МІНІСТЕРСТВО ОСВІТИ І НАУКИ УКРАЇНИ
Національний університет кораблебудування
імені адмірала Макарова

А. В. МІНЯЙЛОВА, О. С. ШЛЯХТІНА

ENGLISH FOR ECOLOGISTS
Навчальний посібник з англійської мови для студентів спеціальності 101 «Екологія»

Рекомендовано Вченою радою НУК

ВИДАВНИЦТВО
НАЦІОНАЛЬНОГО УНІВЕРСИТЕТУ
КОРАБЛЕБУДУВАННЯ
ІМ. АДМІРАЛА МАКАРОВА

2020

УДК 811.111(075.8)
М62

Рекомендовано Вченою радою НУК імені адмірала Макарова
як навчальний посібник
(*протокол № 2 від 25.01.2019 р.*)

Автори: А. В. Міняйлова, канд. пед. наук, доцент, зав. кафедри сучасних мов;
О. С. Шляхтіна, старший викладач кафедри сучасних мов

Рецензенти: О. М. Дубова, доктор філологічних наук, професор кафедри прикладної лінгвістики, Національний університет кораблебудування імені адмірала Макарова;
Н. М. Філіппова, кандидат філологічних наук, професор НУК, завідувач кафедри прикладної лінгвістики, Національний університет кораблебудування імені адмірала Макарова;
Т. І. Філіпп'єва, кандидат педагогічних наук, доцент кафедри англійської філології, Миколаївський національний університет імені В. О. Сухомлинського

Міняйлова А. В.

М62 English for Ecologists : навчальний посібник з англійської мови для студентів спеціальності 101 «Екологія» / А. В. Міняйлова, О. С. Шляхтіна. – Миколаїв : НУК, 2020. – 140 с.

ISBN 978-966-321-397-2

У посібнику наведено вправи та оригінальні тексти за професійною тематикою, спрямовані на формування і розвиток у студентів спеціальності 101 «Екологія» навичок усного та писемного мовлення, читання наукової та довідникової літератури за фахом, презентації результатів наукових робіт на міжнародних конференціях, ведення наукових дискусій англійською мовою.

Навчальний посібник розроблений як основний курс дисципліни «Іноземна мова» (за професійним спрямуванням, англійська) і призначений для студентів спеціальності 101 «Екологія».

УДК 811.111(075.8)

ISBN 978-966-321-397-2

CONTENTS

UNIT 1. ECOLOGY AS A SCIENCE

Key words

relationships – відносини
living thing – жива істота
cell – клітина
environment – навколишнє середовище
habitat – природне середовище
to depend (on) – залежати (від)
seed – зерно
to affect – впливати
impact – вплив
layer – шар
ecosystem – екосистема
to contain – містити
term – термін
species – вид, види
to originate – походити
concept – поняття
to vary – варіювати
to alter – змінювати
to exist – існувати
to accept – сприймати

Ex.1.1. Read the text and answer the questions:

1. Where does the word 'ecology' come from?
2. What does it mean?
3. How did the science develop?
4. What is the subject of ecology?

Ecology Defined

Ecology studies the relationships between living things and their environment. The term 'ecology' comes from two Greek words *oikos* (which means 'house' or 'place to live') and *logos* (which means 'study'). So, ecology studies the 'houses', or environment, of living organisms – all their surroundings, including other animals and plants, climate and soil. Nobody knows when the word 'ecology' first appeared, but German biologist Ernst Haeckel was the first to define it, in 1869.

Although the science of ecology is a new one, people have been studying ecology and applying their knowledge for thousands of years. Prehistoric people had to know something about the ecology of wheat and corn before they could successfully raise crops of these plants. Theophrastus, an early Greek botanist, is considered to be 'the first true ecologist' because he was the first to write about plants in terms of their living places, or *habitats,* such as forest and marsh. The Indians of the North American plains knew a lot about the ecology of the bison

on which their lives depended. Today we often use ecological knowledge without being aware of it; for example, when we want to have a lawn in a shady place, we plant seeds of the grass that grows well in shade.

However, most people don't think ecologically. When they see a bird or a wildflower, their first question is: *What is it*? They want to know the names of the living things around them in nature. And only some people ask the next question: *What does it do*? They are interested in the organism's role in its environment and how it affects and is affected by other organisms. This is what ecology studies.

Ex.1.2. Translate the words from English into Ukrainian.

Ecology, term, organism, biologist, prehistoric, botanist, bison, ecologically, nature, person, role.

Ex.1.3. Decide whether the statements are true or false according to the text.

1. The word 'ecology' first appeared in1869.
2. Ecology is a new science.
3. People have been using ecological knowledge since 1869.
4. To use ecological knowledge you have to be aware of it.
5. Thinking ecologically means being interested in the relationships between living things and their surroundings.

Ex.1.4. Translate into Ukrainian.

Between, although, before, because, such as, which, often, without, however, around, perhaps.

Ex.1.5. Choose the option (*a, b or c*) *to translate the words in the first column.*

1) *science*	a) навчання	b) наука	c) предмет
2) *marsh*	a) рівнина	b) болото	c) височина
3) *the same*	a) інший	b) такий самий	c) якийсь
4) *to study*	a) вивчати	b) проводити	c) знати
5) *relationship*	a) споріднений	b) зв'язаний	c) взаємозв'язок
6) *include*	a) включати	b) вивчати	c) виключати
7) *soil*	a) сіль	b) грунт	c) волога

8) *to depend*	a) залежати	b) взаємодіяти	c) проводити
9) *forest*	a) ліс	b) поле	c) ріка
10) *thousands*	a) сотні	b) десятки	c) тисячі

Ex.1.6. Explain the meaning of the Greek words: *oikos, logos, habitat.*

Ex.1.7. Find Ukrainian equivalents to the English words and word combinations.

To be aware of, to come from, to be sure, to apply one's knowledge, in terms of, to raise crops.

Ex.1.8. Choose the best statement to discover the main idea of each paragraph of the text above.

1. A) Ecology is a new science.

B) Origin of the term 'ecology'.

2. A) The Indians of North America are the first ecologists.

B) People have been using their ecological knowledge for thousands of years.

3. A) Ecology studies the role of living things in their environment.

B) Ecology studies what birds and wildflowers do in their environment.

Ex.1.9. Read the text and do the exercises below.

Ecology as a Science

Modern ecology is focused on the concept of ecosystem, a functional unit consisting of interacting organisms and all aspects of the environment in a specific area. It contains both the nonliving (abiotic) and living (biotic) components through which nutrients are cycled and energy flows.

Constant interactions between living organisms and their physical environment bind these components into a stable system. The state of balance in any ecosystem is self-sustainable so that even slight imbalances are corrected before they become severe, irreparable and fatal.

Ecology is a multidisciplinary science. Facts about ecological systems are drawn from biology, geology, chemistry, physics, history, physiology, anthropology, including various branches of geography: hydrology, soil science, geomorphology, biogeography, etc. Originally environmental biology was considered ecology. Modern ecology has to deal with environmental problems caused by human activities.

The science of ecology has the following areas of study. They are plant and animal ecology, population ecology, community ecology, paleoecology. A new term 'social ecology' was introduced to show interaction of man, society and nature, close interdependence of social and natural factors. Other ecological approaches concern specialized areas. Systems ecology, concentrating on input and output analysis, has stimulated the rapid development of applied ecology, concerned with the application of ecological principles to the management of natural resources, agricultural production, and problems of environmental pollution.

In applied ecology, basic ecological principles are applied to the management of populations of crops and animals, so that yields can be increased and the impact of pests reduced. Applied ecologists also study the effect of humans on their environment and on the survival of other species. Theoretical ecologists provide simulations of particular practical problems (e.g., the effects of fishing on fish populations) and develop models of general ecological relevance.

Nowadays it is evident that some of the most pressing problems of men-expanding population, food scarcities, environmental pollution, and all the sociological and political problems are to a great degree ecological.

bind – пов'язує
to deal with – мати справу з
applied – прикладний
food scarcities – дефіцит їжі

Ex.1.10. Here are the answers to some questions on the text. What are the questions?

1. Ecology deals with the organism and its environment. (What?)
2. Interactions between individuals, between populations and between organisms and their environment form ecological systems. (What?)

3. The state of balance in any ecosystem is self-sustainable so that even slight imbalances are corrected before they become severe, irreparable and fatal. (Why?)

4. Modern ecology has to deal with environmental problems caused by human activities. (What?)

5. Facts about ecological systems are drawn from biology, geology, chemistry, physics, including various branches of geography. (Where?)

6. The ecosystem is a functional unit consisting of interacting organisms and all aspects of the environment in any specific area. (What?)

7. The most pressing problems of men-expanding populations, food scarcities, environmental pollution are to a great degree ecological. (What kind of?)

Ex.1.11. Complete the sentences.

1. Ecology is a study of … .
2. Modern ecology is focused on … .
3. The state of balance in any ecosystem is ... .
4. Ecology is a multidisciplinary science drawing facts from … .
5. The science of ecology has such areas of study as … .
6. The term ‘social ecology’ was introduced to … .
7. Applied ecologists study … .

Ex.1.12. Match the following terms with their proper definitions.

1. Physiological ecology	a) the study of the ecology of fossil organisms
2. Behavioral ecology	b) the study of the organization and functioning of communities, which are assemblages of interacting populations of the species living within a particular area
3. Population ecology	c) the study of the relationships between individuals
4. Community ecology	d) the study of the food-gathering techniques of individuals, the survival adaptations against predation and mating
5. Paleoecology	e) the study of the processes that affect the distribution and abundance of animal and plant populations

Ex.1.13. Read the text and answer the questions.

1. What were people focused on many centuries ago?
2. What did they study in the late 1800s and early 1900s?
3. What is the main goal of modern ecology?

Ecology: Development and Challenges

Although ecological knowledge has been used by people for thousands of years, ecology is one of the newest sciences. For many centuries, people concentrated on naming the plants and animals they discovered and on describing the structure of the dead specimens they collected. Gradually, as the question 'What is it?' was more easily answered, people began studying the effects of the environment on living organisms. During the 1800s, for example, scientists investigated the effects of day length on bird migration and the effects of humidity on the development of insects. Hundreds of books were written on the behaviuor of animals and on the distribution of plants and animals over the earth.

The emphasis was still on individual organisms. In the late 1800s and early 1900s, however, scientists began to study *populations* of organisms rather than individuals. At that time they realized that all of the populations of plants and animals in a certain area make up a sort of *community,* with different kinds of organisms having different 'jobs' in the community. Studies of nature became broader. In 1935, the word *ecosystem* appeared to describe all living communities of an area including nonliving parts of their environment. The earth is a huge ecosystem. Other ecosystems are forests, lakes, meadows, vacant lots, or even your back yard.

One of the main goals of ecologists today is to investigate ecosystems. The challenge of ecology is to understand how ecosystems 'work' and how they change eventually.

specimens – зразки
investigate – досліджувати
humidity – вологість
distribution – розподіл
emphasis – акцент, головна увага
community – спільнота

Ex.1.14. Decide whether the following statements are true or false according to the text above.

1. For many centuries people were staying focused on naming species they found in nature.
2. People began to study ecosystems many centuries ago.
3. Studying groups of living organisms led scientists to the ecosystem concept.
4. The term 'community' is used to describe organisms, their environment and the relationship between them.

Ex.1.15. Find Ukrainian equivalents to the words.

Concentrate, structure, collect, effect, migration, individual, organism, population, sort, ecosystem, ecologist.

Ex.1.16. Match the English word combinations with their Ukrainian equivalents.

1)	ecological knowledge	a)	незайняті ділянки землі
2)	many centuries	b)	тривалість дня
3)	dead specimens	c)	екологічні знання
4)	living organisms	d)	рослинне угрупування (фітоценоз)
5)	day length	e)	мертві зразки
6)	bird migration	f)	вплив вологості
7)	effect of humidity	g)	багато століть
8)	behaviour of animals	h)	величезні екосистеми
9)	huge ecosystems	i)	живі організми
10)	vacant lots	j)	поведінка тварин
11)	plant community	k)	міграція птахів

Ex.1.17. Fill in the gaps with appropriate words from the text above.

1. The study of the relationship between plants, animals, and their environment is called ... .
2. The movement of living things from one place to another is ... .
3. ... is a group of plants or animals living in the same surroundings.
4. The word ... is used to describe all living communities and nonliving parts of their environment.

Ex.1.18. Open the brackets using the past simple tense.

In the 1960s – 1970s, many Americans (to become) concerned that pollution was causing health problems. Congress (to respond) by passing laws to revive polluted lakes and rivers, improve quality of the air and save animal species. In the early 1980s, new environmental problems (to emerge). Scientists (to discover) that pollution in one country (can) affect neighbouring countries. Some experts (to warn) that CO_2 could cause the earth's temperature to rise. Scientists also (to discover) that some chemicals were destroying the earth's protective ozone layer.

Ex.1.19. Discuss the following questions:

1. When did the first living things appear on our planet?
2. What is the biosphere?

Ex.1.20. Read the text and check your answers to the questions above.

Life on the Planet Earth. The biosphere

The Earth is about 4.6 billion years old. The first living cells emerged between 4 billion and 3.8 billion years ago. Man appeared only 50,000 years ago and was just an ordinary living being among others. 10,000 years ago people started farming and settling down. They began to alter their surroundings and the environment deliberately in efforts to make their life more secure and comfortable. Then they started to use metals, invented writing, developed science, built towns and cities that eventually led to the industrialisation and population growth 250 years ago.

Although man is the most intelligent form of life on the planet and can change his surroundings in different ways, he is just as dependent upon the natural world as every other species, animal and plant. Man is a part of nature and he can't ignore its laws otherwise the results might be disastrous – and not only for man.

The place on Earth's surface where life dwells is called the *biosphere* – a thin layer which is the meeting place of land, air and water. Life forms live in every part of the Earth's biosphere, including soil, hot

springs, inside rocks at least 6 mi deep underground, the deepest parts of the ocean, and at least 5.5 mi high in the atmosphere. Only the hardest creatures can survive high in the mountains or deep in the oceans.

The biosphere includes a great number of plants, animals, and other life forms of the planet, many of them are yet to be discovered. The biosphere is a relatively thin life-supporting layer around the Earth containing living organisms, which is strongly influenced in composition and structure by the living organisms. Part of the biosphere containing the highest concentration of living matter varies from a few meters in deserts and tundra to a hundred meters in tropical, forest regions and oceans.

The idea of the biosphere appeared more than a century ago. It's a complex system of energy use and material cycling. This system runs on the energy flowing into it from the sun and it gives off energy (primarily as heat) to space.

The biosphere can be divided into two parts, living and nonliving, or biotic and abiotic. The biotic part of the biosphere including fauna and flora is called biota. The abiotic part is represented by three components: the lithosphere (solid part), the hydrosphere (liquid part), and the atmosphere.

Ex.1.21. Decide whether the following statements are true or false according to the text above. Argue them using the suggested phrases in the box.

Agreeing	**Disagreeing**
That's quite right	I don't agree
That's true	Not really
Yes, I agree	I disagree, I'm afraid
I absolutely agree	I don't think that's right
I'm of exactly the same opinion	I can't agree
This is only partly true	Surely not
As far as I know	On the contrary
	It is absolutely wrong

1. Life emerged on the earth 50,000 years ago.
2. Farming completely changed the role of man in nature.
3. The most intelligent form of life on the planet is man.
4. Man is a special living being who can't be affected by the natural world.

5. Life on the planet can be found only on the earth's surface.
6. Nobody can live high in mountainous areas.
7. The biosphere includes all the living forms of the planet.
8. The biosphere consists of several components.

Ex.1.22. Put the words in correct order to make sentences.

1) emerged / Earth / on / ago / Life / about / 4 billion years.

2) on / the / form / planet / is / the / intelligent / Man / of / most / life.

3) the / includes / a great / life forms / on / of / The biosphere / number / planet.

4) between / the / Ecology / is / study / organisms / their / and / relationships / the / environment / of.

5) about / secure / began / 10,000 years ago / to make / to alter / Man / life / environment / and / his / comfortable.

6) caused / by / to deal with / ecology / problems / has / activities / Modern / human / environmental.

7) biology / as / Originally / ecology / treated / was / environmental.

Ex.1.23. Choose the best alternative to complete the following sentences.

1. The first … … emerged between 4 billion and 3.8 billion years ago.
   a) animals b) living cells c) human beings
2. To make his life more secure and comfortable man began … .
   a) to alter his environment b) to establish permanent settlements
   c) to develop science
3. Man is the most … form of life on the planet.
   a) permanent b) intelligent c) special
4. Life on our planet … in the biosphere.
   a) emerges b) evolves c) exists
5. Man is … upon the natural world.
   a) sustainable b) responsible c) dependent
6. The biotic part of the biosphere consists of … .
   a) flora and fauna b) the solid Earth c) the water
7. The biosphere is a … layer around the Earth.
   a) thick life-supporting b) thin life-supporting
   c) non-living

Ex.1.24. Complete the sentences.

1. Man began to change … .
2. Man cannot … , because he is a part of it.
3. Life on the planet exists … .
4. Only the hardest creatures can … .
5. The biosphere includes … .
6. The biosphere is … .
7. The system of energy use and material cycling runs on … .
8. The biotic part of the biosphere consists of … .

Ex.1.25.Find words and phrases that correspond to the definitions given below.

1. A thin layer which is the meeting place of land, air and water.
2. The envelope of air which surrounds the earth, consisting principally of a mixture of gases.
3. The solid crust of the Earth consisting of rocks and soils.
4. All the water of the earth in liquid and solid form.
5. The part of the biosphere consisting of living components (flora and fauna).
6. The part of the biosphere consisting of the lithosphere, the hydrosphere and the atmosphere.

Ex.1.26. Read the international words correctly. Mind the stress.

atmosphere	composition	industrialisation	portion
abiotic	distance	lithosphere	population
acceleration	energy	material	region
biosphere	fauna	metal	result
biotic	flora	nature	sort
comfortable	hydrosphere	natural	special
concept	idea	organism	structure
concentration	ignore	planet	system

Ex.1.27. Complete the following table using dictionary if necessary.

Verb	Noun	Adjective
	acceleration	
exist		

		special
originate		
	development	
establish		
	system	
invent		

Ex.1.28. Match English phrases with their Ukrainian equivalents.

1) the first living cells	a) шар, що підтримує життя
2) a part of nature	b) частина природи
3) to give off energy	c) циклічність розвитку матерії
4) material cycling	d) виділяти енергію
5) population growth	e) змінювати навколишнє середовище
6) to alter the environment	f) ріст населення
7) a life-supporting layer	g) перші живі клітини

Ex.1.29. Identify the meaning of the given words in the word combinations and sentences below.

Area: mountainous areas; densely settled areas; area under crop; residential area, areas of study.

Biota: biotic, abiotic. The biotic part of the biosphere consisting of fauna and flora is called biota. The abiotic part consists of the lithosphere, the hydrosphere and the atmosphere.

Create: living creature; a lovely creature. Only the hardest creatures can survive high in mountainous areas.

Contain: Some parts of the biosphere contain the highest concentration of living matter. Nowadays there are fewer products containing chlorofluorocarbons.

Environment: environmental; environmental protection; environmental studies; environmental research; social environment; natural environment; manmade environment; human environment; environmentalist. The problems of environmental protection are of great importance now.

Emerge: Emergency; in case of emergency; an emergency exit. This door is used only in case of emergency. The life on Earth emerged between 4 billion and 3.8 billion years ago.

Exist: Does life exist on Mars? Lime exists in many soils. Existence; in existence. Do you believe in the existence of life on other planets?

Layer: surface layer; water layer; the atmosphere is divided into layers; upper layers of the atmosphere; life-supporting layer.

Support: to support a family; to support life; to support air pressure; to give support to; to speak in support of; supporter.

Originate: origin; words of Latin origin, the origin of civilization; original; the original inhabitants.

Vary: to vary greatly; to vary from place to place. The highest concentration of living matter varies from a few metres in deserts and tundra to a hundred meters in tropical forest regions and oceans. The climate in this country is as varied as its landscape. Various: for various reasons; various types; at various times. Variety: variety of species; a life full of variety. Variation: variation of temperature, seasonal variations. Variable: variable winds, variable standards; variability. The most characteristic feature of Britain's weather is its variability.

Ex.1.30. Match the verbs in column A with a suitable phrase in column B.

A	B
1) to consist	a) by famous scientists
2) to make life	b) energy
3) to vary	c) into two parts
4) to include	d) of flora and fauna
5) to be developed	e) High in mountains
6) to give off	f) from a few meters to a hundred meters
7) to live	g) secure and comfortable
8) to divide	h) a great number of plants

Ex.1.31. Match the words in column A with their synonyms in column B.

A	B
1) environment	a) stratum
2) to develop	b) to appear
3) to contain	c) to work out
4) layer	d) idea
5) disastrous	e) to have in itself

6)	to emerge	f)	living thing
7)	creature	g)	dangerous
8)	to discover	h)	find out
9)	concept	i)	surroundings

Ex.1.32. Find the best explanation from a–g to the verbs 1–7.

1)	to alter	a)	to have smth. within itself
2)	to create	b)	to appear;
3)	to contain	c)	to have a specified beginning
4)	to exist	d)	to make smth. new
5)	to emerge	e)	to make different, to change
6)	to originate	f)	to be, to continue living
7)	to divide	g)	to separate into parts or groups

Ex.1.33. Discuss in pairs:
- when the first living cells emerged;
- why man began to alter his surroundings;
- whether man is dependent upon the natural world;
- what the biosphere is;
- what biota is;
- what the biosphere runs on.

Ex.1.34. Complete the text using the words from the box.

emerge	the solar system	ape-like-men	invented	alter	develop
permanent settlements		exists	species		
has been around		concept	arrived		

Planet Earth is 4,600 million years old

If we condense this inconceivable time-span into an understandable (1) … , we can liken Earth to a person of 46 years old. Nothing is known about the first 7 years of his life, and whilst only scattered information (2) … about the middle span, we know that only at the age of 42 the Earth began to (3) … . Dinosaurs and the great reptiles did not (4) … until one year ago, when the planet was 45. Mammals … (5) only 8 months ago; in the middle of last week manlike apes evolved into (6) …, and at the weekend the last ice age enveloped the Earth.

Modern man (7) … for 4 hours. During the last hour Man (8) … agriculture. The industrial revolution began a minute ago.

When (9) … appeared Man began to (10) … his surroundings, making his life more comfortable.

He has multiplied the population to enormous numbers, caused the extinction of 500 (11) … of animals, ransacked the planet for fuels and now stands like a cruel infant destroying this oasis of life in (12) … .

Ex.1.35. Complete the text with the prepositions from the box. There may be more than one possible answer.

in	for	to	of	on	nearby	among	with	around	without

Kunas: the World's Greatest Conservationists

Sounds like a true fairy tale but the Kunas are a small tribe of only 30,000 people who live (1) … a group of 360 islands, around Panama, in central America. They have been awarded the Global 500 prize which is given (2) … those who are defenders of nature. The World Wildlife Fund (WWF), a famous organization engaged (3) … the conservation of natural surroundings and other experts (4) … the world have great respect (5) … them.

Why do they deserve so much respect? Because they have succeeded (6) … creating harmony between man and nature and also because their life is based (7) … solidarity. They are considered to be the most democratic in all their thinking and actions.

The Kunas have great respect for the environment. The way in which they take care (8) … nature is very simple but effective. They believe (9) … conserving their forests. They use them but don't destroy them. They are very careful how they use water. They teach their children to respect nature. They have even fought people who wanted to build hotels and houses. Tourists are invited (10) … the condition that they respect the natural surroundings.

The Kunas take decisions all together. Helping one another is a part (11) … their tradition. For example, when a few young people wanted to cultivate some land, the whole village gave them a hand.

Moreover, the Kunas have good relationship (12) … the other people living (13) … . This is because the only 'arm' they are equipped (14) … is dialogue and exchanging ideas. In the past, other people tried to subject them but (15) … success. The reason (16) … this victory of the Kunas is their harmony (17) … people which is the fundamental rule of life.

Ex.1.36. Translate the words and word combinations from Ukrainian into English.

