

MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE

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Methodological guidelines
for independent work
on the subject

**“ENGLISH FOR ACADEMIC AND
BUSINESS PURPOSES”**

(for part-time Master's Degree students of all the University specialities)

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INTRODUCTION

These educational materials are designed for the Master's Degree students of all the University specialities to extend knowledge about contextual use of Passive structures, position and function of V_{ed} and V_{ing} forms, English-Ukrainian word relation, word structure, word meaning, word combinations and structure words.

The manual is based on the authentic texts. It also has the tasks for reading, analysis and translation, lexical tasks, texts for self-study. It has 3 units. They are: structure study, word study and text study.

The manual can be recommended both for using in class and for students' self-study.

Nomenclature

Adj. – adjective – прикметник

Conj. – conjunction – сполучник

Inf. – infinitive – інфінітив

N – noun – іменник

N's – іменник у присвійному відмінку

N₁ – subject – N у функції підмета

N₂ – object – N у функції додатка

Phr. – phrase – словосполучення

Prep. – preposition – прийменник

Pron. poss. – pronoun possessive – присвійний займенник

V – verb – дієслово в особистій або неособистій формі

V_{ed} – дієслівна форма з закінченням –ed

V_f – verb finite – особиста форма дієслова, а також будь-який інший присудок

V_{ing} – дієслівна форма з закінченням –ing

V_{pass} – verb passive – дієслово в пасивному стані

... – знак проходження компонентів один за одним

—> – знак трансформації однієї структури в іншу

Unit 1

Grammar: word order in the sentence and its message. Predicate vs. attribute.

STRUCTURE STUDY

1. PASSIVE STRUCTURES AND THEIR MESSAGE

Pattern Study (1)

Pattern 1:

... N₁... .V_{pass} (Prep.) ... (by/ with-phr.) ...

The idea was first suggested by Prof. X. Ця думка була вперше висловлена проф. X.

An idea was suggested to use another method. Була висловлена думка використовувати інший метод.

Pattern Practice (1)

Ex. 1. Identify the passive structures and the logical predicates, translate the sentences into Ukrainian as shown in the following example.

Example: *More evidence was obtained to support the idea.*

“Evidence was obtained” is the passive structure, “more evidence . . . to support the idea” is the logical predicate. Були отримані нові дані в підтримку цієї ідеї.

The problem was first recognized in the 19th century. Later an idea was suggested to apply it to practical things. Many possibilities for practical applications were analysed. Some of these were tested by experiment. The experimental results were not generally accepted, and the idea was discarded. Then other consequences were deduced and a new model proposed. Recently the model has been modified and is now being used in many practical situations.

Ex. 2. A. Practise orally by using Impersonal passive structures as shown in the following example.

Example: *We (the author, they, etc.) have found that. . . . It has been found that. . .*

1. I must admit that...
2. He has found that...
3. Everybody accepts that...
4. I believe that...
5. The author hopes that...
6. Scientists sometimes say that...
7. Most people assume that...
8. Physicists recognize nowadays that...

B. Give English equivalents of the following Ukrainian phrases using impersonal passive structures and adverbs “widely,” “generally” where required.

1. Кажуть, що
2. Передбачається, що
3. Можна сподіватися, що
4. Слід визнати, що
5. Було знайдено, що
6. Загальноновизнано, що
7. Вважають, що
8. Широко поширена думка про те, що

Pattern Vocabulary (1). List 1

Remember some of the verbs taking a direct object in English but equivalent to Ukrainian verbs followed by a preposition,

- to affect — впливати (на);
- to answer — відповідати (на);
- to approach — підійти (до);
- to attend — бути присутнім (на) (та активно брати участь);
- to consult — консультиватися (у, з);
- to enjoy — отримувати задоволення (від), користуватися;
- to follow — слідувати, стежити (за);
- to influence — впливати (на);
- to join — приєднуватися (до);
- to watch — спостерігати (за).

Ex. 3. Identify passive structures and give Ukrainian equivalents of the relevant part of the sentence as shown in the following example.

Example: *Under these conditions the questions cannot be answered unambiguously. "The question cannot be answered"*

На питання не можна відповісти

1. Some people are easily influenced by other people's opinions. 2. The distribution of plants is greatly affected by local conditions. 3. The seminar was attended by all the participants. 4. His lectures are always followed by heated discussions. 5. In several areas of research the efforts of Scientists are joined by those of philosophers and sociologists. 6. At the university students are offered a curriculum of study which is followed by a test and the award of a degree. 7. The members of the laboratory were consulted prior to this successful operation.

Pattern Vocabulary (1). List 2

Remember some of the verbs followed by a preposition which is retained in the passive structure.

- to account for — пояснювати (служити поясненням, враховувати);
- to agree upon — домовлятися (про);
- to call for — вимагати, закликати (до);
- to deal with — мати справу (з), розглядати;
- to refer to — посилатися (на), згадувати,
- to refer to as — називати;
- to rely on/upon — покладатися (на);
- to substitute for — вводити, підставляти (замість);
- to think of — думати (про),
- to think of as — вважати.

Ex. 4. Identify passive structures followed by a preposition and give Ukrainian equivalents of the relevant part of the sentence as shown in the following example.

Example: *Such things are not even thought of before the discovery is actually made.*
“Things are not thought of ...” Про це не думають....

1. This method has been referred to in an earlier paper. 2. I do not think this instrument can be relied upon. 3. The data cannot be accounted for by the existing theory. 4. This theory has been referred to as the “big bang” theory. 5. The best treatment of this syndrome is generally agreed upon. 6. Rapid development of chemical technology has been called for by the needs of the national economy. 7. The prolongation of life may be thought of as a feat of endurance rather than a race against time.

Reading Practice (Pattern 1)

Text 1.

1. Read the text to yourself and be ready for a comprehension check-up.

SCIENTIFIC METHOD AND METHODS OF SCIENCE

It is sometimes said that there is no such thing as the so-called “scientific method”; there are only the methods used in science. Nevertheless, it seems clear that there is often a special sequence of procedures which is involved in the establishment of the working principles of science. This sequence is as follows: (1) a problem is recognized, and as much information as possible is collected; (2) a solution (i. e. a hypothesis) is proposed and the consequences arising out of this solution are deduced; (3) these deductions are tested by experiment, and as a result the hypothesis is accepted, modified or discarded.

2. Check up for comprehension.

1. Find two sentences which express two different viewpoints on the existence of “scientific method”. 2. What words show that the first sentence is an opinion? 3. What word shows that these viewpoints are in opposition? 4. Find the words equivalent to “scientific method”. 5. What procedure does the scientist follow in his research?

Pattern Study (2a)

Pattern 2a:

...N₁...V_{f pass}...N₂/Inf... (by/with-phr.)...

The laboratory was given new equipment. Лабораторії було виділено нове обладнання.

The scientist was asked to give his point of view on this hypothesis. Вченого попросили висловити свою точку зору щодо цієї гіпотези.

Pattern Vocabulary (2a). List 3

Remember some of the verbs that may be followed by an indirect object which becomes the subject in the passive structure.

to allow		дозволяти комусь
to ask		запитувати когось
to give		давати комусь
to offer	> smb.	пропонувати будь-кому
to promise		обіцяти комусь
to recommend		рекомендувати когось
to teach		вчити когось
to tell		сказати комусь

Pattern Practice (2a)

Ex. 5. Identify, passive structures and give Ukrainian equivalents of the (relevant part of the sentence as shown in the following example.

Example: *During the examination, the students are not allowed to consult grammar books.*

“The students are not allowed...”. Студентам не дозволяють (не дозволяється)

1. He was not offered any help. 2. We have been given all the necessary information. 3. The institute was promised financial support. 4. The speaker was asked a lot of questions. 5. The teachers are recommended to give the passage as a talk. 6. If the mixture is allowed to stay overnight, it gradually decomposes. 7. At that time girls were taught hardly more than three R's (reading, writing and 'rithmetic).

Pattern Study (2b, 2c)

Pattern 2b:

...N₁...V_{f pass}...N₂ (Prep.) (by/with-phr.) ...

At present *chemical methods* of purifying water *are extensively made use of*. В даний час хімічні методи очищення води широко використовуються.

Pattern 2c:

...N₁... V_{f pass} Prep. ...N₂... (by/with-phr.) ...

At present extensive *use is made of* *chemical methods* of purifying water. В даний час широко використовуються хімічні методи очищення води.

Pattern Vocabulary (2b, 2c). List 4

Remember the following V. . .N – combinations and their equivalents:

- to give consideration to – to consider – розглядати;
- to make allowance for – to allow for – враховувати, робити поправку (на);
- to make a contribution to – to contribute to – робити внесок (в);
- to make mention of – to mention – згадувати (про);
- to make reference to – to refer to – посилатися (на);

to make use of – to use – використувувати, скористатися;
to take advantage of – to make use of – скористатися;
to take note of to take notice of – to pay attention to – звертати увагу.

Pattern Practice (2b, 2c)

Ex. 6. Identify passive structures according to Patterns 2b, 2c and give Ukrainian equivalents of the relevant part of the sentence.

