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«ХАРКІВСЬКИЙ ПОЛІТЕХНІЧНИЙ ІНСТИТУТ»

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English
for specific purposes

Англійська мова
за професійним спрямуванням

Textbook
for extramural department students of the first year
(for all specialities)

Навчальний посібник
для студентів І курсу всіх спеціальностей
заочної форми навчання

Харків
НТУ «ХПІ»
ПРОМАРТ
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С 32

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Призначено для студентів заочної форми навчання всіх спеціальностей.

Сергіна С. В.

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The textbook is based on lexical and grammatical material covering normative grammar, basic lexical and oral speech minimum of the course.

It is designed for extramural department students of the first year for all specialties.

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ПЕРЕДМОВА

Для кого цей посібник?

Навчальний посібник розрахований на самостійну роботу студентів І курсу всіх спеціальностей заочної форми навчання. Зміст матеріалу передбачає наявність у студентів базових знань англійської мови та володіння загальнонауковою термінологією. Головна мета посібника — допомогти студентам заочної форми навчання виконувати завдання і забезпечити формування навичок самостійної роботи та підготувати студентів для роботи над подальшим розширенням знань з англійської мови. У кінці кожного семестру студенти складають залік.

Що містить посібник?

Він містить завдання для письмового і усного перекладу, лексично-граматичні вправи, граматичні таблиці і короткий граматичний довідник з коментарями та тематичні тексти, передбачені програмою.

Посібник містить тексти для розвитку різних видів читання (ознайомлювального, переглядового, пошукового, навчаючого), тексти для детального вивчення, тексти з охопленням загального змісту, тексти, що мають на меті знаходження певної інформації. Система вправ спрямована на вироблення навичок і вмінь використовувати лексично-граматичний матеріал практично.

Тексти стосуються соціально-побутової, країнознавчої, загальнонаукової та професійно спрямованої тематики. Вони закінчуються запитаннями, що потребують від студентів індивідуальної відповіді, висловлювання своїх думок, включають їх у комунікативний процес.

Який граматичний матеріал студенти мають вивчити?

Іменник. Множина. Артиклі та прийменники як показники іменника. Вираження відмінкових закінчень в англійській мові

за допомогою прийменників та закінчення *-s*. Іменник у функції означення та його переклад рідною мовою.

Прикметник. Ступені порівняння.

Числівник.

Займенники: особові, присвійні, питальні, вказівні, неозначені та заперечні.

Побудова англійського речення. Види речень: розповідні (стверджувальні і заперечні), питальні та спонукальні речення. Безсполучникові підрядні речення.

Дієслово. Усі часові форми — простий (неозначений), тривалий, перфектний та перфектно-тривалий часи (активний і пасивний стан).

Модальні дієслова.

Форми та функції дієслів *to be*, *to have*, *to do*.

Зворот *there is* (*are*).

Узгодження часів.

Словотворення.

Для засвоєння граматичного матеріалу студенти мають письмово виконати вправи.

Які вимоги до заліку?

До заліку допускаються студенти, які

- успішно написали контрольну роботу;
- виконали домашнє завдання

На заліку студент повинен:

- Захистити контрольну роботу.
- Захистити домашнє завдання.
- Прочитати англійською та перекласти рідною мовою незнайомий текст, якій містить граматичний матеріал, що вивчається протягом I та II семестрів.
- Уміти вести бесіду за темами зумовленими програмою.

UNIT 1

Grammar

Побудова англійського речення. Типи речень
Артиклі та прийменники
Закінчення ***-s***
Іменник в функції означення

Reading Material

1. The Principle of Work of Internal Combustion Engines
2. Conductivity
3. The Control Systems for Motor Drives
4. Refrigeration
5. Dyes
6. Microelements, Vitamins of Plants

Topics

Personal Presentation
My Family

Grammar

Умовні позначення:
S — subject (підмет)
P — predicate (присудок)
O — object (додаток)
N — noun (іменник)
V — verb (дієслово)

Англійське речення

Прямий порядок слів в англійській мові зумовлений відсутністю відмінків.

Запам'ятайте!

Розповідне речення (стверджувальне):

підмет + присудок + додаток

SPO

E.g. He is my friend.

Розповідне (заперечне):

Підмет + присудок + not + додаток

SP not O

↓якщо присудком виступає сильне дієслово *to be* або *модальні дієслова*

Сильні дієслова:
be (am, is, are, was, were)
have (has, had) — для Present та Past Perfect Tense
will (shall)
should, would

Модальні дієслова: can, may, must
E.g. He is not my friend.
They must not miss classes.

Інші дієслова (або слабкі) утворюють заперечну форму за допомогою допоміжного дієслова ***do***:

Підмет + **do not** + присудок + додаток

S do not + PO

does not — для 3-ї особи однини (Present Simple)
did not — для минулого часу (Past Simple)
E.g. He does not read much.
He did not speak English in his childhood.

Питальне речення:

Присудок + підмет + додаток?

PSO?

↓для сильних дієслів
E.g. Is he your friend?
Слабким дієсловам знову потрібна допомога ***do***:

Do + підмет + присудок + додаток?

Do SPO?

does — для 3-ї особи однини (Present Simple)
did — для минулого часу (Past Simple)
E.g. Does he read much?

Спонукальне (окличне) речення:

Присудок + додаток

PO

Для ввічливої форми:

Will Would **SPO?** Could

E.g. Will you open the window?

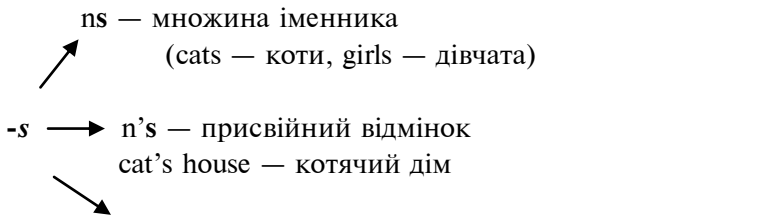
Вираження відмінкових закінчень за допомогою прийменників

Відмінок в українській мові		Прийменники в англійській мові
Називний	Хто? Що? Друг	— (у реченні завжди підмет, стоїть перед присудком) My friend reads much.
Родовий	Кого? Чого? друга	**of; from** The sister *of* my friend is in the room. I have received a letter *from* my friend.
Давальний	Кому? Чому? другу	**to** I always give my books *to* my friend.
Знахідний	Кого? Що? друга	— (у реченні завжди додаток, стоїть після присудка) I see my friend in the room.
Орудний	Ким? Чим? другом ручкою	**by; with** This work is done *by* my friend. I write *with* a pen.
Місцевий	Про кого? Про що? про друга	**about, of** I often think *about* (*of*) my friend.

Багатозначність деяких прийменників

Прикметники	Обставина місця	Обставина часу	Додаток
At	*на, при, в, у, за* at the lesson — на уроці at the table — у стола	*о* at 5 o'clock — о 5-й годині	
By	*біля* by the river — біля річки by the window — біля вікна	*до* by the evening — до вечора	*по*; орудний відмінок by radio — по радіо by plane — літаком
For		*протягом* for 5 minutes — 5 хвилин	*для*, *за* for me — для мене for peace — за мир
In	*в/у* in the plane — у літаку	*у, через* in October — у жовтні in 5 minutes — через 5 хвилин	
On	*на* on the table — на столі	*у/по, після* on Saturday — у суботу on the Ist of May — першого травня	
With			*з, зі*; орудний відмінок with me — зі мною with a pen — ручкою

Функції *-s*



Утворення множини іменника

Закінчення *-s*	Закінчення *-es*	Інша форма
a car — cars an engine — engines a tree — trees	a watch — watches a dress — dresses a dish — dishes a box — boxes	a man — men a woman — women a child — children a tooth — teeth a goose — geese a foot — feet a mouse — mice an axis — axes a datum — data a formula — formulae a phenomenon — phenomena a nucleus — nuclei
a boy — boys	a city — cities	
a piano — pianos a photo — photos	a potato — potatoes a tomato — tomatoes	
a roof — roofs a cliff — cliffs a gulf — gulfs a safe — safes a chief — chiefs	a leaf — leaves a life — lives a wolf — wolves	

Запам'ятайте!

Однина	Множина
a sheep	sheep
a deer	deer
a swine	swine

Присвійний відмінок іменників

Іменник у присвійному відмінку відповідає на питання ***чий?***

Вживання

- *Живі істоти*

Однина	Множина
The man's bag	The men's bags
The boy's bicycle	The boys' bicycles

- *А також:*

a month's holiday
today's party
the country's best opera house

Ланцюжки іменників
(Іменник у функції означення)

Іменники, що стоять перед головним іменником (останнім у ланцюжку), виконують функцію **означення**. Переклад здійснюється двома способами: 1) попередні іменники перекладаються як прикметники, наприклад: *steel beam — сталевий брус*; *world music festival — міжнародний музичний фестиваль*; 2) першим перекладається головне слово: *wheel suspension — підвіска коліс; reaction rate constant — постійна швидкості реакції.*

Запам'ятайте!

this is — these are
that is — those are
there is — there are
it is — they are

Exercises

Exercise 1. Give corresponding feminine nouns.

A lion, a tiger, an actor, a poet, a man, an uncle, a husband, a brother, a grandfather, a son, a master, a baron, a count, a shepherd, a host.

Exercise 2. Give corresponding masculine nouns.
A lady, a girl, a niece, Mrs. Smith, a widow, a stewardess, a French woman, a cow, a queen, a princess, a duchess, a hen, a mother.

Exercise 3. Put the following nouns in plural (don't forget to miss an indefinite article).
A table, a plate, a fox, a room, a lady, a knife, a chair, a bus, a Negro, a match, a way, a house, a family, a flag, a town, a wolf, a country, a lion, a park.

Exercise 4. Make a plural from the following nouns. Pay attention: in plural an indefinite article is not used, definite article is kept.
A star, a mountain, a tree, a shilling, a king, the waiter, the queen, a man, the man, a woman, the woman, an eye, a shelf, a box, the city, a boy, a goose, the watch, a mouse, a dress, a toy, the sheep, a tooth, a child, the ox, a deer, the life, a tomato.

Exercise 5. Use the following word-combinations in plural.
This tea-cup, this egg, that wall, that picture, this foot, that mountain, this lady, that window, this man, that match, this knife.

Exercise 6. Use the following sentences in plural.
1. This is a star. 2. This is a boy. 3. This is a baby. 4. That is a plate. 5. That is a flower. 6. That is a bookshelf. 7. Is this a sofa? 8. Is this a bookcase? 9. Is this a man? 10. Is that a ball? 11. Is that a train? 12. Is that a plane? 13. Is the window open? 14. Is the door closed? 15. Is the boy near the window? 16. That is not a king. 17. That is not a queen. 18. That is not a bus. 19. This isn't a mountain. 20. That isn't a goose. 21. This isn't a mouse. 22. It is a sheep. 23. It is a cigarette. 24. It is a cat. 25. It is not a girl. 26. It isn't a bag. 27. It isn't a tree. 28. It is not a bad egg. 29. It is a good egg. 30. Is that a flower?

Exercise 7. Put the following sentences in plural and translate them.
1. This man is an engineer. 2. That woman is my sister. 3. This child is my son. 4. That goose is big. 5. This mouse is white. 6. This man is a doctor. 7. That woman is my cousin. She is a teacher. 8. That girl is

my niece. She is a pupil. 9. This girl has a blue sweater. 10. This boy has a good coat. 11. My uncle has a large flat. 12. There is a table in the room. 13. I have a good pen. My pen is in my pocket. 14. There is a flower in the vase. 15. This child's foot is sore.

Exercise 8. Put the sentences in plural.

1. This room is very large. 2. There is a match in the box. 3. Has this lady a knife? 4. There is a man and a woman in the street. 5. This lady is that gentleman's wife. 6. This shoe is too large for my foot. 7. The child is sitting on a bench. 8. My tooth is white. 9. This key is made of steel. 10. A potato is a vegetable and a cherry is a fruit. 11. This is my friend's study.

Exercise 9. 1) Put the sentences in plural and translate them.
2) Make the sentences 2, 3, 4, 7, 13 — negative.
3) Put questions to the sentences 2, 7, 11, 14, 16, 18.

1. What is that child's name? 2. The cat has caught a mouse. 3. There was a lady, a gentleman, a boy and a girl in the room. 4. In the farmyard we could see an ox, a sheep, a cow and a goose. 5. Is this worker an Englishman or a German? — He is a Frenchman. 6. Why don't you eat this potato? 7. This strawberry is still green. 8. The withered leaf has fallen to the ground. 9. Can you see a bird in that tree? 10. Does your tooth still ache? 11. I held up my foot to the fire to warm it. 12. His child studies very well. 13. This man works at our office. 14. There is a new house in our street. 15. This story is very interesting. 16. I have hurt my foot. 17. The wolf has been shot. 18. He keeps his toy in a box. 19. Put this knife on that table.

Exercise 10. Put the sentences in plural.

1. This is my office. 2. He has a new suit. 3. This metal is very hard. 4. That ship is a Ukrainian one. 5. I heard her voice. 6. His dog does not like bread. 7. The plate was on the table. 8. This town is very large. 9. I was talking to her at the tram stop yesterday. 10. Is that girl your sister? 11. I shall give you my book. 12. This story will be a good

one. 13. Is this a good match? 14. The boy put his book on the desk. 15. She took off her hat. 16. That house is new. 17. The young man put his hand in his pocket. 18. Is this student coming with us, too? 19. The woman didn't say anything. 20. Does she speak English?

Exercise 11. Put the sentences in plural.

1. This is a bird. 2. Is that also a bird? — No, it isn't. That is a cat. 3. Is that a good horse? — Yes, it is. 4. Is that cow big or small? — It is big. 5. This is an apple and that is a flower. 6. Where is the coin? — It is in the box. 7. What color is the box? — It is green. 8. What is it made of? — It is made of wood. 9. What is that man? — He is a clerk. 10. Is he in the office? — Yes, he is. 11. Is that woman a typist? — No, she isn't. — What is she? — She is a doctor. 12. Is his brother at home? — Yes, he is. 13. This house has a balcony looking out on the street. 14. The architecture of this building is quite modern. 15. This is a new district of Kharkiv. 16. There is a shop, a cinema and a theatre in the new district. 17. He is a retired worker. 18. I am a doctor. 19. We hear the sounds of a child's voice. 20. She is a nice girl.

Exercise 12. Express the same statements in the other way using the possessive case of nouns.

1. The room of my friend. 2. The questions of my son. 3. The wife of my brother. 4. The table of our teacher. 5. The poems of Pushkin. 6. The voice of this girl. 7. The new club of the workers. 8. The letter of Pete. 9. The car of my parents. 10. The life of this woman. 11. The hand-bags of these women. 12. The flat of my sister is large. 13. The children of my brother are at home. 14. The room of the boys is large. 15. The name of this girl is Jane. 16. The work of these students is interesting.

Exercise 13. Write the sentences in plural.

1. This young man and that woman take part in our work. 2. He makes great progress in studies. 3. The achievement of this country in

the field of space exploration is great. 4. An extramural student has the paid leave during exams. 5. She will enter the higher school next year. 6. This scientist makes a great contribution to science. 7. I carry out the experiment and she helps me.

Exercise 14. Express your surprise as in the model.

Model: — His son takes after him.

Does his son really take after him?

1. He studies at the Polytechnic. 2. His friend gives lectures at the same college too. 3. They like to spend their free time together. 4. They speak English and French well. 5. Boris works as an interpreter at the Intourist.

Exercise 15. What questions would you ask friend (your colleague) to get the following answers.

1. No, it is not. My family is not very large. 2. My son takes after me. 3. Yes, he does. He plays tennis very well. But his hobby is chess. 4. Yes, she is. My daughter is fond of serious music. 5. Yes, I have a lot of relatives on my wife's side.

Exercise 16. Write questions to which the following statements will be the answers.

1. Peter Klymenko gives lectures at the University twice a week. 2. His wife is an engineer. She works at a large plant. 3. Her parents live in a village. 4. On Sunday they usually visit their parents. 5. They like to spend their day-off in the park.

Exerciss 17. Express the same statements in the other way using the possessive case of nouns.

1. The text-books of the students are on the desks. 2. The families of these workers are large. 3. The house of their parents is nice. 4. The lecture of this teacher is very interesting. 5. The name of their daughter is Ann.

Exercise 18. Compete the dialogues in writing.

1. By the way, when is your birthday?
...
Are you going to celebrate it?
...
With whom are you going to celebrate it?
...
With pleasure.

2. Have you got a lot of relatives on your and your wife's side?
...
Do you often go to see them?
...
Do they always congratulate you on your birthday?
...
Are they going to come to your place?
...

Exercise 19. Translate the following word combinations and sentences from Ukrainian into English.

1. Дім нашого викладача, картини сучасних художників, завод цих робітників, спеціальності студентів, дім моїх батьків, прізвища студентів, син мого брата, сестра мого друга, чоловік моєї доньки, фото моєї бабусі, кімната Петра, сестра моєї матері.
2. Сестра мого чоловіка одружена. Батько цих дітей інженер. Мати моїх друзів живе на селі. Галина зараз гуляє зі своїми дітьми у парку, а потім вона збирається пекти свій улюблений пиріг. Вона збирається відсвяткувати день народження своєї доньки в наступну неділю.

Exercise 20. Translate the following word-combinations:

spaceship design
air resistance

planet surface
space flight danger
the low temperature nitrogen absorption measurement
control equipment
equipment control
thermoelectric generator development
fuel supply
energy transformation

Exercise 21. Translate the following word-combinations:
household goods
steam engine invention
the car speed calculation problem
a new published proposed invention application
liquid rocket reconstruction
high market price
improved test program
load condition
stress distribution
weight percent

Exercises 22. Translate the following sentences paying attention to the chain of nouns.
1. All language teaching methods must be based on some knowledge of the language taught. 2. The low temperature nitrogen adsorption measurements present the whole problem. 3. There are two types of discharge electron beam device. 4. The larger the cross-section area of the wire the greater the possibility for the electron movement. 5. A direct current system has one great disadvantage. 6. There are a lot of types of special service motor cars. 7. These fuel elements consist of a large number of thin uranium dioxide rods. 8. A new hospital X-ray unit locates a bullet or shell fragment in one minute. 9. There are a lot of principal corrosion protection methods.

Exercise 23. Change the sentences into negative ones.

1. They went to the stadium with us on Saturday. 2. Richard is very good at weight lifting. 3. Our basket-ball team will return on Thursday. 4. There are many good athletes there. 5. Leo has gone to the swimming pool. 6. John took part in the race last week. 8. Our coach speaks English fluently. 9. The participants will be back in twenty minutes. 10. He's been the chess champion of our institute since 1963.

Exercise 24. Put questions to the following sentences.

1. They come to the stadium every day. 2. The game took place last Saturday. 3. Edward and Joseph intend to go in for boxing. 4. Margaret is an excellent dancer. 5. They saw Victor going to the beach. 6. The buses were overcrowded after the game. 7. Jack can speak fluently both English and French. 8. They go to the gym together twice a week. 9. Our new player is feeling better this morning. 10. Pat sat in the garden, basking in the warm sunshine.

Exercise 25. Use plural and make corresponding changes.

1. This magazine is new. 2. That man over there is my friend. 3. This apple is ripe. 4. This exercise is very difficult. 5. That chair over there is broken. 6. This letter is for your friend. 7. This exercise is very easy for them. 8. This is an easy exercise for me. 9. This text is very interesting. 10. That house at the corner is not very old.

Exercise 26. Change into a negative form.

1. We are students of this group. 2. He is a teacher of mathematics. 3. They are civil engineers. 4. Lewis and I are busy today. 5. Michael and Robert are post-graduates. 6. Joseph is his brother. 7. We play chess every afternoon. 8. They work on Sunday. 9. She likes to sing such songs. 10. Daniel wants to help William today.

Exercise 27. Put questions, using *when*, *by who(m)*, *with what*, *where*, *who*, *which*, *what*, *how many*.

1. Progress is made every day **in the world of science**. 4. The University of Glasgo was founded **in 1451**. 3. **Four** exams have been taken by

the first-year students. 4. This new method is studied **by Tom**. 5. In winter the earth is covered **with snow**. 6. Television is watched by children **during the children's hour**. 7. **The first** question is the most significant. 8. **They** were met by their friends.

Exercise 28. Put questions.

1. He learnt English at school. (where) 2. It rained during the night. (when) 3. I've had two cups of coffee. (how many) 4. He knows all the new words. (what) 5. They've used different means of communication. (what means) 6. He worked in the Far East for two years. (how long) 7. That was a bread box. (what sort of box) 8. They've finished a Technical School. (what kind of school) 9. He could not come because he did not feel well. (why)

Exercise 29. Put questions.

1. We will do it by all means. (who) 2. I will be at home at 10 o'clock. (when) 3. About twenty members of this commission will come to Kyiv next week. (how many) 4. They will get a lot of experience there. (what) 5. Ann will be very glad to see you because she is waiting for you. (why) 6. I shall work hard at my English in summer. (when)

Exercise 30. Translate the sentences paying attention to the meaning of the word "matter".

1. Mass is the quantity of matter in a special specimen. 2. Chemistry is the branch of science which deals with different substances or varieties of matter. 3. It is a matter of common observation that matter exists in four states. 4. Though this substance is of organic origin it is still a matter of some doubt whether it is of animal or vegetable origin. 5. As a matter of fact this discovery was not a new one, but still it was very interesting. 6. No matter what results we get we shall continue our work. 7. It doesn't matter when he comes, we shall begin our experiment without him, and later we shall show him

the results. 8. Changes in matter can't be without changes in energy. 9. Matter is that which makes up the universe, matter is the reality. 10. It is known that mass is a quantity of matter that makes a body. 11. The con-centration of mineral matter in sea water slowly increases. 12. Sea water contains approximately 3.6 per cent of mineral matter in solution. 13. The forms of motion of matter are diverse.

Exercise 31. Put general questions. Translate the sentences.

Model: Did he go to Kyiv last month?

1. He went to Kyiv last month. 2. They answered all the questions very well yesterday. 3. She spent her childhood in the country. 4. At school he liked chemistry. 5. She went to the Institute by bus. 6. Many people come to our city every day. 7. This scientist works at a very interesting problem. 8. She teaches chemistry at school. 9. He collects stamps and postcards. 10. They attend lectures every day. 11. On Sundays she does not go to the Institute. 12. We read many English books.

Exercise 32. Put sentences into the negative form, translate the sentences.

1. There were some new laboratories in our Institute some years ago. 2. There is an English magazine on the table. 3. There are foreign students in our group. 4. They go to school. 5. She is still in Lviv. 6. We translated the article yesterday.

Exercise 33. Supply prepositions where necessary.

1. Look ... these two pictures. Whom do you see ... these pictures? 2. Every day Mr. Green gets ... 7 o'clock, goes ... the bathroom, takes a bath and has breakfast. 3. He goes .. the plant ... underground. 4. He arrives ... work ... 8 o'clock. 5. He works ... week-days.

Exercise 34. Make up questions to which the words in italics are the answers.

1. My father worked ***at a large plant*** 2 years ago. 2. I attended some lectures ***yesterday***. 3. Yes, I ***came*** home at 7 o'clock in the evening

last week. 4. We enjoyed our stay in the country ***last year***. 5. I made progress in English ***when I worked at the laboratory.***

Exercise 35. Put questions using the model:

Model: Mary left at 8 o'clock this morning. (What time).
What time did Mary leave this morning?

1. The boys got home around midnight. (What time). 2. They went to the park an hour ago. (Where). 3. Alexander's father worked here ten years ago. (When). 4. The students came here twice, but you were out. (How many times). 5. She went to London to visit her relatives. (Why). 6. It was heavy rain half an hour ago. (What). 7. Some of the delegates spoke Ukrainian to us. (What language). 8. My parents sat in the eighth row. (In which row).

Exercise 36. Correct the sentences using the possessive case where possible. Translate the sentences.

Model: Henry's brother lives in that house.
The boy's (boys') parents are teachers.

1. Johns motor scooter is standing outside. 2. The childs toys are in this big box. 3. Peters sister is very good at mathematics. 4. Helens birthday is in April. 5. Mr. Jones children are very young. 6. Our cats kittens play all day long. 7. Williams and Franks father teaches at the University. 8. These engineers work is most interesting. 9. The United States fuel resources are great. 10. Have you read yesterdays newspaper? 11. I live at a miles distance from the center of the town.

Reading Material

Text 1
THE PRINCIPLE OF WORK OF INTERNAL COMBUSTION ENGINES

Internal combustion is the process of the burning of fuel within the engine. The fuel burns within the engine and provides forces. These forces provide the engine power.

Internal combustion engines have stationary, rotary and reciprocating parts.

Stationary Engine Parts. The stationary engine parts are the cylinder block, the crankcase and the cylinder head.

The cylinder block is one of the basic parts of the engine. The process of combustion takes place within the cylinders. Tractor engines have some cylinders.

The crankcase is a part of the cylinder. It supports the crankshaft and the camshaft and keeps the lubricating oil near the engine parts.

The cylinder heads close the cylinders. The cylinders and the cylinder heads form the combustion chambers.

The burning of fuel takes place within the combustion chambers.

Rotary Engine Parts. Rotary engine parts are the crankshaft, the flywheel and the camshaft.

The crankshaft changes reciprocating motion of pistons to rotary motion. The camshaft opens the valves of the engine.

Завдання до тексту

I. Прочитайте текст та дайте відповідь на запитання:

1. What is internal combustion?
2. What parts do internal combustion engines have?
3. Where does the process of combustion take place?
4. What is the function of the crankcase?
5. Where does the burning of fuel take place?
6. What are the rotary engine parts?

II. Заповніть пропуски словами, що надані нижче:

cylinder head, camshaft, burning, crankcase, crankshaft, cylinder block.

1. The ___ changes reciprocating motion of pistons to rotary motion. 2. The ___ opens the valves of the engine. 3. The _____ is one of the basic parts of the engine. 4. The cylinders and the ___ form the combustion chamber. 5. The _____ of fuel provides forces. 6. The ___ keeps the lubricating oil near the engine parts.

III. Складіть речення з наданих слів та перекладіть українською мовою.

1. Within, burns, the fuel, the cylinder.
2. Of, changes, reciprocating, the crankshaft, the motion, pistons.
3. The crankcase, is, of, a part, the engine.
4. Study, we, engines.
5. Takes place, the combustion, chamber, in, burning, the process, of.

Text 2
CONDUCTIVITY

The transistor has become an important member of electronic devices and surpasses the vacuum tube in many applications in the electronic industry. The term "semi-conductor" means "half-conductor", that is a material whose conductivity is between that of conductors and insulators. They include such elements as silicon, germanium, selenium, phosphorus and others. The conductivity of semi-conductors increases with heating. Light as well as heat increases the conductivities of semi-conductors. Engineers and physicists see in them the way of solving many engineering problems. Converting heat into electricity without using boilers is one of them. This could be done by means of the thermocouples made of semi-conductors. Photocells made of semi-conductors are capable of transforming 10 per cent of sun-ray energy into electric power. The electricity produced by semiconductor thermocouples can give not only heat but cold as well, on this principle refrigerators operate.

Semi-conductors make a great progress of radio engineering, automation, electrical engineering and many other branches of science and technique.

Завдання до тексту

I. Дайте відповідь на запитання.

1. What surpasses the vacuum tube in many applications?

2. What does the term “Semi-conductors” mean?

3. How can you increase the conductivity of a semi-conductor?

I. Знайдіть усі випадки вживання закінчення “s” та прокоментуйте їх.

II. Поставте 2 запитання до тексту.

Text 3
THE CONTROL SYSTEMS FOR MOTOR DRIVES

The widespread use of electric energy is to a great extent due to the ease with which it can be controlled. An electric controller is a device or group of devices, which serves to govern the electric power delivered to the apparatus. The term “govern” means to vary, change, or modulate.

The control systems are very important for motor drives. The basic functions of a controller used in a motor control system are to start, stop, and modulate the flow of electric power to the apparatus to which the controller is connected. Let us break-down these functions as follows: a) Control of motor direction (reversal), b) Control of motor torque (acceleration), c) Control of speed, d) Control of motor retardation (breaking), e) Protection of motor and circuits. In general these functions will have to be performed for all types of motors.

Завдання до тексту

I. Дайте відповідь на запитання.

1. What is an electric controller?

2. What meanings of term “govern” do you know?

3. What are the basic functions of a controller used in a motor control system?

II. Прокоментуйте вживання закінчення *-s* у тексті.

III. З’ясуйте, до якого з абзаців тексту може бути поставлено запитання *Where are the control systems used?*

Text 4

REFRIGERATION

Refrigeration is the transfer of heat from a substance to be cooled to somewhere else. As heat flows naturally from any body into any other colder body with which it is in contact, refrigeration is simple when a supply of some suitable colder substance is available. For example, fish can be cooled by packing ice around them.

Where a suitable colder substance is not available then one has to be produced, a complicated procedure involving the expenditure of energy: it is a process of this kind that is usually implied when the term refrigeration is used.

Nearly all refrigerating plants utilize the lowering of temperature which results from the controlled evaporation of a liquefied gas. When only small refrigerating effects are required they can be obtained by the direct application of electricity through a suitable thermocouple.

Завдання до тексту

I. Словам із колонки A підберіть відповідний переклад із колонки B.

A	B
1. semiconductor	A. охолодження
2. charge	B. приводити до
3. face	C. обігрівач
4. plant	D. поверхня, сторона
5. to result from	E. послідовно
6. to result in	F. термопара
7. heater	G. заряд
8. in series	H. випаровування
9. thermocouple	I. витікати з
10. evaporation	J. напівпровідник
11. refrigeration	K. завод, установка

II. Прочитайте і перекладіть слова, звертаючи увагу на способи їх утворення.

а) to conduct — conductor — semiconductor — conductance — conductivity;

б) to charge — charge — chargable — discharge — recharge;

в) vapour — vaporize — vaporization — evaporation;

г) refrigerate — refrigerator — refrigeration;

д) to heat — heat — heater — overheat — superheat — superheater — superheating — overheating.

III. До вказаних нижче дієслів підберіть іменники та перекладіть українською мовою.

a) to compress, to heat, to transfer, to convert, to push, to generate, to cool.

b) liquid, molecules, current, gas, energy, face.

IV. Закінчіть речення.

1. Fish can be cooled ...
2. Refrigeration is the transfer ...
3. Heat is taken from one side and ...
4. A heat sink is a ...

Text 5
DYES

The process by which the colour of materials such as cotton or wool is changed is known as dyeing. Dyes are very old. Most early dyes were natural. They came from plants or animals.

In ancient Egypt silk wool, linen and cotton were dyed many beautiful colours. The Egyptians got their dyes from plants and roots, the bark of trees, berries and nuts, and from insects.

Dyes made from plants include indigo and alizarin or madder, both of which are still used. These dyes can now be made in factories. Indigo has been used to dye materials blue for more than 5,000 years.

Alizarin is a red dye. It is obtained from the ground root of the madder plant. Alizarin was used by the ancient Egyptians, Greeks and Indians.

Alizarin is a "mordant" colour. This means that a substance known as a mordant must be mixed with the colouring matter to fix the colour on the cloth. Mordants serve yet another purpose — different mordants produce different shades with the same dye-stuff.

Завдання до тексту

I. Дайте відповідь на запитання.

1. What process is called dyeing?
2. Were the dyes used by ancient Egyptians natural or synthetic?
3. Where did the ancient Egyptians get their dye-stuffs from?
4. What do dyes made from plants include?
5. How was alizarin obtained?
6. What do different mordants produce?

II. Прокоментуйте вживання закінчення *-s* у тексті.

II. Поставте два спеціальних запитання до тексту.

Text 6

MICROELEMENTS, VITAMINS OF PLANTS

The word "element" has many meanings. For example, it may mean atoms of one species having the same nuclear charge. But what are "microelements"? That is what we call chemical elements contained in animal and plant organisms in very small quantities. The human organism contains 65 % of oxygen, about 18 % of carbon, and 10 % of hydrogen. These are macroelements, since they are present in large quantities. But titanium and aluminium may be called microelements because their content is only a thousandth of a per cent each.

At the dawn of biochemistry nobody ever paid any attention to such "trifles". A mere hundredth of a thousandth of a per cent was really nothing to speak of. The more so, at that time such small quantities could not even be determined. As engineering and analysis methods progressed, scientists began to find more and more elements

in living matter. However, for a long time the role of microelements remained unknown. Even today, though chemical analysis enables determination of millionths and even hundred-millionths of a per cent of impurities in practically any sample, the importance of many microelements for the vital activities of plants and animals has not yet been established.

But there are some things that have been established. For instance, it is known that various organisms contain such elements, as cobalt, boron, copper, manganese, vanadium, iodine, fluorine, molybdenum, zinc, and even radium. Yes, radium, though in trace amounts.

Iron and manganese play an important role in plant photosynthesis. If a plant is grown in a soil not containing even traces of iron, its leaves and stem will be white as paper. But if such a plant is sprayed with a solution of iron salts it immediately acquires its natural green colour. Copper is also needed for photosynthesis and affects the assimilability of nitrogen by plant organisms. A deficiency of copper in plants results in poor formation of proteins of which nitrogen is a constituent.

Завдання до тексту

I. Дайте відповідь на запитання.

1. What does the word “element” mean?
2. What macroelements does the human organism contain?
3. What is the amount of microelements in a human organism?
4. What elements are known as microelements?
5. What is the role of manganese in plant photosynthesis?
6. Why copper is needed by plants?

II. Підберіть синоніми до поданих слів та словосполучень.

for example; quantity; since; to pay attention to; to progress; impurity; importance; soil.

III. Поставте два спеціальних запитання до тексту.

Topics

PERSONAL PRESENTATION

I am Igor Vlasenko. I am 19. I work at a Joint-Stock Company. I am a junior manager. At the same time I study at National Technical University (Kharkiv Polytechnic Institute) at the Extra-mural department. I am a first-year student of the Institute of Education and Science in Mechanical Engineering and Transport. My major (speciality) is the Technology of Cutting. I am from Kharkiv.

I. Answer the questions.

1. Who are you?
2. What are you?
3. How old are you?
4. Do you work or study?
5. Where do you work?
6. Where do you study?
7. What department do you study at?
8. What is your major?
9. Where are you from?

MY FAMILY

I would like to tell you some words about my family.

We are a family of five. We think we are a large, friendly and united family. So we are happy to be living together and getting on all right.

To begin with, I am going to talk about my dad. His name is Sergey Petrovich. He is 45. He works as a surgeon in a hospital. He is neither old, nor young. He is a good-looking man, handsome, rather thin with dark brown hair just beginning to get grey. He is a very sociable person. What I don't like about my father is that he is always busy. He works overtime very often. He is a bread-maker in our family. He is fond of going to the country on weekends, because he enjoys working in the garden.

My mother's name is Galina Nickolayevna. She is three years younger than my father. She works as a teacher at a nursery school. My mother is rather slim and pretty; she is always elegant and smart. In short, she is a pleasant-looking woman of about 40. She always has a lot of work to do at school and about the house. She is fond of her work and spends a lot of time there. But she has to cook the food for all the family at home. Shopping and cooking is nearly half a day's work for her. But my granny and I have a habit of helping her about the house.

Boris is my elder brother. He is six years my senior. So he is 23 already. He has graduated from the University and he works as an economist now. He is married. His wife is a journalist. They are three in the family. They have got a child, my nephew. It is a lovely little boy of two with golden hair and dark blue eyes. He is full of joy and gaiety. My brother's family lives separately.

And finally, a few words about my grandmother. My granny is my best friend, I must tell you. She is always ready to listen to my endless stories about my school life and my friends. She is retired now, but in her youth and her older age she worked as a teacher at school. She is a very understanding person, I must admit.

Put it into a few words, we are a united and friendly family.

I. Answer the questions.

1. Is you family large?
2. What does it consist of?
3. Is your father older than your mother?
4. Do you have a sister or a brother?
5. Are you fond of your sister/brother?
6. What is your father?
7. Are you great friends?

II. Make up questions about your partners' families.

UNIT 2

Grammar

Прикметник. Прислівник. Ступені порівняння
Числівник

Reading Material

1. Four-Stroke Cycle
2. Lacquers
3. Engine Parts
4. Clasification of Polymers
5. Electrical Machines
6. Heat Exchanger

Topics

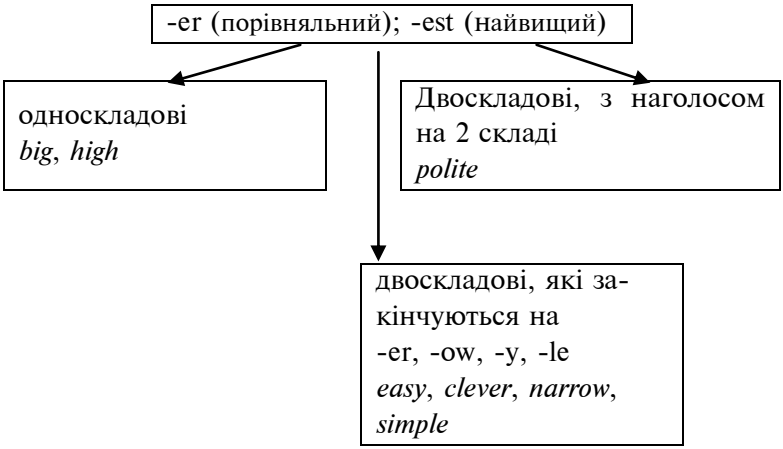
My Biography
My Working Day

Grammar

Прикметник **Прислівник**

Ступені порівняння

І спосіб:



ІІ спосіб:

для багатоскладових та інших прикметників

more — the most
less — the least

Звичайний ступінь	Порівняльний ступінь	Найвищий ступінь
big	bigger	the biggest
high	higher	the highest
polite	politer	the politest
easy	easier	the easiest
clever	cleverer	the cleverest
narrow	narrower	the narrowest
wonderful	less wonderful	the least wonderful
tired	more tired	the most tired
soon	sooner	the soonest
hardly	more hardly	the most hardly

Запам'ятайте!

good — better — the best
bad — worse — the worst
little — less — the least
many (much) — more — the most
far (довжина, відстань) — farther — the farthest
far (кількість, час) — further — the furthest
old — older (elder) — the oldest (the eldest)

Утворення прикметників

іменник + суфікс					
-al formal	***-ful*** useful	***-ous*** danger**ous**	***-y*** rain**y**	***-less*** (з заперечним відтінком) use**less**	***-ic*** magnet**ic**

дієслово + суфікс		
-able, -ible change**able**	***-ant, -ent*** differ**ent**	***-ive*** attract**ive**

префікс + прикметник		
in-, im-, il-, ir- (з заперечним відтінком) **in**definite, **im**possible, **il**legal, **ir**regular	***un-*** (з заперечним відтінком) **un**expected	***dis-*** (з заперечним відтінком) **dis**proportional

Утворення прислівників

Іменник + ***-ly***	Прикметник + ***-ly***	Числівник + ***-ly***
weekly	highly	firstly

Запам'ятайте!

Буква *y* перед суфіксом *-ly* змінюється на *i: happy — happily.*

Деякі прислівники в англійській мові збігаються за формою з прикметниками: ***fast*** — швидкий, швидко; ***early*** — ранній,

рано; ***loud*** — голосний, голосно. Їх легко відрізнити, тому що прислівник, як правило, відноситься до дієслова або прикметника, а прикметник — до іменника.

Порівняльні конструкції
as … as, not so … as, the … the та інші

1)	the ... , the...	чим ... тим

The more, *the* better. — *Чим* більше, *тим* краще.

2)	as ... as	такий же ... як

It is *as* cold today *as* it was yesterday. — Сьогодні *так само* холодно, *як* вчора.

Запам'ятайте!

This box is **twice** (tree times) **as** heavy **as** that.	Ця коробка **вдвічі** (втричі) **важча**, ніж та.

3)	not so ... as	не такий ... як

It is *not so* cold today *as* it was yesterday. — Сьогодні *не так* холодно, *як* учора.

4)	than	ніж

He did more *than* she did. — Він зробив більше, *ніж* вона.

Числівники
Утворення кількісних числівників

Другий десяток: закінчення ***-teen*** — 13—19 (thir*teen* ... nine*teen*).
Десятки: закінчення ***-ty*** — 20—90 *(twenty ... ninety).*

Тризначні числівники утворюються за зразком: 356 — *three hundred* ***and*** *fifty-six*.

Кожні три розряди чисел (справа наліво) відокремлюються комою: 2,437; 5,789,240.

Утворення порядкових числівників

Закінчення ***-th*** — *six**th**, thirteen**th**, twenty-four**th***.

Виняток: *1st — the first, 2nd — the second, 3rd — the third.*

Запам'ятайте!

У числівників ***five*** and ***twelve*** букви ***ve*** змінюються на ***f — fifth, twelfth***; до числівника ***eight*** додається лише буква ***h — eighth;*** у числівника ***nine*** пропускається остання буква ***-e — ninth;*** у числівників, що позначають десятки, кінцева буква ***y*** змінюється на ***ie***: ***twenty — twentieth, fifty — fiftieth***.

Роки читаються так:

1989 — *nineteen eighty-nine*

1905 — *nineteen* [*ou*] *five*

1700 — *seventeen hundred*

2005 — *two thousand five* (*twenty hundred and five*)

Дати та час:

14 січня — *the fourteenth of January, January the fourteenth*

14-го січня — *on the fourteenth of January*

1.01.1984 — **on** the first of January nineteen eighty-four;

в 1741 году — **in** seventeen forty-one;

о 5:30 — **at** half past five;

о сьомій годині дванадцять хвилин — **at** twelve minutes past seven;

без п'ятнадцяти шість — **at** a quarter to six.

Дробові числа:

1/2 — a half; 1/3 — one third (of an apple); 2/5 — two fifths (of an apple).

Математичні операції та функції:

+ — plus	$\sqrt[n]{}$ — *n*-th root of
- — minus	$\sqrt{}$ — square root of
* — times; multiplied by	$\sqrt[3]{}$ — cube root of
/ — divided by	5^2 — five squared
= — is; equals; is equal to	5^3 — five cubed
f(x) — *f* of *x*	7^5 — seven to the fifth power

Exercises

Exercise 1. Form comparative and superlative degrees of the following adjectives.

Hot, long, short, clever, silly, great, red, black, white, thin, thick, fat, nice, warm, cold, merry, small, tall, high, weak, strong, heavy, light, green, dry, clean, dirty, wide, deep, brave.

Exercise 2. Open the brackets using the necessary form of adjective.

1. Which is (large): the United States or Canada? 2. What is the name of the (big) port in the United States? 3. Kyiv is the (large) city in Ukraine. 4. The London underground is the (old) in the world. 5. There is a (great) number of cars and buses in the streets of Kyiv than in any other city of Ukraine. 6. Lviv is one of the (beautiful) cities in the world. 7. The rivers in America are much (big) than those in England. 8. The island of Great Britain is (small) than Greenland. 9. What is the name of the (high) mountain in Asia? 10. The English Channel is (wide) than the Straits of Gibraltar. 11. China is a very (large) country.

Exercise 3. Use *as ... as* or *so ... as*.

