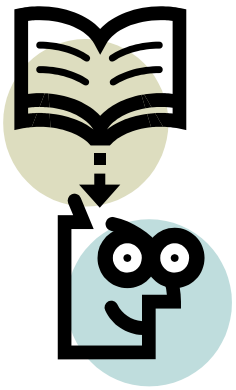

І. М. КУЛІШ

E N G L I S H

FOR NON-LANGUAGE STUDENTS APPLYING FOR MASTER'S DEGREE

A NEW LANGUAGE – A NEW WORLD

Міністерство освіти і науки України
Черкаський національний університет
імені Богдана Хмельницького

І. М. Куліш

E N G L I S H

FOR NON-LANGUAGE STUDENTS APPLYING FOR MASTER'S DEGREE

Рекомендовано Міністерством освіти і науки України
Як навчальний посібник для студентів вищих навчальних закладів

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Куліш І.М. Англійська мова для студентів-магістрантів немовних спеціальностей – Черкаси. – 2007. – с.

Навчальний посібник сформований у відповідності до програми з іноземної мови для студентів-магістрантів немовних факультетів університету.

Навчальний матеріал розташовано за тематичним принципом (за циклами). Робота за темою в межах одного циклу організовується на базі оригінальних текстів, зразків усного мовлення та завдань комунікативного характеру, системи граматичних та лексичних вправ репродуктивного та творчого характеру. Посібник містить тексти для додаткового читання науково-популярного характеру, різноманітні висловлювання для обговорення з метою розвитку критичного мислення та уміння висловлювати свою думку засобами англійської мови, граматичний довідник.

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ПЕРЕДМОВА

Навчальний посібник призначається для студентів-магістрантів немовних факультетів університету. Мета посібника – удосконалювати у студентів навички читання та розуміння літератури наукової та спеціальної тематики на основі активізації знань загальновживаної лексики та активного і пасивного граматичного мінімуму. Поряд з цим у посібнику реалізується мета комплексного оволодіння студентами всіма видами мовленнєвої діяльності на основі комунікативного підходу до вивчення іноземної мови.

Навчальний матеріал посібника розподілено на три тематичних цикли, текстовий матеріал яких згруповано за темами, які охоплюють проблеми наукових досліджень, історію науки і технології та зразки анотації статті, обґрунтування наукового дослідження, форм для продовження навчання за кордоном чи участі у науково-практичній конференції. Кожний цикл, в свою чергу, вміщує декілька основних текстів, які з різних сторін висвітлюють тему, та текстів, які несуть додаткову інформацію за певною тематикою.

Кожний цикл включає серію лексичних та граматичних вправ, призначених для формування мовленнєвих, лексичних, граматичних навичок та тренування вживання мовних явищ на різних етапах удосконалення володіння англійською мовою. Вправи включають також ситуативні, рольові та ділові ігри, які виконують функцію створення ситуацій для вживання засвоєного лексичного та граматичного матеріалу. Дидактичні ігри мають різноплановий вплив на навчальний процес та стимулюють пізнавальний інтерес особистості студента.

Граматичні вправи вміщують деякі явища активного та пасивного граматичного мінімуму англійської мови, а саме основну інформацію про модальні дієслова, пасивний стан дієслів, неозначені форми дієслова, їх особливості та специфіку вживання, узгодження часів та умовні речення. Граматичні вправи спрямовані на активізацію необхідного граматичного матеріалу, ефективне його повторення та практичне застосування отриманих знань.

Посібник вміщує також навчальний матеріал для засвоєння фонетичних особливостей мови, зокрема, англійські висловлювання, які несуть в собі певний пізнавальний зміст та можуть бути використані як “фонетична зарядка” або матеріал для комунікативних вправ, а також граматичний довідник.

UNIT 1

PROBLEMS OF SCIENTIFIC INVESTIGATIONS

LESSON 1

Pre-Text Exercises

1. **Consult a dictionary and remember a) the irregular verbs in three forms; b) the regular verbs; c) nouns:**

a) to run, to win, to mean, to find, to think, to draw, to set;
b) to appreciate, to associate, to belong, to compare, to consist in, to modify, to prevail, to prove, to warn;
c) reception, definition, habit, degree measure, proverb, view, skill, conclusion.

2. **Remember the following word-combinations:**

Merely an echo – просто луна; otherwise – інакше; to put two and two together – зіставляти факти; astonishing speed and rapidity – дивна спритність та швидкість; a driving power – рушійна сила; an unprejudiced thinker – об'єктивний мислитель; to draw valid conclusions – робити серйозні висновки.

THE ART OF THINKING

What is thinking? The word "thinking", like other words, has several meanings. The word is used popularly in the sense of "to have an opinion". This opinion may be our own or it may be merely an echo of somebody else's opinion. One of the definitions of the verb "to think" as given in the dictionary is "to express the mind otherwise than by passive reception of another's ideas". And indeed the word is best used to mean real thinking: putting two and two together, and trying to find out the truth… To accept as true certain thoughts because they happen to be popular, or modern, or because some person with a great name has told us that they are true, is not real thinking at all. It is precisely against this bad habit of looking to authority that Roger Bacon warned us over 500 years ago, and Aristotle long before that.

The most active form of thinking is found when we are discussing or arguing with others. A discussion consists in comparing our views or thoughts with those of others in order to see in what degree or measure our thoughts agree or disagree. By discussion we may modify our views or the views held by others. An argument is more in the nature of a battle, with thoughts used as weapons.

Therefore when we argue, we sometimes are less interested in finding the truth than winning our case and defeating (getting the better of) our opponent.

Thinking may also be called "the machinery of association", for it is to a large extent connected with memory: when we think we are putting facts into combination with facts we are "putting two and two together", as the saying is.

We may now ask ourselves the question, "May we, by striving, become good thinkers?" This depends largely upon the nature of our interest. There are false or doubtful kinds of interest, as well as good ones. A man may be interested simply in making money, and the machinery of association in his mind will work with astonishing skill and rapidity; or a boy may be interested only in passing an examination, and so his machinery of association works hard for a time at something or other, and after the examination, he seldom or never thinks of it again.

Worst of all, perhaps, in its results, is the kind of interest which sets men studying things only in order to defeat someone else, or to prove that they are right, or to make success for the party or the class to which they belong… This kind of interest is extremely powerful and very

general. Unfortunately, interest of this kind and interest in money are the driving powers of most of the thinking that is done in the Western world.

Let us, rather, resolve to found our thoughts on the sort of interest which leads toward the discovery of truth, for there can be no higher ideal. The English translation of a certain Latin proverb runs, "Great is the truth, and it shall prevail" or to put it more briefly, "Truth will conquer". And for truth to prevail we require thinkers, real thinkers, unprejudiced thinkers, who are able to find and remember facts, and draw valid conclusions from them *[Palmer H.E. Standard English Reader. London, [s.a.]. P.347}.*

VOCABULARY EXERCISES

3. Translate the following words and word-combinations:

Passive reception, to find out the truth, to accept a thought, bad habit, to compare views, to defeat an opponent, to a large extent, to lead towards a discovery, certain proverb, to put briefly.

4. Make up a plan of the text.

5. Answer the following questions:

1. What meanings does the word "thinking" have?
2. What is the most active form of thinking?
3. Why may thinking be called "the machinery of association"?
4. May we, by striving, become good thinkers?
5. What may be the driving force of thinking?
6. Do you know any proverbs associated with thinking?
7. What is the highest aim for a thinking individual?

6. Give a summary of the text.

7. Express the following more concisely:

1. A student in his first year at college.
2. Careful investigation in any branch of knowledge.
3. The feeling of discomfort caused by having nothing to eat.
4. A child who has lost one or both of its parents by death.
5. A book giving information on all branches of knowledge.
6. A piece of ore, iron or steel that has the property of attracting iron.
7. A fertile place with water and trees in a desert.

8. **Remember the expressions with the verbs *to do* and *to make:***

to make	a mistake an attempt progress a living use of money a report one's work interesting a contribution acquaintance haste a promise	to do	an exercise one's duty one's work one's best one's share of work one's bit something properly as little as possible a room well to death (to have nothing to do with)

9. Make up sentences with expressions from exercise 8.

GRAMMAR EXERCISES

10. Respond to the following statements using "*must* + Perfect Infinitive" and keep the conversation going.

Model:

A: My watch ran out during the night.

B: You were so very tired yesterday. You must have forgotten to wind it.

1) Stop being funny, Peter. Why is the child wet to the skin? 2) I say, where is Fred? He's kept us waiting for more than half an hour. 3) Oh, bother! The cake is still in the oven. 4) Don't be silly and stop banging the door. I'm having a wash. 5) I wanted to do some shopping in the afternoon but couldn't find my purse. 6) I think I smell something cooking. 7) Jane took Spot for a walk and he disappeared. I'm sure he's been run over. 8) You look a bit tired. Have you been doing the rooms all day? 9) Is John likely to play chess at his father's tonight? I didn't find him in though he promised not to leave till seven. 10) What's wrong? Why does your sister look so worried?

11. Respond to the following statements using "*should* + Perfect Infinitive" or "*ought* + Perfect Infinitive" and keep the conversation going.

Model:

A: It's no use talking, Nancy. You'll have to stay baby-sitting.

B: You should (ought to) have mentioned it yesterday. It would have saved a lot of trouble.

1) Here is a letter from Jane. She wants to come and stay for a week from tomorrow. That will be nice, won't it? 2) I'm expecting two of my school-fellows. They are coming over for the day. Will you give them some supper, Mother? 3) Oh, I've put salt instead of sugar into my tea. 4) I believe the milk has turned sour. 5) You are being interested in collecting stamps! Why haven't you ever told me anything about it? 6) Jack cut himself while he was shaving. 7) Though you have driven in some more nails, I'm afraid the shelf will not hold the weight of all those books.

12. Change the sentences according to the model:

a) *She reads too much. > She shouldn't read so much.*

b) *She doesn't work hard. > She should (ought to) work hard.*

1. You don't do it properly. 2. She doesn't use new information on the problem. 3. The student doesn't remember the conditions of the experiment. 4. The book is not published yet. 5. People do not always express their ideas clearly. 6. They are discussing the project too long. 7. The supervisor makes the postgraduate work too much.

13. Choose the necessary modal verb and translate into Ukrainian:

1. The talker (can, must) remember that conversation (must, should) serve a purpose. 2. We frequently (may, have to) use reference books and encyclopaedias where we (must, can) find information we need at the moment. We (cannot, need not), of course, read reference boors from cover to cover. 3. Writers do not always express things directly so that you (to have to, may) think carefully to see what they mean. 4. Reading a book (need, should) be a conversation between you and the author. 5. To achieve progress in any subject we (may, must) discuss things. 6. It (can, must, may) be born in mind that some people are afraid of having time to think, so they go to the movies, watch television, because they (should, can) think of nothing better to do. 7. When we are introduced to new people we (should, need) try to appear friendly.

LESSON 2

1. Remember the following word-combinations:

The majority of discoveries – більшість відкриттів, to come across – зустрічати, наштовхуватися, to break new ground – відкривати нову галузь, a current belief – розповсюджена думка, by accident – випадково, the magnitude of importance – істинний зміст, the field of observation – область спостереження, to provide an opportunity – надавати можливість.

ROLE OF CHANCE IN DISCOVERY

Probably the majority of discoveries in biology and medicine have been come across unexpectedly, or at least had en element of chance in them, especially the most important and revolutionary ones. It is scarcely possible to foresee a discovery that breaks really new ground, because it is often not in accord with current beliefs. Frequently I have heard a colleague relating some new findings, say almost apologetically, "I came across it by accident". Although it is common knowledge that sometimes chance is a factor in the making of a discovery, the magnitude of its importance is seldom realized and the significance of its role is not fully appreciated or understood. A good maxim for the research man is "look out for the unexpected".

The history of discovery shows that chance plays an important part, but on the other hand it plays only one part even in those discoveries that are attributed to it.

The truth of the matter lies in Pasteur's famous saying, "In the field of observation, chance favours only the prepared mind". It is the interpretation of chance that counts. The role of chance is merely to provide the opportunity and the scientists has to recognize it and grasp it. *[Beveridge W.I. The Art of Scientific Investigation. London. P.83-85]*.

VOCABULARY EXERCISES

2. Translate the following words and word-combinations:

Передбачити відкриття, загальновідомі знання, хороший афоризм, грати важливу роль, з іншого боку, відомий вислів, сфера спостереження, сприяти підготовленому розуму, забезпечити можливість, розпізнати, зрозуміти (усвідомити).

3. Answer the following questions:

1. Did you know that many discoveries in biology and medicine have been made unexpectedly?
2. Is it possible to foresee a discovery?
3. What is a good maxim for the research man?
4. Is the role of chance in scientific discovery great?
5. How can you explain Pasteur's famous saying that "In the field of observation, chance favours only the prepared mind"?

4. Write down the key words to this text and give a summary (about 3-4 sentences).

5. Find the definitions to the following verbs:

to defeat	to inform in advance of what may happen
to warn	to start work at something new
to relate	to give an account of
to come across	to find or meet by chance
to break new ground	to consider as coming from, as being the result of
to attribute to	to overcome, to win a victory over

6. Find the words with similar meaning:

1. a) to attribute to, to provide, to modify, to defeat, to favour, to strive, to prove, to prevail;

b) to secure, to struggle, to love, to conquer, to change, to verify, to ascribe, to succeed.

2. a) discovery, magnitude, maxim, opportunity, field, authority, degree, skill, interpretation;

b) chance, sphere, size, finding, proficiency, administration, extent, aphorism, treatment.

3. a) indeed, merely, frequently, seldom, as well as, otherwise, apologetically, therefore, briefly;

b) often, rarely, really, also, in a different way, regretfully, that is why, in short, only.

7. Translate the following sentences paying attention to the meaning of the words in italics:

a) 1. The world exists in space and *time*. 2. He is always behind *time* with his plans. 3. He came across such reasoning for the first *time*. 4. He *timed* his experiment so that he completed it before dark. 5. The speed of the machine was correctly *timed* and recorded. 6. Our *timely* warning was neglected, nobody took notice of it. 7. We have classes 3 *times* a week.

b) 1. I no longer *count* him among my friends. 2. It is the interpretation of chance that *counts*. 3. I *count* it a great honour to work together with this man. 4. Knowledge without common sense *counts* for little.

8. Translate the following sentences:

1. Хоча більшість відкриттів було зроблено випадково, саме тільки підготовленому розуму сприяє удача. 2. Природничі науки набули свого розквіту в 19 столітті. Саме тоді були зроблені найбільш славетні відкриття у біології. 3. Саме винахід мікроскопу проклав шлях до майбутнього розвитку мікробіології. 4. Багато видатних відкриттів у фізиці було зроблено тільки за допомогою спостереження, але в наш час саме експеримент є основним методом наукового дослідження у фізиці. 5. Справжній науковець не прагне перемогти суперників, саме пошуки істини найбільше притягують його.

9. a) Make up sentences using the following words and word-combinations:

To prove – доводити, to prove to be – опинитися; to happen – траплятися, to happen to be – випадково опинитися; to use – використовувати, to be used to – звикнути, used to – мати звичку; to find – знаходити, to found – засновувати.

b) Translate the following sentences:

1. Він довів свою теорію експериментально. 2. Експеримент виявився успішним. 3. Це трапилося два роки тому. 4. Я випадково зустрів його на конференції. 5. Це слово вживається досить рідко. 6. Він звик вільно висловлювати свою думку. 7. Він мав звичку обговорювати особисті проблеми зі своїми колегами. 8. Я не можу знайти відповіді на це запитання. 9. Ми повинні базувати наші теорії на конкретних фактах.

10. Remember the meaning of these words. Translate the following sentences.

To change – змінювати радикально, to alter – змінювати частково, to modify – змінювати незначно, удосконалювати.

1. Це відкриття змінить нашу уяву про світ. 2. Я сподіваюсь, ви не збираєтесь змінювати своє рішення. 3. Англійський уряд збирається змінити систему шкільної освіти. 4. Наш план слід трохи змінити.

11. Translate the following sentences paying attention to the emphatic construction *it is … that (who):*

1. He had a mind as analytical as a mathematician's and as curious as a philosopher's. It was his curiosity that prompted him to leave his job at the university for a year and go to work at

a plant. 2. Rational behaviour is essential to anyone's mental health. It is for this reason that blind conformity can be dangerous for us. 3. Man is a reasonable animal. It is this quality of reason that distinguishes him from the rest of the animal world. 4. When one speaks of the industries in Britain it is chiefly the heavy industries or the textile industries that one has in mind. 5. For a long time Britain was on the fringe of the civilized world. It was the discovery of America in 1492 that put her in the centre of trade routes.

GRAMMAR EXERCISES

12. Translate the following sentences into Ukrainian, paying attention to the Passive Voice and the place of adverbial modifier:

1. The people have to remember dates, times, prices, names, etc. so that their memory is *the whole time* exercised. 2. When we are *first* introduced to new people we should try to appear friendly. 3. He feels that he is being *unjustly* treated. 4. The view that dreams are illusory expressions is *universally* accepted. 5. Many educational problems which were *formerly* tackled by moral discipline are *now* solved by scientific method.

13. Transform the sentences using the Passive Voice (two variants):

1. They have given him all the necessary information. 2. The management offered her part-time work. 3. The laboratory technician showed us some of the new equipment. 4. They will send him a copy of the report. 5. The head of the conference is informing the colleagues about the latest news.

14. Put the following sentences into the Passive Voice.

1) The boy's mother promised him to take him to the circus if they didn't give him any bad marks at school. (Three passives) 2) We can't trust these things to the removal men, for they may break my precious collection of China glassware. (Two passives) 3) I wish you'd clear this table as I must paste photographs in the album. (Two passives) 4) The pupil looked at his teacher in blank surprise when the latter asked him if it was he who had taken the class register. (Three passives) 5) We can never find him at home for he is always on the move. (One passive) 6) The little one is giving me a lot of trouble because she wants everybody to take notice of her. (Two passives) 7) One couldn't sleep in that bed till they repaired the springs. (Two passives)

15. Translate the following sentences into English using verbs in the Passive Voice:

1. Велика наукова робота проводиться у співробітництві із закордонними вченими. 2. Ці точні механізми були встановлені на борту атомного криголаму. 3. Роботою цих приладів керують висококваліфіковані спеціалісти. 4. Нові дослідження планет сонячної системи будуть продовжуватися вченими за допомогою супутників. 5. Ці наукові дослідження будуть завершені до кінця року. 6. Цей доказ має бути представлений на раді. 7. Відповіді слід писати тільки на цій сторінці. 8. Його поведінку не можна пояснити. 9. Їх думку слід взяти до уваги. 10. Ці помилки слід виправити.

LESSON 3

Pre-text exercises

1. Consult a dictionary and remember a) the verbs, b) the nouns:

a) to provoke, to respond, to restrain, to retain, to seek, to tie;
b) cause, curiosity, generalization, incentive, stimulus.

2. Remember the following expressions:

in common with – (тут) разом з, a bundle of data – набір фактів, a state of knowledge – стан знань (науки), with each advance – з кожним кроком уперед, a wider field of vision – ширше поле зору, previously out of range – раніше недоступний, to take for granted – вважати доведеним.

CURIOSITY AS AN INCENTIVE TO THINKING

In common with other animals we are born with an instinct of curiosity. It provides the incentive for the young to discover the world in which they live…

The curiosity of the scientist is usually directed toward seeking an understanding of things or relationships which he notices have no satisfactory explanation. Explanations usually consist in connecting new observations or ideas to accepted facts or ideas. An explanation may be a generalization which ties together a bundle of data into an orderly whole that can be connected up with current knowledge and beliefs… The student attracted to research is usually one who retains more curiosity than usual.

We have seen that the stimulus to the production of ideas is the awareness of the present unsatisfactory state of knowledge. People with no curiosity seldom get this stimulus, for one usually becomes aware of the problem by asking why or how some process works, or some thing takes the form that it does. That a question is a stimulus is demonstrated by the fact that when someone asks a question it requires an effort to restrain oneself from responding.

… Asking "why" is a useful stimulus toward imaginating what the cause is or purpose may be. "How" is also a useful question in provoking thought about the mechanism of a process.

There is no satisfying the scientists' curiosity, for with each advance we reach a higher level from which a wider field of vision is open to us, and from which we can see events previously out of range *[Beveridge W.I.B. The Art of Scientific Investigation. P. 84-85]*.

VOCABULARY EXERCISES

3. Translate the following word-combinations:

Забезпечувати спонуку, бути спрямованим, задовільне пояснення, набір фактів, поширені знання, стан знань, зберігати цікавість, усвідомлювати проблему, вимагати зусилля, стримуватися від відповіді, корисний поштовх, з кожним кроком уперед, досягти вищого рівня, поле зору, бути недосяжним.