1. This atmospheric interference has often been made reference to by radio and TV commentators. 2. Unfortunately no advantage was taken of the fast reaction rate. 3. So far no notice has been taken of the obvious advantage of this technique. 4. His curiosity was excited when reference was made to still earlier publications. 5. Recently the problem has been given close consideration in connection with a new space project. 6. Mention has already been made of the fact that gold is slowly attacked by these substances. 7. Several outstanding contributions have been made to the study of crystal growth. 8. There is no doubt that in the course of further scientific development extensive use will be made of modern computing machines and electronic devices.

Reading Practice (Patterns 1, 2)

Text 2.

1. Read the text to yourself and be ready for a comprehension check-up.

Recently much attention has been given to the study of this phenomenon. In this paper new experimental observations are presented and discussed. The data have been obtained assuming a new model of the mechanism involved, which was suggested in an earlier study by the author, the measurements have been carried out with a conventional apparatus slightly modified by the author. All possible sources of error are taken into account and consideration is given to the advantages and shortcomings of the present approach. The results are analysed and the analysis is followed by a comparison of the data obtained with those available in literature. It is hoped that the disagreement may be accounted for by an improved experimental technique of the present investigation.

2. Check up for comprehension.

1. Is it an abstract, a summary or a conclusion? 2. What was the author's theoretical contribution? 3. Did anybody else study the phenomenon? (Find two sentences to support your answer). 4. Do the author's results agree with those reported in literature? 5. How does he account for that? 6. How does the author increase the accuracy of his results?

2 AMBIGUOUS VED FORMS Pattern Study (3, 4, 5)

Pattern 3:

...N...Ved (Prep)...

1) *Prof. X proposed a new working hypothesis.* Професор X запропонував нову робочу гіпотезу.

2) *The hypothesis proposed (by Prof. X) accounts for all the experimental observations made.* —> The hypothesis which is (was) proposed (by Prof. X) accounts for all experimental observations which were made. Гіпотеза, що запропонована (професором X), пояснює всі зроблені експериментальні спостереження.

Pattern 4:

... N... *Ved'(Prep.).. Ved''(Prep.)..*

1) *The hypothesis proposed agreed with the experimental observation.* —>The hypothesis which is (was) proposed agreed with the experimental observation. Гіпотеза, що запропонована, була в згоді з експериментальними спостереженнями.

2) *For some time scientists remained interested in the problem.* Протягом деякого часу вчені зберігали інтерес до цієї проблеми.

Pattern 5:

... N'... *Ved'(Prep.).. Ved''(Prep.).. N''*

1) *The institute installed modernized equipment.* В інституті встановлено модернізоване обладнання.

2) *The equipment installed modernized our laboratory too.* Обладнання, що було встановлено, модернізувало і нашу лабораторію.

Pattern Practice (3, 4, 5)

Ex. 7. Identify the predicate and give Ukrainian equivalents of N...*Ved* as shown in the following example.

Example: *Later on scientists accepted the hypothesis rejected previously for want of experimental evidence. "Accepted" is the predicate; scientists accepted – вчені ухвалили; the hypothesis rejected – гіпотеза, що відхилена*

1. The method applied increased the accuracy of the results. 2. After a heated discussion the laboratory applied the method improved by Dr. N. 3. The scientist theoretically predicted complicated interaction between the components involved in the process. 4. At that time the problem presented increased danger of radioactive contamination and encountered opposition at most laboratories concerned. 5. The hypothesis concerned synthesized materials and did not apply to natural products. 6. Heat resistant materials developed in the last decade produced a revolution in a number of industries. 7. Automatized information-processing radically modified the method devised. 8. The crystal produced revealed cracked faces.

Ex. 8. Identify the structures according to Patterns 3–5 and give Ukrainian equivalents of the relevant part of the sentence.

A. 1. The plants affected by the cold produced low crops. 2. The Conference attended by scientists from different countries discussed new trends and methods in this field of research. 3. One of the rights enjoyed by University scientists is that of combining research with teaching. 4. The discovery followed by further experimental work stimulated research in this area.

B. 1. Mathematics, mechanics, statics and geometrical optics referred to as classical disciplines started mathematical traditions in the history of natural science. 2. The heads of the laboratories were asked questions formulated and agreed upon by a group of sociologists. 3. The scientist's eloquence substituted for logical argumentation in defending an "extreme" viewpoint failed to win the audience over. 4. The mixture allowed to stay overnight gradually decomposed. 5. The physicists showed that particles thought of as "elementary" were in fact "non-elementary". 6. The subjects dealt with under this topic aroused a heated discussion.

Reading Practice (Patterns 3, 4, 5)

Text 3.

1. Read the text to yourself and be ready for a comprehension check-up.

Last month our laboratory developed a new technique required for thermodynamic studies of a two-phase system. The technique allowed us to obtain results predicted by theory. The results obtained disagreed with earlier data reported by Dr D. At our laboratory seminar Prof. S. suggested a new model to account for the mechanism of the process involved in the system. The model suggested described adequately the thermodynamic peculiarities studied by Dr. D.

2. Read the text. Follow the course of events concentrating on the *Ved* predicates while omitting the *Ved* attributes.

Pattern Revision (Patterns 1–5)

(to be done at home in written form)

Ex. 9.

A. Identify the structures according to Patterns 1 — 5 and give Ukrainian equivalents of the relevant part of the sentence.

1. The usual procedure is that information storage is followed by information analysis. 2. The procedure proposed provided the required mechanism of reaction. 3. The opening session of the Congress was preceded by a meeting of the General Assembly to elect a new president. 4. It must be admitted that the problem of science classification can be approached from several viewpoints. 5. There are fields which cannot be dealt with on a national scale only, such as environmental protection, space exploration and so on. 6. The difficulties encountered by anyone who attempted to solve the problem are much greater than those faced in the endeavour to reach the summit of Mount Everest. 7. In most important applications cotton has been substituted for by synthetic fibres. 8. The rate of the reaction is affected by the change in such parameters as concentration, temperature and pressure. 9. Under these

circumstances one is faced with a magnified form of a danger common to all inventions: a tendency to use them whether or not the occasion demand. 10. In most cases the solution of such problems is called for by industrial needs, 11. It is often argued that in the 20th century we are left with no expansion of wisdom and with greater need for it. 12. When at last the patient is allowed to sleep he will probably wake up after some 10 – 12hours. 13. These ideas are hardly recognized as mathematics at all by the people trained in the classical branches of the subject. 14. Some aspects of the foregoing topics are dealt with in the next chapter, and a number of problems created by some of the new activities are mentioned but not discussed in detail. 15. Some diseases may show only when an organism containing mutant genes is influenced by certain factors of the environment. 16. No attempts have been made to list all the contributions in which different procedures have been developed and later used. 17. Recent discoveries in all sciences have been greatly assisted by the developments in contemporary research techniques dealt with in the last section of this book. 18. The congress attended by scientists from all the institutions concerned attracted much attention and was referred to as a most representative forum in this field. 19. An alternative to the models discussed above is the steady-state theory of continuous creation referred to earlier and depicted in Fig. 1.

B. Give English equivalents of the italicized part of the sentences, using passive structures and the verbs:

to affect, to allow, to attend, to develop, to deal with, to face, to follow, to make use of, to refer to.

1. *За доповідями пішла бурхлива дискусія.* 2. *На швидкість реакції впливає безліч інших факторів.* 3. *Це питання буде детально розглянуто* в главі III. 4. *На цій стадії ми зіткнулися з новими труднощами.* 5. *Йому не дали можливості закінчити цю роботу.* 6. *Останнім часом ця теорія часто згадується* в багатьох статтях. 7. *Семинар, на якому були присутні всього 5 осіб,* пройшов мляво і нецікаво. 8. *Для того щоб подолати ці недоліки, використовували нову методіку,* спеціально розроблену для даного експерименту.

C. Translate into English.

1. Проблема була вперше поставлена (усвідомлена) в XVIII столітті. 2. Передбачається, що отримані розрахункові дані були перевірені експериментально. 3. Теорія була прийнята більшістю вчених після того, як були отримані нові докази в її підтримку. 4. (У статті) представлені нові дані щодо механізму цього процесу. 5. Цю розбіжність можна пояснити різними методиками вимірювання. 6. (У роботі) використаний новий метод розрахунку цього параметра і запропонована нова модель процесу. 7. Особливу увагу приділено порівнянню експериментально отриманих результатів з

результатами, передбаченими теоретично. 8. У лабораторії встановлено нове обладнання.

3. VING FORMS: POSITION AND FUNCTION IN THE SENTENCE

a) UNAMBIGUOUS VING FORMS

Pattern Study (6, 7a)

Pattern 6:

...*Ving* (N₂)...*V_f*...

Recognizing a problem is the first step to its solution. Постановка проблеми означає перший крок на шляху до її вирішення.

Pattern 7a:

...*Ving* (N₂)...N₁...*V_f*...

Recognizing a problem the scientist makes the first step to its solution. Визнаючи проблему, вчений робить перший крок на шляху до її вирішення.

Pattern Practice (6, 7a)

Ex. 10. Identify the structures according to Patterns 6–7a and give Ukrainian equivalents of the relevant part of the sentence as shown in the following example.