1. Mike is ... tall ... Pete. 2. Kate is not ... nice ... Ann. 3. My room is ... light ... this one. 4. This book is not ... thin ... that one. 5. Andrew is ... old ... Michael. 6. She is ... young ... Tom's brother. 7. This

woman is ... good ... that one. 8. Nick's English is not ... good ... his friend's. 9. I am not ... tall ... Pete. 10. This woman is ... young ... that one. 11. I am ... thin ... you. 12. Kate is ... lazy ... her brother. 13. This child is not ... small ... that one.

Exercise 4. Translate the sentences.

1. What is your height? You are taller than me. 2. She felt as strong as her brother. 3. We started earlier than you. 4. He was more careful than me. 5. This student is the most attentive in our group. 6. I need a warmer coat. 7. He is as tired as you are. 8. He was one of the most experienced workers at the factory. 9. Better late than never. 10. She was not so attractive as her mother is. 11. His work is not so difficult as mine. 12. He is the eldest in the family. 13. It is easier to swim in the sea than in the river. 14. This is the smallest room in our flat.

Exercise 5. Put *as ... as*, *so ... as* or *than*.

1. Our house is not ... big ... yours. 2. The new cinema in our district is much bigger ... the old one. 3. We are ... proud of our district ... you are of yours. 4. The house I live in is ... old ... the one my sister lives in. 5. Exercise 2 is easier ... exercise 3. 6. This song is more beautiful ... that one. 7. My composition is not ... long ... yours.

Exercise 6. Open the brackets, using the necessary form of the adjective.

1. This man is (tall) than that one. 2. Asia is (large) than Australia. 3. The Dnieper is (short) than the Mississippi. 4. Which building is the (high) in Kharkiv? 5. Mary is a (good) student than Lucy. 6. The Alps are (high) than the Urals. 7. This garden is the (beautiful) in our town. 8. She speaks Italian (good) than English. 9. Is the word "newspaper" (long) than the word "book"? 10. The Thames is (short) than the Volga. 11. The Arctic Ocean is (cold) than the Indian Ocean. 12. Chinese is (difficult) than English. 13. Spanish is (easy) than German. 14. She is not so (busy) as I am. 15. It is as (cold) to-

day as it was yesterday. 16. This book is (interesting) of all I have read this year. 17. January is the (cold) month of the year. 18. My sister speaks English (bad) than I do. 19. Which is the (beautiful) place in this part of the country? 20. This nice-looking girl is the (good) student in our group.

Exercise 7. Translate the sentences paying attention to the construction *the... the...* .

1. The shorter the half-life period of an element, the greater is its radioactivity. 2. The bigger the turbine-and-generator unit, the more economical it is for the power generating industry. 3. The greater the force applied and the distance moved the more work has been performed. 4. The faster the object moves, the greater is air resistance.

Exercise 8. Translate the following sentences paying attention to the words in bold types.

1. ***The higher*** the temperature of a metal, ***the higher*** is its resistance. 2. ***The more*** you read, ***the more*** you learn. 3. ***The larger*** the water-pipe, ***the more*** water passes through it. 4. ***The faster*** the molecules of a substance move, ***the higher*** is the temperature of the substance. 5. ***The shorter*** the wire, ***the less*** is its resistance to current flow. 6. ***The greater*** the number of free electrons in a substance, ***the better*** that substance conducts electricity.

Exercise 9. Say what you don't have to do in each case. Use the words prompted. Follow the model.

Model: — I'm much better today. (to stay in bed)
— I'm much better today, so I don't have to stay in bed.
I found my old dictionary. (to buy a new one)
I believe he'll be able to do this work himself. (to help him)
The secretary looked through the mail. (to do it)
Saturday is my day-off. (to go to work)
John rang me up last night. (to visit him)

Exercise 10. Compare the size or quantity of the object below.
Model: — The film, the book and the play (interesting)
— The film is interesting, the play is more interesting than the film, and the book is the most interesting of them all.
Chinese, English, German (difficult)
Ann's house, Helen's house, your house (large)
The hotel "Kharkiv", the hotel "Yalta", The hotel "Mir" (expensive)
Spring, winter, summer (pleasant)
The tape recorder, the TV set and the radio-set (expensive)

Exercise 11. Say what you don't have to do in each case. Use the words prompted. Follow the model.
Model: — I'm much better today. (to stay in bed)
— I'm much better today, so I don't have to stay in bed.
My classes begin at 10 tomorrow. (to get up early)
Mary is a punctual woman. (to wait for)
They lived quite near the station. (to take a taxi)
My wife usually does shopping. (to go shopping)
My friends promised to give me a lift to the airport. (to take a bus)

Exercise 12. Compare the size or quality of the objects below.
Model: — Your garden and your friend's garden. (large)
— My garden is larger than yours.
Your kitchen and your neighbour's kitchen. (small)
Your flat and your friend's flat. (good)
Your job and your wife's job. (bad)
The central avenue and Park Road. (long)
Kyiv and Kharkiv. (old)

Exercise 13. Fill in the blanks with too or very, whichever seems to make the meaning of the sentence clearer.
1. When Englishmen speak ... fast I can't understand them very well. 2. He speaks ... fast. I can't understand him. 3. Our teacher of English

speaks ... fast sometimes, but we all understand her well. 4. The weather in Alaska is ... cold in winter, but William enjoys it much. 5. I'm afraid it is ... late to go there today. 6. We came home from the stadium ... late. 7. Henry is ... tired to go to the gym with us. 8. The doctor says Mike is ... weak to play football. 9. These new gloves are ... small for me. 10. It's ... cold to go to swimming today; we'll go tomorrow. 11. My friends are studying English ... hard and that's why they are making such good progress. 12. These weights are ... heavy for me; I can't lift them at all.

Exercise 14. Translate into English.

Я навчаюсь у Харківському національному університеті на II курсі. Я вивчаю англійську мову. Кожного дня я ходжу на лекції і практичні заняття. Двічі на тиждень у нас лабораторні роботи. Кожна лабораторна робота триває 45 хвилин.

Моя сестра працює на великому заводі. Вона звичайно дістається до заводу автобусом. Вона витрачає півгодини на те, щоб доїхати до заводу. Але вчора вона витратила 45 хвилин через сильний снігопад. Тому сьогодні вона встала рано, щоб не запізнитися на роботу. О першій дня у неї звичайно обід. Вона обідає в їдальні. Я вчора не ходив у їдальню. Ми прийшли додому о 7 вечора, повечеряли, послухали передачу УТН, о 21 годині подивилися цікавий фільм. Перед сном ми любимо трохи погуляти. Іноді до нас приходять наші друзі. Минулої неділі ми ходили з ними в парк. Нам дуже сподобалася наша прогулянка. Вчора приходив до нас мій колега. Ми пообідали і пішли в кіно.

Exercise 15. React to the following as in the model.

Model: — I have got a 3-room flat. What about you?

— As for me, I've got a 4-room flat.

1. I live in a 9-storeyed building. What about you? 2. I've got all modern conveniences in my room. What about you? 3. I have got a lift in my house. What about you? 4. I have dinner in my dining-

room. What about you? 5. I've got a colour TV set in my sitting-room. What about you?

Exercise 16. Answer the questions using the degrees of comparison.
1. Does Peter drive the car as carefully as Tom does? 2. Does a taxi run as fast as a bus does? 3. Did Jane speak as calmly as Helen did? 4. Did you come as late as your brother did? 5. Does Nick speak English as slowly as Peter does? 6. Does Susan speak French as well as her mother does? 7. Does Harry get up as early as his father does? 8. Does Jack do his grammar exercises as carelessly as he did last year?

Exercise 17. Fill in the blanks with necessary words (see the model).
Model: ... is the coldest season of the year.
***Winter** is the coldest season of the year.*
1. There are seven ... in the week. 2. The first day of the week is .... 3. ...is the second day of the week. 4. ... are the rest five days of the week. 5. There are sixty ... in an hour. 6. There are twelve ... in a year. 7. Spring, ..., autumn and ... are four seasons. 8. January is the first month of the .... 9. December is the last ... of the year. 10. The first autumn month is ....

Exercise 18. Translate the sentences.
1. This student group is smaller than that one. 2. This is the longest telephone line. 3. This student is more active than that one. 4. Peter is the most capable student. 5. Nick works better than David. 6. John works worst of all. 7. This radio set is as big as that one. 8. This English program is not so simple as you think.

Exercise 19. Open the brackets using the necessary form of adjectives or adverbs.
1. Mary sings (beautiful) her friend Agnes. 2. Our bus arrived (late) ever before. 3. My brother prepares his homework (careful) I do.

4. They work (hard) we do. 5. William speaks French much (good) I do. 6. The Josephsons go to the theatre (frequent) we do. 7. We get up every morning much (early) they do. 8. I'm sure I cannot run (fast) you can. 9. They won't get home (soon) we will. 10. James answered us (quick) we expected. 11. He naturally speaks (slowly) our teacher does. 12. Most of my friends walk (rapid) I do.

Exercise 20. Open the brackets using the necessary form of adjectives or adverbs.

1. Are you (young) your brother? 2. This magazine is (interesting) that one. 3. My watch is (good) my friend's one. 4. Jim is (bad) student in our group. 5. In our country January is (cold) month of the year. 6. This bunch of flowers is (beautiful) that one over there. 7. The Pacific is (large) ocean in the world. 8. This is (comfortable) pair of shoes that I have. 9. The weather today is (warm) it was when I arrived. 10. John's watch costs (much) mine. 11. February is (short) month of the year. 12. Mary seems to be (busy) now she was in the morning. 13. Mr. Brown is (busy) person in the office. 14. Is this (wide) street in your town? 15. This is (difficult) exercise in our book. 16. New York is (large) city in the United States of America. 17. This bulb is (bright) the one I brought yesterday. 18. His watch keeps (good) time mine. 19. Jane is (intelligent) her friend Mary. 20. He bought (expensive) alarm clock in the shop.

Exercise 21. Open the brackets using the necessary form of adjectives or adverbs.

1. London is the ... (large) city in Europe and the second ... (large) city in the world. 2. One of the ... (fine) streets of London is Regent Street. We can find the ... (big) London shops there. 3. The Dnieper River is ... (wide and deep) in Ukraine. 4. The climate of England is much ... (mild) than that of the East Europe. 5. This colour is ... (fresh and bright) than that one. 6. By the way, which is the ... (short) way there? — First go right, then turn left. There is no ... (short) way

than this one. 7. You have got (much) time than I have. 8. Your collection of records is (good) than mine. 9. My recorder is (bad) than yours. 10. Perhaps my recorder is (bad) of all. 11. This is a (good) opportunity to do it. 12. This is (much) important thing for me. 13. I think it is (little) important for him.

Exercise 22. Translate the sentences paying attention to the construction *the... the.*

1. The stonger the acid, the greater is the tendency to lose protons. 2. The stronger the magnification, the greater is the possibility to detect whether the body is homogeneous. 3. The faster an object moves, the greater is the air resistance. 4. The lower the atomic weight or atomic number of the inert gas, the lower are its boiling and melting points. 5. The larger the diameter, the smaller is the resistance and hence, the more current will flow through it. 6. The greater the difference in temperature between two points, the more heat will flow per second. 7. The greater the number of free electrons in a substance, the better that substance conducts electricity.

Exercise 23. Use the necessary form of the adjective by opening the brackets.

1. Atoms are not (smaller, the smallest) particles, but they are very small. 2. This discovery is (more important, the most important) than the previous one. 3. It is much (easier, the easiest) to make parts of plastics than of metal or wood. 4. This is (better, the best) laboratory in our Institute. 5. Aluminium is (lighter, the lightest) known metal. 6. Hydrogen is (lighter, the lightest) of the elements. 7. Beryllium is (less, the least) active member of the group, and there is a regular increase in activity from metal to metal in the order of increasing atomic numbers. 8. Kyiv University is (larger, the largest) University in that country. 9. (More, the most) characteristic chemical property of hydrogen peroxide is its great oxidizing power.

Exercise 24. Open the brackets and translate the sentences.
1. The monument to Shevchenko is one of (famous, the famous) and (good, better, the best) in Kharkiv. 2. The London underground is (old, the oldest) in the world. 3. The Olympic Stadium is (large, the largest, larger) in Ukraine. 4. This street is as (green, the greenest) as that one. 5. This building is much (big, bigger, the biggest) than the old one. 6. This park is (beautiful, the most beautiful) in our city. 7. This street is not so (longer, long) as that one.

Exercise 25. Open the brackets using the necessary form of adjective.
1. New York is (large) city in the United States. 2. These exercises are (difficult) ones in the whole book. 3. Henry is (good) student in our group. 4. In many countries December is (cold) month of the year. 5. William is (young) boy in our class. 6. The Pacific Ocean is (deep) ocean in the world. 7. This is (comfortable) chair in this room. 8. August is usually (hot) month of the year. 9. The Mississippi River is (long) river in the United States. 10. Olga is (intelligent) student in our group. 11. This is (beautiful) park in our town. 12. Here is (wide) street in our district. 13. They say he is (bad) student in our institute. 14. Ben is (tall) player in our basketball team.

Exercise 26. Open the brackets using the necessary form of adverb.
1. I arrived at the meeting (late) you. 2. She called me up (early) usually. 3. Andrew answered me (quick) I expected. 4. He plays the piano (good) his brother. 5. I knew that he could walk (fast) I. 6. Olga works (hard) the other students. 7. She goes to the cinema (often) I. 8. They'll get home (soon) we. 9. The students speak English much (slow) their teacher.

Exercise 27. Open the brackets using the necessary form of adjective.
1. Mike is (tall) his brother. 2. You are (young) I. 3. This book is (interesting) that one. 4. That exercise is (easy) this one. 5. Shevchenko Street is (wide) Pushkin Street. 6. February is (short) March. 7. Her

pronunciation is (good) Nick's. 8. Our house is (large) your house. 9. These roses are (beautiful) those.

Exercise 28. Read in English and write them down.

19 − 11 = 8	256 − 142 − 74 = 40	1231 − 231 = 1000
95 − 40 = 55	471 − 349 − 102 = 20	8275 − 275 = 8000
23 + 11 = 34	1056 − 222 − 121 = 713	1987 + 124 = 2111
65 + 7 = 72	5643 − 184 − 764 = 4695	3245 + 78 = 3323

Exercise 29. Write down the following numerals.
9, 11, 20, 33, 45, 89, 100, 400, 721, 999, 1535.

Exercise 30. Translate into English the following word-combinations using ordinal numerals.

третій рік;	сьоме березня 1900 р.;
дев'ятий день;	двадцяте січня 2000 р.;
тринадцята школа;	двадцять третє грудня 2002 р.;
тридцять друга книга;	я народився 1 лютого 1985 р.
сорок третій дім;	він приїхав 21 травня 2003 р.

Reading Material

Text 1
FOUR-STROKE CYCLE

Like automobiles tractors have internal combustion engines. They ignite and burn the fuel within the cylinder and provide power. The four-stroke cycle is the most common type.

There are four operations in the four-stroke cycle. They are intake stroke, compression stroke, power stroke and exhaust stroke.

Intake. When the crankshaft rotates it moves the piston down the cylinder by means of the connecting rod. The piston draws the air and fuel into the cylinder.

Compression. The piston moves up, the valve closes and the piston compresses the air between the piston and the cylinder head.

Power. At this moment the fuel is injected into the compressed air of the cylinder. The fuel mixes with the compressed air. The heat of the compressed air ignites the mixture. The burning of this mixture provides power and this power forces the piston down. This is power stroke.

Exhaust. The piston is at the end of the stroke. The exhaust valve opens and the piston forces out the burnt gases.

There are diesel engines of the four-stroke cycle type and the two-stroke cycle type. The farm tractors have both types.

In diesel engines the heat of the highly compressed air ignites the fuel and in gasoline engines the electric spark ignites it.

Завдання до тексту

I. Прочитайте текст та дайте відповідь на запитання:

1. What engines do tractors have?
2. What are four operations in the four-stroke cycle?
3. What is intake?
4. How does compression work?
5. What is power stroke?
6. What is exhaust?
7. What types of engines do tractors have?

II. Заповніть пропуски словами, що надані нижче:

compression stroke, power stroke, down, electric spark

1. During the intake stroke the piston moves _____ and the intake valve opens. 2. The piston compresses the fuel mixture during the _____. 3. During the _____ an electric spark ignites the fuel. 4. In gasoline engines the _____ ignites the fuel.

III. З'єднайте дієслова з колонки A з іменниками з колонки B.

A	B
1. inject	A. gases
2. draw in	B. the exhaust valve
3. exhaust	C. the air-fuel mixture
4. open	D. a high compression ratio
5. have	E. tractors
6. ignite	F. the fuel
7. drive	G. air
8. inject	H. the fuel
9. draw in	I. air
10. exhaust	J. gases
11. open	K. the exhaust valve
12. have	L. a high compression ratio
13. ignite	M. the air-fuel mixture
14. drive	N. tractors

Text 2

LACQUERS

Lacquer is a fast-drying, hard, high-gloss surface coating. Lacquers are made by dissolving a cellulose derivative and other modifying materials in a solvent and adding a pigment, if desired.

The cellulose derivative most commonly used is a nitrocellulose.

Nitrocellulose is not soluble in conventional paint thinners, and so a mixture of solvents with high volatility and extremely fast-drying times is used. The mixture usually contains ethers, aromatic hydrocarbons and petroleum thinners.

Nitrocellulose is extremely hard. Its flexibility is enhanced by addition in the formulation of plasticizers, such as vegetable oils.

Adhesion of lacquers can be improved by the addition of other resins.

Lacquers dry by evaporation of the solvent. They are usually applied by spray because of their rapid drying properties.

Lacquers have been used extensively as fast-drying finishes for automobiles and as coatings for furniture.

Завдання до тексту

I. Дайте відповідь на запитання.

1. What is a lacquer?
2. How are lacquers made?
3. Which is the most commonly used cellulose derivative in lacquer production?
4. Is nitrocellulose soluble in conventional paint thinners?
5. What mixture is used for nitrocellulose?
6. Which are the properties of nitrocellulose?
7. How can adhesion of lacquers be improved?
8. Where are lacquers extensively used?

II. Знайдіть відповідне пояснення до кожного терміну.

1. lacquer	A. the molecular attraction between the surfaces of bodies in contact
2. cellulose	B. a clear or coloured usually glossy and quick-drying surface coating;
3. pigment	C. a complex carbohydrate of the cell walls of plants used especially in making paper or rayon;
4. thinner	D. colouring matter; a powder mixed with a liquid to give colour (as in paints);
5. solvent	E. any of various substances obtained from the gum or sap of some trees and used especially in varnishes, plastics, and medicine;
6. ether	F. a light flammable liquid used as an anesthetic and solvent;
7. adhesion	G. a volatile liquid (as turpentine) used to thin paint;
8. resin	H. a liquid substance capable of dissolving or dispersing one or more other substances.

Text 3
ENGINE PARTS

Cylinder is one of the basic parts of the engine. Within the cylinders the process of fuel combustion takes place. In the internal combustion engine the fuel burns in charges. Each fuel charge mixes with air and burns.

Tractor engines have two, four or six cylinders.

The cylinder head closes the cylinder at one end and the piston closes it at the opposite end. They form the combustion chamber. So each cylinder is a combustion chamber.

The piston moves up and down within the cylinder. The connection of the piston to the crankshaft causes this reciprocating motion. The connecting rod transmits the power to the crankshaft. The crankshaft changes the reciprocating motion of the piston into rotary motion of the flywheel. The clutch controls the engine power.

The crankcase keeps the oil for the engine. The pump circulates the oil to the engine parts.

The engine has four systems. Each of the, systems has special functions. These systems are: the fuel system, the lubricating system, the electrical system and the cooling system.

Завдання до тексту

I. Перекладіть англійською мовою такі речення:

1. У двигуні внутрішнього згоряння паливо спалюється в зарядах.
2. Колінчастий вал змінює зворотно-поступальний рух поршня в обертальний рух маховика.
3. З'єднання поршня з колінчастим валом викликає зворотно-поступальний рух.
4. Поршень рухається вгору-вниз усередині циліндра.

II. Прокоментуйте всі випадки вживання іменників у множині.

III. Складіть три спеціальних запитання до тексту та дайте відповідь.

Text 4
CLASSIFICATION OF POLYMERS

Polymers (high polymers, macromolecular substances) are of great fundamental importance for our existence and our culture. The human body, all animal and plant tissues, and most building substances in organic nature, such as proteins, wood, and chitin, consist of polymeric or macromolecular materials.

A polymer (Greek ***polys***, many; ***meros***, part or unit) is a substance consisting of molecules which are, at least approximately, multiples of low-molecular-weight units. The low-molecular-weight unit is the monomer. As long as the polymer is strictly uniform in molecular weight and molecular structure, its degree of polymerization is indicated by the Greek word for the number of monomers which it contains; thus we speak of a dimer, trimer, tetramer, pentamer, and so on. The term polymer designates a combination of an unspecified number of units.

If the number of units becomes very large, one also uses the term high polymer. According to present-day usage, a polymer or high polymer need not consist of individual molecules which all have the same molecular weight, nor is it necessary that they all have the same chemical composition and molecular structure as each other or as the monomer unit. Natural polymers may exist in their native state, such as certain globular proteins or poly-carbohydrates, in which the individual molecules all have the same molecular weight and molecular structure, but most synthetic and natural high polymers are obtained and investigated in a state where significant differences occur in the molecular weight of the individual macromolecules so that the material must be considered as a mixture of homologous polymeric constituents.

The existence of a lesser or wider molecular-weight distribution is caused by our present inability to prepare polymers of exactly uniform character and by the lack of methods of resolving a homologous polymeric mixture into completely homogeneous fractions. The slight var-

iability in chemical composition and molecular structure results from the presence of end groups, occasional branches.

Завдання до тексту

I. Складіть запитання до різних членів поданого речення та дайте відповідь на них.

The term polymer designates a combination of an unspecified number of units.

II. Продовжіть речення.

1. The human body, all animal and plant tissues consist of...
2. According to present-day usage, a high polymer need not consist of...
3. Natural polymers may exist in...
4. The term polymer designates...
5. A polymer is a substance...

III. Прокоментуйте всі випадки вживання іменників у множині.

Text 5
ELECTRICAL MACHINES

As a rule electrical equipment operates reliably. Still it does not mean that it deserves no attention. It is necessary to give the equipment frequent inspections, keep it well cleaned, lubricated and repaired. Undue heating, vibration, sparking should be immediately removed.

Heating may be due to overload or to a short circuit between turns, lack of oil in bearings. Vibration may be due to unproper foundation, unbalance in the moving parts of the machine.

Conductors may get heated because of overload or by reason of damage of the insulation of the conductor.

An electrical machine of any kind requires certain conditions under which it may operate reliably: temperature and freedom of access of surrounding air, need for protection against dirt, dust, type and duration of load, etc.

Rotating machines should be placed on solid foundations.
Conductors should be protected against mechanical damage.
All measures of safety precaution must be undertaken.

Завдання до тексту

I. Дайте відповідь на запитання.

1. How can we look after the electrical equipment?
2. What are the reasons of heating?
3. What are the conditions of a reliable operation?

II. Знайдіть у тексті англійські еквіваленти таких словосполучень: надмірний нагрів; зберігати чистим; коротке замкнення; на твердій основі.

III. Випишіть з тексту 1—2 речення, що передають основну думку.

Text 6
HEAT EXCHANGER

A heat exchanger is a device built for efficient heat transfer from one medium to another, whether the media are separated by a solid wall so that they never mix, or the media are in direct contact. They are widely used in space heating, refrigeration, air conditioning, power plants, chemical plants, petrochemical plants, petroleum refineries, and natural gas processing. One common example of a heat exchanger is the radiator in a car, in which a hot engine-cooling fluid, like antifreeze, transfers heat to air flowing through the radiator.

Heat exchangers may be classified according to their flow arrangement. In parallel-flow heat exchangers, the two fluids enter the exchanger at the same end, and travel in parallel to one another to the other side. In counter-flow heat exchangers the fluids enter the exchanger from opposite ends. The counter current design is most efficient, in that it can transfer the most heat. In a cross-flow heat exchanger, the fluids travel roughly perpendicular to one another through the exchanger.

For efficiency, heat exchangers are designed to maximize the surface area of the wall between the two fluids, while minimizing resistance to fluid flow through the exchanger. The exchanger's performance can also be affected by the addition of fins or corrugations in one or both directions, which increase surface area and may channel fluid flow or induce turbulence.

The driving temperature across the heat transfer surface varies with position, but an appropriate mean temperature can be defined. In most simple systems this is the log mean temperature difference (LMTD). Sometimes direct knowledge of the LMTD is not available and the NTU method is used.

Завдання до тексту

I. Знайдіть у тексті приклади словотворення та назвіть частини мови, які вони утворюють.

II. Знайдіть у тексті дієслова та поясніть час, в якому вони вживаються.

III. Складіть речення:

1. a, are, used, widely, in, space, heating, heat, exchanger
2. common, of, a, heat, exchanger, one, is, the, radiator, in, a, car, example
3. with, the, driving, temperature, the, heat, transfer, across, surface, varies, position

Topics

BIOGRAPHY

I am Igor Alexandrovich Vlasenko. I was born on the 28th of April 1980 in Kharkiv. In 1990 I went to school No 164 in Kharkiv. In 1996 I changed school No 164 into gymnasium No 46. In 2000 I finished gymnasium No 46. From August 2000 till September 2001 I worked at Kharkiv Turbine Plant. From October 2001 — till present I work at a joint-Stock Company. In 2002 I entered National Tech-

nical University (Kharkiv Polytechnic Institute) at the extra-mural department.

I am single.

My mother is Vlasenko Elena Vladimirovna, she is 42, she is a housewife.

My father is Vlasenko Alexander Nikolayevich, he is 45, he is a driver.

My sister is Vlasenko Vera Alexandrovna, she is 15, she is a pupil of school No 164.

My address is 45 Poltavsky Shlyah Street, Apt 30, Kharkiv, 61052, Ukraine.

My phone is 0-6-3 7-7-2-2-7-11.

I. Answer the questions.

1. When and where were you born?
2. When did you go to school?
3. When did you finish it?
4. Where do you work?
5. Do you study?
6. What year do you study at?
7. What department do you study at?
8. Are you married?
9. Where do you live?

II. Give some information about a famous person biography.

MY WORKING DAY

Let me introduce myself. I am Ivan Dmitrenko. I am 25. I work as a mechanic at the plant and at the same time study at the National Technical University "Kharkiv Polytechnic Institute". I am a first-year student of the Extramural Department. I am from Kharkiv.

Now, let me describe my usual working day. I must be at work at eight thirty. So, on weekdays I have to get up at half past seven. My alarm clock usually wakes me up and my working day begins.

I do my morning exercises and take a shower. Then I have breakfast. I love to listen to the latest news while I am eating.

I leave the house at ten minutes to eight and walk to the nearest bus stop. I live rather far from the plant and it usually takes me about a quarter of an hour to get there by bus.

At twelve o'clock I have a break for lunch. I don't take a packed lunch from home and prefer to eat in the canteen.

I come back home at about 8 o'clock in the evening. I have supper. After supper I have coffee or tea and watch TV.

At about eleven p.m. I go to bed. I like to read something before going to bed or to listen to some music. Sometimes I fall asleep while I am reading.

And now I want to tell you a few words about my studies at the University. Two times a year I have a examinations. As a rule I have three or four lectures a day. I have to do the control tasks and pass exams in different subjects. I don't miss my classes because I want to pass my examinations successfully. I go to the library to get ready for my practical classes or to write a report. As a rule I have no free time on weekdays. So, by the end of the week I get very tired.

I. Write a story about your usual student's working day using the questions.

1. Do you get up early?
2. Is it easy for you to get up early?
3. Do you wake up yourself or does your alarm clock wake you up?
4. Do you do your morning exercises?
5. What do you prefer: a hot or a cold shower in the morning?
6. What do you usually have for breakfast?
7. Some people look through newspapers or listen to the latest news while having breakfast. What about you?
8. When do you usually leave your house (hostel)?
9. How long does it take you to get to your University?
10. Do you go there by bus/trolley-bus or walk?

11. How many lectures do you usually have every day?
12. Where do you usually have lunch (dinner)?
13. What time do you come home?
14. How long does it take you to do your homework?
15. How do you usually spend your evenings?
16. Do you have much free time on weekdays?
17. What time do you usually go to bed?
18. Do you work? If yes, where?

II. Make the sentence following the correct order.

1. attended, times, I, lectures, three, a week
2. breakfast, in, mother, gets, ready, my, the kitchen
3. to, breakfast, I, after, the, Institute, go
4. the underground, go, by, I, to, the Institute
5. institute, your, far, your, from, is, home?
6. you, do, where, work?
7. do, work, after, you, what, your, do, in the evening?
8. you, to, tomorrow, go, will, the Institute?
9. the evening, I, in, classes, attend
10. shall, we, the Institute, go, not, tomorrow, to
11. last, he, generally, for, year, was, late, the classes
12. did, find, my, not, I, watch, on, the table
13. I, it, under, found, the table
14. to, does, music, my, washes, daughter, every, her, gymnastics, dresses, morning, and, to school, goes

UNIT 3

Grammar

Займенники
Відмінювання дієслів ***to be***, ***to have***
Зворот ***there is*** **(*are*)**
Відмінювання дієслів у Present, Past, Future Simple(Indefinite)

Reading Material

1. Different Types of Memory
2. Computer Graphics
3. Types of Turbines
4. Reciprocating Engine Parts
5. Plastics
6. Principle of Engine Operation

Topics

Our University
My Hobby

Grammar

Займенники

Особові та присвійні займенники

Особові		Присвійні		Зворотні та посилюючі (-ся, себе, сам)
Називний відмінок (хто?)	Об'єктний відмінок (кого? кому?)	I форма (чий? чия?)	II форма (абсолютна)	
I (я)	me (мене, мені)	my (мій)	mine (мій)	myself
You (ти)	you (тебе, тобі)	your (твій)	yours (твій)	yourself
He (він)	him (його, йому)	his (його)	his (його)	himself
She (вона)	her (її, їй)	her (її)	hers (її)	herself
It (воно)	it (його, йому)	its (його)	its (його)	itself
We (ми)	us (нас, нам)	our (наш)	ours (наш)	ourselves
You (ви)	you (вас, вам)	your (ваш)	yours (ваш)	yourselves
They (вони)	them (їх, їм)	their (їх)	theirs (їх)	themselves

E.g. This is my office.
This office is mine.

Вказівні займенники

this → these that → those	цей — ці та — ті

E.g. This man → these men

Неозначені займенники

Займенники ***some*** та ***any*** використовуються для позначення **невизначеної кількості**: *some letters, some people, some sand.*

Some використовується в стверджувальних реченнях, а ***any*** — у питальних та негативних:

Any використовується, як правило, у загальних питаннях (*так — ні*), а в спеціальних питаннях і питаннях-проханнях чи

пропозиціях використовується ***some***: *Do you have* ***any*** *ideas where to go tonight?* (загальне питання); *Where can I get* ***any*** *information on the exhibition?* (спеціальне питання до обставини місця); *Would you add* ***some*** *salt to the salad?* (питання-прохання); *Do you want* ***some*** *more coffee?* (питання-пропозиція).

У стверджувальних реченнях ***any*** означає *будь-який*: ***Any*** *help will be welcome.*

No означає *ніякий, ніякі*: *I have* ***no*** *ticket.* ***No*** *comments.*

Похідні займенники від ***some***, ***any***, ***no*** мають аналогічні значення:

something *— щось;*

somebody = someone *— хтось;*

somewhere *— десь;*

anything *— щось* (у питальних та негативних реченнях); *що-завгодно* (у стверджувальних реченнях);

anybody = anyone *— хтось* (у питальних та негативних реченнях); *хто-завгодно* (у стверджувальних реченнях);

anywhere *— десь* (у питальних та негативних реченнях); *де-завгодно* (у стверджувальних реченнях);

nothing *— ніщо, нічого*;

nobody = no one *— ніхто;*

nowhere *— ніде.*

Кількісні займенники

Займенники ***many, few*** вживаються перед **злічуваними** іменниками у множині, а також замінюють їх, наприклад: *There were many (a lot of) students in the room. She has few books.*

Займенники ***much, little*** вживаються перед **незлічуваними** іменниками, а також замінюють їх, наприклад: *There is much (a lot of) snow on the ground. I have very little time.*

Багато	many (books, students)
	much (snow, time)
	a lot of (books, students, snow, time)

Мало	few (books, students)	декілька	a few (books, students)
	little (snow, time)	трохи	a little (snow, time)

Відмінювання дієслова *to be*

Відмінювання дієслова **to be** (бути) в **Present Indefinite Tense**	
I **am**	I **am not**
He **is**	He **is not**
She **is**	She **is not**
It **is**	It **is not**
We **are**	We **are not**
You **are**	You **are not**
They **are**	They **are not**

Am I?	Yes, I **am**	No, I **am not**
Is he?	Yes, he **is**	No, he **isn't**
Is she?	Yes, she **is**	No, she **isn't**
Is it?	Yes, it **is**	No, it **isn't**
Are we?	Yes, we **are**	No, we **aren't**
Are you?	Yes, you **are**	No, you **aren't**
Are they?	Yes, they **are**	No, they **aren't**

Відмінювання дієслова **to be** (бути) в **Past Indefinite Tense**	
I **was**	I **was not**
He **was**	He **was not**
She **was**	She **was not**
It **was**	It **was not**
We **were**	We **were not**
You **were**	You **were not**
They **were**	They **were not**

Was I?	Yes, I **was**	No, I **wasn't**
Was he?	Yes, he **was**	No, he **wasn't**
Was she?	Yes, she **was**	No, she **wasn't**
Was it?	Yes, it **was**	No, it **wasn't**
Were we?	Yes, we **were**	No,we **weren't**
Were you?	Yes, you **were**	No, you **weren't**
Were they?	Yes, they **were**	No, they **weren't**

Відмінювання дієслова **to be** (бути) в **Future Indefinite Tense**		
I **shall be** He **will be** She **will be** It **will be** We **shall be** You **will be** They **will be**		I **shall not be** He **will not be** She **will not be** It **will not be** We **shall not be** You **will not be** They **will not be**
Shall I **be**? Will he **be**? Will she **be**? Will it **be**? Shall we **be**? Will you **be**? Will they **be**?	Yes, I **shall** Yes, he **will** Yes, she **will** Yes, it **will** Yes, we **shall** Yes, you **will** Yes, they **will**	No, I **shan't** No, he **won't** No, she **won't** No, it **won't** No, we **shan't** No, you **won't** No, they **won't**

Переклад звороту *There + to be*

Форма	Present Simple	Past Simple	Future Simple
Ствер-джувальна	There is a book on the table. There are books on the table. На столі книга (книги).	There was a book on the table. There were books on the table. На столі була книга (книги).	There will be a book (books) on the table. На столі буде книга (книги).
Питальна	Is there a book on the table? Are there books on the table? Чи є книга (книги) на столі?	Was there a book on the table? Were there books on the table? Чи була книга (книги) на столі?	Will there be a book (books) on the table? Чи буде книга (книги) на столі?

Закінчення таблиці

Форма	Present Simple	Past Simple	Future Simple
Заперечна	There is no book on the table. There are no books on the table. На столі немає книги (книг). There isn't a book on the table. There aren't any books on the table.	There was no book on the table. There were no books on the table. На столі не було книги (книг). There wasn't a book on the table. There weren't any books on the table.	There will be no book (books) on the table. На столі не буде книги (книг). There won't be a book on the table. There won't be any books on the table.

Неозначений час (Indefinite Tense)

Present	Past	Future
Vo Vs (he, she, it)	Ved (II ф)	Will (Shall) + Vo
usually always often seldom sometimes	yesterday the day before yesterday some years ago last year	tommorow the day after tomorrow in a day next year soon

Відмінювання дієслова **to work** (працювати) у **Present Indefinite Tense** (дія, яка відбувається звичайно)	
I work	I **do not work**
He **works**	He **does not work**
She **works**	She **does not work**
It **works**	It **does not work**
We **work**	We **do not work**
You **work**	You **do not work**
They **work**	They **do not work**

Закінчення таблиці

Відмінювання дієслова **to work** (працювати) у **Present Indefinite Tense** (дія, яка відбувається звичайно)		
Do I work?	Yes, **I do**	No, **I don't**
Does he **work**?	Yes, he **does**	No, he **doesn't**
Does she **work**?	Yes, she **does**	No, she **doesn't**
Does it **work**	Yes, it **does**	No, it **doesn't**
Do we **work**?	Yes, we **do**	No, we **don't**
Do you **work**?	Yes, you **do**	No, you **don't**
Do they **work**	Yes, they **do**	No, they **don't**

Відмінювання дієслова **to work** (працювати) у **Past Indefinite Tense** ***правильні дієслова*** (дія відбувалася в минулому)	
I **worked**	I **did not work**
He **worked**	He **did not work**
She **worked**	She **did not work**
It **worked**	It **did not work**
We **worked**	We **did not work**,
You **worked**	You **did not work**
They **worked**	They **did not work**
Did I work?	Yes, I **did** No, I **didn't**
Did he work?	Yes, he **did** No, he **didn't**
Did she work?	Yes, she **did** No, she **didn**'t
Did it work?	Yes, it **did** No, it **didn't**
Did we work?	Yes, we **did** No, we **didn't**
Did you work?	Yes, you **did** No, you **didn't**
Did they work?	Yes, they **did** No, they **didn't**

Відмінювання дієслова **to write** (писати) у **Past Indefinite Tense** ***неправильні дієслова*** (дія відбувалася в минулому)	
I **wrote**	I **did not write**
He **wrote**	He **did not write**
She **wrote**	She **did not write**
It **wrote**	It **did not write**

Закінчення таблиці

Відмінювання дієслова **to write** (писати) у **Past Indefinite Tense** ***неправильні дієслова*** (дія відбувалася в минулому)		
We **wrote** You **wrote** They **wrote**	We **did not write** You **did not write** They **did not write**	
Did I **write?** **Did** he **write?** **Did** she **write?** **Did** it **write?**	Yes, I **did** Yes,he **did** Yes, she **did** Yes, it **did**	No, I **didn't** No, he **didn't** No, she **didn't** No, it **didn't**
Did we **write?** **Did** you **write?** **Did** they **write?**	Yes, we **did** Yes, you **did** Yes, they did	No, we **didn't** No, you **didn't** No, they **didn't**

Відмінювання дієслова **to work** (працювати) у **Future Indefinite Tense** (дія відбувається у майбутньому)		
I **shall work** He **will work** She **will work** It **will work**	I **shall not work** He **will not work** She **will not work** It **will not work**	
We **shall work** You **will work** They **will work**	We **shall not work** You **will not work** They **will not work**	
Shall I **work?** **Will** he **work?** **Will** she **work?** **Will** it **work?**	Yes, I **shall** Yes, he **will** Yes, she **will** Yes, it **will**	No, I **shan't** No, he **won't** No, she **won't** No, it **won't**
Shall we **work?** **Will** you **work?** **Will** they **work?**	Yes, we **shall** Yes, you **will** Yes, the **will**	No, we **shan't** No, you **won't** No, they **won't**

Exercises

Exercise 1. Put *some*, *any* or *no*.

1. There are ... pictures in the book. 2. Are there ... new students in your group? 3. There are ... old houses in our street. 4. Are there ... English text-books on the desks? — Yes, there are ... . 5. Are there ... maps on the walls? — No, there are ... . 6. Are there ... pens on the desk? — Yes, there is ... . 7. Are there ... sweets in your bag? — Yes, there are ... . 8. Have you got ... English books at home? — Yes, I have ... . 9. There are ... beautiful pictures in the magazine. Look at them. 10. There is ... ink in my pen: I cannot write. 11. Is there ... paper on your table? 12. I haven't got ... exercise-books. Give me ..., please. 14. It is winter. There are ... leaves on the trees.

Exercise 2. Put *some*, *any* or *no*. Translate the sentences.

1. There are ... schools in this street. 2. Are there ... pictures in your book? 3. There are ... flowers here in winter. 4. I can see children in the yard. They are playing. 5. Are there ... new buildings in your street? 6. There are ... people in the park because it is cold. 7. I saw ... boys in the garden, but Mike was not among them. 8. They brought ... good books from the library. 9. Give me ... tea, please, I am thirsty. 10. Dinner was not yet today, so she gave the children ... bread and butter because they were hungry. 11. Do you want ... milk in your coffee? 12. Have you got ... time to spare? I'd like to ask you ... questions. 13. Is there ... cheese on the plate? 14. There is ... ham on the plate. 15. There is ... tea in the cup: the cup is empty.

Exercise 3. Put *somewhere, anywhere* or *nowhere*.

1. I haven't seen him ... . 2. I know the place is ... about here, but exactly where, I don't know. 3. Did you go ... yesterday? — No, I went ..., I stayed at home the whole day.

Exercise 4. Put *some, any no, every* or their derivatives.

1. Can I have ... milk? — Yes, you can have ... . 2. Will you have ... tea? 3. Give me ... books, please. I have ... to read at home. 4. Put ...

sugar in her tea: she does not like sweet tea. 5. Is ... the matter with you? Has ... offended you? I see by your face that ... has happened. 6. We did not see ... in the hall. 7. ... was present at the lesson yesterday. 8. He is busy. He has ... time to go to the cinema with us. 9. Do you need ... books to prepare for your report? 10. Have you ... questions? Ask me ... you like, I shall try to answer ... question. 11. ... liked that play: it was very dull. 12. If ... is ready, we shall begin our experiment.

Exercise 5. Put *some, any, no, every* or their derivatives.

Can ... see? No, ... people can't see. ... people are blind. Blind people can't see. They can't see ...; they can see ... .

Can ... hear? ? No, ... people can't hear. ... people are deaf. Deaf people can't hear. They can't hear ...; they can hear ... .

Can we see ...? No, we can't see ... . We cannot see the air. ... can see the air.

We can't walk without legs and feet. People without legs and feet can't walk. They can't walk ... . They can walk ... .

Can you see ... in an empty box? No, I can't see ... in an empty box. I can see ... in an empty box. Why not? Because there is ... in an empty box. There isn't ... in an empty box. What is an empty box? An empty box is a box that has ... in it. An empty box is a box without ... in it. An empty room is a room without ... in it.

Exercise 6. Put *some, any, no* or their derivatives.

1. Have you ... relations? — No, I haven't ..., I have ... relations. 2. Has she ... nephews or nieces? — She has ... nephews. 3. She has ... sisters, she has only brothers. 4. Do you know ... about Chinese art? 5. They have ... cousins in Minsk. 6. Have you ... brothers? — No, I haven't ..., I have ... brothers. 7. I have ... good friends. 8. We did not know ... about his problems: he told us ... . 9. Have you got ... interesting books? 10. Have you ... friends in America? 11. He has ... English books in this bookcase. 12. Did you meet ... on your way

to school? 13. Have you got ... pencils in your bag? 14. Do we have ... chalk on the blackboard? 15. How could I know that he was ill? ... told me ... . 16. She has ... mistakes in her test.

Exercise 7. Tell us what pieces of furniture there are in the sitting-room using the words suggested below.

On the floor, opposite the window, on the wall, in the bookcase, in the middle of the room, in the corner of the living-room, in the kitchen, in the bathroom, near the window, on the desk, near the kitchen table.

