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Методичні рекомендації до читання текстів
англійською мовою для студентів
спеціальності 132 – Матеріалознавство

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Методичні рекомендації до читання текстів англійською мовою для студентів спеціальності 132 – Матеріалознавство /Укладач: доц. С.В. Щербина. – Кропивницький: ЦНТУ, 2025. – С. 69.

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Дані методичні рекомендації й завдання до читання текстів англійською мовою призначені для студентів всіх курсів англійською мовою технічних спеціальностей (магістрів й аспірантів), а також для студентів інших спеціальностей, які прослухали курс "Хіміко-фізичні властивості матеріалів". Методичні рекомендації спрямовані на розвиток навичок і умінь читання текстів за фахом.

Інформаційний зміст текстів доступний для сприйняття англійської мови студентами. Окрім навчання читання запропонований комплекс вправ передбачає також розвиток навичок усного мовлення, письма й критичного мислення.

Методичні вказівки можуть бути використані як для аудиторної роботи під керівництвом викладача, так і для самостійної роботи.

PART I

1. Essential Vocabulary.

Find Ukrainian equivalents for the following words

- | | |
|----------------------|-----------------------|
| 1. inventor | 2. bright boy |
| 3. brain | 4. angry <i>adj.</i> |
| 5. to decide | 6. to discover |
| 7. technical devices | 8. chemical apparatus |
| 9. can <i>n.</i> | 10. to devote |
| 11. telephone | 12. transmitter |
| 13. dynamo | 14. to transform |

2. Answer the following questions

1. When did Thomas Edison live and work?
2. Was he successful in the school?
3. What did he like and did not like to study?
4. At what age did Edison begin his experiments?
5. What book changed his life?
6. When did his most important invention happen? What was that?

3. Read and translate the text

Text 1 Thomas Edison

Thomas Edison who lived and worked in the United States of America in the second half of the 19 century and the first half of this century was one of the greatest inventors of his country and of the world.

When he was a boy nobody thought that he might become an inventor. He even went to school when he was quite a big boy. At school he always asked his teachers a lot of questions and they thought of him as of not a very bright boy. After three months at school his teachers told his mother that her son's brain was "no good" and that he was one of the worst schoolchildren of the school. This made Edison's mother so angry that she took him from the school and decided to teach him at home herself. She soon discovered that though he was not good at school studies, he liked very much to put questions to everybody about nature of different things and especially about mechanisms and technical devices. She saw that every day Thomas became more and more interested in science and began teaching him everything that she knew

about chemistry and electricity. During the years of his studies at home Edison read an unusually great number of books and magazines.

Edison began his experiments when he was only eleven. He spent the greater part of his day in making different experiments. To make chemical apparatuses and devices necessary for his experiments he had to collect more than two hundred bottles and a great lot of cans. When he was sixteen, Tom devoted almost all his time to science and experiments. He spent only four hours out of each twenty hours on sleep, using the rest of the time for his studies, books, and magazines and for his work. One night on his way home Edison bought some books by Faraday. In simple words the book told him the story of that great scientist's experiments. Tom did not sleep that night, reading the books. The morning found him still reading them. His mother came to his room and asked him, "Aren't you going to stop reading to cut something?". Tom looked at her, "No, I can't. I have so much to do and life is so short". When he was twenty two, Edison went to New York. There he devoted all his time to inventions. He organized several big laboratories where hundreds of assistants helped him to do his experiments. He made many important inventions.

In 1869 he was still a telegraph operator, he took a patent for automatic telegraph system and the electric pen. Then he invented the telephone transmitter. The invention of the phonograph belongs also to Edison. His most important invention, which he did in 1878, was the electric lamp (As you know, it was not the first electric lamp in the world. In 1872 the Russian scientist A. N. Lodygin invented the first electric lamp until in 1876 another Russian scientist P. N. Yablochkov invented the first arc lamp. In those years their lamps were in great use not only in Russian towns. Some European cities also used them to light the streets and public building. In those years in Europe they called the electric light the "Russian light"). He invented also a dynamo and many other electrical devices. In 1887 he transformed the kinetoscope into the moving picture machine. You can understand his greatness as an inventor from the fact that he patented as many as 1,200 inventions.

4. Match the synonyms

- | | |
|------------|----------------|
| 1. country | a) subordinate |
| 2. patent | b) significant |

- | | |
|-------------------|--------------|
| 3. devote | c) subjects |
| 4. important | d) testing |
| 5. assistant | e) dedicate |
| 6. invention | f) state |
| 7. school studies | g) license |
| 8. experiment | h) discovery |

5. Translate the sentences into Ukrainian

1. When he was a boy nobody thought that he might become an inventor. 2. They thought of him as of not a very bright boy. 3. She soon discovered that though he was not good at school studies, he liked very much to put questions to everybody about nature of different things and especially about mechanisms and technical devices. 4. He spent the greater part of his day in making different experiments. 5. One night on his way home Edison bought some books by Faraday.

4. Retell the story.

5. Read and translate the text.

Text 2 From the History of Edison's Inventions

Almost all of Edison's inventions had practical use. As you already know, in 1869 he took out patent for automatic telegraph system and the electric pen. His invention of the carbon microphone marked a new age in the telephony and helped in bringing the telephone into everyday use. You are to know that a microphone is a device for delivering electric signals corresponding to the variations in the air pressure which sound waves produce. The changing pressure of the waves produces the corresponding variations in the electric current. This way the microphone transforms the sound signals into the electric ones. In 1877 Th. Edison made his new invention. This time it was a speaking machine which he called a phonograph. For the first time in history a mechanical device recorded the voice of man. All America talked of this invention. Thousands of people came by trains to see how the phonograph spoke. Even the President of the United States himself invited Edison to the White House to demonstrate the new machine. Ten years later Edison developed a number of speaking machines which were much better than his first models. They were much smaller and had motors and disks instead of cylinders. But not in all European countries,

people and even scientists understood the meaning of Edison's great invention. Even in England the public refused to use it for a long time. In France at the demonstration of the "speaking machine" before the members of Academy of Sciences, one of the members of the Academy said, "It is a shame to show such things to people to deceive them because every man knows that a metal thing cannot speak". In Russia at the public demonstration of the first machine, a member of the government protested against it and arrested for three months the man who demonstrated the "speaking machine". Only one hundred years separates us from the time when Edison invented his first "speaking machine" but now we cannot think of our everyday life without recording and speaking apparatuses. They are quite necessary for our laboratories as well as for our classrooms. Today the recording and speaking machines not only speak but also help teach us languages as well as other subjects.

8. Divide the text into the parts according to its contents. Give a corresponding heading to each of the parts and write them down.

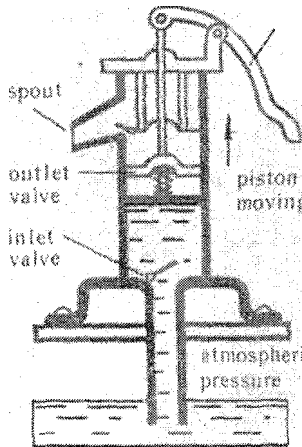
9. Give Ukrainian equivalents to the following.

1. Practical use, 2. to take out patent, 3. automatic telegraph system, 4. electric pen, 5. carbon microphone, 6. to help in bringing the telephone into everyday use, 7. a microphone is a device for delivering electric signals corresponding to the variations in the air pressure which sound waves produce, 8. changing pressure of the waves, 9. the electric current, to record.

10. Examine the drawing and read the text without using a dictionary.

Text 3 Lift Pump

A lift pump is a device for pumping liquids. It consists of a long tube and a cylinder with a spout as shown in the drawing. A metal valve at the top of the tube is an inlet one. It allows water to pass through but prevents it from going back down the pipe. (In the body of the piston there is another valve. It is an outlet one. It allows water to pass above the piston and then to flow out of the spout at the top of the cylinder. How does a lift pump work?



As the handle goes down, the piston moves upwards, creating a vacuum in the cylinder and the tube. Thanks to the vacuum, atmospheric pressure can force water up the tube. As the piston moves down, the air in the room between the piston and the bottom of the cylinder passes through the outlet valve and out of the system. After several strokes of the handle, water fills the pipe and flows through the lower valve into the cylinder. On the next down stroke of the piston, water passes through the outlet

valve. On the following upstroke the outlet valve closes and the piston raises water, which runs out of the pump.

11. Translate the quotes, explain their meaning.

1. Almost everything in life is easier to get into than out of.
2. Use technology to simplify your life, not to make it more complicated.
3. Be sympathetic to other people's ideas and desires.

PART 2

1. Essential vocabulary. Learn the following structural words and write down two examples with each of them.

1. **Enough** - *достать*:

The plate is not thick enough. It is warm enough. The pressure in the boiler was high enough.

2. **Everywhere** - *всюду*:

Students come to our camp from everywhere. You can find the book everywhere: in any library or even in every bookshop.

3. **Sometimes** - *иногда*:

He sometimes goes to a cinema. We visit our friends sometimes.

2. Essential vocabulary. Read the word-combinations and sentences with the new words. Try to remember as many words as you can.

1. **Possible** adj. *можливий*:
My friend is able to answer all possible questions. This is the only possible answer to the problem. This is the only possible road to the port. Such results are quite possible. Television as well as telephone makes it possible to see a person at the other end of the line. Do you know what kind of telephone it is?
2. **Length** n. *довжина; відстань; протяжність*:
the length of the rod; the length of the road; to be at the length of five meters; to observe the whole length of the street; the length of a speech; the length of the day; to increase the length of one's life; The ship is 100 feet in length. The room is five meters in length.
3. **Wire** n. *провід, дріт*:
a bell wire; earth (ground) wires; measuring wire; a wire bed; wire communication; a wire channel. We use only copper wires here. There is a piece of copper wire nine meters long. If you cut the wire into three equal parts, what will the length of each part be?
4. **Definite** adj. *певний, визначений*:
Give your assistants only definite tasks. He gave us no definite answer. You are to start the experiment only at a definite time. We need only definite data. Your words are quite definite.
5. **Circuit** n. *ланцюг (ел.), контур*:
an electric circuit; an open circuit; an open wire circuit; to close a circuit; a main circuit; an earth circuit; a closed circuit-
6. **Size** n. *розмір*:
All the test-tubes are of the same size. I don't know the size of my hat. These hats are smaller in size.
7. **Unit** n. *одиниця (виміру)*:
A centimeter is a unit of length. A minute is a unit of time. A kilometer per hour (к. р. h.) is a unit of speed.
8. **Real** adj. *дійсний; справжній, натуральний*:
a real friend; the real name; real coffee; real facts; the real life; the real events; the real gold; a real man; a real writer; a real hero.

9. **Field** n. *поле; область*:
a green field; a magnetic field: the field of science; to be a specialist in many fields; the field of scientific research; an electric field.
10. **Equip** v. *устатковувати; споряджати; оснащувати*:
We have to equip the factory with automatic lines. They equipped the expedition with the necessary materials. We equipped our English language study-room with modern tape-recorders and play-recorders.
11. **Times** n. *раз*:
two times; several times. Read the text two times. We have lectures on mathematics three times a week. Three times six is eighteen. Do one thing at a time.
12. **Keep (kept, kept)** v. *зберігати, тримати*:
to keep canned food in a cold place; to keep water in the system clean; to keep fruit fresh; to keep milk cold; to keep tubes empty; to keep one's word; to keep a secret.
13. **Elaborate** v. *детально розробляти*:
to elaborate the details of the plan; to elaborate the plan of work; to elaborate new methods of teaching languages; to elaborate important scientific problems; to elaborate new devices for counting sugar bags; to elaborate an automatic device for can controlling.
14. **Introduce** v. *вводити*:
to introduce the video-telephone; to introduce a new system of teaching mathematics; to introduce a new method of filtering; to introduce signals into counting system; to introduce a hot copper wire into the test-tube.
15. **Get (got, got)** v. *отримувати*:
He gets letters every day. We get the magazine four times a week. I like to get definite answers. My friend got the diploma of the engineer two years ago.

1. **Read and translate the following text.**

Electrons that Think

We live in the electronic age. As a science, electronics is still a baby, but it is changing the lives of people as much as the industrial revolution did.

When somebody thinks of electronics, he thinks first of all of such devices as radio or television which appeared in the beginning of last century. But electronics — the control of electric current in vacuum tubes and special crystals has thousands of other uses today. Even the engine in a modern car is not possible without electronics controlling the work of its cylinders. Everywhere you can see machines, trains and airplanes equipped with different electronic devices.

Scientists are constantly finding new ways of using electrons to make our life safer, easier and richer. Electronics made possible automation which controls factory production by machines instead of people. In an automated factory electronics controls the machinery and keeps the records so that no one has to do simple and monotonous work.

The heart of automation is an electronic computer. Elaborated thanks to the work of many inventors, scientists, engineers and workers, the machine can do all sorts of problems. The electronic computer used in different factories and laboratories and computing centers can solve almost any production problem automatically.

In elaborating the computer, scientists and engineers used the basic principle of automatic computation described below. As you know at a time a wire can carry only one electric signal but that one signal delivers two units of information; if the current is on, the signal sent through the wire is a "yes" signal, if the current is off, the transmitted signal is a "no" one.

As a computer can work only "yes" and "no" signals it uses what engineers call a binary system which corresponds to a binary number system. What is a binary number system?