Example: *Noticing relationships in his observations, the scientist attempts to classify and explain them.*

Noticing... the scientist attempts. Помітивши ... вчений намагається ...

Noticing relationship in his observations is very important for every scientist.

Noticing... is important. Помічати... важливо. ...

1. Establishing relationship between the phenomena of the Universe is a major task of theory. 2. Having reported of his discovery of rays of unknown nature Becquerel excited the curiosity of Marie Curie. 3. Realizing the necessity for a different approach the physicists reluctantly abandoned the project. 4. Confining his attention to one problem the scientist will surely achieve its solution much sooner. 5. Putting the discovery to use sometimes requires more effort than making it. 6. Pointing out their mistakes to some people is often quite difficult.

Pattern Study (7b, 8)

Pattern 7b:

...N₁...*V_f*...(N₂/Prep. phr.)...*Ving*...

1) *The scientist is often interested in a problem, disregarding possible consequences of its solution.* Вчений часто цікавиться проблемою, не звертаючи уваги на можливі наслідки її вирішення.

2) Normally *the atom has equal amounts of positive and negative charges, making it "neutral".* У звичайному стані атом має рівну кількість позитивного і негативного зарядів, що робить його «нейтральним».

3) The lighter, negatively charged *particles* in the atom *are electrons moving* in orbits around the nucleus. Більш легкі, негативно заряджені частинки в атомі – електрони, які обертаються по орбітах навколо ядра.

Pattern 8:

...V...Ving...

Nobody can *avoid making* occasional mistakes. Ніхто не може уникнути того, щоб іноді не робити помилок.

Pattern Vocabulary (8). list 5

Remember a few word groups followed by *Ving*.

it is no good, it is no use – марно, не має сенсу (робити); it is worth (while) – варто (робити), заслуговує (зусиль, дій і т.д.); one cannot help – неможливо ні (робити).

Pattern Practice (7b, 8)

Ex. 11. Identify the structures according to Patterns 7b, 8 and give Ukrainian equivalents of the relevant part of the sentence.

1. Every new idea is immediately taken up and developed further, forming the initial point of an avalanche-like process. 2. It has been shown that there is a distortion of the crystal lattice, accompanying the charge-ordered state. 3. What is worth doing is worth doing well. 4. At this stage innovation becomes a group and not an individual activity, involving both a sophisticated body of information and a sophisticated technology. 5. Soon Pierre Curie joined Marie Curie in her search for the “mysterious” substance, giving up his own research. 6. It is no good stressing a paradox if you wish to excite curiosity of the audience unprepared for the lecture. 7. In 1913 Bohr proposed the solar theory of the atom, giving rise to still greater activity in both theoretical and experimental nuclear physics. 8. Some people have been so scared reading about harmful effects of smoking that they gave up reading. 9. Now mention should be made of the fact that geochemistry applies the concepts of chemistry to terrestrial circumstances, studying the distribution of elements in the course of geologic evolution. 10. The editor could not help detecting many errors both of fact and of thinking. 11. Are these prognoses really worth making? 12. To find out more about the space scientists sent little moons, or satellites, circling in orbits above the Earth.

Pattern Study (9)

Pattern 9:

... Prep. ...Ving

The success of any research depends largely *on* precisely *defining* its objective. Успіх будь-якого дослідження в значній мірі залежить від чіткого визначення його мети.

Unfortunately the advantage *of joining* efforts for a complicated job is not always understood. На жаль, перевага об'єднання зусиль для виконання складної справи не завжди розуміється.

By realizing the threat to our environment we have made the first step to its preservation. Усвідомивши загрозу навколишньому середовищу, ми зробили перший крок на шляху до її охорони.

Pattern Practice (9)

Ex. 12. Substitute the proper English words from the list below for the Ukrainian words in brackets.

1. His research (призвело до встановлення) a new principle. 2. The success of the space research program (з'явився результатом з'єднання) the latest achievements in science and technology. 3. Using modern installations and techniques the scientists (вдалося вирішити) a complicated engineering problem. 4. Pure science (прагне осягнути) the laws of the material world. 5. Traditionally chemists (займалися вимірами) the properties of matter and (аналізом) the reactions by which some chemical substances are transformed into others. 6. A quantum chemist (цікавить побудова) adequate mathematical models of atomic and molecular structures. 7. Prof. E. was the first to see the advantages of the new approach and (наполягав на використанні) it to interpret the results. 8. Adequate theories often (позбавляли вчених від проведення) many useless experiments. 9. This group of engineers (відповідальна за модернізацію) the laboratory equipment. 10. The advent of electronic computers (сприяло звільненню) man's brain from the labour of measurement and computation.

to aid in freeing; to aim at understanding; to be concerned with measuring and analysing; to be interested in constructing; to be responsible for modernizing; to insist on making use of; to prevent scientists from making; to result from combining; to result in establishing; to succeed in working out.

Ex. 13. Read the first sentence and complete the second one using Pattern 9. Make use of the prepositions and the word groups given below.

To test the idea, the scientists have carried out the experiment. They did it

1. *without; in addition to; in spite of; instead of; in view of; by,*
2. *to install new equipment; to propose an explanation of their own; to collect more evidence for its support; to modify the model; to give up the idea; to establish the mechanism of the process; to join the efforts of two laboratories; to encounter difficulties with conventional equipment; to put to me a recent discovery; to make use of a new principle; to modify a conventional device.*

Ex. 14. Identify the structures according to Pattern 9 and give Ukrainian equivalents of the relevant part of the sentence.

1. If you never thought of asking a question you are not interested in having the answer. 2. If you want to succeed in interesting the audience you should not try surprising them with an isolated fact. 3. By having defined one's research objective one has already made the first, and the most important, step towards the final success. 4. Modern chemistry is primarily concerned with building structural bonds between the elements of matter. 5. Many useless experiments were prevented from being made by an adequate theory. 6. A true scientist is interested in being told about his mistakes. 7. Research is searching without knowing what you are going to find. 8. Any single card should contain notes from only one source. This will aid in arranging and organizing the materials for your research paper. 9. We do not know how to solve the problem of interesting schoolchildren in science. 10. His research resulted in establishing a new mechanism of the process. 11. Some people say that theory is a device for saving time.

Reading Practice (Patterns 6—9)

Text 4.

1) Read the text to yourself and be ready for a comprehension check-up.

PURE AND APPLIED SCIENCE

As students of science you are probably sometimes puzzled by the terms "pure" and "applied" science. Are these two totally different activities, having little or no interconnection? Let us begin by examining what is done by each.

Pure science is primarily concerned with the development of theories (or, as they are frequently called, models) establishing relationships between the phenomena of the universe. When they are sufficiently validated these theories (hypotheses, models) become the working laws or principles of science. In carrying out this work, the pure scientist usually disregards its application to practical affairs, confining his attention to explanations of how and why events occur.

2) Check up for comprehension.

1. Does the author give definition of both "pure" and "applied" science? 2. Find the word which is used as an equivalent of "sciences". 3. When does a hypothesis become a principle of science? 4. What questions is the pure scientist concerned with? 5. Find the words equivalent to "how and why events occur". 6. What is usually disregarded by the pure scientist?

Pattern Revision (6—9)

Ex. 15. A. Identify the structures according to the Patterns 6—9 and give Ukrainian equivalents of the relevant part of the sentence.

1. It is correct to say that basic research is directed toward understanding the foundations of nature without taking into account their practical applicability. 2.

Finding an adequate solution to this most urgent technological problem will surely require much time and still more effort. 3. Today we cannot help witnessing a tendency in science to direct the collective efforts of a research team at the achievement of a common goal. 4. Let's proceed by dividing research into three stages and examining each stage to find what functions of the research process may be automated without endangering creativity. 5. Such a configuration, in addition to being amenable to analytical treatment, has significant practical importance. 6. Being interested in the subject which you are studying is the best motivation for learning it. 7. Fundamental research is that which you undertake without caring whether the results will be of practical value or not. 8. The scientist and public must equally share the responsibility for finding a desirable solution to many modern technological and social problems. 9. In determining the mechanism of genetic information transmission biochemists have observed that "the language of life" is really a simple and elegant code. 10. Taking into account individual components resulted in a radical change of the entire system. 11. One of the ways to solve the problem of feeding the ever-growing world population is by turning fishing from a hunting to a farming operation. 12. Several review committees were formed, including a special environmental group. 13. Increasing the amount of available technical information scientists also contribute to transformation of some well-rooted beliefs.

B. Give English equivalents of the italicized parts of the sentences, using the verbs given below. Mind Pattern 9.

1. Керівник роботи завжди наполягав на перевірці отриманих результатів. 2. Така перевірка мала на меті виключити випадкові помилки і допомогла отримати надійні дані. 3. Присутність домішки в зразках завадило отримати відтворені результати. 4. Кожне нове відкриття приводить до виникнення нових областей досліджень. 5. Корінні зміни в такій традиційно експериментальній науці, як хімія, з'явилися результатом застосування в ній квантової теорії. 6. Через кілька років вченому вдалося отримати експериментальні результати, що підтвердили його теорію. 7. Вчені багатьох країн займаються вивченням цього явища і повинні в рівній мірі нести відповідальність за застосування його можливих результатів на практиці.

to aid in; to aim at; to be concerned with; to share the responsibility for, to insist on, to prevent from; to result from; to result in; to succeed in.

b) UNAMBIGUOUS COMBINATION OF VING AND N

Pattern Study (10)

Pattern 10:

...Pron. poss. / N's... Ving...