A carpet, a wardrobe, a mirror, a sofa, two armchairs, a large number of books, a TV set, a dressing-table, six chairs, a lot of things, a bath and shower, four stools, a tape-recorder, a telephone.

Exercise 8. Answer the following questions.

I. 1. What is there in the sitting-room? 2. What is there in the entrance-hall? 3. What is there on the wall? 4. What is there on the floor? 5. What is there in the book-case? 6. What is there in the right-hand corner of the room? 7. What is there in the middle of the room? 8. What is there in the bathroom? 9. What is there in the corner of the sitting-room? 10. What is there opposite the window? 11. What is there in your study?

II. 1. How many rooms are there in your flat? 2. How many armchairs are there in your sitting-room. 3. How many books are there in the bookcase? 4. How many pictures are there on the wall? 5. How many chairs are there around the table? 6. How many taps are there in the bathroom? 7. How many bedside tables are there in the bedroom? 8. How many carpets are there on the floor? 9. How many sideboards are there at the wall?

Exercise 9. Translate the sentences.

1. Is there anything interesting in this journal? — Yes, there is something. 2. There is nothing interesting in this article for me. 3. There

isn't anything interesting in this article for me. 4. Nobody knows anything about this discovery. 5. Anybody will help you if you ask any of us. 6. No problem is so important as this one. 7. There isn't anyone in the lab. 8. We could find your book nowhere.

Exercise 10. Write down some statements with these pairs of words using the constructions *there is, there are*.

1. A telephone — on a small table. 2. Books — on the bookshelves. 3. Food — in the fridge. 4. Furniture — in the sitting-room. 5. Hot and cold water — in the taps.

Exercise 11. Write down the questions you would ask your friend (or your colleague) to get the following answers.

1. Oh, yes, there is a colour TV set in my flat. 2. Yes, there are some books on the desk. 3. Yes, there is a bath and a shower in my bathroom. 4. We have three comfortable rooms in our flat. 5. The dressing-table is in the corner of the bedroom.

Exercise 12. Fill in the blanks with *some, any* or *no*.

1. Are there ... stools in the kitchen? 2. Are there ... bookshelves in the study? 3. There is ... refrigerator in the sitting-room. 4. Are there ... pictures in the text? 5. She has ... typewriter and tape-recorder on the desk.

Exercise 13. Supply prepositions wherever needed in the sentences.

This is my sitting-room. There is a thick carpet ... the floor, a sofa ... the right and 2 armchairs ... a small table. The TV set is ... the left-hand corner ... the room. The side-board is ... the window. The bedroom is not very large. There is a dressing-table ... the corner ... the room. There are 2 beds ... bed-side tables.

And this is my bathroom. There is hot and cold running water ... the taps. The mirror is ... the shelf, the rail for towels is ... the basin.

Exercise 14. Disagree with the following statements using the expressions: *nothing of the kind, I don't think so or I'm afraid you are wrong.*

1. There is a mirror above the shelf. 2. There are some bookshelves in the entrance-hall. 3. There is a standard for hats and umbrellas in the bedroom. 4. There is a large number of books in the kitchen. 5. There are many pictures on the walls of our classrooms.

Exercise 15. Translate paying attention to the italicized words.

1. *That* tube has two anodes and a single cathode. 2. The receivers discussed have been *those* designed for communication work only, but *this* is by no means the only purpose for which receivers are used. 3. A poor conductor has relatively few free electrons so that *these* few must travel around the circuit quite rapidly in order to secure an equally large current. 4. If a voltage differs greatly from *that* shown, the operator should consult his circuit diagram to determine which parts are in *that* circuit and which could possibly cause the trouble. 5. For converting the high-voltage alternating current delivered from the secondary of a power transformer to direct current, such as is required by radio receivers and transmitters, vacuum tube rectifiers are widely used. *These* employ the principle of electrons flowing from cathode to anode only when the anode has a positive charge applied to it.

Exercise 16. Translate the sentences paying attention to the construction *there + to be*.

1. There are many universities and institutes in our country. 2. There is a students' scientific and technical society at our Institute. 3. There are various computers at our computing centre. 4. There were only four departments in our Institute before the World War II. 5. There will be some engineers at the seminar on programming tomorrow. 6. There is a seminar on the History today. 7. There was a lecture on cybernetics yesterday. 8. There were many ways of solving the prob-

lem. 9. There are many complex parts and units in every computer. 10. There will be some new laboratories in our Institute next year.

Exercise 17. Fill in the blanks by the words *few, little, a few, a little.*
1. I couldn't buy the coat because I had ... money left. 2. Let us buy some ice-cream, I have ... money left. 3. ... pupils speak English as well as she does. 4. There were very .. people in the streets. 5. We can't play because we have too ... time. 6. Give me ... apples. 7. They spent ... days in the country and then returned to Kyiv. 8. Ask Ann to help you to translate the text; she knows French ... 9. Mary works hard at her English. She makes ... mistakes in her speech. 10. Can you lend me ... money?

Exercise 18. Change according to the model.
Model: His answer was good. — He answered well.
1. John is a slow eater. 2. Mary's translation of the sentence is correct. 3. My companion was a quick walker. 4. She was a careless cook. 5. His arrival was unexpected. 6. My friend is an excellent dancer. 7. His death was sudden. 8. Her speech at the meeting was wonderful.

Exercise 19. Make up the story concerning your University.
I am a first-year student at ... University. My college is in ... street/highway (шосе) next to the ... Metro station/bus/tram stop. My college is/ is not large. There are lots of/ quite a few lecture halls, rooms for studies and laboratories there. Its research laboratories are/are not provided with the most modern equipment. Serious and significant researches are/ are not conducted by our college scientists. There are very many/some/no well-known scientists working at our college. My special field is ... . As a first-year student I am not doing any research yet but I am planning to take part in the research activities of our department next year/in a year/in the third year. I am going to leave college in ... .

Exercise 20. Complete the sentences according to the model, using *there is, there are*.

a) *Model: Kyiv is a cultural centre, (many theatres, museums) in it.*

Kyiv is a cultural centre, ***there are*** *many theatres, museums in it.*

1. Ukraine is rich in mineral resources, (much iron, coal, oil) in it. 2. I shall go to the library, (no books) in our reading room. 3. Your work was very poor, (many mistakes) in it. 4. Our laboratory is very good, (new devices, modern apparatus) in it. 5. Our city is very beautiful, (parks, gardens) in it. 6. Many years ago our town was very small, (no big houses, cinemas, institutes) in it.

b) *Model: Ask him to come at three, in the hall (a meeting).*

Ask him to come at three, there will be a meeting in the hall.

1. Don't forget to come tomorrow, at 5 o'clock (a very interesting lecture). 2. Carry out this work today, (no time tomorrow) I think. 3. Read the article now, (no time later). 4. Do not come late, (nobody in the laboratory).

Exercise 21. Complete the sentences.

1. There is ... . 2. There are several ... . 3. There is one ... . 4. There are two ... . 5. There are many ... . 6. There is only one ... . 7. There are more than five ... . 8. There is a (an) ... . 9. There are four good ... . 10. There is a big ... .

Exercise 22. Change the sentences using the model.

Model: Give him some more milk, please.

Don't give him any more milk, please.

1. Give him some more milk, please. 2. She made some mistakes in spelling. 3. We learnt some new words in class yesterday. 4. There are some nice flowers in that vase. 5. The doctor gave me some pills to take. 6. We need some more chairs in this room. 7. He bought some beautiful stamps at the post-office. 8. There are some new students there now. 9. I told them about some of my spelling mistakes. 10. There are some good books there.

Exercise 23. Complete the sentences using *some* or *any*. Translate the sentences.

1. The baby is asleep. Please don't make ... noise. 2. There aren't seats available. 3. I tried to borrow ... English books from him, but he said he didn't have ... . 4. Please put ... water in that vase; the flowers are dying. 5. They are having ... trouble with the motor of their new car. 6. He never makes ... mistakes in spelling. 7. There are ... famous museums there but we didn't have to visit ... . 8. The doctor gave me ... medicine for my cough. 9. I never have ... trouble with my radio-set. 10. We need ... butter for breakfast.

Exercise 24. Complete the sentences using *there is, there are*. Translate them.

1. ... someone knocking at the door. 2. ... two large book-cases in his room. 3. ... nobody at home at present. 4. ... a letter parks in this city. 5. ... twelve month in a year. 6. ... an English-speaking student there. 7. ... a new film on at the club tonight.

Exercise 25. Put the verb *to be* in *Present Indefinite*.

1. I ... a pupil. 2. My father ... not a teacher, he ...a scientist. 3. ... your aunt a doctor? — Yes, she ... . 4. ... they at home? — No, they ... not at home, they ...at work. 5. My brother ... a worker. He ... at work. 6. ... you an engineer? — Yes, I ... . 7. ... your sister a typist? — No, she ... not a typist, she ... a student. 8. ... your brother at school? — Yes, he ... . 9. ... your sister at school? — No, she ... not at school. 10. My ... sister ... at home. 11. ... this your watch? — Yes, it ... . 12. She ... an actress. 13. This ... my bag: 14. My uncle ... an office-worker. 15. He ... at work. 16. Helen ... a painter. She has some fine pictures. They ... on the walls.

Exercise 26. Put the verb *to be* in *Present, Past* or *Future Indefinite*.

1. My father ... a teacher. 2. He ... a pupil twenty years ago. 3. I ... a doctor when I grow up. 4. My sister... not ... at home tomorrow.

5. She ... at school tomorrow. 6. ... you ... at home tomorrow? 7 ... your father at work yesterday? 8. My sister ... ill last week. 9. She ... not ill now. 10. Yesterday we .... at the theatre. 11. Where ... your mother now? — She .... in the kitchen. 12. Where ... you yesterday? — I ... at the cinema. 13. When I come home tomorrow, all my family ... at home. 14. ... your little sister in bed now? — Yes, she ... 15. ... you ... at school tomorrow? — Yes I ... .16. When my granny ... young, she ... an actress. 17. Where ... your books now? — They ... in my bag.

Exercise 27. Open the brackets using the verbs in *Present Simple*.

1.My sister (to get) up at eight o'clock. 2. She (to be) a school-girl. She (to go) to school in the afternoon. 3. Jane (to be) fond of sports. She (to do) her morning exercises every day. 4. For breakfast she (to have) two eggs, a sandwich and a cup of tea. 5. After breakfast she (to go) to school. 6. It (to take) him two hours to do his homework. 7. She (to speak) French well. 8. My working day (to begin) at seven o'clock. I (to get) up, (to open) the window and (to do) my morning exercises. It (to take) me fifteen minutes. At half past seven we (to have) breakfast. My father and I (to leave) home at eight o'clock. He (to take) a bus to his factory. My mother (to be) a doctor, she (to leave) home at nine o'clock. In the evening we (to gather) in the living-room. We (to watch) TV and (to talk).

Exercise 28. Rewrite the following text in *Past Indefinite*.

On Monday we have five classes. The first class is Ukrainian. At this lesson we write a dictation and do some exercises. Nick goes to the blackboard. He answers well and gets a "five". Pete does not get a "five" because he does not know his lesson. After the second class I go to the canteen. I eat a sandwich and drink a cup of tea. I do not drink coffee. After the University I do not go home at once. I meet with my groupmates. We go to the cinema and sometimes walk round the park. Then I go home.

Exercise 29. Rewrite the text in *Past Indefinite*.

On Tuesday I get up at half past six. I go to the bathroom and wash my hands and face and clean my teeth. Then I dress, go to the kitchen, and cook breakfast for my family. At half past seven my son gets up and has breakfast. I have breakfast with my son. My son eats a sandwich and drinks a cup of tea. I don't drink tea. I drink coffee. After breakfast my son leaves home for the University. I don't leave home with my son. On Tuesday I don't work in the morning. I work in the afternoon. In the evening I am at home. My husband and my son are at home, too. We rest in the evening. My son watches TV, my husband reads newspapers and I do some work about the house. At about eleven o'clock we go to bed.

Exercise 30. Rewrite the following text in *Past Indefinite*.

Billy wakes up when it is already quite light. He looks at his watch. It is a quarter to seven. Billy jumps out of bed and runs to the bathroom. He has just time to take a cold shower and drink a glass of tea with bread and butter. He is in a hurry to catch the eight o'clock train.

At the railway station he meets three other boys from his group. They all have small backpacks and fishing-rods.

In less than an hour they get off the train at a small station near a wood. They walk very quickly and soon find themselves on the shore of a large lake. The boys spend the whole day there fishing, boating and swimming.

They returned home late at night, tired but happy.

Exercise 31. Open the brackets using the verb in *Present* or *Past Indefinite*.

1. My brother (to wash) his face every morning. 2. Yesterday he (to wash) his face at a quarter past seven. 3. I (not to have) history lessons every day. 4. We (not to rest) yesterday. 5. My brother (not to drink) coffee yesterday. 6. My mother always (to take) a bus to get

to work, but yesterday she (not to take) a bus. Yesterday she (to walk) to her office. 7. You (to talk) to the members of your family every day? — Yes, I .... But yesterday I (not to talk) to them: I (to be) very busy yesterday. 8. You (to come) home at six o'clock yesterday? — No, I ... . Yesterday I (to come) home from school at half past eight. I (to be) very tired. I (to have) dinner with my family. After dinner I (to be) very thirsty. I (to drink) two cups of tea. Then I (to rest). 9. Your sister (to go) to school every day? — Yes, she ... .

Exercise 32. Open the brackets using the verbs in *Present* or *Past Indefinite*.

1. My friend (to know) Spanish very well. 2. Who (to ring) you up an hour ago? 3. He (to live) on the third floor. 4. It (to take) you long to find his house yesterday? 5. When your lessons (to be) over on Monday? 6. I (to have) dinner with my family yesterday. 7. Her friends (to be) ready at five o'clock. 8. One of her brothers (to make) a tour of Europe last summer. 9. Queen Elizabeth II (to be) born in 1926. She (to become) Queen of England in 1952. 10. You always (to get) up at seven o'clock? — No, sometimes I (to get) up at half past seven.

Exercise 33. Open the brackets using the verbs in *Present, Past* or *Future Indefinite*.

1. I (to go) to bed at ten o'clock every day. 2. I (to go) to bed at ten o'clock yesterday. 3. I (to go) to bed at ten o'clock tomorrow. 4. I (not to go) to the cinema every day. 5. I (not to go) to the cinema yesterday. 6. I (not to go) to the cinema tomorrow. 7. You (to watch) TV every day? 8. You (to watch) TV yesterday? 9. You (to watch) TV tomorrow? 10. When you (to leave) home for school every day? 11. When you (to leave) home for school yesterday? 12. When you (to leave) home for school tomorrow? 13. My brother (to go) to work every day. He (to leave) home at a quarter past eight. As the office he (to work) at (to be) near our house, he (to walk) there. He (not

to take) a bus. Yesterday he (not to go) to work. Yesterday he (to get) up at nine o'clock. 14. You (to have) a PT lesson yesterday? No, I ... . 15. What you (to buy) at the shop yesterday? — I (to buy) a book. 16. Yesterday my father (not to read) newspapers because he (to be) very busy. He (to read) newspapers tomorrow.

Exercise 34. Open the brackets using *Present, Past* or *Future Indefinite.*

a) l. It is a well-known fact that we (to train) qualified specialists. 2. Many students (to take part) in research work 3. There (to be) about 100 institutions of higher learning in this country with half a million students. 4. Our country (to have) a large number of higher schools furnished with up-to-date teaching material and equipment, and a highly qualified staff of professors and teachers.

b) 1. Next summer they (to work) on the construction site. 2. Students (to do) practical work in laboratories and workshops. 3. There (to be) a conference in the hall of our Institute in the evening. 4. These young workers (to take) part in the construction of this power station. 5. In modem world radio an TV (to play) an important role as a means of people's political and cultural education 6. We (enter) the Polytechnic Institute next year.

Exercise 35. Translate the sentences and define the tense.

1. The higher school provides the students with theoretical knowledge, but they lack practical skills. 2. During their practice at a plant students use technical facilities. 3. Two years ago he studied at a school. 4. Twice a year they took their examinations. 5. Next year he will enter the University. 6. After graduating he will be a teacher of English.

Exercise 36. Use the necessary form of the verb and translate the sentences.

1. Gagarin's flight (to mark) the beginning of space exploration and thus (to open) a new epoch in human history. 2. Our engineers (to make) an electric car of original construction. 3. The workers (to get)

good results when the methods of their work (to improve). 4. Women (to make) a great contribution to education and scientific progress. 5. Three years ago he (to graduate) from the Polytechnic Institute and (to begin) to work. 6. An automatic lunar self-propelled vehicle, remote-controlled from the Earth (to place) on the Moon for the first time in history of cosmonautics, and (to start) research work there. 7. The direct study of lunar surface (to begin) with Moon landing by automatic space stations.

Exercise 37. Translate the sentences.

1. Democratization opens up the way to spiritual emancipation and awakens the public thinking. 2. The new school reform will bring some changes in the system of education. 3. Its purpose is to improve the quality of teaching and to prepare the growing generation for independent life and work in the conditions of rapid social, economic, scientific and technological progress of our society. 4. Computers are widely used in teaching process. 5. The coming academic year will be especially full and interesting for students and teachers.

Exercise 38. Open the brackets using *Present, Past* or *Future Indefinite* and translate the sentences.

Jack (live) in the hostel. He (get) up at eight o'clock in the morning. He (go) to classes at nine o'clock. In the afternoon he (study) in the library. He (do) his homework in the evening. He (go) to the cinema on Saturdays. He (have) many friends and (go) to visit them on Sundays.

Pete (not live) in the hostel, he (live) with his parents. He (not go) to the Institute on Tuesdays and Thursdays. On those days he (go) to the laboratory and (work) there till six o'clock. He seldom (go) to the cinema but he (like) concerts. He (listen) to music over the radio at night.

Exercise 39. Change *Present Indefinite* into *Past Indefinite*.

1. They walk through this park every day. 2. She drinks tea with all her meals. 3. We usually come to the Institute by bus. 4. He always

talks to us in English. 5. John and Nick are good friends. 6. Jimmy has many friends in this town. 7. Fanny reads the newspaper every evening. 8. My brother smokes very much. 9. Our teacher of English asks us many questions. 10. The weather is fine.

Exercise 40. Open the brackets.

1. He (have, has) many friends in our group. 2. I (come, comes) to the Institute by bus. 3. There (is, are) seven days in a week. 4. This is (a, an) difficult exercise. 5. There (is, are) nobody there. 6. (That, those) magazines belong to me. 7. Mr. Smith (teach, teaches) English. 8. I spend (a, an) hour on my homework every day. 9. You and George (is, are) good friends. 10. Julia (haven't, hasn't) a fountain-pen.

Exercise 41. Use the verb *to be* in *Past Indefinite*.

1. They ... absent from the institute on Friday. 2. We ... busy all day yesterday. 3. Yesterday the weather ... very cold. 4. All the exercises in the last lesson ... easy. 5. My English teacher ... not satisfied with my answer. 6. Last month you ... ill. 7. I ... very tired when I came home yesterday. 8. Max ... pleased to receive the first prize. 9. She ... afraid to go through the woods alone. 10. Peter and Leo ... at home when I called on them the other day.

Exercise 42. Use the verb *to be* in the necessary form.

1. This ... a very interesting magazine. 2. Mr. Smith ... a teacher of English. 3. Helen and Mary ... good students. 4. Today ...Wednesday, isn't it? 5. I ... very busy today. 6. You ... a student, aren't you? 7. They ... not sisters, ... they? 8. Why ... the window open? 9. You and Henry ... brothers, aren't you? 10. He ... our best athlete, isn't he?

Exercise 43. Fill in the blanks with the verbs in brackets using the right tense form.

1. Jack ... late yesterday and ... not time for breakfast. (get up, have) 2. We ... in Kharkiv during our last holidays and ... not ... anywhere.

(stay, go) 3. They ... to help Nick with his studies. (try) 4. I ... to the boy but he ... not ... me. (speak, recognize) 5. ... your sister ... from Lviv University two years ago? (graduate) 6. When ... you ... the subject of your report? (choose) 7. The engineer ... a serious experiment and ... significant results last year. (conduct, get) 8. The sportsmen ... that they ... happy to return home. (to say, to be)

Exercise 44. Use the verb in brackets in the right tense form.

1. Tom ... very busy tomorrow especially in the afternoon. (be) 2. What time ... the girls ... shopping? (do) 3. I ... not ... a plane, I ... by train. (take, go) 4. What kind of transport ... you ...? (use) 5. We haven't got enough paper. When ... she ... any? (buy) 6. It ... about three hours to get there. (take) 7. ... you ... Warsaw next summer? Yes, we ... Warsaw and Riga as well. (visit)

Exercise 45. Give answers according to the model.

Model: Is your sister at home? (this afternoon) — No, but she will be at home this afternoon.

1. Is father very busy now? (in half an hour) 2. Has your friend come yet? (soon) 3. Did you see Nelly yesterday? (in a week) 4. Do you know the number of this train? (in some minutes) 5. Have you bought a suitcase for this trip yet? (the day after tomorrow) 6. Did they take the exam on Saturday? (next Monday) 7. Have you shown your guest round the city? (tomorrow)

Exercise 46. Define the tense of the verb and translate the sentences.

1. According to the atomic theory this means that the number of atoms of carbon in combination with the same number of atoms of oxygen is two times as great in carbon monoxide as in carbon dioxide. 2. The velocity of a reaction means the amount of the material which undergoes change in a unit of time. 3. The heterogeneity of substance may be shown by different means. 4. Fractional distillation is used extensively in chemical industry as a means of separating and purify-

ing many products. 5. The average distance through which a molecule moves between collisions is called the mean free path. 6. The kinetic theory makes it possible to calculate the mean velocity of molecules.

Exercise 47. Define the tense of the verb and translate the sentences.
1. He carries on his research work in the laboratory of analytical chemistry. 2. Last year a great number of young people graduated from Institutes. 3. They had a very interesting lecture on chemistry yesterday. 4. He will take his exams at the end of May. 5. D. I. Mendeleyev devoted all life to chemistry. 6. Our meetings usually take place on Mondays. 7. Oxford and Cambridge are two great Universities in England. 8. Women couldn't enter these Universities till the end of the 19-th century.

Exercise 48. Open the brackets and translate the sentences.
1. Last year he (to deal with) quantitative analysis. 2. Every day she (to attend) lectures on chemistry. 3. Two years ago he (to study) the problems of the crystal structure. 4. Yesterday they (not work) in the laboratory as there was no electricity. 5. He (to pass) his exams well, and now he (to rest). 6. They (to get) good results, which helped them in their work. 7. Many students (to graduate from) the Institute last year. 8. When they (to heat) water to 100 °C it (to begin) to boil. 9. She (not take part) in this research work as she (to be ill) at that time. 10. Next year he (to graduate) from the Institute and (to leave) Kharkiv for his native town. 11. She (to work) in the field of nuclear physics next year. 12. They (to use) this new device in their work soon.

Exercise 49. Complete the sentences and translate them.
1. The students come to the Institute at 9 but last year they ... at half past nine. 2. She carries out experiments herself but some time ago she ... them under the teacher's supervision. 3. He works at the Research Institute but two years ago he ... at the plant. 4. They speak English rather well but last year they ... poorly.

Exercise 50. Open the brackets and translate the sentences.

1. This scientist (work, works, doesn't work) in the field of organic chemistry, he deals with organic compounds. 2. He (take, doesn't take, will take) part in this work as he has no time. 3. Last year she (uses, used, will use) a new method in her work. 4. He (attends, attend, doesn't attend) lectures on Sundays. 5. In three days they (did not carry out, will carry out, do not carry out) this interesting work.

Reading Material

Text 1
DIFFERENT TYPES OF MEMORY

How does memory work? No one — but no one — is sure. It is that simple.

What makes memory so hard to understand is the seeming caprice with which it operates. Sometimes our recollections are vivid and sharp, sometimes they are blurred and murky. Sometimes we recall things in great sweeping overviews; sometimes we remember only minutiae.

Research now indicates that the way information is stored depends upon the way it was learned in the first place. Short-term memory (STM), our simplest memory-storage receptacle, serves as a kind of holding pen for data we may or may not want to retain.

Generally, the capacity of STM is limited to seven or eight chunks of information. These can range in Complexity from a single digit to an elaborate sentence of thought. STM capacity can thus be enhanced by consolidating many individual bits of information into fewer, meaningful units. For example, it is difficult to memorize at first glance a string of 12 digits, such as 1,8,6,5,1,4,9,2,1,9,6,9. But the task becomes far easier if we recognize that the first four digits represent the year the Civil War ended, the next four the year Columbus discovered America and the last four the year men first landed on the moon. Twelve bits of data are thus compressed into three.

Unlike STM, long-term memory (LTM) has a comparatively limitless capacity and duration. In order for information to make the leap from STM to LTM, it must have some significance or association. Hence, a random licence plate or a random car might be observed and quickly forgotten. But if the same car is screeching away from a robbery and the observer jots down the number to give to the police, chances are that those six or seven digits will be remembered for a lifetime.

Special expertise also facilitates memory. The layman examining a photo of two football teams in play might labor long and hard to memorize the exact location of each player. A quarterback, however, might glance at each picture, recognize the play and instantly memorize each athlete's position.

Recall is also influenced whether information is memorize in linear, beginning-to-end, fashion or all at once. Pictures, for example, are generally absorbed in a single swallow, so we can recall the entirety of some paintings or photos all at once. On the other hand, we probably learn a song or poem in tidy, start-to-finish order. Hence, if we try to remember a lyric from the middle of a time, we find ourselves rapidly reviewing the song from its opening bars, sort of singing our way to the words we are looking for.

Although observing the function of memory is easy enough, explaining its physiology is not. Just what goes on in the brain when we process a thought? Here opinions diverge. Some suggest that the structure of a nerve pathway changes when data are preserved, forming a neural road map of a thought. Others think the brain works holographically, each new piece of information being stored in all areas of the brain.

The study of the physiology of memory is in its infancy, and researchers must thus still rely on analogy, on terms like *storage* and retrieval, to explain how we remember. But even a rudimentary understanding is better than none at all, and science is now providing at least that much insight — a significant stride in a field of study that has mystified so many for so long.

Завдання до тексту

I. Дайте відповідь на запитання.

1. How does memory work?
2. What types of memory do you know?
3. What is the function of memory?
4. What goes on in the brain when we process a thought?

II. Прокоментуйте всі випадки вживання закінчення *-s*.

III. Знайдіть слова, що були утворені за допомогою суфіксації та словоскладання.

Text 2
COMPUTER GRAPHICS

Computer graphics are pictures and films created using computers. Usually, the term refers to computer-generated image data created with the help of specialized graphical hardware and software. It is a vast and recently developed area of computer science. The phrase was coined in 1960, by computer graphics researchers Verne Hudson and William Fetter of Boeing. It is often abbreviated as CG.

The term computer graphics has been used in a broad sense to describe "almost everything on computers that is not text or sound". Typically, the term *computer graphics* refers to several different things:

- the representation and manipulation of image data by a computer
- the various technologies used to create and manipulate images
- the subfield of computer science which studies methods for digitally synthesizing and manipulating visual content, see study of computer graphics

Today, computer graphics is widespread. Such imagery is found in and on television, newspapers, weather reports, and in a variety of medical investigations and surgical procedures. A well-constructed graph can present complex statistics in a form that is easier to understand and interpret. In the media "such graphs are used to illustrate papers, reports, theses", and other presentation material.

Many tools have been developed to visualize data. Computer generated imagery can be categorized into several different types: two dimensional (2D), three dimensional (3D), and animated graphics. As technology has improved, 3D computer graphics have become more common, but 2D computer graphics are still widely used. Computer graphics has emerged as a sub-field of computer science which studies methods for digitally synthesizing and manipulating visual content. Over the past decade, other specialized fields have been developed like information visualization, and scientific visualization more concerned with "the visualization of three dimensional phenomena (architectural, meteorological, medical, biological, etc.), where the emphasis is on realistic renderings of volumes, surfaces, illumination sources, and so forth, perhaps with a dynamic component".

Завдання до тексту

I. Дайте відповідь на запитання.

1. Who invented the term computer graphics?
2. What does the term computer graphics refer to?
3. What new specialized fields of computer graphics have been developed lately?

II. Знайдіть у тексті усі випадки суфіксації та словоскладання.

III. Знайдіть всі випадки множини в останньому абзаці.

Text 3
TYPES OF TURBINES

High-pressure condensing turbines, built in the largest sizes for power-plant use, and of the highest efficiency, are supplied with steam of high pressure and temperature and small volume and exhaust it at very low pressure and large volume. This great increase in steam volume calls for short blades at the high-pressure end and very long ones at the low-pressure end.

High-pressure noncondensing turbines are used where water for condensing purposes is unavailable or where all the exhaust steam at atmospheric pressure can be used for factory processing or for heating.

The steam volume at exhaust is moderate. These turbines are built in small or moderate sizes only.

Back-pressure turbines are used to furnish large quantities of steam at affixed pressure for industrial purposes, generating as a by-product power which is dependent in amount on the demand for heating steam. They must operate in parallel with another power source which will make up the total amount needed.

Superposed or Topping Turbines. Another use of high-pressure noncondensing turbines is for superposition on turbine installations of moderate pressure. For example, an existing plant using steam at 400 lb. and 750 °F. and having a 29-in. vacuum might be furnished with a new boiler equipment supplying steam at 1,250 lb. and 950 °F. The new high back-pressure unit would exhaust steam into the old turbines at a back pressure which would vary with the load but would be kept safe for the old units.

Mixed-pressure turbines are supplied with steam not only from a high-pressure source but also with low-pressure or exhaust steam, generally from another engine or turbine. The low-pressure steam enters and joins with the high-pressure steam after the latter has passed a number of rows of blades and has expanded down to the pressure at which the low-pressure steam is ordinarily received. Generally the low-pressure steam is expected to furnish most of the energy, the controlling system supplying steam from the high-pressure source to the high-pressure end only when the load requirements are greater than can be met by the low-pressure steam alone.

Завдання до тексту

I. Закінчіть речення.

1. High-pressure condensing turbines are used...
2. High-pressure noncondensing turbines are built in...
3. Back-pressure turbines operate in...
4. Superposed turbines are applied...
5. Mixed-pressure turbines are supplied...

II. Прочитайте словосполучення та перекладіть їх українською мовою.

efficiency; fixed pressure; installations; exhaust steam; to furnish; rows of blades; to expand.

III. Складіть план тексту.

Text 4
RECIPROCATING ENGINE PARTS

The internal combustion engine has reciprocating parts: pistons, rings, valves and connecting rods. These parts cause engine vibration.

The piston moves up and down within the cylinder. The piston head receives the force from the combustion of fuel within the cylinder and transmits it to the piston pin, connecting rod and crankshaft.

The piston has four rings. Three rings are at the head of the piston and provide good compression. One ring is at the bottom of the piston. It controls the cylinder lubrication. The piston rings absorb heat from the piston and transmit it to the cylinder.

The engine has valves. They are intake valves and exhaust valves. Intake valves allow the fuel to enter the combustion chamber. Exhaust valves allow the gases to pass from the combustion chamber. So the valves open and close the combustion chamber where the burning of fuel takes place. A camshaft opens each valve.

The connecting rod links the pistons and the crankshaft. It changes the reciprocating motion of pistons into the rotary motion of the crankshaft.

Pistons, rings, valves, connecting rods are reciprocating engine parts.

The piston moves within the cylinder and transmits the forces of the expanding gases to the piston pin, connecting rod and crankshaft.

Piston rings control the wall lubrication and absorb heat from the piston.

The engine valves are of two types: intake valves and exhaust valves. The valves open and close the combustion chamber. When

the intake valve opens the fuel mixture enters the combustion chamber. Through the exhaust valves the burned gases pass into the exhaust system. The connecting rod links the piston and the crankshaft.

Additional engine parts are components of four separate systems: electrical, fuel, lubricating and cooling.

The electrical system of the engines has a storage battery or a magneto. Magneto provides high voltage and transmits it to the spark plugs for the ignition. Spark plugs ignite the fuel mixture in me combustion chamber.

The engine has a fuel system. The fuel system of the diesel engine has a pump. This pump forces the fuel through injectors into the combustion chamber where the burning of fuel takes place. The gasoline engine has no pump, it has a carburettor. The carburettor mixes the fuel and air and transmits this mixture to the combustion chamber.

The engines have oil pumps. These pumps provide engine lubrication. The oil pumps are of three types. Oil filters are between the pump and other engine parts. The oil filters reduce engine wear.

Cooling systems are of two types: thermosiphon and pump. They use water for the engine cooling.

Завдання до тексту

I. Прочитайте текст та дайте відповідь на запитання.

1. What reciprocating parts does the internal combustion engine have?
2. How does the piston work?
3. How many rings does the piston have?
4. What valves does the engine have?
5. What is the function of intake valves?
6. What is the function of exhaust valves?
7. What is the function of the connecting rod?
8. Where does the piston move?
9. What do piston rings control?
10. What are the two types of the engine valves?

11. What does the electrical system of the engines have?
12. What is the function of a carburettor?

II. Продовжіть речення.

1. The internal combustion engine has reciprocating parts: ...
2. The piston head receives ...
3. The piston has ...
4. Three rings are ...
5. One ring is ...
6. Intake valves allow ...
7. Exhaust valves allow ...
8. A camshaft opens ...
9. The connecting rod links ...

III. Перекладіть англійською мовою.

Спалювати паливо; колінчастий вал; кулачковий вал; відкривати клапан; масло; головка поршня; частина, деталь; поршневий палець; вібрація; шатун; впускний клапан; випускний клапан; обертальний рух.

Text 5
PLASTICS

Plastics are organic substances. They are made synthetically by polymerization, and capable of being formed into an almost endless variety of products, e.g. threads, sheets, tubes, and moulded objects.

The ancestor of modern synthetic plastics is celluloid. Celluloid has certain disadvantages — its flammability and the fact that it is not readily moulded. Thus it was not until the discovery of bakelite in 1907 that the real foundation of the synthetic plastics industry was laid.

Plastics that consist of long-chain molecules can be softened by heat and moulded into a desired shape. These plastics are called thermoplastic. Plastics in which the polymer chains are cross-linked have much greater rigidity and cannot be softened. They are called thermosetting. The terms thermoplastic and thermosetting are also applied to the resins from which plastics are made.

The principal agent incorporated in a plastic is the resin. The resin may be natural, like cellulose, but it is most generally synthetic.

The resin is also known as a binder. Substances added to the plastic to enhance certain properties, e.g. hardness, resistance to shock, or resistance to abrasion, are called fillers. Examples are asbestos, glass fibres, and wood flour. Plasticizers are also included in the formulation. Antioxidants may be added to promote chemical stability and thus prolong life.

Catalysts are added to assist the final cure (final formation of the product), and stabilizers to protect against sunlight, heat, and other destructive factors.

The procedure used to shape a plastic into its final form depends on the properties of the plastic. Some plastics can be injection moulded. Other plastics must be compression moulded — after they are filled into the mould they are subjected to pressure. Some plastics are simply cast into their final shape.

Завдання до тексту

I. Дайте відповідь на запитанння.

1. What are plastics?
2. What are the disadvantages of celluloid?
3. When was bakelite discovered?
4. What plastics can be softened by heat?
5. How are these plastics called?
6. What is the principal agent incorporated in plastic?
7. Could you give some examples of fillers?
8. What is the main function of antioxidants?
9. What substances are added to assist the final formation of the product?
10. In what cases are srabilizers added to the formation?
11. What does the procedure used to shape a plastic into its final form depend on?

II. Перекладіть англійською мовою словосполучення.

Промисловість синтетичних пластмас; молекула з довгим ланцюгом; ланцюг з поперечним зв'язком; скловолокно; борошно з деревини; технологічний процес; деструктивні фактори; можуть формуватися методом лиття під тиском; повинні формуватися у формах; основна речовина; термопластичний; термореактивний; сполучна речовина.

III. Продовжіть речення.

1. Celluloid has certain disadvantages ...
2. Plastics in which the polymer chains are cross-linked have ...
3. Catalysts are added to ...
4. Antioxidants may be added to ...

Text 6
PRINCIPLES OF ENGINE OPERATION

Engines operate on cycles. There are four strokes of the piston in one cycle of engine operation. There are two outward strokes toward the crankshaft and two inward strokes away from the crankshaft.

When the piston is at the end of the stroke away from the crankshaft (inward stroke) this is top dead centre (TDC). When the piston is at the end of the outward stroke (toward the crankshaft) this, is bottom dead centre (BDC). The piston movement from TDC to BDC is an engine stroke.

The four strokes in a cycle of the internal combustion engine are: intake, compression, power and exhaust.

Intake. During the intake stroke the piston moves to BDC and the intake valve opens. This movement of the piston draws a mixture of air and fuel into the cylinder (in a diesel this movement of the piston draws in air only).

Compression. When the piston reaches BDC it moves toward the cylinder head (inward motion). The valves do not open and the piston compresses the fuel mixture between the piston and the cylinder head (in a diesel the piston compresses air only).

Power. When the piston reaches TDC, an electric spark ignites the fuel mixture in the combustion chamber of the gasoline engine (in a diesel engine the heat of the highly compressed air ignites the fuel).

When the air-fuel mixture burns it moves the piston with great force.

There are higher pressures in the diesel engines arid because of these pressures the diesel engines have heavier piston pins, connecting rods and crankshafts than the gasoline engines.

Exhaust. The exhaust stroke takes place when the piston moves up. The exhaust, valve opens and the piston forces out the gases. The new cycle will begin in the cylinder.

Because of the four strokes we call this engine a four-stroke-cycle engine. The four-stroke-cycle engine with spark ignition is the most common type of the internal combustion engine.

Завдання до тексту

I. Перекладіть англійською мовою речення.

1. Є два зовнішніх хода в напрямку колінчастого вала і два внутрішніх хода від колінчастого вала.
2. Чотири такти в циклі двигуна внутрішнього згоряння: впуск, стиснення, робочій хід і вихлоп.
3. У дизельних двигунах більш високий тиск, і через це дизельні двигуни мають більш важкі поршневі пальці, шатуни та колінчаті вали, ніж бензинові двигуни.
4. Випускний клапан відкривається, і поршень виштовхує гази.

II. Знайдіть усі випадки використання ступенів порівняння прикметників.

III. Перекладіть українською мовою речення зі зворотом *there+be*.

IV. Сладіть 1 спеціальне запитання до кожного абзацу тексту та дайте на нього відповідь.

Topics

OUR UNIVERSITY

On the 11th of September 2000 (twenty hundred) our Institute was given the name of National Technical University "Kharkiv Polytechnical Institute". The status of "National" is a recognition of our Institute contribution to the development of national higher education, science and economy.

NTU "KPI" is one of the leading higher educational institutions of Ukraine. It's also one of the largest and oldest in our city and our country. The Institute was founded in 1885 and was called the Technological Institute. It had only 2 departments (mechanical and chemical) with 280 students. Its first director was V. L. Kirpichov — an outstanding scientist in the field of mechanics.

At present more than 1,300 academic staff including 70 professors and about 700 associate professors are involved in training and scientific research. About 20 thousand students and 320 postgraduates are trained at 67 specialities (at day-time and extramural departments). During its glorious history our Polytechnic has trained nearly 130,000 (one hundred and thirty thousand) specialists.

Scientific schools of our university are well-known all over Ukraine and the world.

The independence has allowed Ukraine to widen cooperation with foreign countries. Some University departments cooperate with Germany, Hungary, Austria, France and America in various fields of modern technology and business.

I. Put questions to the sentences.

1. On the 11th of September 2000 our Institute was given the name of National Technical University "Kharkiv Polytechnical Institute".
2. The Institute was founded in 1885.
3. It had only two departments.

4. About 20 thousand students and 320 postgraduates are trained at day-time and extramural departments.
5. Some University departments cooperate with Germany, Hungary, Austria, France and America in various fields of modern technology and business.

MY HOBBY

Every person has a favorite occupation, something that he is really interested in, something that let him express himself. I don't mean work — though it also can be exciting. I'm speaking about a hobby.

Some people who really enjoy their work say: my hobby is my work. But how can a regular occupation, something that you have to do, be a hobby? For me hobby means my favourite activity that I like doing in my spare time. It helps me to relax and forget about my problems.

Hobbies are variable as people themselves. Fishing, knitting, painting, photography, racing, scuba diving — all these activities can be hobbies (if they are not person' constant job). But we mostly associate a hobby with collecting things.

People usually choose an object for collecting depending on many reasons. Rich people collect cars and houses. Those who travel a lot can collect things from different countries: coins, national clothes or souvenirs. If all your friends collect stamps or badges, you'll more likely collect the same things: so your friends will for certain appreciate the true value of a rare stamps or a postcard; besides, you'll be able to exchange stamps.

In the twentieth century a new hobby appeared in the life of the people — both teenagers and adults. I mean Internet. Just not long ago only some people knew what it was, and very few people computers in our homes, at schools, at our parents' offices, there are computer centres and Internet cafes all over the city. So, everyone can join the international computer net and travel in a virtual world,

where it's possible to find anything that exists in real life, and even more. The difference is that you do the things that in real life need mobility — visit new places, meet new people, attend language classes, do shopping — you travel in space without a step out of your computer!

Of course virtual life won't replace us real life, and we'll for sure relax not only at computer monitors, but also doing real thing: real fishing, knitting, painting, photography, racing and scuba diving.

I. Answer tha questions.

1. What is a hobby?
2. What hobbies exist?
3. How do people usually choose an object for collecting?
4. What a new hobby has appeared in the life of the people for the last years?
5. What does hobby means for you?
6. Do you have a hobby? What is it?

UNIT 4

Grammar

Тривалий час (Continuous Tense)
Перфектний час (Perfect Tense)
Перфектно-тривалий час (Perfect Continuous Tense)
Пасивний стан (Passive Voice)

Reading Material

1. Vapour Pressure
2. Modern Plastics Industry
3. Types of Electric Current
4. Molecules
5. Properties of Fats and Oils
6. Modern Sources of Power Engineering
7. General Characteristics of Gas Turbines
8. Operation Principles of Diesel Engine
9. Two General Classes of Hydraulic Turbines
10. Types of Thermometers
11. British Thermal Unit
12. Properties of Subatomic Particles
13. Three Types of Atomic Power Plants
14. Phenomenon of Electromagnetism
15. Hydraulic and Pneumatic Servovalves

Topics

Ukraine
Education in Ukraine

Grammar

Тривалий час (Continuous Tense)

be + Participle I (V_{ing})

Present	Past	Future
am is V_{ing} are	was V_{ing} were	will be V_{ing} (shall)
now right now at this moment	from ... till, at ..., for, when he came, when she comes	

Часи групи **Continuous** виражають тривалу дію (процес), що відбувається, відбувалася або буде відбуватися в певний момент або період у теперішньому, минулому або майбутньому.

Запам'ятайте!

Деякі дієслова не вживаються у тривалому часі:

like	see	know	want	remember	suppose
love	hear	realize	need	forget	seem
hate	belong	believe	prefer	understand	mean

Вживання **always** у теперішньому тривалому часі (Present Continuous) надає реченню емоціонального колориту (іронія, схвалення та ін.).