Binary numbers have only two digits instead of ten digits used in our number system. In the binary system one of the digits is 0, the other digit is 1. With the help of only these two digits the electronic computer can count other numbers. For example, "1" in the binary system standing on the second place from right to left means "two" of our number system (... 0010 = 2). The sign "1" of the binary system put on the third place from right to left is "four" in our system (... 0100 = 4), "1" on the fourth place (...01000) is eight; on the fifth place (...010000), sixteen; "1" on the sixth place (...0100000), thirty-two, etc.

So if we take a separate wire for each number place of a binary system to deliver "yes" or "no" signals, using two wires we can count to three; using three wires we are able to count to seven; having four wires we can send "yes" or "no" signals counting to fifteen.

One easily sees that with five wires we can count to thirty-one. With six wires one can count to sixty-three and so on.

The electronic computer uses circuits, vacuum tubes and diodes to calculate the binary numbers.

Scientists sometimes call a computer a "thinking machine" but generally speaking the "thinking machine" does not think at all. It only follows the instructions introduced in the form of computer programs. Studying the principles of electronic computers, one easily sees that they really can't do very many things. They only can turn electric current on and off, producing "yes" or "no" signals and count how many times they do it. So, the electronic computer is nothing but a big calculating machine which counts "yes" and "no" signals in its circuits. As the electronic calculator operates with the speed of electric current it counts almost as fast as the current passes through its circuits.

4. Answer the following questions in written form.

What does the term 'electronics' mean?

What do they use electronic computers for?

What operations do they perform with the help of electronic devices?

What basic principle was used in elaborations the computer?

Can a computer think?

(Find the corresponding explanation in the text.)

5. Read the following text.

Text 2 Electron Microscope

A microscope is an important research tool used in many fields of science and technology. Just as astronomers use telescopes to study unknown bodies in the cosmos or to discover new properties of stars and planets, chemists, physicists, metallurgists, bacteriologists and other

specialists use microscopes to study microorganisms, bodies and objects of the micro-world.

There are several types of microscopes. The most widely used type is an optical microscope or a light microscope. Due to bending (*визуб, ззуб*) of light beams in its lenses, the microscope helps the scientists to see small objects much larger than they are. The wave length of light is very small but still "it is too long to make it possible for scientists to observe with the help of an optical microscope those objects of the microworld which are larger than the wave length of the light used. Yet one can see things which are smaller than the wave length of light. By using special rays with the wave length smaller than that of light scientists could make the micro objects visible. The use of such rays made possible to elaborate a new type of the microscope in which the cathode ray worked instead of the light beam. A super microscope invented in 1938 in Germany was the electron microscope. Using beams of electrons, the electron microscope had a magnification factor of more than 20,000. Electrons in an electron microscope pass through the observed objects like light waves pass through a transparent (*прозорий*) object. The magnet coils of the electron microscope do the work of lenses in optical microscopes: they bend the cathode rays. The bent rays fall on a screen, forming a large, picture of the observed object. It is the picture that the observer can see through the ocular. Thus, a modern electron microscope can magnify the observed object as much as 2,000,000 times.

6. Answer the following questions.

1. What advantages has the electron microscope as compared with the optical one?
2. What is the function of the electromagnets in the electron microscope?
3. What magnification* factor has the electron microscope?
4. Can you see an object through the electron microscope?
(Find the explanation in the text.)

7. Translate and write down the following sentence. Do it without using a dictionary.

1. My friend wants to deepen his knowledge of foreign languages because he is going to enter the foreign language department of the University. 2. To get the contrast, he deepened the blue in his picture. 3. As evening came, the light lessened. 4. We can freshen water by adding some ozone to it. 5. The light from the reading-lamp is too strong. Darken a lamp a little, please. 6. The bar is too long. Shorten it by 6 centimeters. 7. The winter comes and the days are shortening.

8. Read and translate the following sentences without using a dictionary.

1. The AN-124, the world's largest transport plane - popularly known as the Ruslan - brought a giant truck, with a carrying capacity of 354 tons from Vladivostok to the diamond miners of Yakutia. 2. An electric computer can do several thousands of arithmetic operations per minute. 3. Everybody knows that A. S. Popov was the inventor of the radio. 4. Alexander Popov was the first to discover the principle of wireless communication. 5. During World War II the researchers in the field of electronics invented radars and electronic computers. 6. The first great step in the field of electronics was the invention of the vacuum tube. 7. When used for making calculations, an electronic computer makes one mistake in a milliard digits. 8. As the letter is dateless, we cannot find out when he wrote it. 9. The electronic calculator works with the speed of an electric current, which moves almost as fast as light. 10. To make such calculations, one has to know the language of computers. 11. He wants to know the 'why' of things. 12. Now scientists can solve many problems with the help of electronic 'thinking machines', which speed up the process of calculation. 13. I saw some good football players but you top them all. 14. My definition of the word angle is 'the space between two lines that meet or cross'. Can you top it? – Let me have a try. 'Angle is the space between two lines that meet or cross each other measured in degrees'.

9. Translate into English using essential vocabulary.

- | | |
|--|---|
| 1. мій друг в змозі відповісти на всі можливі запитання; | 2. це єдина можлива відповідь на цю проблему; |
| 3. наукова сфера; | 4. поле наукового пошуку; |
| 5. це єдина можлива дорога до порту; | 6. електричне поле; |

7. такі результати досить можливі;
9. підтримуйте воду в системах чистою;
- 11.бути довжиною до п'яти метрів;
- 13.збільшити протяжність життя;
- 15.дзвінковий провід;
- 17.заземлюючий провід;
- 19.вимірювальний дріт;
- 21.траншея;
- 23.дротяний зв'язок;
- 25.ми використовуємо лише мідний дріт;
- 27.давайте вашому помічнику лише конкретні запитання;
- 29.нам потрібні лише визначені данні;
- 31.електричний ланцюг;
- 33.незамкнений ланцюг;
- 35.замкнути ланцюг;
- 37.головний контур;
- 39.замкнений контур;
- 41.всі колби мають однаковий розмір;
- 43.сантиметр - одиниця довжини;
- 45.магнетичне поле;
8. ми маємо устаткувати завод автоматичними лініями
10. тричі по шість - буде вісімнадцять;
12. у нас є лекції з математики тричі на тиждень;
14. зберігайте консервовані продукти в холодильнику;
16. довжина стержня;
18. зберігати пустими труби;
20. дотримуватись свого слова;
22. зберігати секрет;
24. розробляти деталі плану;
26. впроваджувати нові методи фільтрації;
28. розробляти нові методи навчання мови;
30. розробляти важливі наукові проблеми;
32. розробляти нові пристрої для обліку тюків з цукром;
34. розробляти автоматичний пристрій з контролю бляшанок;
36. розробляти план роботи;
38. переводити сигнали в облікову систему;
40. вводити гарячий мідний дріт в пробірку;
42. мені подобається отримувати конкретні відповіді;
44. мій друг отримав диплом інженера два роки тому.

9. *Translate the quotes, explain their meaning*

1. A little knowledge on the subject can be more dangerous than no knowledge on the subject.
2. Learn how to learn.
3. Unwritten rules are just as important as written ones.

PART 3

1. Find Ukrainian equivalents to the following words:

- | | |
|------------------------|------------------------------|
| 1. Alloy | 10. tin |
| 2. branch of technique | 11. the Iron Age |
| 3. to obtain | 12. sulphur |
| 4. the Stone Age | 13. phosphorus |
| 5. to be treated with | 14. to be converted into |
| 6. to contain | 15. to elaborate |
| 7. to melt (together) | 16. chemical composition |
| 8. to add | 17. low melting-point alloys |

2. Read and translate into Ukrainian the following text

Metals and Alloys

Everybody knows that metals and alloys play important part in any branch of technique as well as in our everyday life. But when did man come to know them? How early were metals and alloys used by man?

From the earliest times man has made things of materials obtained from the earth. For thousands of years of the Stone Age for making tools he used mostly stone. Then came the discovery that metal can be produced from certain types of stones when they were treated with fire. By heating stones to very high temperatures man made the metal the stones contained melt and run out of them. Sometimes, as we know it now, man had to add some carbon (C) to produce compounds of metals. We know also copper (Cu) and tin (Sn) to be two of the earliest metals obtained this way. Then man noticed that the two metals, when melted together, produced a new material that was much harder and stronger than either of them had been. Scientists think this discovery opened a new period in man's development. Since the discovery the period to

continue for about seven hundred years is considered to be the age of bronze. That's why the scientists gave it the name of the Bronze Age. It had lasted for about 700 years when came the time when man learned to produce iron, which became one of the most important metals for him. It marked the beginning of a new age - the Iron Age.

Since then man has learned how to produce a lot of other metals and how to obtain thousands of alloys from them. To produce an alloy man melted together two or more metals. As the time passed many different types of alloys were discovered. Now we know some alloys to contain not only metals but also non-metals, such as carbon, sulphur (S), phosphorus (Ph), etc. Generally speaking, it is in the form of alloys that one considered metals to be the most useful. A lot of metals are converted into alloys of much importance and scientists and metallurgists want much more new alloys to serve man's needs. We want you to know that only about as little as 30 metallic elements serve modern needs of man, but there are over five thousand alloys, hundreds of which are in common use. So many different alloys have been elaborated because modern industry requires metals to be used for different purposes.

We know scientists to classify all the alloys into some types or classes according to their chemical composition and physical properties. According to composition, all the alloys are to be classified as ferrous alloys (those containing iron) and non-ferrous ones (those containing no iron or only a small quantity of it). The classes of alloys based upon their physical properties include light-weight alloys, low melting-point alloys and others.

An alloy to answer the purpose it has been elaborated for is to have certain properties or certain combination of properties which no metal in nature has. Many industries need alloys having certain chemical and physical properties. For example, new kinds of stainless steel are being designed to resist the action of acids and corrosion due to the atmospheric agents under high temperatures. Some of the alloys to be used in the automobile engines are to withstand very high temperatures. Future improvements in gas turbines depend in large measure on the development of new improved heat-resisting alloys too. In the nearest future we expect metallurgists to elaborate new ways of controlling both

chemical and physical properties of alloys and elaborating many new ways of important alloys for our technique and economy.

1. *Answer the questions*

How did man learn to obtain metal from stone?

What do we call the age which followed the Bronze Age?

Why do scientists consider metals to be the most useful in the form of alloys?

Can an alloy have properties which no metal in nature has?

4. *Translate the words into English. Make up the sentences with these words.*

- | | |
|----------------------------------|-------------------------|
| 1. додавати | 2. олово |
| 3. напрямок технології | 4. залізний вік |
| 5. добувати, отримувати | 6. сірка |
| 7. сплав | 8. фосфор |
| 9. обробляти | 10. переробляється |
| 11. нагрівання жаростійкі сплави | 12. в загальному вжитку |
| 13. вміщувати | 14. кам'яний вік |
| 15. плавитися (сплавлюватися) | 16. хімічний склад |
| 17. протистояти, витримувати | 18. чинити опір |
| 19. вуглець | 20. розробляти |
| 21. компоненти металів | 22. кислота |
| 23. мідь | |

1. *Translate into Ukrainian. Find out subject and predicative.*

1. Now these plastics are used in the machine building industry as well.
2. Fourteen world records were set by the AN-32 transport plane, specially designed for working in mountainous and hot climate conditions.
3. The experimental wire was covered with rubber.
4. Nadym, a district centre in the Tyumen Region, is located in the permafrost zone, where winters last eight months and the thermometer sometimes drops lower than 50°C.
5. The laboratory man is fastening the rubber tube to the glass tank.
6. The new paper mill in our town was

built two years ago. 7. Electric current is produced in various ways. 8. A group of engineers tested the reactor. 9. The process of extracting such oceanic ores was elaborated in 1987.

6. Read and write down the numbers of the sentences where the action is directed to the subject.

1. Trains, airplanes and ships are equipped with various electronic devices. 2. Many thousands of years ago, the Greeks also used a foot measure. It was slightly larger than our present-day measure. 3. When the symbol for one in the Roman number system was placed after the symbol for five, it was added and the number was equal to six. 4. At the institutes, the students are taught many different subjects. 5. The academic year is divided into two terms. 6. A new library was opened in our district last month. 7. Some new grammar rules were explained at the last lesson. 8. Our English teacher asked us the new grammar rules. 9. The first iron bridge was built in 1778. 10. Professor Bobrov taught us higher mathematics. 11. The student was asked many questions at the examination of physics.

7. Rewrite the sentences, point out the predicate, its tense and voice, translate them into Ukrainian.

1. Mir (Peace) a multimodule orbital station was added to the "family" of space laboratories. 2. On Feb. 20, 1985, it was lifted into space near the Earth by a Proton rocket. 3. The device made by our research group was patented a year ago. 4. The control of this industrial process is automatized now. 5. Scientific and technical progress is aimed at raising labour productivity and reducing the number of people employed in production. 6. In the last century, little was known about the nature of electricity. 7. These books are given to you for two days only. 8. These control methods were first introduced in the mechanical shop of our factory last year.

8. Read and translate the sentences.

1. The electric lamp was invented by P. N. Yablochkov. 2. The Law of Gravitation was discovered by Isaac Newton, the famous English physicist. 3. During the 18th and 19th centuries, a number of theories of gravitation was put forward by astronomers and mathematicians.