Immediate recognition of a discovery depends largely on *its being made* at a proper moment. —> Immediate recognition of a discovery depends largely on the fact that it

is made at a proper moment. Безпосереднє визнання відкриття багато в чому залежить від того, що воно зроблено в належний момент

The story of radioactivity begins *with Henry Bequerel's having reported* his discovery of rays of unknown nature. —> The story of radioactivity begins with the fact that Henry Bequerel reported his discovery of rays of unknown nature. Історія відкриття радіоактивності починається з того, що Анрі Бекерел повідомив про своє відкриття променів невідомої природи.

Pattern Practice (10)

Ex. 16. Identify the structures according to Pattern 10; transform them into clauses as shown above, and give Ukrainian equivalents of the relevant part of the sentence.

1. Mendeleev's having established a periodic law of nature has entered his name into the history book of the world science. 2. Success in science often results from the scientist's confining his attention to one problem for many a year. 3. The results of the experiment depended upon his having applied the proper technique. 4. The idea of scientists' being responsible for most ills of the present day situation is unfortunately quite popular. 5. A brain-storming session consists in everybody's proposing as many, and as wild, ideas as possible, without being concerned as to whether they are workable. 6. Science is sometimes humorously defined as a practice of the scientist's satisfying his curiosity at the expense of the Government.

c) AMBIGUOUS COMBINATION OF *VING* AND *N*

Pattern Study (11)

Pattern 11:

... *N...Ving...*

1) Some problems can be solved only by *the world scientists joining* their efforts. —> Some problems can be solved only if the world scientists join their efforts. Деякі проблеми можуть бути вирішені тільки об'єднанням зусиль вчених усього світу.
2) Such problems can be solved only *by a scientist fully realizing* the possible danger. —> Such problems can be solved only by a scientist who fully realizes the possible danger. Такі проблеми може вирішити тільки вчений, який повністю усвідомлює можливу небезпеку.

Pattern Practice (10-11)

Ex. 17. Identify the structures according to Pattern 11; transform them into clauses as shown above and give Ukrainian equivalents of the relevant part of the sentence.

1. The mid-20th century has witnessed the scientist becoming the most valued member of society. 2. The original idea of a discovery is often the product of one man working in a group environment. 3. There is more chance now of this suggestion being true. 4. A true scientist is prepared for his mistakes being pointed out to him. 5. The snobs at the institute could not tolerate electrical engineers walking around with their dirty hands and spoiling the purity of the scientific atmosphere. 6. It is believed that there is hardly any chance of there being a mistake in these calculations.

Pattern Study (12)

Pattern 12a:

... (with) N...*Ving* / *Ved*, N₁ ...V_f...

With research involving more and more people, the profession of a scientist has become one of the most popular nowadays. —> As research involves more and more people the profession of a scientist has become one of the most popular nowadays. У міру того як наукове дослідження вимагає участі все більшого числа людей, професія вченого стає однією з найпопулярніших в наші дні.

Pattern 12b:

... N₁ ...V_f (with) N...*Ving/Ved*...

Mathematization of science is witnessed in almost all its branches, with specialists in humanities hurriedly joining the process. —> Mathematization of science is witnessed in almost all its branches, and specialists in the humanities hurriedly join the process. Математизація науки спостерігається у всіх її областях, і фахівці в галузі гуманітарних наук поспішно приєднуються до цього процесу.

Pattern Practice (12)

Ex.18. Identify the structures according to Pattern 12 and give Ukrainian equivalents of the relevant part of the sentence.

1. Some scientists do not distinguish between pure and applied mathematics, the distinction being, in fact, of recent origin. 2. At one time a giant lake extended from Vienna to the Aral Sea, its last descendants being the Caspian Sea and the Black Sea of today. 3. They took all the measurements during the actual operation of the machine, this being the usual practice in those days. 4. With everyone being a layman in most fields but his own, it is very important to exchange information on major developments. 5. The universe is now essentially composed of about 90 percent hydrogen and 9 percent helium, with the remaining 1 percent accounting for the more complex atoms. 6. The project abandoned, the leadership in this field passed to another institute. 7. Originally a mathematician, he became engaged first in theoretical physics and then in ace research, all these fields being closely interconnected.

Reading Practice (Patterns 1–12)

Text 5.

1) Read the text to yourself and be ready for a comprehension check-up.

MATHEMATIZATION OF NATURAL SCIENCES

Exact science in its generally accepted sense can be referred to as a family of specialized natural sciences, each of them providing evidence and information about the different aspects of nature by somewhat different working methods. It follows that mathematics in its pure sense does not enter into this frame, its object of study, being not nature itself. Being independent of all observations of the outside world, it attempts to build logical systems based on axioms. In other words, it concentrates on formulating the language of mathematical symbols and equations which may be applied to the functional relations found in nature.

This “mathematization”, in the opinion of most specialists, is witnessed first in physics which deals with general laws of matter and energy on subatomic, atomic and molecular levels. Further application of these mathematical laws and studies is made by chemistry and results in structural bonds between the elements of matter being established.

2) Check up for comprehension.

1. What is generally understood by exact science? 2. How does the author describe “specialized” natural sciences? 3. Why does mathematics not belong to this family? 4. What is the objective of mathematics? 5. Is there only one definition of the objective? 6. What does the application of mathematical laws in chemistry result in?

Pattern Revision (10—12)

Ex. 19.

A. Identify the structures according to Patterns 19— 12 and give Ukrainian equivalents of the relevant part of file sentence.

1. The possibility of there being life on Mars is very doubtful. 2. The most interesting of these phenomena is the reduction of carbon, nitrogen and sulfur, each concentrated at a different interface, two being out of immediate contact with air. 3. This is the principle of inertia – if something is moving, with nothing touching it and completely undisturbed, it will go on forever at a uniform speed in a straight line. 4. An understanding of these particles, in spite of their being connected with the basic forces of the universe, presents a tremendous challenge to the human intellect. 5. The test consists of repeated measurements of intensity with various sizes of apertures being used. 6. The difference between the two values probably accounts for the measured sensitivity being higher than that predicted by theory. 7. One of the objectives of carrying on research at the university is to provide intellectual exercise for the lecturer. This is achieved by the lecturer doing research between lectures and other duties. This presupposes the necessary equipment being available at the university. 8. Man’s principal function in space being maintenance and repair work is beyond any doubt. 9. The 35-year gap in the appreciation of Mendel’s discovery is often attributed to Mendel’s having been a modest monk living in an out-of-the-way Moravian monastery. 10. A few more functional elements, germanium perhaps being a good candidate, may be discovered in the future.

B. Give English equivalents of the italicized part of the sentences.

1. Думка про те, що і вчені і громадськість несуть відповідальність за вирішення цієї проблеми, здається цілком логічною в даний час. 2. Історія вивчення пульсарів почалася в 1968 році з того, що радіоастрономи оголосили про відкриття незвичайного класу об’єктів. 3. Ці об’єкти отримали жартівливу назву «пульсари», причому ця назва швидко стало стандартним терміном. 4. Вважають, що кожне дослідження починається з постановки вченим проблеми. 5. Учений отримав нові докази того, що його гіпотеза вірна. 6. Оскільки більшість субатомних частинок має дуже короткий період життя, електрон, протон і нейтрон залишаються основними об’єктами вивчення в електроніці.

General Revision (1—12)

Ex. 20. Identify the structures according to Patterns 1— 12 and give their Ukrainian equivalents.

1. It is not claimed that the research is aimed at deriving an entirely different set of axioms. 2. A bit of work was needed to establish this but once the result was accepted, it was the best instrument for exploring the atom. 3. In the early days of World War II many engineers were faced with the task of mastering the techniques of using radar. 4. Methods employed in solving a problem are strongly influenced by the re search objective. 5. The inquiry could be greatly helped by distinguishing two different classes of research techniques. 6. In one's search to under stand what happens in this particular case, one cannot help being influenced by the history of quite another problem. 7. The question of collective scientific discoveries has already been raised, it having been suggested that a solution of some urgent problems can be best achieved that way. 8. During such experiments interfering influences must be excluded and an artificial environment created in which the contribution of the individual components can be taken account of and possibly even measured. 9. If the scientist succeeds in confirming his repeated observations it may be stated that an empirical law or rule of nature has been discovered. 10. Let us examine various types of such mispronunciations, remembering, of course, that they are mispronunciations only in the sense of being looked upon unfavourably by cultured speakers. 11. Social scientists and physical scientists, each group representing a diversity of specialized disciplines, were brought together to review some implications of the interaction between science and society. 12. The oceans and the atmosphere are strongly coupled systems and cannot very well be treated separately. The final circulation pattern is determined by the interaction of the two systems, each system influencing the other in a complicated cycle of events. 13. The meteorological working group concluded that meteorological research can be furthered by a trained meteorologist making observations from an orbiting station. 14. It is generally accepted that experiments in geology are far more difficult than in physics and chemistry because of the greater size of the objects and because of the geologic time scale exceeding the human time scale by a million and more times. 15. General scientific methods can be approached from a historical point of view by giving a brief account of the development of scientific concepts and theories. 16. Two types of scientific investigators may be distinguished: classicists and romanticists, the former being inclined to design schemes and to use the deductions from working hypotheses, the latter more fit for intuitive discoveries of functional relations between phenomena and, therefore, more able to open up new fields of study. 17. With extended operation in space being a design goal, special attention was given to reliability problems. 18. The lack of interest of neurophysiologists in the macromolecular theory of memory can be accounted for by recognizing that the theory, whether true or false, is clearly premature.