He is **always** (constantly) laughing at everything.
Він завжди посміхається над усім.

Перфектний час (Perfect Tense)

have + Participle II (V — ed / III форма дієслова) **PII = V_3**

Present	Past	Future
Have (has) + P II	***had + P II***	***will (shall) have + P II***
ever, never, just, already, lately, recently, since, for ages, yet, today, this week (month, year)	before(when, after) he came by (3 o'clock)	before she comes by (3 o'clock)

Часи перфектної групи дієслів виражають дію, яка закінчилась до певного_моменту в теперішньому, минулому або майбутньому часі; виражають результат дії.

Перфектно-тривалий час (Perfect Continuous Tense)

have + been + Participle I (V ing)

Present	Past	Future
have (has) been + V ing	***had been + V ing***	***will (shall) have been + V ing***
for, since, all (my) life, how long...?		

Перфектно-тривалий час вживається для вираження дії, що почалася в минулому і тривала до теперішнього, минулого або майбутнього моменту мови, включаючи його.

Запам'ятайте!

З дієсловами, що не мають форми **Continuous**, замість **Perfect Continuous** вживаються відповідні форми **Perfect**.

We won't have seen him before he arrives to Kharkiv.
Ми не побачимо його, аж поки він не приїде до Харкова.

Пасивний стан
(Passive Voice)

Simple	Continuous	Perfect
be + Participle II	***be + being + Participle II***	***have + been + Participle II***
am is are + V_3	am (is, are) being + V_3	have (has) been + V_3
was (were) + V_3	was (were) being + V_3	had been + V_3
will (shall) be + V_3	—	will (shall) have + been + V_3

Особливості перекладу конструкцій пасивного стану

1.

It + be + V_3

Пасивний зворот з формальним підметом ***it*** перекладається неозначено-особовим реченням.

It is known that the atom consists of three particles.
Відомо, що атом складається з трьох часток.

It is said that his opinion may be relied on.
Говорять, що на його думку можна покладатися.

2.

I (мене, мені) she (її, їй) he (його, йому) we (нас, нам) you (тебе, тобі) they (їх, їм)	**+ be + V_3**

I was shown a new electric device.
Мені показали новий електричний прилад.

I was invited to the birthday party.
Мене запросили на день народження.

3.

S + P (be + V_3) + прийменник

Переклад починається з відповідного українського прийменника

to deal with	мати справу з
to depend on	покладатися на
to laugh at	сміятися над
to look at	дивитися на
to speak about	говорити про
to pay attention to	звертати увагу на
to refer to	посилатися на
to rely on	покладатися на
to speak to smb about smth	говорити з (кимось) про (щось)
to send for	посилати за
to work on	працювати над
to wait for	чекати на

Запам'ятайте!

answer	відповідати на
affect	діяти на, впливати на
follow	іти за
influence	впливати на

Tsiolkovsky's works are often referred to.
На праці Ціолковського часто посилаються.
The gamma rays are not affected by a magnetic field.
На гамма-промені не діє магнітне поле.

Exercises

Exercise 1. Open the brackets using the verbs in *Present* or *Past Continuous, Present* or *Past Simple*.

1. Nina (to celebrate) her birthday yesterday. Her room looked beautiful, there (to be) many flowers in it. When I (to come) in, somebody

(to play) the piano, two or three pairs (to dance). 2. Listen! Somebody (to play) the piano. 3. I (to like) music very much. 4. When I (to look) out of the window, it (to rain) heavily and people (to hurry) along the streets. 5. What you (to do) at seven o'clock yesterday? — I (to have) supper. 6. When I (to come) home yesterday, I (to see) that all my family (to sit) around the table. Father (to read) a letter from my uncle who (to live) in Kyiv. 7. Where you (to be) yesterday? — I (to be) at home the whole day. — How strange. I (to ring) you up at two o'clock, but nobody (to answer). — Oh, I (to be) in the garden. I (to read) your book and (not to hear) the telephone. 8. What you (to do) at five o'clock yesterday? — I (to work) in the library. — I (to be) there, too, but I (not to see) you. 9. Yesterday I (to work) at my English from five till seven. 10. It (to rain) the whole day yesterday. 11. Where your sister (to be) now? — She (to be) in her room. She (to do) her homework.

Exercise 2. Open the brackets using the verb in *Past Simple* or *Past Continuous*.

1. When I (to ring) up my friend, he (to sleep). 2. When grandfather (to watch) TV, he (to fall) asleep. 3. When my friend (to come) to see me, I (to do) my homework. 4. When I (to go) to the stadium, I (to meet) Kate and Ann. 5. When Nick (to ring) me up yesterday, I (to help) his mother. 6. When the children (to walk) through the wood, they (to see) a fox. 7. When I (to come) home, my sister (to wash) the floor. 8. When Mike (to play) in the yard, he (to find) a ball. 9. When I (to draw) yesterday, I (to break) two pencils. 10. When I (to meet) Tom, he (to go) to the shop. 11. When I (to look) out of the window, the children (to play) hide-and-seek. 12. I (to go) to the theatre yesterday. 13. At seven o'clock yesterday I (to go) to the theatre. 14. What you (to do) at 5 o'clock yesterday? — I (to play) the piano. 15. When I (to come) to school, the children (to stand) near the classroom. 16. We (to play) in the yard the whole evening yesterday. 17. When I (to prepare) breakfast in the morning,

I (to cut) my finger. 18. Last year I (to go) to the United States. 19. You (to go) to Great Britain last year? — No, I (to go) to France. 20. What you (to do) yesterday? — I (to translate) a very long article.

Exercise 3. Translate the following sentences paying attention to the use of *Indefinite, Continuous, Perfect Tenses in the Active Voice*.

1. My friend studies at the department of Electrical Engineering. I study at the same department. We do research. Comrade Ivanov also does his research. 2. We discussed various problems at the seminar. 3. They did many operations on the computer ES-1045. 4. Yesterday we went to the Institute library. 5. I answered all the questions at the exam in mathematics. 6. We will solve this algebraic problem. 7. They will do their work in time. 8. I will compare my results with yours. 9. When you came he was calculating his problem. 10. She was discussing some questions with her instructor. 11. I will be waiting for you at 6 o'clock. 12. He has given a short answer to my question. 13. I have just come from France. 14. They have already gone home. 15. They had written the program for the computer by June.

Exercise 4. Choose the necessary adverbs of time and put them into the necessary place.

1. She has graduated from a medical college (two years ago, already). 2. Interesting and significant researches have been conducted in our research laboratory (at that time, since 1999). 3. They have improved their equipment (last year, just). 4. Our laboratory was provided with modern research equipment (a year ago, just). 5. A great number of new research laboratories have been constructed in our country (ten years ago, since 1970).

Exercise 5. In the following sentences supply *yet* or *already*, whichever is correct.

1. Dan has … bought the tickets for the game. 2. Our figure skaters have … been to Finland twice. 3. But they haven't visited Sweden ....

4. Has the Marathon race begun ... ? 5. The contestants have … left for the airport. 6. The football fans have ... taken their seats. 7. I've not used my new skates.... 8. She's not rooted for a single team … . 9. We've not translated this text … .

Exercise 6. Place the indicated adverb in its proper position in the sentence.

1. Bill's been a very careful hammer-thrower (usually). 2. Art takes part in cross-country skiing races (often). 3. My elder brother Gregory played with us. (seldom). 4. Elizabeth plays the piano (well). 5. Charles has been a football fan (never). 6. She is late for our meetings (always). 7. Have they spoken to you about their plans? (ever). 8. Does she fail to prepare her homework? (sometimes). 9. Does she prepare her homework? (generally). 10. Have you spoken to him about breaking a record? (ever). 11. Do you train in this gymnasium? (usually).

Exercise 7. Use the necessary form of the verb. Translate the sentences.

1. My sister ... (come) to visit me next month 2. Listen! Someone ... (knock) at the door. 3. Look! I believe that it is Helen who ... (cross) the street. 4. The sun ... (shine) brightly when we got up this morning. 5. Walter... (study) English for a few weeks last year. 6. I ... (translate) this article when you rang me up. 7. He said that he ... (leave) before the telegram came. 8. Where ... he ... (go) on his vacation next year? 9. A bad workman ... (quarrel) with his tools. 10. Jack ... (be) the life and soul of the party yesterday. 11. I ... (take) the liberty of borrowing your dictionary while you were absent. 12. His two great interests in life ... (be) music and painting. 13. She ... (give) us an indefinite answer yesterday. 14. He ... (have) the impudence to say that I was telling lies! 15. How often ... you ... (hear) from your brother? 16. Two heads ... (be) better than one. 17. We ... (have) a slight earthquake last night. 18. Sandy ... (read) all these English and French books. 19. Follow this road until you ... (reach) the Post Office, then turn left. 20. Martin ... (pass) all his examinations with flying colours.

21. I ... (make) a great find in a second-hand bookshop yesterday. 22. We feel that he ... (tell) us the truth. 23. I have a fancy that Mabel ... (arrive) late. 24. Ruth ... (fall) in love with your friend Oscar. 25. They ... (feel) quite exhausted when they ... (reach) the top of the mountain.

Exercise 8. Open the brackets using the necessary form of the verb. Translate the sentences.

1. Where is your luggage? — I (to leave) it at the station. I (to take) it tomorrow when Nick (to come) to help me. 2. I (to read) about an hour when he (to come). 3. The play (not yet to begin) and the people (to talk) in the hall. 4. Yesterday I (to buy) a new pair of gloves, as I (to lose) the old ones. 5. We (to walk) in silence. He already (to tell) me all that (to be) interesting about himself, and I (to have) nothing to tell him. 6. The moon (not to rise) yet, and only two stars, like two distant lighthouses, (to shine) in the dark blue sky. 7. One night a little swallow (to fly) over the city. Its friends (to fly) away to Egypt six weeks before, but it (to stay) behind. 8. What you (to do) these three months? 9. Our train starts late in the evening, so if you (to come) at seven o'clock, we still do pack our luggage. 10. When you (to see) him last? 11. I (to meet) him when he (to walk) across the park. 12. You ever (to act) on the stage? — Why yes, that's what I (to do) for the last six years. 13. Don't enter the bedroom! The child (to sleep) there, and he always (to wake) up when somebody (to open) the door.

Exercise 9. Read and translate the following sentences paying attention to the predicates in *Passive voice*.

1. These digits are easily multiplied. 2. I was asked many questions about my work. 3. They were explained how to solve this problem on a computer. 4. The sequence of reasonable operations has been performed by the computer. 5. The new department of mathematics has just been opened. 6. Many books on computers' organization and ar-

chitecture had been translated from English into Ukrainian by the end of last year. 7. The experiments on the new microcomputer were being carried out during the whole month. 8. All the digits are recorded on the paper tape when addition is performed. 9. The new key adding machine was transferred into the next room yesterday. 10. The sequence of reasonable operations is now being carried out by this microcomputer. 11. The conference was addressed by a well-known scientist. 12. The invention of computers was spoken of at the last lecture. 13. Modern personal computers are always looked at with interest. 14. Many new branches of industry have been developed in our country since World War II.

Exercise 10. Fill in the blanks with the verbs given below. Use them in *Passive voice*.

To express; to carry out; to invent; to record; to polarize; to tell; to store; to represent; to require; to construct.

1. All the digits inside the hardware ... by the arranging of the special equipment. 2. Complex calculations … with the help of a computer. 3. A special counter wheel (рахувальне колесо) for an arithmometer … by a Russian engineer V. T. Ordner in 1874. 4. The answers of computations ... often in the form of tables. 5. Small spots on a surface inside a computer ... magnetically. 6. By means of instruction any computer ... what operations to perform. 7. All instructions … in registers, the units of hardware. 8. Any information … by the binary system. 9. Numbers or instructions … for solving a problem by a computer. 10. Several computing units ... by M. V. Lomonosov for computational science.

Exercise 11. Find the sentences in *Passive voice*.

1. Several new office buildings have been constructed in the town lately. 2. They have just constructed the new building for the theatre. 3. The buildings for the hospital and a new department store were constructed two years ago. 4. English is spoken in many countries of

the world. 5. The language spoken in Brazil isn't English. 6. Was he invited to come to the office? Yes, he was. 7. He was offered a very interesting job there. 8. The job offered to him is so interesting. 9. The system used here is of simple construction. 10. The name given to the system is very short. 11. The system was examined yesterday.

Exercise 12. Practice changing these sentences to passive form.

1. They deliver all the mail at half past nine. 2. The teacher corrects our composition at home. 3. Everyone hears our broadcasts. 4. This engineer writes all the letters in English. 5. William teaches this group of children. 6. Mary has written several articles for this journal. 7. They will finish the work on Saturday. 8. The students will buy the theatre tickets now. 9. They must send this package at once. 10. All of us must study these rules. 11. You must write this application in ink. 12. They published this booklet in our town. 13. His bad behaviour disappointed all of us. 14. They will build this block of flats in six months. 15. We can use all this material right now. 16. Everybody knows you.

Exercise 13. Put in the necessary form of the verb (*Active* or *Passive*) in the *Present Indefinite*.

Model: make(s) — is (are) made.

1. Part I of the experiment ... in the first two weeks of the month. 2. Everyone ... the same experiment and exercise at the same time. 3. Part 2 of the experiment ... in the last two weeks of the month. 4. You must ... the experiment today. 5. The experiments in Part 1 ... in Mechanics and Optics Laboratories on the first floor. 6. You may ... any part you like.

Exercise 14. Translate the following sentences.

1. The Shevchenko Museum is devoted to the life and public activity of great Ukrainian poet and painter, a revolutionary democrat. 2. St. Sophia Cathedral, an outstanding monument of architecture in

Ukraine, was built in the first half of the 11th century. 3. The history of Shevchenko Opera Theatre is closely connected with the establishing and progress of Ukrainian musical culture. 4. The Kyiv State University was named after Shevchenko in 1939. 5. Kreshchatik, the main street of Kyiv was restored in the 1950s. 6. He was awarded with the Order of Yaroslav Mudri.

Exercise 15. Translate the following sentences.

1. The librarian explained that the library included collections of many works. 2. The most precious volumes are given below. 3 The temperature and humidity are carefully controlled. 4. It is known that mathematical analysis is an important division of higher mathematics. 5. It was stressed that mathematical methods were penetrating deeply into different sciences and economics.

Exercise 16. Find *Passive Voice* in the sentences given below and translate the sentences.

a) 1. Polymers are machined much better and easier than wood, stone or metal, therefore so much attention is being given to these man-made materials at present. 2. Polyethylene (PE) was discovered as early as 1933, but it was not produced in any large quantities until World War II. 3. It is made from an easily obtainable by-product of petroleum. 4. Polypropylene (PP) resins are being used in films, tubes and hundred of other industrial articles. 5. To meet the present-day requirements much more kinds of both cheap and durable polymer materials will be turned out by our chemical industry in future.

b) 1. The development of heavy industry in our county is paid great attention to. 2. It should be said that all the chemical elements known to science can be found in the Ural mountains. 3. It is no wonder, therefore, that the development of the country's economy is greatly influenced by the Urals. 4. Some metals and minerals found there are looked upon as extraordinarily valuable, for instance, titanium, vanadium and lots of others. 5. They are made use of in some highly im-

portant industries. 6. The iron ores of the Ural mountains are spoken about as having no equal in quantity and variety.

Exercise 17. Check your knowledge of *Passive Voice* by translating the following sentences.

1. The air is warmed by the sun, not directly by the sun rays but due to the fact that the earth absorbs the radiation from the sun, converts it into heat and then transfers this heat to the air by convection. 2. When a body or structure is subjected to external loads internal forces are created by the corresponding elastic deformations of the body or structure which oppose the external forces and thereby maintain equilibrium. 3. It has been estimated that some 8,000 millions of meteors enter our atmosphere each day. 4. It is said that he will become a good specialist. 5. It will thus be seen that the motor action and the dynamo action, which for the sake of convenience are studied separately, cannot, as a matter of fact, have separate existence. 6. We were told that he was making considerable progress in his English.

Exercise 18. Define the tense of the predicate and translate the sentences.

1. Great progress has been made in radio engineering since A. S. Popov's invention. 2. Radio has helped to bring remote areas of the country closer to Kyiv. 3. The importance of radio has not lessened with the appearance of television. 4. With the appearance of cosmic transmitters TV has become accessible in remote areas of the country. 5. The lab is equipped with TV apparatus. 6. Transmissions are conducted from theatres with the help of mobile TV stations.

Exercise 19. Open the brackets using the necessary form of the verb.

1. Popov's "storm indicator", which he (to demonstrate) in 1855, (to be) the prototype of modern radio receivers. 2. Great progress

(to be made) in radio engineering since then. 3. We can (to call) radio a newspaper needing no paper and reaching all distance. 4. Radio (to help) to bring remote areas closer to cultural centers of the country. 5. The importance of radio (not to lessen) with the appearance of television. 6. The main TV center (to be situated) in Kyiv. 7. Many programmes (to be transmitted) from special TV Theatre. 8. The inventor of the radio A. S. Popov (to be born) in 1859. 9. He (to graduate) from the Petersburg University in 1883. 10. The development of television (to begin) with the work of Boris Rodin. 11. He (to put forward) the idea of using an electron-beam tube to receive pictures.

Exercise 20. Translate the following sentences, pay attention to the predicates.

a) 1. The Nobel Prize has been awarded to British scientists for this outstanding discovery. 2. The young branch of science has already developed into hundreds of instruments. 3. Lasers have been used by building workers, drillers, communication workers. They have been made to help doctors and scientists in their research. 4. Our specialists have developed laser units for continuous cutting of metals, glass, plastics, and so on. 5. The bloodless knife has been used to perform a number of operations on internal organs. 6. Modern enterprises have been built in many cities and towns.

b) 1. US scientists have opened a fundamentally new road in space exploration. 2. By the beginning of the 19th century the atomic theory of the structure of matter had been established experimentally. 3. When modern computers had been designed they found wide application in industry. 4. Great success has been achieved in the study of the Moon and the planets of the Solar System. 5. Many new industrial enterprises will have been built in Africa by the end of the five-year period. 6. More than 300 new models of tractors and various other machines have been designed and recommended for mass production.

Exercise 21. Translate the following sentences, pay attention to the predicates.

1. Research institutes of the Academy of Sciences obtained valuable results in the study of the process of control. 2. Scientists have solved many problems of the linear and nonlinear theory of automatic control, and theory of optimum control systems. 3. Control of vast systems has been computerized and new computers have been developed. 4. Scientists are searching for ways of solving the problem of controlled thermonuclear fusion. 5. Much progress has been made in nuclear power engineering. 6. The first home electronic computer was built in 1952. 7. New and more efficient computers were developed in subsequent years. 8. Research in science knows no end, but it is especially fruitful when scientists are inspired by ideals of social progress and peace. 9. The first atomic clock was developed by Nobel Prize winners Basov and Prochorov. 10. The clock improved the accuracy of the time standard 10,000 fold, and provided an interesting discovery, namely, that the Earth's rotation slows down in spring and quickens in autumn. 11. When the great number of experiments and researches had been done, the sputnik was launched. 12. The discovery of radioactive substances took place at the end of the 19^{th} century. Less than fifty years later, man's mind had developed ways of using nuclear reactions, created atomic piles, and produced radioactive isotopes.

Exercise 22. Define the tense of the predicate, translate the following sentences.

1. Mechanics deals with a variety of problems. 2. This type of problem is dealt with in mechanics. 3. Mechanics treats of terrestrial bodies in state of rest, that is, a state of equilibrium. 4. A trajectory may be either of straight or curved lines, in accordance with which the motion of a point is then described either as rectilinear or curvilinear one. 5. The rotation of the electric motor is transmitted to the spindle of the lathe. 6. By setting the lathe properly we might ob-

tain the required rotation speed of the spindle. 7. We will study in detail the first compound of chlorine. 8. Its compounds with hydrogen will be represented by formula HC1.

Exercise 23. Translate the following sentences.

1. Electronics solves the most complicated problems in automation and production processes by relatively simple means. 2. A lot of problems find solution in modern electronics. 3. The Russian physicist Stoletov was the first to formulate the law of electron emission by a heated body. 4. The first two-electrode valves were made in 1904. 5. The development of electronic amplifiers has made it possible to utilize a number of familiar physical phenomena. 6. Photocells became widely used only in conjunction with electron valves. 7. The preparatory stage in the development of electronic devices was laid primarily by the profound researches of the Russian physicist Stoletov. 8. The mercury rectifier is a device for economical conversion of alternating current into direct current. 9. The use of the photoelectric effect, i.e., the emission of electrons by a metal under the action of light was especially important in electronics.

Exercise 24. Open the brackets using the necessary form of the verb.

1. Electronics (to be) the science that (to study) the principles and technology of electronic and ionic devices. 2. Electronics (to be) the basis of modern automation. 3. It (solve) the most complicated problems in automation. 4. It (to be) possible to use this method. 5. It (to be) necessary to solve this problem long ago. 6. The discovery of radio by A. Popov (to give) a powerful stimulus to the development of electronics. 7. The first two-electrode valves (to be made) in 1904. 8. The use of a grid (to make) it possible to use the three-electrode valve as an amplifier. 9. The development of electronic amplifiers (to make) it possible to utilize a number of familiar physical phenomena.

Reading Material

Text 1
VAPOUR PRESSURE

Every liquid produces a vapour as the molecules near its surface free themselves from the attraction of their neighbours and fly off into space. This vapour exerts pressure on any containing vessel and the amount of pressure exerted by the vapour of any particular liquid depends solely on the temperature of the liquid surface; the higher the temperature, the greater the pressure. For any liquid a graph can be drawn showing the relationship between this vapour pressure and the temperature of the liquid surface.

How can gas be liquefied?

When heat is removed from a gas its temperature is lowered until it reaches a value corresponding to the pressure (see above) after which further removal of heat liquefies the gas. Alternatively, an increase in pressure combined with removal of heat makes it possible to liquefy the gas without reducing its temperature.

What is superheated vapour?

It is vapour removed from contact with its liquid and at a temperature higher than that which corresponds to its pressure as indicated by the temperature-pressure-vapour relationship for that particular substance.

What is saturated vapour?

It is vapour whose temperature and pressure are in accordance with the temperature-vapour-pressure relationship for the particular substance. Vapour in contact with its liquid is saturated.

Завдання до тексту

I. Дайте відповідь на запитання.

1. What does every liquid produce?
2. What is saturated vapour?
3. What is superheated vapour?

II. Заповніть пропуски відповідними за змістом словами.

1. Every liquid produces ... (vapour, gas, fog).
2. For any liquid a ... can be drawn (table, picture, graph).
3. The higher the temperature of a liquid surface, the greater the ... (power, pressure, speed).
4. Vapour in contact with its liquid is ... (dissapiered, saturated, overheated).
5. The rate of production of energy is ... (voltage, resistance, horsepower).
6. The kilowatt is another unit of ... (weight, velocity, power).

III. Складіть три спеціальні запитання до тексту.

Text 2
MODERN PLASTICS INDUSTRY

Plastics are among the most important materials resulting from scientific discoveries of the last hundred years. The foundation of the modern plastics industry really begins with the discovery of bakelite by Backeland, the Belgian chemist. Bakelite is a thermo-setting resin; once moulded at a high temperature before cooling, it keeps its shape and can not be moulded again. It proved a new substance of very good qualities, for instance, as an insulating material in the electric industry. Backeland could synthesize it from coal, lime, water, and air, and thus he produced the first wholly synthetic plastic.

There are now hundreds of different plastics, each with its own particular properties. On the one hand, we have bakelite, hard, rigid and quite impenetrable by light even in a thin layer. On the other hand, we can make plastics which are as flexible as celluloid, even more transparent, and yet extremely hard.

Plastics are used largely for small articles, varying from electric light switches to the dash-boards of cars. It is believed that with the production of stronger plastics and new methods of manufacture, there will be no technical limit to the size of articles.

The scientists of a plastics laboratory together with workers and technicians have already developed a motor-car coach made completely of plastics. It will be highly durable, light, sound-proof, heat- and corrosion-resistant.

There would be hardly any sphere in which these astonishing materials may not be applied when future research has made even greater improvements available.

Nearly all the plastics are compounds of such simple elements as carbon, hydrogen, oxygen and sometimes nitrogen. The characteristics of the various plastics depend upon the way in which these elements are combined, and organic chemists have developed a technique of setting out the composition of the molecule in diagrammatic form.

To summarize the question as briefly as possible it may be said that the various elements are combined to form long molecular chains which, although they cannot be seen under the microscope, are susceptible to X-ray analysis. The general theory at the moment seems to be that in the plastics of the cellulose acetate type the treads are arranged in long bundles, while in the other plastics which give no X-ray patterns the treads are probably in tangled masses.

Another word which inevitably crops up in any discussion of plastic structure is polymerization. Polymers can be defined as substances having the same atoms present in the same proportions, but having different molecular weights and physical properties. For example, acetaldehyde (C_2H_4O) may be converted into paraldehyde ($C_2H_40)_3$. Some substances polymerize spontaneously at room temperature, others need the application of heat or some catalyst. The result is the formation of a new compound which may have characteristics entirely different from the original.

Coal, cellulose in the form of cotton linters or wood pulp, sulphuric, nitric and acetic acids, casein, urea, formal dehyde, glycerine, and various vegetable products are the basic materials for the plastics industry.

Завдання до тексту

I. Дайте відповідь на запитання.

1. What major problem is discussed in the text? Express your opinion on the problem.
2. When did the foundation of the modern plastics industry really begin?
3. How can polymers be defined?

II. Продовжіть речення.

1. The foundation of the modern plastics industry really begins with...
2. Bakelite is...
3. The characteristics of the various plastics depend upon...
4. Plastics are used largely for...

III. Зробіть аналіз усіх форм дієслова, які зустрічаються в тексті.

Text 3
TYPES OF ELECTRIC CURRENT

The question is often asked: "What is an electric current?" If we could examine the inside of a copper wire while a current flowing, we should see an electron, leaving one copper atom, moving over to the next copper atom and so on. This stream of electrons moving along from atom to atom is called an electric current. The practical unit of current is called the ampere.

No one has ever seen an electric current. We only know of the existence of a current owing to its effects. A current can heat a conductor, it can have a chemical action when passing through a solution, or it can produce a magnetic effect. We can measure currents by observing their heating, chemical or magnetic effects.

Two things are necessary to cause an electric current to flow: first — a complete circuit, and second — a driving force called the electromotive force (e.m.f.).

If we were to put free electrons on an insulated copper ball, what would they do? In this case they would try to repel each other.

In case we connected this charged ball to another ball of equal size by a copper wire, would be the result? The electrons would move along the copper wire until the number of electrons on each ball were the same. This is an example of electromotive force causing a current to flow.

A battery has a surplus of electrons on one of its two plates; so we say that a battery furnishes an e.m.f.

If a copper wire is run from one plate to the other, a current flows in the complete circuit thus made. If a small bulb is placed in the circuit, it will light up, giving evidence to a current flow.

If the battery were disconnected and a generator substituted for it, we should have a typical lighting system.

Завдання до тексту

I. Дайте відповідь на запитання.

1. What is called an electric current?
2. Can you see an electric current?
3. How do we know of the existence of the electric current?

II. Знайдіть у тексті інтернаціоналізми.

III. Складіть план тексту.

Text 4
MOLECULES

To the modem chemist, the atom is the smallest particle of an element that can enter into a chemical reaction. Thus, each element has atoms that are peculiar to itself and different from those of each of the other elements. Chemical reactions occur when atoms of different kinds unite to form groups in which they bear definite relationships to each other or when these groups undergo disruption or rearrangement. Chemical unions are of two general types.

In one type of union, atoms become bonded together to form definite aggregates that exist as independent, electrically neutral particles and are known as molecules (Latin — little mass). Some elements

have atoms that unite with others of their own kind to form molecules. These are known as elemental molecules and arc exemplified by the chlorine molecule which is made up of two chlorine atoms. Compound molecules are composed of two or more kinds of atoms and are exemplified by the water molecule, which contains two atoms of hydrogen and one of oxygen.

To give a short definition of a molecule is not to give a more or less full account of properties. Molecules are regarded as the smallest particles or elementary substances that can have independent existence. They account for the chemical properties and at least some of the physical properties of the substance they constitute. A single molecule does not exhibit in full the physical properties commonly associated with its particular variety of matter. These properties arise both within the molecule itself and within the aggregates of like molecules that constitute a sample of the given substance. The density of water depends not only on the mass and volume of individual molecules but also on the manner in which the molecules are packed together. Since the chemist works with the aggregates, their properties are of great practical importance.

A molecule of a compound contains, of necessity, at least two different atoms. An element molecule may contain only one atom, or it may contain two or more. Helium has monoatomic molecules; chlorine and hydrogen each exist as diatomic molecules; and sulphur molecules contain eight atoms. During reactions the atoms of elemental molecules usually are separated and individually redistributed in new combinations.

Завдання до тексту

I. З'єднайте дві частини речення.

1. Chemical changes
2. Melting, boiling and
3. Chemists investigate the aggregates

4. Dehydration synthesis is a chemical reaction that involves molecules
5. Chemical bond is a process of
6. Hydrocarbons are organic molecules
7. Chlorination is a method of water
8. Diatomic molecules are made up of identical elements

A. to form larger and complex molecules.
B. evaporation are the physical changes
C. that consist of carbon and hydrogen.
D. and are called diatomic elements.
E. linking elements (atoms) in molecules by electrical force.
F. can form new substances.
G. disinfection and is used all over the world.
H. that are of great practical importance.

II. Визначте, які речення є правильними (t), а які ні (f).

1. Atom takes part in aggregation.
2. Atoms join with others of different kind to form ions.
3. Polymer molecules may contain many thousands of component molecules.
4. Chemical bonds are interactions that separate atoms in chemical elements.
5. The density of water depends on the mass and volume of compounds.
6. Diatomic molecules consist of five atoms that are chemically unbound.

III. Перекладіть українською слова та словосполучення.

Chemical reactions, physical properties, chlorine molecule, independent existence, exemplify, substance, mass and volume, diatomic molecules, sulphur, molecules, neutral particles, rearrangement, Helium, disruption, monoatomic molecules, contain, occur, aggregates, hydrogen.

IV. Заповніть пропуски словосполученнями, що наведені нижче.

chemical properties density chemists redistributed constitute molecule atom measure the volume

1. ... is a small part of an element.
2. ... analyze substances, conduct experiments and write different reports on chemical processing.
3. The ions put together by the dissociation of any ... are of two kinds.
4. People study ... of different things and materials in order to develop new goods.
5. Boats and ships can float on the water because of the difference between mass and....
6. Oxygen, carbon, hydrogen, nitrogen, calcium and phosphorous ... our body.
7. It is difficult to ... of a liquid because liquids can change their shapes.
8. The atoms of molecules can be ... in various combinations.

V. Складіть запитання, розташовуючи слова у правильному порядку.

1. What / atom / consist / does / of?
2. is / What / molecule / a?
3. How / are / bonded / atoms / to / a molecule / form?
4. When/ the chemical/ the molecules/ reactions/ occur/ between/ do?
5. What/ the/ chemical reactions/ characteristic / are/ features of/ the?
6. What / the physical / the substances / properties /are / of?
7. How / we / different /define / the density / do / of / substances?
8. What / happen / molecules / to / the / during / the/ can / reactions?

Text 5
PROPERTIES OF FATS AND OILS

For an understanding of the place of fats and oils in the diet and in the arts, some elementary knowledge of their chemical and physical properties is essential. It is the object of this section to present the minimum of such necessary information in the simplest way practicable. For complete treatment of the chemistry of fats and oils see J. Lewkowitsch, Chemical Technology and Analysis of Oils, Fats, and Waxes (London, Macmillan, 1922, 3 vols., 6th edition).

As already stated, fats may be decomposed into glycerin and fatty acids. This manner of decomposition takes place only in the presence of moisture. For each molecule (a molecule is the smallest particle of a substance that can exist and still exhibit the properties of that substance) of glycerin set free there are set free three molecules of fatty acid. In the process three molecules of water are taken up, partly to help re-form the glycerin and partly to help re-form the fatty acids. Conversely (in the laboratory) the fat may be reconstituted from glycerin and fatty acid, in which event three molecules of water are set free for each molecule of fat synthesized.

The process of splitting a substance whereby water is taken up is known to chemists as hydrolysis, a word which is merely Greek for cleavage by water. The process is often termed saponification, since it was first observed to take place in the manufacture of soap. The term saponification (instead of the more exact term hydrolysis) is, however, applied indiscriminately and inappropriately to any chemical change of this nature, whether or not soap is formed. Nowadays in industry fats are very often converted into glycerin and fatty acids — that is, hydrolyzed — without the formation of any soap whatever. A soap is merely the combination of a fatty acid with a metal, i.e., it is a salt. The commonest soaps are the fatty-acid salts of sodium (sodium is a soft, white metal obtained from common salt, sodium chloride) and potassium. (Potassium is also a soft, white metal obtained from wood ashes or from certain minerals found in Germany, Alsace, and elsewhere. Both sodium and potassium oxidize with great rapidity when exposed to the air, and hence are never found in nature except in the form of their compounds.) Hard soaps are sodium salts; soft soaps, potassium salts. The fatty-acid salts of ammonium are also sometimes used for cleansing. Only a few other soaps are of practical importance, for example lead soaps which are used in medicinal plasters, zinc soaps which are used in ointments, and aluminum soaps which are used in waterproofing. Very few of the salts of fatty acids have the properties of common soap. Most of them are but slightly

soluble in water, and therefore do not yield suds and have little or no detergent (i.e., cleansing) action. All are nevertheless termed soaps by chemists.

Завдання до тексту

I. Знайдіть у тексті всі речення з Passive Voice; назвіть час присудка.

II. Поставте по одному запитанню до кожного абзацу тексту.

III. Складіть план тексту.

Text 6
MODERN SOURCES OF POWER ENGINEERING

Power in its perfect form — electric power-determines the pace of the technological advance of mankind.

The numerous machines, mechanisms and automatic devices functioning in industry, agriculture, transport and every day life depend upon power production. In the twentieth century, mankind's progress depends not only on electricity output, but also on the efficiency of application of electricity in all spheres of the national economy.

The extensive consumption of electricity and its key role in developing the productive forces is accounted for by its high efficiency and huge advantages over other types of energy. It is the cleanest, most universal and efficient. Electricity can be transmitted over long distances. It is easily distributed among numerous consumers, or on the contrary, can be concentrated into gigantic capacities.

Electricity has a revolutionizing effect on machinery and technology in all spheres of economy. This accounts for the priority given to the accelerated development of electricity all over the world.

For quite a long time man has been using wind, water and other conventional sources for producing electric power.

The world's first experimental atomic power station was put into operation in 1954.

Завдання до тексту

I. Дайте відповідь на запитання.

1. What determines the pace of the technological progress of mankind?
2. What new kind of power station was put into operation in 1954?
3. What conventional sources of power do you know?

II. Перекладіть українською всі речення з абзаців 3, 4, в яких вжито пасивний стан, і визначіть час.

Text 7
GENERAL CHARACTERISTICS OF GAS TURBINES

The turbine is a major component common to the gas turbine-propeller engine, and to the thermal jet engine. In the gas turbine-propeller engine the turbine must develop the shaft power for driving the air compressor, propeller, and the auxiliaries. In the thermal jet engine, however, it is required to furnish only sufficient power to drive the air compressor and the auxiliaries. It should be noted that, in general, gas turbine-propeller engines are designed to deliver auxiliary jet thrust from the exhaust gases in addition to the propeller thrust, the usual proportions being 80 percent propeller thrust and 20 percent auxiliary jet thrust.

The general characteristics of turbines are well understood, and a wealth of information concerning them has been gathered during the past decades. Particularly helpful to the development of turbines which operate with highly heated gases are the experiences gathered in the development of turbo-superchargers and also steam turbines for high pressure and high-temperature applications. In many respects the turbine for gas turbine-propeller engines or turbo-jet engines is quite similar to the conventional steam turbine, the major difference being in the metallurgy, the means provided for cooling the bearings and highly stressed parts, and in the constructional features to safeguard against thermal distortion. The basic theory underlying their

design and the evaluation of their operating characteristics is identical with that for steam turbines.

The turbine blades may be either solid or hollow, the type of construction being influenced by the material selected for their manufacture. The hollow blade offers the advantages of being adapted to cooling by flowing cold air through its interior and of reducing weight. The walls of the blade are usually tapered so that the outer extremity, where the stress vanishes, is quite thin. The greatest benefit derived from cooling is at the root of the blade where the stresses are high; the outer edge, because of its small stress, may be allowed to run hot.

Since improving turbine efficiency and output are related to ability to operate with higher temperatures, developments aimed at raising the permissible operating temperature of the turbine are of great importance. One promising approach is the application of ceramic coatings on the turbine blades to take the impact of the hot gases. The problem here is to develop a ceramic coating of high melting point which will bond to the metal and will have a coefficient of expansion close enough to that of the metal to prevent the coating from cracking or flaking off. Another approach proposes to let cooling liquid flow through a passage in the root of the blades.

Завдання до тексту

I. Дайте відповідь на запитання.

1. Is there any difference between the turbines for gas turbine-propeller engines and turbojet engines?
2. Name the types of turbine blades.
3. What is the main advantage of the hollow blade?
4. What is the function of ceramic coatings on the turbine blades?
5. What are turbine efficiency and output related to?

II. Знайдіть у тексті англійські еквіваленти таких слів:

сипатися, головний, металургія, пустий, схожий, дозволений, викривлення, допоміжний.

III. Висловте основну думку тексту в 3—5 реченнях.

Text 8

OPERATION PRINCIPLES OF DIESEL ENGINE

The operation principles of the four-stroke-cycle diesel engine and the four-stroke-cycle gasoline engine are basically the same but still there is some difference between them.

The diesel engine draws in air only on the intake stroke. In gasoline engines we use fuel and air mixed in the carburettor.

The fuel for the diesel is injected under high pressure at the end of the compression stroke.

There is no electrical ignition system in the diesel engine. The heat of the highly compressed air ignites the fuel in the combustion chamber of the diesel. The compression ratio of the diesel engine is about 15 to 1 and this develops temperatures necessary for self-ignition of the fuel.

Because of the higher pressures in the diesel engine it has heavier parts than the gasoline engine. Diesels have heavier piston pins, connecting rods, bearings and crankshafts.

There are two-stroke and four-stroke-cycle diesel engines. We use them on farm tractors.

Most of farm engines are of the four-stroke type but there are some smaller engines of the two-stroke type. We use two-stroke-cycle diesel engines on some farm tractors.

The most important factor which provides the engine's greatest efficiency is proper maintenance. If the engine has proper maintenance and operates at proper temperatures it will give the greatest efficiency, long engine life and low operation cost.

The four-stroke cycle has the following movements. On the intake stroke the movement of the piston from TDC to BDC draws in the air-fuel mixture. Compression follows intake — and takes place when the valves are closed.

When the piston moves from BDC to TDC it compresses the air-fuel mixture in the combustion chamber. The electric spark ignites

the compressed mixture and the expanding gases provide power. This is power stroke. As the piston moves from TDC to BDC the connecting rod transmits the force of the expanding gases from the piston head to the engine crankshaft. Exhaust takes place when the piston moves from BDC to TDC.

The exhaust valve opens and the piston forces out the burnt gases.

The four-stroke-cycle engines need more time for intake, compression, power and exhaust strokes than the two-stroke cycle engines.

In the two-stroke-cycle engines one cycle requires one revolution of the crankshaft. In the four-stroke-cycle engines intake, compression, power and exhaust require two revolutions of the crankshaft. The four-stroke-cycle engines provide greater efficiency than the two-stroke cycle engines.

The spark plugs ignite the air-fuel mixture in the gasoline engine. In the diesel engines there are no spark plugs. The compression raises the temperature of the air in the combustion chamber of the diesel engine and the fuel self-ignites.

Завдання до тексту

I. Перекладіть речення англійською мовою.

1. У дизельному двигуні немає електричної системи запалювання.
2. Ступінь стиснення дизельного двигуна становить від 15 до 1, і це створює температури, необхідні для самозаймання палива.
3. Через більш високий тиск у дизельному двигуні він має більш важкі деталі, ніж бензиновий двигун.
4. Більшість сільськогосподарських двигунів є двигунами чотиритактного типу, але існують двигуни двотактного типу меншого розміру.
5. Якщо двигун має належне технічне обслуговування і працює при відповідних температурах, це забезпечить максимальну ефективність, тривалий термін служби двигуна і низьку експлуатаційну вартість.

II. Знайдіть у тексті всі випадки вживання дієслів у пасивному стані та визначте час, в якому вони вживаються.

III. Продовжіть речення.

1. In gasoline engines we use ...
2. The fuel for the diesel is injected under ...
3. The compression ratio of the diesel engine is ...
4. The four-stroke-cycle engines provide ...

Text 9
TWO GENERAL CLASSES OF HYDRAULIC TURBINES

Introduction. Power may be developed from water by three fundamental processes: by action of its weight, of its pressure, or of its velocity; or by a combination of any or all three. In modern practice the Pelton or impulse wheel is the only type which obtains power by a single process, the action of one or more high-velocity jets. This type of wheel is usually found in high-head developments.

Types of Hydraulic Turbines. Hydraulic turbines may be grouped in two general classes: the impulse type which utilizes the kinetic energy of a high-velocity jet which acts upon only a small part of the circumference at any instant, and the reaction type which develops power from the combined action of pressure and velocity of the water that completely fills the runner and water passages. The reaction group is divided into two general types: the Francis, sometimes called the reaction type, and the propeller type. The propeller class is also further subdivided into the fixed-blade or propeller type, and the adjustable-blade type of which the Kaplan is representative.

Impulse Wheels. With the impulse wheel the potential energy of the water in the penstock is transformed into kinetic energy in a jet issuing from the orifice of a nozzle. This jet discharges freely into the atmosphere inside the wheel housing and strikes against the bowl-shaped buckets of the runner.

Impulse wheels are used at heads of 800 ft. or more, although they may be used at lower heads, depending on the horsepower capacity

involved. Usually not more than one or two jets are applied to the circumference of the runner or bucket wheel. The specific speed suitable for a given head and capacity of unit is much lower than that for the Francis or for the propeller type.

Steam issuing from the nozzles passes through the blading on one wheel and on exit immediately enters the blading on the second wheel, which turns in the opposite direction. The arrangement allows large power to be produced by a light and compact machine and has been used for propelling naval torpedoes, the working fluid being highly compressed and heated air. The two propellers turn in opposite directions, one being mounted on the hollow shaft and placed slightly ahead of the other.

Завдання до тексту

I. Поставте по одному запитанню до кожного абзацу тексту.

II. З'ясуйте та напишіть:

1. Як можна отримати енергію з води.
2. Які існують два основні класи гідравлічних турбін.
3. Принцип роботи робочого колеса активної гідротурбіни.

III. Знайдіть абзац, в якому міститься інформація:

Hydraulic turbines may be grouped in two general classes.

Text 10
TYPES OF THERMOMETERS

Most other thermometers take advantage of the fact that the volume of a substance changes with temperature. Liquids, usually mercury or spirit, can be enclosed in a glass tube. The variation of volume with a temperature change is shown by an alteration in the height of the liquid in the tube, which is itself marked with degrees of temperature.