4. Answer the following questions:

1. Can accepted facts or ideas be always true? If we took accepted facts and ideas for granted, wouldn't it slow down scientific progress?
2. How is the word "explanation" defined in the text?
3. What arouses the curiosity of a scientist or a scholar?
4. Can the curiosity of a scientist be ever satisfied?
5. How can you describe the process of cognition?

5. Translate the verbs and nouns, remember them and make up sentences with them:

a) to arise (arose, arisen), to conduct, to contribute, to indicate, to pool;
b) approach, intercourse, lay person.

6. Make up a plan of the text.

7. Try to explain to your friend why curiosity is an incentive to thinking.

8. a) Make up sentences using the table:

With each step	we reach a higher level of knowledge
With each advance	we get deeper understanding of the nature law
With each new problem solved	we acquire a wider vision of things
With each successful effort	we face a number of new problems
With each new discovery	we become bolder in our attempts

b) Ask your friend what he acquires with each year at the University.

9. Change the words in italic with the words with the similar meaning:

This question *provokes thought.* 2. Curiosity is an *incentive* to thinking. 3. *It requires an effort* to stop smoking. 4. She didn't *respond* when she was questioned. 5. This is *out of my range.* 6. His position enables him to have *a wider field of vision*. 7. They *were unaware* of the danger of fire.

10. Work in pairs. Make up dialogues using the expressions:

You should restrain yourself from eating too much (arguing for the sake of arguing, talking loudly in public, promising things you are unable to do, interrupting your companions etc.); I never do it; I needn't restrain myself from doing it; indeed, sometimes you do it.

GRAMMAR EXERCISES

11. Choose the right form of the Infinitive (Passive or Active, Indefinite or Perfect):

1. The lecturer wants … The students wants … (to understand, to be understood). 2. We expected the meeting … next month. He expected … the attention of the audience (to hold, to be held). 3. Some changes had … He wanted … some changes in the project (to make, to be made). 4. There were a lot of things … He was nowhere … (to see, to be seen). 5. It's good … work for the day (to finish, to have finished). 5. She admits … the same mistake in her previous paper (to make, to have made). 6. He was sorry not … the idea earlier (to give up, to have given up). 7. She confessed … the man before (to see, to have seen). 8. The negotiations seem … to an end (to come, to have come). 9. The relations between the two countries seem … the lowest point (to reach, to have reached).

12. Transform the sentences using the Infinitive instead of Subordinate Clauses:

1. He was sorry *when he heard of your disappointment*. 2. Do you understand *what you have to do?* 3. He hopes *that he will get the information tomorrow*. 4. We should be sorry *if we heard bad reports of him.* 5. The candidate did not expect *that he would pass the interview.* 6. Do not promise *that you will do it,* if you are not sure of success. 7. He was annoyed *when he heard* that the Conservative party got in again. 8. She was sorry *that she had missed the beginning of the lecture.* We must wait *till we hear* the examination results before we make any plans. 10. She is happy *that she has found such a simple solution to this difficult problem.*

13. Find the Objective Infinitive Construction and translate into Ukrainian:

1. I consider them to be good specialists. 2. He heard them discuss their plan. 3. I heard him mention my name. 4. We expect writers to deal with the issues of the modern world. 5. They believed him to be honoured by the invitation to the international congress. 6. We assume these truths to be self-evident. 7. They find the experience of this conference to have been a remarkable one.

14. Translate the sentences paying attention to the Objective Infinitive Construction:

1. We know industrial electronic equipment to play a very significant role in the modern world. 2. We often watched the operator adjust the apparatus. 3. They wanted this device to be installed immediately. 4. Faraday expected electrochemistry to be widely used for peaceful construction. 5. We know electrochemistry to owe its birth to the discoveries of Volta.

15. Transform the sentences using the Objective Infinitive Construction:

1. I've never heard how he spoke about his life in India. 2. The two sides expect that negotiations will be long and difficult. 3. We expect that a scientist or a scholar will keep an open mind. 4 One can hardly expect that a true scientist will keep within the limits of one's narrow field. 5. They thought that he was an eminent scholar. 6. We expected that the partners would agree on a number of issues. 7. We assume that these errors are of no importance. 8. We suppose that his discovery is accidental. 9. We consider that he is a real genius. 10. They estimate that the number of casualties will be much higher.

16. Translate the sentences paying attention to the Objective Infinitive Construction:

1. Вона часто спостерігала, як він годинами працював над цим експериментом. 2. Члени наукового товариства вимагають, щоб цей пристрій було спочатку протестовано. 3. Дослідники вважатимуть цей регіон єдиним джерелом мінеральних ресурсів та енергії. 4. Він знав, що ці дані використовуються в їх дослідженнях. 5. Автор змусив їх переписати два розділи. 6. Ми б хотіли, щоб ви мали свою власну думку щодо цього експерименту. 7. Вчений вважає, що це явище досить рідкісне. 8. Вони очікували, що ця спроба виявиться вдалою.

LESSON 4

DISCUSSION AS A STIMULUS TO THE MIND

Productive mental effort is often helped by intellectual intercourse. Discussing a problem with colleagues or with lay persons may be helpful in one or several ways.

The other person may be able to contribute a useful suggestion. It is not often that he can help by directly indication a solution of the impasse problem, because he is unlikely to have such pertinent knowledge as has the scientist working on the problem, but with a different background of knowledge he may see the problem from a different aspect and suggest a new approach. Even a layman is sometimes able to make useful suggestions.

A new idea may arise from the pooling of information or ideas of two or more persons. Neither of the scientists alone may have the information necessary to draw the inference which can be obtained by combination of their knowledge.

Discussion provides a valuable means of uncovering errors. Ideas based on false information or questionable reasoning may be corrected by discussion. The isolated worker who is unable to talk over his work with colleagues will more often waste his time in following a false trail.

Discussions and exchange of views is usually refreshing, stimulating and encouraging, especially when one is in difficulties and worried.

The most valuable function of discussion is, I believe, to help one to escape from an established habit of thought which has proved fruitless.

Discussions need to be conducted in a spirit of helpfulness and mutual confidence and one should make a deliberate effort to keep an open receptive mind *[Beveridge W.I.B. The Art of Scientific Investigation. P. 84-85]*.

VOCABULARY EXERCISES

1. Translate the following word-combinations:

Productive mental effort; intellectual intercourse; to contribute a suggestion; to indicate a solution; pertinent knowledge; to suggest an approach; pooling of ideas; a different background of knowledge; to draw an inference; a valuable means; to uncover errors; questionable reasoning; to waste time; a false trail; an established habit; to prove fruitless; mutual confidence; a deliberate effort; receptive mind; in a spirit of helpfulness.

2. Make up 5 sentences with the expressions from exercise 1, using as many expressions as you can.

3. Find the words with similar meaning:

1. a) to contribute, to escape, to indicate, to reason, to waste, to worry, to notice, to tie, to pool, to seek;

b) to trouble, to donate, to show, to deduce, to misspend, to detect, to put together, to search for, to get away, to join.

2. a) approach, background, inference, intercourse, waste, opportunity, awareness, incentive, events, range;

b) developments, conclusion, environment, chance, loss, understanding, attitude, stimulus, scope, communication.

4. Make up sentences with the following antonyms:

Cover – uncover, encourage – discourage, valid – invalid, useful – useless, formal – informal, wide – narrow, high – low, lay – professional.

5. Ask your group mates to answer these questions:

1. What is productive mental effort often helped by?
2. May the other person help to solve a problem?
3. What is the use of pooling information?
4. How can discussion help in uncovering errors?
5. What is the most valuable function of discussion according to the author of the article?
6. How should a discussion be conducted?

6. You know there are a few functions of discussion. Make up a dialogue with your friend uncovering the most important one in your opinion.

7. Imagine you are a Professor investigating the art of research. Why, you think, discussion is a stimulus to the mind.

7.Make up sentences using the table:

You are capable of	observing facts and relationships
He is interested in	connecting facts to the accepted ideas
She was capable of	explaining things
I was interested in	comparing facts and figures
	producing new ideas
	generating bold concepts
	questioning the accepted beliefs

9. Imagine you are a tutor consulting a student as to his research or a University instructor discussing students' research with his colleagues. Use the following expressions:

To tie together a bundle of data into an orderly whole, to explain the interrelations of these facts, to take a new approach, to provide a new point of view.

10. Give the definitions of the following notions:

Intercourse	exchange of views
Reasoning	process of thinking logically
Discussion	debate or reason in support of a theory
Argument	final result (outcome)
Suggestion	answer to a problem
Solution	proposal or plan
Conclusion	mistake
Error	social dealing between individuals

11. Imagine you are a head of the conference. Say the final word as to the results of the conference using the table:

The Our	symposium conference discussion session debate intercourse	has proved has been	fruitful helpful productive stimulating encouraging highly satisfying valuable

The	results obtained conclusions made arguments held views exchanged measures worked out decisions agreed upon	will are sure to are likely to	stimulate encourage suggest promote develop

GRAMMAR EXERCISES

12. Translate the sentences paying attention to the Subjective Infinitive Construction:

1. Some theories, which seemed to be perfectly reasonable even a short time ago, have proved to be absolutely wrong. 2. It was hoped that this experimental method would help to solve the problem, but it proved to be quite useless. 3. The discussion proved to be very useful in helping to approach the problem in a new way. 4. The new evidence proved to confirm the theory. 5. Facts that seem insignificant at first often prove later to be of vital importance. 6. He seems to know little about research work. 7. All our efforts proved to be useless. 8. The computer is expected to save the scientist a lot of time. 9. This discovery is considered to be the result of a long and thorough investigation. 10. These phenomena are believed to be interdependent.

13. Translate the sentences keeping in mind:

1) The verbs using with the Subjective Infinitive Construction in Passive form: a) *to believe, to consider, to hold, to think, to suppose (вважати, думати); b) to expect (очікувати), to estimate (оцінювати), to say (говорити), to report (повідомляти).*

2) The verbs using with the Subjective Infinitive Construction in Active form:

to seem, to appear (здаватися), to prove, to turn out (виявлятися), to happen (траплятися, виявлятися).

3) The expressions using with the Subjective Infinitive Construction: ***to be likely (ймовірно), to be sure, to be certain (напевно), to be unlikely (навряд).***

1. Його знали як дуже чутливого до будь-якої критики. 2. Вважають, що атомна енергія стане головним джерелом постачання енергії. 3. Кажуть, що наша лабораторія отримала нові прилади. 4. Відомо, що напівпровідники знайдуть різноманітне застосування в майбутньому. 5. Вважається, що водень складає половину поверхні землі, води та повітря. 6. Очікується, що він поновить випробування на наступному тижні. 7. Ймовірно, ці вчені опублікують результати своїх досліджень. 8. Навряд чи він візьме участь у дискусії. 9. Напевно, він представить свою доповідь наприкінці конгресу. 10. Виявилося, що він усвідомлює всі наслідки експерименту.

14. Transform the following sentences, using the Subjective Infinitive Construction and the verb in brackets according to the model:

History repeats itself. – History is known to repeat itself.

1. Leonardo da Vinci discovered and laid down immortal principles in the theory of art (to know). 2. Leonardo da Vinci designed the first parachute (to suppose). 3. Leonardo denied himself meat out of an aversion to the killing of animals (to say). 4. Applied science will produce a vast increase in entirely new synthetic products of all kinds (to expect). 5. Rapid expansion of industrialization leads to an exhaustion of natural resources (to believe). 6. Close cooperation between scientists and scientific institutions all over the world is one of the most striking characteristics of modern science (to consider). 7. Charles Spencer Chaplin made more people laugh than any other human being in the history of the world (to know).

15. Translate the following sentences into Ukrainian:

1. Leonardo da Vinci is considered to be a pioneer in physiology and botany. 2. The Earth is said to have been part of the Sun. 3. The delegation is reported to have arrived in the capital already. 4. Moral perfection is considered to be one of the ideals of mankind. 5. Leonardo da Vinci is known to have studied optics. 6. His painting and sculpture are supposed to have opened up few fields of enquiry. 7. He is known to have studied the structure of the bones and muscles of the human body.

16. Translate the following sentences into English:

1. Відомо, що наука значно змінила умови життя сучасної людини. 2. Вважається, що Леонардо да Вінчі сконструював перший ліфт. 3. Кажуть, що цей політичний діяч досяг великих успіхів. 4. Очікується, що протиріччя між цими країнами будуть залагоджені. 5. Відомо, що Леонардо да Вінчі створив проект реконструкції Мілана. 6. Кажуть, що він достатньо розумний, щоб правильно оцінити ситуацію. 7. Очікується, що вони поновлять випробування наступного тижня. 8. Повідомляють, що президент вже прибув до столиці.

17. Translate the sentences paying attention to the Object and Subjective Infinitive Constructions:

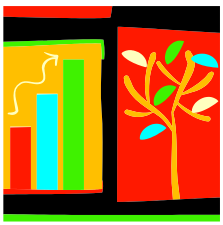
1. We consider radioactive atoms to be very valuable in all sorts of ways. 2. An atom is known has been proved to hold a tremendous force, hidden in its tiny body. 3. Everything around us is known to be composed of atoms. 4. The common articles in the laboratory are known to be made of plastics. 5. In general, plastics are known to be classified into groups according to their behaviour when they are heated. 6. The plastics have proved to be satisfactory alternatives to many other materials. 7. The 19^{th} century is often considered to be the century of steam and electricity. 8. We know the molecules of substances to be in continual motion.

18. Translate the sentences paying attention to the Object and Subjective Infinitive Construction:

1. Відомо, що атомній енергії належить майбутнє. 2. Кажуть, що наша лабораторія отримала нові прилади. 3. Відомо, що розчин – це однорідна суміш двох або декількох речовин. 4. Ми виявили, що ці експерименти відповідали раніше прийнятим нормам. 5. Учні очікували, що магніт притягне цей предмет. 6. Відомо, що біля полюсів магніту магнітне поле сильніше.

LESSON 5

THE GAP BETWEEN SCIENCE AND THE HUMANITIES



One of the results of unavoidable specialization in our modern world is the gap between science and the humanities. Technicians often lack any coherent philosophical background, while men of general culture lose respect for a science they know little about. The outcome is regrettable. Scientific workers may pursue mere technical mastery for its own sake: they may lose sight of human problems. Others are inclined to regard science as no more than the power behind mass production, sanitation, atomic bombs and space travel: they fail to understand its vital contribution to human thought.

One of the ways of bridging this gap is that students of the humanities at the universities should learn some science. If I were asked to justify this belief I would say that anyone whose outlook and imagination are uninfluenced by science is capable of serious errors of judgement in some of the most important issues of the modern world.

The problem is not, however, whether science should be taught, but what kind of science. It can hardly be expected that classicists, modern linguists and historians should be required to perform experiments or to work out mathematical problems, - they are unlikely to have any inclination in this direction. But all students should find interest in science presented historically as a human achievement and as an intellectual competition…

If it is right that one of the main tasks of the education is to bring youth face to face with greatness of science, it should be presented not only historically but biographically as well. Most of us are far more interested in people than in ideas and the imagination of the students can be caught more easily by the aspect of science as a human achievement, than by the strangeness and beauty of natural phenomena. Having heard something about an astonishing man of science, the student might well be interested in the discovery he made and might wish to learn something about it *[McKenzie A. The Major Achievements of Science. Cambridge, 1960]*.

VOCABULARY EXERCISES

1. Translate the following words and word-combinations:

Unavoidable specialization, the gap between science and the humanities, coherent background, to pursue mastery, for the sake of, to lose sight, to be inclined, to regard science, vital contribution, to bridge the gap, to justify this belief, to have a inclination.

2. Answer the following questions:

1. What is the result of unavoidable specialization?
2. What do technicians often lack?

3. What is the outcome of the gap between science and the humanities?
4. What are the ways of bridging this gap?
5. What is the person whose outlook and imagination are uninfluenced by science capable of?
6. What is the main task of education?
7. What might a student be interested in, having heard something about an astonishing man of science?

3. Agree or disagree and explain your point of view:

1. It is necessary to bridge the gap between science and the humanities.
2. Science has made a vital contribution to human thought.
3. The knowledge of humanities develops intuition which enables a scientist to make new discoveries.
4. Breadth in a scientist is a necessary condition for progress.
5. Technicians often lack philosophical background.

4. Give a summary of the issue (Text 5).

5. Give the definitions of the notions using the table:

Generation	state of not being adequate
Lack	want, need, shortage
Outlook	person's way of looking at something
Background	the Arts subjects
Gap	unfilled space, interval, wide separation
The Humanities	the human race, mankind
Failure	person's past experience, education, environment
Humanitarian	person who works for the welfare of all human beings
Humanity	average period in which children grow, marry and have children

6. Speak about your interests and inclinations using the following expressions:

To be influenced by, to be interested in, to lack, to fail to understand, so far, to be inclined to regard, to be capable of, to work out, to do some research, to make some contribution to, I can hardly expect that, I am (un)likely, imagination, outlook, philosophical background, vital issue, discovery.

7. Organize a Round Table:

Theme: "The Problems of Scientific Investigation"

Questions for discussion:
1) The Art of Thinking.
2) Role of Chance in Discovery.
3) Curiosity as an Incentive to Thinking.
4) Discussion as a Stimulus to the mind.
5) The Gap between Science and the Humanities.

Scientific Program:
1) The first report of the first participant, questions to him, addition (complement), discussion.
2) The second report of the second participant, questions to him, addition (complement), discussion and so on.
Summary and Conclusions.

GRAMMAR EXERCISES

8. Translate the sentences with Prepositional Infinitive Construction into Ukrainian:

1. It is desirable for you to know it. 1. He waited for the papers to be published. 3. There is only one thing for you to do. 4. For the experiment to be successful he had to do much work. 5. Have you got anything for me to read? 6. For the meeting to be a success much preliminary work must be done. 7. No efforts are large enough for the research to be completed. 8. We are waiting for the jury to announce their verdict. 9. It will take a number of years for the two sides to come to an agreement. 10. It will be expedient for them to postpone the visit. 11. It will be convenient for all of us to have the examination on Tuesday.

9. Complete the following sentences:

1. It is necessary for her … 2. It is advisable for them … 3. They waited for us … 4. It was important for them … 5. There was no reason for him … 6. It will be dangerous for him … 7. It was high time for them … 8. It is better for her … 9. The best thing for me was … 10. She will wait for me …

10. Make up sentences using "For … to + Infinitive" construction:

Necessary	journalists	take a different view
Important	economists	take some interest in politics
Essential	politicians	confront reality / face facts
Impossible	philosophers	deny the progress of science

11. Translate the following sentences into English:

1. Не існує серйозних перешкод тому, щоб ці країни жили у мирі. 2. Він дав нам декілька статей, щоб ми використали його дані у нашому дослідженні. 3. Лектор говорив достатньо голосно, щоб всі могли чути його. 4. Вкрай важливо, щоб ви прочитали його біографію. 5. Всі ми повинні вчитися на власному досвіді. 6. Необхідно, щоб ця проблема була вирішена негайно.

UNIT 2 SCIENTIFIC PAPERS

LESSON 1

1. Read and remember the model for annotation of the article:

ANNOTATION

1. I was supposed to annotate the following article.
2. It was published in the British journal (magazine, newspaper) …
3. The title (headline) of the article is …
4. The author of the article is …
   (The article was written by a special correspondent of the journal).
5. The article represents a definite interest from the point of view …
6. It gives facts (tables, diagrams, figures, schemes).
7. The article considers the problem of …
8. It describes (discusses) …
9. The article draws the reader's attention to …
10. The author points out that …
11. He stresses that …
12. The writer analyses the achievements of …
13. He approves …
14. The key problem of the article is …

15. To my mind (in my opinion) …
16. The article is worth reading because the problem is of great interest (of good use, actual, informative).

2. a) Before reading the article, try to answer these questions:

1) Do most geniuses grow up in happy families?
2) Does a genius usually produce a lot of work?

b) Read the article and check your answers.

Do Great Minds Think Alike?

What makes a person so brilliant that they change the course of history? Is there a recipe for genius – a list of ingredients that all geniuses share? Perhaps not, but geniuses really seem to have quite a lot in common.

For example, geniuses often come from an unhappy background and many are orphans. One study of important creators found that twenty per cent of them lost one or both parents in childhood. Tolstoy, Michelangelo, Bach, Raphael, Wagner and Charlie Chaplin all lost parents before they were ten years old. Seventy-five per cent of the geniuses in another study came from families affected by poverty, divorce, abuse, alcoholism and mental illness.

What is the connection? Perhaps stress made the children escape into there own private worlds – they felt different from other children and so decided to become even more different. Or were they working hard to please parents who were not there?

