, and so on. The production-line robots are programmed **to carry out** a specific **sequence** of tasks. Robots are unable to think, or decide to do things differently. The robot's computer may be **set up** by writing all the **separate** movements out as a long computer program. **Alternatively**, it is possible to show the robot what to do.

(4) The great benefit of **robotisation**, the introduction of robots to carry out industrial tasks, is that it **relieves** factory workers of the most repetitive and tedious[6] jobs. Robots are also **suited** to carry out dangerous tasks that are far too risky for people **to attempt,** such as

detonating car bombs. Some robots are **fitted with vision equipment** that can **enhance** their **performance**. All the above robots including production-line robots, medical robots, movement imitating robots and self-driving cars are being widely developed and used today. For example, the **average** annual **production rate** of industrial robots is 300,000 **units** per year. There also exist advanced humanoid-like robots that can completely imitate human motion. But what about tomorrow?

(5) The great fear people have of robots, and a very natural one, is that robots will **take away** their jobs. So far, it looks as if there is less to fear from robots than once thought. Even robots designed for less technical tasks, such as housework, seem to be very limited. A robot can be programmed to vacuum clean the floor of a room, but it cannot **switch** in an instant, as a human being can, to moving a chair to one side **with a view to cleaning** underneath it, and then swiftly vacuum clean a **complicated** staircase[7]. The **replacement** of people with robots seems very unlikely. The real future of robotics is in the improvement of **existing** robots and in creating new ones. But the most complicated robot is and will always be the human being and no robot is likely to be comparable to a living man in terms of[8] thinking and inventing.

**Cadmus in Greek mythology was a prince, the son of Phoenix and brother of Europa.*

***Pygmalion in Greek mythology was a sculptor who fell in love with a statue he had created.*

Vocabulary notes for text 9A

[1] companions	партнёр, компаньон
[2] is said to have sown	как говорится в легенде, посеял
[3] knight in armour	рыцарь в доспехах
[4] propel(ling)	толкать вперед, побуждать, стимулировать
[5] shiny	блестящий, отполированный

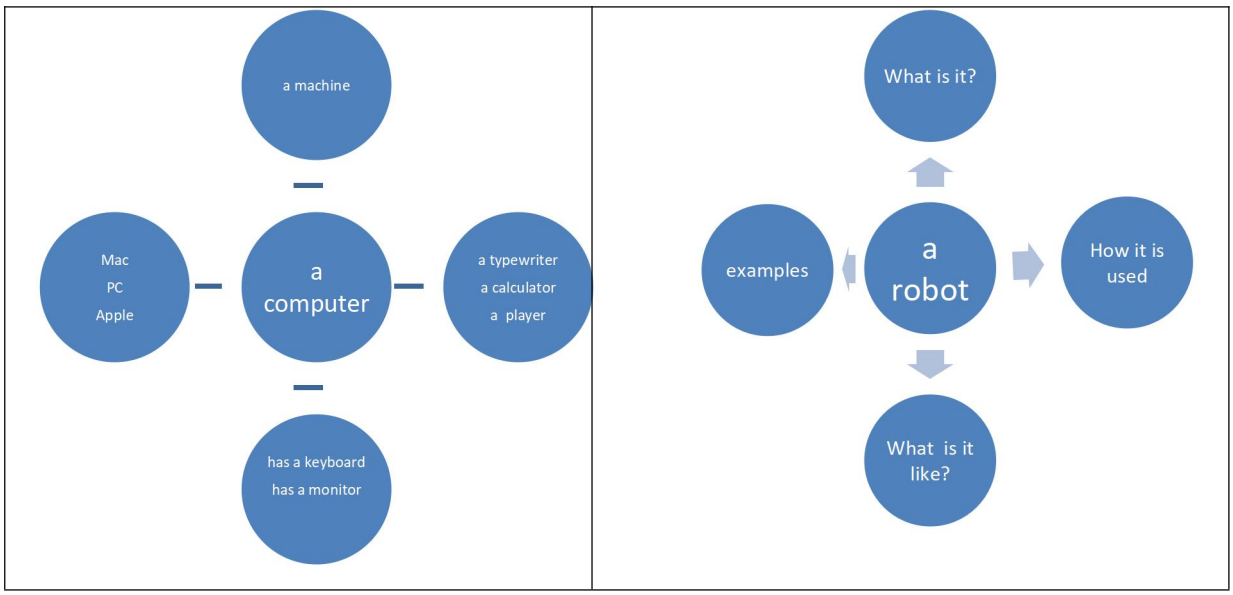
[6] tedious	нудный, скучный, утомительный
[7] staircase	лестница
[8] in terms of	с точки зрения, применительно

2. ***Read the text again paying attention to the words in bold. Try to figure out their meaning from context. Explain their meaning or translate them into Russian. Use a dictionary if necessary.***

3. ***Answer the following questions using text 9A.***

1. When did the concept of artificial servants and companions appear? How did we know about that?
2. When were the drawings of a mechanical knight in armour rediscovered and who had drawn them?
3. Who invented the word ‘robot’ and what did it mean?
4. What do robots look like? What allows robots to perform specific sequences of tasks?
5. What are robots used for and what are the main benefits of using robots?
6. What types of robots are widely used today?
7. How does the text answer the question whether robots will replace humans?
8. What is the future of robotics?

4. Look at the sample concept-of-definition map of a computer and try to produce a concept-of-definition map of a robot using the information in Text 9A.



5. ***Which of the following sentences best summarises the main points of each paragraph? Why?***

The first §

a. is about the ancient legend of Cadmus
b. explains how the concept of artificial servants was born
c. gives an overview of the ancient prototypes of modern robots

The second §

a. describes the origin of the word 'robot'
b. gives some details on how the word 'robot' appeared and how the concept of robots became a reality
c. is about Check playwright Karel Capek

The third §

a. is about how real robots actually look like and operate
b. what robots are made of
c. how the robot's computer is set up

The fourth §

a. is devoted to the benefits of robotisation
b. describes different type of robots
c. describes the most popular robots used today and the benefits of their application

The fifth §

a. gives the author's opinion concerning our future jobs
b. explains why the replacement of people with robots is unlikely and what the future of robotics really is
c. describes the most complicated robot

6. *Summarise text 9A using the sentences from the previous exercise as your key points. Make use of some linking expressions from the list below.*

To begin with, as well, so that, however, for example, finally, according to the text, etc.