The variation of volume with temperature is not the same with all materials and this fact is taken advantage of in the dial type of thermometer where the difference in expansion of the two parts of a bi-

metal strip results in a torque which can be used to operate the pointer on a circular dial. This is a principle used in the recording thermometer or thermograph.

What temperature scales are used?

Only two temperature scales are of importance, the Centigrade and the Fahrenheit. On the former, the freezing point of water at atmospheric pressure is denoted by 0 °C and its boiling point by 100 °C; there are therefore 100 Centigrade degrees between these two temperature levels. On the latter the freezing point is 32 °F and the boiling point 212 °F, so that the difference between the two levels is 180 °F. Hence a change of temperature of 1 °C is the same as a change of 1.8 °F.

To convert from °C to °F and vice versa the following equations are used: °F = (9/5 x °C) + 32 and °C = (°F — 32) x 5/9.

These rules apply whether the temperature is above or below freezing but, of course, a minus sign must be used below O°.

Care must be taken when converting a temperature difference compared with an actual temperature. For instance, a temperature difference of, say, 9 °F would be the same as a difference of 5 °C, whereas an actual temperature of 9 °F would be the same as — 12.8 °C.

Завдання до тексту

I. Перекладіть інтернаціональні слова українською мовою.

Thermometer, thermograph, scale, minus, bi-metal, expansion, mercury, tube, variation, alternation, Centigrade, Fahrenheit, actual, atmospheric, spirit.

II. Перекладіть українською мовою такі слова з тексту:

sign, strip, volume, to enclose, torque, liquid, to result in, vice versa, dial, equation, the same, mercury, scale, spirit.

III. Заповніть пропуски словами, поданими нижче:

volume, atmospheric, spirit, tube, mercury, Centigrade, Fahrenheit, variation

1. Measuring temperature we use two scales ... and ...
2. To make a thermometer we take liquids usually ... or ... enclosed in a glass ...
3. The ... of volume of liquid depends on temperature change.
4. ... of a substance changes with temperature.
5. The freezing point of water at ... pressure is denoted by 0 °C.

Text 11
BRITISH THERMAL UNIT

What is absolute temperature?

On the absolute temperature scale (which may be in either Centigrade or Fahrenheit degrees) 0 °C represents the lowest attainable temperature at which the internal energy of all substances is zero. This temperature is — 273.1°C or — 459.6 °F; hence to convert Centigrade temperatures to °C absolute we add 273.1 and to convert Fahrenheit temperatures to °F absolute we add 459.6.

What units are used for measuring heat?

The British thermal unit (Btu) is used by engineers in the UK and the USA; the calorie is used in scientific work and generally wherever the metric system is in use. The Btu is the amount of heat which will raise the temperature of 1 lb of water by 1 °C. There are two calories: the small calorie, or gramme-calorie, which is the amount of heat required to raise the temperature of 1 gramme of water by 1 °C and the great calorie or Kilocalorie (Kcal) which is 1000 times as great, i.e. the amount of heat required to raise the temperature of 1 kilogramme (Kg) of water by 1 °C. A frigorie is exactly the name as the kilocalorie and is used by European writers to denote the power of removing heat possessed by a refrigerating plant. 1 Kcal = 3.968 Btu = 4.18 J. The joule (J) is the SI (international measure system) unit of heat, but it is not yet in general commercial use.

What is the latent heat of a substance?

The amount of heat which has to be added to unit weight of the substance to change its state from solid to liquid (latent heat of fu-

sion) or from liquid to vapour (latent heat of vaporization). It is used in overcoming intermolecular forces and no change in temperature results.

What is sensible heat?

It is heat which results in a change in temperature; when unit weight of a substance is heated by 1° the gain in sensible heat is equal to the specific heat.

What is specific heat?

The amount of heat that has to be added to a substance to produce a given rise in temperature varies according to the nature of the substance. The specific heat of a substance is the ratio of the amount of heat which will raise the temperature of a given weight of it by 1° to the amount of heat which will produce the same rise in temperature in the same weight of water. It is independent of the temperature scale used. By definition the specific heat of water itself is 1.

Notes on the text:

°C = Centigrade; °F = Fahrenheit;
Btu = British thermal unit; Btu/h = hour; Btu/min
Lb = pound, lbft = pound per foot
Kcal = kilocalorie
Kg = kilogramme
J = joule
SI = international measure system
Ft = foot (30.48 cm)
U.K. = the United Kingdom
0° = zero degrees
A = ampere
i.e. = that is
hp = horsepower
kw = kilowatt

Завдання до тексту

I. Дайте відповідь на запитання.

1. What is temperature?
2. What is absolute temperature?

3. What is heat?
4. What is the latent heat?
5. What is sensible heat?
6. What is specific heat?

II. Прочитайте словосполучення і перекладіть їх.

Temperature — high temperature, low temperature, absolute temperature, attainable temperature, actual temperature, required temperature, Centigrade temperature, Fahrenheit temperature.

Calorie — small calorie, great calorie, gramme-calorie, kilocalorie.

Unit — British thermal unit, unit of heat, plant unit, work unit.

Heat — specific heat, sensible heat, latent heat, heat exchange, heat sink, heat energy.

Energy — heat energy, electric energy, wind energy, solar energy, tidal energy, internal energy, atomic energy, kinetic energy, potential energy, mechanical energy, nuclear energy.

III. Перекладіть англійською мовою словосполучення:

Британська теплова одиниця, фунт на фут, кінська сила, нуль градусів, міжнародна система вимірювання, Цельсій, кілокалорія, шкала, приховане тепло, явне тепло, питоме тепло (теплоємність).

Text 12
PROPERTIES OF SUBATOMIC PARTICLES

According to contemporary physicists, the world is made of several types of objects, collectively referred to as subatomic particles. (These particles can also be thought of as manifestations of something yet more fundamental, known as quantum fields.) There may be as many as 10^{89} identical copies of some of these particles in the present universe. The forms of matter familiar to us, both living and nonliving, on the earth and in the heavens [‘hevnz], are all composed of various combinations of only three types of subatomic particles — protons, neutrons, and electrons. Dozens of other types of particles

can be produced momentarily in the laboratory, however, and are thought to have existed in large numbers in the early universe.

All subatomic particles are defined by a few qualities that they may possess, such as mass, spin, and electric charge. Two particles are of the same type, if all of these qualities agree. Otherwise, they are considered to be different particles. Particles of the same type are, as far as we know, truly identical in these properties of mass, spin, and charge rather than just very similar. If all photons, the particles that make up light, were not identical, lasers would not operate.

The subatomic particles readily convert into one another when they collide. The kinetic energy of motion of light particles can be converted into the energy associated with mass (rest energy) of heavy particles. In many cases, even isolated particles can convert spontaneously into others, if the latter are less massive. In all such transformations, only a few properties, such as the total electric charge, remain unchanged. The subatomic particles do not act like the changeless building blocks imagined by some Greek philosophers. In the last few years, physicists have realized that whichever subatomic particles exist they have changed radically over the lifetime of the universe. It appears that evolution takes place on all levels of matter, not just on the more complex levels of living things. The driving force behind this evolution is the expansion of the universe, which by changing the environment in which particles are found, changes the particles themselves. Only twenty years ago, the idea that the properties of subatomic particles might depend on their environment would have been considered heresy. Nevertheless, there is now considerable theoretical support for this conclusion.

Under the conditions in which physicists usually observe subatomic particles, their defining properties are not perceived to vary giving these properties an illusion of stability. However, under the immense temperatures and densities that prevailed in the early stages of the universe, the properties, such as mass, of some particles would have been very different from what they are now. This situation is re-

lated by nature to the variability of a liquid such as water. Under a fairly wide range of temperatures water remains liquid and its properties do not change much whatever the temperature within this range. But if the water is subjected to much lower temperatures, or is heated to above 100° Celsius, its properties change abruptly. The liquid becomes a solid (ice) or a gas (water vapour). This type of change, in which the properties of a substance change drastically as a result of a small variation in its environmental conditions, is called a "phase change" by physicists.

The presumed change in the properties of subatomic particles at very high temperatures is also considered to be a phase change, one that involves the properties of space, as well as of the particles in it. In other words, the particles do not react directly to a temperature change but to some alteration in space, the medium, in which they find themselves.

Завдання до тексту

I. Випишіть з тексту 5—7 речень, що передають основну думку.

II. Утворіть речення з таких слів.

1. the, particles, convert, into, subatomic, one, another
2. world, made, of, is, types, the, of, objects, several
3. the, particles, subatomic, do, not, act, the, changeless, like building, blocks

III. Складіть запитання до всіх речень, в яких дієслова вжито в пасивному стані.

Text 13
THREE TYPES OF ATOMIC POWER PLANTS

There are three types of atomic power plants suitable for aircraft. They are a closed-cycle propeller-turbine, a turbojet and a ramjet.

If the closed-cycle propeller-turbine is used, the air is compressed at the front of the engine, and bled off from here to the atomic reactor, which then would heat it up tremendously. It would pass through

a heat exchanger to vaporize water or mercury, and the steam then would pass through to the turbine, expand, and drive the turbine, which, in turn, would drive the air screw.

The steam then would be condensed in an air-cooled condenser, and fed back to the compressor inlet, thereby completing the cycle. The main disadvantage with this type of system, however, is that forward speeds are restricted by the use of the propeller, and as one can realize almost any desired forward speed without noticeable increase in the use of uranium, we are not, therefore, taking full advantage of the atomic power.

The turbojet engine does take full advantage of atomic power. It merely uses the atomic reactor to replace the present-day combustion chambers. The compressor compresses the air, and forces it through the reactor. The air is heated by convection and then passing back to the turbine where it expands sufficiently to provide enormous thrust, and also keep the turbine rotating, which, by virtue of an interconnecting shaft, keeps the compressor moving. This type of power plant could give us almost any desired speed.

The ramjet is the simplest engine of the three, in that we mount the reactor right in the engine itself, just aft of the entry duct. The air is compressed by the fast moving aircraft, and then passes directly through the reactor, where it is heated. Coming out of the reactor it passes into the exhaust nozzle where it expands and gives tremendous thrust.

Завдання до тексту

I. Складіть одне загальне запитання до кожного абзацу та дайте відповідь на них.

II. Знайдіть у тексті дієслова, вжиті в пасивному стані.

III. Утворіть речення з таких слів.

1. mercury, a heat-exchanger, air, water, to vaporize, or, through, passes

2. advantage, takes, full, of, the turbojet engine, atomic power
3. is mounted, the reactor, in the engine, right, itself, in the ramjet

IV. Складіть план тексту.

Text 14
PHENOMENON OF ELECTROMAGNETISM

Electricity and magnetism are manifestations of the phenomenon of electromagnetism. Sometimes we can think of electricity and magnetism separately; at other times, we can understand them only as electromagnetic phenomenon, as with an electric motor. However, an electric current can produce magnetic forces, and magnets can produce electric currents. Electrical effects can be explained by the structure of the atom. Of the three basic building blocks of the atom — the proton, neutron, and electron — only two, the electron and proton, have electrical charges. Positively charged protons are in the nucleus of the atom, and the negatively charged electrons move around the nucleus. An atom has no charge because the number of electrons balances the number of protons. However, electrons have less mass than protons and move more readily. The outermost electrons of some atoms can be easily pulled away. When an atom loses electrons, it becomes a positively charged ion. If it gains electrons, it becomes a negatively charged ion. It is such charged particles that are the basis of electricity.

In static electricity, electric charges are transferred from one object to another. The change always involves the movement of electrons, never protons. If the charge is due to an excess of electrons, the object has a negative charge. If the charge is due to a shortage of electrons, the object has a positive charge.

Current electricity involves the movement of some of the electrons in a material. The movement of electrons through a circuit can be compared with the flow of water through pipes. A closed or complete circuit is one in which the free electrons leave the negative terminal of the battery, flow through the wires and bulbs, and return to the positive terminal of the battery.

Conductors consist of atoms whose outer electrons are loosely held and can move freely. The free electrons in a conductor move about in all directions when there is no current. However, when a potential difference is present, some of the electrons move in the same direction producing a current.

Завдання до тексту

I. Випишіть з тексту 5—7 речень, що передають основну думку.

II. Зробіть аналіз усіх форм дієслова, які зустрічаються в тексті.

III. Складіть речення.

1. magnetic, electric, can, produce, forces, an, current
2. manifestations, and, magnetism, are, of, phenomenon, of, electromagnetism, electricity, the
3. structure, the, electrical, be, explained, by, of, the, atom, can, effects

Text 15

HYDRAULIC AND PNEUMATIC SERVOVALVES

The design and construction of pneumatic servovalves has followed the concepts of their hydraulic predecessors. Some pneumatic servovalves on the market today are basically hydraulic servovalves that have been slightly modified for pneumatic service. Others are designed and tailored specifically for pneumatic applications. A primary difference between these two approaches is price; the erstwhile hydraulic valve has been beefed up to contain 3000-psi hydraulic system pressures, while the pure pneumatic servovalve has been designed to handle only the 200-psi maximum pressure.

The accuracy of any pneumatic servo system depends on the characteristics of the servovalve and electronic controls, the actuator quality and the rigidity of the mass/actuator interface. To obtain non-compliant or stiff pneumatic performance, the servovalve must possess certain qualities — the most important of which is bandwidth

or frequency response. Tests have shown that servovalves that have a frequency response of greater than 12 Hz at 90° phase lag are required to attain non-compliant systems. As the frequency response increases, accuracy and stiffness improve.

The maximum flow of the servovalve should be configured to the maximum velocity requirement, but not any greater. This is necessary to utilize the maximum electronic loop gain of the control system without position overshoot or undershoot. Other important servovalve qualities are threshold and hysteresis. Generally, the smaller the value of threshold and hysteresis in a servovalve, the more precise is the position set point of the system. Other system factors that effect set point accuracy are the actuator friction, the number and size of compliant members — such as flexible tubing — between the control ports of the servovalve and the load, and any backlash in the system's linkages.

Завдання до тексту

I. Дайте відповідь на запитання.

1. What was followed the concepts of hydraulic servovalves?
2. What are pneumatic servovalves designed for?
3. What does the accuracy of any pneumatic servo system depend on?
4. What are other important servovalves qualities?
5. What have tests shown?

II. Знайдіть у тексті англійські еквіваленти до таких слів:

пневматичний псевдоклапан, гідравлічний попередник, тиск, точність, якість, жорсткість, одержувати, негнучкий (міцний), досягати, фазове відставання, швидкість, ширина полоси частот, поріг (*техн.*), гістерезис, тертя, гнучкий.

III. Випишіть з тексту речення, в яких використано The Present Perfect Active and Passive.

Topics

UKRAINE

Ukraine is one of the largest countries of Eastern Europe. Its territory is larger than that of France. It is also one of the member-states who founded the United Nations Organization and signed its Charter at the San Francisco Conference in 1945. Located in the east of Europe, Ukraine occupies an area of 603,700 square kilometers. Its territory stretches for almost 900 kilometers from north to south and for 1300 kilometers from east to west. It has state borders with Russia, Byelarus, Moldova, Poland, Slovakia, Hungary and Romania.

The geographical position of Ukraine is favourable for the development of its relations with the countries of Europe and of the Mediterranean Sea and the Atlantic Ocean Basins. Among the biggest Ukrainian rivers are the Dnieper, Dniester, Danube, Southern Bug and Siversky Donetz. Ukraine is washed by two seas: the Black Sea and the Sea of Azov. Plains and excellent chernozem territories occupy the largest part of Ukraine. There are only two mountainous areas in Ukraine — the Carpathians in the west and the Crimean Mountains in the south.

Since Ukraine lies mostly in the temperate zone, its climate is temperately continental, except Southern Crimea, where the climate is rather semi-tropical with Mediterranean evergreen trees.

Ukraine has a democratic political system. The form of governing is parliament-presidential republic. President is the head of the state. He is also the head of the executive branch of power. The legislative power is carried out by the Parliament called the Verkhovna Rada. The laws of the country are made by the members of the Parliament.

Ukraine has rich deposits of iron, and rare metals, coal, natural gas, oil, and other mineral resources — a good base for the development of industry. Recently rich deposits of gold have been found.

Conditions for the development of the economy are favourable. There are numerous enterprises in the fields of engineering, metallur-

gy, chemical engineering, coal mining, fuel production, light, heavy and food industries.

The population of Ukraine numbers about 48 million, three fourths of them are Ukrainians. The rest is made up of Russians, Jews, Poles, Byelorussians, Moldavians, Hungarians and other nationalities. Some 65 per cent of them live in the cities. There are 400 towns and cities in Ukraine. Three of them have population exceeding a million: Kyiv, Kharkiv, Odessa.

Kyiv, the capital of Ukraine is one of the oldest and most beautiful cities in Eastern Europe. Kyiv is the centre of political, economic, scientific and cultural life of the country.

Our country is rich in talents. It gave mankind many outstanding figures in different fields. Ukrainians are particularly proud of such famous writers, artists and scientists as Taras Shevchenko, Lesia Ukrainka, Ivan Franko, Mykhailo Hrushevsky, Mykola Lysenko and others.

Ukraine has more than 1000 institutions of higher learning of different levels of education. Above 1.5 million students study at those establishments. Among the best known higher educational establishments are Shevchenko Kyiv National and Karazin Kharkiv National Universities, Franko Lviv National University, National Technical University "Kharkiv Polytechnic Institute" and many others.

The adoption in August 1991 of the Act of State Sovereignty of Ukraine enabled the Ukrainian people to play a more important role in the international process. On December 1, 1991 Ukraine's population declared its independence by over 90 per cent of vote in the referendum.

I. Match the words with their definitions:

1) border, 2) anthem, 3) court, 4) soil, 5) mankind, 6) belong to, 7) outstanding

a) the whole of the human race, including both men and women;

b) to be of property of (someone) or to be a member of (a group);

c) excellent: very special and important in a particular way;
d) a song, which has special importance for a particular group of people, organization or country, often sung on a special occasion;
e) the line that divides one country from another;
f) a building where trials and other legal cases happen;
g) the material on the surface of the ground in which plants grow; earth.

II. Give English equivalents to the following words and word-combinations.

Займати площу, суверенна держава, проголосити, судова влада, вибори, конституційний суд, нафта, хімічна промисловість.

III. Give Ukrainian equivalents to the following words and word-combinations.

To have state borders with, according to the constitution, the main legislative body, the territory is indivisible, rapid change, climatic conditions, to be proud of, multibranch machine building.

IV. Say if the following sentences are true or false. Give the right variant.

1. Ukraine is smaller than France. 2. The Dniester and the Donets are ones of the biggest Ukrainian rivers. 3. The independence of Ukraine was proclaimed on the 24th of August 1991. 4. The highest executive office is that of the prime-minister. 5. The power in Ukraine is divided into three branches. 6. Only Ukrainians live in Ukraine. 7. There are a lot of historical monuments in Ukraine. 8. Ukraine has state borders with Hungary and Romania. 9. The agriculture is well developed in Ukraine because of its fertile soils. 10. The main legislative body of Ukraine is the constitutional court.

V. Answer the questions.

1. What countries does Ukraine border on?
2. What nationalities live in Ukraine?
3. When was the independence of Ukraine proclaimed?
4. What is the administrative division of Ukraine?
5. In what way is the power in Ukraine divided?

6. What do you know about Verkhovna Rada?
7. What are Ukrainian key industries?
8. Do you know some historical monuments in Ukraine?
9. What are the biggest cities in Ukraine?
10. What natural resources can be found in Ukraine?

EDUCATION IN UKRAINE

Present-day independent Ukraine has inherited a rather developed system of education from the previous regime, which answers the standards of the developed countries.

General secondary education in Ukraine is free and compulsory. The basic link in the chain of public education in Ukraine is the "general education (grade) school". Each has three stages: primary (1st — 4th grades), basic (5—9 grades) and senior (10—12 grades). Secondary education begins at the age of 6—7 and children leave school at the age of 17—18.

Those senior students, who want to get qualification alongside the secondary education, can go to vocational training schools (colleges). There are about 1,800 vocational training schools providing almost 800 qualifications. In most of them the students are also taught to complete curriculum of secondary education.

Institutions of higher learning (higher educational establishments) include universities, academies, institutes and conservatories. Nowadays all the applicants have independent testing on the subjects chosen. And according to its result they are adopted to the higher schools. Among the best known higher educational establishments there are Shevchenko Kyiv National University, Kyiv Polytechnic University, International Independent University "Kyiv-Mohyla Academy", Tchaikovsky National Music Academy of Ukraine (Kyiv Conservatory), Karazin Kharkiv National University, Franko Lviv National University, National Technical University "Kharkiv Polytechnic Institute", Scovoroda Kharkiv National Pedagogical University and many others. The university graduate receives a diploma of Bachelor's degree and Master of Science.

Post graduate education begins after the last year of studies and usually results in theses on the chosen scientific topic and the degree of the Doctor of Philosophy (PhD). Doctor of Science is awarded for an outstanding scientific research.

1. Give Ukrainian equivalents:

developed system of education, general education, basic stage, senior stage, compulsory, grade, conservatory, university graduate, outstanding, vocational training school.

2. Give English equivalents:

відповідати стандартам, програма реформ у сфері освіти, загальноосвітня школа, заклади вищої освіти, аспірантура, програма загальноосвітньої школи.

3. Fill in the blanks, using the suitable words from the text.

1. Present-day independent Ukraine has inherited a rather _____ of _____ from the previous regime, which _____ of the developed countries.
2. _____ secondary education in Ukraine is free and _____.
3. The basic link in the chain of public education in Ukraine is the "____".
4. Each secondary school has three stages: primary, _____ and _____.
5. The university graduate receives a diploma of _____.
6. Doctor of Science is awarded for _____.

4. Answer the questions.

1. What types of higher educational establishments do you know?
2. What does higher education in state and private institutions differ in Ukraine?
3. What subjects do students study?
4. What are the best known higher educational establishments in Ukraine?

UNIT 5

Grammar

Modal Verbs
Functions of the verbs — ***to be, to have, to do***

Reading Material

1. Computers Make the World Smaller and Smarter
2. Classification of Waves
3. Thermoelectric Nanowires vs. Nano Solar Cells
4. Air Conditioning
5. Photovoltaic Energy
6. Cross-Cultural Communication Problems
7. Environment Protection Must Be Global
8. Applied Metrology
9. Types of Business Communication
10. What is Cryogenics?
11. Theory of Metals and Heat Treatment
12. Recent Discoveries in Subatomic Physics
13. Why are Smartphones so Important in Daily Life?
14. Different Types of Drilling Machines
15. Organic Dyes

Topics

Great Britain
Education in Great Britain

Grammar

Модальні дієслова *can, may, must* та їхні еквіваленти

CAN (COULD)	**Можливість щось зробити (можу, вмію)**
Ствердні речення	
I ***can*** play the piano. *Я вмію грати на піаніно.* He ***can*** answer the question. *Він може відповісти на запитання.* He ***could*** play chess when he was five. *Він вмів грати у шахи, коли йому було п'ять років.*	
Питальні речення	
Can you sing? *Ви вмієте співати?* ***Can*** you help me? *Ви можете мені допомогти?* ***Could*** you help me? *Не могли б ви мені допомогти?*	
Заперечні речення	
I ***cannot*** swim. *Я не вмію плавати.* He ***cannot*** understand the rule. *Він не може зрозуміти правила.* I ***could not*** ski when I was little. *Я не вмів кататись на лижах, коли я був малим.*	

TO BE ABLE TO	**(Еквівалент дієслова CAN)**
He is ***able*** to do it. *Він в змозі це зробити.* He ***was able*** to do it yesterday. *Він зміг зробити це вчора.* He ***will be able*** to do it tomorrow. *Він зможе це зробити завтра.* He ***has been able*** to swim since childhood. *Він вміє плавати з дитинства.*	

MAY (MIGHT)	**Дозвіл (можна)**
You ***may*** take my pen. *Ви можете взяти мою ручку.* You ***may not*** touch it. *Не можна торкатися цього.* ***May*** I come in? *Можна увійти?*	
У непрямій мові Ann ***said that I might*** take her car. *Аня сказала, що я можу взяти її машину.*	
Припущення (можливо)	
It ***may*** rain soon. *Можливо (мабуть), скоро піде дощ.* Take care, you ***may*** fall. *Обережно, ви можете впасти.*	

TO BE ALLOWED TO	**(Еквівалент дієслова MAY)**
We ***are allowed*** to take these books. *Нам дозволяють брати ці книжки.* We ***were allowed*** to take these books. *Нам дозволили взяти ці книжки.* We ***will be allowed*** to take these books. *Нам дозволять взяти ці книжки.*	

MUST	**Обов'язок**
You ***must*** respect your parents. *Ви повинні поважати своїх батьків.* You ***must not*** go there. *Не можна ходити туди.* ***Must*** I learn it by heart? *Чи повинен я вивчити це напам'ять?*	
Припущення (напевно)	
It ***must*** be cold outside. *Напевно, на вулиці холодно.*	

TO HAVE TO	**(Еквівалент дієслова MUST)**
I ***have to*** go there. *Мені треба туди йти.*	I ***don't have to*** go there. *Мені не треба йти туди.*
I ***had to*** go there. *Мені довелось піти туди.*	I ***didn't have to*** go there. *Мені не довелось йти туди.*
I ***will have to*** go there. *Мені доведеться піти туди.*	I ***won't have to*** go there. *Мені не доведеться йти туди.*
Do you ***have to*** go there? *Вам треба йти туди?* ***Did*** you ***have to*** go there? *Вам довелось йти туди?* ***Will*** you ***have to*** go there? *Вам доведеться йти туди?*	

SHOULD, OUGHT TO	**Порада, рекомендація (слід, краще)**
You ***ought to*** be more attentive. *Вам слід бути більш уважними.* You ***should*** water these plants. *Вам слід полити ці рослини.*	

NEED? NEEDN'T	**Чи треба? Не треба**
Need I learn this poem by heart? *Мені треба вчити цей вірш напам'ять?* You **needn't** come so early. *Вам не обов'язково приходити так рано.*	

Модальні дієслова з Perfect Infinitive

must (певно)	**+ Perfect Infinitive (have + Participle II)**	Our engineer must have repaired this device. *Певно, наш інженер вже відремонтував цей прилад.*
may, might (можливо)		He may have returned home already. *Можливо, він вже повернувся додому.*
could, might (міг би)		They could have done it themselves. *Вони могли б зробити це й самі.*
should (слід було)		You should have helped him. *Вам слід було допомогти йому.*
needn't (не треба було, можна було й не)		They needn't have got up so early. *Їм не треба було вставати так рано. (Їм можна було й не вставати так рано.)*
can't (не може бути, що)		They can't have finished this experiment. *Не може бути, щоб вони закінчили цей експеримент.*
can (?) (невже)		Can he have done it himself? *Невже він зробив це сам?*

Дієслово *to be*

Форми

Present — am, is, are
Past — was, were
Future — will be
Participle — being, been

Функції

Функції та значення	Приклади
1. Смислове дієслово із значенням «бути», «знаходитись». У реченні після нього вживається іменник з прийменником або прислівник	Our institute is in the center of the city. — *Наш інститут знаходиться у центрі міста.* He is here. – *Він тут.*
2. Дієслово-зв'язка. Після нього може вживатися іменник або прикметник	My friend is a designer. — *Мій друг — конструктор.* She is beautiful. — *Вона вродлива.*
3. Допоміжне дієслово: а) для формування часів групи Continuous активного стану; б) для формування пасивного стану	He is making an experiment. — *Він проводить експеримент.* This book was published last year. — *Ця книга була опублікована в минулому році.*
4. Модальне дієслово у значенні «повинен»: ***to be to***	He is to come at 7. — *Він повинен прийти о сьомій.*

Дієслово *to have*

Форми

Present — have, has
Past — had
Future — will have
Participle — having, had

Функції

Функції та значення	Приклади
1. Смислове дієслово із значенням «мати».	This substance has a very valuable properties. — *Ця речовина має дуже цінні властивості.* He has a little sister. — *У нього є маленька сестра.*

Закінчення таблиці

Функції та значення	Приклади
2. Допоміжне дієслово: а) для формування часів групи Perfect, Perfect Continuous активного стану б) для формування часів групи Perfect пасивного стану	I have just seen him. — *Я тільки що бачив його.* She has been waiting for you for already two hours. — *Вона очикує вас уже дві години.* History exam has been just finished. — *Іспит з історії тільки що закінчився.*
3. Модальне дієслово у значенні «змушений (повинен)»: ***to have to***	On weekdays he has to wake up at 7 o'clock. — *По буднях він змушений прокидатися о 7 годині.*

Дієслово *to do*

Форми

Present — do, does
Past — did
Future — will do
Participle — doing, done

Функції

Функції та значення	Приклади
1. Смислове дієслово із значенням «робити»	Every day I do my morning exercises. — *Щодня я роблю ранкову гімнастику.*
2. Дієслово-замінник. Не перекладається	My father heard it all as plainly as I did. — *Батько чув все це так само ясно, як і я.*
3. Допоміжне дієслово (не перекладається): а) Do/Did SPO? — питальні речення б) do/did not +Vo — заперечні речення (для слабких дієслів) в) Do not PO — спонукальне речення в заперечній формі	Do you want to go to a movie tonight? — *Ви бажаєте піти в кіно сьогодні ввечері?* They didn't come back home in time. — *Вони не повернулися додому вчасно.* Don't be late! — *Не запізнюйтесь!*

Закінчення таблиці

Функції та значення	Приклади
4. Службове слово для посилення значення смислового дієслова. Часто перекладається словами типу *все ж*, *дійсно*.	I answered that I did remember it. — *Я відповів, що пам'ятаю про це дуже добре.* He did do it. — *Він все ж це зробив.* This did take place. — *Це дійсно відбулося.*

Exercises

Exercise 1. Translate the following sentences.

1. Mike can run very fast. 2. They can understand French. 3. Kate can speak English well. 4. My brother can come and help you in the garden. 5. Can you speak Spanish? 6. Can your brother help me with mathematics? 7. His little sister can walk already. 8. The children cannot carry this box: it is too heavy. 9. My friend cannot come in time. 10. This old woman cannot sleep at night. 11. His sister can cook very well. 12. I can sing, but I cannot dance.

Exercise 2. Translate into English using modal verb *can* (*could*).

1. Я вмію розмовляти англійською мовою. 2. Мій тато вміє розмовляти німецькою мовою. 3. Ти вмієш розмовляти французькою? 4. Моя сестра не вміє кататися на ковзанах. 5. Ти можеш переплисти цю річку? 6. Я не можу випити це молоко. 7. Вона не може вас зрозуміти. 8. Ти вмів плавати в минулому році? 9. В минулому році я не вмів кататися на лижах, а зараз вмію. 10. Ви можете мені сказати, як доїхати до вокзалу? 11. Чи не могли б ви мені допомогти? 12. Я не міг перекласти це речення. 13. Ніхто не міг мені допомогти. 14. Де тут можна купити хліб? 15. Твоя бабуся вміла танцювати, коли була молодою? — Так, вона і зараз вміє.

Exercise 3. Translate into English using *to be able to*.

1. Ти зможеш зробити цю роботу завтра? 2. Я думаю, вона не зможе вирішити цю задачу. 3. Завтра я вільний і зможу допомогти тобі. 4. Ми зможемо поїхати до Нью-Йорку в майбутньому році? 5. Ти зможеш відремонтувати мій магнітофон? 6. Вчора я не зміг побачити директора, оскільки він був на конференції, але сьогодні після роботи я зможу це зробити.

Exercise 4. Write the following sentences adding words given in brackets. Change modal verb *can* (*could*) into *to be able* to where it is necessary.

1. I can give you my book for a couple of days (after I have read it). 2. He can ski (for ten years). 3. We knew that she could swim (since childhood). 4. You cannot take part in this serious sport competition (until you have mastered good skills). 5. I could not solve the problem (before he explained it to me). 6. They can (never) appreciate your kindness. 7. I was sure you could translate that article (after you had translated so many texts on physics). 8. You can go to the country (when you have passed your last examination). 9. We can pass to the next exercise (when we have done this one).

Exercise 5. Translate the following sentences.

1. May I go to the post-office with Mike? 2. May I take Pete's bag? 3. Don't give the vase to the child: he may break it. 4. May we take notes with a pencil? 5. You may not cross the street when the light is red. 6. May I shut the door? 7. May I invite Nick to our house? 8. You may go now. 9. If you have done your homework, you may go for a walk. 10. Don't go to the wood alone: you may lose your way. 11. It stopped raining, and mother told us that we might go out. 12. May children play with scissors?

Exercise 6. Translate into English using modal verb *may*.

1. Можна мені увійти? 2. Можна, я піду гуляти? 3. Якщо твоя робота готова, можеш іти додому. 4. Вчитель сказав, що ми мо-

жемо іти додому. 5. Лікар каже, що я вже можу купатися. 6. Батько сказав, що ми можемо іти в кіно самі. 7. Я думав, що мені можна дивитись телевізор. 8. Якщо ти не вдягнеш пальто, ти можеш захворіти. 9. Не виходь з дому: мама може скоро прийти, а вона не має ключа. 10. Будь обережним: ти можеш впасти. 11. Не чіпай пса: він може тебе укусити. 12. Ми, можливо, поїдемо за місто в неділю 13. Він може забути про це. 14. Незабаром може піти дощ.

Exercise 7. Translate into English using the equivalent *to be allowed to*.
1. Мені дозволяють. 2. Діти вже великі. Їм дозволяють ходити до школи самим. 3. Йому не дозволяють купатися в цій річці. 4. Вчора їм дозволили прийти додому о десятій годині. 5. Нам не дозволяють розмовляти на уроках. 6. Тобі дозволили взяти цю книгу? 7. Я думаю, мені дозволять поїхати з тобою за місто. 8. Тобі дозволять піти гуляти, коли ти зробиш уроки. 9. Тобі дозволяли ходити на озеро, коли ти був маленьким? 10. Коли мені дозволять їсти морозиво?

Exercise 8. Insert modal verb *may (might)* or *to be allowed to*. Insert *to be allowed to* only in the cases when *may (might)* can't be used.
1. ... I bring my sister to the party? 2. He asked if he ... bring his sister to the party. 3. After they had finished their homework, the children ... watch TV. 4. He ... join the sports section as soon as he is through with his medical examination. 5. Becky's mother said that everybody ... take part in the picnic. 6. He ... go home if he likes. 7. As soon as the boy ... leave the room, he smiled a happy smile and ran out to join his friends outside. 8. The doctor says I am much better. I ... get up for a few hours every day.

Exercise 9. Insert modal verb *may* or *can*.
1. I ... finish the work tomorrow if no one bothers me any more. 2. ... we come and see you next Sunday at three o'clock in the afternoon?

3. What time is it? — It ... be about six o'clock, but I am not sure. 4. Only a person who knows the language very well ... answer such a question. 5. ... I come in? 6. Let me look at your exercises. I ... be able to help you. 7. I ... not swim, because until this year the doctor did not allow me to be more than two minutes in the water. But this year he says I ... stay in for fifteen minutes if I like, so I am going to learn to swim. 8. Libraries are quite free, and anyone who likes ... get books there. 9. I ... come and see you tomorrow if I have time. 10. Take your raincoat with you: it ... rain today. 11. Do you think you — ... do that?

Exercise 10. Insert modal verb *may* or *can*.

1. You ... come in when you have taken off your boots. 2. Be careful: you ... spill the milk if you carry it like that. 3. Most children ... slide on the ice very well 4. I don't think I ... be here by eleven o'clock tomorrow, but I ... be. 5. ... you see anything in this inky darkness? 6. You ... go when you have finished your compositions. 7. What will we do if the train is late? It ... be late, you know, after the terrible snowstorms we've had. 8. When ... you come and see me? — Let me see: I ... not come tomorrow, for I must be at the meeting, but on Sunday I'll find time. Yes, you ... expect me on Sunday about three o'clock. Will that be all right?

Exercise 11. Insert modal verb *may* (*might*) or *can* (*could*).

1. ... I use your pen? 2. ... I find a pen on that table? 3. You ... read this book: you know the language well enough. 4. You ... take this book: I don't need it. 5. ... I help you? 6. ... I ask you to help me? 7. ... you help me? 8. I ... not imagine her speaking in public: I knew that she was so shy. 9. Something was wrong with the car: he ... not start it. 10. A fool ... ask more questions than a wise man ... answer. 11. She asked me if she ... use my telephone. 12. The school was silent: nothing ... be heard in the long dark corridors. 13. Waiting ... be endless, you know. 14. ... you tell me the nearest way to the city mu-

seum? 15. They ... think that I am too weak to take part in the excursion, but I am strong enough to do any kind of hard work, indeed. 16. He knew this period of history very well: he had read everything on the subject he... find in the rich university library.

Exercise 12. Translate the following sentences.

1. You must work hard at your English. 2. You must learn the words. 3. Must we learn the poem today? 4. It must be very difficult to learn Chinese. 5. You must not talk at the lessons. 6. Everybody must come to school in time. 7. Don't ring him up: he must be very busy. 8. You must not make notes in the books. 9. I must help my mother today.

Exercise 13. Translate into English using modal verb *must*.

1. Я повинна наполегливо працювати над своєю англійською. 2. Ви повинні уважно слухати вчителя на уроці. 3. Ти повинен робити уроки кожен день. 4. Ви не повинні забувати про свої обов'язки. 5. Ви повинні бути обережні на вулиці. 6. Вона повинна бути зараз вдома. 7. Мої друзі, мабуть, у парку. 8. Ви, мабуть, дуже голодні. 9. Мабуть, дуже важко розв'язувати такі задачі. 10. Я повинен сьогодні побачити мого приятеля (друга).

Exercise 14. Translate the following sentences.

1. I had to do a lot of homework yesterday. 2. She had to stay at home because she did not feel well. 3. Pete had to stay at home because it was very cold. 4. Mike had to write this exercise at school because he had not done it at home. 5. They had to call the doctor because the grandmother was ill. 6. Why did you have to stay at home yesterday? — Because my parents were not at home and I had to look after my little sister. 7. I have not written the composition. I will have to write it on Sunday. 8. We did not have to buy biscuits because granny had baked a delicious pie. 9. Will you have to get up early tomorrow?

Exercise 15. Translate into English using modal verb *must* or its equivalent *to have to*.

1. Я повинна	піти в магазин сьогодні
	зварити обід
	зробити уроки
	написати листа
2. Мені доведеться	піти в магазин завтра
	зварити обід
	зробити уроки
	піти до школи
	написати листа брату
3. Мені довелось	піти в магазин вчора
	зварити обід
	зробити уроки
	піти до школи
	написати листа брату

Exercise 16. Transform the following sentences in *Past Indefinite*.

1. It is already twenty minutes past eight. You must go or you will be late for the first lesson. 2. I am very tired. I feel I must go to bed at once, or I will fall asleep where I am sitting. 3. We can't wait for them any longer, we must ring them up and find out what has happened. 4. I am thinking hard, trying to find a solution of the problem. There must be a way out. 5. It is quite clear to everybody in the family that he must start getting ready for his examination instead of wasting time. 6. It is impossible to do anything in such a short time. I must ask the chief to put off my report. 7. I don't mean that you must do everything they tell you.

Exercise 17. Transform the following sentences in *Past* and *Future Indefinite*. Change modal verbs *must* and *can* into their equivalents where it is necessary.

1. You must listen to the tape-recording of this text several times. 2. You must take your examination in English. 3. She can translate

this article without a dictionary. 4. We can't meet them at the station. 5. The doctor must examine the child. 6. He must work systematically if he wants to know French well. 7. This child must spend more time out in the open air. 8. I can't recite this poem. 9. You must take part in this work. 10. He can't join the party because he is busy.

Exercise 18. Translate the following questions into English and answer them.

1. Що ви повинні зробити сьогодні?
2. Що вам (треба буде) доведеться зробити завтра?
3. Що вам довелось зробити вчора?

Exercise 19. Translate into English using modal verbs *must, may* or *can*.

1. Він зараз повинен бути в своєму кабінеті. Ви можете поговорити з ним. 2. Можна увійти? — Будь ласка. 3. Ви повинні прочитати цей текст. 4. Він може виконати це завдання? 5. Можна мені взяти вашу книгу? 6. На уроці англійської мови ви повинні говорити тільки англійською. 7. Ми повинні сьогодні здати зошити? 8. Можна мені поставити вам питання? — Будь ласка. 9. Я не можу піти з вами у кіно, оскільки я дуже зайнятий. 10. Можна тут палити? — Будь ласка.

Exercise 20. Fill in the blanks with modal verbs *can, may* or *must*.

1. What ... we see on this map? 2. ... you speak Spanish? — No, unfortunately I ... . 3. At what time ... you come to school? 4. ... I come in? 5. You ... not smoke here. 6. ... take your book? — I am afraid not: I need it. 7. He ... not speak English yet. 8. I have very little time: I ... go. 9. They ... not go to the park today because they are busy. 10. You ... read this text: it is easy enough.

Exercise 21. Translate the following sentences.

1. I was to wait for her at the railway station. 2. We were to go to the cinema that afternoon. 3. They were to start on Monday. 4. He was to te-

lephone the moment she was out of danger. 5. Roses were to be planted round the pond. 6. There was to be a discussion later on. 7. We were to get there before the others. 8. He was to tell her where to find us. 9. She was to graduate that year. 10. She was to wear that dress at the graduation party. 11. He is to come here at five o'clock. 12. The train was to leave at five-fifteen.

Exercise 22. Translate, minding the different meanings of the verb *to have*.

1. We cannot have a terminated or finite magnetic flux. 2. Very often the magnet has the form of upright round iron legs on which the coils are wound, united by a cross piece, called the yoke. 3. By weighing the amount of copper or silver deposited in a copper or silver voltammeter, we have seen that uniform electric current can be measured. 4. Electromotive force has to be continually applied to maintain the current. 5. In the magnetic circuit we have to consider as important quantities, the length of the circuit, the cross-section of the circuit and the specific magnetic quality of the material the circuit is made of. 6. In many problems in physics we have to deal with the case of a body rotating or swinging round an axis. 7. Everyone is more or less familiar with elementary experiments having to do with electrically charged bodies.

Exercise 23. Read and translate the following sentences paying attention to the modal verbs and their equivalents.

1. Information or data can be stored in the computer's memory or storage. 2. An analog computer is able to calculate by using physical analogs of numerical measurements. 3. The first automatic computers could operate at the low speed. 4. Your paper may be published at our Institute. 5. My friend was happy when at last he might work at the computing center. 6. Our students are allowed to visit the computing center to see the operation of the computer ES-I 1045. 7. Every student must know that a digital computer performs reasonable op-

erations. 8. Some operations for this computer have to be changed and new instructions have to be added. 9. The instructions are recorded in the order in which they are to be carried out. 10. According to the timetable you are to begin your classes at 8 o'clock. 11. Every student of our speciality has to know what a hybrid computer is.

Exercise 24. Translate these sentences.

1. Students have to attend lectures and practical classes. 2 Every advanced student has to carry on research. 3. These girls are to take their entrance examinations in July. 4 The examination was to take place on Monday. 5. We will have to carry on our experiment in the laboratory. 6. I am to meet a friend of mine at the station today. 7. Students will be able to improve their reading speed if they read much. 8. Studying English the students must always work at the language laboratory. 9. Yesterday she had to write an article for the wall newspaper. 10. Many new schools are to be built in new regions of this city. 11. I will have to deliver a lecture on modern methods of language teaching. 12. The foreign guests are to leave Kharkiv tomorrow.