Unit 2

WORD STUDY

1. LEARN TO RECOGNIZE INTERNATIONAL WORDS

Ex. 21. A. Give two Ukrainian equivalents of different origin.

Example: deduction — деду́кція, висно́вок.

Defect, to ignore, substance, to surprise, to transform, variation.

B. Make up English-Ukrainian pairs of the words equivalent in meaning.

1. Decay; 2. derive; 3. determine; 4. essence; 5. goal; 6. prevent; 7. quality; 8. quantity; 9. ultimate; 10. valid.

1. Виводити (дериват, похідний); 2. придатний, дійсний (інвалід, негідний); 3. якість (кваліфікація); 4. кількість (квант, порція); 5. остаточний (ультиматум, остання умова); 6. визначати (детермінізм, детермінанта); 7. запобігати (превентивний); 8. розпад (декаданс, занепад); 9. суть (есенція, квінтесенція); 10. мета.

C. Give Ukrainian equivalents of the following:

to focus attention on smth.; functional relations; general laws of matter; individual components; intimate knowledge.

2. LEARN TO RECOGNIZE THE STRUCTURE OF ENGLISH WORDS

Ex. 22. Recognize the words formed according to the following patterns and give their Ukrainian equivalents.

Pattern 1: **V+er /-or** → **N**

Example: to work — працювати, worker — працівник; to transform — перетворювати, transformer — перетворювач.

1. Theory is an intellectual instrument granting a deep contentment to its designer and to its users. 2. The founders of the Royal Society were typical natural philosophers. 3. The isolated inventor is still the usual source of innovation. 4. Some experimenters were prevented from doing experiments by their faith in a fallacious theory. 5. The lecturer should not try surprising his listeners.

Pattern 2: **V+-ment** → **N**

Example: to develop — розвивати, development — розвиток (процес), подія, явище (результат).

The announcement of discovery; the development of the national economy; recent developments in nuclear physics; the achievement of a solution; the achievements of the USA in space research; the establishment of the Academy of Sciences; the establishment of a new principle; educational establishments of the country; a clear statement of the hypothesis.

Pattern 3: **V+-tion / -ion / -ition** → **N**

Example: *To predict- передбачати, prediction - передбачення (процес), прогноз (результат)*

1. He announced his discovery in a special communication to the French Academy of Sciences, 2. His motivation in carrying on this investigation was not properly understood at first. 3. Definition of most fundamental concepts is always difficult. 4. Pure science is concerned with the establishment of fundamental relations among the phenomena of the universe. 5. Finding a satisfactory explanation for this sort of interaction is not so easy.

Pattern 4: **N+-(u)al** → **Adj.**

Example: *condition – умова, conditional – умовний.*

National economy; such conceptual subjects as mathematics; theory is an intellectual instrument; natural resources; individual components.

Pattern 5: **Adj. +-ent / -ant** → **N+-ence / -ance**

Example: *different – різний, відмінний, difference – різниця, відмінність.*

A competent scientist – the competence of a scientist; a significant statement – the significance of a statement an ignorant audience – the ignorance of an audience; relevant information – the relevance of information.

Pattern 6: **N <=> V**

Example: *influence – вплив, to influence – впливати; a question – питання, to question – ставити під сумнів, сумніватися*

1. Problems of this kind usually interest pure scientists. 2. Information theory aroused considerable interest among intellectuals. 3. This fact limits the scope of investigation. 4. In the same way the necessary limits can be found for these coefficients. 5. We note that these figures are much more reliable than the previous ones. 6. The text is difficult to read, there being too many reference notes in it. 7. This argument will convince anyone who doubts this point. 8. There can be no doubt about it.

Ex. 23. Make up singular-plural pairs.

Foci, quanta, maximum, analyses, vacua, axis, maxima, radius, genii, radii, locus, nuclei, analysis, focus, hypothesis, criteria, nucleus, quantum, crisis, theses, crises, momenta, axes, synthesis, criterion, phenomena, genius, species, loci, hypotheses, thesis, momentum, syntheses, phenomenon, vacuum, species.

Ex. 24. Practise orally in using the names of specialities and sciences.

Example: *I am a mathematician but I am concerned with problems of economy.*

Biologist, physicist, sociologist, theoretician, biochemist, historian, psychologist, geologist, experimenter, economist.

3. LEARN TO DEDUCE THE MEANING OF ENGLISH WORDS

Ex. 25. A. Give adequate Ukrainian equivalents of the italicized words:

Background – загальний елемент сенсу: передування в просторі або в часі. Частотні українські еквіваленти: фон, задній план; освіта, кваліфікація, біографічні дані і т.д.

1. This vacancy can be filled only by a scientist with outstanding record and background. 2. This text deals with the methods of geological science, their historical background and development. 3. People of all backgrounds and all ages all over the world need peace. 4. What is the background of the problem? 5. Much depends on the personal interest of the student, and on his linguistic and cultural background.

Case – загальний елемент сенсу: сукупність конкретних умов або обставин, що характеризують ситуацію. Частотні українські еквіваленти: випадок, стан справ; доводи, докази, аргументи і т.д.

1. In any case the results of the experiment will be of great value. 2. If this is really the case, a true scientific breakthrough of major importance must be anticipated in the next decade. 3. He presented a strong case against a proposed solution. 4. Research workers in need of funds could apply for grants if they could make out a convincing case. 5. He stated his case so well that the committee supported the project. 6. I believe a case exists for revision of the hypothesis.

Develop, development(s) – загальний елемент сенсу: розвиток у часі, розвиток як зміна, зародження і розвиток. Частотні українські еквіваленти: to develop – розвиватися), розробляти, викладати, розкривати, виявляти (ся) і т.д. ; development – розвиток, розробка, виклад, результат розвитку і т.д.

1. Plants develop from seeds. 2. The hypothesis gradually developed in the scientist's mind. 3. No positive evidence has been developed to support the theory. 4.

The solution of the energy problem depends on developing alternative sources of energy.5. Independent study is one of the best habits that a scientist can develop.6. Since World War II much has been done to develop national economies of some developing countries of Asia and Africa. 7. The plasma is forced to behave as a continuum, no instabilities developing. 8. Suddenly a development occurred which prevented research in this area for some time. 9. This paper deals with recent developments in theoretical physics.10. The development of photographic films requires a dark room.

Facilitate, facility (usually plural) – загальний елемент сенсу: найкращі умови, можливості для здійснення чого – небудь. Частотні українські еквіваленти: to facilitate – полегшувати, сприяти і т.д. ; facilities – можливості, зручності, кошти, обладнання, пристрої тощо.

1. The new equipment will facilitate the experiment. 2. After the student acquires considerable facility in understanding and speaking, he learns to read and write. 3. Novosibirsk is an industrial centre offering its inhabitants many urban advantages, educational facilities and cultural opportunities. 4. We are planning the directions and the scope of research and the provision of experimental facilities.5. To carry out this task we need large engineering facilities .6. To complete the project we need adequate facilities for research.

Imply, implication(s), implicit – загальний елемент сенсу: невисловлене словами, але логічно впливає з чогось. Частотні українські еквіваленти: to imply – мати на увазі, означатиме; implication – прихований сенс, значення; щось впливає з чогось і т. д. ; implicit – мається на увазі, що не виражений прямо і т. д.

1. The book does not claim to give more than the name implies. 2. People are always talking about fundamental research, implying the existence of a nameless opposite. 3. Recent observations of various astronomical objects together with their theoretical implications were discussed at the conference. 4. The cutting of sentences into the subject and predicate groups was implicit in traditional grammar analysis. 5. Dirac's theory implied that there should be the same number of anti-particles as particles in the universe. 6. The speaker implies (sends out information) and the listener infers (receives information from the implication). 7. What are the implications of this statement?

Involve – загальний елемент сенсу: включення в діяльність, рух чи обсяг. Частотні українські еквіваленти: to involve – включати в себе; тягти за собою, викликати; залучати; заплутувати, ускладнювати і т. д. ; to be involved – бути включеним, залученим, які беруть участь, складним і т. д.