З'являтися; довкілля; витривалі, міцні істоти; вид; частина природи; залежати від чогось; існувати; флора і фауна; жива матерія; поняття «біосфера»; використання енергії; тонкий шар, що підтримує життя.

Ex.1.37. Speak on the topics using the key words given below.

1. The impact of man on the environment.

(*Farming*, *to settle down*, *to alter the environment*, *to make life secure and comfortable*, *industrialisation*, *towns and cities*, *population growth*).

2. The biosphere is a life-supporting layer around the Earth.

(*To exist*, *to include*, *to vary from ... to*, *to run on*, *energy use*, *material cycling*, *biota*, *abiotic*, *part*, *to divide*, *concept*, *originate*, *develop*).

UNIT 2. FROM SPECIES TO ECOSYSTEMS

Key words

community – спільнота
biotic – біотичний, живий
abiotic – абіотичний, неживий
interaction – взаємодія
nitrogen – азот
soil – грунт
photosynthesis – фотосинтез
to capture – захватити
biological control – біологічний контроль
pest – шкідник, паразит
parasite – паразит
predator – хижак
to provide – забезпечувати
movement – рух
organic – органічний
biomass – біомаса
matter – матерія
to prey – полювати, ловити

Ex.2.1. Read the text and answer the questions.

1. What is an ecosystem?
2. How do the components of an ecosystem interact?
3. Which factors are ecosystems controlled by?

Ecosystem

Ecosystem is a community made up of living organisms and nonliving components such as air, water, and mineral soil. Ecosystems can be studied in two different ways. They are considered as interdependent groups of plants and animals, or as hierarchical systems and communities controlled by general rules. The living (biotic) and non-living (abiotic) components interact through nutrient cycles and energy flows. Ecosystems include interactions between organisms, and between organisms and their environment. Ecosystems can be of any size but each ecosystem has a specific, limited space. Some scientists consider the entire planet as one ecosystem.

Energy, water, nitrogen and soil minerals are essential abiotic components of an ecosystem. Ecosystem consumes the sun's energy and captures carbon dioxide from the atmosphere and uses them via photosynthesis to support the life in it. Animals are also important in the movement of matter and energy through ecosystems. They influence the amount of plant and microbial biomass that lives in

the system. As organic matter dies, carbon is released back into the atmosphere. This process provides nutrient cycling by converting nutrients stored in dead biomass back to a form that can be used again by plants and other microbes.

Ecosystems are controlled by both external and internal factors. External factors such as climate, parent material that forms the soil, topography and time, affect the ecosystem. However, ecosystem can't influence these external factors. Ecosystems are dynamic: they always tend to keep balance and recover from any invasion from outside. Internal factors are different: they have two-way interactions with the ecosystem – they both control each other.

Humans operate within ecosystems and can influence both internal and external factors. Global warming is an example of accumulative effect of human activities. Ecosystems provide benefits, called 'ecosystem services', which people depend on for their livelihood.

Ex.2.2. Translate the words and word combinations from the text into Ukrainian.

Community, living organisms and nonliving components, interdependent groups of plants and animals, nutrient cycles, soil minerals, via photosynthesis, captures carbon dioxide, dead biomass, livelihood.

Ex.2.3. Match Ukrainian word combinations with their English equivalents.

1) community	a) вуглекислий газ
2) soil	b) потоки енергії
3) nutrient cycles	c) забезпечувати
4) energy flows	d) зовнішні та внутрішні фактори
5) photosynthesis	e) спільнота
6) carbon dioxide	f) користь
7) matter	g) фотосінтез
8) provide	h) грунт
9) benefit	i) поживні цикли
10) external and internal factors	j) матерія

Ex.2.4. Decide whether the statements are true or false.

1. Nonliving components of ecosystem include air, water, soil, and plants.
2. All the components of ecosystem influence each other.
3. Ecosystems need solar energy to stay alive.
4. Nutrition cycles are less important than energy flows in ecosystems.
5. External factors and ecosystems interact and affect each other.
6. Both external and internal factors help ecosystems keep balance.

Ex.2.5. Give examples of:

Ecosystems, living (biotic) and non-living (abiotic) components, external and internal factors, human influence on ecosystems.

Ex.2.6. Complete the sentences with the words from the box.

a) size	b) benefits	c) photosynthesis	d) community
e) time	f) nutrient cycles	g) animals	h) balance

1. Ecosystem is a … made up of living and nonliving components.
2. The components of ecosystem interact through … and energy flows.
3. Ecosystems differ in … .
4. … is an essential process in energy exchange within an ecosystem.
5. The amount of plant and microbial biomass is controlled by … .
6. Some external factors such as … and climate also affect ecosystems.
7. Naturally, any ecosystem is seeking … .
8. People need the … provided by ecosystems.

Ex.2.7. Read the text and complete it with phrases a–f below.

Parts of Ecosystem

Any ecosystem is made up of two parts: nonliving (the physical environment) and living (the biological community). The nonliving environment usually includes energy from the sun, temperature, water, gases in the air, wind, soils and the rocks beneath them,

and the topography, or shape of the land. These nonliving parts of ecosystem determine (1) … , and they also affect each other.

The world's deserts, for example, occur where the annual rainfall is ten inches or less. The lack of rain is sometimes caused by the topography. Along the west coast of North America winds carry (2) …. . The air is forced to rise as it hits the coastal mountain ranges. As it rises it cools and the water vapor in the air falls as rain or snow on the seaward side of the mountains. As a result, there is little rainfall on the other side. This is called (3) … .

Living parts of ecosystem often affect the nonliving parts. When rain falls on a forest, the tree branches and leaves help break (4) … . Layers of dead leaves on the forest floor soak up water and prevent the drops from washing soil away. Little water runs off the land. So living trees help maintain the soil on which they depend. In fact, the trees enrich the soil, since the leaves that fall to the forest floor (5) … part of the soil itself.

As ecologists study ecosystems, they often turn to the science of meteorology for information. Does the annual rainfall (6) … , or is it spread evenly over the year? How much does the temperature vary between day and night, and through a year? Finding answers to these questions is important because the climate of the area has a tremendous effect on its plant and animal life.

topography – топографія; поверхня; рельєф
desert – пустеля
annual rainfall – річна кількість опадів
water vapor – водяна пара
mountain ranges – гірські хребти
seaward side – схил гори, звернений до моря
rain shadow – дощова тінь

a) the force of the drops
b) come mostly in one season
c) the kinds of living organisms that can exist in it
d) eventually decay and become
e) water vapor inland from the Pacific Ocean
f) the rain shadow effect

Ex.2.8. Put the words and word combinations in correct order to make a sentence.

1) non-living one / Living part / determined / is / ecosystem /by / the / of.

2) rain on a forest, / and / the tree branches / help / When / break / the force / of / falls / the drops / leaves /.

3) runs / water / off / the / Little / land.

4) trees / Living / maintain / help / which / the / on / they / depend / soil.

5) much / the / between / day / temperature / How / vary does / and / night?

6) the / rainfall / mostly / season / in / annual / one / or / is / spread / it / evenly over / Does / come / the year?

Ex.2.9. Match the English word combinations with their Ukrainian equivalents.

1) energy from the sun	a) рельєф поверхні землі
2) biological community	b) лісовий настіл
3) shape of the land	c) узбережні скелі
4) forest floor	d) рослинне життя
5) lack of rain	e) величезний вплив
6) coastal mountains	f) пустелі світу
7) tree branches	g) сонячна енергія
8) tremendous effect	h) нестача дощу
9) plant life	i) гілки дерев
10) the world's deserts	j) біологічна спільнота

Ex.2.10. Translate into Ukrainian.

Usually, also, any, for example, sometimes, along, or, the other, often, so, in fact, mostly, between, through.

Ex.2.11. Find and correct a semantic mistake in the text below.

Any ecosystem is made up of two parts: *nonliving and living. The nonliving environment usually includes energy from the sun, temperature, water, gases in the air, wind, soil etc. They are determined by the living organisms that exist in the ecosystem.*

Ex.2.12. Read the text and answer the questions.

1. Which factors are involved into the pond ecosystem?
2. What are producers, consumers and decomposers?
3. Give examples of the producers, consumers and decomposers of any other ecosystem (e.g., deciduous forest).

Living Parts of Ecosystem

To learn more about living parts of ecosystem, you should visit a pond. The pond ecosystem usually contains all the nonliving components mentioned above. The sun provides energy for life. The climate determines how much rain falls in the area and whether the pond is covered with ice. These factors have a great effect on the life that the pond supports. The underlying rocks and soils affect the chemistry of the water which in turn helps determine what kinds of plants and animals dwell in the water. And the life of the pond affects the nonliving environment: when plants and animals die, their remains settle to the bottom and decay there, enriching the bottom with muck and making the pond shallower.

Living parts of a pond ecosystem (and of any ecosystem) can be divided into three groups: producers, consumers and decomposers.

PRODUCERS are green plants which capture radiant energy from the sun and convert it into food energy. They also take substances such as carbon dioxide, water, oxygen, nitrogen, and sulfur from the environment and convert them into plant material that is used as food by other organisms. In fact, green plants might better be called converters than producers. Regardless, all other life in the pond ecosystem depends on green plants. The same is true for forests, prairies, tundra, and oceans.

CONSUMERS are animals that depend on green plants as their food. Some of them eat directly plants while others consume animals that have eaten plants. The plantfeeders include tiny animals called zooplankton that eat phytoplankton, and larger organisms, such as pollywogs, insects, and snails that eat larger plants. The planteaters, or herbivores, get their energy directly from the green plants. Other consumers are either carnivores (that usually eat herbivores) or omnivores (that eat both plants and animals). The carnivores in the pond ecosystem include fish, herons, and insects such as giant water beetles. Raccoons and people are omnivores.

DECOMPOSERS are the third major group of organisms. They use dead plant and animal material as food. Decomposers break down the material getting the energy they need to live and releasing minerals and other nutrients back into the environment. Most decomposers are simple organisms such as bacteria and fungi. These microscopic organisms can be found everywhere in the pond, but are especially abundant at the bottom where dead particles of plants and animals settle. On land, decomposers are most abundant at or near the surface of the soil.

producers – продуценти (рослинні джерела живлення, що створюють з неорганічних речовин органічні)

consumers – консументи (споживачі)

decomposers – деструктори, редуценти (мікроорганізми, які розкладають органічні залишки)

plantfeeders – рослиноїдні (травоїдні) тварини, фітофаги

carnivores – м'ясоїдні (тварини) / комахоїдні рослини

herbivores – травоїдні (тварини)

omnivores – всеїдні тварини

abundant – рясний

Ex.2.13. Decide whether the statements are true or false according to the text.

1. The pond ecosystem takes energy from the sun.
2. The rocks and the soil from the bottom eventually determine what kinds of plants and animals dwell in the pond.
3. The main function of producers is producing carbon dioxide, water, oxygen, nitrogen, and sulfur.
4. All the living organisms in the pond ecosystem are consumers.
5. Decomposers consume dead organisms to support living ones.

Ex.2.14. Translate the words from Ukrainian into English.

Скелі, грунт, отримувати енергію, основні групи, сірка, дрібні тварини, двоокис вуглецю, всеїдні, азот.

Ex.2.15. Complete the sentences with suitable words.

1. ... break down plant and animal material, getting the energy they need to live.

2. ... take substances such as carbon dioxide, water, oxygen, nitrogen and sulfur from the environment and convert them into plant material.

3. Some ... consume directly plants while others eat animals that have eaten plants.

4. Animals called ... eat phytoplankton and larger organisms.

5. The other consumers are either ... that usually eat herbivores or ... that eat both plants and animals.

Ex.2.16. Fill in the table according to the example.

Adjective	**Noun**
shallow	shallowness
deep	
long	
wide	
high	
narrow	

Ex.2.17. Read the text and answer the questions.

1. Why do individual predators have to be controlled?
2. Why do biologists believe that most living organisms are parasites?
3. What is ‘biological control’?
4. What does the term ‘symbiosis’ mean?

Living things in ecosystem affect each other in many ways. Consumers that kill other animals for food are called predators. The word ‘predator’ usually brings to mind pictures of lions and wolves, but such creatures as robins, frogs, and humans are also predators. Some predators, carnivores such as lions, depend entirely on animals they kill, while many others, such as foxes and humans, eat plant food too.

Sometimes individual predators prey upon farm animals, and they have to be controlled. However, people often try to wipe out the entire populations of predators. They believe that it’s a good idea, though humans themselves are the greatest predators in the world.

Parasites live on or in other living things – their hosts, often spending the whole life with them. The parasite gets food and sometimes shelter, while the host gains nothing and may even suffer from the parasite.

Very few living things are free of parasites, which are usually smaller and more numerous than their hosts. Indeed, many parasites have parasites of their own.

Some biologists believe that most of the individual organisms are parasites, since there are so many parasitic fungi, bacteria, flatworms, insects, and mites. Parasites are an important part of all communities and, like predators, often affect the numbers of other organisms in the community. People try to bring parasites and predators deliberately into the area where they might control the number of the pests. This method of limiting the number of pests is called a biological control and it might eliminate the need for insect poisons used today.

The close association between parasite and host is an example of symbiosis, which means 'living together'. There are a lot of other examples of symbiosis in nature. In some relationships, one organism benefits and the other one is not affected at all which is called commensalism. Fish called remoras attach themselves to sharks. They get a free ride and eat fragments of the shark's food. There are many other commensal relationships in the sea. In some symbiotic relationships, both organisms benefit that is called mutualism.

predator – хижак

parasite – паразит

host – організм-носій, господар (паразита)

to prey – полювати, ловити

flatworm – гельмінт, плоский черв'як

mite – кліщ

pest – шкідник, паразит

biological control – біологічний контроль (боротьба)

symbiosis – симбіоз

commensalism – комменсализм (взаємини двох популяцій, корисні для однієї і байдужі для іншої)

mutualism – мутуалізм (*симбіоз на взаємовигідній основі*)

Ex.2.18. Translate the words and word combinations from English into Ukrainian.

Predators, control, wipe out, parasite, parasitism, numerous, biologist, fungi, bacteria, flatworm, eliminate, symbiosis, benefit, commensalism, fragment, mutualism.

Ex.2.19. Match the English words with their Ukrainian equivalents.

1) lion	a) гриб
2) wolf	b) плоский черв'як
3) fox	c) клещ
4) human	d) вовк
5) fungus	e) акула
6) flatworm	f) лев
7) shark	g) дрізд
8) mite	h) лисиця
9) robin	i) людина
10) frog	j) жаба

Ex.2.20. Complete the table according to the example.

Predators	**Parasites**
lions	fungi

Ex.2.21. Put the nouns into plural form.

Consumer, predator, wolf, lion, human, carnivore, fox, parasite, organism, fungus, bacterium, insect, relationship.

Ex.2.22. Choose the best answer to the questions.

1. What are the greatest predators in the world?

a) lions b) foxes c) humans

2. Why do biologists believe that most individual organisms are parasites?

a) because parasites depend on their hosts;

b) because parasites are an important part of all communities;

c) because there are so many parasitic fungi, bacteria, flatworms and insects.

3. What does the term ‘symbiosis’ mean?

a) killing each other b) living together c) preying together

4. What does the term ‘commensalism’ mean?

a) both organisms benefit in relationships;

b) one organism benefits, the other one is not affected;

c) none of the organisms benefits but both are affected.

5. What does the term ‘mutualism’ mean?

a) both organisms benefit in relationships;

b) one organism benefits, the other one is not affected;

c) none of the organisms benefits but both are affected.

Ex.2.23. Decide whether the statements are true or false according to the text above.

1. People have to control the predators preying upon farm animals.
2. Parasites affect the other organisms in the community.
3. Hosts are the organisms that live on or in other living things.
4. Predators are free of parasites.
5. Symbiosis is a good example of biological control.
6. Relationships beneficial for both organisms are called mutualism.

Ex.2.24. Ask as many questions to each sentence as you can.

1. Living things in ecosystem affect each other in many ways.
2. Parasites are an important part of a community.
3. Fish called remoras attach themselves to sharks.
4. There are many other commensal relationships in the sea.
5. Some predators depend entirely on the animals they kill.

Ex.2.25. Discuss these questions.

1. Do you agree that people should protect themselves and their property from wild animals?
2. What should people do to protect themselves?
3. *Do you think that poisoning animals is the best way to discourage them?*

Ex.2.26. Read the text and answer the questions below.

Predator and Pest Control

Some animal populations have been greatly reduced or even deliberately exterminated because they are considered dangerous. Extermination of wild animals began in approximately A.D. 80 with the killing of the European lion. Between 1937 and 1970, U.S. government predator control agents trapped, poisoned, or shot 23,800 bears, 7,255 mountain lions, 1,574 gray wolves, 50,283 red wolves, 477,104 bobcats, and 2,823,056 coyotes. Millions of wild animals were killed by poisoned baits, placed traps and individuals for entertainment or sport.

Predator control programs are results of misunderstanding of human-wildlife relationships and the role of dangerous animals in ecosystems. In 1990, predator-related livestock losses in the United States were claimed to be $27.4 million. According to the Office of Animal Damage Control, predator control that year cost $38 million, mainly to kill 86,500 coyotes.

Many poisons used in pest and predator control are wide-spectrum, long-lasting biocides. They contaminate soil and water, then get into the food chain, travel from one organism to another and affect many species. One of the most controversial of these poisons is compound 1080. First introduced in 1945, this powerful, persistent toxin is capable to kill not only the primary target animal but also a whole series of scavengers and decomposers that eat the poisoned carrion as it spreads through the food chain. Over 150,000 baits with compound 1080 had been distributed before its use was banned in 1972. Recently, ranchers have been asking for permission to use collars with 1080 on livestock. They believe that wolves and coyotes will grab their prey by the neck, puncturing the collar and getting a lethal dose of poison. Each collar, however, contains enough poison to kill 185 coyotes or six men. A much better solution would be to employ more herders and guard dogs to watch the sheep and cattle.

1. What animals are mentioned in the text?
2. Find the following numbers in the text: 1945; 38; 185; 7,255; 477,104; 1080; 27.4; 23,800. What do they refer to?

3. Why do people need pest and predator control?
4. What methods do people use to kill predators?
5. Who is mostly interested in killing predators?
6. Why do you think people should stop using the poisonous substances against animals?

Ex.2.27. Find synonyms to the following words from the text:
Solution, dose, puncture, loss, extinction, population, contaminate.

Ex.2.28. Choose one of the given words (*a or b*) *to complete the sentences.*

1. Theophrastus was the first to write about plants in terms of their places of living or ... such as the marsh.
   a) biomes b) habitats
2. Scientists realized that the plants and animals in a certain area make up a sort of ... .
   a) community b) nature
3. As ecologists study ecosystems, they often turn to the science of ... for information.
   a) meteorology b) ecology
4. ... are animals that depend on green plants for food.
   a) producers b) consumers
5. Plant-feeders include tiny animals called ... .
   a) phytoplankton b) zooplankton
6. Consumers that kill other animals for food are called ... .
   a) parasites b) predators

UNIT 3. BIOMES

Key words

biome – біома
distinguish – розрізняти
determine – визначати
characterize – характеризувати
variety – різноманіття
equator – екватор
prevail – переважати
desert – пустеля
zone – зона
tundra – тундра
taiga – тайга
coniferous forest – хвойний ліс
deciduous forest – листяний ліс
rainforest – тропічний ліс
steppe – степ

Ex.3.1. Read the text and do the exercises below.

Types of Biomes

A biome is a major land ecosystem, a large land area that has a distinct kind of plant life. It may include ecosystems of many kinds, but the whole area is distinguished by a particular kind of plant life such as grassland, rain forest, or whatever characterizes the biome.

The location of biomes over the earth is determined mostly by climate, especially by rainfall and temperature. And climate itself is determined by many factors including latitude (distance from the equator), ocean currents, topography, and the prevailing winds.

Biomes don't begin and end sharply. They blend together at their borders, sometimes over a span of many miles. The zone between two biomes or between two ecosystems is called an ecotone. There are a lot of ecotones around us – the shore of a pond, the bank of a stream, the edge between a forest and a meadow. Usually there is a great variety of life in ecotones because animals living there have the best of the two worlds, getting food, shelter, and other necessities from two different ecosystems.

Within a biome you can find areas with the plants which are different from the ones in the other parts of the biome. Often this is a topography effect. The climate at the top of a mountain ridge is cooler than the climate of the surrounding land, so plants usually found in northern biomes can grow on the ridge.

Though the word ‘biome’ is unfamiliar to a lot of people, there are many examples of biomes around us: steppes, deserts, prairies, deciduous forests, tundra, taiga, etc.

Ex.3.2. Translate the English words into Ukrainian.

Biome, characterize, location, climate, temperature, determine, factor, distance, equator, ocean, topography, mile, zone, variety, term, prairie, characteristic, prevail.

Ex.3.3. Match the English verbs with their Ukrainian equivalents.

1) to include	a) відрізняти
2) to distinguish	b) переважати
3) to determine	c) закінчувати(ся)
4) to find	d) змішувати
5) to prevail	e) думати
6) to begin	f) визначати
7) to end	g) рости
8) to blend	h) отримувати
9) to get	i) знаходити
10) to think	j) починати(ся)
11) to surround	k) включати (в себе)
12) to grow	l) оточувати

Ex.3.4. Match the English words and word combinations with their Ukrainian equivalents.

1) plant life	a) луг, степ
2) grassland	b) океанічна течія
3) rainforest	c) берег водойми (ставка)
4) latitude	d) рослинне життя
5) ocean current	e) межа
6) prevailing winds	f) вологий (тропічний) ліс
7) shore of a pond	g) укриття
8) bank of a stream	h) берег потоку (річки)
9) border	i) переважні вітри
10) shelter	j) широта

Ex.3.5. Choose the best option (*a, b or c*) *to complete the sentences.*

1. Biome is characterized by a particular kind of ... .
   a) human life b) animal life c) plant life
2. Location of biomes is determined by ... .
   a) people b) climate c) industry
3. The zones between two biomes or between two ecosystems are called ... .
   a) shelters b) ecogeopraphy c) ecotones
4. Topography can effect ... .
   a) distance from the equator
   b) types of plant life
   c) gravitational forces

Ex.3.6. Choose the best option (*a or b*) *to translate the noun+noun combinations.*

1) plant life
   a) рослини живуть b) рослинне життя
2) rain forest
   a) тропічний ліс b) лісний дощ
3) summer rains
   a) дощове літо b) літні дощі
4) surface water characteristics
   a) характеристики поверхневих вод
   b) характерні поверхневі води
5) marine climate
   a) клімат моря b) морський клімат

Ex.3.7. Read the following text. While reading, find answers to these questions.

1. What is called tundra?
2. What influences the growth of plants?
3. What is the difference between the arctic tundra and the alpine tundra?

Tundra

Climates in high mountain areas or at far northern or southern latitudes often are too harsh for trees. This treeless landscape called

tundra is characterized by a very short growing season and cold, harsh winters. Although water may be abundant on tundra, for much of the year it is locked up in ice or snow and therefore unavailable to plants. Due to the lack of plants tundra is considered a very cold desert.

Arctic tundra is a biome of low productivity, low diversity, and low resilience. Winters are long and dark. Only the top several centimeters of the soil thaw out in the summer and the lower soil is permanently frozen permafrost. This frozen layer prevents snowmelt water from being absorbed into the soil, so the surface soil is waterlogged during the summer. Try to imagine the difficulties encountered by plants in this kind of soil. Most of the year it is completely frozen, and even during the brief growing season the permafrost is a barrier to deep root growth.

Alpine tundra differs from Arctic tundra in several ways. Plants of Alpine tundra face different challenges than those of Arctic tundra. The thin mountain air lets intense solar radiation affect the inner cells and cause deep pigmentation. The summer sun also causes very hot daytime ground temperatures, even though the night temperatures can return to freezing. Alpine soil is open to winds and often rocky. The sloping areas cause moisture to drain quickly. Due to this combination of sun, soil, slope, and air currents, drought is a problem.

Although tundra can support life during the brief summer growing season, only a few species are able to survive the harsh winters or migrate to warmer climates. Dominant tundra plants are dwarf shrubs, grasses, mosses, and lichens. Its larger life-forms, such as arctic musk ox and caribou, or alpine mountain goats and mountain sheep, must be adapted to survive the harsh climate and sparse food supply. Many animals migrate or hibernate during winter.