Exercise 25. Translate the following sentences.

1. Nitric acid may be used to oxidize hydrogen. 2. All the laboratory vessels have to be carefully washed before using them for any experiments. 3. A chemist must know the physical laws which govern the behavior of matter in various states. 4. Considering all the elements together, we may see that there are certain groups that have very similar chemical properties. 5. In the chart we can see that the elements are arranged in horizontal rows of ten in the order of increasing atomic weights. 6. The Periodic Law can be simply stated as follows: The properties of the elements are a periodic function of the nuclear charges of their atoms. 7. Synthetic chemistry deals with the methods by which the complex bodies may be built up from simpler substances. 8. Electrolysis may be an example of electrochemistry.

9. According to the law of conservation of matter, matter can neither be created nor destroyed 10. Matter can exist in four physical states, namely, solid, liquid, plasma or gaseous. 11. Because atoms are so very small their number must be extremely large. 12. We had to use a catalyst to accelerate the reaction. 13. When a house is to be built a number of things are to be taken into consideration.

Exercise 26. Change modal verbs into their equivalents and translate them.

1. Among these may be mentioned the quality of material. 2. At the same time we must, remember about the "style" in which the building is to be planned. 3. This decision should be made before planning the house is started. 4. For concrete sand and stone must be proportioned and mixed 5. Cement should be ground extremely fine.

Exercise 27. Find obligatory verbs and translate them.

1. According to Lomonosov, science and literature should serve the people. 2. Out-of-date equipment is to be repaired and modernized. 3. One should remember that an object can be in equilibrium not only when it is standing motionless but also when it is moving in a straight line at constant speed. 4. Being an experienced engineer you ought to be able to design this device. 5. In this case the emf in equation 1 must be replaced by the voltage across the portion U. 6. In the formulas 1 and 2 all the quantities must be expressed in the same system of units.

Exercise 28. Translate the following sentences paying attention to modal verbs. Define the infinitive form.

l. These materials can be classified into 3 groups. 2. The investigation of cosmic space must be continued on an ever increasing scale. 3. The operator ought to have explained to you the operation of these electronic devices. 4. As the methods of work must have been improved, the workers obtained better results. 5. The engineer should

have controlled the work of the computer, processing the results of our important investigation. 6. The electrician may have turned off the light, we could not continue our experiments in the darkness. 7. Professor had to give detailed answers to each question. 8. We must hurry if we want to catch the train. 9. They had to be informed about his latest achievements in this field of engineering.

Exercise 29. Use modal verbs in *Present* and *Past Indefinite*. Make up questions and negative sentences.

1. He can speak English but he cannot speak French. 2. You may take the dictionary from the library. 3. You must do this work thoroughly. 4. You must not be late for your lectures.

Exercise 30. Translate the sentences paying attention to the meaning of modal verbs with *Perfect Infinitive*.

1. The Curies could have patented their discovery and possibly made a fortune but they published everything. 2. You could have made your report much better if you had collected all the necessary data. 3. He must have gone to the library, I can't find him anywhere. 4. He may have left already, it is rather late. 5. You should have helped your friend, he missed many lessons. 6. He can't have done such a thing. 7. Some of the ancient tools made from copper may have contained some impurities, which contributed to its hardness.

Exercise 31.

I. Find the sentence where the equivalent of the modal verb *can* is used.

1. He had to speak English because he was talking to an Englishman.
2. He will be able to speak English in two months.

II. Find the sentence where the equivalent of the modal verb *may* is used.

1. He will be allowed to use a dictionary while translating the text.
2. He had to use a dictionary while translating the text.

III. Find the sentence where the equivalent of the modal verb *must* is used.

1. He had to take the dictionary from the library.
2. He was allowed to use a dictionary while translating the text.

Exercise 32. Write the following sentences in interrogative and negative forms and translate them.

1. The students may use all the dictionaries from the library. 2. You must use these books. 3. They may speak aloud here. 4. We had to discuss the accident there. 5. This student will need his friend's help. 6. The post-graduates could find this hand-book in the library.

Exercise 33. Write the following sentences in Past and Future Indefinite.

1. The specialists must know the properties of the materials, which they use for construction. 2. You may apply the new methods of work in your research. 3. He can explain to you the principle of work of these instruments.

Exercise 34. Check your knowledge of modal verbs by translating the following sentences.

1. According to the law of conservation of energy, the energy spent in starting the body must be equal to that derived from the body when it is stopped. 2. The wire used should have as large a cross-section as possible when it is desirable to keep resistance as low as possible. 3. We will have to work out an experiment in which we will be able to keep the particles in the plasma, that is (i.e.) deprive them of the possibility of transmitting the heat to the walls of the container. 4. Thus we were obliged to use gaseous heavy hydrogen for our experiments. 5. Using radioactive isotopes, biologists and agriculturalists will be able to carry out research impossible by any other method. 6. The calibrated balance can then be used to measure any unknown force. 7. The open end of the tube is connected to the device

the pressure within which is to be measured. 8. You ought to stay longer and you will see that everything isn't as beautiful as it looks at first sight. 9. The total number of ions in the chamber may then grow very quickly and each primary ionization may be followed by several thousand secondary ionizations. 10. The man was so excited that he could not be understood. 11. We now see that this point must have been the center of mass of the body. 12. He cannot have made such a serious mistake. 13. You should have changed the current strength at all points of the circuit.

Reading Material

Text 1
COMPUTERS MAKE THE WORLD SMALLER AND SMARTER

The ability of tiny computing devices to control complex operations has transformed the way many tasks are performed, ranging from scientific research to producing consumer products. Tiny "computers on a chip" are used in medical equipment, home appliances, cars and toys. Workers use handheld computing devices to collect data at a customer site, to generate forms, to control inventory, and to serve as desktop organisers.

Not only computing equipment getting smaller, it is getting more sophisticated. Computers are part of many machines and devices that once required continual human supervision and control. Today, computers in security systems result in safer environments, computers in cars improve energy efficiency, and computers in phones provide features such as call forwarding, call monitoring, and call answering.

These smart machines are designed to take over some of the basic tasks previously performed by people; by so doing, they make life a little easier and a little more pleasant. Smart cards store vital information such as health records, drivers' licenses, bank balances, and so on. Smart phones, cars, and appliances with built-in computers can be programmed to better meet individual needs. A smart house has

a built-in monitoring system that can turn lights on and off, open and close windows, operate the oven, and more.

With small computing devices available for performing smart tasks like cooking dinner, programming the VCR, and controlling the flow of information in an organization, people are able to spend more time doing what they often do best-being creative. Computers can help people work more creatively.

Multimedia systems are known for their educational and entertainment value, which we call "edutainment". Multimedia combines text with sound, video, animation, and graphics, which greatly enhances the interaction between user and machine and can make information more interesting and appealing to people. Expert systems software enables computers to "think" like experts. Medical diagnosis expert systems, for example, can help doctors pinpoint a patient's illness, suggest further tests, and prescribe appropriate drugs.

Connectivity enables computers and software that might otherwise be incompatible to communicate and to share resources. Now that computers are proliferating in many areas and networks are available for people to access data and communicate with others, so personal computers are becoming interpersonal PCs. They have the potential to significantly improve the way we relate to each other. Many people today telecommute — that is, use their computers to stay in touch with the office while they are working at home. With the proper tools, hospital staff can get a diagnosis from a medical expert hundreds or thousands of miles away. Similarly, the disabled can communicate more effectively with others using computers.

Distance learning and videoconferencing are concepts made possible with the use of an electronic classroom or boardroom accessible to people in remote locations. Vast databases of information are currently available to users of the Internet, all of whom can send mail messages to each other. The information superhighway is designed to significantly expand this interactive connectivity so that people all over the world will have free access to all these resources.

People power is critical to ensuring that hardware, software, and connectivity are effectively integrated in a socially responsible way. People — computer users and computer professionals — are the ones who will decide which hardware, software, and networks endure and how great an impact they will have on our lives. Ultimately people power must be exercised to ensure that computers are used not only efficiently but in a socially responsible way.

Завдання до тексту

I. Дайте відповідь на запитання.

1. Name some types of devices that use "computers on a chip".
2. What uses of handheld computers are mentioned in the text?
3. What are the benefits of using computers with the following items?
   a) Security systems
   b) Cars
   c) Phones
4. What smart devices are mentioned in the text?
5. What are smart cards used for?
6. What are the advantages of multimedia?
7. What can medical expert systems do?
8. How can computers help the disabled?
9. What types of computing systems are made available to people in remote locations using electronic classrooms or boardrooms?
10. What aspects of computing can people power determine?

II. Визначте, які речення є правильними (t), а які ні (f).

1. Desktop organisers are programs that require desktop computers.
2. Computers are sometimes used to monitor systems that previously needed human supervision.
3. Networking is a way of allowing otherwise incompatible systems to communicate and share resources.
4. The use of computers prevents people from being creative.
5. Computer users do not have much influence over the way that computing develops.

Text 2
CLASSIFICATION OF WAVES

Waves transmit energy from place to place. Mechanical waves are formed when a disturbance causes surrounding molecules to change position. This sets up a chain reaction in which neighboring molecules change position, and then return to their original position after bumping their "neighbors".

This chain reaction constitutes a wave. A disturbance can be anything that disrupts the surrounding molecules. Virtually anything that is seen or heard is the result of some kind of disturbance that is transmitted by a wave. All waves have common characteristics-speed, wavelength, frequency, and amplitude. Waves can be classified as mechanical waves or electromagnetic waves. Mechanical waves such as water waves or sound waves require a medium through which to travel. Electromagnetic waves, such as visible light, radio waves, and X rays, can travel through a vacuum — a space void of matter.

Waves can also be classified as either transverse or longitudinal. In transverse waves, the high points of the wave are the crests and the low points are the troughs. In longitudinal waves, the compressions compare to the troughs of transverse waves. The wavelength is the distance from any point on a wave to the next similar point. The number of crests (or compressions) that pass a given point in a certain amount of time is the frequency of the wave.

All waves also share similar behaviors. Waves can be reflected or refracted and can create interference. Both reflection and refraction involve waves and two different mediums. In reflection, the waves bounce back when they encounter a new medium. According to the law of reflection, the angle of incidence equals the angle of reflection. In refraction, the waves change speed and direction as they enter a new medium. Interference is the result of different waves moving through one another. Interference can be constructive, resulting in a greater amplitude, or destructive, resulting in a smaller amplitude.

Завдання до тексту

I. Випишіть з тексту 5—7 речень, що передають основну думку.

II. З'ясуйте, до якого з абзаців тексту може бути поставлено запитання *What is the wavelength?*

III. Складіть з поданих нижче слів речення.

1. refracted, waves, be, can, reflected, or
2. can, or, destructive, interference, be, constructive
3. can, through, a, vacuum, electromagnetic, travel, waves

Text 3
THERMOELECTRIC NANOWIRES VS. NANO SOLAR CELLS

Thermoelectric devices can convert heat into electricity. Many temperature sensing devices take advantage of this effect by using electricity to measure temperature in devices called thermocouples. Various researchers are working to produce inexpensive and efficient thermoelectric materials that can change waste heat into electricity.

Recently there was an announcement that researchers at Berkeley had made silicon nanowires that convert heat into electricity using a thermoelectric effect. One possible use of these is to charge portable devices. The wires could be embedded in fabric, so that your jacket could become a charging station, using your body heat to generate the electricity.

Other researchers have made thermoelectric nanowires. The difference with Berkeley's work is that they have reduced the diameter of the wires and modified the surface texture to reduce the thermal conductivity while maintaining the electrical conductivity, a key requirement of thermoelectric materials. It is, in fact, the combination of the wire diameter, the roughness of the surface texture, and doping the silicon with boron that reduce the thermal conductivity without having serious impact on the electrical conductivity.

This concept can be applied in other ways as well. One possibility for this research is that cars could be set up to use their own waste

heat to run the radio and other electrical devices in the car. Siphoning off and making use of heat from power plants would be another logical use. All that heat your laptop computer generates that now scorches your thighs could be used to power the laptop up.

This got me thinking about the folks who are working on a parallel track to embed solar cells in fabric. Konarka Technologies, for example, is currently selling solar cell material to Sky Shades, a maker of awnings. By embedding nanoparticles in plastic film they produce a lightweight, flexible photovoltaic material called Power Plastic®. The process involves printing or coating nanoparticles (such as quantum dots or nanocrystals) onto other material using a process similar to printing ink on newspaper.

That's when I started wondering, why would you need both of these technologies? Then a light went off in my brain—solar doesn't work in the dark, or in regions of the country where it's cloudy many days of the year. That's why the combination of these two solutions could work to ensure that you're inexpensively charged up, 24/7.

The jacket of the future might have thermo electric nanowires in strategic places (under your arms is a logical hot spot) with solar cells embedded on the shoulders. Imagine how handy a military jacket with both thermoelectric nanowires and solar cells would be. Lighter weight batteries that can be constantly recharged could be carried onto the battlefield to power communications or other equipment.

When will you find such a juiced up jacket in your local department store? You're probably looking about ten years lead time till you make that shopping trip. In the meantime keep that cell phone charger handy and check my Nanotechnology and Energy Web page for updates.

Завдання до тексту

I. Підберіть синоніми до поданих слів.

To convert, to use, device, inexpensive, waste, heat, fabric, to reduce, to modify, requirement, in fact, impact, to apply, possibility, power,

folks, for example, currently, produce, similar to, regions, handy, constantly, equipment, probably.

II. Визначте, які речення є a)правильними (t), b) які ні (f), c) інформація відсутня.

1. Thermoelectric devices can convert water into vapour.
2. Researches from Berkley made their nanowires from gold.
3. Thermoelectric jacket may use the energy of sun to power your hand-held devices.
4. One of the possible applications of the thermoelectric effect in the car is to use the waste heat to power radio and other electrical devices.
5. Konarka Technologies is now producing photovoltaic materials using nanotechnology.
6. Thermoelectric technology and solar cells may be also used in military uniform.
7. We can buy thermoelectric jackets in any shop today.

III. У чому полягає основна ідея тексту?

Text 4
AIR CONDITIONING

Air conditioning is the process of altering the properties of air (primarily temperature and humidity) to more comfortable conditions, typically with the aim of distributing the conditioned air to an occupied space to improve thermal comfort and indoor air quality.

In common use, an air conditioner is a device that lowers the air temperature. The cooling is typically achieved through a refrigeration cycle, but sometimes evaporation or free cooling is used. Air conditioning systems can also be made based on desiccants.

In the most general sense, air conditioning can refer to any form of technology that modifies the condition of air (heating, cooling, humidification, cleaning, ventilation, or air movement). However, in construction, such a complete system of heating, ventilation, and air conditioning is referred to as HVAC.

The basic concept behind air conditioning is said to have been applied in ancient Egypt, where reeds were hung in windows and were moistened with trickling water. The evaporation of water cooled the air blowing through the window. This process also made the air more humid, which can be beneficial in a dry desert climate. In Ancient Rome, water from aqueducts was circulated through the walls of certain houses to cool them. Other techniques in medieval Persia involved the use of cisterns and wind towers to cool buildings during the hot season.

Modern air conditioning emerged from advances in chemistry during the 19th century, and the first large-scale electrical air conditioning was invented and used in 1902 by American inventor Willis Carrier. The introduction of residential air conditioning in the 1920s helped enable the great migration to the Sun Belt in the United States.

Air-conditioning is the bringing of air in a building to a desired temperature, purity, and humidity throughout the year to maintain healthy and comfortable atmosphere. Air-conditioning may be divided into two main sections: one for the processing of materials in industry, the other for human comfort.

Air-conditioning provides the following services:

1. Filtration of the air both in winter and summer to remove dust.

2. Circulation of the air at low velocity and with proper diffusion to prevent draughts and maintain a uniform temperature and humidity at all parts of the inhabited space.

3. Introduction of enough fresh air from the outside atmosphere.

4. Heating of the air in winter.

5. Cooling of the air in summer below the outside atmosphere.

6. Humidify the air in winter to a relative humidity of at least 20—25 per cent.

7. Dehumidify the air in summer to a relative humidity not exceeding 55 per cent.

Завдання до тексту

I. Дайте відповідь на запитання.

1. Define the process of air-conditioning.
2. What is the aim of the air-conditioning process?
3. What is an air-conditioner?
4. How did air-conditioning evolve?
5. When did modern air-conditioning emerge?
6. What are the two main sections that air-conditioning may be divided into?
7. What services does air-conditioning provide?

II. Визначте, які речення є a)правильними (t), b) які ні (f), c) інформація відсутня.

1. Modern air-conditioners give comfort in hot weather, but they cost a lot of money.
2. After ten years of exploitation an air-conditioner should be replaced by a new one.
3. Ener Guide label shows how much energy a particular item of equipment consumes in five years of normal service.
4. Air-conditioners use a kWh rating.
5. An air-conditioner must have a SEER of at least 10 to be sold in the United States.
6. Typical air-conditioning units use outdoor evaporator coil and indoor condenser.
7. Central air-conditioners not only cool air, but also dehumidify.

III. Складіть запитання до речень.

1. He installed an expensive air-conditioner at his office. (Who? What? Where?)
2. It is very hot in here, you should switch on the air-conditioner. (Why? What? Who?)
3. An air-conditioner helps to keep the comfortable level of humidity in the room. (What? What level? Where?)
4. He bought an expensive air-conditioner last month. (Who? What? When?)

5. Air-conditioners are used in flats, offices, cars to keep optimal climatic conditions. (What? Where? What for?)
6. The first air-conditioner was produced in 1929 by General Electrics company. (What? When? By whom?)

Text 5
PHOTOVOLTAIC ENERGY

The sun has produced energy for billions of years. Solar energy is the solar radiation that reaches the earth. Solar energy can be converted directly or indirectly into other forms of energy, such as heat and electricity. The major drawbacks (problems, or issues to overcome) of solar energy are: (1) the intermittent and variable manner in which it arrives at the earth's surface and, (2) the large area required to collect it at a useful rate.

Solar energy is used for heating water for domestic use, space heating of buildings, drying agricultural products, and generating electrical energy. Electricity can be produced directly from solar energy using photovoltaic devices or indirectly from steam generators using solar thermal collectors to heat a working fluid.

Photovoltaic energy is the conversion of sunlight into electricity through a photovoltaic (PVs) cell, commonly called a solar cell. A photovoltaic cell is a nonmechanical device usually made from silicon alloys. Photovoltaic conversion is useful for several reasons. Conversion from sunlight to electricity is direct, so that bulky mechanical generator systems are unnecessary. The modular characteristic of photovoltaic energy allows arrays to be installed quickly and in any size required or allowed. Also, the environmental impact of a photovoltaic system is minimal, requiring no water for system cooling and generating no by-products.

The major applications of solar thermal energy at present are heating swimming pools, heating water for domestic use, and space heating of buildings. For these purposes, the general practice is to use flat-plate solar-energy collectors with a fixed orientation (position).

Solar collectors fall into two general categories: nonconcentrating and concentrating. In the nonconcentrating type, the collector area (i.e. the area that intercepts the solar radiation) is the same as the absorber area (i.e., the area absorbing the radiation). In concentrating collectors, the area intercepting the solar radiation is greater, sometimes hundreds of times greater, than the absorber area.

Solar thermal power plants use the sun's rays to heat a fluid, from which heat transfer systems may be used to produce steam. The steam, in turn, is converted into mechanical energy in a turbine and into electricity from a conventional generator coupled to the turbine. Three types of solar-thermal power systems in use or under development are: parabolic trough, solar dish, and solar power tower.

The parabolic trough is the most advanced of the concentrator systems. This technology is used in the largest grid connected solar-thermal power plants in the world. A parabolic trough collector has a linear parabolic-shaped reflector that focuses the sun's radiation on a linear receiver located at the focus of the parabola. The engine in a solar dish/engine system converts heat to mechanical power by compressing the working fluid when it is cold, heating the compressed working fluid, and then expanding the fluid through a turbine or with a piston to produce work. A solar power tower or central receiver generates electricity from sunlight by focusing concentrated solar energy on a tower-mounted heat exchanger (receiver). This system uses hundreds to thousands of flat sun-tracking mirrors called heliostats to reflect and concentrate the sun's energy onto a central receiver tower. This is a promising technology for large-scale grid-connected power plants. Though power towers are in the early stages of development compared with parabolic trough technology, a number of test facilities have been constructed around the world.

Завдання до тексту

I. Дайте відповідь на запитання.

1. What does the term "solar energy" mean?
2. What are the main drawbacks of solar energy?

3. Where is solar energy used?
4. How can electricity be produced?
5. What is the principle of the solar thermal power plant operation?

II. Знайдіть у тексті слова з такими значеннями: перетворення; рідина; сонячна тарілка; випромінювання; поверхня; розвиток.

III. Знайдіть у тексті та перекладіть речення, в яких вжито модальні дієслова.

Text 6
CROSS-CULTURAL COMMUNICATION PROBLEMS

The key to effective cross-cultural communication is knowledge. First, it is essential that people understand the potential problems of cross-cultural communication and make a conscious effort to overcome these problems. Second, it is important to assume that one's efforts will not always be successful, and adjust one's behaviour appropriately.

For example, one should always assume that there is a significant possibility that cultural differences are causing communication problems, and be willing to be patient and forgiving, rather than hostile and aggressive, if problems develop. One should respond slowly and carefully in cross-cultural exchanges, not jumping to the conclusion that you know what is being thought and said.

William Ury's (Senior Fellow of the Harvard Negotiation Project) suggestion for heated conflicts is to stop, listen, and think, or as he puts it "go to the balcony" when the situation gets tense. By this he means withdraw from the situation, step back, and reflect on what is going on before you act. This helps in cross-cultural communication as well. When things seem to be going badly, stop or slow down and think. What could be going on here? Is it possible I misinterpreted what they said, or they misinterpreted me? Often misinterpretation is the source of the problem.

Active listening can sometimes be used to check this out — by repeating what one thinks he or she heard, one can confirm that one

understands the communication accurately. If words are used differently between languages or cultural groups, however, even active listening can overlook misunderstandings.

Miscommunication between people happens all the time, especially when one of the parties is using a second language. Misunderstandings lead to doubt about the real intent of others.

Every country has its own communication style and habits. English speakers have the habit of using sport and military metaphors. They even use mixed metaphors and dead metaphors. For example, they talk about "leveling the playing field" before they "charge straight in" to the "front line of operations". They can "step up to the plate and grab the bull by the horns". Americans like to use slang words and phrases that even other Americans don't always understand. Japanese people do not like to refuse something, so they say that it will be discussed "later". Later means never.

French people can get easily offended. For example, every word has to have a French translation — e-mail, mail are too English, and so the word "courriel" was created. Germans love details and Italians don't. And the list of generalized differences can go on and on.

English speakers can rapidly create bad impression by being inappropriately informal. Many cultures have a different concept of respect and formality. In many cultures people will only address others using personal names after several months — or not at all. Native English speakers from all countries generally address acquaintances on the first name basis faster than in some cultures.

Americans are the champions with the general use of nick names. Beginning your conversation informally in many countries can be insulting.

Завдання до тексту

I. Дайте відповідь на запитання.

1. What should people know for committing effective cross-cultural communication?

2. What can cultural differences cause?
3. What is the best recommendation to avoid a cross-cultural conflict?
4. What is the main reason of a cross-cultural conflict?
5. What is the most common type of situation when miscommunication between people happens? Why?
6. What new information have you learned about habits of English speakers?

II. Закінчіть речення згідно зі змістом тексту.

1. There is a significant possibility that...
2. The suggestion for heated conflicts is...
3. If words are used differently between languages or cultural groups...
4. Misunderstandings lead to...
5. English speakers have the habit of...
6. Americans like...
7. Japanese people do not like...
8. French people can...
9. Many cultures have...
10. Beginning your conversation informally...

III. Знайдіть абзац, в якому міститься інформація:

Different countries have their own communication style and habits.

Text 7
ENVIRONMENT PROTECTION MUST BE GLOBAL

That the problem of pollution and ecology has become the most important one for mankind is evident to all. The more civilization is developing, the greater the ecological problems are becoming. Air and water pollution by industry is now reaching tremendous proportions. In our era it is changing from a national to an international problem, especially in territories where rivers cross several courtiers. The seas and oceans are also becoming seriously polluted. A similar situation is developing in the atmosphere. It is known that many cities throughout the world suffer from air pollution.

However, our scientific knowledge and technological advancement make it possible to eliminate it if people use good will and make considerable investments for that purpose. The development of natural resources on a global scale is already possible from a scientific and technical standpoint. Large-scale experimental work in this area is successfully being carried out.

At present scientists in industrially developed countries are working on the theory of interaction of all the atmospheric and oceanic global processes that determine the climate and weather of the world. Increasing growth of population, industrialization and the use of resources are slowly but surely changing the global climate and water balance. This can be described as a great experiment, one that may bring about changes in the environment more serious than ever before.

The essential feature in the environment protection is that many problems can be solved only on the level of world community. Therefore, the planning of protection against pollution by human society as a whole is imperative today and in the near future. It is necessary to develop an international program to study data on land, forest, atmospheric and oceanic resources, both renewable and non-renewable. Many scientists and special public organizations must joint efforts in order to deal with the problem and take necessary measures to protect the environment.

It is still a big job and much remains to be done. However, scientists are confident that planned actions of all countries can eliminate pollution and achieve successes in purifying air, water and soil and in safeguarding natural resources. At the same time one must realize that social and political circumstances may stand in the way of further progress in this field.

Завдання до тексту

I. Дайте відповідь на запитання.

1. What is this text about?
2. What is ecology?

3. How does water and air become polluted?
4. Why is the problem of water pollution becoming a global problem?

II. З'єднайте слова з колонки А з відповідними словами з колонки В.

A	B
1. protect	A. do not fell well
2. serious	B. for all people
3. suffer	C. keep safe from smth.
4. interaction	D. protection
5. essential	E. needing attention
6. imperative	F. important
7. public	G. necessary, most important, fundamental
8. safeguarding	H. action on each other

III. Знайдіть модальні дієслова та поясніть особливості їх перекладу.

Text 8
APPLIED METROLOGY

Metrology laboratories are places where both metrology and calibration work are performed. Calibration laboratories generally specialize in calibration work only.

Both metrology and calibration laboratories must isolate the work performed from influences that might affect the work. Temperature, humidity, vibration, electrical power supply, radiated energy and other influences are often controlled. Generally, it is the rate of change or instability that is more detrimental than whatever value prevails. Calibration technicians execute calibration work. In large organizations, the work is further divided into three groups:

a) Set-up people arrange the equipment needed for calibration and verify that it works correctly.

b) Operators execute the calibration procedures and collect data.

c) Tear-down people dismantle set-ups, check the components for damage and then put the components into a stored state. This is

the entry-level position for people who didn't start in the equipment warehouse or transportation functions.

Alternatively, the technicians can be divided by major discipline areas: physical, dimensional, electrical, microwave and so on. But the principles are the same regardless of the equipment. Metrology technicians perform investigation work in addition to calibrations. They also apply proven principles to known situations and evaluate unexpected or contradictory results.

Large industrial organizations also develop people who demonstrate aptitude in testing functions. When this is combined with an engineering degree, it qualifies the person as a metrology engineer who performs metrology work at and above the technician levels.

The metrology and calibration work described above is always accompanied by documentation. The documentation can be divided into two types; one related to the task and the other related the administrative program. Task documentation includes calibration procedures and the data collected. Administrative program documentation includes equipment identification data, "calibration certificates", calibration time interval information and "as-found" or "out-of-tolerance" notifications.

Administrative programs provide standardization of the metrology and calibration work and make it possible to independently verify that the work was performed. Generally, the administrative program is specific to the organization performing the work and addresses customer requirements. An administrative program that has insufficient actual metrology or calibration capability is derisively referred to as a "lick and stick" program.

Завдання до тексту

I. Дайте відповідь на запитання.

1. Where are metrology laboratories places?
2. What kind of influences are often controlled?
3. How can the technicians be divided by major discipline areas?

II. Випишіть з тексту 2—3 речення, що передають основну думку.
III. Знайдіть випадки вживання модальних дієслів та підберіть до них еквіваленти.

Text 9
TYPES OF BUSINESS COMMUNICATION

In the business world, communication is the oil that keeps corporate machines running. It is the glue that holds small businesses together. Business is all about building and maintaining relationships with partners, employees, or customers. Everything from employee satisfaction to productivity and efficiency relies on good communication. In business there is hardly any room for errors in communication. A miscommunication at high levels of a company can make a huge loss.

That is why it is important for everyone from top management to the lowliest employee to understand how to communicate his or her ideas, instructions and expressions with the utmost clarity.

There are some types of communication that are used in business.

Oral communication is probably the most important form of communication in business. Information is passed on, feedback is received and relationships are formed using spoken words.

Spoken communication often combines verbal communication and non-verbal communication, such as tone of voice, body language, etc. Sometimes the meaning of what someone says can change completely when a different tone of voice is adopted. In customer relations, especially, it is important to be aware that tone of voice, intonation, and body language play an important part in communicating. In customer service, the words must be accurate, clear, leaving no room for ambiguity and the tone of voice, body language, and intonation need to communicate confidence and understanding. Oral communication is divided into face-to-face communication and communication by phone.

According to the survey conducted among business professional face-to-face communication is considered to be the most important and essential type of communication in business. Face-to-face meetings build stronger, more meaningful business relationships. It is also easier to read body language and facial expressions and interpret nonverbal communication signals. Respondents agreed that face-to-face communication is best for persuasion, engagement, inspiration, decisionmaking, and reaching a consensus.

When face-to face communication is impossible the easiest and the most convenient way to contact your business partner is by phone. But as telephone communication lacks the visual element present in face-to-face communication, the auditory element becomes the principal conveyor of meaning. For this reason, effective telephone use requires greater attention to speaking clearly and listening attentively than in case of face-to-face communication.

Business writing is a critical aspect of how people can share information with each other in an efficient, professional manner. Formality is an important element of how business writing is conducted today. In fact, each document is considered to be a legal document, which you can always refer to. There are a few types of business writing that people may come across at work: emails, letters sent by post, faxes, memos, minutes, taken at the meetings, summaries, etc. People use business writing to ask for a job, to make inquiries, to order some goods, to make complaints, etc. The main feature of business writing that unites all forms (memos, emails, letters, documents, etc.) together is the style. No matter what kinds of documents you are writing, you have to be concise, clear, and to convey information in an effective way.

Завдання до тексту

I. Висловіть свою думку (згоден чи не згоден), використовуючи такі словосполучення:

In my opinion...; *I think (believe)...*; *I'm sure that...*

1. Non-verbal communication doesn't play an important part in doing business.
2. Oral communication often combines elements of verbal and non-verbal communication.
3. Communication by phone is the best way of decision-making and reaching a consensus.
4. The auditory element becomes the principal conveyor of meaning when it comes to telephone conversations.
5. There are two main features of business writing: formality and special style.
6. People may use business writing only if they work in the office.

II. Складіть 5 спеціальних запитань до тексту.

III. Знайдіть абзац, в якому міститься інформація:

Verbal communication and non-verbal communication.

Text 10
WHAT IS CRYOGENICS?

Cryogenics is the branch of physics and engineering that study very low temperatures, how to produce them, and how materials behave at those temperatures. Besides the familiar temperature scales of Fahrenheit and Celsius, cryogenicists use the Kelvin and Rankine scales.

Liquefied gases, such as liquid nitrogen and liquid helium, are used in many cryogenic applications. Liquid nitrogen is the most commonly used element in cryogenics. Liquid helium is also commonly used and allows for the lowest attainable temperatures to be reached.

These gases are held in either special containers known as Dewar flasks, which are generally about six feet tall (1.8 m) and three feet (91.5 cm) in diameter, or giant tanks in larger commercial operations. Dewar flasks are named after their inventor, James Dewar, the man who first liquefied hydrogen.

The field of cryogenics advanced during World War II when scientists found that metals frozen to low temperatures showed more resistance to wear. Based on this theory of cryogenic hardening, the commercial cryogenic processing industry was founded in 1966 by Ed Busch. With a background in the heat treating industry, Busch founded a company in Detroit called *CryoTech* in 1966. Though *CryoTech* later merged with *300 Below* to create the largest and oldest commercial cryogenics company in the world, they originally experimented with the possibility of increasing the life of metal tools to anywhere between 200—400 % of the original life expectancy using cryogenic tempering instead of heat treating.

This evolved in the late 1990s into the treatment of other parts (that did more than just increase the life of a product) such as musical instruments or amplifier valves (improved sound quality), racing engines (greater performance under stress), firearms (less warping after continuous shooting), knives, razor blades, brake rotors and even pantyhose. The theory was based on how heat-treating metal works (the temperatures are lowered to room temperature from a high degree causing certain strength increases in the molecular structure to occur) and supposed that continuing the descent would allow for further strength increases. Using liquid nitrogen, *CryoTech* formulated the first early version of the cryogenic processor. Unfortunately for the newly-born industry, the results were unstable, as components sometimes experienced thermal shock when they were cooled too fast. Some components in early tests even shattered because of the ultra-low temperatures. In the late twentieth century, the field improved significantly with the rise of applied research, which coupled microprocessor based industrial controls to the cryogenic processor in order to create more stable results.

Cryogens, like liquid nitrogen, are further used for special chilling and freezing applications. Some chemical reactions, like those used to produce the active ingredients for the popular drugs, must occur at low temperatures of approximately −100 °C. Special cryogenic chemi-

cal reactors are used to remove reaction heat and provide a low temperature environment. The freezing of foods and biotechnology products, like vaccines, requires nitrogen in blast freezing or immersion freezing systems. Certain soft or elastic materials become hard and brittle at very low temperatures, which makes cryogenic milling (grinding) an option for some materials that cannot easily be milled at higher temperatures.

Завдання до тексту

I. Дайте відповідь на запитання.

1. What is cryogenics?
2. Where are liquid nitrogen and liquid helium used?
3. What kinds of temperature scales do cryogenicists use?
4. Whom was the first early version of the cryogenic processor invented by?
5. What are special cryogenic chemical reactors used for?

II. Продовжіть речення.

1. Besides the familiar temperature scales of Fahrenheit...
2. Liquid nitrogen is...
3. Based on this theory of cryogenic hardening, the commercial cryogenic processing industry...
4. Using liquid nitrogen, CryoTech formulated...
5. Special cryogenic chemical reactors are used...

III. У чому полягає основна ідея тексту?

Text 11
THEORY OF METALS AND HEAT TREATMENT

Theory of metals deals with the nature, structure and properties of metals and alloys and their uses. Metals and alloys differ in mechanical, physical, chemical and technological properties.

Mechanical properties of metals and alloys are strength, hardness, toughness, elasticity, brittleness, ductility and so on.

Physical properties are electrical conductivity, magnetism, density and porosity, colour and others.

Chemical properties are resistance to high humidity, corrosive atmosphere and action of an acid.

Technological properties are machinability, fluidity and so on.

According to their structure and properties different metals and alloys have different uses in industry.

Heat treatment is a method by which the heat theater can change the physical properties of a metal. The process of heat treatment consists of hardening, tempering, annealing, casehardening. Heat treatment is done in gas, oil and electrical furnaces because the heat may be easily controlled in these furnaces.

The specialists in theory of metals investigate microstructure and properties of metals, test metals and alloys, study different ways of increasing the strength of metals. One of the main tasks at the laboratory is examining metals by means of a microscope. Metals may have defects such as blowholes, cracks and non-metallic inclusions. The microscope is one of the most important instruments for finding these defects. For this purpose we take a piece of a metal, polish and etch it in a dilute acid. Then the sample is placed on a glass of the microscope and examined.

Завдання до тексту

I. Дайте відповідь на запитання.

1. What does theory of metals deal with?
2. What properties do metals and alloys differ in?
3. Why do metals and alloys have different uses in industry?
4. Where is heat treatment done? Why?
5. What are the main tasks of the specialists in theory of metals?

II. Випишіть з тексту англійські еквіваленти таких термінів:

тріщина, вологість, пористість, провідність, пружність, цементація, відпал.

III. Перекладіть українською такі терміни:
toughness, to etch, delute, acid, inclusions, hardening, theory of metals, blowholes, machinability.

Text 12
RECENT DISCOVERIES IN SUBATOMIC PHYSICS

The attempt to unify fundamental physics on a microscopic level with the large-scale structure of the Universe was one of the heroic intellectual enterprises of the 20th century. It deserves to be understood by the wider public of educated people.

Recent discoveries in subatomic physics have led physicists to think that space devoid of observable matter, may, nevertheless, contain varying amounts of entities known as quantum fields. Quantum fields are modern versions of the classical fields introduced in the nineteenth century to account for such phenomena as electric and magnetic forces. The classical idea was that one electrically charged particle produced a field in its vicinity. This field, in turn, produced a field slightly farther away from the particle, which eventually reached the vicinity of a second particle and influenced its motion. This sequence of events produced the effect that we identify as forces. In this way, forces could be understood as having only local effects.

Such classical fields, like all physical properties in prequantum physics, had definite numerical values, either there was a field present in some region of space and time or there was not. If no forces acted in the region, the field had a numerical value of zero. If forces acted in the region, the field had some measurable nonzero value, and this numerical value changed continuously through space and time. Classical physicists believed that every event in the physical universe was potentially measurable and predictable.

In quantum physics, the situation is not so simple. Today's physicists hold that it is actually impossible to measure a precise number for all physical quantities at the same time that the knowledge of certain quantities precludes the knowledge of the others. This is the gen-

eral content of what has come to be known as Heisenberg's uncertainty principle. One consequence of this principle is that we cannot specify precisely both what fields and which particles are present in some region of space. Either the value of the field everywhere can be known, in which there is nothing known of the particle content, or we can know which particles are present and the average value of the field over the region, but not its precise value at each point. The particle content and average field value is generally the more useful description.

In this new quantum description of fields, the classical field and the particles have been fused into a single concept, the quantum field. It can be said that quantum fields are the core reality, and that everything else is a manifestation of them.

Завдання до тексту

I. Знайдіть відповідь у тексті на запитання.

1. What have recent discoveries in subatomic physics led scientists to think about space?
2. What was the classical concept of an electromagnetic field?
3. What is the modern idea of quantum fields?
4. What is the main idea of Heisenberg's uncertainty principle?

II. Запишіть речення в тому порядку, як вони зустрічаються в тексті.

a) This is the general content of Heisenberg's uncertainty principle.

b) The heroic intellectual enterprises of the twentieth century were the attempts to unify fundamental physics on a microscopic level with the large-scale structure of the Universe.

c) The modern versions of the classic fields are quantum fields which accounted for such phenomena as electric and magnetic forces.

d) It is impossible to measure a precise number for all physical quantities at the same time.

e) Physicists think that space devoid of observable matter contains varying amounts of quantum fields.

III. Випишіть з тексту 2—3 речення, що передають основну думку.

Text 13
WHY ARE SMARTPHONES SO IMPORTANT IN DAILY LIFE?

In the hustle and bustle of modern life, there are so many important elements. You might find yourself with a busy and hectic schedule. There are certain elements of your life that you will need to sort out and organise. It is important to have a schedule and to plan things to make your life run smoother.

These days on of the most important devices you can use to help with your life is a smartphone. If you already have one, then you will know how important they are. There is so much that you can do with a smartphone and so many different ways in which they play a key role in your life. If you don't yet have a smartphone, then you need to think about getting one.

If you want to enhance and advance your working life and personal life, then you will need to get a smartphone. You can use the phone like a miniature laptop. This means that you can live so much of your day to day lifestyle on the move. Here is a list of some of the reasons why smartphones are so important in daily life.

Connectivity. Smartphones are so important these days due to the connectivity they provide. This isn't just improvements in phone calls and text messaging. But there are also the number of connectivity options available. Through your smartphone, you can access Facebook and other social networking sites with ease.

Besides this you also have an array of new and advanced connection services. There are things like Viber, which acts as an international call service like Skype. This saves money on your phone call allowance. One of the most popular connectivity apps for smartphones is the instant messaging app Whatsapp. This works over the internet connection and can make use of Wi-Fi to ensure it doesn't eat into your data plan.

On top of all this, you also can send and receive emails on the move. When you set your smartphone up you will have the option sync

an email address to your phone. This will give you access to your emails at any time of the day.

Efficiency. One of the things that make smartphones so vital to our daily lives is their efficiency. The speed with which you can do tasks on a smartphone is almost unparalleled. In fact, there are some occasions in which they may even be faster than using computers. The size of a smartphone makes it almost like a miniature computer.

The fact that you can synchronise email addresses on your smartphone makes it invaluable. If you use your phone for business, which most people do, then it is even more efficient. Allowing you to get work done and communicate with people even whilst you're on the move.

From a business viewpoint, you can also use your smartphone to connect and collaborate with colleagues. Applications like One Drive and Google Docs means that you can create and share information with others. This means that you can work on the move wherever you are.

Functional. Perhaps the biggest appeal of smartphones is their functionality. Nowadays there is precious little that cannot be done with a smartphone. As mentioned you can use it for work, as almost a portable computer. But there is so much more to a smartphone than just connectivity and efficiency.

You can store important data such as files, information and details on your phone. There is an app for almost anything these days. You might want to do online banking, check out the nearest coffee shops in your area or find out the best places to park. You can visit the app store and find apps for almost anything you could think of.

Aside from this you can also use security measures to protect your phone. Try setting pin numbers to protect your handset and sim card. You can also block numbers if needs be. If you first want to, say, find who owns a Houston Texas number before you block it then you can look it up online. Your smartphone allows you to set call details for

numbers as well. So you can put yourself in complete control of who you receive calls from.

Завдання до тексту

I. Заповніть пропуски, використовуючи лексику, що зустрічається в тексті.

1. Smartphone is one of the most important _____ you can use in your everyday life.
2. You can use the phone like a miniature _____.
3. Through your smartphone, you can access_____.
4. The fact that you can _____ email addresses on your smartphone makes it invaluable.
5. The biggest appeal of smartphones is their_____.

II. З'ясуйте, до якого з абзаців тексту може бути поставлено запитання *Can you use security measures to protect your phone?*

III. Розкажіть про використання смартфонів у вашому житті.

Text 14
DIFFERENT TYPES OF DRILLING MACHINES

Drilling machines which are used mainly for drilling holes in machine parts are made in many different types designed for handling the various classes of work.

The **upright drilling machine** is the type most commonly used, and the name applied to this class indicates that the general design of the machine is vertical, and also that the drill spindle is in a vertical position.

The **radial drilling machine**. The main advantage of a radial machine is that the drill can be moved over the work to any desired position, so that a large number of holes ran be drilled in the work without moving it.

The sensitive drill is a small machine of light construction, which possesses sensitive qualities which are of value in drilling holes in delicate work.

The **multiple-spindle type** is built in both vertical and horizontal design.

It can perform a number of operations on a component without the necessity of changing tools.

Gang Drills. When a number of single-spindle drilling machine columns are placed side by side on a common base and have a common work table, the machine is known as a **gang drill**. Each spindle is independently controlled as to speed and feed so that a number of operations may be performed in succession and simultaneously upon the machine. In this machine a work is moved progressively from one spindle to the next.