Geniuses are also incredibly productive. Picasso is responsible for 20,000 works. Thomas Edison, inventor of the light bulb, patented 1093 inventions. Freud produced 330 publications. Of course, high productivity will include failures, but what makes geniuses different is that they do not give up when they fail – they build on failure to create their biggest successes. Freud had his breakthrough about the importance of dreams after spending years on another project, which finally came to nothing. He was already over forty – but according to one study, most great works are done between the ages of thirty-five and forty-five. Whenever their great creations come, however, one thing seems to connect all geniuses (even young ones like Mozart) – a "ten-year rule". Geniuses have always worked hard in their chosen areas for at least a decade before they create their first masterpieces.

Finally, could genius also be a question of simple childlike curiosity? Einstein often said that his greatest discoveries came from simply asking the same kinds of questions children ask – but unlike most adults, he never stopped asking them. (*adapted from The Sunday Times by The Moscow News)*

3. Answer the questions:

1) What have Michelangelo, Wagner and Charlie Chaplin in common?
2) According to the article, how can the death of a parent influence a child?
3) Did Freud's work on the importance of dreams finally come to nothing?
4) What is the "ten-year rule"?

4. Find words in the article which mean:

1) The type of education, family and social experience that someone has (n)
2) The time when you are a child (n)
3) When people have very little money (n)
4) Cruel treatment to someone (n)
5) The opposite of successes (n pl) and succeed (v)
6) An important discovery or development (n)
7) Works of art, pieces of writing, etc. of an excellent standard (n pl)
8) Typical of a child, in a positive way (adj)

5. Read the quotation. What does it mean?

"Genius is one per cent inspiration, ninety-nine per cent perspiration" *Thomas Edison*

6. In pairs. Were there any facts in the article that surprised you? Can you teach someone to be a genius? Do you think special schools which aim to develop geniuses are a good idea?

(From Wavelength Intermediate. By Kathy Burke and Ben Wordon)

7. Give the annotation of this article.

GRAMMAR EXERCISES

8. Transform the following sentences using Participle phrases instead of the Subordinate Clauses:

1. The scientists *who will take part in the conference* must submit their abstracts. 2. A dialect is a form of language *that differs from the generally accepted standards of speech.* 3. The Queen opens the Parliament with a speech *that sets out the Government's programme for the future.* 4. The man *who is addressing the meeting* is the leader of the opposition. 5. Science fiction is fiction *that deals with imagined scientific discoveries and advances.* 6. Anybody *who will touch that wire* will get an electric shock.

9. Open the brackets using Participle 1 according to the model:

Model: (to be a good teacher) he could explain everything simply and clearly. – Being a good teacher he could explain everything simply and clearly.

1. (to be a man of flexible views) he appreciated the new theory. 2. (to be tired she went to her room). 3. (to be a foreigner) the man couldn't understand what we were talking about. 4. (not to know the answer) he decided not to say anything. 5. (to have his term paper to write) the students couldn't visit his parents.

10. Transform the sentences using Participle 1:

1. *As he was clever enough,* he realized his mistake at once. 2. He fell silent and *thus showed that the interview was over.* 3. *When he discussed his research with his colleagues,* he saw some of its weak points. 4. They applied his method to concrete problems and *thus provided a valuable test for it.* 5. *When you exchange opinions with other people,* you enrich your mind.

11. Translate the following sentences into Ukrainian:

1. When dreaming, one tends to believe in the reality of the dream world. 2. When giving advice to others, think whether you would follow it yourself. 3. When introducing a new method of research, you must consider its practicability. 4. Skimming is appropriate when trying to decide if careful reading would be desirable. 5. When speaking English, I often make mistakes.

LESSON 2

1. Read and remember the model for substantiation of a research:

SUBSTANTIATION

Our research is focused on the t**heme**
The **topicality** of the research is stipulated by …
The **object** of the research is ...

The **subject matter** of the research is ...
The **goal** of the project is ...
To achieve the goal we have to solve the following **tasks**:

- to investigate …
- to analyze …
- to determine …
- to work out practical recommendations as to the application…

To solve these concrete tasks the following **methods** of scientific investigation will be applied:

- the method of comparative analysis;
- the method of typological analysis;
- the method of quantitative analysis;
- the method of statistic analysis.

The **scientific significance** is determined by …
The **practical application** of the research is based on the possible usage of the obtained data and the main conclusions, results of the work in the research work …

2. Make up the substantiation of your research and retell it.

3. Before reading the following article answer the following questions:
1. What famous people do you know with disabilities?
2. Do you think people with disabilities can have good and successful lives?
3. What can you say about Stephen Hawking?

4. Now read the article and give the annotation of it:

Stephen Hawking

There is a man driving around in a motorized wheelchair in Cambridge, England. He can only move his eyes and two fingers on his left hand. He communicates through a computer. He types words on the computer and the computer speaks for him. This man is Stephen Hawking. People know him for his courage and his sense of humour. He is also the greatest physicist since Albert Einstein.

Stephen Hawking was born in 1942 in Oxford, England. His farther was a specialist in tropical diseases. Stephen wanted to be a scientist too. He went to the University of Oxford and received a degree in physics. He then went to the University of Cambridge to study for a Ph.D. During this time doctors discovered that he had ALS, which is sometimes called Lou Gehrig's disease. This fatal disease weakens all body's muscles. Most people with ALS live for five years. The doctors thought Hawking would live for only two and a half more years. When Hawking heard this, he became very depressed.

At about this time he met Jane Wilde, a language student at Cambridge. They fell in love and got married in 1965. Hawking has often said that his wife gave him courage to continue to study and work. Although Hawking had become more severely paralyzed, he became a Professor at Cambridge. Luckily, the work of a physicist only requires one thing: the mind. Hawking had a son and then a daughter. He had another son 12 years later when his disease had gotten much worse. His youngest son never heard his father's real voice. He has only heard the voice from the computer.

Hawking does research about how the universe began. He sees connections and works out explanations that other people cannot. His research has influenced many other scientists. Some of his ideas are so advanced that other scientist cannot prove them yet. His most famous ideas are about black holes. Black holes are not really holes. They are so dense that even light cannot pass through. That is why they are called black holes.

As his disease got worse, money became a problem for Stephen Hawking. He had a lot of medical expenses. He needed special wheelchair, nurses 24 hours a day, and machines to help

him read and speak. To earn extra money, Hawking gave speeches and published articles. Then someone told him to write a book that explained the universe to ordinary people. Hawking agreed and wrote *A Brief History of Time*. The book sold over 8 million copies worldwide, and Hawking became a millionaire. Even though most people could not understand Hawking's ideas, he amazed them. Hawking became world famous. He met the Queen of England, he was on the covers of magazines, and he appeared on television shows.

In 1990 Hawking ended his 25-year marriage. This was shocking to many of his friends because his wife, Jane, was very devoted to him. She took care of all his needs. She fed him, bathed him, dressed him, and raised their children by herself. Hawking left her for a younger woman – his nurse! They were married in 1995.

Hawking's strong personality and spirit have helped him to live with ALS for over 30 years. He has helped to make people aware of ALS and other disabilities. Hawking teaches us that even though a person is physically disabled, the mind has no limits. (*From: What a life! By Milada Broukal*)

GRAMMAR EXERCISES

5. Translate the sentences with Participle II:

Model: 1. The report written by an expert was of great interest. – *Доповідь, написана спеціалістом, представляла великий інтерес.* ***2. Written by an expert, the report could be trusted. –*** *Оскільки доповідь була написана спеціалістом, їй можна було вірити****. 3. If confirmed, these facts can be of great value. –*** *Якщо ці факти підтвердяться, вони можуть виявитися дуже цінними.* ***4. When offered help, they accepted it eagerly. –*** *Коли їм запропонували допомогу, вони прийняли її з готовністю.*

1. Science is knowledge arrange in an orderly manner. 2. Experiment is a test carried out to gain new knowledge. 3. The number of electronic computers used in any given field of human activity is an indication of the degree of its modernity. 4. Thinking expresses itself in words spoken or written. 5. If asked to assess the chances of victory in a war, the computer will analyse facts quite differently from a military expert. 6. When asked about the latest development in this African country, the UN spokesman gave a full account of the situation. 7. Asked to justify his belief, the scientist said that science is becoming an essential part of our everyday life.

6. Combine two simple sentences into one, using Participle II.

Model: The speaker refused to continue. He was infuriated by the interruptions. – Infuriated by the interruptions, the speaker refused to continue.

1. He decided to have some rest. He was exhausted by hard work. 2. We decided to go home. We were depressed by the news. 3. Art students fail to understand the importance of science. They are inclined to regard science only as the power behind mass production. 4. We changed the lines of our research. We were disappointed by the results. 5. The subject of the research was presented historically. It seemed to be more interesting.

7. Transform the following sentences, using Participle II.

Model: Though he was defeated, he remained a popular leader. – Though defeated, he remained a popular leader.

1. Though he was offered a large reward, he would not disclose the truth. 2. Though he was well-educated, he lacked any coherent philosophical background. 3. Although these publications remained unconfirmed, they stirred considerable unrest. 4. Though the explorers were exhausted by heat and privations, they would not give in.

10. Use the verb in brackets in the form of Participle I or Participle II:

1. Scientists (to deal) with the problems of pollution insist on its being exactly assessed. 2. The problem of pollution in industrial areas (to deal) with in this paper is one of the most

important for modern science. 3. People (to use) force when it is not necessary cannot be justified. 4. Electronics computers (to use) in the research, saved the scientists a lot of time. 5. (To carry out) numerous experiments and tests, the scientists tried to prove the original hypothesis. 6. The experiments (to carry out) by a team of young scientists led to sensational results.

LESSON 3

1. **Discuss in pairs and then in a group why, you think, scientists talk.**
2. **Read the article to know Herman Bondi's point of view.**

Why Do Scientists Talk?

There are two main methods for scientists to communicate with each other. The publication of scientific research is the method of the greatest long-term importance. For this reason a large number of journals exist throughout the world appearing at more or less frequent intervals, containing original papers submitted by scientists. These scientific journals are the very essence of science. It is through them and through the study of papers by other scientists in detail and at leisure that we can learn to understand each other's work sufficiently to extend it, to criticize it, to check it, and to communicate it further to our students and colleagues.

The importance of this permanent record of scientific work cannot be overestimated in the growth of scientific subjects, and modern developments have tended all the time to increase this importance. At one time, a hundred years ago or so, a great deal of scientific communication was in the form of books. Some of these, like Darwin's "Origin of Species", communicated ideas of the very first importance to the scientific world at large. A great disadvantage of books, however, is that they tend to be rather massive and therefore the writing up of the work usually extends through many years. With the intensive and cooperative efforts of large numbers of scientists, which is the rule nowadays, a far more frequent means of communication is desirable, and this is provided by scientific journals. For them too, there is the standard of scientific publications that has been established over the years. Few journals will accept a paper unless it is a complete piece of work.

Thus most scientific journals when the author sends them his paper for publication, first send it to a referee, a man making roughly the same field as the author, who is able to judge whether the contribution is an original or duplicated work already published, whether it is likely to be of importance for the subjects to deserve inclusion in the next issue of the journal, whether there are obvious errors that the authors may not have noticed, and finally, perhaps the most important criticism of all, whether the paper is clear.

Another characteristic of the printed record is its impersonal nature. Over the years, a highly impersonal style has grown up in scientific publishing, which from the many points of view is very desirable, especially in order to keep down the emotional overtones that are always present in human cooperation and that are no less common among scientists than among others.

Now, at last, I am approaching the core of my subject, for this other means of communication is talking. Talking not on a platform but in the most informal way conceivable; talking across a coffee table, at a bar, while going for a swim, and so on. It is only by personal talk between scientists that unformed ideas can travel from one mind into another and that the motivation for different lines of attack can be discussed. It is only by talking that a scientist can discover which point of his approach seemingly so clear to himself, others find particularly hard to understand. Of course, for talking personal confidence is vital, and for personal confidence contact is essential. Unfortunately, many meetings are overorganized with far too much time taken by set talks with little left for the discussions, and hardly any time or energy for the purely informal personal contacts that are so vital.

3. Look through the text again and make up a plan of the article. Compare your plan with your friends' plans and discuss them.

4. Find in the article the English equivalents to the following words and word-combination. Write them down and make up your own sentences with them.

1. Підхід, метод. 2. Прагнути, мати тенденцію. 3. Представити на розгляд. 4. Життєвий, життєво важливий. 5. Суттєвий. 6. Очевидно, ймовірно. 7. Говорити з трибуни. 8. Говорити за столом. 9. З літератури. 10. У вільний час. 11. Одного разу. 12. Перш за все. 13. Офіційні переговори. 14. Значення, розраховане на довгий термін. 15. Суть статті.

5. Think about collocations for each noun:

Model: *Scientific*, *Expensive*, *Monthly*, *Interesting*, *Useful*, *Physiological* → ***journal***

Contribution, confidence, detail, nature, reason, record, rule, form, referee.

6. Discuss in pairs and then in a group:

1. What methods of communication for scientists do you know?
2. Why are scientific journals the very essence of science?
3. What is the great disadvantage of books?
4. What standard of scientific publications has been established?
5. Why is the paper first sent to a referee?
6. Do you also think that an impersonal style of papers is very desirable?
7. Why does the author think that talking is an essential means of communication?
8. What kind of talking is desirable and why?

7. Give a summary of the article.

GRAMMAR EXERCISES

8. Translate the following sentences paying attention to the Objective Participial Construction.

1. When we came back we found them still arguing. 2. He wanted his papers published as soon as possible. 3. He was pleased to hear his words quoted several times in the President's speech. 4. You could hear the loudness of the teacher's voice changing according to what he was talking about. 5. We watched the planes landing and taking off. 6. They heard the engine roaring and the plane started.

9. Translate the following sentences using the examples of the Objective Participial Construction after the verbs *to have* and *to get*:

They had new equipment installed in the library. – Їм встановили в бібліотеці нове обладнання. The administration had/(got) this scheme cancelled. – Адміністрація добилася скасування цієї програми або скасувала цю програму.

1. They had all his speeches recorded. 2. A publisher in London had Dr. Brown's book translated into English. 3. We must have all the equipment packed by tomorrow. 4. When he had all his taxes paid, the amount left in the bank was hardly worth mentioning. 5. They got their children educated in the best British Universities. 6. She had her manuscript typed without a single typing error.

10. Translate the following sentences into Ukrainian paying attention to the Absolute Participial Construction:

Model: His speech finished, **the audience applauded.** – *Коли його промова була завершена,* аудиторія зааплодувала. ***The speaker having finished,*** **the audience applauded.** – *Коли оратор завершив промову,* аудиторія зааплодувала. ***His speech being very interesting,*** **the audience listened attentively.** – *Оскільки його промова була дуже цікавою, аудиторія слухала уважно.* **He continued speaking, *his colleagues listening attentively.*** – Він продовжував говорити, *а його колеги уважно його слухали.*

1. Her proposal having been accepted, she took her seat. 2. Nobody having anything more to say, the meeting was closed. 3. The crisis having passed, they could think about the future. 4. Her courage failing, the girl rushed back. 5. It being a scientific matter, we had to call in specialists. 6. The standard of living having improved after the First World War, the working class families could afford spending more money on foodstuffs.

11. Translate the following sentences into English paying attention to the Absolute Participial Construction:

1. Він не повернувся до цього дослідження знову, але його завдання було виконано. 2. Оскільки на його погляди не вплинула наука, він здійснив ряд серйозних помилок у своїх судженнях. 3. Оскільки припинення динаміки індустріального розвитку досить не реальне, нам слід повернути технологію на побудову здорового оточення. 4. І дослідники, і вчені проводять дослідження, але різниця між ними така, що перші займаються точними та природничими науками, в той час як останні працюють у сфері гуманітарних наук.

LESSON 4

1. **Discuss in pairs whether it is possible to teach language to animals.**
2. **Read the article to discus this problem in a group.**

Teaching Language to an Ape

By Ann Games Premack and David Premack

Over the past years several efforts have been made to teach a chimpanzee human language. In the early 1930's Winthrop and Luella Kellogg raised a female chimpanzee named Gua along with their infant son; at the age of 16 month Gua could understand about 100 words, but she never did try to speak them. In the 1940's Keith and Cathy Hayes raised a chimpanzee named Vicki in their home; she learned a large number of words and with some diffilty could mouth the words "mama", "papa" and "cup". More recently Allen and Beatrice Gardner have taught their chimpanzee Washoe to communicate in the American Sign Language with their fingers and hands. Since 1966 in our laboratory at the University of California we have been teaching Sarah to read and write with variously shaped and coloured pieces of plastic, each representing a word; Sarah has a vocabulary of about 130 terms that she uses with a reliability of between 75 and 80 percent.

Why try to teach human language to an ape? In our own case the motive was to better define the fundamental nature of language. It is often said that language is unique to the human species. Yet it is now well known that many other animals have elaborate communication systems of their own. It seems clear that language is a general system of which human language is a particular, albeit remarkably refined, form. Indeed, it is possible that certain features of human language that are considered to be uniquely human belong to the more general system, and that these features can be distinguished from those that are unique to the human information-processing regime. If, for example, an ape can be taught the rudiments of human language, it should clarify the dividing line between the general system and the human one.

Sarah had managed to learn a code, a simple language that nevertheless included some of the characteristic features of natural language. Each step of the training program was made as

simple as possible. The objective was to reduce complex notions to a series of simple and highly learnable steps.

In assessing the results of the experiment with Sarah one must be careful not to require of Sarah what one would require of a human adult. Compared with a two-year-old child, however, Sarah holds her own in language ability. In fact, language demands were made of Sarah that would never be made of a child. Man is understandably prejudiced in favour of his own species, and members of their species must perform Herculean feats before they are recognized as having similar abilities, particularly language abilities. Linguists and others who study the development of language tend to exaggerate the child's understanding of language and to be extremely sceptical of the experimentally demonstrated language abilities of the chimpanzee. It is our hope that our findings will dispel such prejudices and lead to new attempts to teach suitable languages to animals other than man.

3. Find in the article the English equivalents to the following words and word-combinations:

1. Виховувати. 2. Поряд з, разом з. 3. У віці. 4. Надавати форму. 5. Запас слів, словник. 6. Надійність. 7. Вид, різновид. 8. Загальний, звичайний. 9. Особливий, окремий. 10. Значний, чудовий. 11. Риса, особливість. 12. Належати. 13. Розрізняти. 14. Вносити ясність. 15. Ти не менше. 16. Мета. 17. Оцінювати. 18. У порівнянні. 19. Зберігати свої позиції. 20. Бути упередженим. 21. За, на користь. 22. Виконувати, здійснювати. 23. Бути знаним, визнаним. 24. Перебільшувати. 25. Знахідка, відкриття, результати. 26. Розсіювати, розганяти. 27. В дійсності, фактично.

4. Give the definitions of the following words, use the dictionary if you need:

Objective, term, communication, favour, motive, result, process.

5. Analyze the way of word-building:

Variously, coloured, shaped, reliability, remarkably, information-processing, characteristic, natural, learnable, careful, understandably, sceptical, suitable, two-year-old.

6. Discuss with your friends the following questions:

1. What were the methods of teaching language to an ape?
2. Is language unique to the human species only?
3. Why do people try to teach human language to an ape?
4. What were the results of such experiments?

GRAMMAR EXERCISES

7. Analyse the table *Verb + to-Infinitive or Verb + ing-form.*

Some verbs take a to-infinitive and some take an ing-form. Some verbs take either a to-infinitive or an ing-form. Compare:

VERB + TO INFINITIVE	VERB + ING FORM	BOTH

Agree, guarantee, undertake ask, demand, beg attempt, seek can't afford can't wait choose, decide claim, pretend expect fail, omit, neglect, hesitate happen, turn out, prove hope, aim learn, train manage offer, promise, swear plan, arrange, prepare refuse seem, appear tend threaten wish, want	Admit, confess, deny appreciate avoid, save, escape, resist can't face can't help delay, postpone, put off dislike, detest, can't stand enjoy, fancy finish, quit, give up imagine, consider involve justify, excuse keep, keep on, carry on mention miss practice resent, mind risk suggest tolerate	Start, begin continue intend, propose bother love, like prefer hate

8. Put in the verbs. Use a to-infinitive or ing-form:

Elaine: Are we going to have a holiday this year?
Gary: I thought we'd decided (spend) our holidays on a Spanish beach somewhere.
Paula: Oh, good. I enjoy (lie) on the beach. I might manage (get) a suntan.
Elaine: But I dislike (stay) in one place all the time. I refuse (sit) on the beach all day.
Martin: I don't mind (tour) around in the car.
Elaine: You promised (go) to Scandinavia with me. We could take the car.
Gary: I'm not going to drive. I do too much driving. I can't face (drive) all holiday.
Martin: I wasn't planning (go) abroad. I can't afford (spend) too much money.