4. After the tests, the results received were tabled and discussed by our specialists. 5. The fate of peace on Earth is to a great extent predetermined by modern scientific developments. 6. Water clocks were widely used by many peoples. 7. After cooling, the beer was bottled and the bottles were then labeled. 8. The cans of dry milk can be opened with a can-opener. 9. After the liquid changes its color the experimenter stops the reaction. 10. Our factory built two new shops last month. 11. After the experimental studies, the new filtration method was tested at the juice factory.

9. *Read and write down the numbers of the sentences where the action is directed to the subject.*

1. Our feed mill was built two years ago. 2. The institute of food industry built two new laboratories last month. 3. After the experimental studies, the researchers of these food laboratories tested the new method of food preservation. 4. The new method preservation by heating was tested in our research laboratory. 5. The book was included in our collection last year. 6. The book about elevators included 50 schemes and pictures. 7. The first line of the metro in Moscow was finished in 1935. 8. The second and the third lines of the metro were finished in a much shorter time than the first one.

10. *Put the verbs into brackets into correct form.*

1. The speed of the technological line (to calculate) with the help of a computer. 2. The words on the chalk-board (to write) in English. 3. At institutes and universities students (to get) higher education. 4. The teacher (to ask) a lot of questions at the examination. 5. At our English lessons, the students (to ask) questions only in English. 6. The graph (to divide) by this curve into 2 parts. 7. Radioisotopes have thousands of uses, and new ways of using them (to discover) every day. 8. Radar systems (to develop) and (to improve) during the days of World War II. 9. The milk brought from farms (to cool) in large refrigerators. 10. In our country more than 200000 books and magazines (to publish) every year. 11. At the station, the sportsmen from England (to meet) by the students of the Institute of Physical Culture.

11. Translate the quotes, explain their meaning

1. Talk about your own mistakes before criticizing those of the other person.
2. Any fool can make a rule.
3. Choose your words carefully.

PART 4

1. Essential Vocabulary. Find Ukrainian equivalents for the following words:

- | | |
|---------------|--|
| 1. pendulum | 2. swing |
| 3. device | 4. to be wound up |
| 5. apparatus | 6. gear |
| 7. tool | 8. spring |
| 9. to attach | 10. the escape wheel |
| 11. weight | 12. toothed-wheel |
| 13. rod | 14. lever |
| 15. as a rule | 16. transmission |
| 17. to push | 18. hands of the pendulum
clock surface |
| 19. to move | 20. plane of the pendulum
turns |
| 21. length | 22. rotate |
| 23. strength | 24. pull |
| 25. gravity | 26. altimeter |

2. Read the following text.

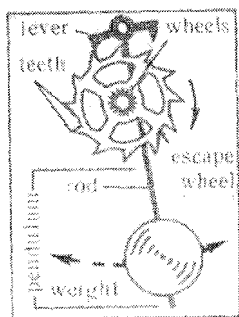
Text 1 The Pendulum

Devices and apparatuses of modern science are as a rule very complicated. But when they are examined one can easily see that they practically consist of a few simple tools put together. These simple tools are found in many different kinds of instruments and are used to do

many kinds of work. One of the tools for many uses is, for example, the pendulum.

A simple pendulum is any weight attached to a rod (see the picture). Push the weight to the left. After it stops moving to the left it begins moving back to the right. Such movements can continue for a long period of time.

The most important fact about the pendulum is that it moves with the regular rhythm. Experiment and theory both show that the rhythm depends on two things, the length of the pendulum and the strength of gravity.

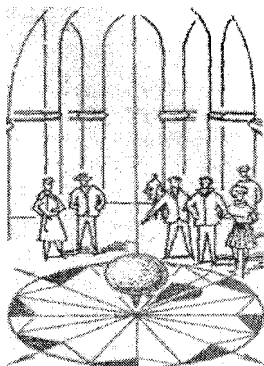


The longer the pendulum the more time it takes for each swing.

The greater the strength of gravity, the less time it takes for each swing. Because of its regular rhythm, a swinging pendulum is used to measure time. Generally speaking a pendulum clock is simply a device for counting the swings of a pendulum.

The main spring of the clock is wound up and then is slowly unwinding. When unwinding it turns a wheel which is connected by gears to other wheels.

The corresponding wheels are connected with the hands of the clock. One of the wheels that the spring turns is the escape wheel. It has teeth and is called a toothed-wheel. The lever with two fingers on it is attached to the pendulum rod. As the pendulum swings, the lever puts first one finger and then the other between the teeth of the escape wheel, stopping it each time. As a result, the escape wheel makes small turns which correspond to the rhythm of the pendulum. Due to the transmission of the swing movement and its transformation the hands of the pendulum clock make the corresponding movements, thus counting the short turns of the escape wheel on the dial.



Here the second property of the pendulum is described. The nearer to the equator a point on the Earth's surface is, the more slowly the plane of the pendulum turns. At the equator it does not turn at all. The turning of the plane of the pendulum shows that the Earth really rotates on its axis. The way in which the rate of turning varies from place to place is one of the many proofs that the Earth is round. In addition, the rate of turning at any place shows how far from the equator that place is.

Below you are given a description of the third property of the pendulum. The force of gravity, acting on anybody that is near the Earth, pulls it towards the center of the Earth.

The strength of this pull depends on how far the body is from the center of the Earth. The farther away it is, the weaker the pull. When a balloon rises above the Earth, it moves away from its center. As it rises, the pull of gravity on everything which is attached to the balloon becomes weaker. Due to this fact, a pendulum carried by the balloon can serve as an altimeter, measuring the height of the balloon above the Earth. The higher is the balloon, the weaker is the pull of gravity. The weaker the pull of gravity, the slower the rhythm of the pendulum and the greater its swings are. This way the pendulum shows the height above the Earth.

The kind of a pendulum used for measuring the pull of gravity is called a gravity pendulum.

3. Answer the following questions.

1. What does the movement of the pendulum depend on?
2. Does the pendulum make the clock hands move?
3. What is the function of the pendulum in a clock?
4. In which way can one use a pendulum to determine the distance of a body from the equator?
5. What principle is the work of the pendulum altimeter based on?

4. Translate into English.

1. пристрій
2. поверхня

- | | |
|------------------------------------|-----------------------------|
| 3. знаряддя | 4. довжина |
| 5. передавальне колесо | 6. важіль |
| 7. як правило | 8. штовхати |
| 9. зубчате колесо | 10. прилад |
| 11. сила | 12. тяжіння |
| 13. маятник коливання | 14. прикріпляти |
| 15. висотомір | 16. натяг |
| 17. шестерня | 18. важіль |
| 19. бути заведеним | 20. вага |
| 21. передача. | 22. площа маятникового ходу |
| 23. обертатись | 24. рухатись |
| 25. стрілки маятникового годинника | |

5. Find the meaning to the corresponding word.

1. A rod with a weight at the end that moves regularly from side to side to control the mechanism of a clock...
2. An object or a piece of equipment that has been designed to do a particular job...
3. The tools or other pieces of equipment that are needed for a particular activity or task...
4. How heavy sb/smith is, which can be measured in, for example, kilograms or pounds...
5. A long straight piece of wood, metal or glass...
6. The force that attracts objects in space towards each other, and that on the earth pulls them towards the centre of the planet, so that things fall to the ground when they are dropped ...
7. To use force to move past sb/smith using your hands, arms, etc...
8. to make smth such as the window of a car move upwards by turning a handle, pressing a button, etc

6. Match synonyms.

- | | | |
|--------------|----|-------------------------|
| 1. weight | a) | being physically strong |
| 2. as a rule | b) | usually |
| 3. to push | c) | button |
| 4. to move | d) | remove |
| 5. length | e) | change position |
| 6. strength | f) | handle |
| 7. swing | g) | movement |

- | | | |
|-------------|----|--------------|
| 8. spring | h) | twisted wire |
| 9. lever | i) | being heavy |
| 10. surface | j) | flat layer |
| 11. pull | k) | size |

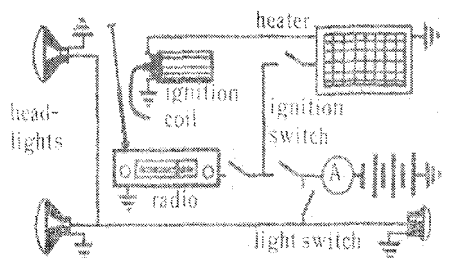
7. *Using the illustrations describe the working principle of the pendulum.*

8. *Translate the following sentences into English.*

- Ці нові технологічні процеси вивчаються у нашому відділі.
- За звичай такі питання обговорюються на інститутських зборах.
- Властивості рідин змінюються із зміною їх температури.
- Цей прилад був розроблений спеціалістами у нашому цеху.
- Друга хімічна лабораторія була устаткована сучасним електронним обладнанням.

9. *Read the text and find out the meanings of the underlined terms without using a dictionary*

Text 2 An Automobile Electric System



The picture below shows a simplified diagram of an automobile electric system. Lights, radio, heater and ignition are all connected in parallel with the storage battery of the car.

An ammeter is placed between the battery and all the other apparatuses so that it measures the total current being drawn by them. When the ignition switch is turned on and current is drawn by the ignition coil, the ammeter shows a discharge. Lights, heater and radio also cause a discharge. When the motor is started and the generator begins to function, the ammeter shows a charge going into the storage battery. The generator, which is driven by the motor, is now supplying all the electric energy needed in addition to recharging the battery.

10. Translate the quotes, explain their meaning.

1. Consider things from every angle.
2. Believe in others and they'll believe in themselves.
3. Don't take yourself too seriously.

PART 5

1. Essential vocabulary. Read all the word-combinations and sentences with the new words.

1. **near** adj. *близький*:
The examination is quite near. Show me the nearest way to the station. Take me to the nearest library. Ann is my nearest friend.
2. **near** adv. *недалеко, поблизу, близько*:
How near is station from here? Nobody was near. Was your answer very near the right one?
3. **backward(s)** adv. *назад*:
He stepped backward. The car was pushed backward. Can you say the alphabet backward?
4. **forward** adv. *вперед*:
We brought the date of the meeting forward from the 20th to the 24th of May. If your clock says 11.50 at 12 o'clock it is 10 minutes slow; you must put it forward. If it says 12.05 at 12 it is 5 minutes fast; you must put it back.
5. **hold** (held, held) v. *держати; тримати в собі, вміщувати, притримуватись*:
You can't hold this kind of milk in a plastic bag for a week. You must hold the windows of the sound laboratory shut. How much water does the flask hold? The car can hold five people. He always holds to his principles. Hold all the details of the plan under the control. The bottles hold half a liter of lemonade.
6. **memory** n. *пам'ять*:
My friend has a good memory for numbers. Develop your memory. A computer has an electrical or magnetic memory. The chief engineer has to hold all the details of this plan in his memory.

7. **piece** n. *кусок; часть*:
If a pipe was divided into two parts, we say that it was cut into two pieces. Give me a piece of paper. The shelves were brought to the laboratory in pieces.
8. **break** (broke, broken) v. *ломить (ся)*:
to break in two; to break a flask; to break a chain; to break an apparatus.
9. **half** n. *половина*:
Break the rod into halves. He usually spends the second half of Saturdays in the institute reading-hall. The Kiev train leaves at half past eight in the morning. You can get to the port in half an hour. Don't leave your work half done. The distance to the information center of our institute is not more than half a kilometer. He returned to the mechanical department in half an hour. The bottles were half empty.
10. **shape** n. *форма*:
He holds the minerals in a box of oval shape. The oil tank was made in the shape of a cube. The gas container had a spherical shape. Houses are built in all shapes and sizes. The rocket was made in the shape of a cigar.
11. **perfect** adj. *чудовий*:
This is really a perfect way of solving the problem. The laboratory is a perfect place for research. The sound laboratory received perfect equipment for recording speech.

2. Read the following text.

An "Electronic Eye"

An "electronic eye" is a device that can do hundreds of different things. In electronics and engineering it is called a phototube or a photocell.

Photocells are widely used in chemical as well as in food industry. For example, at canning factories an "electronic eye" is used for counting the finished cans of food which come out of the sealing machinery into the moving conveyor belts. Its work can be described as follows.

A phototube is placed on one side of the belt and a lamp producing a light beam is put on the other. When a light beam reaches a phototube,

the electric current passes from the tube to an electric counting machine. Every time a can comes between the light and the "eye" it cuts the beam, and the current is stopped. When the can moves on, the light reaches the tube again, and thus starts the current in the circuit. Each time the electric impulse is started, it moves the counter one digit. The process results in the accurate count of every can that is moved along the conveyor of finished production.

In another part of the canning factory an "electronic eye" is used to inspect labels on the cans. When the labeled cans pass by, the labels do not reflect enough light to start an electric current. But if a can without any label passes near the "electronic eye", the bright metal of the can reflects the light back into the phototube. Now the light is strong enough to start an electric current which flows from the phototube to the controlling device and the controlling rod pushes the unlabelled can off the belt.