Damage to tundra is slow to heal. At present, the greatest threat to this distinctive biome is oil and natural gas wells in the Arctic and mineral excavation in mountain regions. Because plants grow slowly during the brief summer at high altitudes or latitudes it is unlikely that truck ruts and bulldozer tracks on the tundra landscape will heal during our life-times. Furthermore, some of the most promising sites for oil exploration or mining are the sites where animals can find food in summer. Even slight inbreak into this fragile ecosystem can cause great damage.

thaw out – розтанути
waterlogged – заболочений
encountered – стикалися

Ex.3.8. Match the words from column A with those in column B.

A	B
treeless	water
long	lands
migratory	birds
harsh	winters
abundant	climate
cold	desert
snowmelt	landscape

Ex.3.9. Find sentences in the text 'Tundra' with phrases from exercise 3.8 and translate them into Ukrainian.

Ex.3.10. Decide whether the following statements are true or false. Correct the false ones.

1. Climates in high mountain areas are fine for trees.
2. Tundra is a rather warm desert.
3. Arctic tundra and Alpine tundra differ from each other.
4. The tundra plants and animals adapt to survive the harsh climate.
5. The greatest threat to tundra at present is fossil fuel extraction.

Ex.3.11. Match English word combinations with their Ukrainian equivalents.

1) vast land	a) верхній шар
2) evergreen forest	b) арктична пустеля
3) annual precipitation	c) велика територія
4) top layer	d) полярний заєць
5) arctic desert	e) річна кількість опадів
6) polar bear	f) трав'яний покрив
7) arctic hare	g) вічнозелений ліс
8) mat of grasses	h) розлив нафти
9) oil spill	i) полярний ведмідь
10) dwarf willow	j) карликова верба

Ex.3.12. Make as many word combinations as you can.

include	question
living	frozen
permanently	animals
raise	trees
affect	
arctic	

Ex.3.13. Translate the following phrases into Ukrainian.

Frozen water, growing population, animals living there, plants found there, covered with ice, little is known about.

Ex.3.14. Read the texts and do the exercises below.

Taiga, or northern coniferous forest, is made up almost completely of spruce and fir trees. It lies south of tundra and covers a broad zone across North America, Europe, and Asia. Taiga forests reach southward along mountain ranges such as the Rockies and the Appalachians. Since taiga lies closer to the equator than tundra, it receives more energy from the sun. Snowfall is greater and the snow insulates the soil, preventing permafrost in most areas. The needlelike leaves of the evergreen trees have a waxy coating that protects them from the cold and reduces the loss of water. Little sunlight slips through the evergreens to the forest floor, so few plants grow there.

Even though most of taiga is made up of evergreens, there are other trees, such as birches, willows, and aspens, which are favoured foods of moose and beavers. The evergreens are the main habitat of red squirrels and martens. Taiga winters are long and cold, but the insulating snow cover, and the food and shelter of trees make it possible for a greater variety of animals to survive there than in the tundra to the north.

The climate of taiga is unfavourable for people to live there. So far, people have used taiga mostly as a source of lumber and paper pulp. Explorers are searching for fuel and mineral treasures in the land of taiga. The demand for all of these resources will increase with population growth.

Temperate deciduous forest covers most of the eastern United States, Great Britain, eastern Asia, and almost all of central Europe. The growing season is warm and long, and there are forty inches or more of rainfall spread evenly through the year. A greater variety of plants and animals lives in this biome than in taiga and tundra. Most of the trees are deciduous, dropping their leaves in autumn. They include oak, maple, beech, elm, birch, and ash. Enough of the sun's energy gets through the upper leafy crowns of tall trees to support another layer of trees, the understory, and abundant shrubs, ferns, and wildflowers.

Man has influenced this biome significantly and the climate of the temperate deciduous forest has changed. Numerous forests have been cut down to provide vast areas for farming, industries, and building cities, highways, etc. Chicago, Boston, Philadelphia, and New York City stand in the areas where deciduous forests once grew.

Ex.3.15. Complete the sentences with the words from the box.

a) foods	b) marvelously	c) soil	d) equator
e) variety	f) trees	g) survive	h) fuel

1. Taiga is made up almost completely of spruce and fir … .
2. Since taiga lies closer to the … than tundra, it receives more energy from the sun.
3. Snowfall is greater and the snow insulates the … .
4. There are other trees such as birches, willows and aspens, which are favoured … of moose and beavers.
5. Taiga winter is long and cold but the food and shelter of trees make it possible for a greater variety of animals to … there.
6. The explorers are searching for … and mineral resources in taiga.
7. A greater … of plants and animals lives in this biome than in taiga and tundra.
8. Animal life of the forest is … varied.

Ex.3.16. There are six sentences in the text. Find where each sentence begins and ends.

Coniferous Forest

The coniferous forest, which is called the 'great north woods', has fewer types of trees than those in warmer regions not many kinds of trees (only firs, spruces, pines and other conifers) can stand the cold northern winters their needles, for instance, have a waxy covering that protects them from freezing because of the cold, fallen branches, needles, and dead animals do not decay as fast as in warmer regions since the decay of plant and animal remains is one of the main factors in producing fertile soil, the soil of the coniferous forest is not particularly rich poor soil is another reason why many kinds of trees are unable to grow there.

Ex.3.17. Read the text and answer the questions.

1. Where are the most productive biological communities in the world?
2. Why is it said that rainforests make their own rain?
3. How many layers can tropical forests have?
4. What does the forest understory consist of?
5. What animals can survive in the forest floor layer?
6. What kind of soil is in the tropical rainforests?
7. What is the role of decomposers in maintaining high productivity of rainforests?

Tropical Rainforests: Life in Layers

The richest and most productive biological communities in the world are in the tropical forests. These forests have been reduced to less than half of their former extent by human activities and now cover only about 7 percent of the earth's land area. However, about two-thirds of the vegetation mass and about half of all living species in the world live in this area!

The biggest biological diverse of the tropical moist forests is in the Amazon River basin of South America, the Congo River basin of central Africa, and the large islands of Southeast Asia. Whereas in the forests of mainland Southeast Asia, western Africa, and Central

America wet and dry seasons change during a year, the South American and central African forests are true rainforests. Rainfall is generally more than 400 cm per year and falls more or less evenly throughout the year. It is said that such rainforests 'make their own rain' because about half the rain that falls in the forests comes from condensation of water vapor released by transpiration from the trees themselves.

Habitats in tropical rainforests can be divided into three to five distinct layers from ground level to the tops of the tallest trees. Crowns of numerous trees of the top layer form a canopy about 40 m above the forest floor. Hundreds of birds, insects, reptiles, and small mammals live in the canopy, never getting down from the crowns of the trees.

The forest understory consists of small trees and shrubs growing between the trunks of the major trees, as well as lianas and ferns that attach themselves to the trees. Some of the bigger trees may support 50 to 100 different species of plant and animals.

By contrast, the forest floor is generally dark, humid, and rather open. Few herbaceous plants can survive in the deep shade created by the canopy of the trees. The most of fauna is represented by ants, termites and rodents. Rare predators such as leopards, jaguars, smaller cats, and large snakes hunt both on the ground and in the understory.

The next layer is the soil. Although the productivity of a tropical rainforest can be as high as 90 tons per hectare per year, the soil is acidic, nutrient poor and not fertile. It has been depleted by tropical rains and high temperatures.

The warm and moist soil of tropical rainforests is favourable for decomposers such as fungi, bacteria, etc. The interactions of decomposers and living plant roots in the soil maintain the rainforest ecosystem. Tropical rainforests are able to support high productivity only through rapid recycling of nutrients. Some of these decomposers have symbiotic relationships with the roots of specific trees. The trees have broad, not deep roots to gain nutrients from the soil. So nutrients are absorbed quickly and almost entirely and are reused immediately to make the plants grow and provide necessary base to the pyramid of this ecosystem.

Ex.3.18. Find the following words and word combinations in the text and check their meaning:

Biological diverse, vegetation mass, canopy, trunk, understory, shrub, fern, herbaceous plants, fertile, fungi, symbiotic relationships.

Ex.3.19. Use as many adjectives from the text as you can to describe:

– the top layer of the tropical forests;
– the forest understory;
– the forest floor;
– the soil level.

Ex.3.20. Match the words in column A with their definitions in column B.

A	B
1) decompose	a) the uppermost branches of the trees in a forest
2) nutrient	b) of land or soil that can produce good crops
3) fertile	c) steam, smoke or other substances spread about or hanging in the air
4) condensation	d) to become bad or rotten, or decay
5) canopy	e) a large continuous extent of land
6) trunk	f) a substance that helps a living thing grow
7) vapor	g) the thick main stem of a tree, from which the branches grow
8) mainland	h) drops of water that form on a cold surface when steam or water vapor touches it

Ex.3.21. Read the text below and check the meaning of unknown words.

Restoring a Dry Tropical Forest

A. When the Spanish conquistadores arrived in Central America in the sixteenth century, about 5.5 million hectares of dry tropical forest stretched along the Pacific coast from Colombia to Mexico. In contrast to the evergreen rainforests and cloud forests on the Atlantic side of the isthmus, dry forests have distinct seasons. During the wet summer months, the vegetation is dense and lush. In the winter, however, when rains are sparse, trees and bushes lose their leaves, and the whole forest becomes open and desert-like.

B. This dry forest was much easier to convert to farms and ranches than the moist forests. Its climate is healthier, and its soil was more fertile and conducive to agriculture. Today, only about 1 percent of Central America's dry forest remains in anything like its original condition, making it one of the most threatened ecosystems in the world. As the forest has disappeared, many of its unique plant and animal species have become rare and endangered. If much more forest is lost, hundreds or even thousands of species will become extinct.

C. An exciting project is currently underway in Costa Rica where scientists and local residents have joined together to restore about 700 square kilometers of dry tropical forest to approximately its original condition. A new national park called Guanacaste (named after the Costa Rican national tree that once grew in this forest) is being created from private lands, an existing park, and other public land holdings. Under the leadership of entomologist Dan Janzen, attempts are being made to understand the ecosystem and to reintroduce native plants and animals in an effort to restore – rather than just rehabilitate – the forest.

D. How is this possible after the land has been abused and degraded for centuries? Isn't it long past the point at which it can be rescued? Fortunately, according to Janzen, most of the original flora and fauna have not been completely eliminated, only reduced. Small areas containing most of the indigenous species remain scattered across the countryside. The challenge is to find these species and create habitats where they can thrive and re-create the forest.

E. Fire is one of the greatest threats to the forest. Every year during the dry season local people accidentally or deliberately start fires that sweep across the land, destroying native species and converting forest to grassland full of non-native invaders. Creating breaks to control the spread of fire and persuading residents to fight fires rather than set them is the first step toward restoring the forest.

F. Contrary to what you might expect, grazing animals are not excluded from Guanacaste National Park. In fact, they are encouraged because they are efficient seed dispersers. Because the forest probably coevolved with a fauna that included large,

hoofed grazing animals before humans arrived, many plant species actually depend on animals for regeneration. Horses, monkeys, goats, birds, and even turtles eat fruits and pass their seeds their digestive system days or weeks later. This not only distributes seeds to new locations, it also provides fertilizer for their initial growth. Furthermore, some seeds have tough outer coverings that are weakened by digestive acids and enzymes, facilitating germination. Being able to use the new national park for grazing during restoration makes the whole process much more attractive to its neighbours.

G. Involving local people in the project and making the park economically beneficial to them is another essential key to successful restoration. When they see how a park will help them, residents will be enthusiastic participants. Native people, with their knowledge of the forest and their skills as land stewards, can be an invaluable resource in the restoration process.

H. Once Guanacaste National Park is reconstituted, locals can work as guides and rangers or provide services to tourists who come to visit and view wildlife. Providing jobs in the area will help stem the tide of urbanization and also preserve local culture. Biodiversity and cultural heritage can be saved simultaneously. This exciting project may serve as an inspiration and guide to similar efforts in many areas of the world where bad land-use practices threaten both wildlife and indigenous people.

Ex.3.22. Look through the text again and match the following headings with the paragraphs A–H of the text.

1. The challenge to create the forest.
2. A restoration project.
3. A key to successful restoration.
4. Dry tropical forests. What are they?
5. Benefits of restoration.
6. The dying forest.
7. The greatest threats to the forest.
8. Encouraging the grazing animals.

Ex.3.23. Decide if the statements are true or false. Correct the false ones.

1. Dry forests have the soil which is less fertile and conductive to agriculture.
2. The vegetation is usually very good during the wet summer months.
3. Local residents and the government are ready to restore dry tropical forests in Costa Rica.
4. It is possible to restore forests because many original plants and animals have not completely disappeared.
5. One of the greatest threats of the forest is fire.
6. Grazing animals are considered to be efficient seed dispersers.
7. It is not a good idea to allow grazing animals to use national park territory.
8. It is worth involving local people in the project of restoration.
9. It is impossible to save biodiversity and cultural heritage at the same time.

Ex.3.24. Give synonyms to the following words:

To restore, to rescue, to eliminate, to scatter, to invade, to expect, to disperse, residents, to diversify.

Ex.3.25. Read the text below and answer the questions.

1. What are the main characteristics of deserts?
2. How are animals adopted to live in deserts?
3. In which way can deserts be attractive or even miraculous?

Deserts

Deserts are characterized by low moisture levels and precipitation that is infrequent and also unpredictable from year to year. With little moisture to absorb and store heat, daily and seasonal temperatures can fluctuate widely.

Deserts can be classified by the amount of precipitation that falls, by the temperature that prevails, by the causes of desertification or by their geographical location. Deserts with less than 2.5 cm (1 in.) of measurable precipitation aren't able to support vegetation. If annual precipitation is 2.5 to 5 cm (1 to 2 in.), sparse vegetation can be found there (less than

10 percent of the ground is covered), and plants in this harsh climate have some specific features to conserve water and protect tissues from predation. Water-storage tissues and thick epidermal layers help reduce water loss. Spines or serrated leaves edges scare away predators.

Warm and dry air creates wide desert areas in continental interiors of South and West America, North and South Africa, China, and Australia. Descending air currents help create desert zones along the west coast of South America and Africa that are among the driest regions in the world. Although deserts are considered hot and barren, with sand dunes, those at high latitudes are often cool or even cold. Sand dunes can be found more often in coastal areas.

Deserts with 5 to 10 cm (2 to 4 in.) of annual precipitation support a wider variety of plants where shrubs and small trees dominate.

Animals of desert have both structural and behavioral adaptations to meet their three most critical needs: food, water, and heat balance. Most desert animals escape daytime heat hiding in burrows and rocky shelters which they leave only at night. Pocket mice and kangaroo rats get water they need from the seeds and grains they eat.

Desert environment is easily damaged by human activities and is slow to recover due to the harsh climate. Tracks of tanks left during World War II in the California desert, for instance, are still visible. Many dry areas have been overgrazed, mainly by domestic livestock. Other areas are becoming agricultural though future availability of water to sustain crops is uncertain. The cultivation of semi-arid regions encourages erosion of soil and is one of the causes of increased desertification. Desert farming is possible with the aid of irrigation and the Imperial Valley in California provides an example of how previously barren land can become productive by the import of water from an outside source. Many trade routes have been forged across deserts, especially across the Sahara Desert, and traditionally were used by caravans of camels carrying salt, gold, ivory and other goods.

Ex.3.26. Find in the text the most characteristic adjectives that describe life in deserts. What nouns do they describe?

Ex.3.27. Decide if the statement is true or false. Correct the false one.

1. Deserts have sparse vegetation because of low precipitation level.
2. It is never cool or cold in deserts.
3. You can see lots of shrubs covering land in deserts.
4. Everyone can easily adapt to life in difficult conditions of deserts.
5. Desert environment can't be recovered easily and quickly.

Ex.3.28. Check the meaning of the words that are used in the text and given below:

Burrow, moisture, shelter, fluctuate, spine, serrated, gravelly, sustain, vulnerable, visible, semi-arid, desertification.

Ex.3.29.Which of the following definitions can be given to the words from the exercise 3.27?

– to rise and fall;
– a hole or tunnel made in the ground and used as a home by rabbits, foxes, etc.;
– the process by which fertile land changes into desert;
– which has little rain but is not completely dry;
– which can be seen;
– to keep alive or in existence.

Ex.3.30. Match English word combinations with their Ukrainian equivalents.

1) desert soils	a) листяний ліс
2) abundant crops	b) водопостачання
3) deciduous forest	c) клімат пустелі
4) water supply	d) пасовище, степ
5) desert climate	e) збереження води
6) grassland	f) безхмарні дні
7) water conservation	g) багаті врожаї
8) rainy season	h) грунту пустелі
9) cloudless days	i) сезон дощів

Ex.3.31. Choose the best option to complete the sentences.

1. Desert plants have small leaves or no leaves; it helps them (*evaporate; repel; conserve*) water.
2. Rain water (*condenses; evaporates; precipitates*) quickly because of high temperature and frequent strong winds.
3. Plant seeds have tough coats which (*cover; protect; grow*) them till the next rainfall.
4. Some desert mammals (*come; go; have*) into a deep sleep during the driest months of the year.
5. People are (*changing; turning; getting*) to deserts more and more for farmland and home sites.

Ex.3.32. Put the words and word combinations in correct order to make a sentence.

1. months of the / year / Some / into /go / a deep / during / the driest / desert mammals / sleep.
2. plants and animals / home / for / that are specially / for life / that environment / in / The desert / is / adapted.
3. store / swell up / Cactus plants / water / and / during / the rainy season.
4. all continents / Deserts / about / of / cover / on /the earth's land surface / 14 per cent / and occur.
5. frequent / temperatures / climate / by / characterized / high / is / strong / winds/ and / Desert.
6. been / by / Deserts / changed /not / much / man / have.

Ex.3.33. Choose the best option to complete the sentences.

The desert biome is an area (*who, where, that*) gets less than 25 centimeters of rainfall a year. Desert biomes are (*in, over, on*) western North America, western Asia, the centre (*at, of, as*) Australia and (*in, along, under*) the west coast of South America. A desert can be hot (*or, as, but*) cold. The Sahara is a hot desert, scorching (*in, by, at*) day time, chilly (*in, before, at*) night. In a cool desert such (*that, as, also*) the Gobi desert there is also a great difference (*among, between, across*) daytime and night time temperatures. (*Also, Or, But*) in a cool desert, winter temperatures may drop (*below, above, at*) freezing.

Ex.3.34. Use the word from column B to complete the line in column A.

A	B
As you walk the desert you notice that	through
the plants in the desert adapted to the lack of	are
rainfall. They have roots near the surface.	wide-spread
This enables to absorb water quickly before	them
the water evaporates. Plants such cactus, have	as
thick fleshy stalks that them store water.	help
You can few animals in Sahara.	see
In the day time, creatures such as lizards	and
rodents often escape the heat in burrows. Night	underground
brings to the surface searching for food.	them

Ex.3.35. Choose the best option to translate the underlined words and word combinations.

1. The desert is home for plants and animals that are specially adapted for life in that environment.

a) адаптовані b) були адаптовані c) будуть адаптовані

2. Once the water is gone, the farms have to be abandoned.

a) як тільки вода закінчується

b) одного разу вода закінчилась

c) вода закінчилась

3. Cactus plants store water, then they shrink as the dry months come and most of the water is used.

a) вода використовувалась

b) вода використовується

c) використана вода

4. In a cool desert, winter temperatures may drop below freezing.

a) замерзає b) точки замерзання c) така, що замерзає

5. The Sahara desert is the world's largest desert, covering over 9 million km^2 of North Africa.

a) така, що покриває b) покриває c) покривала

6. The Sahara desert expanded by 7 % between 1980 and 1995.

a) збільшується b) збільшилася c) збільшена

Ex.3.36. Complete the table below using the examples given.

Positive degree	Comparative degree	Superlative degree
colourful	more colourful	most colourful
hot	hotter	hottest
		driest
		best
	less	
	worse	
brief		
high		

Ex.3.37. Complete the table.

Biome	Geographical position	Climate	Common plants	Common animals
Tundra				
Taiga				
Tropical rainforest				
Forest				
Desert				

Ex.3.38. Choose the best option (*a*, *b or c*) *to complete the sentences.*

1. To classify landscapes, scientists have divided them by similar climates, plants and animals into groups called ... .
   a) ecosystems b) biomes c) ecotones
2. The frozen soil is called ... .
   a) rock b) thaw c) permafrost
3. The northernmost forest is the ... forest.
   a) coniferous b) rain tropical c) deciduous
4. ... trees, such as oaks and maples, shed their leaves in autumn.
   a) coniferous b) deciduous c) rain tropical
5. The ... biome is an area that receives less than 25 cm of rainfall a year.
   a) tundra b) rain tropical c) desert
6. ..., or northern coniferous forest, is made up almost completely of spruce and fir trees.
   a) desert b) taiga c) tundra
7. ... cover about 70 % of the Earth's surface.
   a) ponds b) oceans c) estuaries

Ex.3.39. Fill in the gaps with the words from the box.

at least	describe	are	by	of	grassland	into

Biome divisions are merely a system to help scientists ... the natural world. As you might expect, not all scientists divide the world ... the same kinds and number ... biomes. However, as a rule, ... six land biomes are accepted ... most scientists. The six major land biomes ... tundra, coniferous forest, deciduous forest, tropical rain forest, ..., and desert.

Ex.3.40. Divide the text on sentences.

The system of classifying the world's ecological systems into biomes is used to categorize similar communities on a broad, regional scale classifying biomes is based on the outward appearance of the dominant vegetation types in the area biomes differ in their productivity and biodiversity equatorial regions have the highest productivity and biodiversity, which tend to decrease at higher latitudes.

UNIT 4. SOIL AS A NATURAL RESOURCE

Key words

pesticides – пестициди
erosion – ерозія
weathering – вивітрювання
chemical – хімічний
acid – кислота
fibrous – волокнистий
nitrogen – азот
moisture – вологість
fertility – родючість
to contain – містити
tissue – тканина
to rotate – чергувати
to deplete – виснажувати
deforestation – обезліснення
desertification – опустелювання
hazard – небезпека
overgrazing – надмірний випас худоби
fertilizer – добриво
to cause – спричиняти
to expand – розширювати
carbon dioxide – вуглекислий газ
humus – гумус
to decay – розкладатись
to absorb – поглинати
to bind – з'єднувати
salinization – солоність
irrigation – зрошення
to evaporate – випаровувати
algae – водорості
to contaminate – забруднювати
to contribute – робити внесок
to extract – видобути
residue – залишок
to become barren – стати неродючим

Ex.4.1. Read the text below and complete it with the following phrases:

a) a regulator of water quality
b) which include weathering and erosion
c) together support life
d) most of the Earth's genetic diversity
e) converting dead organic matter into various nutrient forms
f) strong internal bonds
g) plant roots need oxygen
h) receive occasional rainfall

What is Soil?

A

Soil is a mixture of organic matter, minerals, gases, liquids, and organisms that (1)_____. Soil consists of a solid phase, a porous phase that holds gases and water.

Soil is a product of the influence of climate, relief, organisms, and its parent materials (original minerals) interacting over time. It continually undergoes development by way of numerous physical, chemical and biological processes, (2)_____. Taking into account its complexity and (3)_____, it is considered an ecosystem by soil ecologists.

B

Soil acts as an engineering medium, a habitat for soil organisms, a recycling system for nutrients and organic wastes, (4)_____, a modifier of atmospheric composition, and a medium for plant growth, making it a critically important provider of ecosystem services. Since soil has a tremendous range of available niches and habitats, it contains (5)_____. A gram of soil can contain billions of organisms, belonging to thousands of species, mostly microbial which are still unexplored.

C

Since (6)_____, ventilation is an important characteristic of soil. This ventilation can be accomplished via networks of interconnected soil pores, which also absorb and hold rainwater making it readily available for uptake by plants. Since plants require a nearly continuous supply of water, but most regions (7)_____, the water-holding capacity of soils is vital for plant survival.