9. Put in the verbs. Use a to-infinitive or ing-form:

A: Where's your new hi-fi?
B: Oh, it went wrong. It kept (make) a funny noise. I took it back to the shop.
A: Did your get your money back?
B: Well, first they offered (repair) it, so I asked (see) the manager. In the end she agreed (give) me back the money.
A: And are you going to get another one?
B: I don't know. I want (think) about it. Can't help (wonder) if I really need a hi-fi after all. And I can't afford (buy) a very good one.

LESSON 5

1. You want to continue your studies abroad. For this you should fill in a special application form. Read the notes and consult the vocabulary given below.

Any **application form** is a special form developed by University, Institute, College, Congress, conference to provide more specific information about the applicants and to formalize all the information about them for better data processing.

The application form usually includes the following sections: general information about the institution, benefits, responsibilities, applicants' criteria, closing data for applications.

The application form contains usually:

- **Personal details** (data): Family name/Legal name (last, first, middle)
  Title (Mr., Mrs., Miss, Ms., Dr.)
  Sex (male, female)
  Permanent home address, phone/fax number or Present address
  Place and date of birth
  Marital status (single, married, divorced, widowed)
  Military status
- **Academic background** usually includes all academic qualifications obtained since completing secondary education, stating the institutions attended, the main subjects of study and when the main courses started and finished. Usually the applicants attach photocopies of all relevant academic certificates or transcripts, with accompanying translations into English, if they are issued in another language.
- **Professional background** listing all positions held since completing secondary education.
- **Residency issues** (citizenship, permanent residence status, previous country of residence).
- **Proposed course of study:** What qualifications would you like to obtain, in what subjects?
  At which institution would you like to study or conduct research? Are you applying for a fully funded scholarship?
  Often the applicants are asked to attach **letters from two referees** (both of whom should be professional or academic) in support of the application, sometimes it's necessary to attach the **Personal Essays.** The Personal Essays provides individualized information about the applicant, his/her ambitions, interests.
- At the end you can find applicant's **obligations** while studying. All the application forms should be filled in clearly or typed.

2. Read the lexical commentaries to the text and learn the words and word-combinations given below:

Fill in the form – заповнити форму;
application form – заява, бланк, форма для участі у чомусь;
to provide specific information – забезпечити, надати специфічну інформацію;
benefits – переваги, привілеї;
closing date of applications – кінцевий термін надсилання заяв;
academic background – освіта;
academic certificate – диплом;
to attach photocopy – прикласти фотокопію;
transcript – копія;
to hold a position – займати посаду;
residency – країна проживання;
residence status – місце проживання;
to apply for a scholarship – подавати документи на отримання стипендії;
personal essay – автобіографія.

3. Translate the sentences into Ukrainian:

1. Have you filled in the application form you got yesterday?
2. I read all the general information about the University, its benefits and my responsibilities.
3. What is the closing date (deadline) for my application?
4. Don't forget to mention your permanent home address and telephone number.

5. What should I write in the section “Military status”?
6. Do you have any academic qualification?
7. I attached the photocopy of my academic certificate to my application form.
8. I’d like to continue my studies and conduct my research work at Oxford University.

4. Make up sentences with the words and word-combinations:

To fill in the form, to fill a glass with water;
to provide information, to provide with books;
to be responsible, responsibilities;
to attach photocopy, personal essay, documents;
residency, residence, to be a resident of;
to obtain qualification, experience.

5. Work in pairs. Make up a dialogue using information from an application form (ex.1).

GRAMMAR EXERCISES

6. Translate the sentences into Ukrainian paying attention to the Gerund:

1. It goes without *saying*. 2. There are two ways of *getting* sugar: one from beet and the other from sugarcane. 3. Jane Eyre was fond of *reading*. 4. It looks like *raining*. 5. My watch wants *repairing*. 6. Thank you for *coming*. 7. I had no hope of *getting* an answer before the end of the month.

7. Transform the sentences using the Gerund with the preposition *of*:

Model: *She thought* ***she would go to the country for the weekend. –*** *She thought* ***of going to the country for the weekend.***

1. I thought I would come and see you tomorrow. 2. She has always dreamt she will live in a small house by the sea. 3. He thought he would buy a new car after that terrible accident. 4. He dreams he will travel round the world. 5. He thought he would publish his article in the international journal.

8. Transform the sentences using the Gerund with the preposition *after*:

Model: When she had bought everything she needed, *she went home*. – ***After buying everything she needed****, she went home.*

1. When he had made a thorough study of the subject, he found that it was a great deal more important than he had thought at first. 2. After I had hesitated some minutes, I finally decided to support the first point of view. 3. When she had graduated from the university, she went to teach in her hometown. 4. When he had proved that his theory was correct, he started studying ways and means of improving the conditions of work in very deep coalmines.

9. a) Translate the examples with the different forms of the Gerund and compare them:

1) I like telling fantastic stories. *(Indefinite Active)* ***2) He likes being told fantastic stories.*** *(Indefinite Passive)* ***3) She is proud of having spoken with Nobel Prize winner.*** *(Perfect Active)* ***4) He is proud of having been spoken to.*** *(Perfect Passive).*

b) Translate the sentences with different forms of the Gerund:

1. Їй подобається, що її фотографують для цього журналу. 2. Він ненавидить, коли його ігнорують. 2. Я пишаюся тим, що навчався в цьому університеті. 3. Вона пишається тим, що їй пропонували роботу саме у цьому закладі. 4. Я просто люблю писати листи. 5. Вона насолоджується, коли отримує подарунки. 6. Його брат ненавидить, коли над ним сміються. 7. Я люблю плавати в басейні після роботи.

LESSON 6

1. **Discuss in pairs and then in a group:**

Have you ever participated in the work of an international congress?
Have you ever taken part in the organization of the international congress?
Is it necessary for students, postgraduate students and young scientists to participate in such congresses or conferences? Why?
Do you have an experience in writing an abstract for the congress?
Was it easy for you to fill in all the forms required by the Organizing Committee of the Congress?
Is it interesting for you to exchange information with your colleagues?

2. Look through the set of documents for the conference.

12th World Conference on Tobacco or Health
Global Action for a Tobacco Free Future
3-8 August 2008, Helsinki, Finland

The plenary sessions include these topics:
Addiction
Between the conferences and the state of the pandemic
Cultures
Ethics of policies of prevention
FCTC – Framework Convention on Tobacco Control
Implementation of policies
Information technologies
Sports
Youth

The main session topics include:
Beyond the convention
Cessation methodologies
Clinical and educational settings
Control policies in action
Country profiles
Economical aspects of tobacco
Environmental tobacco smoke
Ethics, society and tobacco
European policy
Global trends and smoking
Litigation experiences
New sciences
Smoking and diseases
Sponsorship and/or social responsibility
Tobacco, alcohol or drugs

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a. **Abstract title**
b. **Abstract information**
c. **Abstract content**
d. **Submit your abstract when complete**

The form is available from 15 July 2007 – 15 January 2008.

The Preliminary Programme and Conference Registration Form will be published in autumn 2007.

Call for Workshops
Proposals for workshops and special sessions are welcome until 30 September 2007. Please send proposals to e-mail address: wstoh2008@health fi

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Call for Abstracts
Please submit your abstract on-line by 15 January 2008. Please note that only electronic submission is possible. There are three main categories for abstracts: scientific, advocacy, policy and the presentations are either oral or poster presentation.

Continuous Professional Development
In addition to the regular programme, there are Continuous Professional Development sessions offering courses about practical issues. These courses require a separate fee.

Ancillary Meetings
Along with the scientific programme there is an opportunity for international and national organisations to arrange ancillary meetings before or during the conference. Those interested in organising ancillary meetings are requested to submit an abstract about the purpose and nature of the meeting. This is possible through a structured abstract submission form on the web site.

Fellowship programme
A small number of fellows will be invited to join a high quality educational programme for three days before the conference. The programme includes i.e. epidemiology and monitoring, economics and advocacy. The conference fee is included in fellowship. The application form will be available in May 2007 on the web site. The deadline for applications is 15 September 2007 and notification for nominees will be made 15 December 2007.

Social Programme

The opening ceremony and reception, a concert and the closing ceremony are included in the conference fee. The optional tours, for an additional fee, acquaint you with Finnish culture and music, and also the city and history.

Pre-Registration Form

Please send me the Preliminary Programme and Call for Abstracts

Last name _____
First name _____
Organisation _____
Mailing address _____
Country _____
E-mail _____

Please return this form to:
"WCTOH 2008"
CongCreator CC
PO Box 762
FIN-00101 Helsinki, Finland

Alternatively you can pre-register on www.wctoh2008.org

3. Read the following lexical commentaries for better comprehension:
Abstract – наукова робота, стаття;
Deadline for abstracts – кінцевий термін надсилання робіт;
Allocate – розміщувати;
Oral presentation – усна презентація;
Poster session – презентація на стенді;
Overhead projection – кодоскоп;
Slide projection – слайдовий проектор;
Poster – стенд;
Badge – картка, значок;
Registration fee – реєстраційний внесок;
Confirmation – підтвердження;
Cancellation – відмова;
Reservation – бронювання, замовлення готелю;
Official carrier – офіційний перевізник.

4. You are going to participate in the work of the congress so you should fill in the gaps in the pre-registration form.

5. Read the abstract instructions and answer the questions:

a) Abstracts must contain data. Trade names should not be mentioned in the title. References can be included in the body of the text. Abbreviations should be defined. Faxes are not acceptable. For style please refer to the example. Underline the name of the expected speaker. Abstract should not contain more than 200 words excluding title and author(s). Type the abstracts inside the margins. Use a type-writer.

b) 1. What must abstracts contain?
2. What shouldn't abstracts include?
3. What is the size of an abstract?

4. Where must an abstract be typed?

6. You want to send your abstract to an international scientific conference. Fill in the gaps of the Abstract Submission Form provided below.

ABSTRACT SUBMISSION FORM

Address for correspondence _____
Title (Prof/Dr/Mr/Ms) _____ Date of birth _____
Initial of first name only _____ Surname _____
Department/Institution/Company _____
Address _____ Town/City _____
Postal code _____ Country _____
Is this your home _____or business _____ address?
Telephone _____ Fax _____

Group allocation
I wish to submit my abstract to the following group _____

Abstract Submission

_____
_____
_____
_____
_____

7. You have to prepare a speech about your scientific research. Do it using the following phrases and word-combinations.

I would like to begin with …
The key thing I'd like to start with is …
The subject of my speech is …
I'm going to deal with …
I'd like to draw (fix) your attention to (on) the following questions …
Assume that …
These assumptions call attention to …
On the other hand …
It is safe to say that …
In order to go more thoroughly into this problem …
It is essential for …
In addition to …
As mentioned above …
It is necessary to determine here …
It should be stressed here …
Here is an illustrative explanation of …
Previous investigations show …
From the view point of …
Perhaps it will be polemic to …
In this sense I would like to emphasize …
I would like to raise some questions related to …
Thus, we come to the following conclusion …
Thank you for attention …

GRAMMAR EXERCISES

8. Remember the verbs and expressions after which the Gerund is used:

to avoid	**to excuse**	**to keep (on)**
to burst out	**to finish**	**to mind** (in interrogative and negative sentences)
cannot help	**to forgive**	**to postpone**
to deny	**to give up**	**to put off**
to enjoy	**to go on**	**to stop**

Translate the sentences into Ukrainian paying attention to the Gerund:

1. He keeps insisting on my going to the south. 2. Oh please do stop laughing at him. 3. Do you mind my asking you a difficult question? 4. I don't mind joining this group for discussion. 5. She could not help smiling. 6. I cannot put off doing this translation. 7. I avoided speaking to them about that matter. 8. She burst out crying. 9. He denied having been at the laboratory that evening. 10. He enjoyed talking of his future work. 11. Excuse my leaving you at such a moment. 12. Please forgive my interfering. 13. He gave up smoking a few years ago. 14. They went on talking. 15. He postponed going to the conference as he felt ill.

9. Translate the sentences into English:

1. Ми закінчили роботу над цією проблемою. 2. Він заперечує свою участь у злочині. 3. Я не могла не погодитись з ним. 4. У такому випадку ми відкладемо обговорення доповіді. 5. Я не заперечую, щоб залишитися дома і попрацювати над моїм перекладом. 6. Будь ласка, пробачте, що у мене поганий почерк. 7. Він не міг не думати, що його син зробить велику помилку. 8. Я отримала насолоду від перегляду цього запису знову. 9. Намагайся уникати обговорення цієї теми з учасниками проекту. 10. Продовжуйте працювати таким чином і ви припинити боятися за своє майбутнє.

10. Remember the verbs after which the Gerund with a definite preposition is used:

to accuse of	**to insist on**
to agree to	**to look forward to**
to approve of	**to object to**
to be afraid of	**to persist in**
to congratulate on	**to prevent from**
to depend on	**to succeed in**
to dream of	**to suspect of**
to feel like	**to thank for**
to give up the idea of	**to think of**

Translate the sentences into Ukrainian paying attention to the Gerund:

1. My friend succeeded in translating this article. 2. We are looking forward to seeing you again. 3. He persisted on trying to solve that difficult problem. 4. Jane thought of leaving Lowood after Miss Temple's marriage. 5.He accused them of having written his private letters. 6. He never agreed to their joining this doubtful project. 7. The results of your research depends on using his methods during the experiment. 8. I don't feel like seeing him. 9. I insist on being told the truth. 10. I object to his applying the results of the investigation. 11. She congratulated herself on having thought of such a good idea.

11. Translate the sentences into English:

1. Я наполягаю на тому, щоб допомогти їй. 2. Я не схвалюю того, що ви витрачаєте так багато часу даремно. 3. Він заперечує проти того, щоб брати участь у цих зборах. 4. Він погоджується, щоб всі проблеми були обговорені спочатку у групі. 5. Він боявся

проінформувати керівника про зміну методики. 6. Він мріяв про завершення експерименту та поїздку закордон. 7. Він з нетерпінням чекає участі у титульному бої за звання чемпіона світу. 8. Він відкидає ідею організації конгресу на даному етапі. 9. Комісія підозрювала його у поширенні фальшивої інформації. 10. Я була вдячна їм за допомогу у пошуку необхідних матеріалів для доведення нашої точки зору.

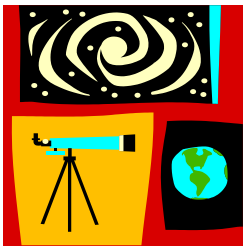
UNIT 3

HISTORY OF SCIENCE AND TECHNOLOGY

LESSON 1

THE BEGINNINGS OF TECHNOLOGY

From: A.E.E. Mc.Kenzie. The Major Achievements Of Science. Cambridge, 1967



The beginnings of technology can be traced to what is known as Palaeolithic or Old Stone Age, when the earliest men made tools of flint, wood and bone, such as axes, knives, needles, spears and bows. The Palaeolithic Age was succeeded, about 5000 B.C., by the Neolithic or New Stone Age, in which men still used mainly stone for their tools, but turned from hunting to agriculture. A wooden hoe and a wooden sickle with a flint edge were invented, and also pottery for their storage and cooking of cereals. Neolithic man invented textiles to clothe himself, instead of skins, and produced the first primitive machines for spinning thread and weaving cloth.

Some time in the millennium before 3000 B.C., the smelting and casting of metals were discovered. By heating certain types of stone with charcoal, copper was produced and later it was found that the addition of a small quantity of tin to copper gave rise to a harder metal, bronze.

The earliest civilizations arose in the river valleys of the Tigris-Euphrates, the Nile and the Indus. Here were the plough, the domestication and harnessing, the systems of irrigation, the wheeled card and the ship. The agricultural workers were able to produce a sufficient surplus of food to maintain the ruling castes of nobles and priests and also smiths, potters and other specialist craftsmen. The virtual cessation about 2500 B.C. of the prodigious technical advances made in the previous millennium has been ascribed to the class structure of these early urban societies; the manual workers were peasants and slaves and they had no incentive or leisure to devise and apply improvements in their crafts.

The Sumerians, whose bronze-age civilization flourished about 3000 B.C. in the valley of the Tigris-Euphrates, devised a system of writing consisting of triangular wedges indented in soft clay tables, known as cuneiform script, and the Egyptians developed a hieroglyphic script, written with ink on papyrus, made from the pith of reeds. Simple methods of calculation, representing the earliest form of arithmetic, were invented, and several geometrical facts useful in surveying were discovered, for example the properties of a right-angle triangle. The Babylonians divided the circle into 360 degrees, and it is to them that we owe the fact that there are sixty minutes in an hour, and sixty seconds in a minute.

The clear and glittering skies of Babylonia and Egypt attracted men’s attention to the notions of the heavenly bodies and it was in astronomy that empirical knowledge was first systematized so as to make possible the prediction of future events. It is not difficult to understand why astronomy should have been the first branch of science to be developed successfully. The data are points of light in the sky, which are simple and isolated; their periodic motion enables observations to be repeated over and over again. Astronomical observations were used to construct a calendar, necessary for the seasonal operation of seed sowing. The Babylonians achieved a remarkable accuracy and refinement; they estimated the length of the year, which is the time taken by the sun to return to the same position among the stars, to an

error of only four and a half minutes, and they knew that lunar eclipses form sequences recurring at intervals of about eighteen years.

VOCABULARY EXERCISES

1. Give the Ukrainian equivalents of the words and word-combinations:

The beginnings of technology, to be traced, tools of flint, to spin thread, to weave cloth, to smelt metals, to cast metals, to heat with charcoal, a sufficient surplus, virtual cessation, prodigious technical advances, a manual worker, to devise and apply improvements, triangular wedges, the properties of a right-angle triangle, notions of the heavenly bodies, seed sowing.

2. Find synonyms in the lists of words (1) and (2):

a) 1. To continue, to stop, to pass, to stay, to demand, to let, to wish.
   2. To require, to remain, to allow, to want, to go on, to spend, to discontinue.
b) 1. Inexpensive, dear, basic.
   2. Fundamental, cheap, expensive.
c) 1. Clearly, actually, precisely, normally.
   2. Exactly, naturally, sharply, really.
d) 1. Pleasure, learner, thought, reaction, course, for the sake of.
   2. For the benefit of, student, process, response, enjoyment, idea.

3. Make up a plan of the text.

4. Ask you friend to answer the following questions:

1.Describe briefly the Palaeolithic and Neolithic ages and the changes which occurred in the Neolithic.
2.How was copper and bronze obtained in ancient times?
3.Speak on the technical and social features of the earliest civilizations?
4.What systems of writing were devised by the Sumerians and Egyptians? What other systems of writing do you know?
5.What practical needs led to development of astronomy?

5. Give the summary of the text.

6. Comment and discuss with your friends:

1. The things taught in schools and colleges are not education, but a means of education.
2. The brain is a wonderful organ; it starts working the moment you get up in the morning, and does not stop until you get into the office.
3. Never take anything for granted.
4. With stupidity gods themselves struggle in vain.

7. Find the definitions for the notions:

Value	A financial policy of reducing taxes along with cutting public spending.
Cost	A particular type of money used in a state, total amount in circulation.
Price	Convertible money.
Wage(s)	Charge or payment for professional advice or services (e.g. lawyers, doctors).
Salary	Worth, marketable price, estimation.
Fee	Money for which a thing is bought or sold.
Currency	A sum paid by the borrower for the use of the sum lent.
Hard	Price to be paid for a thing.
Currency	Payment made or received at regular intervals for work or services.

Inflation Interest Rate Monetarism	Fixed monthly or quarterly payment for regular employment on a yearly basis. Fall in value of money, increase in amount of paper money circulating; rise in level of prices due to relative increase of purchasing power.

8. Make up sentences with the notions from the table.

GRAMMAR EXERCISES

9. Transform the following sentences using the necessary form of the past tense. Mind Sequence of Tenses.

1. It is clear that he is right. 2. They claim that they are trying to reach an agreement on all the issues. 3. He says that the lecture is very interesting. 4. They complain that he has been rude to them. 5. The witness insists that he hasn't seen the man. 6. She says that she has been having strange dreams for a long time. 7. He insists that he is innocent. 8. Our correspondent reports that the rate of unemployment is rising in Britain.

10. Put the verbs in the appropriate tense:

1. The author of the article wrote that until the 1970s the Americans (to supply) themselves with energy from their own sources. 2. Magellan finally proved conclusively that the Earth (to be) not flat. 3. The guide informed us that there (to be) no permanent residents on the island until 20th century. 4. Leonardo da Vinci discovered that the Moon (to shine) be reflected sunshine. 5. Already in the 50s there was some evidence that new discoveries in this field (to be made). 6. The scientist insisted that sleep (to be) just a waste of time. 7. He discovered his abilities as a hypnotist when he (to be) a schoolboy. 8. Socrates said that nothing (can) harm a good man. 9. The man explained that he (not to speak) English.