An "electronic eye" can not only see things but also distinguish colors. It distinguishes colors of such fruit as oranges, lemons and so on. That's why it can be used to separate the ripe fruits from the green ones. For this purpose at the canning factories, oranges, for example, are sent to the conveyor belt which passes by an electronic sorting device equipped with a phototube. When a green orange passes by the "electronic eye" of the sorting device, the phototube closes the electric contacts of the device and the rod pushes the orange off the belt.

Other phototubes are used to see whether tomatoes are ripe enough for canning. For this purpose two tubes are used. One of them can "see" only green light, the other "sees" only red. If the current of the "red" tube is stronger than that of the "green" one, the tomato is ripe enough to be canned. Thus, when the device "sees" a red tomato it opens a lid at the end of the conveyor and the tomato continues its way on the production line. If a green tomato is signaled by the device, a rod pushes the tomato off the belt.

In machine plants, an "electronic eye" can be used for inspecting machine parts. If the parts are worked not well enough, they do not reflect enough light into the phototube and are sorted out by a device as bad ones.

An "electronic eye" does another important work at metallurgical plants. In the making of steel it is necessary that the temperature of molten metal be exactly right. As the steel gets hotter and hotter, its color changes from red-hot to light-red, then to orange and at last to white. By fixing the exact color of the metal, a phototube gives the most accurate measurement of its exact temperature. By passing the electric current of the corresponding strength to the controlling device the phototube can bring the molten metal to the exact temperature wanted and keep it as long as necessary.

Thus, the simple electronic device, which is called a phototube (a photocell), helps to carry out various technological processes effectively.

3. Answer the following questions.

1. How is an "electronic eye" called?
2. Where are photocells used?
3. What can an "electronic" eye" do?
4. What work does it at metallurgical plants?

4. Make the plan of the text.

5. Insert the corresponding words into gaps, translate into Ukrainian.

1. The examination is quite ____
2. How near is station from here?
3. Show me ____ way to the station
4. He stepped ____
5. Take me to ____ library.
6. Ann is my ____ friend.
7. Nobody was ____
8. The car was pushed ____
9. Was your answer very ____ the right one?
10. Can you say the alphabet ____?
11. If your clock says 1.50 at 12 o'clock it is 10 minutes slow; you must put it _____. If it says 12.05 at 12 it is 5 minutes fast; you must put it back.
12. ____ all the details of the plan under the control.
13. The bottles ____ ____ a liter of lemonade.

14. We brought the date of the meeting ___ from the 20th to the 24th of May.
15. You can't ___ this kind of milk in a plastic bag for a week.
16. My friend has a good ___ for numbers.
17. You must ___ the windows of the sound laboratory shut.
18. How much water does the flask ___?
19. The car can ___ five people. He always ___ to his principles.
20. Develop your ___
21. This is really a perfect way of solving the problem.
22. The laboratory is a ___ place for research.
23. The sound laboratory received ___ equipment for recording speech.
24. A computer has an electrical or magnetic ___
25. If a pipe was divided into two parts, we say that it was cut into two ___.
26. The chief engineer has to hold all the details of this plan in his ___.
27. Give me a ___ of paper.
28. The shelves were brought to the laboratory in ___.

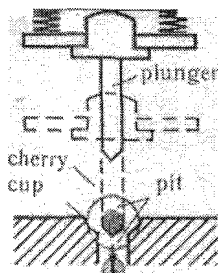
6. Translate the content of the following sentences into English using the verbs in Passive Voice.

1. Вчора я взяв цю книгу в бібліотеці інституту.
2. Минулого року гурт наших спеціалістів винайшов пристрій для нарізки металевих труб.
3. Д. Менделєєв створив Періодичну систему елементів.
4. Наша радіостанція прийняла сигнали їхнього судна.
5. Цей завод виробляє устаткування для автоматичних ліній.
6. За допомогою магніту можна очистити зерно від невеликих металевих предметів.

7. Read the following sentences and schematically show the situations described in them.

1. The plate is divided into 3 parts with a special cutter.
2. The assistant connected the water tank and the pump with a thin copper pipe.
3. The tank and the pump were connected with a thin copper pipe by the inventor.
4. The thermometer was attached to the steel wall of the oil tank.
5. The assistant professor prepared all the necessary equipment for the lecture demonstration.
6. The operator is attaching the thermometer to the wall of the tank.
7. All the equipment for the lecture is prepared on the demonstration table.

8. Look through the text and retell it in Ukrainian, using the drawing.



At the cannery cherries are first stemmed (stem, v. *чистити ягоди*) by hand or by mechanical stemmers. After stemming cherries are washed. Cherries are canned in two ways: with pits and without pits

If they can cherries without pits, pits are removed. Removing of pits is accomplished by automatic machine in which cherries fall into small cups and in which the pits are removed by a plunger

9. Read the following sentences. Determine the meanings of the verb "to carry". Translate the sentences without using a dictionary.

1. This article carries no new information for me. 2. The magazine carries a number of illustrations. 3. The shop does not carry fruit. 4. The car carried us 50 kilometers. 5. Last month they carried the research work to the end. 6. Any word carries a definite meaning. 7. The pipes carry hot water. 8. A taxi carried them to the station. 9. Railways and ships carry different goods.

10. Translate the quotes, explain their meaning.

1. The world needs great ideas for simple problems.
2. All time is of equal value.
3. It takes something to create something.

PART 6

I Essential vocabulary. Read all the word-combinations and sentences with the new words.

1. need v. *потребувати*:

They need the calculating-machine for analysing research data. For our today's English lesson we need the gramophone disks with the records of English and American political songs. This soup needs salt.

QUESTIONS: 1. What do you need to translate the text from a technical magazine? 2. How much time do you need to learn the new words? 3. Do you need to be told twice? 4. Do children need milk?

2. **power** n. *сила; енергія:*

lifting power; the power of falling water; atomic power; electric power. The scientists in the field of nuclear research are working on the problem of obtaining power from atom. Passing through the turbines of the power station, the water rotates them, transmitting its energy to the turbine-driven dynamos. The abbreviation h. p., which is often used in physics and mechanics, stands for horse power'. The car was equipped with a motor of 80 h. p.

3. **remarkable** adj. *чудовий, видатний:*

He is a remarkable scientist in the field of physics. The city is remarkable for its old monuments.

4. **find** (found, found) v. *знаходити, відкривати:*

I can't find my letter on your desk. It is necessary to find the answers to the questions which the article raises. **QUESTIONS:** 1. What devices can you find in the sound laboratory? 2. Do you find the English language difficult? 3. Who found America at the end of the XV century?

5. **pass** v. *проходити:*

Let me pass, please! The train passed the station without stopping. In our way home we pass the building of the Polytechnic Institute. Students' years pass quickly.

6. **flow** v. *текти:*

When valve C in the water system is open the liquid flows from the upper to the lower tank. Rivers flow into the sea.

7. **move** v. *переміщувати:*

Please, move the chair closer to the table. Please move the demonstration screen nearer to the window. If you don't see the screen from your place, move to another seat.

2. Read the following

Text 1. How Machines "Remember" Sounds

There are two main ways of "remembering" or recording sounds so that they can be reproduced. One of the methods is a mechanical one and is used in phonograph records, which are usually known as gramophone plates or discs. The other method is a magnetic one and it is used in magnetic tape and magnetic wire recorders.

A phonograph record can be defined as a mechanical memory of sound vibrations. When a record rotates, the wobbles (*борозда*) in its grooves deliver certain pressure to the working end of the needle and it begins to vibrate with the corresponding frequencies to reproduce the sounds. The process can be easily observed in the following simple experiment. Take a small piece of paper and hold it between a finger and a thumb so that the acute angle of the piece come in the groove of an old 78 revolution-per-minute phonograph record while it is turning. Listen attentively and you can hear the sound of music produced by the rotating disk. You hear it because the piece of paper is vibrated by the moving wobbles. Each time the piece of paper vibrates, it conveys the corresponding vibrations to the air and produces the sound wave, acting as a very small loudspeaker.

Old phonographs of Edison's time worked very much like such loudspeakers. The record with big grooves turned quickly, 78 revolutions per minute. The grooves were deep enough to vibrate a big needle attached to a very thin metal diaphragm. The diaphragm conveyed the vibration to the air and this way sent out a sound wave.

The sound then was amplified by passing it through a big curved horn (*труба*). When the vacuum tube (*радиолампа*) was invented and could be used to amplify sound there was no more need in the record turning so fast. With an electronic amplifier a phonograph needle could be smaller and didn't have to vibrate so hard. So, the long-playing records began to be produced. They have many more grooves which are placed much closer to each other and turn at less than half the speed of the old records, i. e. at the speed of $33\frac{1}{2}$ r. p. m. (revolutions per minute). Some French and American factories began also to produce records that turned at the speed of 45 r. p. m.

In a modern electronic phonograph there is no diaphragm, which is vibrated by a needle in order to make sound. Instead, in the modern phonographs, the movement of a small needle which comes into contact with the wobbled groove; is conveyed to a very small crystal of salt in which the mechanical movement is transformed into electrical current. The moving wobbles deliver certain pressure on the crystal and the crystal produces a small current flow. The current is amplified by vacuum tubes and then goes to the loudspeaker.

Another principle of "remembering" sound is used in a magnetic recorder. In the magnetic system there is practically very little mechanical movement. With magnetic recording, the only, mechanical movement used is that of the tape or of the magnetic wire itself.

The first magnetic recordings were put on wire. Later tape was found to be better. It is easier to handle and does not break so easily as a wire or a gramophone disks do. Recording tape is made of plastic that has in it thousands of very small pieces of iron that can be magnetized. For recording on a tape, we pass it by a little electromagnet. The pulsating current carrying the sound signals makes the magnetic field stronger or weaker and the pieces of iron in the tape are correspondingly magnetized. The sound recorded on the tape is reproduced when the tapes pass by another magnet with a little coil or wire. When the magnetic force is passing through the coil, it produces electric current. The pulsating current started in the coil by the magnetized tape is a perfect reproduction of the current which magnetized the tape. The current generated in the coil passes to the loudspeaker, producing the corresponding sounds in it. This way the sound which was recorded on the tape is reproduced

3. Answer the following questions.

1. Can sounds be "canned"?
2. Can we use paper for recording our speech?
3. What was used in the first magnetic recorders for recording sounds?
4. Can you use paper for producing sounds of speech?

4. Describe the ways in which the sounds of speech and music can be recorded.

5. Read the sentences, find out all possible translations into Ukrainian, write them down.

1. The new machine was used to test the materials. 2. The elevator of this type was well studied and described in the books published in our country as well as abroad. 3. The temperature of air is defined with the help of different measuring devices. 4. Most of the tools are made of steel. 5. The results of the experiments determining the properties of this new metal were recorded with the help of an automatic device. 6. The productivity of this mill is raised from year to year. 7. Such problems are usually solved with the help of electronic computers. 8. General subjects such as history, mathematics, foreign languages and others are taught in institutes from the very beginning of the studies. 9. He was given the book for two days only. 10. The instruction to the new press was sent to the mill yesterday. 11. After capping, the bottles are put into a refrigerator. 12. The astronomic distances are usually measured in light years. 13. An important role in making cheese is played by the technological process of pasteurization. 14. The film was liked very much by all the students. 15. The expedition was joined by a new group of specialists. 16. The new-type disc separator is demonstrated to the students every day. 17. Chemical symbols are used to record and explain chemical reactions.

6. Find out subordinate clauses which include verbal predicative referring to the future.

1. He thinks that they are working in the chemical laboratory. 2. It is important that the engineer study the project. 3. We recommend that the operator control the temperature in the device every hour. 4. For making these parts it was important that the steel contain less carbon. 5. It is possible that during pasteurization the temperature of the milk raise up to 160°F. 6. It was reported that the description of the new machine invented by one of our engineers was published in a scientific magazine. 7. They say that the fifth-year students are familiar with the plan of this research work. 8. It is important that all the students of our group be present at the Students Conference. 9. It is important that a student of a technical institute study mathematics regularly because it is one of the main subjects in training engineers.

7. Translate the sentences.

1. The method described opened new prospects for generating energy. 2. The construction of our engineering plant was started two years ago. 3. Large deposits of titanium are located in this region. 4. Thoughts are expressed by means of words. 5. When the first motocars were invented it was found that better roads were needed to use the cars. 6. Such crystals are grown only in special conditions. 7. The assistant was asked to finish the experiment. 8. To demonstrate them the new method of cutting invented by Dr. Popov, the students were invited to the plant. 9. Methods applied for industrial purposes are called "engineering methods". 10. The warmer the air in the drying tube is, the better the process of drying salt is carried out. 11. The higher the cathode's temperature the more electrons are emitted by it. 12. Cutting is applied when it is necessary to separate any part from a metal body. 13. For cutting such pipes special pipe-cutters are used. 14. It is reported that the tests of the industrial samples showed good results. 15. It is necessary that the workers assemble the machine today.

8. Explain the difference between the sentences.

1. a) The young man, who works in our research group, is a student of the evening department. b) The young man who works in our research group is a student of the evening department. a) The molecules, which are the smallest particles of a substance, can now be seen through an electron microscope. b) The molecules which move in the closed vessel collide with each other and with the walls of the vessel. 3. a) The laboratory assistant who prepares the materials for lecture demonstration comes at 9. b) The laboratory assistant, who prepares all the materials for lecture demonstration, comes at 9. 4. It was reported that the description of the new machine invented by one of our engineers was published in a scientific magazine. 5. They say that the fifth-year students are familiar with the plan of this research work. 8. It is important that all the students of our group be present at the Students Conference. 9. It is important that a student of a technical institute study mathematics regularly because it is one of the main subjects in training engineers.