1. *The first industrial revolution involved the replacement of human and animal muscle power by the power of machines.* 2. *A technical project often starts as a simple practical activity involving only a few scientists or engineers.* 3. *This institute is involved in a research project on laser techniques.* 4. *The activities involved in various space programs have created a revolution in scientific research.* 6. *The solution of the equations involved is reduced to a sequence of basic arithmetical operations.*

Matter –загальний елемент сенсу: щось матеріальне, відчутне, істотне; то, що має значення. Частотні українські еквіваленти: matter – матерія, речовина; матеріал (статті, книги тощо), сутність, предмет; справа, питання і т. д.; to matter – мати значення.

1. Chemistry deals with changes in *the composition of matter*, physics is concerned with changes in *the location or size of matter*. 2. Animal and human organisms fight off infections and other *invasions by foreign matter*. 3. *The subject matter of the lecture* was the influence of the climate on the development of a nation. 4. This collection of stories provides *an interesting reading matter*. 5. *It is no easy matter* to describe this phenomenon in detail. 6. His taking part in the discussion *made the matters worse*. 7. *The answer* to this question, however, *will hardly matter* under present conditions.

B. Make up English–Ukrainian pairs of the word groups equivalent in meaning.

As a matter of fact; in a matter of seconds; it does not matter; it is a matter of common experience; it is a matter of common knowledge.

За лічені секунди; кожен знає з досвіду; не має значення (не важливо); загальновідомо; фактично.

4. LEARN TO DEDUCE THE MEANING OF WORD COMBINATIONS

Ex. 26. Give Ukrainian equivalents of the N'...N"...Nⁿ groups and the hyphenated word groups.

1. A group of people working together to make an invention can be called a group inventor. 2. A research group produces a group environment for its individual members. 3. Science is a Janus-headed figure. 4. Scientific development is an avalanche-like process. 5. The lecturer tries to bring the audience up-to-date by giving them the latest information.

Ex. 27. Give Ukrainian equivalents of the following word combinations:

1. to bear in mind (this should always be borne in mind); 2. to design the experiment (the experiment was not designed to measure this quantity); 3. to hold possibilities for (the problems hold possibilities for practical application); 4. to make strides (science is making greater strides every year); 5. to meet needs (to

manufacture commodities to meet human needs); 6. to open the way to (one daring theory opens the way to the next); 7. to put to the fore (they say that nowadays the group inventor has been put to the fore and replaced the isolated scientist); 8. to take pictures (the black and white pictures of the process are taken regularly throughout the experiment); 9. to take time (it takes more than 10 years to do this).

Ex. 28. Give Ukrainian equivalents of the V-Adv. groups.

1. All mistakes in your calculations will be immediately pointed out. 2. Every new idea is taken up and developed further. 3. It is not clear now how a solution to the problem can be worked out. 4. It is no easy matter to trace back the origin of this conception. 5. Not all measurements and readings push science forward. 6. The idea was put forward a few years ago.

Ex. 29. Make up English-Ukrainian pairs of the word groups equivalent in meaning.

1. At any rate; 2. at great expense; 3. at least; 4. at once; 5. as soon as; 6. at the edge of; 7. by no means; 8. from now; 9. in full; 10. in general; 11. in the long run; 12. let alone; 13. not (no). . . at all; 14. of necessity; 15. of one's own; 16. on the one hand . . . on the other hand; 17. some day; 18. that long.

1. У всякому разі; 2. принаймні; 3. за великі витрати; 4. ні (ні)... зовсім; 5. як тільки; 6. на краю; 7. ні в якому разі; 8. відтепер; 9. в повному обсязі; 10. взагалі; 11. що довго; 12. не кажучи вже про; 13. відразу; 14. за необхідністю; 15. одного дня; 16. з одного боку ... з іншого боку; 17. про власних; 18. в довгостроковій перспективі.

Ex. 30. Identify the word groups formed according to the following patterns and give their Ukrainian equivalents:

Pattern A: N'... Prep. ...N''

Note: N'' belongs to a group of abstract nouns of the type:

Under: discussion, consideration, examination, study, review, way, etc.

In: use, progress, question, motion, demand, etc.

Out of: date, reach, fashion, phase, etc.

Of: interest, value, importance, concern, use, etc.

At: rest, issue, stake, etc.

Example: *The work in progress will hardly produce immediate practical results. "The work in progress" ...Робота, що проводиться (ведеться)...*

1. The text includes fragments of the opinions concerning the subject under discussion. 2. Results of great significance are very rare. 3. The problem at issue – man and his environment – concerns everybody. 4. It is rather difficult to point out all the defects of the system under investigation. 5. The book in question was published

in 1967. 6. The portion of the particles at rest is insignificant. 7. The discussion concerns problems of common interest; for most scientists.

Pattern B: N '...be_г...Prep. ...N"

Example: *Similar work is in progress in many other laboratories. "Work is in progress". . . Работа проводится ...*

1. At present a new system is under investigation. 2. It is not clear at this point if the measurements are of any practical value. 3. The concept was in use in the 19th century. 4. By that time the prediction will be of no interest to anybody. 5. These ideas are absolutely out of date. 6. Every one knows that mathematicians are in great demand currently.

5. REVISE IF YOU FORGET

(to be done at home in written form)

Ex. 31. Read the text, concentrating on the "quantity" words. Pay attention to the difference in meaning due to the article used. Give Russian equivalents of the italicized words.

TO SMOKE OR NOT TO SMOKE?

The problem of smoking *is much under discussion*. *Some people smoke, some don't*. At present *little is known* for certain about the tobacco effect on the human organism. *The amount of nicotine* absorbed by a heavy smoker per day is capable of killing a horse. Yet *it does no visible harm* to the smoker. At least *no immediate harm*. As to long-range effects *much of what is attributed* to tobacco can be caused by different factors. *Quite a number of* studies are carried on in order to establish cause effect relationship between smoking and *some dangerous diseases*. *The number of theories* advanced is increasing, but *the many papers* dealing with the problem have to admit that *most evidence* is ambiguous and that there is *a little confusion* and *a lot of controversy* concerning the results obtained. However, *the little evidence* that is conclusive makes *all doctors* say that the practice is harmful.

Most of those smoking wish to give it up, and it is a matter of record that *a great many heavy smokers* often make *several attempts* before they give up ... either smoking or the attempts. It requires *not a little will power* and *a great deal of determination*. *So only few* succeed. And *those few* say that they have felt so *much* better ever since.

Ex. 32. A. Fill in the blanks with *it* or *its*, *they* or *their*.

1. ... follows that mathematics in ... pure sense will not enter into this frame, ... object of study being not nature itself. 2. We see that astronomy is still at the very opening of... existence. 3. Many seek after knowledge for ... own sake. 4. The number of elements which make up organic compounds is quite restricted, although the number of combinations into which ... can enter is great indeed. 5. In ...

deductions the authors assumed that the third-order elastic constants varied linearly with temperature.

B. Give Ukrainian equivalents of the italicized words.

1. When *it is said* that a man weighs 160 lbs *it means* that he is exerting a force of 160 lbs on the floor. 2. *It is likely that* the reserves of oil and coal will be exhausted in less than a century, 3. Lack of figures *may make it difficult to produce* accurate statistics. 4. In any case *it is not difficult to devise* a suitable computational scheme. 5. *We found it more convenient to describe* the structure in terms of bond angles and bond distances.

Ex. 33. Identify the function of *one* and give Ukrainian equivalents of the italicized words.

1. Reading books-enlarges *one's horizons*. 2. *It takes one* much time and effort to carry out calculation of this kind. 3. Your definition is somewhat different from *the one mentioned above*. 4. The choice of the critical concentration is *an arbitrary one*. 5. *One accepts standards which* are specifically biological. 6. The technique *does not allow one to isolate* each individual component. 7. *One cannot be surprised if one is not accustomed* to the situation which is nullified by the surprise.

Ex. 34. Identify the function of *this (these)* and give Ukrainian equivalents of the italicized words.

1. *These outstanding discoveries* were made by Ukrainian scientists at the beginning of *this century*. 2. Usually a second alloy-layer appears between the outer coating and the base metal, and it is probable that *this consists* of different compounds. 3. Two basic schemes of replica are possible, *these are illustrated* in Fig. 1. 4. The definition does not make any mention of the rates of adsorption. *These may be quite different* for different materials. 5. I do not remember who was the first *at this laboratory* to use this term.

Ex. 35. Identify the function of *that (those)* and give Ukrainian equivalents of the italicized words.

1. It will be better to say that fundamental research is *that which* may have no immediate practical value. 2. The task of theory is to enable one to calculate the result of an experiment in a shorter time than *that required* to perform the experiment. 4. *Those interested* in the problem are referred to a more recent and complete work by Dr. N. 5. The experimental results indicated the presence of some foreign species and *that confirmed* an earlier idea concerning the reaction mechanism.

Ex. 36. Substitute the proper nouns for the italicized pronouns.