11. Transform the sentences with direct speech into indirect one:

1. "I'm tired", she said. 2. The attendant said, "The exhibition finished last week". 3. A representative of the National Coal Board in Britain said, "Britain will have to return to the use of coal". 4. The chairperson said, "We shall put off the discussion of this issue till tomorrow". 5. She said, "We are leaving today". 6. The young scientist said, "I won't support this idea". 7. He replied, "I have lived here since 1970". 8. Mr. Smith said, "I shall never change my mind". 9. The teacher said: "Don't worry. Correct all mistakes in your essay." 10. The scientific supervisor said to the postgraduate, "You must explain the meaning of this term".

12. Translate the sentences into English:

1. Він сказав, що ми змушені повернутися. 2. Голова зборів оголосив, що перерви між засіданнями не буде. 3. Вона пояснила нам, якими будуть умови роботи експедиції. 4. Лектор оголосив, що завтра занять не буде. 5. Він сказав, що ніколи не повернеться сюди.

13. Make up indirect questions, using the verbs *to ask, to want to know, to wonder* in the Simple Past tense:

1. When will the performance begin? 2. Do you need my help? 3. How long will it take you to come over? 4. Who designed this palace? 4. When was the city founded? 5. Why did you live so early?

14. Translate the following sentences into English:

1. Я замислився про те, що чекає нас в майбутньому. 2. Ми запитали його, чому він запізнився на засідання. 3. Він не міг згадати, куди він поклав свій записник. 4. Студента запитали, хто побудував цю фортецю. 5. Я запитав її, коли вона здасть свій проект.

LESSON 2

THE SPLENDID ACHIEVEMENTS OF THE GREEKS

From: A.E.E. Mc.Kenzie. The Major Achievements Of Science. Cambridge, 1967

Although they took the first step in the creation of science by systematic observation and measurement, the Babylonians and Egyptians failed to take the second, which is abstraction and generalisation. The latter was the splendid achievement of the Greeks. The Greeks made no revolutionary technological discoveries. Much of the manual work in their society was performed by slaves and this was responsible for a psychological bias which led them to exalt the theoretical at the expense of the practical. Their attitude was expressed by Aristotle. But as more arts were invented, and some were directed to the necessities of life, others to recreation, the inventors of the latter were naturally always regarded as wiser as the former, because their branches of knowledge did not aim at utility. An aristocratic attitude of this kind towards knowledge is conducive to the development of philosophy, but not of experimental science or technology, and the science of the Greeks grew up as part of their philosophy. They desired to understand the world rather than to control and change it.

The Greeks were the first to conceive science as a body of knowledge logically deducible from a limited number of principles. Their most brilliant and characteristic scientific achievement was the development of the isolated facts, discovered by the Egyptians and Babylonians in connection with land surveying into a rigid local system, summarised by Euclid in his Elements of Geometry. Euclid has exercised a profound fascination on many of the creators of modern science. Galileo and Pascal studied him delightedly in youth, despite parental obstruction, and when a friend admitted he could see no value in Euclid, Newton, who seldom smiled, broke into involuntary laughter. The geometry of the Greeks made possible their theoretical astronomy.

The conclusions of geometry, granted the axioms, are logically inescapable. The demonstration of what can be achieved by pure reason in geometry had a profound influence on Plato (427 – 347 B.C.) who, with his pupil Aristotle (384 – 322 B.C.), marks the summit of Greek philosophy; he is said to have placed a notice to his students at the entrance to the Academy: ‘Let no one unacquainted with geometry enter here’.

We need not concern ourselves with Plato’s ideas of science. His main influence occurred at the Renaissance and lay in his conviction that the design of the universe is essentially mathematical. But it is quite otherwise with Aristotle. To the man of the Middle Ages Aristotle loomed through the mists of antiquity colossal and omniscient. His works dominated scientific thought two thousand years after they had been written. They were encyclopaedic in character and embodied all the known science of his time.

Aristotle’s science was a logical system in which the truth of nature were exhibited as deductions from ultimate, universal principles. Such as that the heavenly bodies must move in circles because circular motion is the perfect type of motion, were perceived intuitively as correct, and, like the axioms of geometry, were fundamentally indemonstrable.

Aristotle was primarily a biologist and was constantly faced with the problem of growth. He believed that everything in nature has an aspiration or tendency to achieve an ideal state or form and that every natural process has a last stage, the form of which was present in the first. The most obvious example is a seed; in the acorn is the potential form of the oak. By analogy, he ascribed the behaviour of inanimate matter not, as we do today, to some system of mechanical relations, but to an innate striving or ‘occult qualities’. Thus a body falls, not because of force, but because it is seeking its natural place. This type of explanations, in terms of purpose or ultimate end, is called theleological and it has disadvantage that it is incapable of further development.

VOCABULARY EXERCISES

1. Give the Ukrainian equivalents of the words and word-combinations:

Systematic observation and measurement, splendid achievement, psychological bias, to exalt the theoretical at the expense of the practical, to be regarded as, to aim at utility, to conceive science, logically deducible, to mark the summit of philosophy, an ultimate principle, circular motion, to be perceived intuitively, to be fundamentally indemonstrable.

2. Give the English equivalents of the words and word-combinations:

Зробити перший крок, ручна праця, мати суттєвий вплив, полягати у переконаності, логічно неминучий, досягти ідеального стану чи форми, за аналогією, внутрішнє прагнення, очевидний приклад, подальший розвиток.

3. Find antonyms in the lists of the words (1) and (2):

a) 1. To stop, to stay, to differ, to question.
   2. To leave, to agree, to answer, to continue.

b) 1. Long, last, active, expensive, necessary.
   2. Unwanted, first, cheap, passive, short.

4. Make up a plan of the text.

5. Discuss with your friends:

1. In what way does the Greek science differ from that of Babylonians and Egyptians?
2. Why didn't Greeks make any revolutionary technological discoveries?
3. What was the role of Euclid in science? Speak on Galileo's and Newton's attitude to Euclid.
4. What influence did Aristotle exert upon scientific thought? What was the reason of this influence? Give some other examples of the influence a scientist exerted upon the development of science.
5. Speak on Aristotle's "theory of an ideal state or form".

6. Give the summary of the text.

7. Remember the expressions with the regular verb *to raise (піднімати)* and the irregular verb *to rise – rose – risen (підніматися):*

To raise	one's voice against fear masses against terrorism prices/wages/taxes/by 5 per cent the standard of living someone's popularity a point in the discussion production	To rise	against the enemy in value above the horizon from the dead

8. Make up sentences with the expressions from exercise 7.

9. Comment and discuss with your friends:

1. Nothing is so firmly believed as what we least know.
2. An erudite fool is a greater fool than an ignorant fool.
3. Knowledge is an antidote to fear.
4. Experience is the child of Thought and Thought is the child of Action.

GRAMMAR EXERCISES

10. Read the information about conditional structures and translate the examples:

1st conditional

If + Present tense, … will/won't …

- We use the first conditional to talk about things that we think might happen in the future:
  *If I **find** your watch, I'**ll** tell you.*
  (You've lost your watch, and I'll look for it – perhaps I'll find it.)
- In the first conditionals, we use *if* + Present tense to talk about the future.

2nd conditional

If + Past tense, … would/wouldn't …

- We use the second conditional to *imagine* things that we don't expect to happen:
  *If I **found** a watch in the street, I'**d** take it to the police.*
  (No-one has really lost a watch – I'm just imagining the situation.)
- We also use the second conditional to imagine things that can't be true:
  *If I **lived** in Hawaii, I'**d** go swimming every morning.*
  (I don't live in Hawaii – I'm just imagining it.)
- In second conditionals Past tense does not refer to past time – it is used to show that the condition is unreal.
- In second conditionals, we can use *were* instead of *was.*
  *If he **were** older, I'd take him swimming.*
  *If I **were** you, I'd see a doctor.*

11. Look at these two conditional sentences. What is the difference?

1. If they offer me the job, I'll probably take it.
2. Of course, if someone offered me a better job, I'd probably take it.

Now complete these *If* … sentences.

1. … I'll give you a lift to the station.
2. … I'd hand it in to the police.
3. If you carry on working like this …
4. … no-one would need to learn English.
5. If they weren't so rude to everyone …
6. If you don't apologise …
7. … I'll come round and see you.
8. … you'd feel much better.

12. On a piece of paper, write the first part of an *If* … sentence, and give it to another student to complete.

13. Read the information and translate the examples:

I wish	I had more money I could go home He'd stop shouting

- After *I wish,* we use Past tense or *could/would.*

- We use *I wish* + Past to talk about the present:
  *I wish I **had** a car.* (I don't have a car).
- We use *I wish + could/would* to talk about the things we want to do and things we want to happen:
  *I wish I **could** go out.* (I want to go out but I can't).
  *I wish they'**d** pay me more money.* (I want them to pay me more but they won't).

14. Make sentences with *I wish* … for each situation.

Example: *It's cloudy; the water's cold; you can't go swimming.*

I wish it wasn't so cloudy.
I wish the sun would come out.
I wish the water was warmer.
I wish we could go swimming.

a You're so shy; you want to meet more people; no-one invites you out.
b You live with your parents; you want to leave home; you haven't got much money.
c Everything costs too much; you pay a lot of tax; you can't afford a holiday.
d You're on a desert island; it's very hot; you haven't got any books with you; you want to escape.

LESSON 3

THE SEPARATION OF SCIENCES

From: J.D. Bernal. The Extension of Man. London, 1972

When modern science was growing up, from the time of Galileo to the time of Newton, all the sciences were very much joined together. A single man like Cooke could do absolutely first-class in pure mathematics, in physics, in chemistry and even in biology. Towards the end of that time the sciences were just beginning to separate and after that they continued to separate more and more. By the nineteenth century, in fact up to the time I was in Cambridge nearly forty years ago, the science faculties were almost completely separate – but there were already signs that they were coming together again.

Just at this moment we are witnessing a great convergence of all the sciences. In order to be a good biologist now, for instance, you have to know not only what might be called school physics, but quite a lot of really modern physics – quantum physics and so forth – and a great deal of chemistry as a basis for biochemistry. Conversely the physicist himself, even if biology is not part of his subject, is obliged to know something of it because he may find a great deal of his work will be concerned with biophysics. The problem for a physicist, rather than for physics as a subject, arises because physics is increasingly penetrating all the other parts of science. This is already evident in the names of the new hybrid subjects. We have long had one called physical chemistry; now we have a subject called chemical physics which is different, not so much in the proportion of physics and chemistry that come into it, as in its central interest of helping chemistry in the first case and of extending the range of physics in the second.

Now we also have biophysics and biochemistry. It would appear that physics is spreading towards biology on one side, while on the other the mathematical aspect of physics is also becoming much more marked, especially now that we have a growing symbiosis between physics and mathematics in computers. For the computer contains both the purely physical element in its actual components and mathematical logic in their arrangement. To develop and

make the transistors or magnetic memory elements or the newer devices that will replace them, needs a great deal of physics, but although the connections between the computers are actually made with material wires or printed circuits, their lay-out and set-up are really pure mathematics.

VOCABULARY EXERCISES

1. Give the Ukrainian equivalents of the words and word-combinations:

To be joined together, a sign, a convergence of all the sciences, for instance, to be concerned with biophysics, to be evident, hybrid subjects, growing symbiosis, in the arrangement, the newer devices, lay-out and set-up.

2. Give the English equivalents of the words and word-combinations:

Відокремлюватися все більше, фактично, бути свідком, квантова фізика, навпаки, проникати в інші частини, розширювати межі, новіші пристрої, замінювати.

3. Find in the text the nouns meaning branches of science and form the nouns meaning scientists dealing with these branches.

4. Make up a plan of the text.

5. Discuss with your friends:

1. When were all sciences very much joint together?
2. What are we witnessing at this moment?
3. What hybrid subjects do you know?
4. What sciences are involved in making and using computers?

6. Give the summary of the text.

7. Comment and discuss with your friends:

1. All men are liable to error.
2. Nothing in education is so astonishing as the amount of ignorance it accumulates in the form of inert facts.
3. Love truth, but pardon error.
4. Wear your learning like your watch in a private pocket and do not pull it out to show that you have one.

8. Answer the question saying why you think so:

What would you prefer (what would you rather do):

- communicate with a person or a computer?
- learn a foreign language with the help of a computer or a teacher?
- have a diagnosis stated by a computer or a doctor?
- have your marriage arranged by your friend or a computer?
- play chess (games) with a person or a computer?

Use these words and expressions:

Heartless, unfeeling, soulless, indifferent, liable to error/object to error, inhuman, it depends, to provide a tremendous variety of choice, to reduce the element of risk.

GRAMMAR EXERCISES

3d conditional

If + Past Perfect, … would/wouldn’t + have…

- Here we use the Past Perfect to talk about what didn't happen:
  If we had won the match, we would have got through to the final. (But we lost.)
- We do not use ***would have*** in an if-clause.
- We can use ***could have*** or ***might have*** in the main clause:
  If I'd bought a ticket yesterday, I might have won a prize.
- We can use ***would*** in the main clause if we are talking about the present:
  If you had planned this properly, you wouldn't be in this mess now.

8. Transform the sentences as to the model:

Model: I couldn't buy the book because I didn't have any money. – I could have bought the book if I had had some money.

1. Gary couldn't play basketball because he was ill. 2. We couldn't meet because you didn't ring me up. 3. We couldn't work this out a lot quicker, because we had no calculator. 4. I couldn't sign the contract because we didn't discuss it. 5. I couldn't save a lot of time because I didn't take your advice.

9. Transform the sentences as to the model:

Model: Debbie didn't lock her bike and it got stolen. – If Debbie had locked her bike, it wouldn't have got stolen.

1. Barbara went to bed late and so she overslept. 2. It wasn't warm enough, so we didn't sit outside. 3. You forgot the map, so we lost our way. 4. I noticed the mistake when I checked the figures. 5. Wayne was wearing a crash helmet, so I didn't recognize him. 6. No one watered the flowers, so they died.

10. Use the correct form of the verb in brackets:

1. I (to write) the composition long ago if you had not disturbed me. 2. If he (to work) hard, he would have achieved great progress. 3. If he (to come) to our house yesterday, he would have met his friend. 4. If she (not to help) me, I should have been in a very difficult situation. 5. Bob would have more free time if he (not to read) so many newspapers. 6. If only you had let me know, I (to go) there immediately. 7. If you had not put the cup on the edge of the table, it (not to get) broken.

11. Translate the following sentences:

1. Якби ви не перервали нас учора, ми б закінчили роботу вчасно. 2. Якби ви сказали їй про це минулої неділі, вона б мала час написати статтю. 3. Якби ви спостерігали за кішкою, вона б не з'їла всю рибу. 4. Якби ви мені зателефонували тоді, я б допоміг вам. 5. Якби ніч не була такою темною, ми б не заблукали.

12. Read the information and translate the examples:

I wish	I had translated the article I had met you yesterday I had more practice in chess

- We use *I wish* + Past Perfect to talk about the past:
  *I wish I **had won** a championship.* (I didn't win it).

13. Use the correct form of the verb in brackets:

1. I wish I (to pass) my driving test last Monday. 2. I wish I (not to forget) my friend's birthday yesterday. 3. I wish it (to be) sunny during our picnic last Saturday. 3. My friend wishes

(not to do) it last night. 4. I wish I (to bring) my camera last summer. 5. They wish they (not to see) this horrible scene again.

LESSON 4

ISLAMIC SCIENCE

From: D. Bernal. The Extension of Man. London, 1972

The Arab period of science can be said to date not quite from Mohammed but from the eighth century to the twelfth century. In all the places where it spread, it was not only merely science, it was organised science. It was organised by the foundation of some thing to which we are not quite accustomed, but which was new in the world of those days, universities. Strictly speaking, there were no universities in Greece at all: there were schools. A philosopher would have a school and a few men would come and listen to his lectures, but it was essentially a private affair. The nearest thing you had to a university was the Museum, but the Museum was not, strictly, a teaching institute at all, it was a research institute. The idea of a teaching- institute arose out of the school attached to the mosques, the Madrasah, and there teachers would come and teach all subjects to any students who came there to learn.

There is a very instructive story about one of the greatest of the Mohammedan scholars, Al-Ghazzali, who lived in the tenth century. He had been to the great university of Ray in Persia and, in his four years in the university, he had studied all the courses — philosophy, metaphysics, mathematics — and everything that could be learnt there. He was on his way back to his native town, hoping to make a career for himself, and, being a poor student, he attached himself — as an individual traveller would have had to do — to a caravan. As they were travelling along, a set of Bedouins attacked the caravan and robbed them of everything. Al-Ghazzali had kept all his notes from the course in a little leather bag which was about all he had, and they took that too. So he went to the Bedouin chief, caught his stirrups and begged him to return this bag, saying that it was of no use to the Bedouins who could not read and that it was the fruit of his four-year learning at the university. The Bedouin chief threw the bag at him and said, 'I thought you went to the university to learn, not to take notes'. Al-Ghazzali was very struck with this and went back to the university for further four years, taking no notes at all but really thinking about it all to such good purpose that he became the leading Mohammedan philosopher.

So by now, institutionally, you have the foundation of the universities, and the interesting thing is that many of the customs we have now are taken directly from those practised in the Mohammedan universities — for instance, the cap and gown, which was referred to them as the robe of honour and was given to students after matriculating. Four hundred years later, when European universities arose, their founders thought — well, these caps and gowns are part of the university, we must have them too. Similarly they have very nice caps and gowns in Africa now and many other places.

But not only were there universities, there were scientific societies. They had rather curious names from our point of view. One of the most famous was called «The Brethren of Purity», which was a chemical society and studied the methods that were supposed to provide the elixir of youth and the stone for the transformation of base metal into gold and so forth. Yet, no one knows to this day whether that was what they were really doing or whether they were not using chemistry as an analogue for moral virtue — the two were curiously mixed. Physics, somehow or other, was never quite so mixed with morality as was chemistry.

Now let us look at what they actually did. One of the later Mohammedans said: “Our duty is to examine the works of the Ancients (the Greeks) and to improve them in any place in which they can be improved.” This was their attitude: that there was a terrific

body of knowledge of the Ancients which ought to be known and ought to be examined to see whether it could be interpreted, tidied up and improved. And this they did.

VOCABULARY EXERCISES

1. Give the Ukrainian equivalents of the words and word-combinations:

Organised science, strictly speaking, research institute, to be attached to the mosque, to be on one's way back, leather bag, to take notes, the cap and gown, to matriculate, curious name, moral virtue.

2. Give the English equivalents of the words and word-combinations:

Просто наука, звикнути, походити (стати результатом), приєднатися, схопити стремена, бути дуже враженим, мантія честі, подібно, якось (якимось чином).

3. Form negative adjectives with necessary prefixes (use a dictionary):

il- im- in- ir- un-	possible regular consciously moral mortal legal logical practicable pure valid visible responsible real lucky

4. Work in pairs and answer your friend's questions:

1. Describe briefly the universities of Greece.
2. What time can be considered the Arab period of science?
2. What did Al-Ghazzali ask the Bedouin chief?
3. What did Al-Ghazzali do after he had met Bedouins?
4. When did the European universities arise?
5. What did the European universities borrow from the Arab universities?
6. What was the name of the most famous scientific society?

5. Give the summary of the text.

6. Comment and discuss with your friends:

1. Is there anyone so wise as to learn by experience of others?
2. Our knowledge is the amassed thought and experience of innumerable minds.
3. Curiosity is one of the permanent and certain characteristics of a vigorous mind.
4. Everyone complains of his memory, but no one complains of his judgement.

GRAMMAR EXERCISES

Зверніть увагу на змішані випадки вживання часів в умовних реченнях II і III

типу:
If he were not so short-sighted, he would have seen me in the theatre yesterday.
Умова стосується теперішнього часу (II тип), а наслідок – минулого (III тип).
If you had finished the work yesterday, you would be free now.
Умова стосується минулого часу (III тип), а наслідок – теперішнього (II тип).

7. Make up conditional sentences:

1. He is groaning with pain now because he did not go to the dentist to have his tooth filled. If …
2. He went to Kyiv specially to hear this famous singer because he is fond of him. If …
3. He is not a first-class sportsman now because he did not train hard last year. If …
4. I am not acquainted with this famous professor, that's why I did not ring him up yesterday. If .
5. I am busy now because I did not translate the article yesterday. If …

8. Use the correct form of the verb in brackets:

1. If he had worked hard during the term, he (to be) the best student in his group. 2. If he (to be) more attentive, he would have understand the task. 3. If he had prepared for the exam well, he (to get) better mark now. 4. If she were good at foreign languages, she (to enter) the foreign languages department. 5. If you (to read) the article yesterday, you would answer the question now.

9. Translate the sentences into English:

1. Якби я в школі вчила німецьку мову, я б навчалася в іншій групі зараз. 2. Якби вона була більш самовпевнена, вона б вчора сама вирішила цю проблему. 3. Якби ти проглядала ці статті раніше, ти б знала суть цього питання. 4. Якби він був більш відповідальним, він би прослідкував за роботою лабораторії минулого тижня. 5. Якби ти вчора повідомив всім про зустріч, ми б обговорили це питання зараз.