9. Read the following sentences. Find out what part of speech the underlined words belong to. Render the contents of the sentences without using a dictionary.

1. Most weights and measures are based on the metric system. 2. The automatic system landed on the Mars on November, 2003. 3. Wire the house for electrical supply. 4. The units of length measure used in the Metric system are kilometers, meters, centimeters, etc. 5. By its gravitational pull, the Sun keeps various planets in their regular orbits and pulls them with it through space. 6. Pay attention to the pronunciation of the verb to use [z] and of the noun use [s]. Do you know that one of the most popular uses of radioisotopes is inspecting various products. 7. In the English system of measurement the distance between towns is measured in miles. Note that a mile, a unit of length used in the English system of measurement, is equal to 1.6 kilometers (km).

10. Read the following text without using a dictionary and render its contents in Ukrainian.

Text 2. Heat Energy from the Sun

For many centuries man has used the transformed heat of the Sun in the form of wood, coal, oil or natural gas, and in a million other ways. But though natural fuel supplies are great, some time they will come to an end. Isn't it possible to use directly the energy of the Sun?

For a long time man has been using power from the Sun directly to dry fruits and other food products. It has been also used for heating and boiling water as well as forgetting steam. Later he began using the power for heating homes and still later for cooling things in solar refrigerators. Nowadays solar energy collected with the help of special reflectors has been used in water-heaters constructed in Alma-Ata. The solar water-heater is a simple device. To make a heater one blackens the bottom and sides of a box, coats it with heat insulating material and then covers the box with a piece of transparent glass. Now it is ready to be put out in the sun. Due to the sun energy the temperature inside the box begins to rise rapidly even if it isn't a very hot day. The bottom of the box being blackened, the device transforms the light of the sun into heat,

while the glass cover stops the heat from escaping. As a result of this process the temperature inside the box goes much more quickly and will go much higher, if the top is covered not with one but with several sheets of glass. The designers elaborated a water-heater with a temperature as high as 226°C inside it - that is, two and a quarter times the temperature of boiling water. Its box has eight sheets of glass.

Another type of a heater has been elaborated. Its box is about 16 feet long, seven feet wide and about 7 inches high. On a sunny day, it can heat 150 gallons of water to a temperature of about 60° C.

11. Translate the quotes, explain their meaning

1. You win some, you lose some.
2. Enjoy things because they are impermanent.
3. A diverse population gives you the opportunity to learn many new things.

PART 7

1. Essential Vocabulary. Read the word-combinations and sentences with the new words. Try to memorize as many words as you can.

1. **late** adv. *пізно*:
I shall be home late. He went to bed very late yesterday. My watch is two minutes late that's why I am late for my class today.
2. **seldom** adv. *зрідка, нечасто*:
During examination sessions I seldom or never go to a cinema.
3. **mix** v. *змішувати(ся)*:
to mix sugar and egg-powder with water; to mix flour with water; to mix several colors. **QUESTIONS**: 1. What color do we get by mixing yellow and blue? 2. Does oil mix with water? 3. Do you often mix business with pleasure?
4. **mixture** n. The noun mixture is a derivative of the verb to mix. A mixture is "something made by mixing two or more ingredients". Air is a mixture of gases. A mixture of flour and water is used in bread making. **QUESTIONS**: 1. What is a mixture of fuel and air used for? 2. What color will the mixture of red and yellow make?

3. Can sand and water make a mixture? 4. Where can you see a mixture of ice and water?
5. **consider** v. *розглядати; вважати; брати до уваги:*
 In his letter the inventor asked the committee to consider his invention. Let me consider this problem a little. We consider Lobachevsky is a great mathematician. When writing a scientific article you have to consider the results of other researchers who dealt with the same problem. **QUESTIONS:** 1. What do you consider the most important subject for a first-year student? 2. What do we consider the most important problems of our days?
6. **convert** v. To convert means "to change something from one form into another":
 to convert water into steam. The engine converts heat into mechanical energy. **QUESTIONS:** 1. Can you convert yards into meters? 2. What conditions are necessary to convert a mixture of flour and water into bread? 3. Can solar energy be converted into the chemical one? 4. How do we call the process of converting; solar energy into the chemical energy?
7. **operator** n. *оператор:*
 Only one operator is needed to work this new conveyor line. *The Ukrainian for to operate* is працювати: Conveyors operate according to some main principles. During the tests the machine was operating for 15 hours without any stoppage. **QUESTIONS:** 1. What energy are conveyors operated with? 2. Can a machinery at plants operate day and night?
8. **operation** n. *управління, дія, робота, функціонування і т. д.:*
 We must teach the workers the rules for the operation of the machine they work at. **QUESTIONS:** 1. Are the principles for the operation of conveyors studied in a polytechnic institute? 2. Can the operation of a machine be described with the help of formulae only?

2. Read the following text and render its contents.

Text 1. Measuring Time

Just as distance is measured by counting out units of length, time is measured by counting out units of duration (тривалість) of any movement. For measuring, units have to be repeated one after another.

Such a repetition of units is observed when something is going on with a fixed rhythm. That's why any rhythm in nature can be used for measuring time. The first rhythms that were used for this purpose were those of the motion of the Earth and the Moon. As you know, it takes the Earth one day to make a complete turn on its axis and it takes the Moon one month to make a complete turn around the Earth. In its turn it takes the Earth one year to make a complete turn around the Sun. Man took these rhythmic periods as basic measuring units of time. That's where the three main units of time, the day, the month, the year used in the calendar, come from. To measure time intervals which are smaller than the day man has designed many different kinds of clocks. The main clocks used in the earliest days were sundials and water clocks. The earliest sundial was made by the Egyptians. It was just a rod or a stone placed on a surface. The dial face was usually the ground itself. In a sundial, time was shown by the movement of the *с (тінь)* of a rod or a stone. Observing that its shadow pointed in different directions during the day, the Egyptians divided the dial face into some parts, marking this way the ground for their hours. Thus, the first less-than-a-day unit of time appeared.

Except sundials water clocks were widely used by peoples for centuries. In a water clock, the unit of time was the amount of time that it took for water to flow out of a corresponding container. The Greek water clock worked as follows. Water dropped (*капала*) into a container. As the water slowly rose in the container, the float rose too. The rod attached to the float turned the cogwheel which was attached.

3. Fill in the gaps in the sentences.

1. The units have to be repeated ____
2. ____ in nature can be used for measuring time.
3. It takes the Earth one day to make a complete turn on its ____
4. It takes the ____ Earth one year to make ____ the Sun.

5. Man took these ___ as basic measuring units of time.
6. The earliest ___ was made by the Egyptians.
7. The ___ was usually the ground itself.
8. As the water slowly rose in the ___, the float rose too.
9. The rod attached to the float turned the ___ which was attached.

4. Translate into English the following sentences.

1. Я буду дома пізно. 2. Вчора він ліг пізно. 3. Мій годинник запізнюється на 2 хвилини. Ось чому я спізнився сьогодні на заняття. 4. Підчас екзаменаційної сесії я рідко чи ніколи не ходжу до кінотеатру. 5. Змішувати декілька кольорів. 6. Який ми отримуємо колір змішавши жовтий з голубим? 7. Чи змішується олія з водою? 8. Ви часто змішуєте справи із задоволенням? 9. Повітря - це суміш газів. 10. Для чого використовується суміш палива і повітря? 11. Який колір утримується шляхом суміші червоного і жовтого? 12. Чи можуть пісок і вода утворити суміш? 13. Де можна побачити суміш льоду і води? 14. У цьому листі винахідник попросив комітет взяти до уваги його винахід. 15. Дозвольте мені трохи розглянути цю проблему. 16. Ми вважаємо Лобачевського великим математиком. 17. При написанні наукової статті ви маєте брати до уваги результати інших досліджень, що стосуються той самої проблеми. 18. Який предмет ви вважаєте найголовнішим для студента-першокурсника? 19. Що ми вважаємо найбільш важливою проблемою сьогодні? 20. Перетворювати воду в пар. 21. Двигун перетворює високу температуру в механічну енергію. 22. Чи можете ви перевести ярди в метри? 23. Чи може сонячна енергія бути переведеною в хімічну? 24. Як називається процес перетворення сонячної енергії в хімічну? 24. Щоб працювати на цьому конвеєрі потрібен лише один оператор. 25. Конвеєри працюють відповідно до декількох головних принципів. 26. Підчас іспитів машина працювала на протязі 15 хвилин без жодної зупинки.

5. Read the following sentences. Render the contents of the sentences without using a dictionary.

1. The machine is worked by electricity. 2. The demonstration bench in our physical laboratory was removed to the right-hand corner. 3. The work at the physical center was restarted in a few weeks. 4. He is the

man who knows all the angles of the brewery business. 5. The chemicals were resorted and put into separate boxes. 6. Two added to twelve makes fourteen.

6. Match the meaning of the word with the corresponding one.

- | | |
|---------------|--|
| 1. Distance | a) the dark shape that sb/sth's form makes on a surface |
| 2. Unit | b) the amount of space between two places or things |
| 3. Repetition | c) the fact of doing or saying the same thing many times |
| 4. Rhythm | d) a strong regular repeated pattern of sounds or movement |
| 5. Month | e) a fixed quantity, etc. that is used as a standard measurement |
| 6. Period | f) a particular length of time |
| 7. Interval | g) a period of about 30 days |
| 8. Sundial | h) a device used outdoors for telling the time when the sun is
i) shining |
| 9. Surface | j) a period of time between two events |
| 10. shadow | k) the top layer of an area of water or land |

7. Find correlations between the words.

- | | |
|--------------|----------------|
| 1. late | 1. transform |
| 2. seldom | 2. combine |
| 3. mix | 3. task |
| 4. mixture | 4. think about |
| 5. consider | 5. compound |
| 6. convert | 6. early |
| 7. operator | 7. supervisor |
| 8. operation | 8. rarely |

8. Explain the following proverbs, find Ukrainian equivalents.

1. Never put off till tomorrow what you can do today.
2. An early bird that catches the worm.
3. Great people live dangerously.

9. Read the text. Tell how the things can be counted.

Text 2 Counting Things

To count things is not such a simple process as you may think. Of all the animals living on the earth only man can count. A very old device for counting which man still uses today is his hand. Do you know that some primitive tribes (tribe – *плем'я*) in Africa can count only using their hands and other parts of the body. With the help of these primitive devices for counting, a tribesman from New Guinea can count to 27—no further. He uses his right-hand finger to point to his left-hand fingers to express numbers from 1 to 5. Then he points to his wrist, elbow and other parts of his arm to express numbers from 6 to 10. Pointing to his ear the tribesman signals 12. His left eye is a sign for 13, and his nose, for 14. Going down to his right-hand side he can count this way from 15 to 27.

PART 8

1. Essential Vocabulary. Read the word-combinations and sentences with the new words. Try to memorize as many words as you can.

1. **quantity** n. *кількість; величина:*

There are various quantities of vitamins in fresh fruits. Mathematics is the science of pure quantity. The term "quantity of information" is often used in cybernetics. *QUESTIONS:* 1. What units do we use for measuring the quantity of a liquid? 2. What is the quantity of water man uses in his diet every day? 3. What quantity of fuel is necessary for an automobile to make (he distances of 20 km?).

2. **particle** n. The noun particle means "the smallest possible quantity of a solid substance":

radioactive particles; particles of stone. *QUESTIONS:* 1. Can one see particles of dust? 2. Do scientists use a micrometer to determine the size of a particle? 3. Can we observe solid particles in water? 4. Do salt crystals consist of particles? combine v. In chemistry the verb to combine means "to join, to mix together two substances and form a new compound". Sodium combines with water to form an alkali. Calcium combines with sulphuric acid to form carbonic gas.

- QUESTIONS:** 1. What world movement has combined forces of many nations and countries throughout the world? 2. Does oxygen combine with gold? 3. Does combining work with pleasure give good results?
3. **spend** (spent, spent) v. *витрачати, проводити:*
He spends half of his money on books. The researcher spent nearly 2 years on the project. **QUESTIONS:** 1. How much time a day do **you** spend on reading for your seminars and practical classes? 2. Did you spend your last week-end with friends?
4. **stream** n. *поток, струя; струміль:*
a stream of liquid; a stream of gas. Streams of people were walking along the street. We tried to go against the stream but could not. The people and cars moved in one continuous stream. **QUESTIONS:** 1. Can you stop a stream of cold air coming into your room through a broken window? 2. How can you stop a stream of water from a tap which is out of order?
5. **graduate** v. To graduate from means "to finish a course of study at a school or at an institute and to get a diploma":
to graduate from a technological institute; to graduate from a college; to graduate from a university. **QUESTIONS:** 1. What institute will you graduate from? 2. What diploma does a person get if he graduated from the mechanical department of a polytechnic institute?
6. **explanation** n. The noun explanation is a derivative of the verb to explain.
Listen attentively to your teacher's explanation. The explanation of the experimental results is given in the dissertation. **QUESTIONS:** 1. Can an explanation be bright? 2. Can one write an explanation down?
7. **velocity** n. *швидкість:*
The velocity of sound depends on what sound is passing through. **QUESTIONS:** 1. What is greater: the velocity of light or that of a planet? 2. Does a computer operate with the velocity of human thoughts? 3. What science deals with particle velocity?
8. **motion** n. The noun motion means "the process of moving or the process of changing the position":
a free motion of a body. The sea is always in motion. If a thing is in motion, it is not at rest.