READING

Part 2

7. *Match the words with the definitions.*

To underestimate / creativity / to adapt / to take over / to diagnose / empathy

- the ability to think of new ideas
- to think something is less than it is
- to work out what kind of illness someone has
- when someone takes control of something, like a job or a place
- to change something so that it fits better
- the ability to deeply understand someone's situation or feelings

8. *Read the text and decide which statements are True and which are False.*

1. Most jobs seem as if they can be done by robots or computers. (T/F)
2. Robots are always better at diagnosing illnesses than doctors. (T/F)
3. Many experts agree robots will replace teachers. (T/F)
4. One advantage of robot teachers is that they don't need to rest. (T/F)
5. Robot assistants could help teachers by marking homework and writing reports. (T/F)
6. Some teachers use robots to reduce their time answering emails and marking homework. (T/F)

Text 9B

ROBOT TEACHERS

(1) If you think of the jobs robots could never do, you would probably put doctors and teachers at the top of the list. It is easy to imagine robot cleaners and factory workers, but some jobs need **human connection** and creativity. But are we underestimating[1] what robots can do? In some cases, they already **perform** better than doctors at diagnosing illness. 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?

(2) Some educators predict that the robot 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[2] signals. Then they will **adapt** the information to each student. It is not a popular opinion and it is 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 per cent 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.

(3) 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**[3], teachers would have more time and energy for the parts of the job humans do best.

Vocabulary notes for text 9B

[1] underestimate	недооценивать, преуменьшать
[2] brain	мозг
[3] report	доклад, отчет

9. ***Read the text again and choose the best answer.***

1. It is easy to think robots …

a. will replace people even if we don't like the idea.

b. are more capable than people and it's true.

c. can do less than people but it is not always true.

2. Some educators think that teachers in the future will …

a. help robots in class. b. teach knowledge to students. c. no longer exist.

3. Robots will probably never …

a. have human understanding of emotions. b. be a popular choice for teachers. c. be intelligent enough to work in education.

4. Some parts of the world ...

a. pay robots to teach. b. already use robots in teaching jobs. c. have a shortage of teachers.

5. Teachers …

a. work harder than office workers. b. have less help than office workers. c. leave their jobs to become office workers.

6. Robots could …

a. empathise with students. b. mark homework. c. prepare lessons.

10. ***Match the words from text 9B with their definitions using the context.***

1. human connection	a. to some degree, but not completely;
2. to perform	b. to make something more modern or suitable for use by adding new information;
3. to transfer information	c. a state of being related to someone or something else;
4. an assistant	d. to plan, prepare for, or organise something;
5. to adapt	e. to do an action or a piece of work;
6. partly	f. to correct mistakes;
7. to arrange (meetings)	g. a helper;

8. to update (calendars)

9. to mark (homework)

10. to write reports

h. to write a statement to parents about their child performance at school;

i. to pass information from one person to another;

j. to change something to suit different conditions or uses.

11. Post Text Discussion. ***Work in pairs. Students A strongly believe that robots are better than humans at teaching; Students B strongly believe that robots can never be as good as teachers. Change partners again and talk about your ideas.***

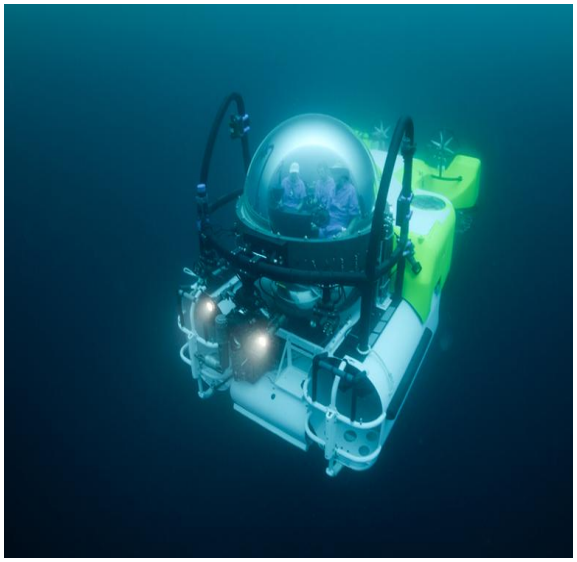
READING

Part 3

12. ***Before reading answer the following questions. Then read text 9C and check your answers.***

1. What do you see in the pictures below? Do you know how these underwater vehicles are called?
2. How do you think the topic of robots is related to the topic of submersibles?
3. What can submersibles be used for?
4. What is the difference between the submersible in the first and in the second picture?

1.



2.

Text 9C

ADVANCES IN UNDERWATER ROBOTS

(1) A submersible[1] is a small, mobile undersea research vessel capable of functioning in the ocean depths. The development of a great variety of submersibles during the later 1950s and the 1960s came about as a result of improved technology and in response to a demonstrated need for the capability to visit the ocean depths to make direct observations and measurements, to recover lost equipment, and for possible rescue activity. Submersibles are extremely diverse in both shape and size and are designed to perform different and often highly specialised tasks.

(2) In recent years, it has become clear that special purpose, unmanned[3] submersible vehicles are replacing manned[2] submersibles. Submersible robots that have long been used to explore the underwater environment are expanding rapidly today. Underwater robots are being used in an increasing number of applications, including the military. In addition to rescue missions, submersibles are used for laying underwater pipelines[3], for work on offshore oil drilling platforms, for seafloor mapping[4], and underwater surveys[5]. Using robots to conduct underwater inspections is far safer and less expensive than using human divers. They also provide complete, detailed imagery[6], real-time data for 3D modelling, better precision[7] in detecting structural weaknesses, and improved access to previously unreachable areas, such as inside pipes.

(3) A variety of underwater robots have emerged over the last few decades to meet these challenging underwater tasks: **UUVs:** Unmanned underwater vehicles which travel in a single direction and are highly efficient at mapping large areas of seafloor. **ROVs:** Remotely operated vehicles are designed for omni-directional[8] maneuvering and are often externally powered and tele-operated using a tether[9] cable. They are commonly used to inspect offshore structures. **AUVs**: autonomous underwater vehicles are typically untethered, maneuver themselves, and often have grasping[10] and manipulation capabilities. AUVs have a number of depth/size classes, ranging from man-portable vehicles with 100-meter depth ratings to deep-

water platforms. Low-cost vehicles: Robotics companies are trying to bring smaller and less expensive vehicles to the general public and hobbyists. These are sometimes used by researchers to test specific aspects of the systems they are developing, such as new sensor arrangements or planning and control strategies. (4) The dominant trend in underwater robotics is toward autonomy. Instead of remote control by a human or preprogrammed trajectories, we are seeing more built-in autonomy that can react to the specific conditions on-site. Artificial intelligence (AI) will also play a larger role in underwater robotics, where AI might actually take over the role of the ROV pilot, who tele-operates an underwater robot and evaluates its imagery.