D

Soils can effectively remove impurities, kill disease agents, and degrade contaminants. Typically, soils maintain a net absorption of oxygen and methane and undergo a net release of carbon dioxide and nitrous oxide. Soils support plants with air, water, temperature moderation, nutrients, and protection from toxins. Soils provide readily available nutrients to plants and animals by (8)_____.

Ex.4.2. Arrange the following headings to the parts of the text above.

1. Soil diversity
2. Essential functions of soil
3. Soil provides water and air for plants
4. Formation of soil

Ex.4.3. Match the words with their definitions.

1)	pollution	a)	rain, snow, sleet, or hail that falls to or condenses on the ground
2)	fertilizer	b)	the maximum amount that something can contain
3)	deplete	c)	the presence in or introduction into the environment of a substance which has harmful or poisonous effects
4)	precipitation	d)	allow (something) to move, act, or flow freely
5)	utilize	e)	a substance used for destroying insects or other organisms harmful to cultivated plants or to animals
6)	deterioration	f)	the action or process of getting rid of something
7)	pesticide	g)	a chemical or natural substance added to soil or land to increase its fertility
8)	release	h)	the process of becoming progressively worse
9)	disposal	i)	use up the supply or resources of
10)	capacity	j)	make practical and effective use of

Ex.4.4. Discuss the following questions:

1. What are the effects of using pesticides and artificial fertilizers in modern farming?
2. What causes erosion of the top layers of the soil?

Ex.4.5. Read the text and check your answers.

Fertility

Soil has been forming for over thousands of years from the weathering of rock. There are three types of weathering: physical weathering (temperature changes make the rock expand and contract until it shatters into pieces), chemical weathering (carbon dioxide and water form a weak acid that dissolves rocks such as limestone) and biological weathering (the rock is broken down by the action of living things such as plant roots and bacteria). The top layer of the soil (topsoil) is rich in humus – a dark, fibrous material formed from decaying organic matter.

Humus contains micronutrients such as nitrogen, minerals and microorganisms that break down the organic matter. Humus absorbs moisture and binds inorganic particles together. The quality

(or fertility) of soil depends on the amount of humus in it – the organic content. Good quality topsoil is dark, moist and crumbly.

The middle layer of the soil contains less organic material but it is rich in minerals. The lower layer is made of inorganic material similar to the parent rock which originally formed the soil.

All living things are made of protein which contains nitrogen. Without nitrogen plants and animals cannot grow because they cannot build new tissue. Traditional farming methods rotate cereal crops (which remove nitrogen from the soil) with leguminous plants (which replace the nitrogen). Intensive growing of cereals tends to deplete the soil of nitrogen. Repeated cropping and overgrazing (putting too many cattle on a small area of grassland) cause erosion of the top layers of the soil. The essential nitrates are removed from the topsoil so the nitrogen cycle which is crucial to the balance of nature is broken.

The earth loses 24 billion metric tons of topsoil every year through intensive farming methods and deforestation. The final stage of the topsoil loss is desertification. All the organic and mineral content of the soil disappears and the poor quality subsoil isn't able to support plant growth. About 20 million hectares of productive land become barren every year due to soil erosion. Thirty percent of the world's land surface is in danger of desertification.

Another hazard of intensive farming is salinization which is caused by perennial irrigation in arid climates. Soil contains some salt which is washed away when it rains. In the areas where rainfall is minimal, the amount of salt in the soil is very high. Evaporation from reservoirs and irrigation channels increases the salinity of the water. When a new irrigation scheme raises the water table, salt in the soil dissolves and rises up to the surface. Unless the area is left fallow and unirrigated for a season so that the salty water can drain away, the land will become permanently salinized and unable to support plant life.

The quality of soil can be improved by adding fertilizers. Organic fertilizers are made from animal and plant material such as compost or manure that enrich the soil with essential micronutrients such as nitrates, phosphates and potash. Artificial (inorganic) fertilizers contain high concentration of these micronutrients. They are much more powerful than natural organic fertilizers but they cause eutrophication that damages the environment. Excess nitrogen is washed out of the soil

during the rain. It goes to rivers and lakes and encourages the growth of algae in the water and wild plants on nearby land. Overgrowth of algae breaks the balance of nature in lakes and seas. Oversaturating of the banks with wild plants causes them to rot and die. The air becomes contaminated with nitrous oxide which contributes to the greenhouse effect. Nitrates, phosphates and potash are taken up by growing plants and get into the soil with animal manure. The phosphates and potash in artificial fertilizers can be extracted from rocks by mining.

Artificial fertilizers contain much more micronutrients which cause rapid plant growth but thus deplete the soil. Artificial fertilizers make the plants tasteless and they have a low nutritional value. They can be contaminated with chemical residues from the fertilizer manufacturing process. For both environmental and health reasons, more and more consumers nowadays are buying organic food that is grown without artificial fertilizers.

Ex.4.6. Read the international words correctly. Mind the stress.

type	method	bacteria
physical	cycle	organic
temperature	balance	microorganism
chemical	ton	intensive
humus	scheme	erosion
mineral	reservoir	productive
protein	phosphate	irrigation
reserve	biological	

Ex.4.7. Match the halves of the sentences. Do you agree or disagree with these statements?

1) There are three types of weathering: …	a) … support plant growth.
2) The quality of soil depends …	b) … deplete the soil of nitrogen.
3) All living things are made …	c) … perennial irrigation.
4) Plants and animals cannot grow without …	d) … physical, chemical, biological weathering.
5) Traditional farming methods rotate …	e) … of protein.
6) Intensive farming methods tend to …	f) … on the amount of humus in it.

7)	Repeated cropping and overgrazing cause …	g)	… adding fertilizers.
8)	Poor quality subsoil cannot …	h)	… cereal crops with leguminous plants.
9)	Salinization is caused by …	i)	… nitrogen.
10)	The quality of soil can be improved by …	j)	… erosion of the top layers of the soil.

Ex.4.8. Complete the table with adjectives.

Noun	*Adjective*
e.g. salinity	saline
environment	
product	
height	
salt	
biology	
origin	
fibre	
nutrient	
tradition	
use	
reason	

Ex.4.9. Match the English word combinations with their Ukrainian equivalents.

1)	weathering of rock	a)	чергувати культури
2)	to shatter into pieces	b)	виснажувати грунт
3)	to dissolve rocks	c)	порушувати цикл
4)	plant roots	d)	інтенсивне сільське господарство
5)	to absorb moisture	e)	завдавати шкоди навколишньому середовищу
6)	fertility of soil	f)	вивітрювання гірських порід
7)	to get washed down with the rain	g)	коріння рослин
8)	to rotate crops	h)	змити дощем
9)	to deplete the soil	i)	руйнувати гірські породи

10) to break the cycle	j) поглинати вологу
11) intensive farming	k) родючість грунту
12) to cause environmental damage	l) розбити на шматки

Ex.4.10. Translate into Ukrainian the following words and word combinations.

Dissolve: Dissolve in the water.

Soil: Poor soil, rich soil, virgin soil, sandy (clayey) soil, permanently frozen soil, poor quality subsoil.

Moisture: Moisture of plants, to absorb moisture.

Arid: Arid zone, arid climate, arid desert.

Irrigation: Irrigation engineering, irrigation canal, irrigation farming, irrigation station.

Waste: Waste disposal, waste utilization.

Eutrophication: Anthropogenous eutrophication, cultural eutrophication, eutrophication of waters.

Ex.4.11. Combine the adjectives with nouns to form word combinations:

Adjectives: animal (human), chemical, biological, productive, intensive,
poor quality, low nutritional, artificial, mineral, organic

Nouns: farming methods, content, subsoil, land, fertilizers, resources,
waste, value, residues, weathering

Ex.4.12. Match the verbs in column A with a suitable phrase in column B.

A	B
to remove	the organic matter
to encourage	the inorganic particles together
to contribute	the rock to expand and contract
to break down	rocks
to buy	new tissue
to deplete	nitrogen from soil
to bind	plant growth

to cause	to the greenhouse effect
to dump	animal and human waste into the sea
to dissolve	the soil of other nutrients
to support	organic vegetables
to build	the growth of algal

Ex.4.13. Choose the correct option (*a*, *b*, *or c*) *to complete the following sentences.*

1. The top layer of the soil is rich in … .
   a) clay b) limestone c) humus
2. The quality of soil depends on the … of humus in it.
   a) weathering b) amount c) types
3. The middle layer of the soil … less organic material.
   a) contains b) changes c) absorbs
4. The lower layer is made of inorganic material … to the parent rock.
   a) contrary b) similar c) like
5. Without nitrogen plants and animals cannot … .
   a) form b) bind c) grow
6. Repeated cropping and overgrazing cause … of the top layer of the soil.
   a) weathering b) erosion c) moisture
7. The final stage of the loss of topsoil is … .
   a) desertification b) erosion c) weathering
8. Salinization is caused by perennial … in arid climates.
   a) farming b) irrigation c) evaporation
9. The quality of soil can be … by adding fertilizers.
   a) damaged b) decreased c) improved
10. Artificial fertilizers cause environmental … by a process called eutrophication.
   a) effect b) damage c) growth

Ex.4.14. Find English equivalents to the Ukrainian word combinations.

Багаторічна іригація (зрошення), сухий клімат, розчиняти в воді, погрожувати, підтримувати життя рослин, стати неродючою (про землю), опустелювання, збезлісення, верхній шар грунту,

вуглекислий газ, вивітрювання (ерозія) породи, температурні зміни, засолення (грунтів), надмірне підбурювання пасовища, виснажувати (грунт), вбирати вологу, вапняк, чергувати культури, інтенсивне сільське господарство, руйнувати породи, родючість грунту.

Ex.4.15. Read the text and discuss why and where erosion occurs.

Erosion

Erosion is the action of surface processes (such as water flow or wind) that removes soil, rock, or dissolved material from one location on the Earth's crust, and then transports it to another location . This natural process is caused by the dynamic activity of erosive agents, that is, water, ice (glaciers), snow, air (wind), plants, animals, and humans. In accordance with these agents, erosion is sometimes divided into water erosion, glacial erosion, snow erosion, wind erosion, etc. The particulate breakdown of rock or soil into clastic sediment is referred to as physical or mechanical erosion; this contrasts with chemical erosion, where soil or rock material is removed from an area by its dissolving into a solvent (typically water), followed by the flow away of that solution. Eroded sediment or solutes may be transported just a few millimetres, or for thousands of kilometres.

While erosion is a natural process, human activities have increased by 10–40 times the rate at which erosion is occurring globally. At well-known agriculture sites such as the Appalachian Mountains, intensive farming practices have caused erosion significantly compared to the natural rate of erosion in the region. Excessive (or accelerated) erosion causes both 'on-site' and 'off-site' problems. On-site impacts include decreases in agricultural productivity and (on natural landscapes) ecological collapse, both because of loss of the nutrient-rich upper soil layers. In some cases, the eventual end result is desertification. Off-site effects include sedimentation of waterways and eutrophication of water bodies, as well as sediment-related damage to roads and houses. Water and wind erosion are the two primary causes of land degradation; combined, they are responsible for about 84 % of the global extent of degraded land, making excessive erosion one of the most significant environmental problems worldwide.

Intensive agriculture, deforestation, roads, anthropogenic climate change and urbanisation are amongst the most significant human activities in regard to their effect on stimulating erosion. However, there are many prevention and remediation practices that can stop or limit erosion of vulnerable soils.

Ex.4.16. Match the words in column A with those in column B and translate these word combinations into Ukrainian.

A	B
erosive	farming
intensive	erosion
ecological	practices
land	agent
waterways	degradation
sediment-related	collapse
excessive	sedimentation
prevention	damage

Ex.4.17. Complete the sentences according to the text:

1. Erosion is … .
2. Erosion is caused by … .
3. Excessive (or accelerated) erosion results … .
4. On-site impacts include … .
5. Off-site effects include … .
6. Water and wind erosion are … .

Ex.4.18. Match the words with their definitions:

1)	erosion	a)	the mechanical and chemical breakdown of rocks by the action of rain, snow, cold, etc.
2)	silt	b)	a prolonged period of abnormally low rainfall, leading to a shortage of water
3)	weathering	c)	water or other liquid diffused in a small quantity as vapour, within a solid, or condensed on a surface
4)	reduce	d)	the gradual destruction and removal of rock or soil in a particular area by rivers, the sea, or the weather.

5)	drought	e) the action or process of causing so much damage to something that it no longer exists
6)	moisture	f) fine sand, clay, or other material carried by running water and deposited as a sediment, especially in a channel or harbour
7)	exhaust	g) provide with something needed or wanted
8)	famine	h) make smaller or less in amount, degree, or size
9)	destruction	i) extreme scarcity of food
10)	supply	j) use up (resources or reserves) completely

Ex.4.19. Speak on the topics using key words below.

1. The weathering of rock.

(*To form; to make the rock expand and contract; to shatter into pieces; to dissolve rocks; to break down; to be formed from decaying organic matter; to contain; to absorb moisture; to bind inorganic particles together; to depend on*)

2. Farming methods.

(*To rotate cereal crops; to deplete the soil; to cause erosion; to remove; to be crucial; deforestation; desertification; poor quality subsoil; to support plant growth; to become barren; salinization; perennial irrigation; arid climate; to increase the salinity of water; to support plant life*)

3. How to improve the quality of soil.

(*To add fertilizers; to enrich the soil with micronutrients; to contain; artificial fertilizers; natural organic fertilizers; to cause environmental damage; to encourage the growth of algae; to break the balance of nature*)

4. What contributes to the greenhouse effect.

(*To rot; to die; to become contaminated with nitrous oxide*)

Ex.4.20. Make up as many word expressions as possible and translate them into Ukrainian.

to kill	pesticides
to absorb	cancer
to accumulate	birth defects
to cause	insects
to increase	crop yield
to reduce	microorganisms

to introduce	water
to deplete	capacity
	failure of crops
	damage
	farming methods
	soil quality

Ex.4.21. Match the following words with their synonyms.

hazard	join (unite)
absorb	whole
similar to	necessary
remove	development
deplete	become better
essential	take in (suck in)
growth	take off / away
arid	use up
add	dry
entire	like (of the same sort)
improve	danger

Ex.4.22. Match the words with their definitions.

1) rock	a) not able to produce crops
2) expand	b) varying the crops grown each year on the same land to avoid exhausting the soil
3) contract	c) having not enough rainfall to support plants
4) decay	d) continuing throughout the whole year
5) bind	e) solid stony part of the earth's crust
6) fertile	f) make or become larger
7) similar	g) lose power; go bad
8) remove	h) tie or fasten
9) rotation (of crops)	i) producing much
10) barren	j) like; of the same sort
11) perennial	k) make or become smaller or shorter
12) arid (of climate)	l) take off or away (from the place occupied)

Ex.4.23. Read the text and answer the questions:

1. What are the main fossil fuels?
2. What problems does coal mining cause?
3. Where is petroleum used?
4. Why is natural gas a clean form of energy?

Fossil fuels

Fossil fuel is a general term for buried combustible geologic deposits of organic materials, formed from decayed plants and animals that have been converted to crude oil, coal, natural gas, or heavy oils by exposure to heat and pressure in the earth's crust over hundreds of millions of years.

Fossil fuels contain high percentages of carbon and include petroleum, coal, and natural gas. Other commonly used derivatives include kerosene and propane. Fossil fuels range from volatile materials with low carbon to hydrogen ratios like methane, to liquids like petroleum, to nonvolatile materials composed of almost pure carbon, like anthracite coal. Methane can be found in hydrocarbon fields either alone, associated with oil, or in the form of methane clathrates.

Although fossil fuels are continually being formed via natural processes, they are generally considered to be non-renewable resources because they take millions of years to form and the known viable reserves are being depleted much faster than new ones are being made.

The use of fossil fuels raises serious environmental concerns. The burning of fossil fuels produces around 21.3 billion tonnes of carbon dioxide (CO_2) per year. It is estimated that natural processes can only absorb about half of that amount, so there is a net increase of 10.65 billion tonnes of atmospheric carbon dioxide per year. Carbon dioxide is a greenhouse gas that increases radiative forcing and contributes to global warming. A global movement towards the generation of low-carbon renewable energy is underway to help reduce global greenhouse gas emissions.

Coal

Coal supplies us with about 28 % of all the energy used. It is burned to make water hot and produce steam. The steam, in turn, generates electric power or operates steam engines. In many countries people use coal to heat their homes.

Coal mining caused many problems in the past. Accidents in coal mines kill workers every year and breathing coal dust can lead to lung diseases. Although many factories have installed cleaning filters, coal emits sulphur oxides that pollute our air when burned.

Today, scientists are looking into ways to burn coal in a cleaner way – like turning it into liquid or gas first. Such methods are still very expensive and probably cannot be used on a large scale for years to come.

Coal will remain a major source of energy for a long time, because the world still has reserves to last a few hundred years.

Petroleum

Petroleum or crude oil supplies the world with about 40 % of its energy. It is not only used to make petrol and heating oil but chemicals, fertilizers, plastics, drugs and other products as well.

Most of our petroleum lies in rock layers deep below the surface of the earth. Oil workers pump it out by drilling into these layers. Then it is transported over long distances, mostly by pipeline or tankers to refineries, where it is made into petrol and diesel as well as other petroleum products.

But like coal, petroleum creates problems in our environment. Tanker accidents cause oil to leak out into the ocean. Burning petrol or diesel in cars and trucks leads to smog and other kinds of pollution.

Although oil reserves are slowly running out, oil companies are constantly searching for new reserves. Such new reserves, however, lie mostly in areas which are very difficult to reach.

In some places, like the western United States, there are big deposits of oil rock, called oil shale. Petroleum can be extracted from this rock but such a process is still very expensive.

Natural Gas

About 20 % of the energy used worldwide comes from natural gas. Deposits are usually found in the same areas as petroleum, but there are places, like Siberia that have gigantic gas fields.

Natural gas is a cleaner form of energy because it doesn't have most of the pollutants that coal and oil have. The gas is turned into liquid and can be transported over long distances through pipelines.

Ex.4.24. Circle which of the following energy sources are represented by fossil fuels:

Coal – solar energy – petroleum – wind energy – nuclear energy – tidal energy – natural gas – methane – geothermal energy – kerosene – biomass energy.

Ex.4.25. Match the words with their definitions.

1)	crude oil	a)	something that is put on a field to make plants grow
2)	deposit	b)	a factory where oil is made purer and into other products
3)	drill	c)	oil that comes out of an oil well naturally
4)	fertilizer	d)	material between two things
5)	layer	e)	illnesses that make it hard for you to breathe
6)	lung disease	f)	a layer of a mineral or metal in rocks
7)	reserves	g)	sandy, soft rock that has oil in it
8)	run out	h)	to make a hole into the earth with a machine
9)	oil shale	i)	to become less and less
10)	refinery	j)	raw materials

Ex.4.26. Use the words from the box to complete the paragraph.

electricity	gas	pollution	burned
coal	oil	fossil	carbon dioxide

Most of the energy they use in Britain comes from 1)_____ fuels. Three fossil fuels are: 2)_____, 3)_____and 4)_____. Fossil fuels are 5)_____ to give us energy, and are often used to generate 6)_____. This produces 7)_____, as well as sulphurous and nitrous oxides that can lead to air 8)_____ and acid rain.

Ex.4.27. Read the text and answer to the following questions.

1. Why do we need energy?
2. Which traditional energy sources are available?
3. Which environmental problems are related to the use of fossil fuels?
4. What are the alternative sources of energy?

5. Which of the alternative sources are renewable?
6. Why is the use of nuclear energy controversial?

Sources of energy

The energy is very important in our life because we use it for transportation, for electricity production, for house heating and for cooking gas. Traditional energy sources are coal, petroleum and natural gas. Coal is a solid fossil fuel used for production of energy and chemical compounds. Petroleum is a mixture of hydrocarbons derived from the decomposition of organic matter in anaerobic conditions. Natural gas and other fossil fuels are separated from crude oil through fractional distillation. Natural gas is mainly composed of methane; since it's colourless and odourless, for safety reasons an odorant called mercaptan is added to the gas before being delivered. The use of fossil fuels rises several issues related to the environmental pollution, since combustion releases CO_2 in the atmosphere contributing to global warming, to the high risks of environmental disasters during extraction and delivery and to the increasing costs due to their limited availability.

Nuclear energy may represent an alternative source of energy, but uranium is not present in unlimited amounts. Nuclear power is characterised by the very large amount of energy produced from a very small amount of fuel, however, much of the waste produced is radioactive and therefore must be carefully managed as hazardous material. Some renewable sources of energy have been developed, such as solar energy, tidal energy, biomass energy, wind energy, hydroelectric energy, geothermal energy.

Solar energy is used for heating water and for electricity production (photovoltaic energy). Wind power derives from the conversion of wind energy into electricity by using a turbine and a generator. Geothermal energy exploits the endogenous heat inside the Earth. Hydroelectric energy exploits the gravitational force of water falling, while tidal energy is based on the conversion of the gap between high and low tide into electricity. Biomass energy is derived from several sources such as wood, landfill gases, garbage, waste and alcohol fuels. Such sources provide great advantages since they are unlimited and they are not depleted by use, but there are some disadvantages, such as the high

costs in building the power plants and the fact that their use is limited by the characteristic of the territory. Further technological improvements aim to the reduction of power plants costs and of CO_2 emissions.

Ex.4.28. Decide if the sentences are true or false.

1. Scientific community agrees that oil reserves are unlimited.
2. Coal is a liquid fossil fuel.
3. Petroleum is a mixture of hydrocarbons.
4. Natural gas is colourless and odourless.
5. Hydrocarbon combustion contributes to global warming.
6. Solar energy can only be used for electricity production.
7. Wind energy is a renewable source of energy.
8. Geothermal energy exploits heat from the sun.

Ex.4.29. Circle which of the following energy sources are renewable:

Coal – solar energy – petroleum – wind energy – nuclear energy – tidal energy – natural gas – methane – geothermal energy – kerosene – biomass energy.

Ex.4.30. Match the words on the left with the correct definition on the right:

1) coal	a) main component of natural gas
2) solar energy	b) process related to nuclear energy
3) fission	c) in the absence of oxygen
4) photovoltaic energy	d) important part of the hydroelectric power plant
5) methane	e) substance added to natural gas for safety reasons
6) wind farm	f) renewable source of energy
7) nuclear energy	g) solid fossil fuel
8) dam	h) alternative, but not renewable source of energy
9) mercaptan	i) type of solar energy used for electricity production
10) anaerobic condition	j) groups of wind turbines in the same location

Ex.4.31. Choose the best option to complete the sentences.

1. Coal is _____ .
   a) an alternative source of energy b) a solid fossil fuel
   c) a renewable source of energy d) a liquid fossil fuel
2. ____ is the main hydrocarbon component of natural gas.
   a) Methane b) Ethane c) Propane d) Butane
3. ____ is a renewable source of energy.
   a) Uranium b) Sun c) Petroleum d) Coal
4. Photovoltaic solar energy is used for ____ .
   a) heating water b) steam production
   c) kinetic energy conversion d) electricity production
5. Wind energy is obtained by converting _____.
   a) electric energy in kinetic energy
   b) chemical energy in electric energy
   c) kinetic energy in electric energy
   d) electric energy in kinetic energy
6. Hydroelectric energy is produced by using ____.
   a) different temperature of water b) force of falling water
   c) highly pressurized water d) electrolysis of water
7. Geothermal energy exploits ____.
   a) heat from the sun b) heat inside the Earth
   c) steam from boiling water d) hot water from the house
8. ____ represents one of the reasons for controversial in the use of nuclear energy.
   a) The unlimited reserves of uranium
   b) The very low cost of construction of nuclear power plant
   c) The low risk related to nuclear power plant
   d) The disposal of radioactive waste

Ex.4.32. Read the text. In the first paragraph fill in the gaps with the words from the box below. In the second paragraph choose appropriate words.

a) solar	b) combined	c) seventh	d) greenest
e) increase	f) broke	g) free	h) fossil

The United Kingdom is doing a lot to (1)_____ its use of renewable energy. It is moving away from (2)_____ fuels

and making more use of green energies, such as wind power, nuclear power and (3)_____ energy. New figures from the UK's electricity provider show that the UK had its (4)_____ year ever in 2017 for electricity production. It even had its first coal-(5)_____ day for over 150 years. The UK (6)_____ 13 clean energy records in 2017. In June, wind, nuclear and solar power produced more electricity than gas and coal (7)_____. It was the first time this has ever happened. The UK's power system is now the fourth cleanest in Europe and the (8)_____ cleanest in the world.