2. Find the Ukrainian equivalents to the following words.

- | | |
|------------------------|-----------------|
| 1. Strange | 2. high above |
| 3. sign | 4. to add |
| 5. strange <i>adj.</i> | 6. lantern |
| 7. kite | 8. continuously |
| 9. to deliver | 10. to wonder |
| 11. beam | 12. prism |
| 13. to bend | 14. to invert |
| 15. to reverse | 16. to exist |
| 17. velocity | 18. mystery |
| 19. quantity of matter | |

3. Read the text and translate it.

Text 1 One of the World's Greatest Thinkers

Late at night, on their way to London, two old friends were coming up to a small town when they suddenly noticed a strange light high above it, shining as a bright star.

"It must be a comet", said one of them.

"A comet," repeated the other. "That's a bad sign".

"Let's walk faster. In the town we shall find out what it is," added the first and the friends decided they would better ask the people in the town about the strange shining thing.

When in the morning the two travelers came up to the first town house by the road they asked the people who lived there if they had seen the strange light that night too. The friends were told everybody in the town had seen it. It had been no comet at all but a device made by a boy from their town and used by him for his experiments. The 'comet' the friends had noticed was just a paper lantern attached to the end of a kite. The people who were speaking with them showed them the paper kite flying high above the town and the house gates the kite rope was attached to. They were also shown another device made by the boy. On the front wall of the house there was a water clock about 4 feet high. As water was dropping from its tank it turned a small wheel which was connected by a system of cog-wheels with the hands of the clock. Every morning

the boy filled the water tank to make the clock operate continuously. It was the boy who in twenty years became one of the world's greatest scientists. His name was Isaac Newton.

After he had graduated from the University of Cambridge, where he studied mathematics, Newton elaborated methods of calculation which have ever since been used by researchers and scientists in many fields of science. Then he was only twenty-three years old. When he was twenty seven he became a professor at Cambridge. Delivering lectures did not take much of his time. He had to give only a lecture a week. When he delivered his lectures only few of his students went to hear him. So, few of the students understood his lectures that he often read to the wall.

I. Newton spent much of his time in experimenting. He was working so hard that his close friends could seldom see him. He often was working all night long and went to bed at 2 or 3 o'clock in the morning.

One of the subjects I. Newton devoted much time to was the nature of light. He came to the problem of light, wondering about the nature of color. To examine the nature of color he made the following experiment. He darkened his study and made a tiny round hole in the window shade. A wide beam of sunlight which was passing through the hole in the window shade fell on a wedge-shaped (клиноподібний) piece of glass called a prism. After the light had passed through the prism it fell on the screen which was mounted at some distance beyond the prism. The light that had come through the prism was no longer white. The prism had not only bent the beam, changing its direction, but had converted it into a series of colored bands, red at one end, yellow at the center, then green, blue, and finally violet. It was this series of bands that Newton called the spectrum (спектр). After he had analyzed the components of the spectrum, Newton went further in his experiments. In between the prism and the screen he placed a second prism shaped like the first, but inverted so that it should reverse the effect of the first prism. Now the series of the colored bands, passing through the second prism, were transformed into pure white light - identical to the original sunbeam! What did it mean?

"It meant", said Newton, "that there was no such thing as white light". Basically, light existed only as colored particles — red, orange, yellow, green, blue, violet. All the colors mixed together looked white. The first

prism in this experiment had broken the light beam into its separate colors. The second prism proved that the colors could be combined so that the beam again looked white.

Newton thought the difference in the colors of the spectrum was due to the different velocities of the particles. Each color, he thought, had to have different velocity, for example, blue particles moved faster in glass than in air and because of this the light passing through a glass prism broke down.

It is interesting to notice that Newton was not the first to come to the idea of the velocity of light. It was Newton was sure that when it became possible to measure such great velocities, his idea about the nature of color would be proved right. But even great Newton's ideas sometimes proved to be wrong.

Another Newton's greatest achievement was the universal gravitational law. The gravitational law explained many mysteries of the structure of the Universe. Newton calculated the force of gravity between the Sun and the planets and the quantity of matter in these objects. He showed that the weight of the same body was twenty-three times greater at the surface of the Sun than at the surface of the Earth. He found the true size and shape of the Earth. Newton proved that mechanical laws acting on the Earth that is in the world we live in were the mechanical laws of the Universe.

Great thinker and researcher Isaac Newton devoted his whole life and all his talents to experimenting and science, which greatly enriched our knowledge of the laws of nature and the Universe.

4. Find the answers to the following questions.

1. How old was the scientist described in the text when he became popular in the world?
2. Did his students like the lectures delivered by the scientist?
3. Did the scientist's ideas about the velocity of light prove correct?

5. Reading the following examples, write out the numbers of those sentences which answer the text given above. Prove your answers reading aloud the corresponding pieces of the text.

1. The people in the town asked the friends about the strange thing shining in the sky. 2. The friends answered, that everybody had seen the strange light. 3. The strange light in the sky was not natural. 4. Newton's methods of calculation are in use nowadays. 5. Newton spent much time on delivering lectures at Cambridge University. 6. The white light can be converted into a series of colored bands 7. Newton used the second prism to repeat the effect he had watched with the first one. 8. The experiment with the prisms proved the hypothesis about the nature of light.

6. Explain the following proverbs, find Ukrainian equivalents.

1. There is no place like home.
2. Live and learn.
3. An hour in the morning is worth two in the evening.

7. Translate into English.

1. У свіжих фруктах існує різні кількості вітамінів. 2. Математика - це наука чистої кількості. 3. Термін кількість інформації часто використовується в кібернетиці. 4. Які одиниці ми використовуємо для визначення кількості рідини? 5. Яка необхідна кількість пального, щоб автомобіль проїхав відстань у 20 км? 6. Радіоактивні частки. 7. Чи можна побачити частинки пилу? 8. Чи використовують науковці мікромір щоб визначити розмір мікрочасток? 9. Чи можемо ми поспостерігати цілі частинки у воді? 10. Чи складаються кристали солі з часток? 11. Сода розчинюється у воді і утворює луг. 12. Кальцій сполучається з сірчаною кислотою і утворює вуглецевий газ. 13. Чи сполучуються кисень з золотом? 14. Чи дає добрі результати поєднання роботи із задоволенням? 15. Він витрачає половину своїх грошей на книги. 16. Дослідник витратив приблизно 2 роки на своє дослідження. 17. Скільки часу ти використовуєш на начитку семінару та на практичні заняття? 18. Ти провів свої останні вихідні з друзями? 19. Струмień рідини. 20. Струмień газу. 21. Потоки людей йшли вздовж вулиці. 22. Ми намагались іти проти течії, але не змогли. 23. Люди і машини рухались в одному нескінченному потоці. 24. Ти можеш припинити струмь холодного повітря, що дме з розбитого вікна? 25. Як можна

припинити струю води з крану, що зламався? 26. Закінчити технологічний інститут. 27. Закінчити коледж. 28. Закінчити університет. 29. Який інститут ви закінчили? 30. Який диплом отримає людина, що закінчила механічний факультет політехнічного інституту? 31. Слухайте уважно пояснення вашого вчителя. 32. В дисертації надані пояснення експериментальних результатів. 33. Чи може пояснення бути дотепним? 34. Чи може хтось записати пояснення? 35. Швидкість звуку залежить від того, через який звук вона проходить. 36. Що є більшим: швидкість світла чи планети? 37. Чи оперує комп'ютер із швидкістю думок? 38. Яка наука вивчає швидкість часток? 39. Вільний рух тіла. 40. Море завжди у русі. 41. Якщо річ у русі, вона не може бути у покої.

8. Make the sentences with the following words

- | | | |
|------------------------|------------------------|----------------|
| 1. Strange | 2. high above | 3. sign |
| 4. to add | 5. strange <i>adj.</i> | 6. lantern |
| 7. kite | 8. continuously | 9. to deliver |
| 10. to wonder | 11. beam | 12. prism |
| 13. to bend | 14. to invert | 15. to reverse |
| 16. to exist | 17. velocity | 18. mystery |
| 19. quantity of matter | | |

9. Match the synonyms

- | | |
|-----------------|----------------|
| 1. strange | a) gleam |
| 2. high above | b) to endure |
| 3. sign | c) symbol |
| 4. to add | d) elevated |
| 5. lantern | e) lamp |
| 6. continuously | f) to reverse |
| 7. to deliver | g) to meditate |
| 8. to wonder | h) enigma |
| 9. beam | i) constantly |
| 10. to bend | j) swiftness |
| 11. to invert | k) to turn |
| 12. to exist | l) to annex |
| 13. velocity | m) odd |
| 14. mystery | n) to convey |

10. Read the following text. Write down all unknown words and find their meaning in Ukrainian.

Text 2 Loudspeaker

The loudspeaker is practically a dynamic microphone which is worked backward. It turns the pulsation of electric current into vibrations of the air which can be heard, the sound itself is produced by a cone made of hick paper. This part of the loudspeaker is shaped as a cone because the cone is the best shape for a device which is used for vibrating the air. A coil of wire is attached to the narrow side of the cone. The coil carries the amplified frequency current which comes from the last vacuum tube of the radioset. Behind the coil there is a powerful magnet. Due o the current in the coil, passing near the magnet, the coil either moves in the direction of the magnet or is pushed back. As the current in the coil starts and stops, and becomes stronger and weaker, the coil moves closer to or farther away from the magnet. Vibrating with the changes in the current, the coil moves the cone with it, producing each time the corresponding sound waves.

11. Translate the quotes, explain their meaning.

1. Be willing to lose a battle in order to win the war.
2. The primary goal of education is to make people better people.
3. If you can read, you can live as many lives as you wish.

PART 9

I Essential vocabulary. Find the meanings of the following words in the dictionary, taking into consideration the context.

1. **Alloy** n.: Alloy is a mixture of metals.
Brass and bronze are examples of alloys.
2. **Fire** n.:
There is no smoke without fire. Keep away from fire.
3. **Improve** v.
Conditions of work at this factory continue to improve.
My knowledge of chemistry is not enough, I want to improve it.

4. **Last** v.:
How long will the discussion last?
5. **Offer** v.:
Our professor offered a new plan to conduct the research.
He offered me his help.
6. **Resist** v.:
There are some plastics that resist heat. Do you know a metal which resists acids? Does aluminum resist rust?
7. **Result in** v.:
Application of our research resulted in increasing the plant's output.
8. **Serve** v.:
What purpose can this tool serve?
9. **Steel** n.:
alloy steel; carbon steel; blue steel-
10. **Treat** v.:
to treat the substance with acid.
11. **Stone** n.:
This was an old road covered with stones. In front of the building there was a wall of stone.

2. Translate into Ukrainian using dictionary.

- | | | |
|-------------|--------------------------------|-----------------|
| 1. Property | 2. corrosion-resistant | 3. Withstand |
| 4. shape | 5. to distinguish the property | 6. conductivity |
| 7. pipe | 8. to be magnetized | 9. requirement |
| 10. rust | 11. due to conductor | |

3. Read the following text

Text 1 Some Important Properties of Metals

Why are metals of such importance for man's life?

The answer to this is to be found in their characteristic properties. The most important of these is strength, which means that metals can withstand weight without bending or breaking, and are also corrosion-resistant and may be formed into different shapes, which distinguishes them from many other classes of materials. Some metals also have other special properties, two of which are conductivity and the property to be magnetized. Strength is of great importance for most industrial purposes.

That is why steel is widely used in modern industry. We know steel constructions to be used not only for building ships, planes and engines but in building industry too. Steel is also used for producing tubes, pipes, etc. For this purpose, engineers often use special kinds of steel. As iron and steel are used more often than any other metal, we usually divided metallurgical materials into two classes: ferrous metals and non-ferrous ones. Where the requirements for strength are combined with the requirements for resistance to rusting, such non-ferrous metals as aluminum, bronze or brass¹ may be used. We know engineers to use copper and aluminum for conducting electric current since these metals offer less resistance to it than ferrous metals do. A copper wire offers less resistance to current than an aluminum wire of the same size does. But due to its lighter weight aluminum offers less resistance per unit of weight.

When current passes through a conductor, resistance results in giving off heat; the greater the resistance, the greater is the heat for a given current. That's why metals with high electric resistance are used for electric heating. This property is found in the alloys; among the best for the purpose are alloys of nickel and chromium.

Brass is an alloy of copper and zinc in varying proportions, yellow in color; sometimes tin or other metals are added. It is easily machined and is widely used for making parts and various research instruments, as it is not magnetized.

4. Find the answers to the following questions.

1. Why are metals so important for man's life?
2. Why is steel so widely used in modern industry?
3. What metals do they mostly use in engineering for conducting electric current?