Vocabulary notes for text 9C

[1]submersible	подводный аппарат
[2]manned	с человеком на борту
[3]pipelines	трубопроводы
[4]mapping	картографирование
[5]survey(s)	исследование, обзор
[6]imagery	снимки, изображение
[7]precision	точность
[8]omni-directional	во всех направлениях
[9]tether	трос
[10]grasping	схватывание, хватательный

13. ***Read the text and circle any words you do not understand. In groups, make a list of unknown words and use dictionaries to find their meanings.***

14. ***Choose the right option.***

1. A submersible is …
   a. a vehicle that can travel under water
   b. an underwater helicopter
   c. a military ship that can stay under water

2. A submersible was designed to …
   a. explore the ocean depths
   b. to grow sea plants and collect pearls
   c. to measure the distances
3. UUVs are efficient at…
   a. collecting seafloor samples
   b. mapping seafloor
   c. rescue missions
4. ROV …
   a. is controlled from the surface
   b. eliminates the cable
   c. is a manned submersible
5. AUVs …
   a. maneuver themselves
   b. use a tether cable
   c. are designed for omni-directional manouvering
6. The dominant trend in underwater robotics is toward…
   a. remote control by a human
   b. preprogrammed trajectories
   c. autonomy

15. ***Read the text again and find answers to the following questions in the text.***

1. What is a submersible?
2. When did the development of submersibles come about?
3. What were they designed to do?
4. What types of submersibles are there?
5. What are different types of submersibles designed for?
6. In what applications are submersibles being used nowadays?
7. What is the dominant trend in underwater robotics?

16. ***Mark the following statements as True or False.***

1. A lot of different underwater vehicles appeared 60 years ago.
2. In the 60-s nobody was interested in the exploration of the underwater world.
3. There are not so many types of submersibles.
4. Without using submersibles we wouldn`t have been able to know as much about the ocean depths as we have.
5. Unmanned submersibles are likely to be more widely used in the future.
6. The number of applications of submersibles is growing.
7. Unmanned submersibles are designed to carry out dangerous missions.

17. Speaking activity. ***Search the Internet (e.g. https://oceanexplorer.noaa.gov/technology/subs/subs.html) to find more examples of how submersibles are used. Tell your group about one of them. Decide which examples can be considered important milestones in the development of submersibles. Compare your lists.***

18. Listening about robots. ***Study the descriptions of the links below. Choose one video that you find the most interesting, watch it a few times and prepare to tell your groupmates about it. Add your own opinion.***

What jobs will robots take over?

It's very clear by now that technology has automated many of tasks we once had to labour through - but what about your job? According to a survey of 1,900 experts by the Pew Research Center, an overwhelming majority believe artificial intelligence will have a very big part in our lives by 2025. Some experts, however, say this might not be totally to our advantage. This video will look at the survey and other studies to find out what the future may hold.

https://www.bbc.com/news/av/magazine-28779146

Artificial intelligence: Can you build a robot in one day?

The latest in the BBC's series on intelligent machines takes a look at how easy, or difficult, it is to create robots, while the author is set the challenge of using a

Student Robotics kit to create his own robot, in just one day.

https://www.bbc.com/news/av/technology-34288064

Intelligent machines: Will you be replaced by a robot?

From car production to oil exploration, robots are playing an increasing role in the workplace. Automation has brought more money into the economy and created more jobs recently. But will the predictions of science fiction writers that robots one day take away our jobs completely come true?

https://www.bbc.com/news/av/technology-34242250

VOCABULARY

Module 9 Word List

Text 9a	**Text 9b**
1. turn (v) into	28.human connection (n)
2. verifiable (adj)	29.underestimate (v)
3. actual (adj)	30.diagnose (v)
4. take (v) over	31.transfer (v) information
5. powerful (adj)	32.assistant (n)
6. preferably (adv)	33.empathy (n)
7. look like (v)	34.partly (adv)
8. extend (v)	35.arrange (v) meetings
9. carry out (v)	36.update (v) calendars
10.sequence (n)	37.mark (v) homework
11.set up (v)	38.write (v) reports
12.separate (adj)	39.cut (v) the time
13.alternatively (adv)	**Text 9c**
14.relieve (v)	40.submersible (n)
15.suit (v)	41.come (n) about
16.attempt (n)	42.in response (n) to
17.be fitted (v) with	43.capability (n)

18.vision (n)	44.observation (n)
19.enhance (v) performance (n)	45.measurement (n)
20.average (adj)	46.recover (v)
21.production rate (n)	47.rescue (n)
22.unit (n)	48.diverse (adj)
23.take (v) away	49.purpose (n)
24.switch (v) to	50.detect (v)
25.with a view to doing something	51.emerge (v)
26.complicated (adj)	52.to meet (v) challenging tasks
27.existing (adj)	53.evaluate (v)

1. ***Match the words and word phrases with the correct definitions as they are used in text 9A.***

I.

1. to turn into
2. verifiable
3. humanoid
4. actual
5. to take over
6. powerful

a. able to be proved
b. having a lot of power to control people or events
c. to begin to have control of something
d. to change or develop from one thing to another
e. existing in fact
f. a machine or creature with the appearance and qualities of a human

II.

1. sequence
2. to set up
3. separate (adj)
4. alternatively

a. to make a machine ready to be used
b. to improve an unpleasant situation
c. a series of related things or events
d. to be convenient

5. to relieve	e. existing or happening independently
6. to suit	f. used to suggest another possibility (=instead)

III.

1. to enhance performance	a. a standard that is considered to be typical
2. average	b. used to refer to something that exists now
3. to switch (to)	c. the speed at which the process of making goods to be sold happens
4. with a view to doing something	d. to change suddenly from one thing to another
5. existing	e. with the aim of doing something
6. production rate	f. to improve the quality of something

IV.

1. preferably	a. to be similar in appearance to someone
2. to look like	b. to do or complete something
3. to extend	c. if possible
4. to carry out	d. an act of trying to do something
5. an attempt	e. to be equipped with
6. to be fitted with	f. to add to something in order to make it bigger or longer

2. *Read the sentences and choose the right option. Explain your choice and translate the sentences into Russian.*

A.

1. At the current *amount/rate* of production they expect it will take a few months to carry out the order. 2. These measures have been taken with a *view/aim* to increasing the company's results. 3. Our faculties are in two *separate/secondary* buildings. 4. The results of the new research seem to conflict with the

exciting/existing theories. 5. The CEO is one of the most *powerless/powerful* figures in a company. 6. She started studying English, but *chose/switched* to History in her second year. 7. He was an experienced player who was working hard to *enhance/enlarge* his performance. 8. If you don't make any *tries/attempts* to join in their conversation they won't let you say a word. 9. A series of video are designed to *extend/expect* public awareness of how to protect yourself from the virus. 10. He asked for help because he could not *sort/set* the equipment up.