The United Kingdom has been *tried / trying* to reduce the amount of coal it uses. Coal now *supplies / supply* less than 7 per cent of the UK's *electrical / electricity*. A spokesman said it must now try to use fewer / less gas to make sure it meets its target for greenhouse gas *emissions / remissions*. The UK currently uses too much gas. The *conversation / conservation* charity World Wildlife Fund said it was pleased that the UK is moving *forwards / towards* greener energy. It said: 'We have never been cleaner or greener, and we are on [target] for an even better year in 2018'. It added: 'Climate change is *weakening / wreaking* havoc on our nature and wildlife, but we are at *last / lost* facing up to the challenge. We are turning our backs on polluting fossil fuels and embracing a new, *clean / cleanse* future'.

Ex.4.33. Choose the best option to complete the sentences according to the text.

1. The United Kingdom is doing a lot to increase its _____ energy.
   a) used of renewable b) user off renewable
   c) use of renewable d) use off renewable
2. It is moving away from fossil fuels and making more use of _____.
   a) greenish energies b) greened energies
   c) greens energies d) green energies
3. The figures from the UK's electricity provider show that the UK had its greenest year _____.
   a) never in 2017 b) even in 2017
   c) ever in 2017 d) every in 2017

4. The wind, nuclear and solar power produced more electricity than gas _____.
   a) end coal combine b) and coal combined
   c) and coals combined d) and coal combine
5. The UK's power system is now the _____ Europe.
   a) fourth cleanest on b) fourth cleanest in
   c) fourth clean nest in d) fourth clean nest on
6. The United Kingdom has been trying to reduce _____ coal it uses.
   a) the a mountain of b) the a mount of
   c) the all mount of d) the amount of
7. A spokesman said it must now try to use less gas to make sure it _____.
   a) meets its target b) meet its target
   c) meets it target d) meet it target
8. World Wildlife Fund said it was pleased that the UK is moving _____ energy.
   a) two wards greener b) too wards greener
   c) towards greener d) tow wards greener
9. It added: 'Climate change is wreaking _____ nature'.
   a) havoc on hour b) havoc on your
   c) havoc in our d) havoc on our
10. We are turning our backs on polluting fossil fuels and embracing _____ future.
   a) a new, clean b) anew, cleaned
   c) a news, clean d) a new, cleaned

Ex.4.34. Put the words into correct order to complete the sentences.

1. moving / from / fuels / is / away / fossil / It.
2. New / from / UK's / provider / figures / the / electricity.
3. power / more / than / Solar / produced / electricity / gas.
4. was / has / the / ever / first / happened / time / It / this.
5. the / power / fourth / system / cleanest / is / The / now / UK's.
6. Trying / of / to / coal / reduce / it / the / uses / amount.
7. try / now / must / It / gas / less / use / to.
8. The / is / towards / energy / UK / moving / greener.

9. Climate / nature / our / on / havoc / wreaking / is / change.
10. fossil / on / backs / our / turning / are / We / fuels.

Ex.4.35. Match the words with their definitions.

A

1) renewable	a)	a black or dark brown rock found underground deposits and burnt for heating or power
2) fossil fuels	b)	something that creates and gives something to people
3) provider	c)	a natural source of power that comes from under the ground or under the sea, such as coal and gas
4) solar	d)	a set of connected things or parts forming a bigger whole
5) coal	e)	a type of energy that is not gone forever when it is used
6) combined	f)	about the sun
7) system	g)	united or joined

B

8) reduce	h)	gives or provides someone with something needed or wanted
9) supplies	i)	now; at the present time
10) target	j)	making the air, rivers, seas or other things dirtier because of dangerous things going into them
11) emissions	k)	a goal, objective or result which people try to reach or get to
12) currently	l)	lots and lots of damage and destruction
13) havoc	m)	the production and sending out of something, especially gas or radiation
14) polluting	n)	make smaller or less in amount, degree, or size

Ex.4.36. Put the letters in the underlined words into correct order.

1) <u>resnaice</u> its use of renewable energy
2) moving away from <u>isfsol</u> fuels
3) <u>lurance</u> power
4) <u>eirtyticlce</u> production
5) <u>lroas</u> power

6) The UK's power sytsme
7) reduce the atmnuo of coal it uses
8) greenhouse gas nseosmisi
9) The conservation htircay World Wildlife Fund
10) wreaking vcoah on our nature
11) facing up to the clalenghe
12) embracing a new, clean rfueut

UNIT 5. ATMOSPHERE

Key words

ozone layer – озоновий шар
to surround – оточувати
oxygen – кисень
vapour – пара
to reflect – відображати
irreversible – незворотний
radiation – радіація
hurricane – ураган
to convert – перетворити
temperature – температура
average – середній
to absorb – поглинати
to predict – передбачити
to rise – піднімати(ся)
ultraviolet radiation – ультрафіолетове випромінювання
depletion – виснаження
to melt – танути
to extend – подовжити
to consist of – складатися з
chlorofluorocarbon (CFC) – хлорфторуглерод
to compare – порівнювати
to contribute to – робити внесок у
to accelerate – прискорити
emission – викид, випуск
moisture – вологість
weather forecast – прогноз погоди
properties – властивості
latitude – широта
precipitation – опади
electrically charged particles – електрично заряджені частинки

Ex.5.1. Read the text and name the main layers of the atmosphere.

Atmosphere and its Constituents

Earth's atmosphere has a series of layers, each with its own specific traits. Moving upward from ground level, these layers are named the troposphere, stratosphere, mesosphere, thermosphere and exosphere.

The troposphere is the lowest layer of the atmosphere. Starting at ground level, it extends upward to about 10 km above sea level. Most clouds appear here, mainly because 99 % of the water vapor in the atmosphere is found in the troposphere. The more the distance from the earth, the colder temperature is and the lower air pressure is.

The next layer up is called the stratosphere. The stratosphere extends from the top of the troposphere to about 50 km above the ground. Ozone molecules in this layer absorb high-energy ultraviolet (UV) light from the sun, converting the UV energy into heat. Unlike the troposphere,

the stratosphere actually gets warmer the higher you go. Commercial passenger jets fly in the lower stratosphere, partly because this less-turbulent layer provides a smoother ride.

Above the stratosphere there is the mesosphere. It extends upward to a height of about 85 km above the planet. Most meteors burn up in the mesosphere. Unlike the stratosphere, temperatures once again grow colder as you rise up through the mesosphere. The coldest temperatures in Earth's atmosphere, about -90 °C (-30 °F), are found near the top of this layer.

The layer of very rare air above the mesosphere is called the thermosphere. High-energy X-rays and UV radiation from the sun are absorbed in the thermosphere, raising its temperature to hundreds or at times thousands of degrees. In many ways, the thermosphere is more like outer space than a part of the atmosphere. Many satellites actually orbit Earth within the thermosphere.

Although some experts consider the thermosphere to be the uppermost layer of the atmosphere, others consider the exosphere to be the actual 'final frontier' of Earth's gaseous envelope. Air in the exosphere is gradually 'leaking' out of Earth's atmosphere into outer space.

The ionosphere is not a distinct layer like the others mentioned above. Instead, the ionosphere is a series of regions in parts of the mesosphere and thermosphere where high-energy radiation from the sun separates electrons from their parent atoms and molecules. The electrically charged atoms and molecules that are formed in this way are called ions, giving the ionosphere its name and endowing this region with some special properties.

Ex.5.2. Answer the questions on the text above.

1. What are the main layers of the atmosphere?
2. Where is the highest concentration of water vapor in the atmosphere?
3. In which layer is the UV energy converted into heat?
4. What is the coldest temperature found in the atmosphere?
5. Why is the temperature raising significantly in the thermosphere?
6. How did the ionosphere get its name?

Ex.5.3. Complete the sentences with the words from the box.

a) considered	b) layer	c) air pressure	d) absorbed
e) extends	f) satellites	g) sea level	h) ions

1. Each …of the atmosphere has its own specific traits.
2. The troposphere extends up to about 10 km above … .
3. The stratosphere … from the top of the troposphere to about 50 km above the ground.
4. High-energy ultraviolet light from the sun is … by ozone molecules in the stratosphere.
5. The higher you go in the troposphere, the lower … becomes.
6. A lot of … can be found in the thermosphere orbiting Earth.
7. The thermosphere is … the uppermost layer of the atmosphere.
8. … are formed in the ionosphere by separating electrons from their parent atoms and molecules.

Ex.5.4. Match the layers of the atmosphere with their descriptions.

1) troposphere	a) the layer in which most meteors burn up
2) stratosphere	b) the actual final layer of the atmosphere
3) mesosphere	c) the lowest layer of the atmosphere
4) thermosphere	d) the layer which has some special properties due to the presence of electrically charged particles
5) exosphere	e) the layer in which ozone molecules convert UV energy into heat
6) ionosphere	f) the layer that is similar to outer space

Ex.5.5. Read the text and complete it with the following phrases.

1) electrically charged particles
2) are also present
3) surrounds the earth
4) a large hole in the ozone layer
5) shortwave ultraviolet radiation
6) inert gases

Ozone Layer

The atmosphere is the layer of gas that (1)_____. The composition of the atmosphere changes with the distance from

the earth's surface. The layer near the surface – the troposphere – contains the air we breathe which consists of nitrogen (78 %), oxygen (21 %), carbon dioxide (0.03 %) and (2)_____ (1 %). Water vapor, small particles of dust and tiny quantities of other gases such as helium, ozone, nitrous oxide, and methane (3)_____. The stratosphere contains thin, cold air with less oxygen and no dust or water vapor. The ionosphere is a thin layer of air with (4)_____ which reflect electromagnetic waves.

The lower part of the stratosphere is a band of warm gas called the ozone layer (15–40 km above sea level). Ozone absorbs (5)_____ – harmful, burning rays from the sun. These rays kill plants and cause burns, skin cancer, and cataracts in animals and people. The ozone layer protects us from these damaging effects. The man-made chemicals such as chlorofluorocarbons (CFCs) break up ozone molecules. Most scientists believe that CFCs are bad for the environment and they have already caused (6)_____. CFCs also contribute to the greenhouse effect.

Ex.5.6. Decide whether the following statements are true or false.

1. Gases around the earth form the atmosphere.
2. The air from the stratosphere is vital for people to live.
3. The amount of carbon dioxide in the troposphere is more than the amount of oxygen in it.
4. Dust and water vapor can't be found in the stratosphere.
5. Ultraviolet radiation is dangerous burning rays from the sun.
6. Some artificial chemicals unite ozone molecules.

Ex.5.7. Match the words with their definitions.

1) layer	a) to make something bigger or longer
2) atmosphere	b) a gas used in fridges and, in the past, in aerosols which damages the ozone layer
3) ion	c) to take something in, especially gradually
4) radiation	d) a level of material, such as a type of rock or gas, that is different from the material above or below it, or a thin sheet of a substance

5)	to extend	e)	an atom that has an electrical charge because it has added or lost one or more electrons
6)	to absorb	f)	a chemical element that is a gas with no smell or colour
7)	chlorofluorocarbon (CFC)	g)	the mixture of gases around the earth
8)	ultraviolet (UV) light	h)	a gas which is a result of heating water or ice
9)	oxygen	i)	a form of energy that that can be very dangerous to health
10)	water vapor	j)	light of this type causes the skin to become darker in the sun

Ex.5.8. Fill in the gaps with appropriate words from the box.

cancer ozone layer aerosol can ozone friendly ultraviolet radiation CFCs

The (1)_____ is a layer of gas high above the surface of the earth that helps protect it from the sun's (2)_____, which can damage our skin and cause (3)_____.

Scientists have recently discovered holes in the ozone layer, caused by substances called (4)_____ (chlorofluorocarbons). CFCS are used in the refrigerators, (5)_____ and in the manufacture of some plastic products. Some companies now make aerosols that don't contain CFCs, and these are often marked (6)_____.

Ex.5.9. Choose an appropriate word to complete the text.

Ozone Layer in Danger

Do you know what's happening to the ozone layer around the Earth? Well, it is *disappearing / getting wider*. Being 20 km wide, it *helps / protects* our planet from the sun's *useful / dangerous* rays but unfortunately there are two *huge / tiny* holes in it. The hole over the Arctic is the size of Greenland and the *one / ones* over the Antarctic is the size of the USA. Without the ozone

layer there is nothing to protect the world from the harmful sun rays – *chlorofluorocarbons / ultraviolet light*. UV rays cause *lung diseases / skin cancer* and *eye / hair* problems, and they also damage the plants.

The truth is that the human being is *destroying / taking care of* the ozone layer by putting CFCs into the air. They can be found in aerosols, fridges, freezers and air conditioners.

It's up to us to stop *protecting / damaging* the ozone layer!

Ex.5.10. Complete the sentences according to the text above.

1. The … is disappearing.
2. The ozone layer has two … .
3. The name of the harmful sunrays is … .
4. The places over which the holes have been appeared are … and … .
5. The diseases caused by the sun's rays are … and … .
6. These rays also destroy … .
7. The … is damaging the ozone layer.
8. CFCs can be found in …, …, …. and … .

Ex.5.11. Fill in the gaps with appropriate prepositions.

1. Natural sources contribute … the depletion of the ozone layer but not as much as human activity.
2. Natural sources account … approximately 15–20 % of ozone damage.
3. The most important gas which leads … acidification is sulphur dioxide.
4. It's well known that depletion of ozone layer causes skin cancer … human beings.
5. Ozone concentration … the lower stratosphere over Antarctica will increase … 5–10 % by 2020.
6. The ionosphere protects the biosphere … the harmful effect of cosmic radiation.
7. Twelve European countries have agreed to reduce nitrogen oxide emissions … 30 % … 2025.

Ex.5.12. Speak on the topics using key words below.

1. The composition of the atmosphere.

(*To surround the earth*, *to be divided into*, *a layer*, *to contain*, *to be present*, *electrically charged particles*, *to reflect waves*).

2. The ozone layer depletion.

(*To absorb UV radiation*, *to cause burns*, *damaging effects*, *CFCs*, *to contribute to the greenhouse effect*, *to occur in*, *the Arctic*, *the Antarctic*, *dangerous*, *aerosols*, *fridges*, *freezers*, *air conditioners*).

Ex.5.13. Read and answer the questions.

Climate and weather

There is often confusion between weather and climate. Weather is the condition of the atmosphere at a particular place over a short period of time, whereas climate refers to the weather pattern, using statistical data, of a place over a long enough period to yield meaningful averages.

Meteorology studies weather, while climatology studies climate; both are atmospheric sciences. Climate is an important physical element because it indicates the atmospheric condition of heat, moisture and circulation; it plays a dominant role in shaping vegetation and soil; and it ultimately affects all forms of life, as a result of the very definition of the word, which is a scientific prediction, based on evidentiary statistics, sustained over a long period.

There are many elements that make up both the weather and the climate of a geographical location. The most significant of these elements are temperature, atmospheric pressure, wind, solar irradiance, humidity, precipitation, and topography. The greatest influence of climatic change is associated with not only natural, but also artificial factors, which can be measured in terms of both short-term and long-term climate change.

The most important factors affecting climate are latitude, altitude, distance to the ocean or sea, orientation of mountain ranges toward prevailing winds, and the ocean current.

1. What's the difference between climate and weather?
2. What does climate indicate?
3. What elements make up the weather and climate?
4. What two groups of factors cause climatic change?
5. What are the most important factors having influence on climate?

Ex.5.14. Match the words with their definitions:

1)	predict	a)	rain, snow, sleet, or hail that falls to or condenses on the ground
2)	average	b)	very great; intense
3)	precipitation	c)	the weather conditions prevailing in an area in general or over a long period
4)	survive	d)	interrupt (an event, activity, or process) by causing a disturbance or problem
5)	climate	e)	a storm with thunder and lightning and typically also heavy rain or hail
6)	accurate	f)	the result obtained by adding several amounts together and then dividing this total by the number of amounts
7)	hail	g)	(especially of information, measurements, or predictions) correct in all details; exact
8)	thunderstorm	h)	continue to live or exist, especially in spite of danger or hardship
9)	disrupt	i)	pellets of frozen rain which fall in showers from cumulonimbus clouds
10)	severe	j)	say or estimate that (a specified thing) will happen in the future or will be a consequence of something

Ex.5.15.The following words are related to WEATHER. Decide which ones go with GOOD WEATHER and which with BAD WEATHER.

For example, GOOD WEATHER: hot, ...

BAD WEATHER: gloomy, ...

Gloomy, damp, hot, windy, sunshine, bright, lightning, cloudless sky, stormy, snowy, dark sky, gentle wind, sunny, cloudy, blue sky, overcast, warm breeze.

Ex.5.16. Choose the correct alternatives in these sentences.

1. You don't really need an umbrella – it's just a light *drizzle/storm/rain.*

2. I wish it wasn't so *humid/chilly/cloudy* today. I can't stop shivering.

3. There's a really *strong/heavy/rough* wind. We should go and fly our kite.

4. The *fog/cloud/frost* was so bad we couldn't find our car for ages.

5. I got caught in a heavy *shower/ sunshine/lightning* on the way home and got soaked to the skin!

Ex.5.17. Read and say what weather forecasting involves and what forecasters rely on.

Forecasting weather

Weather forecasting is the attempt to predict the weather of a place for the next few hours or days. The U.S. federal government funds billions of dollars to the National Weather Service, which has four functions: to provide severe weather warnings, weather observations and forecasting, education, and aviation briefings. Along with the general forecasts broadcast on television and radio and published in the newspapers, the Weather Service provides specialized reports to people.

The business of weather forecasting begins with the collection of weather data such as temperature, pressure, wind speed, wind direction, cloud forms, and rain. The data are plotted on maps and make it possible to analyze the general atmospheric conditions. The visual models of the weather systems are converted to numerical computer models. In mid-latitudes weather systems such as cyclones with their fronts and anticyclones are the main features of weather maps. They are the basic models that forecasters use to predict the weather after computing the speed, direction, and internal features of each system. Since the continuous flow of data indicates that they are changing, sometimes in unexpected ways, forecasters must continuously update their predictions.

Forecasting weather for longer periods of time will require a better understanding of how the polar-front jet-stream functions and links to surface weather systems. The forecasts are not perfect, but improving technical facilities and understanding have led to great improvements in the past thirty years.

Ex.5.18. Decide whether the statements are true or false.

1. Forecasters are able to predict weather changes of an area for a few days ahead.

2. Weather observations and forecasting aren't important for the U.S. federal government.

3. To analyze the general atmospheric conditions forecasters need to collect a lot of data.

4. Cyclones and anticyclones are essential models in predicting the weather.

5. There is no need to update weather data regularly.

6. The accuracy of forecasts hasn't changed for the last thirty years.

Ex.5.19. Underline the adjective which best describes the following weather nouns.

fine / heavy drizzle	*strong / thick fog*
strong / heavy shower	*powerful / mild hurricane*
sudden / light downpour	*loud / thick thunderstorm*
powerful / freezing sleet	*brief / destructive typhoon*
violent / hard hailstorm	*heavy / thin snowfall*
dense / light rain	

Ex.5.20. Find the odd word out:

1) monsoon, rain, drought, drizzle;
2) breeze, hurricane, wind, draught;
3) smoke, mist, fog, vapor;
4) hot, boiling, scorching, chilly;
5) sunny, clear, fine, overcast;
6) hail, snow, lightning, sleet.

Ex.5.21. Look at these extracts from postcards about the weather. Put the words/phrases in bold in the correct column in the table.

1. I can't believe it – it's been **pouring with rain** all week long!

2. Most days it's been fairly **cloudy** with a **light drizzle** – I wish it would decide if it's going to rain properly or not!

3. Yesterday there was a **strong wind**, which was great for windsurfing.

4. It's quite **warm** and **humid** during the day, but it can get **freezing cold** at night.

5. When we went outside the tent this morning, there was **frost** on the ground and a **thick fog** – we could hardly see the other tents!

6. The weather's been lovely – blue skies and **unbroken sunshine** but with a **gentle breeze** to keep us cool!

7. Last night there was the most amazing storm with some really dramatic **thunder and lightning.**

8. It's been quite chilly for September and we've had quite a few **showers**, too, which hasn't been great.

Rain	Wind	Temperature	Snow / Ice	Other

Ex.5.22. Look again at the types of weather in Ex.5.21. Answer the questions.

1. Which do you hate?
2. Which do you not mind?
3. Which do you love?
4. Which have you never experienced?

Ex.5.23. Read the text and choose the best option (*a*, *b*, *c or d*) *to complete the sentences below.*

Climate changes

Experts in climatology and other scientists are becoming extremely concerned about the changes to our climate which are taking place. Admittedly, climate changes have occurred on our planet before. For example, there have been several ice ages or glacial periods.

These climatic changes, however, were different from the modern ones in that they occurred gradually and, as far as we know, naturally. The changes currently being monitored are said to be the result not of natural causes, but of human activity. Furthermore, the rate of change is becoming alarmingly rapid. The major problem is that the planet appears to be warming up. According to some experts, this warming process, known as global warming, is occurring at a rate unprecedented in the last 10,000 years.

The implications for the planet are very serious. Rising global temperatures could give rise to such ecological disasters as extremely high increases in the incidence of flooding and of droughts. These in turn could have a harmful effect on agriculture. It is thought that this unusual warming of the Earth has been caused by so called greenhouse gases, such as carbon dioxide, being emitted into the atmosphere

by car engines and modem industrial processes, for example. Such gases not only add to the pollution of the atmosphere, but also create a greenhouse effect, by which the heat of the sun is trapped. This leads to the warming up of the planet.

1. The chief worry regarding changes in climate is … .
   a) that they are gradual and natural
   b) that they are rapid and brought about by man
   c) that they have never occurred before
   d) that they are not perceptible
2. 'Global warming' means … .
   a) decreasing temperature b) melting of ice bergs
   c) rise in temperature d) longer summers
3. Rising temperature leads to … .
   a) pollution b) natural disasters
   c) diseases d) greenhouse gasses
4. Greenhouse effect is … .
   a) trapping of solar heat b) reduction of sunlight
   c) pollution on earth d) flooding on earth
5. Climatology means … .
   a) study of climate b) study of changes in weather
   c) study of global warming d) study of natural disasters

Ex.5.24. Read a magazine article about global warming. Eight paragraphs have been removed from the article. Choose from paragraphs A–I the one which fits each gap (*1–8*)*. There is one extra paragraph which you do not need to use.*

What's up with the weather?

The world climate is in chaos. Freak weather conditions have been so common recently that even the hardest bitten cynics suspect that something odd is going on.

1	

In December 1995, climatologists from the United Nations' Intergovernmental Panel on Climate Change (IPCC) all agreed that global warming is an undeniable fact.

2	

Optimists foresee milder winters and record harvests for farmers. They believe that the severity of storms will reduce due to the stabilizing of differences between the equator and the poles.

3	

In a warmer world, extremes of wet and dry will intensify. In very dry regions where there is little water anyway, an increase in temperatures would worsen droughts and increase desertification – especially in the interiors of continents where rainfall will become very rare. In areas where high levels of rainfall are normal, such as in coastal and mountainous regions, increased water vapor, and hence fiercer rainfall, should be expected.

4	

As a result of this, insurance companies are panicking. Many are trying to persuade governments to regulate emissions of greenhouse gases.

5	

Professor Parry, a member of the IPCC, states that there really isn't very much we can do to stop global warming happening. "Even if we could dramatically reduce industrial emissions, the atmosphere would continue to heat up for another 50 years – because the oceans act like a vast storage heater, holding on to heat and delaying the warming of the air about us".

6	

Some scientists, however, fear that the Flood Barrier may be overwhelmed because the geological structure of Britain means that the south east of England is actually tilting into the sea. This, with the rising sea levels, means that the high-tide level of the River Thames in central London is set to rise by a rate of 75 centimeters a century.

7	

The rest of us won't get off lightly though. Warmer weather is likely to increase the amount of algae in reservoirs and lakes. This will make water treatment and purification more difficult and there will probably be an increase in stomach-and intestine-related illnesses. Fierce storms could also bring about health problems.