10. Complete the sentences by matching a line from column A with a line from column B:

A	**B**
If I were a Minister of the Environment	I'd ban the import of foreign cars.
If I were a Minister of Defence	I'd increase tax on people with very high incomes.
If I were a Minister of Trade	I'd stop factories letting harmful chemicals into the atmosphere.
If I were a Minister of the Home Office	I'd reduce the number of prisoners.
If I were a Minister of the Finance	I'd build up conventional weapons and get rid of nuclear weapons.

What changes would you make if you were Ministers of various departments? What would be the results of these changes?

UNIT 5

EXPERIMENTS

From: J. D. Bernal. The Extension of Man. London, 1972

The physical method as we know it begins with observation and goes on to experiment. What is experiment? An experiment, from its name, means an experience that is often referred to as a trial. People are obliged to experiment, to find out by trying things out, whether they will work. A considerable step forward was taken when it was realised that you did not necessarily have to find this out on the full scale all the time.

In due course, this led to the idea of the plan. The Egyptians and the Babylonians made plans of towns, of fortifications, of fields and other operations. Somewhere or other — though I suppose they have been lost by now — there must have been plans of the pyramids. They must have been drawn out in dimension: we know that because here was a mathematical problem, a piece of mathematics. They desired to build a pyramid so many ells long and so many high; they had to calculate how many stories were required, how many jars of beer and how many loaves of bread to feed the men, supposing the men could do such and such amount of work a day. Those are the Egyptian elementary textbooks of 2000 B.C. They had to work out — and, as you know, it takes a bit of thinking out even now — the formula for the volume of a pyramid. But all these things, all these approaches to the introduction of mathematics, were part of a way of doing big things on a small scale. The fundamental realisation was the mathematical realisation of what we call the principle of similarity. Of course, as a notion it is extremely old, because it was used not only for objects but for animals and people. In the Old Stone Age they drew pictures of animals, usually fairly full scale, and then drew pictures of spears hitting them, and this was the principle of similarity. Later, they would draw the animals quite small: they would draw them and tattoo them on each other and it helped them in the hunt. Here the idea of scale came in — scale, incidentally is another of these practical things: it means the steps, the ladder. When the Egyptians had to make one of these magnificent large decorations on temples, they drew up Cartesian net, a piece of graph paper, and they set ordinary workmen to do the work on the large scale. The artist drew the design on a small piece of paper and gave the coordinates, and the workmen put it up at a scale thirty times as big.

They had the idea of scale, but experiment was the trial. Now the best example of trial is not in physics but in chemistry. If you had discovered a mine and found some ore minerals and wanted to know how valuable they were, you could, of course, take the whole pile of ore and extract the gold from it. You would then know how much gold was there, but you would rather like to know beforehand whether it was worth doing. So you took a little sample and assayed it in a small way. Instead of using a large balance that weighed half a ton or so, you used a little balance able to weigh a fraction of a pennyweight. There, then, you have the idea that you can get everything to work by doing it in a small way: and by doing it in a small way you could see what to do in a big way.

The controlled experiment came a good deal later and some of the first and best experiments, which we will be discussing later, were those made by Gallileo who discovered the law of falling bodies by experiment or, to he more accurate, what he really did was to discover which of the laws that had seemed to mathematicians to be equally good theoretically, was the one which crude nature actually used. But his experiment on falling bodies was, in a sense, a little too good. What I mean is that he said: "I have carried out this experiment one hundred times and it always gives exactly the same result" — he had not been trained in statistics. We would now say that he must have been telling lies, but the point is that by these experiments you interrogated nature or, in the language of the times, "you torture nature and force it to reveal its secrets".

In a literal sense you do alter things by forcing them to show what they will do under different circumstances and then, from that point of view, find out their essential nature.

VOCABULARY EXERCISES

1. Give the Ukrainian equivalents of the words and word-combinations:

To be referred to as a trial, to try things out, on the full scale, somewhere or other, to be drawn out in dimension, it takes a bit of thinking out, an approach to the introduction of mathematics, the principle of similarity, crude nature, to interrogated nature, to reveal secrets, under different circumstances, essential nature.

2. Give the English equivalents of the words and word-combinations:

Мусити експериментувати, значний крок уперед, у свій час, знати заздалегідь, допитувати природу, буквально (у буквальному розумінні).

3. Find the synonyms in lists 1 and 2:

a) 1. To memorize, to notice, to doubt, to improve, to interrogate.
   2. To better, to disbelieve, to learn, to observe, to torture.

b) 1. Strong, clever, weak, poor, lucky, essential.
   2. Intelligent, bad, happy, powerful, strengthless, main.

4. Ask your friend to answer the following questions:

1. Why are people obliged to experiment?
2. What is it necessary to know when driving a tunnel?
3. What plans did the Egyptians and Babylonians make?
4. What pictures did the people draw in the Old Stone Age?
5. What methods are used now in drawing and making sketches?

5. Make up a plan of the text in the forms of your own questions.

6. Give a summary of the text.

7. Discuss with your friends the following expressions:

1. Important principles may and must be flexible.
2. The world is full of willing people: some willing to work, the rest willing to let them.
3. Knowledge is a city, to the building of which every human being brought a stone.
4. We cannot learn men from books.

GRAMMAR EXERCISES

8. Use the correct form of the verb in brackets:

1. If he were not such an outstanding scientist, he (not to have) so many pupils. 2. If you (to give) me your e-mail, I shall send you a message. 3. If she (not to be) so absent-minded, she would be a much better student. 4. If my sister doesn't go to the south, we (to spend) the summer in the Crimea. 5. If you were not so careless about your health, you (to consult) a doctor. 6. If he (to work) hard, he would have achieved great progress. 7. This student would not have missed so many lessons if he (not to hurt) his leg.

9. Translate the sentences into English:

1. Якби ти допоміг мені розв'язати цю задачу, я б переклав твою статтю. 2. Якби ви його зустріли, ви б його не впізнали. 3. Якби я був на вашому місці, я б порадився з науковим керівником. 4. Якби ви чули її твори, ви б знали її історію. 5. Якби він не дотримувався порад лікаря, він би не одужав так швидко. 6. Якщо вона почне грати зараз, вона буде видатним музикантом. 7. Якби ти попередив мене вчора, я б не зробив стільки помилок. 8. Якби вона не надіслала цього листа минулого тижня, ми б поїхали на конференцію.

10. Use the correct form of the verb after *I wish:*

1. I wish it (to be) warm and fine all the year round. 2. I wish I (not to lend) Nick my watch: he has broken it. 3. I wish I (not to have) to do my homework every day. 4. I wish I (to know) Spanish. 5. I wish I (not to drink) so much coffee in the evening: I couldn't sleep half the night. 6. I wish I (to be) at yesterday's party: it must have been very merry. 7. I wish we (to meet) again next summer.

11. Answer the following questions:

What would you do

- if you found burglars in your flat?
- if you saw a ghost?
- if the weather had been fine last weekend?
- if you had more time?
- if you were the president of the country?
- if you had no homework tonight?
- if you won a million?
- if you could speak perfect French?

TEXTS FOR SUPPLEMENTARY READING

TEXT 1

THE PURPOSE OF A MAP

From: G. R. Grone. Maps and Their Makers. N. Y., 1966

The purpose of a map is to express graphically the relations of points and features on the earth's surface to each other. These are determined by distance and direction. In early times «distance» might be expressed in units of time, or lineal measures — so many hours 'march or days' journey by river, and these might vary on the same map according to the nature of the country.

The other element is direction, but for the ordinary traveller, whose main concern was «Where do I go from here, and how far away is it?» the accurate representation of direction was not of primary importance. Partly for this reason, written itineraries for a long time rivalled maps, and throughout the centuries from the Roman road map to the thirteenth—century itinerary from London to Rome of Matthew Paris and even to the Underground and similar 'maps' of today, no attempt is made to show true direction. Similarly, conspicuous landmarks along a route were at first indicated by signs, realistic or conventional, and varied in size to indicate their importance. Clearly the conventions employed varied with the purpose, of the map, and also from place to place, so that in studying early maps the first essential is to understand the particular convention employed.

The history of cartography is largely that of the increase in the accuracy with which these elements of distance and direction are determined and in the comprehensiveness of the map content. In this development cartography has called in other sciences to its aid. Distance were measured with increasing accuracy 'on the ground'; then it was found that

by applying trigonometrical principles it was unnecessary to measure every requisite distance directly, though this method required the much more accurate measurement of a number of short lines, or bases. Similarly, instead of determining direction by observing the position of a shadow at midday, or of a constellation in the night sky, or even of a steady wind, use was made of terrestrial magnetism through the magnetic compass, and instruments were evolved which enabled horizontal angles to be measured with great accuracy. Meanwhile the astronomers showed that the earth is spherical, and that the position of any place on its surface could be expressed by its angular distances from the equator (latitude) and a prime meridian (longitude), though for many centuries an accurate and practical method of finding longitude baffled the scientists.

The application of these astronomical conceptions, and the extension of the knowledge of the world through exploration and intercourse, encouraged attempts to map the known world — but this introduced another problem: how to map a spherical surface on a flat sheet. The mathematician came to the rescue again — with this system of projections, by which some, but not all, spatial properties of the earth's surface can be preserved on a single map. Then the astronomers discovered that the earth is not a perfect sphere, but is flattened slightly at the poles; this introduced further refinements, such as the conception of geodetic as opposed to astronomical latitudes, into the mapping of large areas, and great lines of triangulation were run north and south across the continents to determine the true «figure of the earth», and to provide bases for their accurate mapping.

Meanwhile, increasing demands were being made on the map maker. The traveller or the merchant ceased to be the sole user of maps. The soldier, especially after the introduction of artillery, and the problems of range, field of fire, and dead ground which it raised, demanded an accurate representation of the surface features, in place of the earlier conventional or pictorial delineation, and a solution in any degree satisfactory was not reached until the contour was invented. This again adds to the task of the surveyor who must run lines to levels and sometimes to the extent of pegging out the contour lines on the ground. Then the archaeologist, the historian, and much later, the modern geographer had their own special requirements, and in cooperation with them the cartographer must evolve methods of mapping all kinds of «distributions», from geological strata and dolmens, climatic regimes and plant associations, to land use and ‘urban spread'. It is the present widespread recognition of the value of the map in the coordination and interpretation of phenomena in many sciences that has led to what may truly be called a modern renaissance of cartography.

Questions

1. What is the purpose of a map?
2. Describe the earlier maps used by the ordinary traveller.
3. What principles were applied to make it unnecessary to measure every requisite distance directly?
4. What problem was introduced in cartography due to application of new astronomical conception?
5. What led to a modern renaissance of cartography?

TEXT 2

TIME AND ITS KEEPERS

From: The Home Owner, I960, No. 119

«What is time? The shadow on the dial, the striking of the clock, the running of the sand...». Thus the poet Longfellow, in a sentence, summed up the origins of time-keepers, though not in the chronological order.

Symbolically, time itself is but a shadow cast by the sun and by-that shadow was time first measured. Primitive man, planting a stick, patched its moving shadow and so measured the passing of the hours. From this came the sundial, which showed accurate solar time during the hours of daylight.

Almost as old is the clepsydra, or water-clock, which went one better — it could record time equally well by day and night. Dating from as early as 1400 B. C, it consisted of a basin with a hole, through which water flowed at a given rate, the falling level being marked with a scale of hours inside the vessel. The clepsydra was in use by the Egyptians and an example of it can be seen in the Science Museum at South Kensington.

Other early methods of telling the time were the hour glass (still in use as an egg-timer), the graduated candle used by King Alfred, and the lamp clock, based on the rate at which the oil burned.

But the real basis of the clock, as we know it today, was the introduction of wheels, springs and weights designed to move a pointer on a dial; and the origin of this mechanism is one of history's mysteries.

Some claim that the credit for this belongs to a Benedictine monk named Gerbert (who later became Pope Silvester II) in the year 996. He was responsible for a clock, made for the monastery at Magdeburg, which worked by weights — one of the first forms of motive power. Other historians point to another monk, Richard de Walingford, of St. Albans, who is said to have invented the first cathedral clock in 1326. These clocks, incidentally, had only one hand, denoting the hours; the minute hand was not invented until about 1670.

Subsequent investigations, however, suggest that the mechanical clock was already in existence long before these times, that it can he traced to the eleventh century and even earlier — that, in fact, it was known to the Saracens of classic Arabia.

In 1581, at the early age of 17, the great mathematician Galileo hit on an idea which was to revolutionise the art of clockmaking. He thought about it, literally for years, before his thought took definite shape — in the forms of a pendulum attached to a clock. The actual construction of the first pendulum clock is attributed to his son and the principle was fully developed fifteen years later by the Dutch mathematician, Christian Huygens. This was some time before the year 1658; but here, once again, we are up against the many contradictions of historians, some of whom claim that the first man to apply Galileo's principle was an Englishman named Richard Harris, who is said to have built a pendulum clock for the turret of St. Paul's Covent Garden, in 1642.

Another advance in the evolution of clockmaking came with the invention of the coiled spring, which was attributed at first to a young Nuremberg clockmaker, Peter Hele, in the early sixteenth century, but is now believed to have been in existence in Italy as early as 1400. This invention was of paramount importance, since it made possible the construction of smaller and portable clocks and, finally, the pocket watch and the wrist watch as we know them today,

The watch owes much to Thomas Tompion who was born about 1638. He was the great 'improver' on what had gone before in the making of clocks. His first watch was made for King Charles II and examples of his work, in both watches and clocks, are still to be seen at Buckingham Palace and in many country houses, still working perfectly. When he died, in 1713, he was buried in Westminster Abbey.

But it was in Geneva that the great art of watchmaking finally centred and it is to a great eighteenth-century Swiss genius that we owe the original selfwinding watch. He was Abraham-Louis Perrelet, who spent the whole of his life — he lived to the age of ninety-seven — in studying and working at his craft.

The first watches were, of course, made for the pocket and it was not until the first decade of the twentieth century that the wrist watch, at first openly derided, became established and popular. Great advances were then rapidly made, culminating in the self-winding, water-proof wrist watch.

The story of clocks and clockmaking is a fascinating study. It is an art which, like time itself, never stands still and its craftsmen are forever making new and exciting discoveries.

Questions

1. What can you say about first time-keepers?
2. What do historians say about the origin of the clock mechanism?
3. Whom is the actual construction of the pendulum clock attributed to?
4. Can you say anything about Thomas Tompion?

MODERN SCIENCE

TEXT 3

THE PROMISE OF PLENTY

From: J. Moss. The Scientific Revolution. London, 1967

The scientific revolution is going faster than ever and there is no reason to suppose that its pace will slow. As many as three out of four of all scientists that have ever lived are alive today and, between them, they know of inventions and techniques that could provide a world of plenty for all, but instead of abundance, science, or rather its misuse, could bring about the distinction of civilisation, if not of mankind.

Within the life span of some people still alive scientific discoveries and their application have transformed the world. The motor car is not yet eighty years old, Marconi sent his first weak radio signals over 30 miles seventy years ago and it is sixty-three years since Orville Wright's first controlled power-driven flight. Forty years ago John Logie Baird successfully demonstrated television at Solfridge's store in London.

The world's first nuclear reactor operated in wartime secrecy in a squash court in Chicago in 1943 controlling the fission of uranium stems, a phenomenon that had been discovered only four years previously. The first three atom bombs were exploded in 1945 — one on a test site in New Mexico and two which killed thousands of Japanese at Hiroshima and Nagasaki. It was said that the production of these first atom bombs cost more than all that had been spent on science before them. Now just over twenty years later there is a vast nuclear power industry and the stockpiling of nuclear weapons.

Twenty years span the time from the first electronic computer, developed to calculate quickly the trajectories of anti-aircraft shells and missiles, to the present computer industry. That first computer had 18,000 valves and weighed 30 tons. Now brief-case-sized computers are being built and matchbox-sized computers are being talked about. These will soon be feasible, thanks to micro-miniaturization of components.

It is barely 20 years since Sputnik 1 started the practical exploration of space and about 10 years since Yuri Gagarin's pioneer manned orbit of the Earth. Now satellites are launched almost daily and hardly rate a newspaper paragraph. Men stay in orbit for days in spaceships, close photographs have been taken of Mars, and of the other side of the moon.

Instruments have been landed on the moon and pictures of its stony surface sent back to earth.

Developments in medicine and discoveries about the nature of life have gone on at a similar place. Antibiotics, starting with penicillin, have been used massively in the past twenty years and have conquered many bacterial diseases. Effective vaccines like Salk's polio vaccine have been developed and successfully used in recent years to control major killing and disabling disease.

In 1940 2,500 people died from diphtheria in England and Wales. In 1960 the toll was five. The scourge of tuberculosis has receded within a generation thanks mainly to antibiotics. The deeper understanding gained within the past ten years of the mechanisms of living organisms may turn out to be the most far-reaching discoveries of all. Molecular biology has revealed the precise chemical structure of the acids in the nucleus of the living cell. The disposition of the thousands of atoms that make up deoxyribonucleic acid (DNA) and the other essential part of the cell's reproductive process, the proteins not only increase understanding of life, but have revealed a genetic code which shows how and why living cells replicate as they do. The first steps of transplanting internal organs in man have been taken and human bio-engineering has already installed heart pacemakers in a number of people.

But science and its application present no picture of unmixed blessings. The very scope and pace of scientific change also increases the hazards. There were 12,872,000 vehicles on Britain's roads at the end of 1965, 8, 917, 000 of them private cars. They killed during the year 7, 952 people and injured 397,937. Every day, on the average, 22 people the equivalent of a big aeroplane disaster or a major railway accident, die on the roads.

Propaganda is being made for motorists and their passengers to wear seat belts and first laws are being prepared, but-designing of cars for their safety features is only just beginning. Radio-active fallout from the nuclear testing in 1962 and previous years increased until 1964, when it began to decrease, thanks to the partial test ban treaty. But the statistics of how many people will die from this cause to the century's end have already been worked out. Smoke pollution has been reduced in patches over the country after legislation accelerated by the London smog of 1952, which killed 4,000, but pollution by sulphur dioxide and motor vehicles has increased. The widespread use of pesticides, herbicides and fungicides has increased agricultural production enormously, but has also affected wildlife as well as domestic animals and people.

Questions

1. What is the ratio between the scientists alive today and those that have ever lived?
2. What scientific discoveries have transformed the world?
3. What was the cost of the production of the first three atom bombs?
4. What is the brief specification of the first computer?
5. What can the recently developed vaccines do?
6. What motorists should do for the safety?
7. What are the results of the application of pesticides, herbicides and fungicides?

TEXT 4

SCIENCE IS NOT STANDING STILL

From: J. Moss. The Scientific Revolution. London, 1967

It has been estimated that two-thirds of all scientific discoveries have been made since the second world war. The next twenty years are likely to be more spectacular than the past twenty. Discoveries may change the economy in way that were not thought likely.

For example, the recent discovery of methane gas in the North Sea may transform the power and fuel industry if, as seems likely, enough gas is found. It may give a much cheaper source of fuel than coal or imported oil. Fuel demand is rising all the time, so natural gas is unlikely to oust other forms of fuel. The trouble about using it fully for the nation is that its exploitation in the North Sea is mainly in the hands of the big American and Dutch monopolies that now import oil on a large scale.

Other power sources may be discovered. Generation of electricity without the intervention of rotating machinery would become practical if magnetohydrodynamics (MHD) methods, fuel cells and other methods could be developed cheaply enough. The H-bomb may be tamed for peaceful purposes by an international effort for releasing thermonuclear energy. Electric cars and new, cleaner and more convenient forms of surface or rail transport may transform city life.

Man's imagination may be stirred most by scientific activity that has no conceivable practical application. Radio astronomy may settle age-old controversies about the nature age, formation and development of the universe. A unified theory of matter may emerge covering firstly the 100 or so fundamental particles or sub-divisions of the atom that high energy nuclear physicists have found. There are hopes that such a theory may range to include not only the very small, but the very large, as startling new discoveries are made about quasars, the immensely powerful radio resources, millions of light-years away.

We are becoming accustomed to regarding our planet as situated in the Sun's atmosphere and subject to its changes, as space near our earth is explored. Radio communication and reception is already being attempted with other civilisations in the universe, while communication by satellite will increase enormously across our own planet.

Science is moving so fast that it is difficult to keep up, let alone understand, all its myriad developments. It is particularly hard to foresee all the applications that may emerge from present discoveries. Even more frustrating is the way in which science is simply not being applied to glaringly obvious social problems. These are world-wide, and hunger and disease are the greatest of them.