B.

1. The quickest way is through the city centre. *Alongside/alternatively*, there is a ring road, which is less busy. 2. They could choose whatever time *suites/suits* them best because they were among the first to apply. 3. You need to acquire lots of important skills to be *fitted/fixed* for your job. 4. The *average/maximum* age of young people going to universities is about 18-20 years old in our country. 5. Rain in the morning will *turn/move* into snow during the afternoon. 6. The exams are at the end of the term, but the *actual/real* results will appear in June. 7. If you look at the picture of a silicon chip, you might think that it *looks like/looks at* intricate cities. 8. The events in the article are presented in chronological *sequel/sequence*. 9. Water the plants twice a week, *preferentially/preferably* in the morning. 10. There are lots of different medicines that *relieve/retrieve* pain.

3. *Look at the words below. Try to recall how they were used in text 9B.*

To underestimate/ assistant / empathy / report / to update / connection / partly / to transfer / to arrange / to diagnose / to adapt / to mark / to cut the time / to perform

4. *Match the words with the correct definition of the word as it is used in text 7B. Think of your own example sentences with these words.*

1. to underestimate
2. to adapt
3. empathy

a. the state of being related to someone or something
b. to plan, prepare or organise something
c. to some degree, not completely
d. the ability to understand other people's

4. report
5. to update
6. connection
7. partly
8. to transfer
9. to arrange
10. to mark

e. to think that something or someone is not as good as they really are
f. to correct mistakes and give points for a piece of work
g. a description of an event or situation
h. to change something to suit certain conditions
i. to make something more modern
j. to move something from one place to another

5. ***Replace the words in bold with their synonyms using the words from Exercise 4. Translate the sentences into Russian.***

Example: *Modern robots can* ***be taught*** *to use information from previous activities for future decisions.→ Modern robots can* ***be instructed*** *to use information from previous activities for future decisions.*

1. After the discussion it was decided **to pass on** control of public land to the state. 2. The meeting has been **set** for Wednesday. 3. A **new** version of that code has just been published. 4. Pearson plans to use technology **to check** examination papers. 5. To write a **statement** to parents about a child's ability and performance at school is part of a teacher's job. 6. Many software companies have **changed** popular programs to work with the new operating system. 7. He gave in his homework only **half** finished. 8. The city **undervalued** the cost of the new building. 9. Such competences as cooperation, responsibility, self-control and **the capacity to understand other people's feelings** are really important these days. 10. Family **links** can make getting a job much easier.

6. ***Find the following words or phrases in the text 9C.***

1. A noun naming *a small underwater vehicle* used especially for deep sea research. (para 1) 2. A phrasal verb which means *to happen or take place* (para 1)

3. This noun phrase is used to describe *something which happens as an act of responding*. (para 1) 4. The *quality or state* of *being capable*. (para 1) 5. *The act of recognising or noting a fact* or object often using some instruments. (para 1) 6. *The act or process of measuring*. (para 1) 7. A verb meaning *to bring back to the normal condition*, to find. (para 1) 8. A noun describing *an act of saving or being saved* from danger or difficulty. (para 1) 9. A noun meaning *an aim or end to be reached*. (para 2) 10. A verb meaning *to discover or determine the fact or presence of something*. (para 2) 11. *A number or collection of different things*, especially of a particular class. (para 3) 12. A verb meaning *to appear or become known.* (para 3) 13. A participle form of a verb *range* in combination with the preposition *from* which expresses *the idea of a variety of different things.* (para 3)
14. A phrase describing *a control of operation from a point at some distance* (para 4) 15. A verb meaning *to determine the significance, worth, or condition of something* (para 4)

7. *Match the words with numbers (1-10) with the words with letters (a-j) to make up word collocations. Explain the meaning of these expressions and try to recall how they were used in texts 9A, B, or C.*

I.

1. verifiable	a. rate
2. actual	b. a computer
3. powerful	c. the deadline
4. to extend	d. facts
5. to carry out	e. issues/meanings
6. to set up	f. results
7. separate	g. idea
8. to relieve	h. the task
9. to be fitted for	i. tension

10.production	j. research

II.

1. existing	a. the purpose
2. to suit	b. system
3. to arrange	c. challenges
4. to update	d. a meeting
5. to underestimate	e. mission
6. complicated	f. performance
7. remote	g. approaches
8. to enhance	h. control
9. to meet	i. an opponent
10. rescue	j. the software

8. ***Vocabulary in context. Read the sentences below and find the key words and expressions from the previous exercise. Translate the sentences into Russian***.

1. My secretary will phone you to arrange a meeting. 2. The students are encouraged to participate in carrying out research in their field of study. 3. This easily verifiable fact proves that our theory is true. 4. Actual results may differ from the expected results. 5. Some powerful ideas have emerged at our university. 6. They agreed to extend the deadline until the end of the month. 7. He helped me to set up my computer. 8. Developing new robots and replacing human workers with intelligent robots are two separate issues. 9. Herbal tea helps relieve tension and calm the nerves. 10. I'm afraid, I am not fitted for so great a task. 11. The oil production rate increased due to new technology. 12. In his new book he analyses the existing approaches to managing. 13. The old building is now used as a hotel and has been reconstructed to suit that purpose. 14. Since he hadn't updated the antivirus software on his computer for a long time his system was infected. 15. They lost mostly because they had underestimated their opponents. 16. Most of our graduates are well prepared to work with complicated systems. 17. It is difficult to

imagine how people watched TV without a remote control a few decades ago. 18. A bit of stress has been shown to enhance performance during an exam. 19. If your immune systems fails to meet the challenge of the first contact, you might be infected. 20. The news agencies say that submersibles can also aid search and rescue missions.

9. ***Work in groups. Choose 5-7 words from Module 9 Word list and prepare a short news story to tell your group using these words. Ask your listeners to note down the words while they listen to your story. Compare your lists.***

Example*:* The P 3 humanoid robot was revealed by Honda in 1998 as a part of the company's continuing humanoid project. President and CEO Hiroyuki Yoshino, at the time, described Honda's humanoid robotics program as consistent with its direction to enhance human mobility. In 1999, Sony introduced the AIBO, a robotic dog with a capacity of interacting with humans; the first models released in Japan sold out in 20 minutes. Honda revealed the most advanced result of their humanoid project in 2000, named ASIMO. ASIMO was fitted to be able to run, walk, maintain connections with humans, recognise faces, and interact with its environment.