8	

A. It seems as though these serious and urgent predictions are already coming true. Recently, Hurricane Andrew cost American insurance

companies $16.5 billion and insurers worldwide have concluded that the greenhouse effect could bankrupt them.

B. World temperatures are forecast to rise by 1.8 to 6.3 °C by the year 2100 but no one is certain what its eventual effects will be. Consequently, a number of theories have been developed.

C. Most scientists' fears are focused on the heavily populated south coast of England. Increased coastal development means that flooding would be catastrophic. The value of the coastal land between Bognor Regis and Bournemouth was recently estimated at £5,745 million.

D. In old urban areas, most storm drainage systems are combined with the sewage system. 'Flash flood' storms are therefore likely to send waves of untreated sewage into the watercourse. 'We have to face the fact' – says Professor Parry – 'that climate change is inevitable – and possibly it will be very unpleasant'.

E. The most innovative country in this respect is Spain. In the last three years it has been at the forefront in promoting the use of alternative energy forms – including tidal and hydro-electric power.

F. On New Year's Day of this year, for example, Mexico City had its first snowfall in twenty years; monsoons in India, Bangladesh and Nepal stranded nearly two million people in June, and last year's Caribbean storms were the worst for sixty years. Scientists are now convinced that the world's climate has been changed by mankind.

G. Pessimists on the other hand predict a rise in sea levels of 15 to 96 centimetres – meaning that many low-lying islands like those in the Pacific and Carribean will be totally submerged.

H. At the 1992 Earth Summit in Rio, nations promised to cut their carbon dioxide emissions drastically by the year 2000, although the only country that looks on target is Sweden. The other nations seem to be counting on solutions like solar power to come to the rescue.

I. In Britain, the threat of flooding is being taken very seriously. The Thames Flood Barrier was built to protect London from the rising sea level.

Ex.5.25. Look at the following words from the text and try to explain them:

Cynics, panel, undeniable, foresee, record, harvests, stabilizing, poles, extremes, droughts, continents, vapor, regulate, greenhouse gases, vast, tilting, algae, reservoirs, purification, intestine-related.

Ex.5.26. Complete the sentences with the words from the box:

desertification	odd	freak	severity	intensify	coastal
emissions	overwhelmed	equator	solar	watercourse	
tidal wave	innovative	monsoon			

1. The … of the winter caused many farmers to lose their crops. (harshness)
2. The storm began to … so we had to run for cover. (become stronger)
3. It was demanded that industry should reduce its … of greenhouse gases into the atmosphere. (release)
4. Singapore is only 1° north of the … .(imaginary line round the centre of the earth)
5. … is taking place in Northern Africa due to lack of rainfall. (a change of land into desert)
6. In India the … often brings very bad flooding. (period of heavy rain)
7. A tidal wave completely flooded the … area and left many people homeless. (seashore)
8. It was … that she was wearing a fur coat on such a warm day. (strange)
9. The storm was so strong that the … filled almost immediately. (drainage channel for water)
10. He is a very … chef who is always thinking up new recipes. (original)
11. The dam burst and many villages below were … with flood water. (not able to cope)
12. Due to … weather conditions, we had snow in May. (extremely unusual)
13. Following the earthquake there was a(n) … that destroyed the whole village. (massive wave)
14. In hot countries it's economical to heat water using … power. (sun)

Ex.5.27. Use the words in brackets to form words that best fit the gaps.

These days, meteorologists give us (*0*)*reasonably* (*reasonable*) accurate weather forecasts. But what did we do before 1)_____ (*science*) used modern technology to predict the weather? Well, people looked at their 2)_____ (*surround*) to get clues about what the weather might be like. For example, the movements of clouds tell us a lot about future weather conditions. Clouds moving in different 3)_____ (*direct*) usually mean bad weather is not far off. Animal 4) _____ (*behave*) is another good clue. Look to see where birds are flying in the air. If they are flying higher than usual, the weather will be nice. Stand still and listen. Many animals, 5)_____ (*particular*) birds, tend to go quiet just before it rains. How the air smells is another 6)_____ (*use*) indicator of future weather conditions. There is a saying, 'flowers smell best just before the rain'. This is because smells are stronger in humid air. One more tip: look up at the moon. If you can see it 7) _____ (*clear*), it means that the weather has cooled and rain is 8) _____ (*probable*) on the way. Of course, none of these methods are perfect and it would be 9)_____ (*correct*) to use them instead of modern technology. But they do have their uses. So why not learn them? You never know when they might be 10)_____ (*help*).

Ex.5.28. Read the story. Complete each gap with one of the words from the box. There are three extra words that you do not need to use. Then discuss the questions below.

warmth	chilly	shone	shady	cloud	breeze	power
harder	poured	blew	icy	stronger	hot	shivered

The Wind and the Sun were arguing about their strength.

'I have the strongest (1) … that ever was', said the Sun. 'Nothing can stand against me'.

'Nothing except me', said the Wind. 'I am far (2) … than you'.

'We shall find out', said die Sun. 'I know a way to settle the argument. Do you see that man coming down the road? Well,

whichever one of us makes him take off his coat, he must be considered the strongest. You try first'. The Sun hid himself behind a (3) … while the Wind began. The Wind (4) … . The man bent his head. The Wind whistled. The man (5) … . The Wind roared and raged and sent (6) … blasts against the man. But the (7) … the Wind blew, the closer the man wrapped his coat about him. 'My turn now', said the Sun as it came out from behind the cloud.

At first the Sun (8) … gently, and the man unbuttoned his coat and let it hang loosely from his shoulders. Then the Sun covered the whole Earth with (9) … . Within a few minutes the man was so (10) … that he was glad to take off his coat and find a (11) … place.

1. What do you think the moral of this story is?
2. Do you agree with it?

UNIT 6. AQUATIC ECOSYSTEMS

Key words

transparent – прозорий
constituent – складова частина
to connect – з'єднати
pressure – тиск
solid – твердий
to occur – відбуватися
groundwater – підземні води
glacier – льодовик
freshwater – прісна вода
solvent – розчинник
destruction – руйнування
to be responsible for – відповідати за
sediment – осад
steam – пар
to condense –конденсувати
salt content – вміст солі
strait – пролив
gulf – затока
to estimate– оцінювати
density – щільність
to recycle – переробляти
supply – постачання

Ex.6.1. Discuss the following questions:

1. What do you know about water?
2. What is its chemical formula?
3. Why is water important for life?

Ex.6.2. Read the text and check your answers.

The Importance of Water for Life

Water is the transparent, tasteless, odorless, and nearly colorless chemical substance that is the main constituent of Earth's streams, lakes, and oceans, and the fluids of most living organisms, and that is vital for all known forms of life, even though it provides no calories or organic nutrients. Its chemical formula is H_2O, meaning that each of its molecules contains one oxygen and two hydrogen atoms connected by covalent bonds. Water is the name of the liquid state of H_2O at standard ambient temperature and pressure. It forms precipitation in the form of rain and aerosols in the form of fog. Clouds are formed from droplets of water and ice, its solid state. When finely divided, crystalline ice may precipitate in the form of snow. The gaseous state of water is steam or water vapor. Water moves continually through the water cycle of evaporation, transpiration, condensation, precipitation, and runoff, usually reaching the sea.

Water covers 71 % of the Earth's surface, mostly in seas and oceans. Small portions of water occur as groundwater (1.7 %), in the glaciers and the ice caps of Antarctica and Greenland (1.7 %), and in the air as vapor, clouds and precipitation (0.001 %).

Water plays an important role in the world economy. Approximately 70 % of the freshwater used by humans goes to agriculture. Fishing in salt and fresh water bodies is a major source of food for many parts of the world. Much of long-distance trade of commodities (such as oil and natural gas) and manufactured products is transported by boats through seas, rivers, lakes, and canals. Large quantities of water, ice, and steam are used for cooling and heating, in industry and homes. Water is an excellent solvent for a wide variety of chemical substances, it is widely used in industrial processes, in cooking and washing. Water is important in many geological processes. Groundwater is present in most rocks, and the pressure of this groundwater affects patterns of faulting. Water in the mantle is responsible for the melt that produces volcanoes at subduction zones. On the surface of the Earth, water is important in both chemical and physical weathering processes. Water, and to a lesser but still significant extent, ice, are also responsible for a large amount of sediment transport that occurs on the surface of the earth. Deposition of transported sediment forms many types of sedimentary rocks, which make up the geologic record of Earth history.

Ex.6.3. Match the words with their definitions:

1)	constituent	a)	a slowly moving mass of ice formed by the accumulation and compaction of snow on mountains or near the poles
2)	pressure	b)	matter that settles to the bottom of a liquid
3)	occur	c)	continuous physical force exerted on or against an object by something in contact with it
4)	solid	d)	water held underground in the soil or in pores and crevices in rock
5)	glacier	e)	the action or process of causing so much damage to something that it no longer exists or cannot be repaired

6)	recycle	f)	being a part of a whole
7)	groundwater	g)	allowing light to pass through so that objects behind can be distinctly seen
8)	sediment	h)	happen; take place
9)	destruction	i)	firm and stable in shape; not liquid or fluid
10)	transparent	j)	convert (waste) into reusable material

Ex.6.4. For questions 1–15, read the text below and decide which word (*a*, *b*, *c or d*) *best fits each space. There's an example at the beginning* (*0*).

Water

Water is one of our most (*0*) *...B...* resources; to (1) ... it simply, without water there would be no life. Unfortunately many of us seem to have (2) ... this fact, and as a result the world is (3) ... the danger of running (4) ... water. The actual (5) ... of water on earth has changed little since the time of the dinosaurs. The problem has been (6) ... by people's misuse of our water supply. This not only (7) ... that we have polluted our rivers and seas, but also that we are (8) ... a great deal of this precious resource. Unfortunately, the destruction of the rain forests has (9) ... this problem worse since much of the rain that falls is (10) ... because it runs off into the sea. The population of the earth is increasing daily, so it is vital that we (11) ... a solution to this problem before it is too late. The first step is to educate people, especially by reminding them of the (12) ... of water. For most of us it is available whenever we (13) ... it, whether to bathe in or to drink, so we seldom bother to think about it. People then need to be taught how to reuse or recycle water. One of the simplest ways of doing this is to reuse bath or shower water for (14) ... cleaning or watering the garden. Ponds which filter used water are also becoming popular. Whatever methods we might decide to use, we must (15) ... the worth of water and how we can conserve it.

0)	*a) valid*	*b) precious*	*c) worthy*	*d) superior*
1)	a) show	b) make	c) write	d) put
2)	a) looked over	b) omitted	c) forgotten	d) missed
3)	a) facing	b) witnessing	c) viewing	d) noticing
4)	a) out of	b) into	c) off	d) away with
5)	a) sum	b) total	c) number	d) amount
6)	a) brought out	b) caused	c) done	d) happened

7)	a) underlines	b) says	c) means	d) proves
8)	a) exploiting	b) wasting	c) spending	d) throwing
9)	a) caused	b) done	c) created	d) made
10)	a) missed	b) fallen	c) lost	d) given up
11)	a) recover	b) work	c) come up	d) find
12)	a) value	b) cost	c) price	d) tag
13)	a) ask	b) require	c) command	d) open
14)	a) housing	b) household	c) housekeeping	d) housework
15)	a) comprehend	b) estimate	c) perceive	d) realize

Ex.6.5. Complete the table with verbs.

Noun	Verb
e.g. prediction	*predict*
threat	
rotation	
evacuation	
survival	
contamination	
addition	
circulation	

Ex.6.6. Complete the table with adjectives.

Noun	Adjective
e.g. chemistry	chemical
importance	
universe	
insufficiency	
efficiency	
evidence	
catastrophe	

Ex.6.7. Read the text and answer the questions below.

Water Environment. Oceans

As it is seen from space, our planet is a brilliant blue sphere – a world of water. Indeed, it can be said that this planet is quite misnamed, for solid 'earth' covers only a fraction of its surface. Oceans cover 71 %

of the globe, almost 140 million square miles (362 million square kilometers). Moreover, the tallest mountains found on land would easily disappear if dropped into the deepest ocean trench. It was not always this way.

THE ORIGIN OF OCEANS

Some 4 billion years ago, Earth's surface was so hot that water evaporated on contact. Although the young planet's surface was dry, its atmosphere was filled with volcanic steam and dust. This thick cloud cover shielded Earth from the blazing Sun, and so helped cool it. As temperatures dropped, the atmospheric steam and dust began to condense into rain. The resulting downpour lasted for thousands of years. When the clouds finally parted, Earth had been transformed into a sparkling blue orb. One vast ocean blanketed the entire planet. Above the ocean's surface peeked the tips of the tallest volcanoes – the world's first islands.

Earth's primordial ocean was barely salty. Only later, after continents had formed, rain and waves washed salt and minerals from the land into the sea. The gradual leaching away of the continents increased the salt content until it reached the level that exists today.

After hundreds of millions of years, the rising continents took their present form – dividing Earth's primordial sea into three major oceans: the Pacific, Atlantic, and Indian. The Arctic Ocean, considered by many oceanographers to be a marginal sea of the Atlantic, is nonetheless often elevated to ocean status.

Although the oceans are distinct in character, all are interconnected. Each of the oceans contains many smaller sections, called seas, which are sometimes separated from the open ocean by a narrow opening called a strait. The Mediterranean and Caribbean are among the best known of the world's seas, which total 70 in number. Gulfs and bays are small sections of ocean that border land.

WHAT IS SEAWATER?

All the world's oceans and seas share certain basic traits. Certainly all are salty. Common salt, or sodium chloride, is the most abundant, but by no means the only, salt found in seawater. Seawater also contains magnesium, calcium, and potassium salts. The overall salt content of seawater is about 3.5 %. Of this fraction, 85 % is sodium chloride.

The saltiness, or salinity, of seawater varies slightly from place to place. The least saline seawater is found in the Baltic Sea. Its salt content is just 1 %. The saltiest seawater is found in parts of the Red Sea, where salinity soars to 27 %.

The variance in saltiness depends largely on climate. Abundant rainfall tends to decrease, or dilute, the salt content of seawater. Strong sunlight and high year-round temperatures increase salinity through evaporation.

The temperature of deep-ocean waters is more or less uniform around the world: just above freezing. But surface temperatures vary widely depending on latitude, seafloor depth, and prevailing ocean currents.

As might well be expected, ocean surface temperatures are highest in the tropics, where the water is continually warmed by strong sunlight. The highest ocean temperatures in the world, 96 °F (36 °C), occur in the shallow waters of the Persian Gulf.

Surface waters are coldest near the poles, where the Sun stays low in the sky throughout the year. The coldest–several degrees below freezing–can be found in Russia's White Sea. Currents, which act like distinct rivers within the larger ocean, often contain unusually warm or cool waters. As a result, the Pacific Ocean waters are noticeably warmer on the North American side than they are on the Russian side.

Another important quality of seawater is its density, or specific gravity. Owing to its saltiness, seawater is denser, or 'heavier', than freshwater. The density of ocean water depends not only on its salinity, but also on its temperature: warmer water tends to be less dense than cold water. The greatest variance in ocean-water density occurs near the ocean surface, where water is subject to the influences of the weather. In general, density decreases in areas where freshwater is added to the ocean through runoff from land, melting of ice, or precipitation. The density of seawater increases with cooling and when freshwater is removed through the process of evaporation.

1. What is the origin of oceans?
2. What are three major oceans?
3. What do oceans include?
4. What common traits do oceans and seas share?

5. Where can the least saline / the saltiest seawater be found?
6. What does the variance in saltiness depend on?
7. Why are the Pacific Ocean waters warmer on the North American side than on the Russian side?
8. What does the density of ocean water depend on?

Ex.6.8. Work out all possible word combinations from column A and B and translate them into Ukrainian.

A	B
to cover	freshwater
to increase	temperature
to reach	salt content
to contain	surface
to border	level
to share	land
to depend on	sections
to decrease	traits
to remove	magnesium
	climate
	latitude
	seafloor depth
	ocean currents
	warm or cool waters

Ex.6.9. Complete the following sentences with the words from the box.

surface condense share freshwater varies density interconnected temperatures

1. All the world's oceans and seas … certain basic traits.
2. Although the young planet's …was dry, its atmosphere was filled with volcanic steam and dust.
3. As temperatures dropped, the atmospheric steam and dust began to … into rain.
4. Although the oceans are distinct in character, all are … .
5. The saltiness, or salinity, of seawater … slightly from place to place.

6. The highest ocean … in the world, 96 °F (36 °C), occur in the shallow waters of the Persian Gulf.

7. Another important quality of seawater is its …, or specific gravity.

8. Density decreases in areas where … is added to the ocean through runoff from land, melting of ice, or precipitation.

Ex.6.10. Complete the following paragraph with the prepositions from the box.

by into for from of×3 in×2

The Pacific Ocean

The Pacific Ocean is by far the world's largest and deepest body … water. The Ocean floor can be divided … three main regions. Most of the Pacific is blessed with an even climate marked … pleasant, steady trade winds. But storms of great violence, known as typhoons, occur … the western Pacific. The Ocean is rich … natural resources. Its vast fisheries supply three-fifths … the world's catch, with tuna and salmon especially abundant. Salt, magnesium, sand, and gravel are harvested … the Pacific's coastal regions. The Pacific is also used as a dumping ground … vast amounts of waste. Although the Ocean as a whole has been able to absorb and dilute much of it, some … the smaller seas and other local areas have become seriously polluted.

Ex.6.11. Read a magazine article about ocean exploration. Eight paragraphs have been removed from the article. Choose from the paragraphs (*A–I*) *the one which fits each gap* (*1–7*). *There is one extra paragraph which you do not need to use. There is an example at the beginning* (*0*).

Ocean Exploration

Although there has always been great interest in what mysteries the oceans hold, it has only been in recent decades that modern technology has enabled scientists to start exploring the ocean floor. As recently as the 1960's, scientists made developments in sounding and in recording what happened beneath the sea.

0	*H*

Many nations took part in efforts to develop new ways of discovering the secrets of the oceans. They were interested in exploiting areas containing rich mineral deposits as well as documenting the wide variety of life forms found in the depths. They were also interested in investigating the earth's structure. The first step was to make maps of the ocean floor.

1	

The sea bed is covered in mountain ranges, plains and valleys and can be hazardous for submarine vehicles. But detailed knowledge of the floor of the seas and oceans was also needed for a proper understanding of the constant movement of the earth's surface, such as the creation of new mountain ranges and the eruption of volcanoes. Such an eruption was recently witnessed by the crew of the Alvin, a unique type of submarine.

2	

The cold sea water had hardened the lava. Other flows had broken into what looked like black glass, and hot fluids were bursting from the sea floor. The temperature outside the Alvin began to rise and the crew realised they had arrived in the middle of a volcanic eruption.

3	

There would be a chance to record the chemical and geological changes, as well as the renewal of plant and animal life. They'd come to this particular spot because cameras had spotted an area that was rising rapidly. There'd also been an increase in active hot springs. The rising area suggested there might be an eruption, and that is exactly what happened in 1991.

4	

During the first dive (April 1991) it was obvious there'd just been a volcanic eruption. Fresh lava lay on the sea bed, which was discovered to have been less than 2 weeks old. It seemed they had missed the explosion. There was a huge hole in the sea bed. Nothing was left alive.

5	

The scientists dropped a marker so they could return to the spot and check the progress of the area. At this same spot just 21 months

later, giant tube worms had grown to a length of four feet. More discoveries were in store for the divers, though. Mineral chimneys allow fluid and steam to escape from the lava.

6	

To do this, they took samples of water and minerals from the chimneys for analysis. Due to the heat caused by the eruption they put thermometers into the chimneys to discover the temperature of the sea water.

7	

As they chanced to be in the right place at the right time, exciting discoveries have been made to help us understand the mysteries of the deep.

A. Although they saw no movement of lava, they knew they had stumbled on a unique opportunity. On return visits they could collect new data on the changes taking place.

B. The reason for mapping the sea bed was to aid submarines, like the Alvin, which are nowadays able to descend to great depths. The maps enable scientists to guide these submarines to prevent them from having accidents.

C. A year later, in March, 1992, a white mat of bacteria had covered the lava. This bacteria had attracted an army of crabs which were feeding off it, and plants had begun to appear.

D. At this depth seawater won't boil until it reaches 730 °Farenheit. In one of the chimneys they took the temperature of the water and it was 757 °F. This is one of the hottest temperatures ever recorded on the seafloor.

E. In April, 1991, after a one and a half hour descent to the bed of the Pacific Ocean, the crew of the Alvin did not see the sea life they expected. Instead they saw a scene of catastrophe. Fresh lava from a volcano had destroyed everything.

F. This, though, was the first time scientists had been able to witness the growth of these chimneys from birth and watch the development of an underwater 'plumbing' system.

G. Immediately after the eruption all kinds of animal life swarmed to the area in the hope of finding large quantities of food. This was the scene the divers witnessed when they arrived.

H. But they had to rely on irregular reports from ships that were on the surface of the water. The data that was collected was unreliable, so new methods of reaching the ocean floor had to be developed.

I. Since then scientists have returned twice, in March, 1992 and December, 1993. In the three years since the explosion there has been rapid change on the seabed.

Ex.6.12. Fill in the gaps with an appropriate word from the box:

renewal	constant	eruption	rapidly	samples	exploiting
fluids	deposits	unique	hazardous		

1. After the volcanic… people fled from the boiling lava. (*explosion*)
2. Mountain climbing can be a(n) ... hobby. (*dangerous*)
3. Saudi Arabia is rich due to its many oil ... (*reserves, resources*)
4. The river banks were worn away by the ... flow of water. (*continuous*)
5. He became rich by ... the gold mine. (*extracting resources from*)
6. His ... strength meant he could do things others only dreamed about. (*one-of-a-kind*)
7. Drink water in the morning to replace lost body ... . (*liquids*)
8. After a forest fire, the ... of the woodland occurs surprisingly quickly. (*recovery*)
9. The water level rose ... and soon the river burst its banks. (*quickly*)
10. The scientist collected ... of plants for analysis in his lab. (*specimens*)

Ex.6.13. Read the text and answer the questions.

Groundwater

Groundwater is water that occurs below the surface of Earth, where it occupies all or part of the void spaces in soils or geologic strata. It is also called subsurface water to distinguish it from surface water, which is found in large bodies like the oceans or lakes or which flows overland in streams. Both surface and subsurface water are related through the hydrologic cycle (the continuous circulation of water in the Earth-atmosphere system).

Most groundwater comes from precipitation. Precipitation infiltrates below the ground surface into the soil zone. When the soil zone becomes saturated, water percolates downward. A zone of saturation occurs where all the interstices are filled with water. There is also a zone of aeration where the interstices are occupied partially by water and partially by air. Groundwater continues to descend until, at some depth, it merges into a zone of dense rock. Water is contained in the pores of such rocks, but the pores are not connected and water will not migrate. The process of precipitation replenishing the groundwater supply is known as recharge. In general, recharge occurs only during the rainy season in tropical climates or during winter in temperate climates. Typically, 10 to 20 percent of the precipitation that falls to the Earth enters water-bearing strata (aquifers).

Groundwater is constantly in motion. Compared to surface water, it moves very slowly, the actual rate dependent on the transmissivity and storage capacity of the aquifer. Natural outflows of groundwater take place through springs and riverbeds when the groundwater pressure is higher than atmospheric pressure in the vicinity of the ground surface. Internal circulation is not easily determined, but near the water table the average cycling time of water may be a year or less, while in deep aquifers it may be as long as thousands of years.

Groundwater plays a vital role in the development of arid and semiarid zones, sometimes supporting vast agricultural and industrial enterprises that could not otherwise exist. It is particularly fortunate that aquifers antedating the formation of deserts remain unaffected by increases in aridity with the passage of time. Withdrawal, however, will deplete even the largest of groundwater basins so that development based on the existence of aquifers can be only temporary at best.