Завдання до тексту

I. Випишіть з тексту 5—7 речень, що передають основну думку.

II. Поставте одне спеціальне запитання до кожного абзацу тексту.

III. Складіть речення з даних слів:

1. drilling, are, used, machines, mainly, drilling, for, holes, in machine, parts
2. are, many, different, types, drilling, in, machines, made
3. sensitive, drill, is, a, small, the, machine, light, construction, of
4. independently, spindle, is, each, controlled
5. multiple-spindle, type ,the, is, built, in, vertical, and, both, horizontal, design

Text 15
ORGANIC DYES

The first human-made organic dye, mauveine, was discovered by William Henry Perkin in 1856. Many thousands of dyes have since been prepared. Synthetic dyes quickly replaced the traditional natural dyes. They cost less, they offered a vast range of new colors, and they imparted better properties upon the dyed materials. Dyes are now classified according to how they are used in the dyeing process.

Acid dyes are water-soluble anionic dyes that are applied to fibers such as silk, wool, nylon and modified acrylic fibers using neutral to acid dyebaths. Attachment to the fiber is attributed, at least partly, to salt formation between anionic groups in the dyes and cationic groups in the fiber. Acid dyes are not substantive to cellulosic fibers.

Basic dyes are water-soluble cationic dyes that are mainly applied to acrylic fibers, but find some use for wool and silk. Usually acetic acid is added to the dyebath to help the uptake of the dye onto the fiber. Basic dyes are also used in the coloration of paper.

Direct or **substantive dyeing** is normally carried out in a neutral or slightly alkaline dyebath, at or near boiling point, with the addition of either sodium chloride (NaCl) or sodium sulfate (Na_2SO_4). Direct dyes are used on cotton, paper, leather, wool, silk and nylon. They are also used as pH indicators and as biological stains.

Mordant dyes require a mordant, which improves the fastness of the dye against water, light and perspiration. The choice of mordant is very important as different mordants can change the final color significantly. Most natural dyes are mordant dyes and there is therefore a large literature base describing dyeing techniques. The most important mordant dyes are the synthetic mordant dyes, or chrome dyes, used for wool; these comprise some 30 % of dyes used for wool, and are especially useful for black and navy shades. The mordant, potassium dichromate, is applied as an after-treatment. It is important to note that many mordants, particularly those in the hard metal category, can be hazardous to health and extreme care must be taken in using them.

Vat dyes are essentially insoluble in water and incapable of dyeing fibres directly. However, reduction in alkaline liquor produces the water soluble alkali metal salt of the dye, which, in this leuco form, has an affinity for the textile fibre. Subsequent oxidation reforms the original insoluble dye.

Reactive dyes utilize a chromophore containing a substituent that is capable of directly reacting with the fibre substrate. The covalent

bonds that attach reactive dye to natural fibers make it among the most permanent of dyes. "Cold" reactive dyes, such as Procion MX, Cibacron F, and Drimarene K, are very easy to use because the dye can be applied at room temperature. Reactive dye is by far the best choice for dyeing cotton and other cellulose fibers at home or in the art studio.

Disperse dyes were originally developed for the dyeing of cellulose acetate, and are substantially water insoluble. The dyes are finely ground in the presence of a dispersing agent and then sold as a paste, or spray-dried and sold as a powder. They can also be used to dye nylon, cellulose triacetate, polyester and acrylic fibres. In some cases, a dyeing temperature of 130 °C is required, and a pressurised dyebath is used. The very fine particle size gives a large surface area that aids dissolution to allow uptake by the fibre. The dyeing rate can be significantly influenced by the choice of dispersing agent used during the grinding.

Azo dyeing is a technique in which an insoluble azoic dye is produced directly onto or within the fibre. This is achieved by treating a fibre with both diazoic and coupling components. With suitable adjustment of dyebath conditions the two components react to produce the required insoluble azo dye. This technique of dyeing is unique, in that the final color is controlled by the choice of the diazoic and coupling components.

Sulfur dyes are two part "developed" dyes used to dye cotton with dark colors. The initial bath imparts a yellow or pale chartreuse color. This is oxidized in place to produce the dark black we are familiar with in socks and the indigo blue of the common blue jeans.

Завдання до тексту

I. Поставте п'ять запитань до тексту.

II. Запишіть речення в тому порядку, як вони зустрічаються в тексті.

1. Azo dyeing is a technique in which an insoluble azoic dye is produced directly onto or within the fibre.

2. Dyes are now classified according to how they are used in the dyeing process.
3. They can also be used to dye nylon, cellulose triacetate, polyester and acrylic fibres.
4. The mordant, potassium dichromate, is applied as an after-treatment.
5. The covalent bonds that attach reactive dye to natural fibers make it among the most permanent of dyes.

III. Завершіть речення:

1. Synthetic dyes quickly replaced...
2. Dyes are now classified according to...
3. ... are water-soluble anionic dyes.
4. ... are water-soluble cationic dyes.
5. The dyeing rate can be significantly influenced by...

Topics

GREAT BRITAIN

Great Britain or the United Kingdom of Great Britain and Northern Ireland is situated on the British Isles. They lie to the west of the European continent. The total area of Great Britain is 244,1 thousand sq. km. It consists of England, Wales, Scotland, Ireland and over five hundred small islands.

The climate of Great Britain is rather mild with frequent rains and fogs. There is no striking discrepancy between seasons.

The population of Great Britain is over 56 million. The principal part of the United Kingdom is England and that is why the name "England" is often used to denote the whole country. London is its capital.

The United Kingdom is a parliamentary monarchy. At the head of it is the King or, as at present, the Queen. But her power is limited by Parliament. The ruling of the country is carried out by the government (the Cabinet) headed by the Prime Minister.

The latter is usually the leader of the party that has a majority in the House of Commons. There are three main political parties in Great Britain: Conservative, Labour and Liberal.

England is a highly developed industrial country. There are many big industrial cities here, such as Birmingham, Manchester, Liverpool, Cardiff, Sheffield and many others. One of the leading industries is the textile industry (Liverpool, Manchester). Coal, iron and steel and various machines are produced in Great Britain too. Shipbuilding, clothing, electronics, motor industry are also highly developed.

Great Britain imports cotton, wool, oil and non-ferrous metals. Its exports consist of fabrics, yarn, textile, machinery, electrical equipment and chemicals.

Coal is the main source for the development of British industry.

The climate of the whole country is not quite favorable for agriculture. That is why farming is declining in England. As a result it has to import main foodstuffs from other countries.

Great Britain is a country of high culture. There are many universities, colleges and scientific institutes here. Such English scientists of the past as Newton, Faraday, Darwin, Rutherford and others greatly contributed to world science. English writers Shakespeare, Byron, Dickens, B. Shaw and many others enriched world literature.

I. Answer the questions.

1. Where is the UK situated?
2. What parts does the UK consist of?
3. Who is the formal and real head of the country?
4. What industries are the most developed in Great Britain?
5. What does GB export and import?
6. GB is a country of high culture, isn't it? Why?

II. Say if the following statements are TRUE or FALSE. If FALSE give the right variant.

1. The total area of the United Kingdom is more than 200,000 square kilometers.

2. Great Britain is separated from the continent by the Suez Canal.
3. The highest mountain in the United Kingdom is Everest.
4. England, Wales, Scotland and Northern Ireland are the parts of Great Britain.
5. The population of Great Britain is greater than that of Ukraine.
6. All the territory of England is flat.
7. The capital of Wales is Cardiff.
8. Highlands is the name of the group of lakes in Northern Ireland.
9. The national symbol of Scotland is red rose.

EDUCATION IN GREAT BRITAIN

The National Education Act of 1944 provided three stages of education: primary, secondary and further education. The years of compulsory schooling are from five to sixteen, and pupils may stay on for one or two years if they wish.

Primary education is up to the eleven, covering nursery school (3—5), infant school (5—7) and junior school (7—11) Children under five do not have to go to school, but there is some free nursery school education before that age. The places are usually given to families in special circumstances, for example families with one parent only. That is why many parents have organized play groups where children can go several times a week.

There are private and free state schools. There are two types of private schools: the preparatory and public schools. The preparatory schools are for pupils aged up to 13, and the public schools are for 13 to 18 year-olds. These schools are very expensive and attended only by 5 per cent of the schoolchildren.

Free secondary education has been available to all children in Britain since 1944. At the age of eleven children go to secondary schools. Until recently there were three main parts of secondary schools. Due to their abilities all children were allocated to grammar schools, technical and modern schools. These three types of school still exist, but their number is decreasing. They are being replaced by

the so called comprehensive schools. Over 80 per cent of schoolchildren go to comprehensive schools. They are open to all children irrespective of their abilities, aiming to develop the talents of each individual child. So they offer a wide choice of subjects, from art and craft, woodwork and domestic science to modern languages, computer studies, etc. All pupils move to the next class automatically at the end of the year.

At the age of 16 pupils take their examinations. Most take General Certificate of Education (G.C.E.). Ordinary Levels — normally called just "O". Pupils take as many subjects as they want to. For University entrance pupils have to take "A" Level (Advanced Level) G.C.E. exam.

Many people decide to leave school at the age of 16 go to Further Education (FE) College for practical vocational training, for example in engineering , typing, cooking or hairdressing.

I. These are the facts about education in London. Read these notes and correct them if necessary.

1. Pupils must go to school until the age of 16.
2. Primary education includes nursery school, infant school and junior school.
3. Infant school is for pupils aged from 5 to 8 years.
4. Junior school is for pupils aged from 8 to 12 years.
5. There are two types of schools — private and state schools.
6. Private schools are not very expensive and are attended by 50 per cent of the schoolchildren.
7. There are two types of secondary schools — grammar and modern schools.
8. Comprehensive schools were introduced to offer education for pupils of all abilities.
9. For university entrance pupils have to take A-level exam.

II. Translate into English.

1. Діти до 5 років не повинні ходити в школу, але існує безкоштовна дошкільна освіта до цього віку. 2. Загальноосвітні школи

були створені, щоб дати освіту учням з різними здібностями. 3. Приватні школи дуже дорогі і їх відвідують близько 5 відсотків школярів. 4. Загальноосвітні школи пропонують широкий вибір предметів від мистецтва і ремесла, столярної роботи до точних наук , сучасних мов і інформатики. 5. Багато учнів вирішують піти зі школи у 16 років і одержати професійну освіту.

III. Complete the sentences.

1. The years of _____ schooling are from 5 to 16.
2. There are three stages of education: primary, secondary and _____ education.
3. There are two types of private schools — the preparatory and _____ schools.
4. At the age of 16 pupils take _____ exam.
5. Comprehensive schools are open to all children _____ of their abilities.
6. The National _____ Education Act provided three stages of education.

IV. Choose the right variant.

1. Children must go to school from.
a) Five to seventeen
b) Six to sixteen
c) Five to sixteen

2. Primary education includes.
a) Nursery, infant, and junior schools
b) Nursery and junior schools
c) A nursery school

3. There are two types of private schools.
a) Public and comprehensive schools
b) Public and preparatory schools
c) Public and modern schools

4. For University entrance it is necessary to take.
a) A-level exam
b) O-level exam
c) C-level exam

V. Answer the questions.

1. Till what age must children go to school?
2. What is the first stage of education?
3. What is the second stage of education? What were the three main types of secondary schools until recently? Do these types of schools still exist?
4. What are the advantages of comprehensive schools?
5. What subjects do comprehensive schools offer?
6. How do pupils move to the next class?
7. Who can enter the University?

VI. Re-arrange the words.

1. Children school don't under five to have to go.
2. Expensive schools private very are.
3. Schools and free there state private are.

VII. Make up short dialogues using the words:

private and free state schools, comprehensive schools, examinations, a wide choice of subjects, Further Education College.

VIII. Express the same in English:

початкове навчання, обов'язкове навчання, ігрові групи, доступний, широкий вибір предметів, середня класична школа, школа без викладання класичних мов, домоведення.

UNIT 6

Grammar

Багатофункціональні слова
Безсполучникові підрядні речення (Complex Sentences without conjunctions)
Узгодження часів (Sequences of Tenses)
Складні речення (Complex Sentences)

Reading Material

1. Peripherals
2. Metrication in the World
3. Nanotechnology and Electronics
4. Chemical and Physical Characteristics of Fats and Oils
5. Computer Crimes
6. Modern Sports Cars
7. Biopharmaceutical
8. Science of Measurement
9. Mixing of Low and Moderate Viscosity Liquids
10. Wastewater
11. Multimedia
12. Electronic Devicees and Components
13. Which is More Environmrntally Friendly: Paper or Plastics?
14. What are the Latest Technologies in the Computer Field?
15. The Magnitude of a Physical Quantity

Topics

The United States of America
Education in the United States

Grammar

Багатофункціональні слова

as

as (прислівник) — ***як***:

He works as a doctor. — *Він працює доктором.*

as (сполучник) — ***коли***:

As he came in, everybody stopped talking. — *Коли він зайшов, всі перестали говорити.*

as (сполучник) — ***оскільки***:

I didn't go to the cinema as I was too busy. — *Я не ходив у кінотеатр, оскільки був занадто зайнятий.*

for

for (прийменник) — ***для***, ***заради***:

He bought flowers for his granny. — *Він купив квіти для своєї бабусі.*

for (прийменник) — ***протягом***:

I have been studying English for 10 years. — *Я вивчаю англійську мову 10 років.*

for (сполучник) — ***оскільки***:

He has missed the train for he got up late. — *Він запізнився на потяг, бо пізно прокинувся.*

it

it (особовий займенник) — ***він***, ***вона***, ***воно***:

I have a car. It is red. — *У мене є машина. Вона червона.*

it (неособовий займенник) — не перекладається:

It is raining. — *Дощить.*

it is (was) ... that (who) — ***саме***:

It is him who did it. — *Саме він зробив це.*

one

one (кількісний числівник) — ***один***:

I have only one English dictionary. — *У мене є тільки один англійський словник.*

one (замінює іменник):
The new car runs faster than the old one. — *Новий автомобіль працює швидше, ніж старий.*
one (неозначений займенник) — вживається в неозначено-особових реченнях, не перекладається:
One can find any information in the Internet. — *Будь-яку інформацію можна знайти в Інтернеті.*

since
since (прийменник) — ***після***, ***з***:
I have been waiting for you since 2 p.m. — *Я чекаю вас з 2 години дня.*
since (сполучник) — ***відтоді***, ***оскільки***:
He was absent since he was ill. — *Він був відсутній, оскільки хворів.*

that
that (вказівний займенник) — ***той***:
That building is very old. — *Та будівля дуже стара.*
that (займенник) — замінює іменник, щоб уникнути повторення:
The climate here is like that in France. — *Клімат тут такий, як у Франції.*
that (відносний займенник) — ***який, що***:
This is the letter that came yesterday. — *Це лист, що прийшов учора.*
that (сполучник) — ***що***, ***щоб***:
I know that he is fond of roller-skating. — *Я знаю, що він любить кататися на роликах.*

Безсполучникові підрядні речення

Додаткові підрядні речення

Характеризуються відсутністю сполучника ***that***.

I do not think this work was so difficult.	*Я не думаю, що ця робота була такою важкою.*
I know you are right.	*Я знаю, що ви праві.*

Означальні підрядні речення

Характеризуються відсутністю слів ***who, whom, which, that***.

The letter he sent me was too long.	*Лист, який він мені прислав, був надто довгим.*
The work I am doing now is very important.	*Робота, яку я зараз виконую, дуже важлива.*

У безсполучникових реченнях прийменник може стояти тільки **після** дієслова. Він виділяється наголосом.

The man you were speaking ***to*** is our coach.	*Чоловік, з яким ви розмовляли, наш тренер.*
I want to buy the book you told me ***about***.	*Я хочу купити книжку, про яку ви мені говорили.*

Узгодження часів

Теперешній час	Минулий час
I think (that)...	*I thought (that)...*
Present Indefinite he knows my address	**Past Indefinite** he knew my address
Present Continuous he is sleeping	**Past Continuous** he was sleeping
Present Perfect he has already passed the exam	**Past Perfect** he had already passed the exam
Present Perfect Continuous he has been waiting for you for 2 hours	**Past Perfect Continuous** he had been waiting for you for 2 hours
Past Indefinite he returned yesterday	**Past Perfect** he had returned the day before
Past Continuous he was studying the whole evening yesterday	**Past Perfect Continuous** he had been studying the whole evening the day before
Future Indefinite he will come soon	**Future in the Past Indefinite** he would come soon
Future Continuous he will be watching TV in the evening	**Future in the Past Continuous** he would be watching TV in the evening

Закінчення таблиці

Теперешній час	Минулий час
Future Perfect he will have finished his work by 8 o'clock	**Future in the Past Perfect** he would have finished his work by 8 o'clock
Future Perfect Continuous he will have been travelling for a year next week	**Future in the Past Perfect Continuous** he would have been travelling for a year the following week

У непрямій мові обставинні слова та вказівні займенники змінюються:

Пряма мова	Непряма мова	Пряма мова	Непряма мова
this	that	yesterday	the day before
these	those	the day before yesterday	two days before
here	there	___ ago	___ before
today	that day	next year	the next (the following) year
tomorrow	the next day	last week	the last (previous) week
the day after tomorrow	two days later	now	then

Перетворення спонукальних речень в непрямій мові

Пряма мова	Непряма мова
He says: "Keep quiet! Don't make noise!"	He told (asked) me to keep quiet and not to make noise.

Питання в непрямій мові

Спеціальні питання

Пряма мова	Непряма мова
He asked (me):	He asked me...
"What are you doing?"	what I was doing.
"Where do you live?"	where I lived.
"Where does he work?"	where he worked.

Закінчення таблиці

Пряма мова	Непряма мова
He asked (me):	He asked me...
“What is Nick doing?”	what Nick was doing.
“What have you prepared for today?”	what I had prepared for that day.
“When did you come home yesterday?”	when I had come home the day before.
“When will your mother come home?”	when my mother would come home.

Загальні питання

Пряма мова		Непряма мова		
He asked me:	**“Are** you **watching** TV?”	He asked me	if / whether	I **was watching** TV**.**
	“Do you **play** chess?”			I **played** chess.
	“Does she **go** to school?”			she **went** to school.
	“Have you **done** your homework?”			I **had done** my homework.
	“Did you **skate** last winter?”			I **had skated** last winter.
	“Will you **see** your friend tomorrow?”			I **would see** my friend the next day.

Exercises

Exercise 1. Translate the sentences paying attention to the subordinate clauses without conjunctions.

1. The hotel we stayed at is in the centre of the city. 2. The film we saw yesterday is not a very good one. 3. I think he is the best man I have ever known. 4. The experiments showed this substance was unique in its properties. 5. We know the value of voltage is the same in all the elements of a parallel circuit. 6. The weight of an atom depends on the number of protons and neutrons it contains. 7. The test we have made is of great importance for our laboratory. 8.The problem we will deal with is connected with new electronic de-

vices. 9. We think cadmium is very useful for the application in transistors. 10. The instructor said we would use the device in long distance flights. 11. Should this question put differently I would answer perfectly well. 12. Had he time he would come. 13. We should finish our work earlier, could we get the necessary equipment.

Exercise 2. Put into indirect speech.

1. The physicist said to the journalist: "I have already made the experiment". 2. The young chemist said: "The discovery is of practical value". 3. The engineers replied: "We must make the design accessible for cleaning". 4. The designer asked the experts: "Do you find it difficult to maintain constant temperature?" 5. The president was asked: "How long have you been researching into the general circulation of the ocean?" 6. The researcher declared: "The development of the electronic computer has changed the scientific world". 7. The scientist argued: "The computer may be subject to errors". 8. The experimenter reassured us: "The radar will be put to other uses". 9. The chief said to a young designer: "Check the capacity of the engine". 10. The lecturer said: "The neutron was discovered in 1932". 11. The astronomer explained: "Nothing can travel faster than light".

Exercise 3. Translate the sentences paying attention to the subordinate clauses without conjunctions.

1. The man you see in the classroom is our teacher. 2. Here is the book you gave me on Monday. 3. The problem we are speaking about will be discussed tomorrow. 4. The writer told us about yesterday's conference he had made a speech at. 5. When the point a force is applied at moves the work is done. 6. Internal energy is the energy a medium possesses as a result of its internal state. 7. The event you have just been told about took place a couple of years ago. 8. The machine this air-screen is intended for requires a continuous supply. 9. Negative valence is an expression of the number of electrons an atom is capable of gaining.

Exercise 4. Translate the sentences paying attention to the complex sentences.

1. He told me that he would come to see me the next day. 2. We think that you will help us. 3. Tom said that he was going to give up his job. 4. The girl who was injured in the accident is now in hospital. 5. Nick works for the company which makes computers. 6. The police have caught the man who stole my friend's car. 7. Everyday observations show that hot objects radiate much more heat than cold ones. 8. Many of the processes that are used in fabricating metallic articles depend upon changing the shape of a piece of metal. 9. When a body returns to its original position after being slightly disturbed, the equilibrium is said to be stable. 10. Electron emission that may be produced by electron impinging upon substances with efficient velocity is a unique physical phenomenon.

Exercise 5. Change the direct speech into indirect speech.

1. Academician Paton said (stated): "The science and technology in welding in our country today brought about a veritable technical revolution in heavy engineering". 2. Academician Paton said: "The science and technology of welding have an important part to play in the future world". 3. The academician said: "Among the means that will be used in the future to join metals and other materials are high frequency current ultrasonics, plasma and controlled fusion". 4. He thought: "The very term "welding" will become old-fashioned and welding will be replaced by a kind of "gluing". 5. He said: "Our country developed a cement kiln 20 m long and 5m in diameter". 6. Paton believed: "The most promising method is that of "cold welding", with which the metal is not heated to melting point but is joined by means of tremendous compression and the uniting of atoms". 7. Hamilton inquired: "What is the motion if the configurations at two given instants, t_0 and t_1, are known?"

Exercise 6. Put into indirect speech.

1. The physicist said to the journalist: "I have already made the experiment". 2. The young chemist said: "The discovery is of practical value". 3. The designer asked the experts: "Do you find it difficult to maintain constant temperature?" 4. The president was asked: "How long have you been researching into the general circulation of the ocean?" 5. The researcher declared: "The development of the electronic computer has changed the scientific world". 6. The scientist argued: "The computer may be subject to errors". 7. The experimenter reassured us: "The radar will be put to other uses". 8. The chief said to a young designer: "Check the capacity of the engine". 9. The lecturer said: "The neutron was discovered in 1932". 10. The astronomer explained: "Nothing can travel faster than light". 11. The engineers replied: "We must make the design accessible for cleaning". 12. Peter asked me: «Where can I buy an English-Ukrainian dictionary?"

Exercise 7. Define the type of subordinate clauses. Translate the sentences.

a)

1. *That it is possible to convert heat to energy and energy back to heat* can be demonstrated in a number of ways.
2. *When we will start a new series of experiments* is not yet settled.
3. *Whether the spaceship will be able to leave the earth* depends upon the speed of the ship.

b)

1. One of the main characteristics of plastics is *that their molecules are composed of a large number of repeating molecules known as monomers.*
2. The most important feature of this plant is *that all its shops are equipped with automatic and semi-automatic machine tools.*
3. The difficulty is *whether all the processes of the production at the plant can be mechanized.*

Exercise 8. Translate the following sentences, paying attention to the Sequence of Tenses.

1. Nobody expected that he would ever be able to do it. 2. It seemed that everything was quite all right. 3. He told them of what had happened to him in Paris. 4. We knew that he was writing a new novel. 5. He declared that he would defend his rights. 6. She said that similar questions might be asked at the examinations. 7. We heard that she had become a champion. 8. He saw that the ship was leaving.

Exercise 9. Change the sentences from direct into indirect speech.

1. She asked me: "What are you doing?" 2. He asked her: "Are you angry with me?" 3. I asked him: "Where do you work?" 4. We asked them: "Have you made up your minds?" 5. They asked us: "Did you see the monument?" 6. She asked him: "Can you promise me that?" 7. He asked me: "Where will you go?" 8. I asked her: "When will you join our circle?"

Exercise 10. Complete the sentences using — am /is /are was /were / will be.

1. There ... a lot of equipment on the site yesterday. 2. Microwaves ... electromagnetic radiation that have an ultra high frequency. 3. Lomonosow ... the first person to record the freezing of mercury. 4. Look! There ... a lot of files on my desk! 5. A refrigerator ... a box where articles are kept at a cool temperature. 6. This new equipment ... tested tomorrow. 7. Satellites ... very useful for making ecological surveys. 8. I ... a first year student of Kharkiv Polytechnic Institute. 9. Computer engineering ... now the most rapidly growing field. 10. The most important metals in industry ... iron and its alloy — steel. 11. All the students ... present in class yesterday.

Exercise 11. Find mistakes in the following sentences and correct them.

1. Nuclear power stations is designed to withstand earthquakes and tornadoes. 2. Lasers be used in the treatments of wounds and dental

problems. 3. The Internet technology is being created by Vinton Cerf in 1973. 4. Internet will used by millions of people around the world. 5. A new explosive dynamite was been invented by a Nobel. 6. The computer engineer be asked to estimate the costs for the computer repair. 7. The structural theory of organic chemistry were introduced by Kekule and Bublerov. 8. I weren't told why the experiment had been stopped. 9. Many laws and important phenomena was investigated by chemistry. 10. Smog be the most visible evident of atmospheric pollution.

Reading Material

Text 1
PERIPHERALS

A peripheral is a device connected to a host computer, but not a part of it, and is more or less dependent on the host. It expands the host's capabilities, but does not form part of the core computer architecture. The examples are input/output devices such as printers, image scanners, drives, microphones, loudspeakers, webcams, and digital cameras.

A keyboard is a human interface device which is represented as a layout of buttons. Each button, or key, can be used to either input a linguistic character to a computer, or to call upon a particular function of the computer. Traditional keyboards use spring-based buttons, though newer variations employ virtual keys.

A mouse is an input device that operates by controlling the position of the cursor (in the shape of an arrow) on the monitor. A mouse is a pointing device that combines the traditional cursor movements — accomplished by pressing arrow keys — with the means to select an object on the display screen. One or more buttons located on the top of the mouse enable you to choose options. Small portable computers sometimes use a built-in or attachable trackball instead of

a mouse. Rolling the trackball with your fingertips produces the same results as moving the mouse.

Light pens, often used in stores, are able to input a large amount of data quickly by moving a light beam across a barcode. This converts the barcode into digital data that is usable by the computer. Other types of light pens are also used for computer-aided design (CAD) and pen-based computers; the latter interpret and convert human writing into computer form.

A scanner is an input device that acts like a miniature photocopy machine connected to a computer, copying graphic images into the computer and allowing typewritten pages to be entered without retyping. Scanners include both hand-held and desktop models. A scanner works by passing a beam of light across the original page or artwork and sensing the reflected light; it then assembles this information into a data file that describes the images as rows of tiny dots, each one noted for its colour and brightness. That file is then passed on to the computer.

Several devices are used to get the output from the computer. Monitors, which look like television sets, quickly display and redisplay the computer's output. They are often called VDUs (video display units), VDTs (video display terminals), or simply screens. The image displayed on the screen is composed of many rows of tiny dots, called pixels (short for picture element). The number and size of pixels determine the resolution (sharpness and clarity) of the display. The more pixels, the higher the resolution.

There are different types of display screens. The most common type is the LCD (liquid crystal display) monitor. It takes up little space and uses the same technology as that used for screens of notebooks. The CRT (cathode ray tube) is rather like a conventional TV. They can be monochrome or colour. Monochrome monitors show one colour, generally white, green, or amber, on a dark background. Colour monitors (often called graphics monitors) display text characters and graphic images in colour.

Speakers and headphones allow the user to hear audio data, such as speech or music, through the computer.

Printers create paper copies, called hardcopies, of information sent from the computer. Printers for personal computers are connected to the computer by a cable through a port — the location through which the computer exchanges information with an external device. A port has a physical connector and an address, so that programs know where to send information. The two basic types of ports are serial and parallel.

Завдання до тексту

I. Дайте відповідь на запитання.

1. What peripheral devices can be attached to the host computer?
2. What are the functions of input devices such as a keyboard, a scanner, a mouse and a light pen?
3. What do you know about such output devices as monitors?
4. What is a keyboard designed for?
5. Can you explain the difference between CRT and LCD?
6. What are speakers and headphones used for?
7. What is a printer?
8. How are printers connected to the computer?

II. Заповніть пропуски в реченнях відповідними словами:

printers, software, capacity, drive, pixels, scanner, peripherals, barcode, removable

1. Digital cameras can be attached to a computer to directly transfer pictures for editing using special ... and unwanted pictures can be deleted. 2. The resolution of a camera is measured in ... and given as two numbers. 3. Other factors that vary between storage devices include: the speed at which the ... moves the media past the read/write head and reads or writes data to the storage media and the ... of the media. 4. There are various types of ... for out-putting text and graphics to paper. 5. Data can take many forms and there is a wide

variety of input, output, storage and communication ... . 6. ... is an input device that acts like a miniature photocopy machine connected to a computer, copying graphic images into the computer and allowing type- written pages to be entered without retyping. 7. ... reader is used for looking up prices. 8. ... storage enables the user to change the media and transfer it to another computer.

III. Знайдіть відповідність термінів з колонки A та їх визначення у колонці B.

A	B
1. barcode reader	A. a piece of equipment that is connected to the central processing unit of a computer system
2. peripheral	B. a measure of the quality of a display screen in terms of the amount of graphical information that can be shown on the screen
3. resolution	C. a symbol on the monitor screen that indicates the point on the screen that is being used
4. cursor	D. an optical input device that uses the reflection of a light beam to read barcode labels
5. keyboard	E. a common cursor control input device used with a graphical user interface. It commonly has 2 or 3 button switches on top and a ball underneath that is rolled on a flat surface
6. mouse	F. the main electronic input device that has keys arranged in a similar layout to a typewriter

Text 2
METRICATION IN THE WORLD

The spread of metrication around the world in the last two centuries has been met with both support and opposition. All countries except Burma (Myanmar), Liberia, and the United States of America have officially adopted the metric system, although actual usage may be more complex. Only the United States continues to see significant popular opposition to metrication, the main objections being based in localism, tradition, cultural aesthetics, economic impact, or distaste for measures viewed as "foreign". Japan had significant popular opposition at one time for similar reasons. Popular opposition in the United Kingdom exists to a lesser degree and can be associated with anti-European Union sentiment. France, where the measures were largely invented, saw popular opposition during the early 19th century, though not for long. Thus, with the exception of the United States, metrication is now fully or substantially accepted in nearly all countries.

One argument used by opponents of the metric system is that traditional systems of measurement were developed organically from actual use. Early measures were human in scale. In parts of Malaysia, villagers asked the distance to the next village were likely to respond with three rice cookings; an approximation of the time it would take to travel there on foot. Everyone is assumed to know how long it takes to cook rice. Named units referring to seeming standards also were contextualized. The aune, a French ell used for measuring cloth, depended on the sort of cloth being measured, taking price and scarcity into account; an aune of silk was shorter than an aune of linen. At the time of the French revolution there were over 5000 different foot measures.

Traditional English units of measure reflect these ways of measuring, including their lack of standardisation. These units were not scientifically precise, but were easy to learn and use for making rough estimates of size. Traditional English expressions such as a stone's

throw, within earshot, a cartload or a handful illustrate the thinking behind traditional measurements. These measures were often relational and commensurable: a request for a judgment of measure allowed for a variety of answers, depending on the context of the request.

The present UK imperial system is based on the Weights and Measures Act 1824, about 30 years after the founding of the metric system. The British Weights and Measures Society has argued that metrics led to a greater complexity for consumers because, unlike the ounce, the gram is too small for measurement in everyday life and that the introduction of the metric system can aid profiteering if manufacturers downsize packages.

Завдання до тексту

I. Визначте, які речення є a) правильними (t), b) які ні (f), c) інформація відсутня.

1. The European Union is responsible for compulsory metrication.
2. In the US there is also government compulsion with weight and measures.
3. There are still a great number of countries that oppose metrification.
4. According to the British Weights and Measures Society some metric units are too small for measurement in everyday life.
5. A lot of traditional units are mentioned in colloquial English expressions.

II. Знайдіть абзаци, в яких міститься інформація:

1. the current result of metric adoption
2. consumers' problems with metrics
3. the usage of traditional units is based on their actual use
4. the imperial system dates back to the 19th century

III. Виберіть відповідь на запитання: *How were traditional measures developed?*

a) artificially
b) on the basis of rationality and commensurability
c) by holding a contest
d) by means of a science

IV. У чому полягає основна ідея тексту? Виберіть з наведеного нижче назву тексту:

a) Metrication Opposition
b) Different Values in Different Places
c) Displacement of Traditional Units
d) Establishing Uniformity of Weights and Measures

Text 3
NANOTECHNOLOGY AND ELECTRONICS

Researchers at the University of Michigan have recently demonstrated that nanowires can be used as electrodes in organic light emitting diode (OLED) displays, thereby enabling manufacture of larger flexible OLED displays. This started me thinking about how nanotechnology might affect the appearance and function of electronic devices.

For example, could a laptop computer display unroll like a portable movie screen or could you detach it from the laptop and attach it to the back of an airline seat with Velcro®? Or might the laptop of tomorrow be roughly the same shape as the ones we use today, but be thinner, lighter, sturdier, and able to perform more functions? I began to tally up the ways that nanotechnology might change laptops.

One option to the nanowire-enabled flexible OLED displays could be a very thin, low-power, high resolution screen that uses nanotubes. Motorola is working on such a display which it calls a nano-emissive display because the nanotubes emit electrons at each spot on the display that has to be illuminated to form a picture. This display actually works much like an old fashioned TV, but can provide laptops with very lightweight screens and fine enough resolution for high definition TV.

Motorized hard drives may also become a thing of the past, replaced by lighter, faster, and more reliable solid state hard drives. One such drive is the 64 Gb solid state hard drive that Samsung is making available later this year. These drives are created using a process that prints nano-scale features called transistor gates on the memory chip.

The width of these gates can vary. The Samsung module uses flash memory chips with 60 nanometer-wide transistors gates. It will be interesting to see how quickly manufacturers convert from conventional hard drives to flash based-hard drives as they become available with 64 Gb and greater capacity.

Less conventional technologies are also being explored, such as the atomic force microscopy-based memory being developed in IBM's Millipede project. This type of memory uses many fine silicon probes with tips 1 nanometer in diameter. Researchers are projecting that this chip should be able to store 1 terabyte (abbreviated Tb, and equaling 1,000 gigabytes) on a 1 square inch silicon chip.

Microprocessor manufacturers are also making processors with nano-scale transistors that use less power and fit more transistors on each silicon chip, therefore providing higher performance. The current generation of microprocessors is being built with 65 nanometer gate width transistors and processors that use 45 nanometer gate width transistors should be available in the next few months as the race to increase the computing capabilities of your laptop continues.

Nanotechnology is also providing options for powering your laptop. Lithium ion batteries are commonly used in laptops and many lithium ion battery manufacturers use nano-enhanced electrodes to improve battery performance and safety. A company called ZPower is developing batteries composed of silver and zinc that use nanoparticle-enhanced electrodes. The claim is that these batteries will have twice the energy density of lithium ion batteries and allow your laptop to operate longer on a single charge.

Several companies are working on fuel cells powered by methanol. These cells use a nano-enhanced catalyst and could run your laptop for as long as a full day. When the fuel cell runs out you just replace the methanol cartridge, rather than having to plug your laptop into a wall outlet.

Nanotechnology will certainly transform laptops and other electronic devices over the next few years, and with the many types of

changes who knows what the laptop of tomorrow will be. It could weigh just ounces and run for weeks on a single charge. We can only hope that while reinventing the laptop some manufacturers take the opportunity to also design a chassis that offers a break from today's standard flat, black or grey box. Imagine impressing your friends with a laptop with a display that unfurls like a sail and a case that comes in every color of the rainbow.

Завдання до тексту

I. Визначте, які речення є a)правильними (t), b) які ні (f), c) інформація відсутня.

1. Researchers at Michigan University has developed a technique for producing flexible computer monitors.
2. Motorola is working on the creation of a display containing nanoshperes. 3. a Nano-emissive display works much like an old TV-set.
4. Samsung is already selling its solid state hard drives.
5. New nano-technology hard drives are placed on the flash-memory chip.
6. IBM is developing a 1 square inch memory chip which can store 5,000 Tb. 7. Microprocessors using 45 nanometer gate width transistors are already available.
8. Nano-scale transistors used for production of processors can increase power consumption.
9. Manufacturers of lithium ion batteries use nano-technology to produce battery cases.
10. ZPower is developing batteries composed of silver and copper.
11. New batteries can 10 times increase the energy density.
12. When your laptop is powered by methanol fuel cell you have to recharge it plugging it into a wall outlet.

II. Знайдіть у тексті слова, які означають:

1. an institution of higher education having authority to award bachelors' and higher degrees, usually having research facilities;
2. a device capable of representing information visually;
3. an informal word for film;

4. a stable elementary particle present in all atoms, orbiting the nucleus in numbers equal to the atomic number of the element in the neutral atom;
5. a tiny wafer of semiconductor material, such as silicon, processed to form a type of integrated circuit or component such as a transistor;
6. a very brief space of time;
7. a bow-shaped display in the sky of the colours of the spectrum, caused by the refraction and reflection of the sun's rays through rain or mist.

III. У чому полягає основна ідея тексту?

Текст 4
CHEMICAL AND PHYSICAL CHARACTERISTICS OF FATS AND OILS

The present study deals only with such oils and fats as are capable of serving as foodstuffs, even though in practice they are not put to such use. The common chemical characteristic of such oils and fats is that they may be decomposed into glycerin and one or more acids of the class known to chemists as fatty acids. (Chemists designate as acids a class of substances which have an acid or sour taste; contain the element hydrogen; and act upon metals, hydrogen being evolved and its place being taken by the metal. The compound thus formed with the metal is known as a salt.) The common physical properties of such oils and fats are that they float on water but are not soluble in it; they are greasy to the touch, and have lubricating properties; they are not readily volatile; and may be burned without leaving any residue, i.e., ash. No other class of substances has the chemical properties of the fats and oils; but many possess similar physical ones, e.g., mineral oils, earth-wax (ozocerite), paraffin, animal waxes like spermaceti or beeswax, vegetable waxes like carnauba or candelilla wax, volatile or essential vegetable oils like the oils of thyme, of cloves, of cedar, and attar of roses. None of these substances furnishes both glycerin and

fatty acids; none of them has nutritive value; none of them will be considered further in this treatise.

Fats and oils, then, in the restricted meaning in which these two words are used hereafter, are substances which consist always of chemical combinations of glycerin with certain fatty acids, and which may serve as foods.

The distinction between a fat and oil is purely an accidental one depending upon the environment in which the substance happens to be placed. If the substance is solid at ordinary temperatures, it is termed a fat; if fluid, an oil. This is merely a distinction of convenience, since all oils are solidified at lower temperatures and all fats melted at higher temperatures. Obviously, the dividing line that holds for a cool climate would not hold for a hot one. In each climate, however, the distinction is of importance in industrial and in culinary uses; it has also some importance in nutrition, since fats are somewhat less digestible than oils. In this study fat is often used indiscriminately for a solid or a liquid substance.

Animal fats and oils are derived both from terrestrial and marine animals. Marine fats include liver oils, blubber oils, and fish oils. In addition, from certain marine animals waxes are obtained, e.g., spermaceti, which, because it is a wax and not a fat, need not be considered here. The different types of marine fats, which in practice are often mixed, have been of great importance in the past and still possess considerable significance. Some of these serve special purposes, such as codliver oil; others are used to some extent as foodstuffs; but for the most part they serve industrial uses.

With two important exceptions animal fats are obtained from carcasses. These two exceptions are butter and the fat of the yolks of eggs. Carcass fat is found in different locations. There is a good deal of it in the visceral cavities and in and around the viscera. More or less of it occurs in the muscles, in the connective tissue, under the skin, and in the bones. The proportions found in the different parts of the body vary from species to species and in any given species

with the age of the individual animal and its condition. The fats from the different parts and organs of a given animal differ somewhat in their properties. As a rule, the fat from the interior of the animal is somewhat firmer than the fat from near the body surface, i.e., it melts at a somewhat higher temperature. Furthermore, under certain conditions the feed of the animal affects the physical properties of the carcass fat more or less. Animals fattened upon a diet containing much oil — for example, peanuts — tend to produce softer carcass fats than animals of the same species fattened upon a diet containing relatively little oil — for example, corn (maize).

Завдання до тексту

I. Підберіть антоніми до таких слів та словосполучень:

edible; common; known; soluble; ordinary; convenience; low; important; digestible; significant; soft; little; agree; legal; moral.

II. Знайдіть усі випадки вживання The Passive Voice; вкажіть час присудка.

III. Продовжіть речення.

1. Oils and fats may be decomposed into...
2. Chemists designate as acids...
3. The distinction between a fat and oil...
4. Marine fats include...
5. With two important exceptions animal fats are obtained from...

Text 5
COMPUTER CRIMES

More and more, the operations of our businesses, governments, and financial institutions are controlled by information that exists only inside computer memories. Anyone clever enough to modify this information for his own purposes can reap substantial rewards. Even worse, a number of people who have done this and been caught at it have managed to get away without punishment.

These facts have not been lost on criminals or would-be criminals. A recent Stanford Research Institute study of computer abuse was based on 160 case histories, which probably are just the proverbial tip of the iceberg. After all, we only know about the unsuccessful crimes. How many successful ones have gone undetected is anybody's guess.

Here are a few areas in which computer criminals have found the pickings all too easy.

Banking. All but the smallest banks now keep their accounts on computer files. Someone who knows how to change the numbers in the files can transfer funds at will. For instance, one programmer was caught having the computer transfer funds from other people's accounts to his wife's checking account. Often, traditionally trained auditors don't know enough about the workings of computers to catch what is taking place right under their noses.

Business. A company that uses computers extensively offers many opportunities to both dishonest employees and clever outsiders. For instance, a thief can have the computer ship the company's products to addresses of his own choosing. Or he can have it issue checks to him or his confederates for imaginary supplies or services. People have been caught doing both.

Credit Cards. There is a trend toward using cards similar to credit cards to gain access to funds through cash-dispensing terminals.

Yet, in the past, organized crime has used stolen or counterfeit credit cards to finance its operations. Banks that offer after-hours or remote banking through cash-dispensing terminals may find themselves unwillingly subsidizing organized crime.

Theft of Information. Much personal information about individuals is now stored in computer files. An unauthorized person with access to this information could use it for blackmail. Also, confidential information about a company's products or operations can be stolen and sold to unscrupulous competitors. (One attempt at the latter came to light when the competitor turned out to be scrupulous and turned in the people who were trying to sell him stolen information.)

Software Theft. The software for a computer system is often more expensive than the hardware. Yet this expensive software is all too easy to copy. Crooked computer experts have devised a variety of tricks for getting these expensive programs printed out, punched on cards, recorded on tape, or otherwise delivered into their hands. This crime has even been perpetrated from remote terminals that access the computer over the telephone.