10. ***Summarise in English using some key words from the vocabulary section.***

Россияне усомнились в способности роботов заменить их на работе. При этом, если посмотреть на похожий опрос от 2019 года, число уверенных в своем преимуществе перед машинами сократилось.

Россияне считают, что в обозримом будущем роботы не смогут занять их рабочие места. Социологический опрос на эту тему провел ВЦИОМ. 70% опрошенных заявили, что выполнять их обязанности роботы не будут, хотя 18% считают, что в незначительной степени умные машины заменять их на работе все же смогут. 51% уверены, что сама по себе роботизация — скорее отрицательная тенденция. Больше в успех роботов верит молодое поколение (48%). Среди опрошенных в возрасте от 45 до 59 лет 78% уверены, что заменить их машинами в обозримом будущем не удастся. В опросе, который

проводился посредством телефонных интервью, приняли участие 1600 респондентов. В 2019 году проводилось похожее исследование. Как заявили тогда 78% россиян, они не опасаются, что машины смогут заменить их на работе. Среди сфер, где можно использовать роботов, респонденты называли в первую очередь освоение космоса и опасные промышленные производства. Далее шли медицинская диагностика и ликвидация последствий чрезвычайных ситуаций.

SPEAKING AND DISCUSSION

1. ***Discuss some of the questions below in mini-groups. Think of what arguments you can give to explain your view, look for more examples to illustrate your points. Share your ideas with other groups.***

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? How are robots better than the human workforce?
2. If you could have a robot, what tasks would you use it for? Would you ever trust a robot to look after your children or walk your dog?
3. Police and the military use robots 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?
4. Do you think that one-day robots will replace teachers?
5. What threat do machines present to mankind?
6. Do you believe machines will ever outsmart people and take over the planet?
7. Robotic surgery is a method to perform surgery using very small tools attached to a robotic arm and a surgeon controls the robotic arm with a computer. How beneficial do you think this is now and for the future of medicine?
8. Do you believe it's just a matter of time before fast-food workers are replaced by machines?
9. What do you think would happen to the world's economy

if robots began replacing people in the workforce?

10. Did you ever have a favourite Sci-Fi films hero who was a robot? Speak about this film in more detail.

2. ***Work in pairs or groups. Discuss the benefits and disadvantages of machines and automation and create a mini-presentation based on your ideas.***

3. ***Read how futurologist Gray Scott sees the future of robotics.***

"Robots will harvest, cook, and serve our food. They will work in our factories, drive our cars, and walk our dogs. Like it or not, the age of work is coming to an end".

Can you describe a typical day in your life when all work is done by robots? What do you think people will be doing and how our life will change?

GRAMMAR

Lead-in

Read the sentences below, explain their meaning or translate them into Russian paying attention to the highlighted words. In groups discuss the following questions.

1. What are the highlighted words called?
2. How similar are they to verbs and adjectives?
2. What types of participles are there?

- The noise of the car coming from an open window was very annoying.
- The new materials used in computer manufacturing deliver enhanced performance.
- Having completed the mission, the astronauts returned to the Earth.

STUDY NOTE. Participles are words derived from verbs that can function as adjectives and adverbs or as parts of verb phrases to create verb tenses.

The main types of participles are the present participle (or participle I) - *coming*, perfect/perfect continuous participle- *having completed/having been reading*, and the past participle (participle II) - *used*.

1. ***Look at more examples of participles and complete the table. Try to define the meaning and function of the participles in the examples.***

1. Today's robots are machines **controlled** by a computer.
2. A device **carrying** out certain manufacturing or other tasks similar to tasks **carried** out by people is called a robot.
3. **Having killed** the dragon, Cadmus sowed its teeth that later on turned into a group of ferocious warriors.
4. **Having grown** from dragon teeth, a race of fierce armed men called Sparti fought one another until only five survived.
5. A humanoid **drawn** by Leonardo da Vinci is among the first verifiable automaton.
6. **Having developed** a powerful presence in fiction and films before **being created** in reality, robots are an example of how science fiction becomes science fact.
7. **Having been programmed** to carry out a specific sequence of tasks, production robots started to be widely used in different branches of industry.
8. **Being** unable to think or decide to do things differently, robots will never replace humans.
9. **Having been fitted** with vision equipment, robots were able to see.
10. Production-line robots, medical robots, movement **imitating** robots and **self-driving** cars are being widely developed and used today.
11. Even robots **designed** to do not very technical tasks like housework seem to be very **limited**.
12. The real future of robotics is in the improvement of **existing** robots and in creating new ones.

	Active	***Passive***
Present Participle		

(V+ing)		
Perfect Participle (having+V3)		
Past Participle (V3)		

STUDY NOTE. Present and past participles can be used as adjectives. The present participle describes what someone or something is (What kind?). The past participle describes how somebody feels. (How do you feel?)

a boring lesson makes you feel bored; but*: I was bored in the Maths lesson. I almost fell asleep.*

Have you seen that film? It is absolutely terrifying. but: *He never flies, he is terrified of flying.*

2. *Choose the correct form.*

1. A: Have you read that new book yet? B: Only some of it. It's very…

a. bored b. boring

2. A: Did you enjoy your holiday? B: Oh, yes. It was very…

a. relaxed b. relaxing.

3. A: I'm going to a lecture tonight. Do you want to come? B: No, thanks. I'm not … in the subject.

a. interested b. interesting

4. A: Did you hurt yourself when you fell? B: No, but it was very …

a. embarrassed b. embarrassing

5. A: Was mother upset when you broke her vase? B: Not really, but she was very….

a. annoyed b. annoying

6. A: How do you feel today? B: I still feel very ….

a. tired b. tiring

7. A: You look ill. What's the matter? B: I've had a very … day.

a. tired b. tiring

8. Sit down - I've got some very … news for you.

a. excited b. exciting

9. He's got a very … habit of always interrupting people.

a. annoyed b. annoying

10. I'm very … by your behaviour.

a. disappointed b. disappointing

STUDY NOTE. The **perfect** participle is used to emphasise that one action happened before another.

Perfect participle: Having won the match, they were happy. (After they won the match they were happy.)

Participles may also be identified with a particular **voice**; active or passive. In passive participle phrases the grammatical subject is the logical object.

Present participle passive: After being arrested, he was taken to the police station.

Perfect participle passive: Having been told the bad news, he could not believe it.