A vast amount of groundwater is distributed throughout the world, and a large number of groundwater reservoirs are still underdeveloped or uninvestigated. Scientists estimate that some 5.97 quintillion gallons (22.6 million cubic km) of groundwater reside in the upper 2 km (1.2 miles) of Earth's surface. The most frequently investigated or exploited groundwater reservoirs are of the unconsolidated clastic (mainly sand and gravel) or carbonate hardrock type found in alluvial valleys and coastal plains under temperate or arid conditions.

Though some groundwater dissolves substances from rocks and may contain traces of old seawater, most groundwater is free of pathogenic organisms, and purification for domestic or industrial use is not necessary. Furthermore, groundwater supplies are not seriously affected by short droughts and are available in many areas that do not have dependable surface water supplies.

1. Where does groundwater come from?
2. What process is called recharge?
3. When and where does recharge occur?
4. How deep can groundwater be found?
5. Why is it not necessary to purify groundwater for domestic use?

Ex.6.14. Match the sentence halves:

1) Surface water is found in large bodies…	a) …the rainy season in tropical climates.
2) Most groundwater comes…	b) …as recharge.
3) Recharge occurs only during…	c) …like the oceans or lakes.
4) The process of precipitation replenishing the groundwater supply is known…	d) …of pathogenic organisms.
5) A vast amount of groundwater is distributed…	e) …from precipitation.
6) Most groundwater is free…	f) …throughout the world.

Ex.6.15. Match the words with their opposites:

1) shallow	a) portable
2) low	b) expensive
3) immobile	c) hidden
4) liquid	d) deep
5) cheap	e) fresh
6) visible	f) wet
7) dry	g) weak
8) salty	h) heavy
9) strong	i) solid
10) light	j) high

Ex.6.16. Read the article and circle the correct answer for items 1 to 4.

What is the problem discussed? Which paragraphs include the writer's suggestions? What are these suggestions? What results/ examples does the writer use to support his suggestions?

Water, Water Everywhere…

Imagine a world with no drinking water, and no water to wash or cook with. It's hard to imagine this, because we use water every day without even thinking about it. Yet there are terrible water shortages all over the world. In parts of Africa and China, for example, many people don't even have clean water to drink. In fact, over half of the people in the world have to live with water shortages every day. We all need water – not just for our homes and factories, but to survive. Fortunately, there are things that we can all do to save water.

The solution begins at home. We can save the water from our baths and use it for the garden, instead of wasting hundreds of litres of clean water on our lawns and plants. This would help to save many litres of water every day, especially in the summer.

Governments can help by passing laws to stop factories from wasting and polluting water. If factories recycled water and stopped pouring chemicals into our lakes and rivers, there would be a lot more clean water around.

Governments could also stop water companies from wasting millions of litres of water because of leaking pipes. Many cities have successfully saved water by repairing pipes.

All in all, there are many things we can do to save our planet's disappearing water supplies. The time has come to start understanding the value of water, before a world without clean water becomes a terrible reality.

1. The writer says that in many parts of the world people ... .
   a) don't have water at all.
   b) don't have any clean water.
   c) have too much water.
2. The writer suggests that we should ... .
   a) use more water at home.
   b) stop using water at home.
   c) stop using so much water at home.

3. There would be more clean water around if factories ... .
   a) produced more water.
   b) used the same water several times.
   c) only used water from rivers and lakes.
4. Water companies can help ... .
   a) by fixing pipes.
   b) by giving us more water.
   c) by making people pay a lot more.

Ex.6.17. Choose the best option to complete the text.

What is the water cycle?

Earth has a limited amount of water. So that water (1) ... going around. We call it the water cycle. The water cycle begins (2) ... evaporation. Evaporation is (3) ... the sun heats up water in rivers, lakes or the ocean, then (4) … it into water vapor or steam. The water vapor or steam leaves the body of water (5) ... goes into the air. Transpiration is the process by (6) ... plants lose water out of their leaves. Condensation is when water vapor in the air gets cold and changes back into water to (7) ... clouds. Think of it this way. When you open a cold soda on a hot summer day, your soda will start (8) ... as water droplets form on the outside of the can. Precipitation occurs when so much water has condensed that the air can't hold (9) ... anymore. This is (10) ... we get rain or snow. Collection happens when the precipitation falls and (11) ... back in the oceans, lakes and rivers. When it falls to the ground, it will soak into the earth and (12)... ground water. This is the water cycle and it just keeps repeating.

1)	a) grows	b) keeps	c) takes	d) makes
2)	a) on	b) at	c) by	d) with
3)	a) when	b) why	c) what	d) where
4)	a) pulls	b) turns	c) builds	d) gives
5)	a) or	b) so	c) and	d) but
6)	a) whose	b) whom	c) what	d) which
7)	a) form	b) follow	c) find	d) feel
8)	a) sweated	b) sweat	c) to sweat	d) sweats
9)	a) them	b) it	c) they	d) there
10)	a) what	b) who	c) which	d) how
11)	a) collects	b) is collected	c) collected	d) was collected
12)	a) become	b) change	c) cover	d) pick

UNIT. 7 NATURAL DISASTERS

Key words

lightning – блискавка
thunderstorm – гроза
thunder – грім
sleet – дощ зі снігом
hail – град
flash – спалах
precipitation – опади
lightning bolt – блискавка
storm cloud – штормова хмара
charge – заряд
current – електричний струм
tornado – торнадо
hurricane – ураган
tsunami – цунамі
flood – повені
avalanche – лавина
volcano – вулкан
earthquake – землетрус

Ex.7.1. Read the text and answer the questions.

1. What is a thunderstorm?
2. Where do thunderstorms occur?
3. What do they usually accompanied by?
4. What do thunderstorms result from?
5. Where can thunderstorms occur?
6. Why are thunderstorms dangerous?

Thunderstorm

A thunderstorm, also known as an electrical storm, lightning storm, or thundershower, is a storm characterized by the presence of lightning and its acoustic effect on the Earth's atmosphere, known as thunder. Thunderstorms occur in a type of cloud known as a cumulonimbus. They are usually accompanied by strong winds, heavy rain, and sometimes snow, sleet, hail, or, in contrast, no precipitation at all. Thunderstorms may line up in a series or become a rainband, known as a squall line. Strong or severe thunderstorms include some of the most dangerous weather phenomena, including large hail, strong winds, and tornadoes. Some of the most persistent severe thunderstorms, known as supercells, rotate as do cyclones. While most thunderstorms move with the mean wind flow through the layer of the troposphere that they occupy, vertical wind shear sometimes causes a deviation in their course at a right angle to the wind shear direction.

Thunderstorms result from the rapid upward movement of warm, moist air, sometimes along a front. As the warm, moist air moves upward, it cools, condenses, and forms a cumulonimbus cloud that can reach heights of over 20 km (12 mi). As the rising air reaches its dew point temperature, water vapor condenses into water droplets or ice, reducing pressure locally within the thunderstorm cell. Any precipitation falls the long distance through the clouds towards the Earth's surface. As the droplets fall, they collide with other droplets and become larger. The falling droplets create a downdraft as it pulls cold air with it, and this cold air spreads out at the Earth's surface, occasionally causing strong winds that are commonly associated with thunderstorms.

Thunderstorms can form and develop in any geographic location but most frequently within the mid-latitude, where warm, moist air from tropical latitudes collides with cooler air from polar latitudes. Thunderstorms are responsible for the development and formation of many severe weather phenomena. Thunderstorms, and the phenomena that occur along with them, pose great hazards. Damage that results from thunderstorms is mainly inflicted by downburst winds, large hailstones, and flash flooding caused by heavy precipitation. Stronger thunderstorm cells are capable of producing tornadoes and waterspouts.

cumulonimbus – кумулонімус (дощові хмари)
rainband – дощик
squall line – лінія шквалу
supercells – сильні грози
rotate – обертати
wind shear – зсув вітру
deviation – відхилення
dew point temperature – температура точки роси
waterspouts – водоспади, смерч

Ex.7.2. Read the last part of the text about thunderstorms and fill in the gaps with appropriate words from the box.

a) severe	b) subtropics	c) myths	d) radar
e) precipitation	f) atmosphere	g) supercells	h) shear

There are four types of thunderstorms: single-cell, multi-cell cluster, multi-cell lines, and (1) … . Supercell thunderstorms are the strongest and most (2)…. Mesoscale convective systems formed by favorable vertical wind (3) … within the tropics and (4) … can be responsible for the development of hurricanes. Dry thunderstorms, with no (5) … , can cause the outbreak of wildfires from the heat generated from the cloud-to-ground lightning that accompanies them. Several means are used to study thunderstorms: weather (6)…, weather stations, and video photography. Past civilizations held various (7) … concerning thunderstorms and their development as late as the 18th century. Beyond the Earth's (8) …, thunderstorms have also been observed on the planets of Jupiter, Saturn, Neptune, and, probably, Venus.

Ex.7.3. Match the English words and word combinations with their definitions.

1) supercell	a) a cloud forming a towering mass with a flat base at fairly low altitude and often a flat top, as in thunderstorms
2) downdraft	b) variation in wind velocity occurring along a direction at right angles to the wind's direction and tending to exert a turning force
3) cumulonimbus	c) a rotating column of water and spray formed by a whirlwind occurring over the sea or other body of water
4) dew point	d) a downward current or draft of air, especially one down a chimney into a room
5) waterspout	e) a narrow band of high winds and storms associated with a cold front
6) squall line	f) pellets of frozen rain that fall in showers from cumulonimbus clouds
7) wind shear	g) a system producing severe thunderstorms and featuring rotating winds sustained by a prolonged updraft that may result in hail or tornadoes
8) hail	h) the temperature to which air must be cooled to become saturated with water vapor

Ex.7.4. Look at the words and find the odd one in each line.

1) snow, sleet, hail, water, rain;

2) thunderstorm, cumulonimbus, electrical storm, lightning storm, thundershower;

3) thunderstorm, hurricane, tornado, lightning, wind;

4) lightning, waterspout, water, river, flood;

5) water, snow, salt, vapor, ice;

6) weather radar, weather forecast, weather station, video photography.

Ex.7.5. Read the text and match each paragraph A–F with appropriate headline from 1–6.

Lightning

A _____

Lightning is an electrical discharge caused by imbalances between storm clouds and the ground, or within the clouds themselves. Most lightning occurs within the clouds. During a storm, colliding particles of rain, ice, or snow inside storm clouds increase the imbalance between storm clouds and the ground, and often negatively charge the lower reaches of storm clouds. Objects on the ground, like steeples, trees, and the Earth itself, become positively charged – creating an imbalance that nature seeks to remedy by passing current between the two charges.

B _____

Lightning is extremely hot – a flash can heat the air around it to temperatures five times hotter than the sun's surface. This heat causes surrounding air to rapidly expand and vibrate, which creates the pealing thunder we hear a short time after seeing a lightning flash.

C _____

Cloud-to-ground lightning bolts are a common phenomenon – about 100 strike Earth's surface every single second – yet their power is extraordinary. Each bolt can contain up to one billion volts of electricity.

A typical cloud-to-ground lightning bolt begins when a step-like series of negative charges, called a stepped leader, races downward from the bottom of a storm cloud toward the Earth along a channel at about 200,000 mph (300,000 kph). Each of these segments is about 150 feet (46 meters) long.

When the lowermost step comes within 150 feet (46 meters) of a positively charged object, it is met by a climbing surge of positive electricity, called a streamer, which can rise up through a building, a tree, or even a person.

When the two connect, the electrical current flows as negative charges fly down the channel towards earth and a visible flash of lightning streaks upward at some 200,000,000 mph (300,000,000 kph), transferring electricity as lightning in the process.

D _____

Some types of lightning, including the most common types, never leave the clouds but travel between differently charged areas within or between clouds. Other rare forms can be sparked by extreme forest fires, volcanic eruptions, and snowstorms. Ball lightning, a small, charged sphere that floats, glows, and bounces along oblivious to the laws of gravity or physics, still puzzles scientists.

E _____

Lightning is not only spectacular, it's dangerous. About 2,000 people are killed worldwide by lightning each year. Hundreds more survive strikes but suffer from a variety of lasting symptoms, including memory loss, dizziness, weakness, numbness, and other life-altering ailments. Strikes can cause cardiac arrest and severe burns, but 9 of every 10 people survive.

Lightning's extreme heat will vaporize the water inside a tree, creating steam that may blow the tree apart. Cars are havens from lightning – but not for the reason that most believe. Tires conduct current, as do metal frames that carry a charge harmlessly to the ground.

F _____

Many houses are grounded by rods and other protection that conduct a lightning bolt's electricity harmlessly to the ground. Homes may also be inadvertently grounded by plumbing, gutters, or other materials. Grounded buildings offer protection, but occupants who touch running water or use a landline phone may be shocked by conducted electricity.

1) The impact of a lightning strike
2) cloud-to-ground lightning
3) Protection from lightning
4) What is lightning?

5) Other types of lightning
6) Lightning causes thunder

Ex.7.6. Decide whether the statements are true or false.

1. Balance between storm clouds and the ground may cause a lightning.
2. The lower layers of a storm cloud and objects on the Earth's surface have opposite charges.
3. The sun's temperature is five times higher than the temperature of a lightning.
4. Negative charges go down towards the Earth to meet positive charges and produce a lightning.
5. Some types of lightning never reach the Earth's surface.
6. Scientists can't explain the nature of ball lightning.
7. About 2,000 people suffer from memory loss, dizziness, weakness, numbness, and other life-altering ailments every year.
8. A lightning can split a tree apart due to its extremely high temperature.
9. When you see a lightning, you have to leave your car immediately to survive.
10. Running water and a landline phone may still conduct electricity even in a grounded house.

Ex.7.7. Match the English words with their Ukrainian equivalents.

1) to conduct	a) заземлений
2) to collide	b) електричний струм
3) to charge	c) ступеневий провідник
4) imbalance	d) проводити
5) to remedy	e) іскритися, спалахувати
6) current	f) передавати
7) flash	g) зіткнутися
8) grounded	h) випаровуватися
9) stepped leader	i) блискавка
10) to transfer	j) дисбаланс
11) to spark	k) заряджати
12) to vaporize	l) виправити

Ex.7.8. Put the words into correct order to make a sentence.

1. occurs / Lightning / the clouds / or between / within /storm clouds / the ground / and.

2. the /heats / air / it / Lightning / temperatures / to / extremely / around / high.

3. electricity /Up / one / volts / of / a lightning / is / to /contained / in / bolt / billion.

4. from / Negative / a storm cloud / race / the / of / toward / the / Earth / along / downward /a channel / bottom /charges.

5. types / travel / areas /differently /between / charged / or between / of / lightning Some / clouds / within.

6. electricity / rods / are / houses / by / that / grounded / harmlessly / a lightning bolt's / to / Many / conduct / the ground.

Ex.7.9. Complete the sentences with appropriate words and then check your ideas in the text above.

1) Lightning is an electrical … caused by imbalances between storm clouds and the ground, or within the clouds themselves.

2) During a storm, colliding particles of rain, ice, or snow inside storm clouds increase the … between storm clouds and the ground, and often negatively charge the … reaches of storm clouds.

3) A typical cloud-to-ground lightning bolt begins when a step-like series of negative charges races downward from the bottom of a storm cloud toward the … along a channel.

4) … is a small charged sphere that floats, glows, and bounces along oblivious to the laws of gravity or physics.

5) Lightning is not only spectacular, it's … .

6) Lightning's extreme heat will … the water inside a tree, creating steam that may blow the tree apart.

7) Tires … current, as do metal frames that carry a charge … to the ground.

8) Many houses are … by … and other protection that conduct a lightning bolt's electricity harmlessly to the ground.

Ex.7.10. Read the text about tornadoes and choose the best answer (*a*, *b*, *c*, *or d*) *to the questions 1–8 below.*

Tornadoes

Tornadoes have been reported in all states, but most tornadoes happen in the central parts of America called 'Tornado Alley'.

A tornado, funnel cloud, is born from a powerful storm called a supercell. In some supercells, warm moist air rises quickly into the atmosphere. Winds blowing at different speeds at different parts of the supercell produce wind shear and cause a horizontal, rotating column of air. A funnel cloud will form as the air column rotates faster and more tightly within the supercell. In the Northern Hemisphere, tornadoes rotate counter-clockwise. In the Southern Hemisphere, they rotate clockwise. The rain and hail within the storm cause the funnel cloud to touch the ground resulting in a tornado. The strength of a tornado is measured by what's called the Fujita scale. The weakest tornadoes (F0) feature winds of 40–78 miles per hour, while the strongest tornadoes (F5) have winds of up to 318 miles per hour. All tornadoes can be devastating, especially if they touch down in areas with lots of people.

A spinning wind can reach speeds of more than 200 miles per hour. The best protection against a tornado is to take cover in a basement. If a basement is not available, you should crouch down in a bathtub or under a sturdy piece of furniture and you should stay away from windows.

Tornado Outbreak

A tornado outbreak occurs when one storm system produces multiple tornadoes. Some tornado outbreaks can result in the formation of dozens of tornadoes over several states. One particularly powerful tornado outbreak occurred between April 25 and April 28 of 2011, where a record 355 tornadoes in 21 states and Canada were recorded, an including an F5 tornado that completely destroyed parts of Tuscaloosa, Alabama. Much of the destruction was caught on camera and broadcast across the country and internet. The same weather system produced hailstones that measured 4.5 inches across in southern Virginia. 328 people were killed as a result of the outbreak, which totaled over $11 billion in damages.

1. Which is NOT true about tornadoes?
   a) They are born from supercells.
   b) Most tornadoes occur in North America in Tornado Alley.
   c) They only occur in some states.
   d) Tornado strength is measured on the Fujita Scale.
2. What states have never had tornadoes?
   a) Alaska and Hawaii b) States outside of Tornado Alley
   c) The passage doesn't say d) All states have had tornadoes
3. What causes the supercell to tilt downward toward the ground?
   a) Warm air b) Rain and hail
   c) Wind d) Lightning
4. When are tornadoes most devastating?
   a) When they register on the Fujita Scale
   b) When they hit areas with lots of people
   c) When they hit in Tornado Alley
   d) When wind shear occurs
5. What is the theme of the first paragraph?
   a) Birth and Strength of a Tornado
   b) Wind Speed
   c) The Fujita Scale
   d) Historic Tornadoes
6. Why does the author refer to the hailstones that hit Virginia as part of the tornado outbreak of April 2011?
   a) To show how powerful and destructive the storms were
   b) To show that much of the damage was caught on camera
   c) To show how long the storm lasted
   d) The show that tornado outbreaks often happen in the spring
7. In a tornado outbreak.... (select all that are true)
   a) A single storm system can produce multiple tornadoes
   b) Only F5 tornadoes occur
   c) Storms that produce damaging hail can occur as well
   d) Dozens of tornadoes can form in distant locations
8. What did paragraph two include that paragraph one did not include?
   a) Information on when tornadoes become very destructive
   b) A specific instance
   c) Information about how tornadoes form
   d) Information about the Fujita Scale

Ex 7.11. Match the words with their synonyms.

1) supercell	a) pillar
2) moist	b) gradation
3) column	c) start
4) funnel	d) powerful storm
5) scale	e) destructive
6) devastating	f) wet
7) outbreak	g) happen
8) occur	h) crater

Ex.7.12. Complete the sentences with the words from box.

a) pushed	b) twisting	c) funnel	d) tornadoes
e) demolish	f) occur	g) protection	h) rotate

1. Tornadoes, sometimes called twisters, … all over the world.
2. A tornado is a … cloud.
3. In the Northern Hemisphere, tornadoes … counter-clockwise.
4. Warm air mass is … upward very quickly by a colder air mass.
5. The … grows stronger until a funnel is formed.
6. When tornadoes touch the earth's surface, the violent rotating winds can … almost everything in their paths.
7. The best … against a tornado is to take cover in a basement.
8. Usually 700 or more … form each year in the United States.

Ex.7.13. Read the article and choose the correct item.

Tornado Sweeps across Northern England

Twenty people have been injured by a violent tornado which struck northern England yesterday afternoon.

The tornado caused a 1) *great deal / good number* of damage to the small village of Oakbridge in Lancashire. 2) *Many / Much* people were injured by falling roof tiles and 3) *very few / very little* homes were left unharmed by winds that reached speeds of up to 100 mph. The tornado also caused 4) *some / a few* damage to the village's famous Gothic church and 5) *a few / few* shocked locals even claimed to have seen a car being lifted up and dropped some distance away. 6) *Most / Much* residents are now calculating 7) *how much / how little* it will cost to repair the damage to their homes and say that

8) *not enough / not many* help is being made available to them. 9) *Very few / Very little* nearby towns were as badly affected as Oakbridge but there are further warnings of strong winds and heavy rainfall in the region.

Ex.7.14. Read the text and choose the best answer (*a*, *b*, *or c*) *to the questions 1–3 below.*

Tornadoes Vs. Hurricanes

When the wind is howling, the rain is crashing down, and storm warnings are being blared on all radio and television stations, you may find yourself wondering if you are in the middle of a tornado or a hurricane. Both are wicked weather events that involve wind, rain- and significant threat. Which type of storm is more dangerous? That is a question experts have been trying to decide for years.

Hurricanes are commonly located over oceans and typically begin as tropical storms during the late summer or fall. Strong winds rotate and, as they do, they pull water up from the sea and dump it on the closest land. As the eye of the storm reaches shore, everything calms. The sun may shine, but it does not last long before the other half of the storm hits. Frequently hurricanes bring storm surges or huge rushes of water that come ashore and cause floods, knocking down buildings and dragging homes and cars back out to sea. Hurricanes often last for hours, or even days before finally fading away.

Tornadoes, on the other hand, are found more on land, usually beginning as thunderstorms with thunder, lightning, and even hail. As they build in strength, the winds begin to rotate and become like a huge, powerful vacuum. These winds create a funnel cloud, which moves up to 30 miles an hour across the sky. If the tornado touches the ground, it can destroy homes, and lift cars.

As to which storm is the most dangerous, the answer has not been decided yet. Tornadoes move faster, but hurricanes last longer. There is no question, however; being a part of one is an event no one is likely to ever forget.

1. What factor do tornadoes and hurricanes share?
   a) Both begin over water as tropical storms.
   b) Both have a central eye where it is calm.
   c) Both are dangerous weather events.
   d) Both include thunder, lightning, and hail.

2. What is the difference between tornadoes and hurricanes?
   a) Tornadoes last for hours to days.
   b) Tornadoes include a strong storm surge.
   c) Tornadoes are made up of ocean water.
   d) Tornadoes create powerful funnel clouds.
3. What does a hurricane have that a tornado does not?
   a) A funnel cloud
   b) A central eye
   c) A thunderstorm
   d) A high risk of danger

Ex.7.15. Read the text about volcanoes and decide whether the statements below are true or false. Correct the false ones.

Volcanoes

There are three layers inside the Earth: the crust, the mantel and the outer and inner cores. The crust is like the skin of the earth which is divided into plates, called tectonic plates. There are 16 main plates and they are 70 km thick. These plates float on the mantel and move over the earth surface. They move only a few centimetres each year. Volcanoes and earthquakes occur due to these movements. Volcanoes mainly emerge at cracks or plate outlines. When they widen, ash and rocks are thrown into the air. Soon red hot lava pours out. Volcanic eruptions occur when the molten roc beneath the earth's crust, called magma, forces its way up through a vent and is spilt as lava. Larger lumps are called bombs.

Cases may concentrate and cause a great explosion. The biggest explosion ever recorded happened when Krakatau in Indonesia, erupted in 1883. It was heard 5,000 km away.

As the rocks and ash cool, they make layers of solid rock. When the Vesuvius erupted in 79 AD the city of Pompeii was completely buried under volcanic ash.

Most volcanoes form on land, but there are some volcanoes that form on the ocean floor. Mauna Loa, in Hawaii, is the world's largest volcano. It reaches 4,170 m above the sea level. But its base is on the Pacific Ocean floor, 5,180 m below the sea level.

We can divide volcanoes according to their activity: active volcanoes are still active and erupt frequently (Etna, Sicilia and Santa Maria, Guatemala), dormant volcanoes are temporarily inactive but not fully extinct (Vesuvius, Italy); a volcano is extinct, or dead, when it hasn't erupted for at least 100,000 years (Menengai Crater, Kenya).

Volcanologists study volcanoes and volcanic phenomena.