Theft of Time-Sharing Services. When the public is given access to a system, some members of the public often discover how to use the system in unauthorized ways. For example, there are the "phone freakers" who avoid long distance telephone charges by sending over their phones control signals that are identical to those used by the telephone company.

Since time-sharing systems often are accessible to anyone who dials the right telephone number, they are subject to the same kinds of manipulation.

Of course, most systems use account numbers and passwords to restrict access to authorized users. But unauthorized persons have proved to be adept at obtaining this information and using it for their own benefit. For instance, when a police computer system was demonstrated to a school class, a precocious student noted the access codes being used; later, all the student's teachers turned up on a list of wanted criminals.

Завдання до тексту

I. Визначте, які речення є a) правильними (t), b) які ні (f), c) інформація відсутня.

1. Computer-related crime has diminished.
2. A thief can transfer funds from other people's accounts.
3. Dishonest employees can't ship the company's products to addresses of their choosing.
4. It is impossible to counterfeit credit cards.
5. Phone freaks can be found out.

6. Personal information should not be stored in computer files.
7. A real bank checks very carefully before handling out any money.

II. Підберіть синоніми до таких слів та словосполучень:

to come to light; confidential; attempt; crooked; to deliver; to perpetrate crime; freaks; to avoid; to obtain; to reveal; merchandise; transaction; severance pay; publicity; executive.

III. Підберіть антоніми до таких слів та словосполучень:

fraudulent; common; to ship; like; to go to jail; to be adept at; to reveal; a precocious student; former; by accident; to complain of.

IV. Складіть невелику розповідь про комп'ютерну злочинність, користуючись інформацією, наведеною в тексті.

Text 6
MODERN SPORTS CARS

Sports cars continue to evolve as automakers strive to create the ultimate fun-to-drive machines. They're getting faster, more cutting-edge, more high-tech and more efficient with each generation. Options are plentiful no matter what your budget is. Sports cars typically follow this formula: rear-wheel drive, two doors, low-slung, and lightweight, though many automakers deviate from this formula all the time with great results. If you have a bit more cash to spend and go the supercar route or want something exotic, these cars represent the pinnacle of what the automotive industry is capable of in terms of technology, engineering, and design.

Pros and Cons of Sports Cars

If you're looking for driving purity and fun, there's nothing better than a sports car. Though many sedans and hot hatches offer sporty driving dynamics and gobs of power, a purpose-built sports car is always going to give you that extra edge and engagement. There is also a sports car for every budget: Whether you have $20,000 to spend or $150,000 and more, there is a capable machine for you. Stylish and often avant-garde, sports cars often push the boundaries of design and make a loud statement about who you are.

Sports cars are generally far less practical than other types of vehicles with their smaller trunks, less headroom, cramped cabins, and sometimes only two seats. They are often more expensive to operate as well because they usually require premium gasoline and demand higher insurance rates. Many sports cars are also not four-weather vehicles and require some extra care and attention to drive safely. Because they can be flashy and stand out more on the road, they also tend to get more attention from the authorities.

What's New in Sports Cars for 2019?

The highly anticipated Toyota Supra will finally be unveiled. This sports car marks the return of the legendary Supra nameplate. This two-seater is powered by a turbocharged inline-six engine that will output more than 300 horsepower. We have already driven an early prototype of this two-seater, and our initial impressions were really good. The Supra feels focused, responsive, and precise. There's a lot of hype to live up to, so Toyota has its work cut out for it.

The BMW Z4, which shares a platform and many other parts with the Supra, was also overhauled for 2019. The biggest change is the new style and the fact it's no longer available with a retractable hardtop.

A new-generation of Porsche 911 has debuted and although the German automaker hasn't messed around too much with the iconic sports car's formula, it has received important updates and refinements all around. The 8th-generation 911 has more power, is more efficient, and gets a bunch of interesting tech like night vision assist, automatic emergency braking, and adaptive cruise control. Prices for the 911 have also gone up.

Aston Martin has been making big moves, refining and modernizing its lineup. The Aston Martin Vantage has been completely overhauled and is aiming to find fans with a younger audience. With a menacing new look and improved driving dynamics, it devours corners with poise and purpose.

Mercedes-AMG has a new hypercar called the 1 (it used to be called the Project 1), which has more than 1,000 horsepower. The AMG

GT line has also been refreshed. This entire line of cars is simply remarkable to drive.

Perhaps one of the most important sports cars of the modern era, the Mazda MX-5 Miata got an important refresh for 2019: It finally got the power bump that people have been asking for — output from the naturally aspirated four-cylinder is now 181 hp and 151 lb-ft of torque. Bringing it up to speed in terms of tech, the lightweight roadster also gets a backup camera for the first time. Of course, there is also the RF available with its retractable fastback. Lightweight, nimble, engaging, pure, and fun at any speed, the Miata is an icon — it has a focus and joyfulness that is rare in this segment.

One big trend we will see going forward is more hybrid or fully electrified sports cars. Electrification isn't just reserved for improving fuel economy these days, and sports car makers are starting to tap the technology to bolster performance.

Завдання до тексту

I. Визначте, які речення є a)правильними (t), b) які ні (f), c) інформація відсутня.

1. Sports cars are getting faster, more cutting-edge, more high-tech and more efficient with each generation.
2. If you're looking for driving purity and fun, there's nothing worse than a sports car.
3. The Mazda MX-5 Miata didn't get an important refresh for 2019.
4. Mercedes-AMG has a new hypercar which has more than 1,000 horsepower.
5. Fully electrified sports cars(hybrids) are a new trend in automobile industry.

II. Поставте у відповідність такі англійські слова та їх українські еквіваленти:

1. vehicle	A. швидкість
2. steam	B. двигун внутрішнього згоряння

3. speed	C. пара
4. internal combustion engine	D. транспортний засіб
5. fuel	E. паливо

III. Складіть 5 спеціальних запитань до тексту.

IV. Складіть, користуючись інформацією з поданого тексту, невелику розповідь про сучасні спортивні машини.

Text 7
BIOPHARMACEUTICAL

A biopharmaceutical, also known as a biologic(al) medical product, is any pharmaceutical drug product manufactured in, extracted from, or semisynthesized from biological sources. Different from totally synthesized pharmaceuticals, they include vaccines, blood, blood components, allergenics, somatic cells, gene therapies, tissues, recombinant therapeutic protein, and living cells used in cell therapy. Biologics can be composed of sugars, proteins, or nucleic acids or complex combinations of these substances, or may be living cells or tissues. They (or their precursors or components) are isolated from living sources — human, animal, plant, fungal, or microbial.

Terminology surrounding biopharmaceuticals varies between groups and entities, with different terms referring to different subsets of therapeutics within the general biopharmaceutical category. Some regulatory agencies use the terms *biological medicinal products* or *therapeutic biological product* to refer specifically to engineered macromolecular products like protein- and nucleic acid-based drugs, distinguishing them from products like blood, blood components, or vaccines, which are usually extracted directly from a biological source. Specialty drugs, a recent classification of pharmaceuticals, are high-cost drugs that are often biologics. The European Medicines Agency uses the term *advanced therapy medicinal products* for medicines for human use that are "based on genes, cells, or tissue engineering", including gene therapy medicines, somatic-cell therapy medicines, tissue-engineered medicines, and combinations thereof. Within EMA

contexts, the term *advanced therapies* refers specifically to ATMPs, although that term is rather nonspecific outside those contexts.

Gene-based and cellular biologics, for example, often are at the forefront of biomedical research, and may be used to treat a variety of medical conditions for which no other treatments are available.

The term biopharmacology is sometimes used to describe the branch of pharmacology that studies biopharmaceuticals.

Завдання до тексту

I. Знайдіть та перекладіть рідною мовою терміни, що виділені в тексті.

II. Продовжіть речення.

1. A biologic(al) medical product, is any pharmaceutical drug product manufactured in, extracted from, or semisynthesized from...
2. Biologics can be composed of...
3. Terminology surrounding biopharmaceuticals varies between...
4. Biologics are isolated from living sources...
5. Gene-based and cellular biologics may be used...

III. Знайдіть абзац, в якому міститься інформація:

Biopharmaceutical can be composed of sugars, proteins, or nucleic acids or complex combinations of these substances.

Text 8
SCIENCE OF MEASUREMENT

Metrology is the science of measurement. Metrology includes all theoretical and practical aspects of measurement. The word comes from Greek μέτρον (metron), "measure" + "λόγος" (logos), amongst others meaning "speech, oration, discourse, quote, study, calculation, reason". In Ancient Greek the term μετρολογία (metrologia) meant "theory of ratios".

Metrology is defined by the International Bureau of Weights and Measures (BIPM) as "the science of measurement, embracing both experimental and theoretical determinations at any level of uncertain-

ty in any field of science and technology". The ontology and international vocabulary of metrology is maintained by the International Organisation for Standardisation.

Metrology is a very broad field and may be divided into three subfields:

1) Scientific or fundamental metrology concerns the establishment of quantity systems, unit systems, units of measurement, the development of new measurement methods, realisation of measurement standards and the transfer of traceability from these standards to users in society.
2) Applied or industrial metrology concerns the application of measurement science to manufacturing and other processes and their use in society, ensuring the suitability of measurement instruments, their calibration and quality control of measurements.
3) Legal metrology concerns regulatory requirements of measurements and measuring instruments for the protection of health, public safety, the environment, enabling taxation, protection of consumers and fair trade.

Traceability, accuracy, precision, systematic bias, evaluation of measurement uncertainty, reliability are critical parts of a quality management system.

A core concept in metrology is (metrological) traceability, defined as "the property of the result of a measurement or the value of a standard whereby it can be related to stated references, usually national or international standards, through an unbroken chain of comparisons, all having stated uncertainties". The level of traceability establishes the level of comparability of the measurement: whether the result of a measurement can be compared to the previous one, a measurement result a year ago, or to the result of a measurement performed anywhere else in the world.

Traceability is most often obtained by calibration. Calibration is the process where metrology is applied to measurement equipment and processes to ensure conformity with a known standard of meas-

urement, usually traceable to a national standards board. These standards are usually coordinated by national metrological institutes: National Institute of Standards and Technology, National Physical Laboratory.

Mistakes can make measurements and counts incorrect. Even if there are no mistakes, nearly all measurements are still inexact. The term "error" is reserved for that inexactness, also called measurement uncertainty. Among the few exact measurements are the absence of the quantity being measured, such as a voltmeter with its leads shorted together, the meter should read zero exactly.

Sufficiently correct measurements are essential to commerce. About nine out of every ten people working in metrology specialize in commercial measurement, most at the technician level. Correct measurements are beneficial to manufacturing, but other methods are available and sometimes are more appropriate.

Metrology has thrived at the interface between science and manufacturing. Aerospace, commercial nuclear power, medicine, medical devices and semiconductors rely on metrology to translate theoretical science into mass produced reality.

The basic concepts of metrology appear simple on the surface, and metrology is rarely taught in a systematic manner above the technician level. Within most businesses, metrology core beliefs such as recording all setups and observations or possible future reference are opposed to the general business practice of minimizing recordkeeping to limit litigation effects.

Завдання до тексту

I. Визначте, які речення є a)правильними (t), b) які ні (f), c) інформація відсутня.

1. Metrology is a purely applied branch of science.
2. All measurements performed by metrology engineers are perfectly exact.
3. The result of a measurement must be compared to the standard one.

4. Almost all branches of industry depend on the achievements of metrology.

II. Знайдіть абзаци, в яких міститься інформація:

1. the definition of metrology
2. the origin of metrology
3. allowing of errors
4. the benefits of metrology

III. Виберіть відповідь на запитання: *What does metrology ensure?*

a) that there are no mistakes
b) the protection of public safety
c) the correctness of specific measurement situations
d) the quality control of measurement instruments

IV. У чому полягає основна ідея тексту? Виберіть з наведеного нижче назву тексту.

a) Subdivisions of Metrology
b) Core Concepts of Metrology
c) Metrology as a Scientific Discipline
d) Applied Metrology

Text 9
MIXING OF LOW AND MODERATE VISCOSITY LIQUIDS

The impeller mixer is the most commonly used type of mixer for low viscosity liquids (viscosity less than 100 poise). Such a mixer consists of one or more impellers, fixed to a rotating shaft and immersed in the liquids. As the impellers rotate, they create currents within the liquid, which travel throughout the mixing vessel. If turbulent conditions are created within the moving streams of liquid, mixing will occur. Turbulence is usually most vigorous near the impeller and the liquid should pass through this region as often as possible. The fluid velocity in the moving streams has three components: a) a radial component acting in a direction at right angles to the shaft, b) a longitudinal component acting parallel to the shaft and c) a rotational

component acting in a direction tangential to the circle of rotation of the shaft. The radial and longitudinal components usually promote mixing but the rotational component may not.

If an impeller agitator is mounted on a vertical shaft located centrally in a mixing vessel, the liquid will flow in a circular path around the shaft. If laminar conditions prevail, then layers of liquid may form, the contents of the vessel rotate and mixing will be inefficient. Under these conditions a vortex may form at the surface of the liquid. As the speed of rotation of the impeller increases this vortex deepens. When the vortex gets close to the impeller, the power imparted to the liquid drops and air is sucked into the liquid. This will greatly impair the mixing capability of the mixer. Rotational flow may cause any suspended particles in the liquid to separate out under the influence of centrifugal force. Rotational flow, and hence vortexing, may be reduced by locating the mixer off centre in the mixing vessel and/or by the use of baffles. Baffles usually consist of vertical strips fixed at right angles to the inner wall of the mixing vessel. These break up the rotational flow pattern and promote better mixing. Usually four baffles are used, with widths corresponding to $1/18^{th}$ (5.55 %) to $1/12^{th}$ (8.33 %) of the vessel diameter.

Three main types of impeller are used for liquid mixing: paddle mixers, turbine mixers and propeller mixers.

Завдання до тексту

I. Випишіть з тексту речення, в яких використано Modal verbs.

II. Продовжіть речення.

1. The impeller mixer is...
2. As the impellers rotate, they create...
3. The fluid velocity in the moving streams has three component...
4. If laminar conditions prevail...
5. Baffles usually consist of...

III. Висловте основну думку тексту у 3—5 реченнях.

Text 10
WASTEWATER

Wastewater, also written as waste water, is any water that has been adversely affected in quality by anthropogenic influence. Municipal wastewater is usually conveyed in a combined sewer or sanitary sewer, and treated at a wastewater treatment plant. Treated wastewater is discharged into receiving water via an effluent sewer. Wastewaters generated in areas without access to centralized sewer systems rely on on-site wastewater systems. These typically comprise a septic tank, drain field, and optionally an on-site treatment unit. The management of wastewater belongs to the overarching term sanitation, just like the management of human excreta, solid waste and storm water (drainage).

Sewage is the subset of wastewater that is contaminated with feces or urine, but is often used to mean any wastewater. Sewage includes domestic, municipal, or industrial liquid waste products disposed of, usually via a pipe or sewer (sanitary or combined), sometimes in a cesspool emptier.

Sewerage is the physical infrastructure, including pipes, pumps, screens, channels etc. used to convey sewage from its origin to the point of eventual treatment or disposal. It is found in all types of sewage treatment, with the exception of septic systems, which treat sewage on site.

In some urban areas, sewage is carried separately in sanitary sewers and runoff from streets is carried in storm drains. Access to either of these is typically through a manhole. During high precipitation periods a combined sewer overflow can occur, forcing untreated sewage to flow back into the environment. This can pose a serious threat to public health and the surrounding environment.

Sewage may drain directly into major watersheds with minimal or no treatment. When untreated, sewage can have serious impacts on the quality of an environment and on the health of people. Pathogens can cause a variety of illnesses. Some chemicals pose risks even at

very low concentrations and can remain a threat for long periods of time because of bioaccumulation in animal or human tissue.

Завдання до тексту

I. Прочитайте текст та дайте відповідь на запитання.

1. Where is wastewater usually conveyed and treated?
2. How is treated wastewater discharged into receiving water?
3. What do on-site wastewater systems typically comprise?
4. Who does management of wastewater belong to?
5. What is sewerage?

II. Визначте, які речення є a)правильними (t), b) які ні (f), c) інформація відсутня.

1. Waste water is any water that has been used in vain.
2. Municipal wastewater is usually conveyed in an effluent sewer.
3. Wastewaters generated in areas without access to centralized sewer systems rely on onsite wastewater systems.
4. Sewerage is the physical infrastructure, including pipes, pumps, screens, channels etc.
5. When untreated, sewage does not have serious impacts on the quality of an environment and on the health of people.

III. Знайдіть абзац, в якому міститься інформація:

What does sewerage include?

Text 11
MULTIMEDIA

Multimedia is the term used to refer to a combination of text, graphics, animation, sound and video.

MP3 (MPEG Audio Layer 3) is a standard way of storing compressed, digital audio files (usually music). The name MP3 comes from MPEG (pronounced EM-peg), which stands for Motion Picture Experts Group, an organisation that develops standards for audio and video compression.

MP3 competes with another audio file format called WAV. The key difference is that MP3 files are much smaller than WAV files. An MP3 file can store a minute of sound per megabyte, while a WAV file needs 11 or 12 megabytes to hold the same amount. How does MP3 achieve this compression? CDs and audio files don't reproduce every sound of a performance. Instead, they sample the performance and store a discrete code for each sampled note. A CD or WAV file may sample a song 44,000 times a second, creating a huge mass of information.

By stripping out sounds most people can't hear, MP3 significantly reduces the information stored. For instance, most people can't hear notes above a frequency of 16 kHz, so it eliminates them from the mix. Similarly, it eliminates quiet sounds masked by noise at the same frequency. The result is a file that sounds very similar to a CD, but which is much smaller. An MP3 file can contain spoken word performances, such as radio shows or audio books, as well as music. It can provide information about itself in a coded block called a tag. The tag may include the performer's name, a graphic such as an album cover, the song's lyrics, the musical genre, and a URL for more details.

Digital audio is created by sampling sound 44,000 times a second and storing a code number to represent each sound sample. The files are compressed by removing any sounds that are inaudible to the human ear, making them much smaller than files created using other digital audio storage standards, such as WAV. The size of an audio file is commonly measured in megabytes (MB) (millions of bytes). The frequency of a sound is measured in kilohertz (kHz) (thousands of cycles per second). MP3 files have extra code added, called tags, that give the user information about the file e.g. the performer's name, a URL (uniform resource locator i. e. a web address) or a graphic such as an album cover.

Because of their small size, MP3 files are more suitable for transferring across the Internet (the connection of computer networks

across the world). Some Internet websites (sets of related pages stored on a Web server on the World Wide Web) are devoted to providing MP3 files for downloading (copying from a server computer to a client computer). The user can create their own music compilations (combinations of files) by listening to each file using a computer program, such as Windows Media Player, and choosing what files to download, They can then use a computer program called an MP3 player to listen to the files and control the sound. MP3 players let the user group songs into play lists and randomize the selections. They also have sound control features such as spectrum analyzers, graphic equalizers, and frequency displays.

Завдання до тексту

I. Дайте відповідь на запитання.

1. What does the term "multimedia" mean?
2. What does MP3 stand for?
3. What is the difference between MP3 and WAV files?
4. What kind of sound does MP3 strip out?
5. What kind of information is included in the tag?
6. Why are MP3 files more suitable for transferring across the Internet?
7. What is downloading?
8. How can the user see the information stored in the MP3 file tag?
9. How can the appearance of MP3 player be changed?
10. Is it possible to listen to MP3 files without a computer?
11. What is MIDI? 12. What is a DVD-ROM?

II. Знайдіть відповідність термінів, поданих нижче та їх визначення: *MIDI, MPEG, ripper, skin, download, MP3, URL, multimedia, tag, DVD-(ROM).*

1. A uniform (or universal) resource locator.
2. Acronym for musical instrument digital interface. A standard for connecting musical instruments to computer systems.
3. A Motion Picture Experts Group standard for audio compression.

4. Motion Picture Experts Group, a committee that develops standards for audio and video file formats and compression.
5. The combination of text, graphics animation, sound and video.
6. A program that extracts songs from a CD and turns them into WAV files.
7. A computer program that is used to change the interface of another program, e.g. to change the screen display on an MP3 player program.
8. A label used in a mark-up language. It is attached to a piece of text to mark the start or the end of a particular function.
9. A process of copying a file from a server to a client computer in a network.
10. A digital versatile disk read-only memory. An optical disk storage device that can hold a large amount of video data.

III. Знайдіть еквіваленти таких словосполучень:

стандартний спосіб запам'ятовування (зберігання); зжимання цифрових звукових файлів; основна відмінність; хвилина звучання; заміряти характеристики; дискретний код; групувати записи пісень; знайти пісню на диску; робити вибірку із збірок; пульт мікшування.

IV.Визначте, які речення є правильними (t), а які ні (f).

1. MP3 reduces the information stored by removing loud sounds.
2. It is possible to alter the look of your MP3 player by downloading a skin program.
3. You can "rip" audio information from a CD by using a recorder program.
4. One can convert a WAV file to MP3 format by using an encoder.
5. You can view the lyrics, notes and author data by clicking on Track Info.
6. MIDI systems store the actual sound.

Text 12
ELECTRONIC DEVICES AND COMPONENTS

Electronics is the discipline dealing with the development and application of devices and systems involving the flow of electrons in a vacuum, in gaseous media, and in semiconductors. Electronics deals with electrical circuits that involve active electrical components such as vacuum tubes, transistors, diodes, integrated circuits, optoelectronics, and sensors, associated passive electrical components, and interconnection technologies. Commonly, electronic devices contain circuitry consisting primarily or exclusively of active semiconductors supplemented with passive elements; such a circuit is described as an electronic circuit.

Electronics is considered to be a branch of physics and electrical engineering.

The nonlinear behaviour of active components and their ability to control electron flows makes amplification of weak signals possible. Electronics is widely used in information processing, telecommunication, and signal processing. The ability of electronic devices to act as switches makes digital information processing possible. Interconnection technologies such as circuit boards, electronics packaging technology, and other varied forms of communication infrastructure complete circuit functionality and transform the mixed components into a regular working system.

Electrical and electro-mechanical science and technology deals with the generation, distribution, switching, storage, and conversion of electrical energy to and from other energy forms (using wires, motors, generators, batteries, switches, relays, transformers, resistors, and other passive components). This distinction started around 1906 with the invention by Lee De Forest of the triode, which made electrical amplification of weak radio signals and audio signals possible with a non-mechanical device. Until 1950 this field was called “radio technology” because its principal application was the design and theory of radio transmitters, receivers, and vacuum tubes.

Today, most electronic devices use semiconductor components to perform electron control. The study of semiconductor devices and related technology is considered a branch of solid-state physics, whereas the design and construction of electronic circuits to solve practical problems come under electronics engineering.

An electronic component is any physical entity in an electronic system used to affect the electrons or their associated fields in a manner consistent with the intended function of the electronic system. Components are generally intended to be connected together, usually by being soldered to a printed circuit board (PCB), to create an electronic circuit with a particular function (for example an amplifier, radio receiver, or oscillator). Components may be packaged singly, or in more complex groups as integrated circuits. Some common electronic components are capacitors, inductors, resistors, diodes, transistors, etc. Components are often categorized as active (e.g. transistors and hyristors) or passive (e.g. resistors, diodes, inductors and capacitors).

Завдання до тексту

I. Дайте відповідь на запитання.

1. What does the discipline of electronics deal?
2. Where is electronics is used?
3. Can electronic devices act as switches?
4. Where are semiconductors used?
5. What components are categorized as active and passive?

II. Визначте, які речення є a)правильними (t), b) які ні (f), c) інформація відсутня.

1. Electronics deals with electrical circuits that involve active electrical components.
2. Electronic devices contain circuitry consisting primarily or exclusively of active semiconductors supplemented with passive elements.
3. Electronics is considered to be a branch of mechanics.
4. Nowadays, few electronic devices use semiconductor components to perform electron control.
5. Components are generally intended to be connected together.

III. Складіть одне загальне запитання до кожного абзацу та дайте відповідь на них.

Text 13
WHICH IS MORE ENVIRONMENTALLY FRIENDLY: PAPER OR PLASTIC?

When you do get to choose between paper and plastic, don't let green guilt necessarily pull you toward paper. Consider that both materials have drawbacks for the environment.

Before you brown bag it, consider these environmental disadvantages of paper:

- **Causes pollution**: Paper production emits air pollution, specifically 70 percent more pollution than the production of plastic bags. According to certain studies, manufacturing paper emits 80 percent more greenhouse gases. And, consider that making paper uses trees that, instead, could be absorbing carbon dioxide. The paper bag making process also results in 50 times more water pollutants than making plastic bags.
- **Consumes energy**: Even though petroleum goes into making plastic, it turns out that making a paper bag consumes four times as much energy as making a plastic bag, meaning making paper consumes a good deal of fuel.
- **Consumes water**: The production of paper bags uses three times the amount of water it takes to make plastic bags.
- **Inefficient recycling**: The process of recycling paper can be inefficient — often consuming more fuel than it would take to make a new bag. In addition, it takes about 91 percent more energy to recycle a pound of paper than a pound of plastic.
- **Produces waste**: According to some measures, paper bags generate 80 percent more solid waste.
- **Biodegrading difficulties**: Surprisingly, the EPA has stated that in landfills, paper doesn't degrade all that much faster than plastics.

However, plastic didn't get a bad reputation for nothing. Here are some environmental disadvantages of plastic:

- **Litter**: Littered plastic bags are everywhere today — blown around streets, stuck in fences and trees. And, aside from their use in the occasional art film (a la American Beauty) they can be an eyesore and a pain.
- **Danger to wildlife**: Plastic waste is deceptive for birds and other wildlife, who mistake it for food. And you can imagine how eating plastic messes with an animal's intestine. As a result, animals can die of starvation. To prevent this, perhaps paper is the better choice, especially if you live on the coast, as your plastic waste is more likely to make its way to marine life and sea birds.
- **Long-term degrading**: Light breaks plastic down so it photo degrades rather than biodegrades. Estimates say that this process can take up to 500 or even 1000 years in landfills. Unfortunately, we don't really know, as plastic is a relatively new invention.
- **Recycling difficulties**: Although for the most part, plastic takes less energy to recycle than paper, plastic bags are a frustrating recycling dilemma. The curb side recycling in many communities is not meant for plastic bags because they can screw up the plant's machines. Instead, some stores offer bins in which to properly recycle plastic bags.

These factors have made the question of which is greener mind-boggling. The EPA has admitted that not only is the question unresolved, but it doesn't consider the use of plastic bags a major issue. Most environmental groups say that it's best to avoid the choice altogether — instead we should diligently reuse bags.

Завдання до тексту

I. Визначте, які речення є a) правильними (t), b) які ні (f), c) інформація відсутня.

1. Both paper and plastic have drawbacks for the environment.
2. Paper production doesn't produce air pollution.

3. The production of paper bags uses more water that it takes to make plastic bags.
4. Paper doesn't degrade all that much faster than plastics.
5. Plastic takes less energy to recycle than paper.

II. Знайдіть абзац, в якому міститься інформація:

Plastic waste is deceptive for birds and other wildlife, who mistake it for food.

III. Висловте основну думку тексту у 3—5 реченнях.

Text 14
WHAT ARE THE LATEST TECHNOLOGIES IN THE COMPUTER FIELD?

Cloud Computing. Analysts predict that the latest technology inventions in cloud computing will significantly influence how we use our computers and mobile devices.

Cloud computing is where tasks and file storage on your computer are performed and stored elsewhere. By using an internet connection you can connect to a service that has the architecture, infrastructure and software to manage any task or storage requirement at less cost.

The advantages of cloud computing is that it eliminates the difficulty and expense of maintaining, upgrading and scaling your own computer hardware and software while increasing efficiency, speed and resources. Your computer's processing speed, memory capacity, software applications and maintenance requirements are minimized.

You could store and access any size or type of file, play games, use or develop applications, render videos, word process, make scientific calculations, or anything you want, by simply using a smart phone.

As a comparison, let's say you had to generate your own electricity. You would need to maintain, upgrade and scale these resources as required to meet your demands. This would be expensive and time consuming.

Cloud computing could be compared to how a utility provides electricity. It has the architecture, infrastructure, applications, exper-

tise and resources to generate this service for you. You just connect to their grid.

Microsoft, IBM and Google are some of the companies that are investing heavily into the research and development of cloud technology.

3D Printed Car. The latest technology inventions in 3d printing are rapidly changing how things are being made.

It's an emerging technology that is an alternative to the traditional tooling and machining processes used in manufacturing.

At the International Manufacturing Technology Show in Chicago, a little known Arizona-based car maker created a media sensation by manufacturing a car at the show.

It was a full scale, fully functional car that was 3d printed in 44 hours and assembled in 2 days. The video below shows the car being made.

The car is called a "Strati", Italian for *layers*, so named by it's automotive designer Michele Anои because the entire structure of the car is made from layers of acrylonitrile butadiene styrene (A.B.S.) with reinforced carbon fiber into a single unit.

The average car has more than 20,000 parts but this latest technology reduces the number of parts to 40 including all the mechanical components.

Artificial Intelligence and Machine Learning. Artificial Intelligence (AI) and Machine Learning (ML) are nothing unheard of. Still whenever the topic of future technologies comes into discussion, suddenly these two become mandatory topics, well sort of. These two trends are no longer in their research phase. They have already started their industrial journey from 2018 and are growing rapidly.

In 2019, AI and ML are going to reach a larger audience, and by audience I am not referring to only developers and programmers, this includes the common public as well. How? You may ask! Well, AI and ML are going to be used in mobile applications and web applications/websites extensively. This certainly means better business on

the end of the developers and marketers but it can also benefit the consumer or app user by providing a better experience.

These are not all that we are going to see in 2019. There is much more to come in this field ranging from robotics, voice assistants and even usage in healthcare.

Завдання до тексту

I. Визначте, які речення є a)правильними (t), b) які ні (f), c) інформація відсутня.

1. Cloud computing is where tasks and file storage on your computer are performed and stored elsewhere.
2. The disadvantages of cloud computing is that it eliminates the difficulty and expense of maintaining, upgrading and scaling your own computer hardware and software while increasing efficiency, speed and resources.
3. It was a full scale, fully functional car that was 3d printed in 14 hours and assembled in 2 days.
4. Artificial Intelligence and Machine Learning have already started their industrial journey from 2018 and are growing rapidly.
5. We are going to see Artificial Intelligence in the fields ranging from robotics, voice assistants and even usage in healthcare.

II. Складіть одне загальне запитання до кожного абзацу та дайте відповідь на них.

III. Випишіть з тексту речення, в яких використано Passive Voice.

Text 15
THE MAGNITUDE OF A PHYSICAL QUANTITY

Mass, length, time, area, velocity, acceleration — all of these are physical quantities. Whenever we measure one of these we are finding its magnitude. To find the magnitude of a physical quantity we must measure it. The magnitude of any physical quantity is expressed as number times a unit of measure.

Time is a physical concept and its definition is related to certain laws of physics. The laws of physics say that the average time it takes

for the sun to move from its noon position on one day to its noon position the next day must be constant and is called the mean solar day. The laws of physics also say that the period of oscillation of a vibrating slab of crystal in a crystal oscillator should remain constant if the temperature and other external conditions are kept constant. So an electronic crystal oscillator can be made into a very accurate clock. The same is true of the vibrational frequency of atoms in a molecule. In fact atomic clocks counting up these vibrations are the most accurate of all.

The basic unit used in both the English and the metric systems is the second.

Basing a concept such as time on the laws of physics, we cannot be sure that these laws are absolutely correct. For example, suppose the speed of light is slowly increasing with time. This would then cause a change in some of our standards of length and time. So far there is no experimental evidence that any of the universal physical constants are changing with time, but this does not rule out the possibility of a very slow change beyond the accuracy of present measurements.

Being also a physical concept mass must be defined in terms of certain laws of physics. In the metric system the unit of mass was originally defined as the amount of mass contained in 1 cc (cubic centimeter) of water (at a specified temperature and pressure), this amount of mass being called the gram. Thus the density of water is conveniently one gram per cubic centimeter. In the English system the unit of mass is the pound, one kilogram (10^3 grams) being equal to 2.204 pounds of mass.

In physics the quantities such as force and energy are usually measured either in meters, kilograms, and seconds or in centimeters, grams and seconds, the former being called the MKS system of units and the latter the CGS system of units. Both of these metric systems are referred to in scientific papers.

Завдання до тексту

I. Прочитайте текст та дайте відповідь на запитання.

1. What is the definition of time related to?
2. On what condition does the period of oscillation of a vibrating slab of crystal remain constant?
3. What can this fact be used for?
4. What can an electronic crystal oscillator be made into?
5. Can we be sure that the laws of physics are absolutely correct?

II. Перекладіть речення, звертаючи увагу на різні значення слова "time": ***time —*** *час, період, раз*; ***for the first time —*** *вперше*; ***at times —*** *іноді*; ***times —*** *помножений на*.

1. Check the time of the experiment.
2. The production of the plant has increased by more than twenty times since 1945.
3. The Venus at times comes rather close to the Earth.
4. The value is equal to N times R.
5. They usually check the results many times.

III. Знайдіть у тексті випадки вживання дієслів у пасивному стані та прокоментуйте їх.

Topics

THE UNITED STATES OF AMERICA

The main land mass of the United States of America lies in the central part of the North American continent. The 50 states, the District of Columbia and 6 territories and dependencies form an area of 3,615,122 square miles (9,364,000 square kilometers) making the United States the fourth largest country in the world (after Russia, Canada and China). The conterminous states are bounded on the north by Canada, on the east by the Atlantic Ocean, on the south by the gulf of Mexico and Mexico, and on the west by the Pacific Ocean.

The United States of America is a federal republic. The US Constitution defines a federal system of government in which certain pow-

ers are delegated to the national government; other powers fall to the states. The national government consists of executive, legislative, and judicial branches that are designed to check and balance one another. The American Constitution is based on the doctrine of the separation of powers between the executive, legislative and judiciary. The main text of the Constitution comprises seven articles.

Since the Constitution was ratified in 1788, there have been 26 amendments to it. The first 10, known as the Bill of Rights, established a number of individual liberties. Among them are the freedom of religion, speech, and the press, the right of peaceful assembly. Other rights guarded the citizens against unreasonable searches, arrests, and seizures of property, and established a system justice guaranteeing orderly procedures.

The capital of the country is Washington, which is situated in a federal area called District of Columbia.

The major characteristic of the United States is probably its great variety. Its physical environment ranges from the Arctic to the subtropical, from the moist rain forest to the arid desert, from the rugged mountain peak to the flat prairie.

The United States has several immensely long rivers: the Missouri (3,942 km), the Mississippi (3,760 km), the Rio Grande (3,016 km) and others. There are thousands of lakes of all kinds and sizes. The Great Lakes make up the largest group of lakes in the country, as well as the greatest collection of fresh-water lakes in the world.

The climate of the country varies greatly from arctic in Alaska, through continental in the central part to subtropical in the south. The climate along the Pacific coast is warmer than that of the Atlantic coast. The temperature changes little between winter and summer there. In eastern part the difference between summer and winter is distinct, but not so extreme as in the north central part where the difference between winter and summer is 36 degrees Celsius and even more.

With more than 265,455,000 inhabitants the United States is the third country in the world in the terms of population (after China

and India). About 75 per cent of the population live in urban areas. Most of this urban centers lie along the Atlantic and the Pacific Coasts, the Gulf of Mexico and the Great Lakes.

The United States contains a highly diverse population. Its diversity has to a great degree come from an immense and sustained global immigration. Probably no other country has a wider range of racial, ethnic, and cultural types than does the United States. In addition to the presence of surviving native Americans (including American Indians, Aleuts, and Eskimo) and the descendants of Africans taken as slaves to America, the national character has been enriched, tested, and constantly redefined by the tens of millions of immigrants who have gone to America hoping for greater social, political, and economic opportunities than they had in the places they left.

The United States has one of the strongest economies in the world. It is the world leader in the aeronautics, space technology, electronics and computer hardware and software. One fifth of the world's cars are produced in the United States. The United States economy is based on the free enterprise system: private businesses compete against one another with relatively interference from the government. The United States is a large country and is rich in natural resources. It is a leading producer of fuel oil, natural gas, and coal. It is also a leading producer of many other minerals, including copper, gold, aluminum, iron, and lead. The United States grows wheat, corn, and other crops and raises many cows, pigs, and chickens.

The end of the 20th century is marked by the golden age of electronics, biotechnology and cybernetics in the USA.

The American way of life with its striking contrasts has been reflected in American literature by J. London, M. Twain, Th. Dreiser, E. Hemingway and others.

I. Read the text about the USA. Put the statements in the logical order according to the text.

The geographical position of the USA.

The US economy.

The population of the country.
The political structure of the USA.
The US Constitution.
The climate of the country.

II. Answer the questions.

1. Where is the United States of America situated?
2. What does the USA consist of?
3. What are the conterminous states washed by?
4. What is the political system of the country?
5. What is the highest legislative body in the country?
6. Who is the head of the executive branch of power in the USA?
7. What is the highest judicial body in the country?
8. When was the US Constitution ratified?
9. Which rivers and lakes is the country famous for?
10. How can we characterize the climate of the country?
11. What are the main types?
12. What is the population of the country?
13. What has its diversity come from?
14. What is the economy of the United States based on?
15. What are the leading industries of the US economy?
16. What famous American writers do you know?

III. Look through the text and mark the statements right or wrong.

1. The main land mass of the United States of America lies in the northern part of the North American continent.
2. The United States is not the fourth largest country in the world.
3. Article I vests all legislative powers in the Congress.
4. The first 12 amendments are known as the Bill of Rights.
5. The capital of the country is Washington.
6. The climate of the country varies greatly.
7. The Great Lakes make up the largest group of lakes in the country, as well as the greatest collections of salted-water lakes in the world.
8. The tens of millions of immigrants have gone to America hoping for greater social, political, and economic opportunities than they had in the places they left.

9. One fifth of the world's cars are produced in the United States.
10. The United States is a large country and is not rich in natural resources.

IV. Complete the sentences with correct prepositions.

1. The main land mass ___ the United States ___ America lies ___ the central part ___ the North American continent.
2. The conterminous states are bounded ___ the north ___ Canada.
3. The national government consists ___ executive, legislative, and judicial branches.
4. The American Constitution is based ___ the doctrine of the separation of powers.
5. Article I vests all legislative powers ___ the Congress.
6. The Constitution was ratified ___ 1788.
7. Other rights guarded the citizens ___ unreasonable searches, arrests, and seizures ___ property, and established a system justice guaranteeing orderly procedures.
8. The temperature changes little ____ winter and summer there.
9. The United States economy is based __ the free enterprise system.
10. The American way __ life has been reflected __ American literature __ J. London, M. Twain, Th. Dreiser, E. Hemingway and others.

EDUCATION IN THE UNITED STATES OF AMERICA

Strong schools are the foundation of a strong nation. Without good schools none of America's hopes can be fulfilled. The quality of education determines the strength of democracy, the vitality of economy and the promise of ideals.

The history of education in the United States has certain peculiarities which are closely connected with the specific conditions of life in the New World and the history of the American society. In the United States education differs according to the state. In each school the principal or the headmaster of the school decides curriculum for each grade in his own school. There are many different kinds of schools: public schools, private schools, parochial schools, schools specializing in the arts, literature or science, etc.

All American children receive free compulsory education from 6 to 18 (or 16 in some states). The most common system of education comprises four basic levels: preschool (nursery school — from 3 to 4 years, kindergarten — from 4 to 6 years), elementary school (from 6 to 12 years, from 1st grade to 6th grade), secondary (junior high school — from 12 to 15 years, from 7th to 9th grade, senior high school — from 15 to 18 years, from 10th to 12th grade) and higher education. Vocational training, adult education, schools or classes for special types of children also form part of program in most states.

The preschool education programs are flexible and are designed to help the child grow in self-reliance, learn to get along with the others, and form good work and play habits. The main purpose of the elementary school is the general intellectual and social development of the child. Promotion from one grade to the next is based on the pupil's achievement of specific skills in reading, writing, spelling, arithmetic, history, geography, music, and art. In secondary school most pupils follow a course that includes English, science, social studies, mathematics and physical education. Elective subject may be chosen in the fields of foreign languages, fine arts, and vocational training.

Most young Americans graduate from school with a high school diploma upon satisfactory completion of a specified number of courses. Students are usually graded from A (excellent) to F (failing); in each course they take on the basis of performance in tests given at intervals throughout the year, participation in class discussions and completion of written and oral assignments. Locally developed end-of-the-year examinations are given in many schools.

It comprises three categories of institutions: 1) the university, which may contain a) several colleges for undergraduate students seeking a bachelor's (four-year) degree and b) one or more graduate schools for those continuing in specialized studies beyond the bachelor's degree to obtain a master's or a doctoral degree, 2) the technical training institutions at which high school graduates may take courses ranging from six months to four years in duration and learn a wide

variety of technical skills, from hair styling through business accounting to computer programming; and 3) the two-year, or community college, from which students may enter many professions or may transfer to four-year colleges.

Any of these institutions, in any category, might be either public or private, depending on the source of its funding. In private colleges and universities higher education is very expensive. Many students receive a scholarship from the university or have a part-time job to help pay their expenses.

American universities and colleges are usually built as a separate complex, called "campus", with teaching blocks, libraries, dormitories, and many other facilities grouped together on one site, often on the outskirts of the city. Some universities are comprised of many campuses. The University of California, for example, has 9 campuses.

Some American universities are famous all over the world; they are very selective and expensive. The most outstanding are the eight of the group called the Ivy League: Brown, Harvard, Yale, Columbia, Cornell, Dartmouth College, Princeton and Pennsylvania. These universities have similar academic and social prestige in the USA to Oxford and Cambridge in Britain.

I. Read the text about the Education in the USA again. Put the statements in the logical order according to the text.

1. The system of higher education in the United States.
2. Famous American universities.
3. The preschool education programs.
4. American universities.
5. The most common system of education in the United States.
6. Kinds of educational institutions in the United States.
7. A high school diploma upon satisfactory completion of a specified number of courses.

II. Answer the following questions.

1. What is the main peculiarity of the US education?

2. Who decides the curriculum for each grade in each school?
3. What kinds of school are there in the USA?
4. What can you say about the education from 6 to 18?
5. How many levels does the most common system of education comprise? What are they?
6. How can we characterize the programs of preschool education?
7. What is the main purpose of elementary school?
8. What course do the pupils follow in the secondary school?
9. What certificate do most young Americans graduate from school with?
10. What are the categories of institutions in the system of higher education in the USA?
11. How are American universities and colleges usually built?
12. What are the most outstanding American universities?

III. Fill in the gaps in the following dialogue. A European reporter is interviewing an American schoolboy.

R.: So what kind of school do you _____?
S.: I go to Senior _____ School and I am in the 11th _____ .
R.: What are your _____ subjects?
S.: I like Math and Physical _____ best.
R.: How long have you _____ going to this school?
S.: _____ the beginning of the last year?
R.: How many hours ____ day do you spend at school?
S.: Six and a half but _____ free.
R.: What do you want to do after _____ from school?
S.: I would like to go to _____ but my parents _____ afford it. If I get a _____ then I would like to go to Harvard.
R.: Would you rather live in an apartment with friends or on campus?
S.: _____ an apartment, of course!
R.: I wish you good luck!

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