3. *Fill in the Perfect Participle, Active or Passive, of the verbs in brackets. Explain the meaning of participle phrases.*

1. (Work) all day, I was feeling very tired in the evening. 2. (Live) in an English-speaking country for a few years, she spoke English like a native speaker. 3. (Rescue), an injured pilot was taken to hospital. 4. (Write) the test, the students handed in their papers. 5. (Sign) by the boss, the documents were sent to the customers. 6. (Interrupt) a few times, he was rather annoyed. 7. (Stop) the car, the police officer wanted to see the documents. 8. (Arrive) at the station, we called a taxi. 9. (Check in) for the flight, they were ready for the passport control. 10. (Buy) the car, he stopped using public transport.

4. *Choose the correct option. Translate the sentences into Russian.*

1. They were trying to fix a USB cable *having followed/following* the instructions of a YouTube video. 2. Serious faults *finding/found* in the project had to be corrected

quickly. 3. The method *having been discussed/being discussed* by the engineers at the moment has numerous advantages. 4. *Having/having had* no job and no money, he couldn't pay the rent. 5. *Having applied/applied* a new technique, scientists increased the accuracy of the results. 6. Vehicles *controlling/controlled* automatically will appear on the market soon. 7. *Having been noticed/having noticed* a fuel warning light on the instrument panel, he knew he had to find a filling station soon. 8. *Crossing/crossed* the street, one should be careful. 9. *Locking/having locked* the door, he left the house. 10. *Making/ made* use of the principle of feedback, robots can change their operation in response to changing environment. 11. *Completing/having completed* her work, she went home. 12. *Being/having been* an expert in the field of computers, he had no problem finding a well-paid job.

5. *Put the verbs in brackets into the correct participle form. (Some examples can have more than one correct answer with a difference in meaning).*

1. (Give) a lecture, the professor was not using any notes. 2. The problems (discuss) at the conference are very important. 3. The shop (build) next to our university will open soon. 4. (Have) a car, she finds it easy to get around. 5. (Answer) the questions, he gave a lot of examples. 6. (Finish) his research, he was ready for writing a report. 7. The equipment (install) by the company is of the highest standard. 8. (Turn) right or left switch on the winking lights. 9. With the (increase) automation of factories, the commercial use of robots is spreading. 10. (Reach) its maximum intensity, the volcano began to calm down. 11. The (flow) water is always cold. 12. Even in the vicinity of the Pole there are animals (live) on the ice. 13. (Say) good bye, he left the office. 14. (Read) by millions of readers, this book has rightfully become a bestseller.

PARTICIPLE CLAUSES

Participles are often used as part of participle clauses (participles combined with other words). Participle clauses enable us to present information in a more economical way. Participle clauses with past participles have a passive meaning.

Shouting *loudly, Peter walked home. (Peter was shouting)*

Shouted *at loudly, Peter walked home. (Someone was shouting at Peter)*

Participle clauses act as **adjectives or adverbs** within sentences and usually are reduced adverbial or relative clauses. They describe something or someone or give information about condition, result, reason, time etc.

I met him while living in Moscow. (=adverbial clause - while I was living)

Who is that man sitting next to the rector? (=relative clause: man who is sitting)

Note that this passive structure can also be used in participle clauses as an alternative to a since-clause: **having been + past participle**:

Having been unemployed for over two years, I found it difficult to find a job. (=Since I had been unemployed…)

6. ***Rewrite the following sentences with participle clauses according to the examples given below and identify the meaning of participle clauses.***

Example: *Used sparingly, fossil fuels will not run out in the next 50 years.= If we use fossil fuels sparingly, they will not run out in the next 50 years. (condition)*

Having taken the wrong train, I found myself in Pskov, not Novgorod.= Because I had taken the wrong train, I found myself in Pskov, not Novgorod. (reason)

1. Walking in the woods, I suddenly realised that I had lost my way. 2. Having spent a lot of time doing my homework, I went to bed very late at night. 3. Looked after carefully, your car will run well for years. 4. Working in a bank, he knew about the best ways to invest money. 5. My sister is the one talking to the professor. 6. Having collected the data, he began analysing the results. 7. Having arrived at the site, the scientists discovered many fragments of the meteorite. 8. Being one of the most beautiful Russian monuments, St Basil's Basilica is a World Heritage site. 9. Trying to sell more cars for cash, the company is losing money. 10. Karel Capek described a mechanical device that looked like a human but, lacking human sensibility, could perform only automatic, mechanical operations**.**

7. ***Use a participle clause to add the information in italics to the main sentence.***

Example: Sam left school early *because he felt sick.* → **Feeling sick**, Sam left school early. *They spent all the money.* So they couldn't afford to buy a car. → **Having spent** all the money, they couldn't afford buying a car.

1. As she felt tired, Anna went to bed early. _____, Anna went to bed early. *2. After the boss had explained the problem*, he told the employee to deal with it. _____, the boss told the employee to deal with it. *3. While he was drinking his coffee*, he was thinking about the problem. _____, he was thinking about the problem. *4. If it is looked after carefully*, the plant can live through the winter. _____ , the plant can live through the winter. *5. We filled up the car* and continued our journey. _____, we continued our journey. 6. *As the manager was impressed by my work*, he extended my contract. _____ , the manager extended my contract. 7. *They have written two tests today* and they are too tired to do the third one. _____, they are too tired to do the third one. 8. *He was driving home.* He had an accident. _____, he had an accident. 9. *He was trapped in a dilemma* and couldn't decide what to do. _____, he couldn't decide what to do. 10. *After I dropped him at the station*, I drove straight to the supermarket. _____, I drove straight to the supermarket. 11. *The teacher was impressed by Mike's work*, so she gave him the highest mark. _____, the teacher gave him the highest mark. 12. *As he had been to England before,* he knew where to find a good hotel. _____, he knew where to find a good hotel.

STUDY NOTE. Negative participle clauses are also possible, in which case '**not'** normally comes **before** the -ing form or past participle:
Not having seen the film, I could not take part in its discussion.

8. *Combine the following sentences into one using a negative participle clause.*

Example: *I didn't want to hurt his feelings. I didn't ask any questions.* → *Not wanting to hurt his feelings, I didn't ask any questions.*

1. As they haven't received all the applications yet, they are not ready to hire anyone. 2. I didn't want to lose my passport. I gave it to my father. 3. I didn't know what to answer. I didn't say a word. 4. He didn't see the accident ahead. He didn't stop his car. 5. They haven't followed the instructions. They have a problem with the cleaning robot. 6. They haven't found any faults in the project. They can start it as soon as possible. 7. I had no phone. I couldn't call you. 8. He didn't notice a fuel warning light. He didn't fill his car in time. 9. The method wasn't tested. It was not adopted. 10. He hadn't prepared for the exam. He failed it.