5. Explain the important properties of metals.

6. Translate into Ukrainian

1. Alloy is a mixture of metals.
2. Brass and bronze are examples of alloys.
3. There is no smoke without fire.
4. Keep away from fire.
5. Conditions of work at this factory continue to improve.
6. My knowledge of chemistry is not enough, I want to improve it.
7. How

long will the discussion last? 8. Our professor offered a new plan to conduct the research. 9. He offered me his help. 10. There are some plastics that resist heat. 11. Do you know a metal which resists acids? 12. Does aluminum resist rust? 13. Application of our research resulted in increasing the plant's output. 14. What purpose can this tool serve? 15. alloy steel. 16. carbon steel. 17. blue steel. 18. to treat the substance with acid. 19. This was an old road covered with stones. 20. In front of the building there was a wall of stone.

7. Fill in the gaps.

1. The answer to this is ___ in their characteristic properties.
2. Metals can ___ weight without bending or breaking.
3. It ___ them from many other classes of materials.
4. Some metals also have other special properties, two of which are ___ and the property ___
5. Steel is used for ___ tubes, pipes, etc.
6. We usually divided metallurgical materials into two classes: ___ metals and ___ ones.
7. Engineers use copper and aluminum for ___ electric current.
8. A copper wire offers less ___ to current than an aluminum wire of the same size does.
9. But ___ its lighter weight aluminum offers less resistance per unit of weight.
10. ___ for the purpose are alloys of nickel and chromium.

8. Change the sentences into one word, which means the same.

1. A substance that allows electricity or heat to pass along it or through it
2. To be strong enough not to be hurt or damaged by extreme conditions
3. To be a characteristic that makes two people, animals or things different
4. The form of the outer edges or surfaces of something
5. A thing or things that are owned by somebody
6. Able to conduct electricity, heat, etc.
7. Not affected by corrosion

8. A reddish-brown substance that is formed on some metals by the action of water and air due to
9. To make something metal behave like a magnet
10. A tube through which liquids and gases can flow requirement

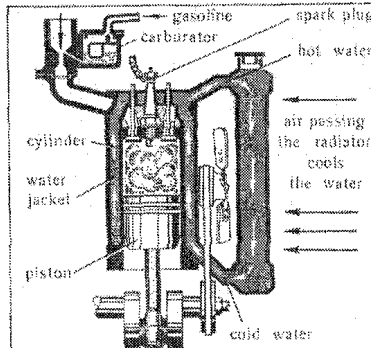
9. Match synonyms.

- | | |
|--------------|-------------|
| 1. Alloy | a) compound |
| 2. Fire | b) blaze |
| 3. Improve | c) enhance |
| 4. Last | d) endure |
| 5. Offer | e) suggest |
| 6. Resist | f) weather |
| 7. Result in | g) emerge |
| 8. Serve | h) assist |
| 9. Treat | i) handle |

10. Find the Ukrainian equivalents of the terms in the drawing below without using a dictionary. Translate the text.

Text 2 Cooling System of Automobile

Immediately after the gas in the cylinder has burned the temperature in the cylinder is almost 4,500°F. This is higher than the melting point of steel. Unless the engine is cooled, the moving parts such as valves and pistons, will expand enough to stick. This will stall the engine and may even ruin it. To cool the engine the cylinder walls are made hollow, so that water from the radiator can circulate through the space. Lot water from the top of the engine flows into the top of the radiator and passes downward through the air-cooled metal tubes. From the bottom of the radiator the water re-enters the engine near the bottom of the engine to complete the circuit. To keep the water in circulation about 5 gallons in all, a centrifugal pump, driven by the engine, aids the natural process of convection. The radiator is in front of the car. As the result, air is forced past the tubes when the car is in motion and the water is cooled. In addition, a fan is placed between the engine and the radiator. The fan draws air through the radiator and drives it against the engine.



11. Translate the quotes, explain their meaning.

1. Real progress occurs when the young feel it is time to change things.
2. Expect the unexpected.
3. Reflecting will teach you patience.

PART 10

1. Essential Vocabulary. Read the sentences with the new structural words. Write down your own examples with each of them.

1. **thus** так, таким чином:

The pipe broke down, thus cutting off water for the laboratory. Professor Petrov began his lecture thus: "Dear Comrades! Today we are having our last lecture. Thus, I hope that the knowledge got by you will be successfully used in your future work".

2. **nowadays** в наш час, зараз:

Nowadays a lot of interesting scientific discoveries are being made.

2. Essential Vocabulary. Read the word-combinations and sentences with the new words. Try to memorize as many words as you can.

1. **contract** v. *зтискувати, скорочувати*:
Before cooling the hot plate was 250 mm long. After it had been cooled it contracted to the length of 247 mm. *QUESTIONS*: 1. Do liquids contract when they become cool? 2. Do things made of wood contract when they are cooled?
2. **expand** v. The verb to expand is opposite in its meaning **to** the verb to contract.
To expand means "to become larger". Metals expand when they are heated. This year the production of cars at the plant has expanded compared with the plan of the last year.
3. **reveal** v. *показувати, виявляти, відкривати*:
The first series of our tests has not yet revealed any results. *QUESTIONS*: 1. Can any new scientific facts be revealed in future? 2. Does the position of stars in the sky help seamen to reveal any information as to the ship's location in the sea? 3. Have all the facts about dolphins been already revealed?
4. **bridge** n. The noun bridge means "a structure built across a river, canal or railroad".
There are five bridges over the Dnipro in Kiev. *QUESTIONS*: 1. What building materials are used nowadays for constructing bridges? 2. In what city of our country are there a lot of opening bridges? 3. What bridge takes less time to construct: a pontoon bridge or a bridge made of steel constructions? 4. Is there any railway bridge in your town? 5. What does an expression "a foot bridge" mean?
5. **content** n. *зміст; об'єм, вмісткість*:
oxygen content in the air; nickel content in human blood; water content of food; culture national in form and socialist in content; the contents of a book; the contents of a story. I don't like the contents of this film. The content of the letter was kept secret. *QUESTIONS*: 1. Is there any difference between water content in frozen food and in fresh food? 2. Is content of air in a fuel mixture for a car always the same?
6. **decide** v. *вирішувати (приймати рішення)*:
Has he decided to become an engineer? It was decided that only two students of our group would have their professional training in Moscow.
7. **boil** v. *кинути*:

At 100° C water boils. *QUESTIONS*: 1. Can a cold liquid boil? 2. Is the boiling point of salt water higher than that of fresh water? 3. What do we call a metal container in which water boils for producing steam in an engine?

8. **freeze** v. *замерзати*:

When the temperature decreases to – 1°C, water freezes and turns into ice. *QUESTIONS*: 1. What kind of frozen food do you know? 2. Can water run from a tap if the tubes are frozen? 3. Can a car move on a river if it is frozen?

9. **precise** adj. *точний, у найвищій мірі*:

precise measurements; the precise meaning; precise definition. What instruments for precise measurements of length do you know?

10. **scale** n. *шкала*:

A ruler usually has a scale in centimeters. There are two scales for measuring temperature: the Fahrenheit scale and Centigrade (or Celsius) scale. *QUESTIONS*: 1. Are scales used in lots of devices? 2. Can we measure the weight on a scale of kilograms? 3. Is the temperature of boiling water the same on the Celsius and Fahrenheit scale? 4. On what measuring devices can we see a scale of seconds?

11. **store** v. *зберігати*:

Grain is stored in elevators. Petrol and gases can be stored in tanks. *QUESTIONS*: 1. Must all acids be stored in darkness? 2. What changes take place when water is stored in an open vessel? 3. Is it possible to store information? 4. Is it possible to store noise?

1. Find the meanings of the following words in the dictionary, taking into consideration the context.

2. **charge** n.: a negative charge; a positive charge; particle charge.

3. **excess** n.: There is too much water in the flask. Pour out the excess of water and start the laboratory work.

4. **false** adj.: a false answer; false measurements; false information; a false door; a false bottom; false ideas.

5. **feel** (felt, felt) v.: He felt the cold of the metal.

6. **human** adj.: human nature; human feelings; human voice.

7. **realize** v.: Gagarin's flight was realized in 1961. The builders realized the program in time. It is even difficult to realize how far from the Earth heavenly bodies are.

8. **sea** n.: sea bottom; sea war; seas of faces; a seaplane.
9. **supply** v.: to supply population with food; to supply a house with water. **volume** n.: the volume of liquid in a tank.
10. **blood** n.: Arterial blood is bright red. I have the same blood group as my mother has.

4. Read the following text and render its contents.

Text 1 Early Ideas of Heat

The discovery of nuclear energy was the second great step man did to use the energy stored in nature. The first great step took place hundreds of thousands of years ago with the discovery of fire, because fire not only helped to fight the darkness of night but also to produce heat. Heat which fire brought to man had remarkable properties. When it was being absorbed by various substances, important changes were taking place in them. Making places of stones for his fires, early man noticed certain stones contain ores. Being treated with fire, stones gave out melted metals. Using heat, man learned to produce strong building materials for his houses, town walls and towns. We can't even think that man could have done all these things without the heat produced by fire. Having been used for many thousands of years, fire became a necessary thing for man's life. The more man used the fire the more he thought of its nature. What is heat? He observed it flow from one place to another. But he could not see this flow moving. If it could not be seen, was it not an invisible liquid? Sitting around the fire, man also felt its heat passing through the air. Was it not an invisible gas then? Early man could not answer these questions.

For over 2,000 years man thought the entire universe to have been made of only four elements — fire, water, heat and cold - combined in various ways. Heat was thought to be a real substance opposite to cold in its properties.

Scientists that lived before our era considered these four elements to contain the secret of life and of all living things. They thought that sickness was due to a man having either too much or too little of the four elements in his body. Thus, they thought blood, for example, to be a kind of man's heat. They considered the redness of man's face in

summer to be due to 'an excess of blood. They thought little color in man's face on a cold winter day to be due to a small quantity of blood in his organism. All these naive ideas and theories had existed for about 3,000 years until precise experiments could separate the true ideas from the false ones.

5. Answer the following questions.

1. Does the word early in the word-combinations an early man, early ideas and early hours mean the same?
2. Did nuclear energy exist when man discovered fire?
3. Did it exist in the Stone Age, in the Iron Age?
4. Does water contain nuclear energy?

6. Read the text again, find answers to the following questions.

Who invented the thermometer for measuring the temperature of human body?

1. Is a man ill if the temperature of his body is 96° F? 100°F?
2. Does water boil at 100°F?
3. Does ice melt at 20°F? at 0°F? at 0°C?

7. Choose the right answer and put it down.

1. What of the following objects should be cooled when stored?
a) sea water; b) blood; c) a mixture of oxygen and hydrogen.
2. What of the following objects can contract?
a) an excess of water in a test-tube; b) false news;
c) a steel bridge; d) content of hydrogen in the air;
f) an electric charge.
3. What of the following can you measure using a precise scale?
a) blood pressure, b) temperature of boiling water;
c) weight of frozen food; d) length of a bridge;
f) volume of petrol in a tank.

8. Translate into Ukrainian.

1. The first series of our tests has not yet revealed any results. 2. Can any new scientific facts be revealed in future? 3. Does the position of stars in the sky help seamen to reveal any information as to the ship's location in the sea? 4. Have all the facts about dolphins been already

revealed? 5. There are five bridges over the Dnipro in Kiev. 6. What building materials are used nowadays for constructing bridges? 7. In what city of our country are there a lot of opening bridges? 8. What bridge takes less time to construct: a pontoon bridge or a bridge made of steel constructions? 9. Is there any railway bridge in your town? 10. What does an expression "a foot bridge" mean? 11. oxygen content in the air. 12. nickel content in human blood. 13. water content of food. 14. culture national in form and socialist in content. 15. the contents of a book. 16. the contents of a story. 17. I don't like the contents of this film. 18. The contents of the letter was kept secret. 19. Is there any difference between water content in frozen food and in fresh food? 20. Is content of air in a fuel mixture for a car always the same? 21. Has he decided to become an engineer? 22. It was decided that only two students of our group would have their professional training in Moscow. 23. At 100° C water boils. 24. Can a cold liquid boil? 25. Is the boiling point of salt water higher than that of fresh water? 26. What do we call a metal container in which water boils for producing steam in an engine? 27. When the temperature decreases to — 1°C, water freezes and turns into ice. 28. What kind of frozen food do you know? 29. Can water run from a tap if the tubes are frozen? 30. Can a car move on a river if it is frozen? 31. precise measurements. 32. the precise meaning. 33. precise definition. 34. What instruments for precise measurements of length do you know? 35. A ruler usually has a scale in centimeters. 36. There are two scales for measuring temperature: the Fahrenheit scale and Centigrade (or Celsius) scale. 37. Grain is stored in elevators. 38. Petrol and gases can be stored in tanks. 39. Must all acids be stored in darkness? 40. What changes take place when water is stored in an open vessel?

9. Read the following text without using a dictionary and render its contents in Ukrainian.

Text 2 Heat Energy from the Sun

For many centuries man has used the transformed heat of the Sun in the form of wood, coal, oil or natural gas, and in a million other ways. But though natural fuel supplies are great, some time they will come to an end. Isn't it possible to use directly the energy of the Sun?