The future of science in Britain depends more today than ever on government. But the good life for the maximum number of people, which should be the aim of government, depends more than ever on science. Successive governments have refused to plan science in a way to provide maximum benefits for the people. This is not simply a question of applying scientific discoveries, but of devising a plan for science that would combine research into finding new principles with their application in such a way that the whole moves forward. There are real dangers that the development of science and hence of its application to human needs may be held back in the future as in the past by shortsightedness and parsimony.

Questions

1. What discovery may transform the power and fuel industry?
2. What other power sources are mentioned by the author?
3. What controversies may be settled by radio astronomy?
4. What are the quasars?
5. What are the greatest social problems to which science should be first of all applied?
6. What are the dangers for the development of science in Britain?

TEXT 5

ORGANIC MATTER

From: I. Asimov. Guide to Science. London, 1975

The term molecule (from a Latin word meaning «small mass») originally meant the ultimate, indivisible unit of a substance, and in a sense it is an ultimate particle, because it cannot be broken down without losing its identity. To be sure, a molecule of sugar or of water can be divided into single atoms or groups, but then it is no longer sugar or water. Even a hydrogen molecule loses its characteristic chemical properties when it is broken down into its two component hydrogen atoms.

Just as then atoms have furnished chief excitement in twentieth-century physics, so the molecule has been the subject of equally exciting discoveries in chemistry. Chemists have been able to work out detailed pictures of the structure of even very complex molecules, to identify the roles of specific molecules in living systems, to create elaborate new molecules, and to predict the behaviour of a given structure with amazing accuracy.

By the mid twentieth century, the complex molecules that form the key units of living tissue, the proteins and nucleic acids, were being studied with all the techniques made possible by an advanced chemistry and physics. The two sciences, "biochemistry" (the study of the chemical reactions going on living tissues) and «biophysics» (the study of the physical forces and phenomena involved in living processes), merged to form a brand new discipline — «molecular biology». Through the findings of molecular biology, modern science has in a single generation of effort all but wiped out the borderline between life and non-life.

Yet less than a century and a half ago, the structure of not even the simplest molecule was understood. About all the chemists of the early nineteenth century could do was to separate all matter into two great categories. They had long been aware (even in the days of the alchemists) that substances fell into two sharply distinct classes with respect to their response to heat. One group — for example, salt, lead, water — remained basically unchanged after being heated. Salt might glow red-hot when heated, lead might melt, water might vaporize — but when they were cooled back to the original temperature, they were restored to their original form, none the worse, apparently, for their experience. On the other hand, the second group of substances — for example, sugar, olive oil — were changed permanently by heat. Sugar became charred when heated and remained charred after it was cooled again; olive oil was vaporized and the vapour did not condense on cooling. Eventually the scientists noted that the heat-resisting substances generally came from the inanimate world of the air, ocean, and soil, while the combustible substances usually came from the world of life, either from living matter directly or from dead remains. In 1807, the Swedish chemist Jons Jakob Berzelius named the combustible substances «organic» (because they were derived, directly or indirectly, from the living organisms) and all the rest «inorganic».

Early chemists focused mainly on the inorganic substances. It was the study of the behaviour of inorganic gases that led to the development of the atomic theory. Once that theory was established, it soon clarified the nature of inorganic molecules. Analysis showed that inorganic molecules generally consisted of a small number of different atoms in definite proportions. The water molecule contained two atoms of hydrogen and one of oxygen; the salt molecule contained one atom of sodium and one of chlorine; sulphuric acid contained two atoms of hydrogen, one of sulphur, and four of oxygen, and so on.

When the chemists began to analyse organic substances, the picture seemed quite different. Two substances might have exactly the same composition and yet show distinctly different properties. (For instance, ethyl alcohol is composed of two carbon atoms, one oxygen atom, and six hydrogen atoms; so is dimethyl ether — yet one is a liquid at room temperature while the other is a gas.) The organic molecules contained many more atoms than the simple inorganic ones, and there seemed to be no rhyme or

reason in the way they were combined. Organic compounds simply could not be explained by the straightforward laws of chemistry that applied so beautifully to inorganic substances.

Berzelius decided that the chemistry of life was something apart which obeyed its own set of subtle rules. Only living tissue, he said, could make an organic compound. His point of view is an example of "vitalism".

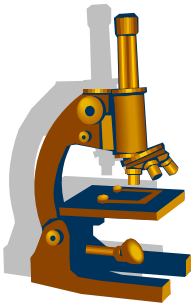
Then in 1828 the German chemist Friedrich Wöhler, a student of Berzelius, produced an organic substance in the laboratory. He was heating a compound called ammonium cyanate, which was then generally considered inorganic. Wöhler was thunderstruck to discover that, on being heated, this material turned into a white substance identical in properties with «urea», a component of urine. According to Berzelius's views, only the living kidney could form urea, yet Wöhler had formed it from inorganic material merely by applying a little heat.

Wöhler repeated the experiment many times before he dared publish his discovery. When he finally did, Berzelius and others refused to believe it. But other chemists confirmed the results. Furthermore, they proceeded to synthesize many other organic compounds from inorganic precursors. The first to bring about the production of an organic compound from its elements was the German chemist Adolph Wilhelm Hermann Kolbe, who produced acetic acid in this fashion in 1845. It was this that really killed Berzelius's version of vitalism. More and more it became clear that the same chemical laws applied to inorganic and organic molecules alike. Eventually the distinction between organic and inorganic substances was given a simple definition: all substances containing carbon (with the possible exception of a few simple compounds such as carbon dioxide) are called organic; the rest are inorganic.

Quest ions

1. Describe the meaning of the term «molecule».
2. What is the origin of molecular biology?
3. Into what classes did the early chemists distinguish all the substances? What was the reason for this distinction?
4. What is the difference in structure between organic and inorganic substances?
5. Speak on Berzelius's version of vitalism.
6. What killed Berzelius's version of vitalism?

TEXT 6



BACTERIA

From: I. Asimov. Guide to Science. London, 1975

Before the seventeenth century, the smallest known living creatures were tiny insects. It was taken for granted, of course, that no smaller organisms existed. Living beings might be made invisible by a supernatural agency (all cultures believed that in one way or another), but no one supposed that there were creatures in nature too small to be seen.

Had man suspected such a thing, he might have come much sooner to the deliberate use of magnifying devices. Even the Greeks and Romans knew that glass objects of certain shapes would focus sunlight on a point and would magnify objects seen through it. A hollow glass sphere filled with water would do so, for instance. Ptolemy discussed the optics of burning glasses, and Arabic writers such as Alhazen, about A. D. 1000, extended his observations.

It was Robert Grosseteste, an English bishop, philosopher, and keen amateur scientist, who, early in the thirteenth century, first suggested a peacetime use for this weapon. He pointed out that lenses (so named because they were shaped like lentils) might be useful in magnifying objects too small to see conveniently. His pupil, Roger Bacon, acted on his suggestion and devised spectacles to improve poor vision.

At first only convex lenses, to correct far-sightedness, were made. Concave lenses, to correct near-sightedness, were not developed until about 1400. The invention of printing brought more and more demand for spectacles, and by the sixteenth-century spectacle making was a skilled profession. It became a particular speciality in the Netherlands. (Bifocals, serving for both far and near vision, were invented by Benjamin Franklin in 1760. In 1827 the British astronomer George Biddel Airy designed the first lenses to correct astigmatism, from which he suffered himself. And, around 1888, a French physician introduced the idea of contact lenses, which may some day make ordinary spectacles more or less obsolete.)

To get back to the Dutch spectacle-makers. In 1608, so the story goes, an apprentice to a spectacle-maker named Hans Lippershey, whiling away an idle hour, amused himself by looking at objects through two lenses held one behind the other. He was amazed to find that when he held them a certain distance apart, far-off objects appeared close at hand. The apprentice promptly told his master about it, and Lippershey proceeded to build the first “telescope”, placing the two lenses in a tube to hold them at the proper spacing. Prince Maurice of Nassau, commander of the Dutch forces in rebellion against Spain, saw the military value of the instrument and endeavoured to keep it secret.

He reckoned without Galileo, however. Hearing rumours of the inventions of a far-seeing glass, Galileo, knowing no more than that it was made with lenses, soon discovered the principle and built his own telescope; his was completed within six months after Lippershey’s.

By rearranges the lenses of his telescope, Galileo found that he could magnify close objects, so that it was in effect a “microscope”. Over the next decades several scientists built microscopes. An Italian naturalist named Francesco Stelluti studied insect anatomy with one; Malpighi discovered the capillaries; and Hook discovered the cells in cork.

But the importance of the microscope was not really appreciated until Anton van Leeuwenhoek, a merchant in the city of Delft, took it up. Some of van Leeuwenhoek’s lenses could enlarge up to 200 times.

Van Leeuwenhoek looked at all sorts of objects quite indiscriminately, describing what he saw in lengthy detail in letters to the Royal Society in London. It was rather a triumph for the democracy of science that the tradesman was elected a fellow of the gentlemanly Royal Society. Before he died, the Queen of England and Peter the Great, Tsar of all the Russians, visited the humble microscope-maker of Delft.

Through his lenses van Leeuwenhoek discovered sperm cells and red blood cells, and actually saw blood moving through capillaries in the tail of a tadpole. More important, he was the first to see living creatures too small to be seen by the unaided eye. He discovered these «animalcules» in stagnant water in 1675. He also resolved the tiny cells of yeast, and, at the limit of his lenses' magnifying power, he finally, in 1676, came upon «germs», which today we know as bacteria.

Microscopes improved only slowly, and it took a century and a half before objects the size of germs could be studied with ease. For instance, it was not until 1830 that the English optician Joseph Jackson Lister devised an «achromatic microscope», which eliminated the rings of colour that limited the sharpness of the image. Jester found that red blood corpuscles (first detected as featureless blobs by Dutch physician Jan Swammerdam, in 1658) were biconcave discs — like tiny doughnuts with dents instead of a hole. The achromatic microscope was a great advance, and in 1878 the German physicist Ernst Abbe began a series of improvements that resulted in what might be called the modern optical microscope.

TEXT 7

EXPLORING THE FRONTIERS OF THE MIND

From: Time, 1974, January

The most mysterious, least-known area of man's universe does not lie in the farthest reaches of outer space. Nor is it found in the most remote Amazonian jungle. It is located instead inside the human skull, and consists of some 3 1/2 pounds of pinkish-gray material with the consistency of oatmeal. It is, of course, the human brain.

The brain is the most important of the body's organs. The heart, after all, is merely a pump; the lungs are an oxygenation system. But the brain is the master control, the guiding force behind all of man's actions. It is the seat of all human thought and consciousness, the source of the ingenuity that made it possible for man's ancestors to survive and eventually to dominate their physically more powerful adversaries and evolve into the planet's highest form of life. Everything that man has ever been, everything he will he, is the products of his brain. It is the brain that enabled the first humanoid to use tools and that gives his genetic successors the ability to build spacecraft, explore the universe and analyze their discoveries. It is the brain that makes man.

But it took many centuries to comprehend that there was a miraculous mechanism inside his head and begin to investigate its workings. Aristotle taught his pupils that the brain was merely a radiator or cooling system for the blood; he identified the heart as the organ of thought. Pliny the Elder was one of the first to identify the brain as “the citadel of sense perception”. But neither he nor generations of scientists who followed him had the knowledge or techniques to explore it. Investigation was also stymied by philosophical obstacles. The brain was considered the seat of the soul; its nature and its workings were considered not only unfathomable but sacrosanct.

Now man has embarked on a great voyage of discovery. In dozens of laboratories in cities round the world, psychologists, physicists and chemists, recognizing that what goes on inside the brain cannot be divorced from what goes on outside, in increasing numbers are poking, prodding and analyzing the organ in an attempt to unlock its secrets. Man has split the atom, cracked the genetic code and, in a Promethean step unimaginable less than a quarter-century ago, leaped from his own terrestrial home to the moon. But he has yet to solve the mysteries of memory, learning and consciousness of managed to understand himself.

The brain is the newest and perhaps last frontier in man's exploration of himself. Crossing that frontier could have the same impact on humanity as the discovery that the earth was round. «We are like the Europeans of the 15th century», rhapsodizes one brain researcher. «We're standing on the shores of Spain or Portugal, looking out over the Atlantic. We know that there is something on the other side and that our discovery of exactly of what this is will mean that things in our world will never be the same again».

The rapidly growing interest and activity in brain, research parallels an energetic, worldwide investigation of genetics that preceded James Watson and Francis Crick's 1953 discovery of the structure of the DNA molecule. Indeed, many outstanding biochemists and microbiologists who helped lay the groundwork for that monumental breakthrough

have recognized that the brain now represents science's greatest challenge. Some have announced their conversion to neuroscience, the discipline that deals with the brain and nervous system. The work of the neuroscientists has already produced an exponential increase in man's understanding of the brain — and a good bit of immediately applicable knowledge as well. It has led to a host of new medical and surgical treatments for such disorders as schizophrenia, depression, Parkinson's disease and epilepsy. It has also resulted in improved and promising new techniques for relieving pain and controlling some forms of violence.

Even these accomplishments could seem insignificant once the modern Magellans attain their goal of understanding the brain's functions in thought, memory and in consciousness — the sense of identity that distinguishes man from all other known forms of life. Finding the key to these mysteries of the brain, a discovery that would suddenly explain these functions, could lead to better ways of treating the psychoses and neuroses that plague millions. It could result in identification of the causes of many neurological disorders and, by revealing how the brain works, revolutionize thought, education and communication. It might even help man turn away from what some see as a headlong pursuit of self-destruction. «If man could discover why he is unique, he might not destroy himself,» says one of the leading brain, researchers. «He might respect himself more than he now does».

None of those engaged in neuroscientific research underestimates the difficulty of reaching that understanding, for the brain is an organ of enormous complexity. While a sophisticated electronic computer can store and recall some 100 billion «bits» of information, for example, the capacity of the brain seems infinite.

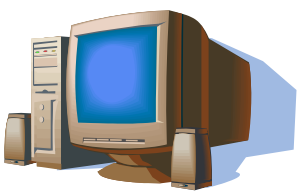
Questions

1. What is the most mysterious and least-known area of man's universe?
1. Why is the brain the most important of the body organs?
2. When was the brain recognized as the «citadel of sense perceptions?
3. What impact on humanity may the proper understanding of the work of brain have?
4. What has already been achieved in man's exploration of the brain?

TEXT 8

MIND-READING COMPUTER

From: Time, 1974, July



The experiment looks like some ingenious test of mental telepathy. Seated inside a small isolation booth with wires trialing from the helmet on her head, the subject seems deep in concentration. She does not speak or move. Near by, a white-coated scientist intently watches a TV screen. Suddenly, a little white dot hovering in the center of the screen comes to life. It sweeps to the top of the screen, then it reverses

itself and conies back down. After a pause, it veers to the right, stops, moves to the left, momentarily speeds up and finally halts — almost as if it were under the control of some external intelligence.

In fact, it is. The unusual experiment is a graphic display of one of the newest and most dazzling breakthroughs in cybernetics. It shows that a computer can, in a very real sense, read human minds. Although the dot's gyrations were directed by a computer, the machine was only carrying out the orders of the test subject. She, in turn, did nothing more than think about what the dot's movements should be. The computer mind-reading technique is far more than a laboratory stunt.

Though computers can solve extraordinarily complex problems with incredible speed, the information they digest is fed to them by such slow, combersome tools as typewriter keyboards or punched tapes. It is for this reason that scientists have long been tantalized by the possibility of opening up a more direct link between human and electronic brains.

B r a i n w a v e s. Although Pinneo and others have experimented with computer systems that respond to voice commands, he decided that there might be a more direct method than speech. The key to his scheme: the electroencephalograph, a device used by medical researchers to pickup electrical currents from various parts of the brain. If he could learn to identify brain waves generated by specific thoughts or commands, Pinneo figured, he might be able to teach the same skill to a computer. The machine might even be able to react to those commands by, say, moving a dot across a TV screen.

Pinneo could readily pick out specific commands. But, like fingerprints, the patterns varied sufficiently from one human test subject to another to fool the computer. Pinneo found a way to deal with this problem by storing a large variety of patterns in the computer's memory. When the computer had to deal with a fresh pattern, it could search its memory, for the brain waves most like it. So far the S.R.I. computer has been taught to recognize seven different commands — up, down, left, right, slow, fast and stop. Working with a total of 25 different people, it makes the right move 60% of the time,

Pinneo is convinced that this barely passing grade can be vastly improved. He foresees the day when computers will be able to recognize the smallest units in the English language —- the 40-odd basic sounds (or phonemes) out of which all words or verbalized thoughts can be constructed. Such skills could he put to many practical uses. The pilot of a high-speed plane or spacecraft, for instance, could simply order by thought alone some vital flight information for an all-purpose cockpit display. There would be no need to search for the right dials or switches on a crowded instrument panel.

Pinneo does not worry that mind-reading computers might be abused by governments or overly zealous police trying to ferret out the innermost thoughts of citizens. Rather than a menace, he says, they could be a highly civilizing influence. In the future, Pinneo speculates, technology may well be sufficiently advanced to feed information from the computer directly back into the brain.

Questions

1. What does the experiment with mind-reading computer look like?
2. Why did L. Pinneo think it necessary to develop such kind of computers?
3. What is the future of such computers according to L. Pinneo?

QUOTES

Discuss these quotes with your friends, saying your ideas about it, whether you agree or disagree and why:

1. *"Language is fossil poetry."* R.W.Emerson
2. *"Language is the dress of thought*." S. Johnson
3. *"I am always sorry when any language is lost because languages are the pedigrees of nations."* S.Johnson
4. *"Brevity is the soul of wit."* W. Shakespeare, "Hamlet"
5. *"The main thing is just to go!"* Marek Kaminski, Polish explorer
6. *"Serious sport is war minus the shooting."* George Orwell, English writer (1903-1950)

7. *"Adventure is the champagne of life."* G.K.Chesterton, English writer
8. *"Drama is life with the dull bits left out."* Alfred Hitchcock, British film maker
9. *"He travels the fastest who travels alone."* Rudyard Kipling, English writer
10. *"It was long ago in my life, as a simple reporter, that I decided that facts must never get in the way of truth."* James Cameron, British journalist
11. *"People come and ask for autographs, but they don't bug you."* John *Lennon,* the day before he was shot by a fan
12. *"Advertising is the greatest art form of the twentieth century."* Marshal McLuhan.
13. *"Intellect has powerful muscles, but no personality."* Albert Einstein
14. *"Be nice to people on the way up because you'll meet them on the way down."* Wilson Mizner, American Businessman
15. *"Don't criticise what you can't understand."* Bob Dylan
16. *" Education is what remains when we have forgotten all we have been taught."* Lord Halifax (1633 – 95)
17. *"The best advice given to the young is: Find out what you like doing best and get someone to pay you for doing it."* Katherine Whitehorn, British journalist
18. *"To live in Australia permanently is like going to a party and dancing all night with one's mother."* Barry Humphries, Australian comedian
19. *"Modern man is educated to understand foreign languages and misunderstand foreigners."* G.K.Chesterton, English writer (1874 – 1936)
20. *"Science has a potential for both Good and Evil."* Maurice Wilkins
21. *"Someone said that God gave us memory so that we might have roses in December."* J.M. Barrier
22. *"Those who cannot remember the past are condemned to repeat it."* George Santayana
23. *"In plucking the fruit of memory one runs the risk of spoiling its bloom."* Joseph Conrad
24. *"Reminiscences make one feel so deliciously aged and sad."* George Bernard Shaw
25. *"Can anybody remember when the times were not difficult and money not scarce?"* Ralph Waldo Emerson
26. *"A liar should have a good memory."* Quintillian (1st century AD)
27. *"There is only one thing worse than being talked about, and that is not being talked about."* Oscar Wilde
28. *"Politics are too serious a matter to be left to the politicians."* Charles de Gaulle
29. *"A celebrity is a person who works hard all his life to become well-known, then wears dark glasses to avoid being recognised."* Fred Allen
30. *"A politician is an acrobat - he keeps his balance by saying the opposite of what he does."* Maurice Barres
31. *"When it is not necessary to change, it is necessary not to change."* Lucius Cary, English royalist politician
32. *"Money can't buy friends, but you get a better class of enemy."* Spike Milligan, Irish comedian
33. *"Tis better to have loved and lost than never to have loved at all."* Lord Tennyson
34. *"Failure is not falling down, it is not getting up again to continue life's journey."* Richard Nixon
35. *"I would live to study and not to study to live."* F. Bacon
36. *"A wise scepticism is the first attribute of a good critic."* J. R. Lowell
37. *"A thing may look speciouos (right, true) in theory, and yet be ruinous in practice."* E. Burke
38. *"Every man who knows how to read has it in his power to magnify himself, to multiply the ways in which he exists, to make his life full, significant and interesting."* Aldous Huxly
39. *"Time is money."* B.Franklin
40. *"There are two tragedies in life. One is not to get your heart's desire. The other is to get it."* G.B.Shaw.