9a. Participle Clauses Summary. ***Listen to a 6 Minute Grammar mini lesson on participle clauses and answer the following questions.***

BBC Learning English - Course: intermediate / Unit 27 / Session 2 / Activity 3

1. What is a present participle clause?
2. What is a past participle clause?
3. What do we use participle clauses for?

9b. Listen again and fill in the missing participles. Explain their meaning. Then think of similar sentences about yourself with different types of participle clauses.

I cut myself … .

I was sitting on the sofa … .

The dog … by the car wasn't hurt.

Cars … here will be clamped.

Bikes … to this fence will be removed.

STUDY NOTE. Participle clauses can be used after various **conjunctions** such as: **when, while, if, though, before, after, etc.** Note the following examples:

I hurt my arm ***while*** *playing tennis.*

Remember to take all your belongings with you ***when*** *leaving the train.*

10a. ***Read and translate the sentences paying attention to the participle clauses with conjunctions.***

1. **When completed** in 2010, the Burj Khalifa became the tallest tower in the world and one of the top attractions in Dubai. 2. **Though being** a school teacher of mathematics, Tsiolkovsky developed insights into space travel that are still in use today. 3. **If compared** to today's TV pictures, the first black-and-white images were rather poor. 4. **While teaching** at school for the deaf, Bell became interested in sound and its transmission. 5. **Though discovered**, Newton's mistake had no influence on his theory. 6. **While conducting** experiments with communication devices and speech systems, Bell developed the telephone. 7. **If cooled** below zero degrees Celsius, water freezes. 8. **After building** 56 new underground stations, the Department of Transport made public transport more accessible.

10b. Rewrite the following sentence with participle clauses adding an appropriate conjunction.

***Example**: Preparing for the presentation, I studied lots of materials.* → *While preparing for the presentation, I studied lots of materials.*

1. Being one of key issues today, information protection is in the focus of attention of today's computer engineers. 2. Analysing the information on what is currently being tested, we can imagine what new robots will be like. 3. Being designed by researchers at the Stanford Research Institute in the late 1960s, an experimental model became one of the first true robots. 4. Having been added to vehicles, airbags saved lots of lives. 5. Being known to people from science fiction, robots didn't become possible until the invention of the computer in the 1940s. 6. Having used a television camera as a visual sensor, the engineers constructed a robot capable of arranging blocks into stacks. 7. Equipped with microprocessors, computerised robots can handle the data being fed to them by various sensors. 8. Being fitted with new safety features, robotic vehicles will be much safer than before. 9. Being one of the main sources of pollution, petrol cars are still widely used today. 10. Increasing the commercial use of robots, we continue to expand their applications.

PARTICIPLE CLAUSES WITH SUBJECTS

STUDY NOTE. Participle clauses can have their own subjects. They are normally placed before the participle. Participle clause with subjects are equivalent to relative and/or adverbial subordinate clauses within complex sentences.

The house sold at last, we were able to start planning to move out.(=When the house was sold, we were able to start planning to move out)

The chairman having finished, everyone began discussing what he had said.(=After the chairman finished, everyone began discussing what he had said.)

11. ***Explain the meaning or translate the sentences with participle clauses with subjects.***

1. Gases are light substances, the lightest of them being hydrogen. 2. Electrons moving through a wire, electrical energy is generated. 3. Many Russian scientists worked in the field of electricity, Lodygin being one of the most prominent. 4. Numerous experiments having been carried out at the space station Mir, it became possible to construct the ISS. 5. With image sensors interpreting signs, lights and lane markings, a driverless car will be able to follow the traffic rules. 6. The question being very difficult, nobody could answer it. 7. The distance having been measured, computer adjusts the car's speed. 8. AI systems and machines having been developed, a few million jobs have consequently been lost by humans. 9. Fifty-six new underground stations having been opened, the public transport system has become more comfortable. 10. The word 'electronics' is derived from the word 'electron', the electron being a negatively charged subatomic particle.

CHECK YOURSELF

VOCABULARY

1. ***Look at the words below. Try to recall how they were used in text 9A. Give their definitions or translate them into Russian.***

Turn into/ verifiable/ humanoid/ actual(ly)/ take over/ powerful/ sequence/ set up/ separate/ alternatively/ relieve/ suit/ vision/ enhance performance/ average/

production rate/ unit/ switch to/ with a view to doing something/ complicated/ existing/ preferably/ look like/ extend/ carry out/ attempt/ be fitted with.

2. Vocabulary in context. ***Fill in the gaps with the words from Exercise 1 in the right form.***

A. 1. The study will be **c**_____ **o**____ over a six-month period. 2. There were lots of rumours but nobody knew what had **a**_____ happened. 3. More and more people confess that they fear that robots will **t**_____ **o**_____ their jobs. 4. When you go out, having some form of identification is recommended, **p**_____ a passport. 5. Inside the robot there's a built-in computer, which **l**_____ **l**_____ a card. 6. We do our best to **e**_____ our students' participation in the English Language Olympiad**.** 7. There is a particular **s**_____ in which you have to perform these tasks. 8. New toll roads could help **r**_____ congestion on other routes. 9. If you fail, you can have a second **a**_____ at the exam. 10. There are few scientists whose **v**_____ of the future seem to be likely to happen. 11. The **a**_____ of the three numbers 7, 12 and 20 is 13, because the total of 7, 12 and 20 is 39, and 39 divided by 3 is 13. 12. More workers were employed to enhance the **p**_____ **r**_____ of the vehicles. 13. Each **u**_____ of the text book focuses on a different grammar point.

B. 14. When you register you need to fill in a really **c**_____ form. 15. New medicines are developed which are successfully used alongside the **e**_____ courses of treatment. 16. Freezing temperatures **t**_____ water **i**_____ ice. 17. Tests allow teachers to measure their students' **p**_____ . 18. A robot resembling humans is called a **h**_____ robot. 19. You can take an online course, or **a**_____, you can have a face-to-face classes. 20. When you deliver a presentation, you should mention only **v**_____ facts. 21. The Internet has a **p**_____ influence on public opinion. 22. Such a database will be extremely costly to **s**_____ **u**__ . 23. After the quarrel they went their **s**_____ ways. 24. We hope that new technologies will make a **s**_____ to clean sources of energy

possible. 25. His new car is **f**_____ with an alarm, so it is well protected. 26. He has a degree in Engineering and is best **s**_____ for technical work.

3. ***Find the words in text 9B using the definitions below.***

1. To some degree, but not completely; 2. a state of being related to someone or something else; 3. to do an action or a piece of work; 4. to write a statement to parents about their child performance at school; 5. to change something to suit different conditions or uses; 6. to make something more modern or suitable for use by adding new information; 7. to correct mistakes; 8. to pass information from one person to another; 9. a helper; 10. to plan, prepare for, or organise something.