1. Physicists may also be mentioned in this connection but without distinguishing between the practical and theoretical *ones*. 2. A great deal of attention has been devoted to problems generated by the “information explosion” as it has been popularly termed. 3. One famous question was already raised: *that of* the “mathematical dream”. 4. The telescope admitted a hundred times as much light as the unaided human eye, and according to Galileo, *it* showed an object at fifty miles as clearly as if *it* was only five miles away. 5. The most wonderful instincts, *those of* the hive-bee and of the ant, cannot be explained in this way. 6. There are men to whom nothing seems great but reason. For men of this class *it is* a cosmos so admirable that to penetrate to *its* ways seems to them the only thing that makes life worth living. 7. Electrolysis of sulphate and chloride solution gave about the same type of deposit. *This* was composed of both the amorphous and compact metal.

Unit 3

TEXT STUDY

I. Read the introduction to yourself and state its topic (follow the guide words to the author's thought equivalent to *однак, скоріше, тому*). Answer the questions: *What is the main characteristic of the problems discussed in the four units of this hook? Are the problems discussed in detail and covered in full?*

INTRODUCTION

In the four units, forming this book an attempt is made to keep the discussion within the range of problems of common interest for most scientists whatever their particular fields. However, it is by no means claimed that the items grouped under the same topic deal with the problem discussed in sufficient detail, let alone cover it in full. Rather, it should be emphasized that the items include but fragments of opinions concerning the subject under discussion expressed by outstanding scientists on different occasions. Therefore, what is presented here is, of necessity, only part of what was said elsewhere.

The first discussion is focused on the relations between pure and applied research, theory and experiment, science and technology, scientist and layman. The discussion is opened by the Soviet physicist academician Lev Artsimovitch and concluded by the American physicist prof. K. K. Darrow. It covers the following items: A. Science and Technology. B. What Science Is. C. Research: Fundamental and Applied, and the Public. D. Scientific Innovation: Its Impact on Technology.

II. *Give Ukrainian equivalents of: an attempt is made, what is presented here is . . . only part of what was said elsewhere.*

Text A. Science and Technology

I. Look through the text concentrating on the beginning of each paragraph and, write down a plan, either in English or in Ukrainian (time limit – 10 min.).

1. Science problems can be roughly classified as analytic and synthetic. In analytic problems we seek the principles of the most profound natural processes, the scientist working always at the edge of the unknown. This is the situation today, for instance, within the two extremes of research in physics – elementary particle physics and astrophysics – both concerned with the properties of matter, one on the smallest, the other on the grandest scale. Research objectives in these fields are determined by the internal logic of the development of the field itself. Revolutionary shocks to the foundations of scientific ideas can be anticipated from these very areas.

2. As to synthetic problems, they are more often studied because of the possibilities which they hold for practical applications, immediate and distant, than because their solution is called for by the logic of science. This kind of motivation strongly influences the nature of scientific thinking and the methods employed in

solving problems. Instead of the traditional scientific question: “How is this to be explained?” the question behind the research becomes “How is this to be done?”, The doing involves the production of a new substance or a new process with certain predetermined characteristics. In many areas of science, the division between science and technology is being erased and the chain of research gradually becomes the sequence of technological and engineering stages involved in working out a problem.

3. In this sense, science is a Janus-headed figure. On the one hand, it is pure science, striving to teach the essence of the law of the material world. On the other hand, it is the basis of a new technology, the workshop of bold technical ideas, and the driving force behind continuous technical progress.

4. In popular books and journals we often read that science is making greater strides every year, that in various fields of science discovery is followed by discovery in at steady stream of increasing significance and that one daring theory opens the way to the next. Such may be the impression with research becoming a collective doing and scientific data exchange a much faster process. Every new idea should immediately be taken up and developed further, forming the initial point of an avalanche-like process.

5. Things are, in fact, much more complex than that. Every year scientists are faced with the problems of working through thicker and tougher material, phenomena at or near the surface having long been explored, researched, and understood. The new relations that we study, say, in the world of elementary particles at dimensions of the order of 10^{-13} cm or in the world of superstellar objects at distances of billions of light years from us, demand extremely intense efforts on the part of physicists and astrophysicists, the continuous modernization of laboratories with experimental facilities becoming more and more grandiose and costing enormous sums. Moreover, it should be stressed that scientific equipment rapidly becomes obsolete. Consequently, the pace of scientific development in the areas of greatest theoretical significance is drastically limited by the rate of building new research facilities, the latter depending on a number of economic and technological factors not directly linked to the aims of the research. It may take, for example, more than 10 years from the initial decision to build a 100 – 200 billion electron volt accelerator to its completion.

It should be borne in mind, too, that few measurements and readings given by these great facilities push science forward, results of any great significance being very rare. For instance, tens of thousands of pictures taken during the operation of an accelerator will have to be scrutinized in the hope of finding, among typically trite processes, signs of a new interaction or of a new event whose presence or absence may confirm a theoretical idea.

II. Paragraph Study.

Read paragraph 1

1. Identify the topic sentence and the illustrating sentences. Find the sentence containing the author’s prognosis and the word indicating that it is a prognosis.
2. What is meant by *the situation* and *these very areas*?

Read paragraph 2.

1. Identify the topic, sentence. Answer the questions: What are the two motive forces behind synthetic and analytic research? What are the consequences arising from the change in motivation for research? What is the present-day relation between science and technology? What is meant by *the doing*? 2. Identify two sentences similar in meaning in paragraphs 1 and 2. 3. Identify the words which reveal a comparison in the first sentence of paragraph 2. 4. Translate the last sentence of the paragraph into Ukrainian.

Read paragraph 3.

1. Identify the topic-sentence and the sentences developing its idea.
2. Give Ukrainian equivalents of *striving to reach the essence ...* and *the workshop of bold technical ideas*.

III. Look through the paragraphs again and indicate the words and word groups used to connect the paragraphs and the sentences within them.

(to be continued at home in written form)

I.1. Read the text again without consulting the dictionary. Identify 7 structures according to pattern 12 and give Ukrainian equivalents of the relevant part of the sentence, paying special attention to the choice of Ukrainian conjunctions.

II. Paragraph Study (consult the dictionary if necessary).

Read paragraph 4.

I. Follow the word *science* through the paragraph and copy out the words related to it in meaning. State the main idea of the paragraph (in English or in Russian). 2. Copy out the sentence summed up by the word *impression*. 3. Copy out the words equivalent to: *безперервний потік, зухвала теорія, лавиноподібний*

Read paragraph 5.

1. Divide the paragraph into three parts with the following titles: Subject of Research, Tools of Research and Results of Research. Indicate the beginning of each part. 2. Read the first sentence again and copy out the words indicating that the popular view on science is not adequate.

III. Translate paragraph 5 into Ukrainian.

Text B. What Science Is

I. See if you remember: *to meet human needs, to refer to, to distinguish, to encounter difficulties, to emerge, at great expense, search for truth, to point out*.

II. Look through the text concentrating on the beginning and the end of each paragraph, and write an outline, either in Ukrainian or in English (time limit – 10 min.).

1. It can be said that science is a cumulative body of knowledge about the natural world, obtained by the application of a peculiar method practised by the scientist. It is known that the word science itself is derived from the Latin “scire”, to

know, to have knowledge of, to experience. Fundamental and applied sciences are commonly distinguished, the former being concerned with fundamental laws of nature, the latter engaged in application of the knowledge obtained. Technology is the fruit of applied science, being the concrete practical expression of research done in the laboratory and applied to manufacturing commodities to meet human needs.

2. The word “scientist” was introduced only in 1840 by a Cambridge professor of philosophy who wrote: “We need a name for describing a cultivator of science in general. I should be inclined to call him a scientist”. “The cultivators of science” before that time were known as “natural philosophers”. They were curious, often eccentric, persons who poked inquiring fingers at nature. In the process of doing so they started a technique of inquiry which is now referred to as the “scientific method”.

3. Briefly, the following steps can be distinguished in this method. First comes the thought that initiates the inquiry. It is known, for example, that in 1896 the physicist Henri Becquerel, in his communication to the French Academy of Sciences, reported that he had discovered rays of an unknown nature emitted spontaneously by uranium salts. His discovery excited Marie Curie, and together with her husband Pierre Curie she tried to obtain more knowledge about the radiation. What was it exactly? Where did it come from?

4. Second comes the collecting of facts: the techniques of doing this will differ according to the problem which is to be solved. But it is based on the experiment in which anything may be used to gather the essential data — from a test-tube to an earth-satellite. It is known that the Curies encountered great difficulties in gathering their facts, as they investigated the mysterious uranium rays.

5. This leads to step three: organizing the facts and studying the relationships that emerge. It was already noted that the above rays were different from anything known. How to explain this? Did this radiation come from the atom itself? It might be expected that other materials also have the property of emitting radiation. Some investigations made by Mme Curie proved that this was so. The discovery was followed by further experiments with “active” radio elements only.

6. Step four consists in stating a hypothesis or theory: that is, framing a general truth that has emerged, and that may be modified as new facts emerge. In July 1898, the Curies announced the probable presence in pitchblende ores of a new element possessing powerful radioactivity. This was the beginning of the discovery of radium.

7. Then follows the clearer statement of the theory. In December 1898, the Curies reported to the Academy of Sciences: “The various reasons enumerated lead us to believe that the new radioactive substance contains a new element to which we propose to give the name of Radium. The new radioactive substance certainly contains a great amount of barium, and still its radioactivity is considerable. It can be suggested therefore that the radioactivity of radium must be enormous”.