GRAMMAR REFERENCES

PASSIVE VOICE

1. **The Passive is formed** by using the appropriate tense of the verb ***to be + Past Participle***.

Tense	Active Voice	Passive Voice
Present Simple	They **repair** cars.	Cars **are repaired**.
Past Simple	They **repaired** the car.	The car **was repaired**.
Future Simple	They **will repair** the car.	The car **will be repaired**.
Present Continuous	They **are repairing** the car.	The car **is being repaired.**

Past Continuous	They **were repairing** the car.	The car **was being repaired**.
Present Perfect	They **have repaired** the car.	The car **has been repaired**.
Past Perfect	They **had repaired** the car.	The car **had been repaired**.
Future Perfect	They **will have repaired** the car.	The car **will have been repaired**.
Modals + be+ Past Part.	You **must repair** this car.	This car **must be repaired**.

2. **The Passive is used**:
   - When the agent (the person who does the action) is unknown, unimportant or obvious from the context.
     *My car **was stolen** yesterday. (unknown agent)*
     *The road repairs **were completed** last week. (unimportant agent)*
     *The kidnappers **have been arrested**. (by the police – obvious agent)*
   - To make statement more polite or formal.
     *My new suit **has been burnt**.(It's more polite than saying "You've burnt my new suit".)*
   - When the action is more important than the agent – as in news reports, formal notices, instructions, processes, headlines, advertisements etc.
     *Taking pictures **is not allowed.** (written notice)*
     *The local bank **was robbed** this morning. (news report)*
     *Bread **is baked** in an oven for about 45 minutes. (process)*
   - To put emphasis on the agent.
     *The Tower of London **was built** by William the Conqueror.*

INFINITIVE

Infinitive forms	**Active Voice**	**Passive Voice**
Indefinite	to offer	to be offered
Continuous	to be offering	-------
Perfect	to have offered	to have been offered
Perfect Continuous	to have been offering	-------

1. The **Indefinite Infinitive** refers to the present or future: *I'd like **to go** for a walk.*
2. The **Continuous Infinitive** is used with *appear, claim, seem, pretend, must, can't, happen, should, would etc* to describe an action happening now: *He must **be working** in the garden now.*

3. The **Perfect Infinitive** is used with *appear, happen, pretend, seem etc* to show that the action of the infinitive happened before the action of the verb: *He claims **to have met** the Queen.*
4. The **Perfect Continuous Infinitive** with *appear, seem, pretend etc* to put emphasis on the duration of the action of the infinitive, which happened before the action of the verb: *She seems **to have been working** all morning.*

The *to*-infinitive is used:

1. to express purpose: *She went out **to buy** some milk.*
2. after certain verbs (*advise, agree, appear, decide, expect, hope, promise, refuse etc): He promised **to be** back at 10 o'clock.*
3. after certain adjectives (*angry, happy, glad etc): She was glad **to see** him.*
4. after question words (*where, how, what, who, which, but not after why): Has she told you where **to meet** them?* But: *I don't know why he left so early?*
5. after *would like/would love/would prefer* to express specific preference): *I'd love to go for a walk.*
6. after nouns: *It's a pleasure **to work** with you.*
7. after *too/enough* constructions: *He's too short **to reach** the top shelf. He isn't tall enough **to reach** the top shelf.*
8. with *it + be + adj (+ of + object): It was nice of him **to remember** my birthday.*
9. with *only* to express unsatisfactory result: *He called me only **to say** that he would be late.*

The infinitive without *to* is used:

1. after modal verbs (*must, can, may, will etc): You must **be** back at 12 o'clock.*
2. after *had better/would rather: I'd rather **had stayed** in last night.*
3. after *make/let/see/hear/feel* + object: *Mum let me **watch** TV. I made him **apologise.***

But: in the passive form: *be made/be heard/be seen* + *to*-infinitive: *He was made **to apologise.***

Note: *help* is followed by a *to*-infinitive or an infinitive without *to: She helped me **(to) wash** the dress.*

The Objective Infinitive Complex

The Objective Infinitive Complex consists of a noun in the Common Case or a personal pronoun in the Objective Case and the infinitive. The nominal part of the complex denotes the subject or the object of the action expressed by the infinitive.

In the sentence this complex has the function of a complex object.

The Objective Infinitive Complex is used:

a) after the verbs denoting perceptions of senses (***to see, to hear, to feel, to watch, to observe, to notice)***; infinitive without *to* is used after these verbs, e.g.: *They all watched **him walk** up the hill.*

b) after the verbs denoting wish, intention, emotions (***to want, to wish, to desire, to like, to dislike, to hate, to intend, should/would like)***, e.g.: *He intended **me to go** with him to the theatre.*

c) after the verbs denting mental activity (***to consider, to believe, to think, to find, to know, to expect, to suppose)*** , e.g.: *We consider **him to be** an interesting person.*
d) after the verbs denoting request, permission, advice, compulsion (***to order, to ask, to request, to allow, to permit, to advise, to recommend, to cause, to force, to make, to let);*** infinitive without *to* is used after ***to make*** and ***to let***, e.g.: *We made **George work**.*

The Subjective Infinitive Complex

The Subjective Infinitive Complex consists of a noun in the Common Case or a personal pronoun in the Nominative Case and the infinitive.

The nominal part of the complex may denote both the subject and the object of the action expressed by the infinitive.

The Subjective Infinitive Complex is used:

a) with the verbs ***to say*** and ***to report*** (in the Passive Voice), e.g.: ***The delegation** is reported **to have arrived** in Geneva.*
b) with the verbs (in the Passive Voice) denoting mental activity (***to consider, to believe, to think, to know, to expect, to suppose)*** , e.g.: ***The meeting** is expected **to begin** this morning.*
c) with the verbs (in the Passive Voice) denoting sense perceptions (***to see, to hear, to feel, to watch, to observe, to notice)***, e.g.: ***He** was seen **to enter** the house.*
d) with the verbs (in the Passive Voice) denoting request, permission, advice, compulsion (***to order, to ask, to request, to allow, to permit, to advise, to recommend, to cause, to force, to make, to let);*** e.g.: ***They** were ordered **to leave** the hall.*
e) with the verbs ***to seem, to appear, to happen, to chance, to turn out, to prove,*** e.g.: ***She** seemed not **to listen** to him.*
f) with the expressions ***to be sure, to be certain, to be likely, to be unlikely,*** e.g.: ***He** is certain **to be sleeping**.*

The Prepositional Infinitive Complex

The infinitive complex preceded by the preposition ***for*** is called the Prepositional Infinitive Complex. It may be used in the functions of a subject, predicative, object, attribute and adverbial modifier of result and purpose.

*It is time **for us to go**. He waited **for her to speak**. There's nobody here **for him to play with.** It was too dark **for her to see him**.*

THE PARTICIPLE

There are two participles in English: **Present Participle** (or **Participle I**) and **Past Participle** (or **Participle II**). Present Participle is formed by adding the ending ***–ing*** to the infinitive without the particle ***to***. Past Participle is formed by adding the ending ***–ed*** for regular verbs and we use the ***III form*** for irregular verbs, e.g.:

Participle I	Participle II
to read – reading	to love – loved
to write – writing	to study – studied
to sit – sitting	to cry – cried
to begin – beginning	to stop – stopped
to look – looking	to permit – permitted
to prefer – preferring	to prefer – preferred
to compel – compelling	to occur – occurred

to travel – traveling to lie – lying to tie – tying to die – dying to study – studying to try - trying	to travel – traveled to fulfil – fulfilled *to write – written* *to bring – brought* *to shut – shut* *to show – shown*

Participle Forms

Participle forms	Active voice	Passive Voice
Present Participle	asking	being asked
Past Participle		asked
Perfect Participle	having asked	having been asked

Present Participle Indefinite may express an action:

a) simultaneous with that expressed by the finite verb, e.g.: ***Reading*** *English books I write out new books;*
b) referring to the present irrespective of the time of the action expressed by the finite verb, e.g.: *The students* ***working*** *in our village came from Kyiv.*
c) having no reference to any particular time, e.g.: *The bisector is a straight lie* ***dividing*** *an angle into two equal parts.*
d) preceding that expressed by the finite verb if these actions closely follow each other, e.g.: ***Entering*** *his room, he went quickly to the other door.*

Perfect Participle is used to express an action preceding that expressed by the finite verb, e.g.: ***Having given*** *her word, she ought to keep it.*

Present Participle Active is used when the noun or pronoun it refers to denotes the subject of the action expressed by the participle, e.g.: ***Having opened*** *my window,* ***I*** *went downstairs.*

Present Participle Passive is used when the noun or pronoun it refers to denotes the object of the action expressed by the participle, e.g.: ***Being invited*** *to an evening-party* ***she*** *couldn't go to the theatre.*

Past Participle has only one form which is passive in meaning, e.g.: *We looked at the* ***destroyed*** *bridge. A central angle is an angle* ***formed*** *by two radii.*

The Objective Participle Complex

The Objective Participial Complex consists of a noun in the Common Case or personal pronoun in the Objective case and a participle. The first part of the complex (the noun or pronoun) denotes the subject or the object of the action expressed by the participle.

The Objective Participial Complex is used:

a) with verbs denoting sense perceptions (after these verbs both Present Participle and Past Participle can be used), e.g.: *I saw* ***him walking*** *in the garden. I saw* ***the window broken***.
b) with verbs denoting wish and mental activity (only Past Participle is used in this case), e.g.: *I want* ***him changed.*** *Margaret considered* ***herself deceived.***
c) with the verbs **to have** and **to get** (after these verbs only Past Participle is used), e.g.: *She had* ***her hair done***. *I must have my* ***watch repaired***.

The Subjective Participle Complex

The Subjective Participial Complex consists of a noun in the Common Case or personal pronoun in the Subjective case and a participle (mostly Present Participle) which stands in predicate relation to the noun or pronoun.

The Subjective Participial Complex is used:

a) with verbs denoting sense perceptions in Passive Voice (in the function of predicate in a sentence), e.g.: ***A plane*** *was heard* ***flying*** *high in the sky.*
b) with verbs *to consider, to believe, to find,* (sometimes with Past Participle), e.g.: ***The work*** *was considered* ***finished****.*

The Absolute Participle Complex

The Absolute Participial Complex is a construction in which a participle has its own subject expressed by a noun in the Common Case or a personal pronoun in the Nominative Case. All the forms of the Participle are used here. The complex is used in the function of adverbial modifier of time, cause, manner or attending circumstances and condition. It may be introduced by the preposition *with.* In this case it is used in the function of adverbial modifier of manner or attending circumstances, e.g.:

The rain having stopped *we went home.*
The day being very fine, *we went for a walk.*
Weather permitting*; we'll spend our day off in the forest.*

Незалежний дієприкметниковий комплекс перекладається на українську мову:
а) підрядним обставинним реченням:
The letter being written*, I went to post it.* - *Коли лист був написаний, я пішла відправити його.*
б) простим реченням, що входить до складносурядного:
They went quickly out of the house, ***Jude accompanying her to the station****.* - *Вони швидко вийшли з дому, і Джуд провів її до вокзалу.*
в) дієприслівниковим зворотом:
Her face smiling*, she came into the room.* - *Усміхаючись, вона увійшла в кімнату.*
г) головним реченням в складнопідрядному:
She sat down at the table, ***her hands beginning to tremble****. – Коли вона сідала за стіл, її руки починали тремтіти.*
д) вставним реченням:
The evening was so dark, ***(the moon not having yet risen),*** *that he could see no one twenty yards off. – Вечір був такий темний (місяць ще не зійшов), що за двадцять ярдів він нікого не міг бачити.*
е) іменником з прийменником:
He came into the room, his face smiling. – Він увійшов до кімнату з усміхненим обличчям.

GERUND

The gerund is a non-finite form of the verb which has noun and verb characteristics.

Gerund Forms

	Active	**Passive**
Indefinite	***writing***	***being written***
Perfect	***having written***	***having been written***

The **Indefinite Gerund** is used:

a) if the action expressed by the gerund is simultaneous with that expressed by the finite verb, e.g.: *Nobody thought of* ***going*** *to bed.*

b) if the action expressed by the gerund does not refer to any particular time, e.g.: *She is fond of **painting**.*

The **Perfect Gerund** expresses an action prior to that denoted by the finite verb, e.g.: *He has no right to come without **having been invited**.*

The gerund is the only form of the verb which can be preceded by a preposition that refers to it; so the gerund is used after verbs, adjectives and expressions which require a prepositional object, e.g.:

*Thank you **for telling** me. – Дякую, що ви сказали мені.*
*She could not keep **from crying**. – Вона не могла стриматися, щоб не заплакати.*
*I am fond **of reading**. – Я люблю читати.*

Gerund is used after such verbs, prepositions and expressions:

*I think of **going** to Minsk next week.*
*After **finishing** school he worked at a plant.*
*She insisted on **going** to the library.*
*She insisted on **being sent** to the library.*
*I am looking forward to **getting** a letter from you.*
*I enjoyed **seeing** this performance.*
*It is no use **learning** rules without examples.*
*Excuse me for **troubling** you.*
*I'm sorry for **not telling** you about it.*
*I am proud of **being** his pupil.*
*I am proud of **having been** his pupil.*
*I am proud of **being** often **invited** there.*
*I am proud of **having been invited** there.*
*They went home **without waiting** for me.*
***Instead of taking** a taxi, I went there by bus.*
*Mother **is busy cooking** dinner.*
*This radio set **is worth buying.***

The –ing form is used:

1. **as a noun**
   ***Eating** vegetables is good for your health.*
2. **after certain verbs *(admit to, avoid, consider, continue, delay, deny, enjoy, escape, excuse, fancy, finish, forgive, imagine, involve, keep=continue, look forward to, mention, mind, miss, object to, postpone, practise, prevent, report, resist, risk, save, stand, suggest, understand etc)***
   *He admitted (to) **stealing** the painting.*
3. **after *love, like, dislike, hate, enjoy, prefer* (to express general preference)**
   *He likes **cooking*** (in general)
   I like to eat a healthy breakfast (it's useful, it's a good idea, specific preference)

4. **after *I'm busy, it's no use, it's (no) good, it's (not) worth, what's the use of, can't help, there's no point (in), can't stand, be/get used to, be/get accustomed to, have difficulty (in)***
   It's no use ***complaining.***
5. **after *go* for physical activities**
   They go ***skiing*** *every winter.*
6. **after *spend/waste time***
   He wasted his time ***playing*** *videogames.*
7. **after prepositions**
   He entered without ***knocking*** *at the door.*
8. **after *see, hear, listen, watch* to express an incomplete action, the action in progress or a long action**
   I saw Kate ***painting*** *the kitchen* (I saw Kate in the middle of painting. I saw part of the action in progress. I didn't wait until she had finished).
   I watched Kate ***paint*** *the kitchen* (I saw the whole action from beginning to end).

CONDITIONALS

Three Types of Conditional Sentences

Type	English	Ukrainian	Use
I	If he **leaves** early, he **will be** on time for the meeting. If the morning **is** fine, they **will compete** outdoors.	Якщо він вийде рано, він буде вчасно на зборах. Якщо ранок буде гарним, вони змагатимуться на відкритому повітрі.	Real – likely to happen in the present or future
II	If he **left** early, he **would be** on time for the	Якби він вийшов раніше (сьогодні, завтра), він був би вчасно на	Unreal – unlikely to happen in the present

	meeting. If the morning **were** fine, they **would compete** outdoors.	зборах. Якби ранок був гарним (сьогодні, завтра), вони б змагалися на відкритому повітрі.	or future; also used to give advice
III	If he **had left** early, he **would have been** on time for the meeting. If the morning **had been** fine, they **would have competed** outdoors.	Якби він вийшов раніше (вчора), він був би вчасно на зборах. Якби ранок був гарним (вчора), вони б змагалися на відкритому повітрі.	Unreal situations in the past; also used to express regrets and criticism

- When the *if*-clause is before the main clause, the two clauses are separated with a comma; e.g.:
  *If you **come early**, we **can go** for a walk.*
  ***But:** We **can go** for a walk if you **come** early.*
- After *if, were* can be used instead of *was* in all persons; e.g.:
  If I ***was/were** you, I **would try** harder.*
- *Unless* means *if not;* e.g.:
  *Unless she **studies**, she **won't pass** her test.*
  (If she doesn't study, she won't pass her test)

SEQUENCE OF TENSES

The sequence of tenses is a dependence of the tense of the verb in a subordinate clause on that of the verb in the principle clause.

If the verb in the principle clause expresses a past action, a past tense or future-in-the-past is used in the object clause, e.g.:

*I thought you **were** his friend. I knew that you **would understand** me.*

If the action of the object clause refers to the same period of time as the past action of the principle clause, the Past Indefinite or the Past Continuous is used in the object clause, e.g.:

*They knew what they **were fighting** for.*

If the action of the object clause precedes the past action of the principle clause, the Past Perfect is used in the object clause, e.g.:

*I thought you **had left** England.*

The sequence of tenses is usually not observed if the object clause expresses a well-known fact, e.g.:

*He knew that metals **conduct** electricity.*

Table1

Заміна часів у підрядному додатковому реченні при головному реченні у минулому часі		
Present Simple > Past Simple Present Continuous > Past Continuous	Дія підрядного речення відбувається одночасно з дією головного	*I thought that he **lived** in New York.* *I knew that mother **was sleeping.***
Present Perfect > Past Perfect Past Simple > Past Perfect	Дія підрядного речення передує дії головного	*I was told he **had returned** from London.* *I heard he **had bought** a new car.*
Future > Future-in-the-Past	Дія підрядного відбувається пізніше, ніж дія головного	*I supposed that he **would send** us a letter.*

Table 2

Direct Speech	**Indirect Speech**
today	that day
yesterday	the day before
tomorrow	the next day
… ago	… before
this …	that …
these…	those …
here	there
last year	the year before
last month	the month before
last …	the … before
next …	the following

Table 3

Direct Speech	**Indirect Speech**
Commands	
Keep quiet! Don't make noise!	*He told me **to keep** quiet and not **to make** noise.*
Special Questions	
What are you doing? *Where does he work?* *When did you come yesterday?*	*He asked me what I **was doing**.* *He asked me where he **worked**.* *He asked me when I had come home the day before.*
General Questions	
Does she go to the University?	*He asked me whether (if) she **went** to the*

Will you see your friend tomorrow?	*University.* *He asked me whether (if) I **should see** my friend the next day.*
Some constructions	
Let's play chess. *All right.* *Oh, no.*	*He suggested **playing** chess.* *He agreed.* *He refused.*

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CONTENTS

UNIT 1 . PROBLEMS OF SCIENTIFIC INVESTIGATIONS……

Lesson 1. TheArt of Thinking. ***Grammar:*** Modal Verbs……

Lesson 2. Role of Chance in Discovery. ***Grammar:*** Passive Voice……

Lesson 3. Curiosity as an Incentive to Thinking. ***Grammar:*** Infinitive. Objective Infinitive Construction…….

Lesson 4. Discussion as a Stimulus to the Mind. ***Grammar:*** Subjective Infinitive Construction…

Lesson 5. The Gap between Science and the Humanities. ***Grammar:*** Prepositional Infinitive Construction……

UNIT 2 . SCIENTIFIC PAPERS……
Lesson 1. Annotation. ***Grammar:*** Participle I……
Lesson 2. Substantiation. ***Grammar:*** Participle II……
Lesson 3. Why Do Scientists Talk?. ***Grammar:*** Participial Constructions……
Lesson 4. Teaching Language to an Ape. ***Grammar:*** Infinitive. Participle……
Lesson 5. Application Form. ***Grammar:*** Gerund ……
Lesson 6. Conference. ***Grammar:*** Gerund ……
UNIT 3. HISTORY OF SCIENCE AND TECHNOLOGY**……**
Lesson 1. The Beginnings of Technology. ***Grammar:*** Sequence of Tenses ……
Lesson 2. The Splendid Achievements of the Greeks. ***Grammar:*** Conditional Sentences (I,II)
Lesson 3. The Separation of Sciences. ***Grammar:*** Conditional Sentences (III) ……
Lesson 4. Islamic Sciences***. Grammar:*** Conditional Sentences (Mixed Type) ……
Lesson 5. Experiments. *Grammar:* Conditional Sentences (All Types) ……
TEXTS FOR SUPPLEMENTARY READING……
Text 1. The Purpose of a Map ……
Text 2. Time and its Keepers ……
Text 3. The Promise of Plenty ……
Text 4. Science is not Standing Still ……
Text 5. Organic Matter ……
Text 6. Bacteria ……..
Text 7. Exploring the Frontiers of the Mind ……
Text 8. Mind-Reading Computer ……
Quotes ……
Grammar References ……
Literature ……
Contents ……