For a long time, man has been using power from the Sun directly to dry fruits and other food products. It has been also used for heating and boiling water as well as forgetting steam. Later he began using the power for heating homes and still later for cooling things in solar refrigerators. Nowadays solar energy collected with the help of special reflectors has been used in water-heaters constructed in Alma-Ata. The solar water-heater is a simple device. To make a heater one blackens the bottom and sides of a box, coats it with heat insulating material and then covers the box with a piece of transparent glass. Now it is ready to be put out in the sun. Due to the sun energy the temperature inside the box begins to rise rapidly even if it isn't a very hot day. The bottom of the box being blackened, the device transforms the light of the sun into heat, while the glass cover stops the heat from escaping. As a result of this process the temperature inside the box goes much more quickly and will go much higher, if the top is covered not with one but with several sheets of glass. The designers elaborated a water-heater with a temperature as high as 226°C inside it -that is, two and a quarter times the temperature of boiling water. Its box has eight sheets of glass.

Another type of a heater has been elaborated. Its box is about 16 feet long, seven feet wide and about 7 inches high. On a sunny day, it can heat 150 gallons of water to a temperature of about 60° C.

10. Translate the quotes, explain their meaning

1. The best way to understand nature is through observation.
2. An hour wasted can never be regained.
3. Learn how to think clearly.

PART 10

1. Essential Vocabulary. Read the word-combinations and sentences with the new words in order to memorize them.

1. **attract** v. притягати; привертати:
A magnet attracts steel particles. The researcher attracted a large number of followers. One of the pictures in his collection attracted our attention.
2. **conclusion** n. закінчення; заключення: t

The conclusion of peace treaty; the conclusion of his speech; at the conclusion of the lecture.

3. **conversion** n. *перетворення*:

conversion of water into steam; conversion of solar energy into heat.

4. **surround** v. *оточувати*:

The park was surrounded with a high wall. The students surrounded their teacher and listened to him attentively. The house was surrounded by old trees. (The trees surrounded the house).

5. **powder** n. *порошок*:

chocolate powder; face powder; fruit powder; magnetic powder; milk powder; sugar powder; washing powder.

2. *Determine the meanings of the new words, taking into consideration the context. You can do it without using a dictionary. Memorize the words.*

1. **expansion** n. The noun expansion is a derivative of the verb to expand.

To expand means *розширювати*: the expansion of metals; industrial expansion; basic vocabulary expansion; heat expansion.

2. **decrease** v. The verb to decrease is the antonym to the verb to increase.

When the liquid in a test-tube is heated, its temperature increases. When the liquid gets colder, its temperature decreases.

3. **weigh** v. The verb to weigh means "to show a certain measure when put on a scale".

The powder in the flask weighs 600 grams. I weigh less than he does. The bags with sugar were weighed. The total weight of the bags was 5 tons.

4. **collision** n. The noun collision is a derivative of the verb to collide. Two buses collided on the corner. The atoms between the walls of the hot vessel constantly collide,

5. **conservation** n. The noun conservation is a derivative of the verb to conserve.

To conserve means *зберігати*: to conserve lakes; to conserve one's strength; to conserve energies; the physical law of conservation of energy. The word conservation is widely used in canning industry: conservation of fruit; conservation of vegetables, etc.

3. Find Ukrainian equivalents.

- | | | |
|--------------|--------------|-------------|
| 1. invisible | 2. substance | 3. repel |
| 4. solid | 5. thickly | 6. to coat |
| 7. valid | 8. fixed | 9. surround |

4. Read the following text and translate it into Ukrainian.

Text 1 Old and Modern Theories of Heat

Until the end of the eighteenth century, heat was still considered to be an invisible substance with special properties. Most of the great scientists of the time believed that there existed a special substance called caloric (from the Latin word for heat). They thought the caloric to be attracted by the mass of a body and to fly away from the body if it is left to itself. According to this theory when a body was heated, the caloric was being added to each individual molecule in the shape of tiny particles of atmosphere. The more caloric the molecule had, the more caloric repelled the other caloric particles that surrounded it. This was supposed to explain why substances expanded with heat.

The expansion of gases according to this theory was explored in the following way. The theory said that gases expanded much more than the solid bodies because each gas molecule was so thickly coated with caloric that the caloric repelling force between molecules was greater than any attracting force. Repelling is the action opposite to attraction.

The caloric theory seemed to have explained a lot of things about heat. But as experiments found more and more points for which the caloric theory could not provide explanation new theory was needed.

Scientists having come to the conclusion that the caloric theory was not a valid one, a new theory of heat which was based on experiments was elaborated. According to the new theory heat was simply a form of the molecule motion. The faster the molecule moved or the more rapidly it vibrated, the higher was the temperature of the molecule. The new theory was given the name of kinetic theory (from the Greek word 'kino' which means 'movement').

The theory says that though each molecule of a solid body has a relatively fixed position, the molecules do not remain motionless; they

are always in a state of slight vibration about their fixed positions. The higher the temperature of a body, the more widely all the molecules vibrate, each of the molecules moving slightly apart from the others. The lower the temperature of a body, the less widely all its molecules vibrate, moving closer to each other. Due to such changes, bodies either expand or contract. According to the kinetic theory heat flows through material not because it is an indivisible substance as the caloric theory said but because with high-speed motion each molecule collides with other molecules surrounding it and increases their speed as well. It is due to these repeated collisions by high-speed molecules that higher temperature is passed through a substance. As you see, according to the new theory heat is considered to be a form of energy.

5. Answer the questions given below.

1. How many ideas concerning the nature of heat are described in the text?
2. What did they think caloric to be?
3. Why do bodies expand or contract according to the kinetic heat theory?

6. Describe the development of ideas on the nature of heat according to the information given in the text.

7. Read the following text. Find the statements proving that:

1. oxygen not only keeps up life on the Earth but protects life as well;
2. oxygen is very important for developing cosmic flights;
3. oxygen as an element was discovered not so long ago.

8. Translate into Ukrainian.

1. A magnet attracts steel particles. 2. The researcher attracted a large number of followers. 3. One of the pictures in his collection attracted our attention. 4. the conclusion of peace treaty. 5. the conclusion of his speech. 6. at the conclusion of the lecture. 7. conversion of water into steam. 8. conversion of solar energy into heat. 9. The park was surrounded with a high wall. 10. The students surrounded their teacher and listened to him attentively. II. The house was surrounded by old

trees. (The trees surrounded the house). 12. chocolate powder. 13. face powder. 14. fruit powder.

9. Translate into English.

1. розширення металів. 2. індустріальний ріст. 3. збільшення базового словника. 4. термальне розширення. 5. Коли рідина в пробірці нагрівається - збільшується температура. Коли рідина остиває - температура зменшується. 6. Порох в порохівниці важить 600 грамів. 7. Я важу менше ніж він. 8. Мішки з цукром зважили. 9. Загальна вага мішків становила 5 тон. 10. Два автобуси зіткнулись на розі. 11. Атоми між стінками гарячої судини постійно зіштовхуються. 12. зберігати озера. 13. зберігати силу. 14. зберігати енергію.

10. Match the correlating to each other words (synonyms, antonyms)

- | | |
|------------------|-------------------|
| 1. attract | a) shrink |
| 2. conclusion | b) result |
| 3. conversion | c) increase |
| 4. surround | d) capture |
| 5. powder | e) assess |
| 6. expansion | f) preservation |
| 7. decrease | g) cover |
| 8. weigh | h) dust |
| 9. collision | i) conflict |
| 10. conservation | j) transformation |

11. Translate the quotes, explain their meaning.

1. Have passion for one thing and be interested in a thousand other things.
2. This too shall pass.
3. The majority is often wrong.

PART 11

1. Essential Vocabulary. Find English equivalents

- | | | | |
|--------------|-----------------|---------------|----------------|
| 1. Oxygen | 2. Mercury | 3. Vessel | 4. Relatively |
| 5. Disappear | 6. Value | 7. Combustion | 8. Acquire |
| 9. jet | 10. conversion | 11. ray | 12. passage |
| 13. eclipse | 14. observation | 15. per cent | 16. liquefying |

2. Read the following text and translate it into Ukrainian.

Text 1 Oxygen

Now not only every student of chemistry but also every school-boy and school-girl knows oxygen to be absolutely necessary for any form of life. No life could have been possible without oxygen. Not a single living organism could have existed on the Earth without it. Strange it may seem but the well-known fact that one-fifth of the air is oxygen was discovered by Lavoisier, the French chemist, only at the end of the eighteenth century. Oxygen is known to be discovered by Lavoisier by means of the following experiment. Mercury having been heated in a closed vessel to a relatively low temperature. A red powder, which later was given the name of mercuric oxide, was formed on the surface of the mercury. At the same time the quantity of the air in the vessel decreased by about one fifth. Then when the temperature was raised and the red powder on the mercury disappeared, the quantity of the air in the vessel increased to its former value. During the experiment Lavoisier found the red powder to weigh more than the mercury it contained. This brought him to the conclusion that the powder contained some element which had been acquired. On the basis of this and other similar facts Lavoisier developed the oxygen theory of combustion. The new gas discovered was named by him 'oxygen' (from the Greek word meaning acid-former) because many of the oxides which he produced in his laboratory proved to have acidic properties. Oxygen forming many compounds, chemists consider it to be the element without which they could not have made most of their experiments. It appeared to combine with almost all the metals, except silver (Ag), gold (Au) and platinum (Pt), and with nearly all the non-metals, except the halogens. Oxygen is also known to be

widely used in medicine. As combinations of oxygen with fuels produce heat energy, it became a factor of great importance for energetic. Being used as an oxidizer in jet engines (a jet engine реактивный двигатель), oxygen is expected to play still greater role in the energetic of the future.

As students studying chemistry you are supposed to know that 21 per cent of all the molecules in the Earth's atmosphere are oxygen molecules, one third of atoms in water are oxygen atoms and 62.5 per cent of atoms in the lithosphere are oxygen atoms too. The element oxygen forms two simple substances: oxygen and ozone. Oxygen is known to turn into ozone thanks to the electric discharges. In the stratosphere the conversion takes place under the influence of the Sun's ultraviolet radiation. Absorbing the ultraviolet rays of the Sun, stratospheric ozone acts as a screen protecting life on the Earth from the effects of the rays. Being a very unstable substance, with the passage of time ozone turns back into oxygen.

3. Answer the following questions.

1. What form of life is possible without oxygen?
2. What part of air is consisted of oxygen?
3. Who discovered oxygen?
4. What place did mercury take in these experiments?
5. What chemical components does oxygen form?

4. Tell the story about discover of oxygen.

5. Read the following text and render its contents in Ukrainian

Text 2 Helium

In 1868, during the eclipse (*затемнення*) of the Sun, astronomers noticed strange lines in the spectrum of the sunlight. Astronomers noticing the lines brought them to the conclusion that the lines could not belong to any element they knew. They decided they discovered a new element which was called helium (from the Greek word for 'sun').

Some time passed and another important observation was made. Chemists experimenting with a gas that came out of some uranium ore found out that the light of the gas passing through a glass prism formed the spectrum lines the astronomers had noticed in the sunlight.

Thus, helium having been discovered first as an element in the Sun helped scientists to find out the element 30 years later on the Earth. Helium is element No 2. Of all the atoms of the Universe, 90 per cent are hydrogen, and only 9 per cent are helium. All the other elements taken together are known to make only one percent.

As helium is very light, it is very rarely found on the Earth. Its atoms moving with very high speed, the Earth's atmosphere cannot hold them. Investigations of large planet atmosphere resulted in finding out that it contains much helium. Being at a very low temperature a solid, in common conditions helium is a light gas. For a long time scientists had difficulties in finding ways of liquefying the element. It was only in 1908 that helium was liquefied. Now chemists and physicists have discovered new methods of liquefying the element and special apparatuses are reported to have been designed to produce about 100 liters of liquid helium per hour. Liquid helium having boiling point very close to the absolute zero, scientists expect to discover new important facts in the world of low temperatures with its help.

6. Make up the plan of the story.

7. Change the phrases into one word.

1. To become impossible to see
2. A poisonous silver-white liquid metal, used in thermometers
3. A container used for holding liquids, such as a bowl, cup, etc
4. To a fairly large degree, especially in comparison to others
5. To become liquid; to make something liquid
6. How much something is worth compared with its price
7. A chemical process in which substances combine with the oxygen in the air to produce
8. To obtain something by buying or being given it:
9. A plane
10. The act or process of changing something from one form, use or system to another
11. A narrow beam of light, heat or other energy
12. A short section from a book, piece of music, etc.
13. An occasion when the moon passes between the earth and the sun so that you cannot see all or part of the sun for a time;
14. An occasion when the earth passes between the moon and the sun so that you cannot see all or part of the moon for a time

15. The act of watching something carefully for a period of time, especially to learn something
16. One part in every hundred
17. A chemical element

8. Match synonyms.

- | | |
|-----------------|-------------------|
| 1. vessel | a) worth |
| 2. relatively | b) relevantly |
| 3. disappear | c) vanish |
| 4. value | d) burning |
| 5. combustion | e) obtain |
| 6. acquire | f) container |
| 7. jet | g) plane |
| 8. conversion | h) movement |
| 9. ray | i) transformation |
| 10. passage | j) examination |
| 11. eclipse | k) dissolve |
| 12. observation | l) beam |
| 13. liquefying | m) down turn |

9. Translate the quotes, explain their meaning

1. Nobody knows everything.
2. Question everything to get the truth.
3. A life examined and explored is a life worth living.

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