8. And the final step is rite practical test of the theory, i. e. the prediction of new facts. This is essential, because fern this flows the possibility of control by man of the forces of nature that are newly revealed

9. Note should be taken of how Marie Curie used deductive reasoning in order to proceed with her research, this kind of “detective work” being basic to the methodology of science. It should be stressed further that she dealt with probability — and not with certainty — in her investigation. Also, although the Curies were doing the basic research work at great expense to themselves in hard physical toil, they knew that they were part of an international group of people all concerned with their search for truth. Their reports were published and immediately examined by scientists all over the world. Any defects in their arguments would be pointed out to them immediately.

III. Paragraph Study.

Read paragraph 1.

1. Follow the dominant noun and the words related to it in meaning through the paragraph and state the main idea. 2. Give Ukrainian equivalents of: *a cumulative body of knowledge, a peculiar method practised by the scientist, manufacturing commodities to meet human needs.*

Read paragraph 2.

1. Follow the dominant noun and its equivalents through the paragraph. Identify the sentence which repeats the idea expressed in the first sentence of the text. 2. Identify the words used by the author as equivalent to: *направляли свій допитливий розум на ...* 3. Identify the words used by the author as equivalent to *doing so, a technique of inquiry.*

Read paragraph 3.

1. Identify the topic sentence and the illustrating sentences. Among the latter identify the dominant noun and follow it through its transformations into its equivalents and pronouns. 2. Give a Ukrainian equivalent of *initiates.*

Read paragraph 4.

1. Identify the topic sentence. Follow the words *the collecting of facts* through their transformations into their equivalents and pronouns. 2. Identify the words equivalent to: *зіткнутися з труднощами, пробірка, в залежності від проблеми.*

Read paragraph 5.

1. Identify the topic sentence and the illustrating sentences. Find the sentence describing the first step on the way to a hypothesis (What modal verb is used to show that it is only the first step?). 2. Identify the words used by the author as equivalent to *this was so.* 3. Give a Ukrainian equivalent of *emerge.* Translate the last sentence of the paragraph into Ukrainian.

Read paragraph 6.

1. Identify the topic sentence and the illustrating sentences. Find the sentence describing the next step in the development of the hypothesis (What word shows that

it is a hypothesis?). State the function of *that is* and give its Ukrainian equivalent. 2. Translate the first sentence into Ukrainian.

Read paragraphs 7 and 8.

1. Identify the topic sentence and the illustrating sentences. Find the sentence describing the final step in the development of the hypothesis. 2. Find the guide words to the author's thought equivalent to: *безсумнівно, не дивлячись на це, на цій підставі*. 3. Try to explain the author's choice of the modal verbs. 4. Find the English equivalent of *i.e.* in paragraph 6.

Read paragraph 9.

1. State the role of deductive reasoning in science. Indicate the words characterizing the conditions under which the Curies worked. 2. Translate paragraph 9 into Ukrainian.

IV. Read the whole text again and see if any corrections should be made in your original outline. Write an abstract of the text in three sentences.

Text C. Research: Fundamental and Applied, and the Public

I. 1. Read the text without consulting the dictionary, pencil-mark the words that you do not understand. Divide the text into three parts, copy out the dominant noun in each part and suggest a title for each part. 2. Identify 19 structures according to Pattern 9 and give their Ukrainian equivalents.

1. People are always talking about fundamental research, implying thereby the existence of a nameless opposite. A good definition of fundamental research will certainly be welcomed: let us see whether we can invent one. We have to begin, of course, by defining research. Unfortunately the concept of research contains a negative element. Research is searching without knowing what you are going to find: if you know what you are going to find you have already found it, and your activity is not research. Now, since the outcome of your research is unknown, how can you know whether it will be fundamental or not?

2. We may say for instance that fundamental research is that which you undertake without caring whether the results will be, of practical value or not. It may not be reasonable to go further and say that fundamental research is that which will be abandoned as soon as it shows a sign of leading to respite of practical value. By saying this you may limit your own achievement. It will be better to say that fundamental research is that which may have no immediate practical value, but can be counted upon as leading to practical value sooner or later. The extension of knowledge and understanding of the world around us will always be profitable in the long run, if not in the short.

3. This is a very powerful argument for fundamental research and it is a completely unassailable one, and yet there are people who will not like it. Let us seek a definition that will give fundamental research a value of its own, not dependent

upon other uses appearing soon or late. We say for instance that fundamental research is that which extends the theory. Now we have to theorize upon theory.

4. There have been several viewpoints about theory. One is that theory discerns the underlying simplicity of the universe. The non-theorist sees a confused mass of phenomena; when he becomes a theorist they fuse into a simple and dignified structure. But some contemporary theories are so intricate that an increasing number of people prefer dealing with the confusion of the phenomena than with the confusion of theory.

5. A different idea suggests that theory enables one to calculate the result of an experiment in a shorter time than it takes to perform the experiment. I do not think that the definition is very pleasing to the theorists, for some problems are obviously, solved more quickly by experimenters than by theorists.

6. Another viewpoint is that theory serves to suggest new experiments. This is sound, but it makes the theorist the handman of the experimenter, and he may not like this auxiliary role. Still another viewpoint is that theory serves to discourage the waste of time on making useless experiments.

7. Let us try to flatter theory by giving it a definition that shall not describe it as a mere handmaid of experiment or a mere device for saving time. I suggest that theory is an intellectual instrument granting a deep and indescribable contentment to its designer and to its users. This instrument is made up of units which can be compared, for instance, to different branches of physics: solid state physics, relativity, acoustics, elementary particles and others, which sometimes have only a remote relation with one another and may not even be interconnected at all.

8. The rest of my talk will be devoted to a different question which is: how are we going to communicate to the layman some of our passion for our science? This is a very important question, for everyone is a layman until he becomes a scientist. If we can solve the problem of interesting the layman we may succeed in attracting the potential Fermis, Slaters, Lands and Fletchers of future into the field of, say, physics. Nothing could be more desirable.

9. A frequent technique is that of surprise. The trouble with this is that one cannot be surprised if one is not accustomed to the situation which is nullified by the surprise. Imagine, for example, a physicist; trying to surprise an audience of laymen by telling them that there are a dozen elementary particles instead of two or three, or that the newest cyclotron imparts an energy of 500 mev to protons. It simply will not work, because the listeners will have no background to compare this information with.

10. It is also a mistake to think that we can excite an audience by solving a mystery for them. The trouble here is that practically no one is interested in the answer to a question which he never thought of asking.

11. Relativity had a 'wonderful build-up in the decade before 1905, for the physicists of that era were acquainted with the sequence of experiments which were designed to show that the earth moves relatively to the ether and which obstinately showed the opposite. Each stage in the unfolding of quantum mechanics was exciting to the physicists who knew the earlier stages, because they knew the problems which

were left unsolved. The writer of a detective story creates the mystery before he solves it; but the mystery usually begins with the discovery of a murdered man, and this is considerably more exciting than a murdered theory. The corresponding technique in physics consists in trying to create a particular state of out-of-dateness in the mind of the public, in the expectation of bringing them up-to-date at the end of the lecture or paper. There is too much risk of leaving the audience in the out-of-date condition, and this technique cannot be recommended.

12. Another mistake, in my opinion at least, is that of stressing a paradox. Try telling an audience that if you know the exact position of a particle you cannot know its momentum, and vice versa – the effect is unpredictable but obviously not what you wanted. Still another mistake is that of springing an isolated fact upon the audience. An isolated fact is not science and it is not interesting. Facts are of interest only as parts of a system. And we must strive to interest the layman in the system.

II. Paragraph Study (*consult the dictionary if necessary*).

Read paragraphs 1–3.

1. Follow the nouns **research**, **definition** and **argument** through their transformations into pronouns and state the main idea of the paragraphs, either in English or in Ukrainian. 2. Copy out the words equivalent to: *дуже бажано мати гарне визначення; зробити, не замислюючись; обмежити можливі результати своєї діяльності; розширення знань приносить користь*. 3. Give Ukrainian equivalents of *a nameless opposite; searching; outcome of your research; immediate practical value; research can be counted upon as leading; in the long run, if not in the short; a very powerful argument for*.

Read paragraphs 4–7.

1. Follow the dominant noun through the paragraphs and copy out definitions of theory and the beginning of the sentences containing counter arguments. 2. Copy out the words equivalent to: *утворюють просту, але сувору систему; теорії мають настільки складний і заплутаний характер; допоміжна функція; запобігати втрати часу; приносить глибоке задоволення*. 3. Give Ukrainian equivalents of *the underlying simplicity; the handman of the experimenter; a device for saving time; a remote relation*.

Read paragraphs 8–12.

1. Concentrate on the opening question and the possible answers considered by the author. Make up a summary of the paragraphs in three sentences in Ukrainian.'

III. Translate paragraphs 8 – 12 into Ukrainian.

IV. Make up a list of words that you have looked up in the dictionary and give their contextual Ukrainian equivalents.

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СПІЛКУВАННЯ»**

*(для студентів освітньо-кваліфікаційного рівня «магістр» заочної форми
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