4*. ***Use the words in the box to fill in the gaps in the sentences below. There are two extra words which you don't need to use in each box.***

Crew, submersible, vehicle, to collect, life –support, capability, to recover, remotely, rescue, samples.

A.

___1___ is a small, mobile undersea research__2__ capable of functioning in the ocean depths. Some of the tasks submersibles performed were to make direct observations and measurements, ___3___ lost equipment, and for possible ___4___ activity. Manned submersibles also have a ___5___ compartment within a pressure hull and _____ 6___systems. Some submersibles have mechanical arms (manipulators) to collect ___7___and perform other modest tasks outside the vessel. To take the right decision they needed ___8___ data from various sources.

Depths, submersible, carry out, operate, capability, remotely, perform, crew, samples, applications.

B.

Automated vehicles___1___ without continuous control from people and ___2___ routine tasks under the sea for months at a time. ___3___-operated vehicles are controlled by people from a safe distance and are often equipped with a manipulator, cameras and sensors. It is difficult for human beings to reach the ___4___ of seas and oceans. Submersibles are being used in an increasing number of ___5____. Submersibles are constructed in a variety of sizes and shapes and are designed to ____6___ different and often highly specialized tasks. The development of submersibles came about in response to a need for the ___7___ to visit the ocean depths. One of the most impressive submersibles is the *Aluminaut,* constructed of high-strength aluminum alloys and able to operate at 4,570 m carrying a ___8___ of six.

GRAMMAR

5. *Choose the correct option.*

1. I think I know the actor *played/playing* the main role in this new TV series. 2.The committee believe the answer *given/giving* by the politician wasn`t the whole truth. 3. All the games *played/playing* after the weekend were draws. That`s never happened before. 4. *Checked in/having checked in,* we unpacked and went to get something to eat. 5. *Having watched/ after watched* his son win the competition, he was filled with pride. 6. She suddenly realised that the person *spoken/speaking* on the phone wasn`t her husband but a complete stranger. 7. He was sitting on the sofa *doing/having done* a crossword. 8. *Having paid/paid* for the meal, we left the restaurant. 9. *Being/been* exhausted, he fell asleep on the bus. 10. While *watching/being watched* a play, he fell asleep.

6. Combine the sentences into one using participle clauses of different types.

1. They called a doctor. The doctor lived nearby. 2. I broke the computer. The computer belongs to my sister. 3. The man is my teacher. The man is talking to the director. 4. We found a researcher. The researcher is working on the same problem.

5. Students will not be allowed to enter. Students have arrived late. 6. Don't shout at the children. The children are playing in the garden. 7. Who is the man? The man is giving a lecture. 8. The client is over there. The client is waiting for you. 9. They are on the plane. The plane is flying to Turkey. 10. The car is mine. The car is parked in front of the office. 11. I left early. I felt sick. 12. My sister heard bad news. She wanted to cry. 13. I had worked hard all week. I was quite happy not to do anything at the weekend. 14. Before I make a decision, I need to discuss it with my family. 15. She had failed one of the exams. She couldn't get into university.

7. Statements about Robots. ***Choose two or three statements below and decide whether you agree or disagree with it. Explain why. Give your own examples.***

1. Robots seem like a modern day invention, but in reality they were created in ancient Greece and Rome.
2. With the appearance of AI, some computers and robots have been given the opportunity to act with human-like behavior.
3. Most jobs are better done by robots.
4. Robots will never replace humans.
5. Nanobots, robots scaled down to microscopic size, have a very promising future.
6. Some of the applications of robots we only imagine in science fiction could one day be a reality.
7. Autonomous intelligent robots will replace people in all the activities and functions in the near future.
8. One day the development of AI and robotics might escape the human control.

MODULE 9 PROGRESS TEST

Vocabulary. ***Decide which answer a, b or c best fits into each gap.***

The 1_____ word "robot," derived from the Czechoslovakian word *robota* (worker), was first used in the play where robots appeared as artificial humans who function only as workers. Devices called "robots" today are extremely 2_____ in both shape and function. For example, the 3_____ robots that work in manufacturing plants mainly 4_____ a certain task programmed into them by human operators and usually 5_____ a human arm. Robots that help with 6_____ operations at disaster sites include those that move away debris

and other obstacles through manipulation via 7_____ control. 8_____ , robots that can perform more complicated tasks, e.g. get around obstacles in their path and search for victims, are self-controlled. With the appearance of AI robots and computers have been able to learn and to use information from previous activities to make future decisions. Smart robots have been 9_____ the capability to act with human-like behavior. Face recognition software, computer10 _____ , or computer games that give players a response based on the players actions are all forms of artificial intelligence.

1.	a. real	b. actual	c. true
2.	a. diverse	b. various	c. multiple
3.	a. exciting	b. exiting	c. existing
4.	a. carry on	b. carry off	c. carry out
5.	a. look as if	b. look like	c. look similar
6.	a. rescue	b. relieve	c. reliable
7.	a. distant	b. long-range	c. remote
8.	a. alternately	b. alternatively	c. actually
9.	a. fitted with	b. fixed with	c. fitted to
10.	a. sight	b. inspiration	c. vision

Grammar. ***Decide which answer a, b or c best fits into each gap.***

1. Imagine you are a passenger in a car with a robot _____ behind the steering wheel. How would you feel?

a. being sat b. having sat c. sitting

2. _____ by robots, James Cameron made one of the best films about robots - *Terminator*.

a. Being fascinated b. Fascinating c. Having fascinated

3. _____ the killer robot in the first *Terminator* film, Arnold Schwarzenegger turned into a kind family-friendly robot in *Terminator* 2.

a. Played b. Playing c. Having played

4. _____ a world where robots become prevalent, science fiction author Isaak Asimov devised his Three Laws of Robotics.

a. Envisioned b. Being envisioned c. Having envisioned

5. _____ from today's perspective, Asimov's laws are highly problematic.

a. Considering b. Considered c. Having considered

6. _____ been well researched in the field of AI, developing human behavior in robots has focused on limited areas.

a. Not having b. Having not c. Don't have

7. _____ the distance by the time required to cover it, we obtained the average speed.

a. Divided b. Having divided c. Being divided

8. The weather _____ stormy, the flight had to be delayed.

a. been b. be c. being

9. A new technique _____ , the efficiency rose.

a. working out b. having worked out c. having been worked out

10. With alternative fuel vehicle _____, we`ll stop being dependent on conventional oil energy.

a. be produced b. being produced c. producing