1. The mantel is the outer layer of the Earth.
2. Plates' movement is the reason why volcanoes occur.
3. Lava and magma are the same thing.
4. Most inactive volcanoes are dead.

Ex.7.16. Answer the following questions. Use a relative pronoun (*who / which / where*) *in the answers.*

1. What is an active volcano?
2. What is a dormant volcano?
3. What is an extinct volcano?
4. What is Krakatau?
5. What happened in Pompeii in 79 AD?
6. What are volcanologists?
7. What is Mauna Loa in Hawaii?

Ex.7.17. Complete the sentences with appropriate words from the box.

a) Pacific	b) conductor	c) basalt	d) lava	e) plates	f) cloud
g) igneous	h) openings	i) icecaps	j) fault	k) magma	l) extinct

1. Volcanoes are ... in the Earth's surface.
2. Volcanoes are usually located where tectonic ... meet.
3. Over 75 % of the Earth's volcanoes are found in the ... Ocean.
4. Hot liquid rock found deep under the Earth's surface is known as ... .
5. When magma erupts to the surface through a volcano, it's called... .
6. Rocks formed from lava cooling are called ... rocks.
7. Granite and ... are examples of Igneous rocks.
8. Volcanoes can be active, dormant, or ... .

9. Volcanoes can be found on the ocean floor and even under ... .
10. Lava cools slowly because it is a poor ... of heat.
11. An ash ... is formed by a volcanic explosion.
12. A ... is a crack or fracture in the Earth's surface.

Ex.7.18. Complete the text using the best option (*a or b*).

An American Volcano

Mount Saint Helens is an active volcano in the state of Washington. In 1980, this volcano erupted, spewing hot (1) … into the air. Explosions caused a huge cloud of (2) … . This gray dust filled the air and settled on houses and cars many miles (3) … . The thick dust made it hard for people and animals to (4) … . The explosions (5) … trees on the side of the mountain. The hot rocks (6) … forest fires. The snow that was on the mountain melted quickly, causing (7) … and mud slides. Mount Saint Helens still (8) … from time to time, but not as badly as it did in 1980. But who knows when it will blow its top again!

1.	a) lava	b) water
2.	a) dust	b) lava
3.	a) ahead	b) away
4.	a) breathe	b) talk
5.	a) covered	b) flattened
6.	a) ignited	b) extinguished
7.	a) avalanches	b) floods
8.	a) occurs	b) erupts

Ex.7.19. Read the text about Cumbre Vieja and decide if the statements are true or false.

1. The volcano is in Africa.
2. The volcano could cause a tsunami.
3. We can prevent the eruption of the volcano.

Wave Power

Cumbre Vieja is a huge active volcano on La Palma in the Canary Islands. Every few decades it *erupts* and scientists are worried because

the walls of the volcano are getting weaker. Scientists fear that when it erupts, one side of the volcano could collapse and fall into the sea. If this happened, it would be a catastrophe. Why? Because it would cause a tsunami – an *enormous* wave – the biggest ever recorded in history.

How would it happen?

The volcano is by the sea, and the water next to the volcano is about six kilometres deep. If the volcano collapsed, 500 billion tonnes of rock would fall into the sea. This would create a *huge* tsunami about 100 metres high.

What would happen next?

The wave would travel away from the Canary Islands in all directions about 800 km/h. The other Canary Islands would be immediately covered by water. In less than an hour a 90-metre wave would hit north-west Africa. The side of the volcano faces west, across the Atlantic Ocean, which would *protect* Europe a little. However, a 12-metre tsunami would still reach Lisbon within three hours. After five hours it would reach Britain. The wave could travel a kilometre inland, and *devastate* towns and villages. London would be flooded.

How far would it travel?

The wave would have enough energy to travel right across the Atlantic Ocean. Eight hours after the eruption it would hit the east coast of America. It would still be about 30 metres high. Boston would be hit first, followed by New York, then the coast down to Miami. The wave would cause a lot of damage in the Caribbean and Brazil too. It would travel for several kilometres inland because the coast is very flat. It would *destroy* everything and kill thousands of people.

What can we do about it?

Nothing much, it seems. The scientists believe that it is not a question of if, but when. The volcano will collapse at some time in the future, but it could be hundreds or thousands of years from now.

Furthermore, if only part of the volcano collapsed into the sea, the tsunami would be much smaller.

Scientists want to put better equipment on Cumbre Vieja, so that they can *predict* the volcano's eruptions in the future and give us an early warning of possible problems.

Ex.7.20. Read the text again. What do the numbers refer to?
1) 6 2) 500 billion 3) 800 4) 90 5) 8

Ex.7.21. Answer the questions.
1. Why are scientists worried about Cumbre Vieja?
2. How long would it take the wave to reach the African coast?
3. Why would Europe be in less danger than America?
4. How big would the wave be when it reached Portugal?
5. Why would it travel a long way inland in the Caribbean and South America?
6. What can scientists do to predict the eruptions?

Ex.7.22. Find in the text these words in italics.
1) two adjectives that mean 'very big'
2) two verbs that mean 'damage very badly'

Ex.7.23. Find the highlighted verbs in the text that belong to the same word family as the nouns.
1) destruction
2) devastation
3) eruption
4) prediction
5) protection

Ex.7.24. Read the letter. Put the verbs in the correct form and choose the best option (*a*, *b*, *or c*) *for 1–4.*
What to Do if a Volcano Erupts

Dear Jerry,

I (write) _____ to tell you what you need (do) _____ if a volcano erupts in your area. I (be) _____ sure you think that you should (run) _____ as fast as you can to a (1) _____ place, well, this is (2)_____. You won't be able (run) faster than the lava of the volcano. This is what you must (do) _____ first. Make sure you know the location of an emergency shelter.

It is also a good idea (have) _____ some disaster supplies at hand. Make sure you (have) _____ a flashlight with extra

batteries so that you can light your way through the darkness. Another idea is (take) _____ a cellphone or portable battery-operated radio to communicate with other people if you (be) _____ in danger.

If you get (3) _____, you will also need a first aid kit. It is also important (have) _____ some emergency food and water. In addition, you will also need some (4) _____ medicines, cash and credit cards, and some strong shoes.

There are some certain things that you could (wear) _____ to protect yourself from any danger, wear long sleeved shirts and pants and use goggles; also hold a damp cloth over your face to help breathing. You don't want your car (explode) _____ , so make sure you (keep) _____ your car and engine off. If you (do) _____ everything I have just told you, then you (have) _____ a good chance of staying alive.

1.	a) safe	b) unsafe	c) insecure
2.	a) correct	b) incorrect	c) right
3.	a) injured	b) uninjured	c) unharmed
4.	a) unnecessary	b) unessential	c) essential

Ex.7.25. Match the words in column A with their synonyms in column B.

A	B
1) sure	a) illuminate
2) disaster	b) well built
3) light	c) wet
4) strong	d) catastrophe
5) damp	e) living
6) alive	f) certain

Ex.7.26. Complete the following sentences according to the letter above.

1. When a volcano erupts, you should … .
2. When a volcano erupts, you shouldn't … .
3. It is a good idea … .
4. When a volcano erupts, it is important … .
5. When a volcano erupts, the best thing you can do is … .
6. I advise you … .
7. Make sure you … .

Ex.7.27. Read the text about earthquakes and complete the sentences below.

Earthquakes

Earthquakes are natural disasters that humans cannot control. Sometimes earthquakes can be dangerous and people need to know more about where earthquakes come from, and how to protect themselves from them and any other natural disasters.

Earthquakes are the shaking, rolling or sudden shock of the earth's surface. They are the Earth's natural means of releasing pressure. More than a million earthquakes occur in the world each year. They can be felt over large areas although they usually last less than a minute. However, earthquakes cannot be predicted although scientists are still working on the problem.

There are about 20 plates along the surface of the earth that move continuously and slowly past each other. When the plates squeeze or stretch, huge rocks form at their edges and the rocks shift with great force, causing an earthquake. As the plates move, they put forces on themselves and each other. When the force is large enough, the crust is forced to break.

Shaking and ground breaking are the main effects created by earthquakes, principally resulting in more or less severe damage to buildings and other structures. The severity of the effect depends on the complex combination of the earthquake magnitude. Ground break is a major risk for large engineering structures such as dams, bridges and nuclear power stations and requires careful mapping of existing faults to identify any likely to break the ground surface within the life of the structure.

1. The above reading is mainly about
   a) the destruction caused by earthquakes
   b) protecting people from earthquakes
   c) describing a violent earthquake
   d) why and where earthquakes occur
2. Earthquake are considered natural disaster because
   a) they are man-made
   b) man has no control over them
   c) man can control them
   d) they are always expected

Ex.7.28. Complete the sentences choosing the best option a, b, or c.

1. Lava and hot gases are produced by … .
   a) earthquakes b) tornadoes c) volcanoes
2. The layer below the earth's crust is called … .
   a) core b) mantle c) inner core
3. Melted rocks come to the surface of the earth because of the activity of …
   a) earthquakes b) volcano c) soil erosion
4. Earthquakes are most likely to take place … .
   a) where two plates meet
   b) on the sea bed
   c) on the mountain top
5. The outer most part of the earth is called … .
   a) inner core b) mantle c) crust
6. A volcano which has not erupted for thousands of years can be termed as..

a) dormant b) extinct c) active

Ex.7.29. Answer the questions.

1. What is an earthquake?
2. Can earthquakes be controlled by people?
3. How many earthquakes do occur in the world each year?
4. How long does an earthquake usually last?
5. What causes an earthquake?
6. Why does the crust break?
7. What do earthquakes result in?

Ex.7.30. Combine the words in the column A with the words in the column B to make word combinations.

A	B
earth's	pressure
natural	means
releasing	surface
natural	power
huge	magnitude
earthquake	break
ground	disaster
nuclear	rocks

Ex.7.31. Read the text about tsunamis and answer the questions below.

Tsunamis

Did you know that an earthquake occurring under the ocean or a volcano erupting under water can trigger off giant sea waves known as tsunamis? Even though tsunamis are considered a global phenomenon and are likely to happen where large bodies of water are found, they tend to occur most frequently in the Pacific Ocean.

The term tsunami comes from the Japanese language meaning *harbour* ('tsu') and *wave* ('nami'). The term was created by fishermen who returned to the coast to find the area surrounding their harbour devastated, although they had not noticed any wave while being in the open sea.

Once a tsunami occurs in the middle of the ocean, it moves with great energy at high speed (from 460 to 900 km an hour) and travels great distances without losing its tremendous force. When all that force hits the shores of islands or countries, it hits them hard causing enormous damage thousands of kilometres from its origin.

When a tsunami reaches the coast, it generally consists of a series of waves. But, unlike the regular waves you might see at the beach or during a normal storm, these might be as high as 24 metres tall – more than ten times higher than a normal wave. The amount of time between each wave generally ranges from 10 to 45 minutes, although in some cases they have been reported to be over an hour apart.

Many people have lost their lives after returning home in between tsunami waves, thinking that the waves had stopped coming. If they had waited for the government to give official instructions, they would still be alive.

Scientists cannot determine exactly when a tsunami will strike, however, some changes in nature can help people become aware of the possibility of a tsunami. For instance, right before this natural disaster an earthquake might be felt, the water may either become unusually hot or smell of rotten eggs: it could also retire a considerable distance from the shore, and sometimes a flash of red light might be seen near the horizon. If any of these events should take place, people must take action immediately to reduce the damage and loss of life a tsunami can cause.

On the morning of December 26th, 2004 an undersea earthquake occurred 150 km off the coast of Indonesia, generating fatal tsunamis that killed nearly 300,000 people from nearby countries and tourists from all over the world. In addition to the deaths caused by the tsunami itself, this natural disaster created many social and health problems. Many people were left homeless and were exposed to extreme weather conditions. To make matters worse, food and water supplies became contaminated by bacteria, which helped spread serious diseases. These problems became even more serious since it was difficult to get medical assistance for the people who needed it.

1. How does a tsunami start?
2. Why can tsunamis bring about much devastation?
3. What shouldn't people do when a tsunami has hit their hometown?
4. How can people predict a tsunamis coming? Give an example.
5. What makes a tsunami such a terrible disaster for humanity?

Ex.7.32. Match the English words with their Ukrainian equivalents.

1) trigger	a) спустошити, розгромити
2) harbor	b) тухлі яйця
3) to devastate	c) понижати
4) tremendous, enormous	d) підводний
5) to determine	e) викликати, спричиняти
6) rotten eggs	f) гавань
7) shore	g) величезний
8) to reduce	h) заражений
9) horizon	i) визначати
10) undersea	j) беріг
11) contaminated	k) горизонт

Ex.7.33. Complete the sentences.

1. Tsunamis are enormous walls of … .
2. The name *tsunami* is … and means … .
3. Most tsunamis are caused by … or … .
4. A tsunami can be up to … times higher than a normal wave.
5. Right before tsunami, an … might be felt.
6. The smell of … might be a sign of an approaching tsunami.

Ex.7.34. Complete the text with the words from the box.

a) eruptions	b) normal	c) earthquake	d) strikes	e) caused
f) shore	g) tide	h) approaching	i) sign	j) emergency

Today we have many early detection systems that warn us about (1) … tsunamis. A tsunami doesn't actually look like a (2) … wave. Initially, a tsunami is seen as the ocean actually leaving the (3) … . This is the trough of the wave and is the first warning (4) … of an oncoming tsunami. As the wave draws near it is seen as a rapidly approaching (5) … . Most tsunamis are caused by earthquakes or volcanic (6) … . They can also be caused by landsides or meteorite (7) … .

In 2009 a 91 magnitude (8) … hit just off the coast of Sumatra, which resulted in a 50m tsunami causing over 200,000 deaths and billions of dollars worth of damage. On the 11th of March in 2011 a powerful tsunami was (9) … by a 9.0 magnitude earthquake. The tsunami hit Japan and killed more than 18,000 people and the damage even caused a nuclear (10) … when a nuclear power plant started leaking radioactive materials.

Ex.7.35. Complete the text using appropriate tenses.

The Day of the Tsunami

Pavaiai, America Samoa

We awoke on Tuesday morning to the house shaking. Earthquakes in this part of the world usually (l) _____ (last) for a minute or two. But this time the house (2)_____ shake) for five minutes. The children and I (3)_____(leave) our beds and (4)_____ (run) outside to the clearing in front of our house, where our neighbors (5)_____ (already/gather). Then just as suddenly as it (6)_____(start), everything (7)_____(become) quiet, and we (8)_____(go) back inside. I (9)_____ (pack) up my three boys and (10)_____ (drive) them to school. Just after I (11)_____(drop) them at the gate and (12)_____(head) to my office, I (13)_____(turn) on the radio. The announcer (14)_____ (talk) about cars floating like toys in the parking lot of the Pago Plaza shopping center and (15)_____(warn) that the tsunami's second

and third waves (16)_____(expect) to hit us on Tutuila Island in less than an hour's time. Instinctively, I swung the car back toward the school. I just wanted to get to my children.

The road (17)_____(jam) with traffic and, at the school, frantic parents (18)_____(call) out their children's names. Teachers (19)_____(urge) us to remain calm. Mr. Moi, the principal, (20)_____(also/ encourage) everyone not to panic. Our children, he said, (21)_____(evacuate) to the highest point on the school grounds, and we could pick them up there.

On my way, I heard hymns. Some children (22)_____(sing), while others (23)_____(pray) and (24)_____(cry). I saw one of my sons and told him to go look for his brother's while I did the same. After 15 minutes he ran to me and said everyone was at the car, and I quickly (25)_____(run) there, too.

My 10-year-old was in tears. 'Mom, I (26)_____(not want) to die', was how he greeted me. My only thought was to drive to the highest accessible point on Tutuila – the village of Aoloau. The drive up, usually 5 minutes, took 20; it seemed everyone (27)_____ (head) there. We (28)_____(stay) in Aoloau for three hours before we realized that were in safe.

Ex.7.36. Complete the sentences using conditionals.

1. The towns_____(not/be destroy) if the volcano hadn't been so destructive.
2. If the inhabitants _____(evacuate) early enough, the terrible disaster would have been averted.
3. If the weather is gloomy, I _____ (stay) in the hotel and read.
4. If I heard a loud, shrill, frightening noise while at the beach, I _____ (return) to the hotel immediately.
5. A tsunami would be set off, if a nearly volcano _____ (erupt).
6. If the curious children and adults hadn't gone on the beach to investigate the strange sound, they _____ (not lose) their lives.
7. The disaster wouldn't have been so terrible, if all the hotels _____ (prepare) for the possibility of a tsunami.

8. If you want to be safe during a tsunami, you _____ (move) miles inland.

9. When the sea draws back it means that a tsunami _____ (come) soon.

10. Many lives would have been saved, if the guest at the hotel _____ (take) precautions.

11. If there is a serious tsunami, the coastline _____ (be) damaged.

12. If the scientists who had observed the ash from volcano had alerted the nearby countries, the extent of the disaster_____(be) much less.

13. If there were strong winds along with a tsunami, there _____ (be) tremendous damage to the coastline.

14. If scientists predict tsunamis, they _____ (save) many lives.

Ex.7.37. Read the text and answer the questions below.

Japan Earthquake and Tsunami

A 9.0 magnitude earthquake occured on the 11th of March 2011 in Japan at 05.46.23 GMT, hitting the northeast coast of Honshu, Japan. The worst affected area is the east coast of Tohoku region.

Based on official Japanese government figures 1,627 people are confirmed dead, 1962 injured with at least 1,720 missing. Figures are expected to rise.

Rescue operations are ongoing and 371,833 persons have been evacuated.

There has been some improvement in the provision of electricity and water services. 1.5 million households remain without electric power and at least 1.4 million households are without running water.

Ten nuclear reactor units automatically shut down after the earthquake in three separate nuclear power plants, Onagawa, Fukushima Daiichi and Fukushima Daini. The automatic shut down went as planned for the Onagawa plant. The problems with the cooling systems in both Fukushima Daiichi and Fukushima Daini continue. Temporary measures for the cooling systems are in place. The state of emergency declared still remains.

National emergency management committee, led by the Prime Minister, has been established to oversee and coordinate all response

activities. All relevant ministries and agencies such as Ministry of Foreign Affairs, Ministry of Land and Transportation and Ministry of Health have been involved in the response. The nuclear disaster response committee has been activated.

More than 39 countries have offered support. Rescue teams coordinated by UN Disaster Assessment and Coordination (UNDAC) team arrived on 13 March. Rescue teams from Australia, USA, Republic of Korea, Mexico, New Zealand, China, United Kingdom, France, Singapore, Germany and Switzerland have been deployed.

1. How many dead people have been reported?
2. What are the consequences as for the services?

Ex.7.38. Decide whether the statements are true or false according to the text above. Correct the false ones.

1. The worst affected area is the northeast coast of Honshu.
2. The total number of dead, injured and missing people is about 5.5 thousand.
3. Almost 400 thousand people were removed from the place of danger to a safe place.
4. There are some problems in the cooling systems of some nuclear power plants.
5. Only National Services helped to solve the situation.
6. Only a few countries have offered support.

Ex.7.39. Match the word expressions with the correct definitions.

1) aftermath	a) the act of destroying something
2) earthquake	b) carried away by water
3) radiation	c) powerful and dangerous rays
4) atomic power plant	d) to move people away from danger
5) rescue teams	e) energy produced by splitting atoms
6) destruction	f) a sudden shaking of the earth's surface
7) debris	g) place where nuclear power is made
8) survivors	h) people who save/help others in danger
9) evacuate	i) pieces of wood, metal etc. after destruction
10) nuclear energy	j) situation after an unpleasant event (e.g war)
11) swept away	k) to continue to live after nearly being killed

Ex.7.40. Complete the table.

Noun	Verb
destruction	
	predict
observe	
	evacuate
	save
damage	
protection	
	survive
rescue	
radiation	
	inhabit

Ex.7.41.Complete the sentences choosing the correct answer from a, b, c or d.

1. The ongoing crisis at Japan's Fukushima nuclear plant has turned into a slow-moving nightmare, with fires, leaks of … radiation, and mass evacuations.

a) safe b) delicious c) poisonous d) positive

2. Japan … by one of the largest earthquakes ever recorded on March 11.

a) hit b) was hit c) was hittingd) hits

3. Thousands of people are dead and many more are still missing or … .

a) injury b) injuring c) injured d) injures

4. You can help people affected by … like floods, fires, tornadoes and hurricanes by donating money.

a) corruption b) disasters c) attention d) blessings

5. A team of doctors flew to Japan, … they will be delivering supplies, assessing needs, and identifying communities that have not yet been reached.

a) which b) whose c) when d) where

6. Whole cities are literally disappearing (washed away) … the tsunamis.

a) despite b) because of c) because d) without

7. My wife just arrived in Japan to see her family and is still worried … the shaking of the earthquake even in Tokyo.
a) about b) of c) on d) at
8. What would you do if you … in an earthquake area.
a) are b) were c) has been d) had been
9. Japan is used to … earthquakes but this time it was so destructive.
a) face b) faced c) facing d) faces
10. The March 11 earthquake is now Japan's … natural disaster since the 1923 Great Kanto Earthquake, which killed more than 142,000 people.
a) deadlier b) deadliest c) as deadly d) the deadliest
11. While rescuers … for victims, the earthquake hit again.
a) searched b) were searched
c) were searching d) searching
12. Egypt has not faced an earthquake … 1990.
a) for b)since c) in d) lately
13. The tsunami … damage everywhere.
a) makes b)does c) carries d) brings
14. Japan can't solve this nuclear power problems by … .
a) itself b) themselves c) herself d) himself
15. After I … of the disaster in Japan, I logged on the internet.
a) heard b) had heard c) have heard d) hearing

Ex.7.42. Read this news article from Reuters about the March 2017 flooding in Peru and do the exercises below.

Abnormal El Nino in Peru Unleashes Deadly Downpours; More Flooding Seen

A sudden and abnormal warming of Pacific waters off Peru has unleashed the deadliest downpours in decades, with landslides and raging rivers sweeping away people, clogging highways and destroying crops.

At least 62 people have died and more than 70,000 have become homeless as Peru's rainy season has delivered 10 times as much rainfall than usual, authorities said Friday. About half of Peru has been declared in emergency to expedite resources to the hardest hit areas, mostly in

the north where rainfall has broken records in several districts, said Prime Minister Fernando Zavala.

Peru is bracing itself for another month of flooding. A local El Nino phenomenon, the warming of surface sea temperatures in the Pacific, will likely continue along Peru's northern coast at least through April, said Dimitri Gutierrez, a scientist with Peru's El Nino committee.

Coastal El Ninos in Peru tend to be preceded by the El Nino phenomenon in the Equatorial Central Pacific, which can trigger flooding and droughts around the world, said Gutierrez. But this year's event in Peru has developed from local conditions.

The U. S. weather agency has put the chances of an El Nino developing in the second half of 2017 at 30–55 per cent.

While precipitation in Peru has not exceeded the powerful El Nino of 1998, more rain is falling in shorter periods of time – rapidly filling streets and rivers, said Jorge Chavez, a general tasked with coordinating the government's response.

'We've never seen anything like this before', said Chavez. 'From one moment to the next, sea temperatures rose and winds that keep precipitation from reaching land subsided'.

Some scientists have said climate change will make El Ninos more frequent and intense.

In Peru, apocalyptic scenes recorded on cellphones and shared on social media have broadened the sense of chaos. A woman caked in mud pulled herself from under a debris-filled river earlier this week after a mudslide rushed through a volley where she was tending to crops. Bridges have collapsed as rivers have breached their banks, and cows and pigs have turned up on beaches after being carried away by rivers.

'There's no need to panic, the government knows what it's doing'. President Pedro Pablo Kuczynski said in a televised event, urging people to stay clear of rivers.

In Lima, the capital, classes have been suspended and running water has been restricted after treatment systems were clogged – prompting a rush on bottled water that produced shortages at some supermarkets.

The vast majority of people affected by the extreme weather are poor, including many who built makeshift homes on floodplains that

had been dry for 20 years, said Chavez. 'There's no electricity, no drinking water … no transit because streets are flooded', said Valentin Fernandez, mayor of the town Nuevo Chimbote.

Chavez said Peru must rethink its infrastructure to prepare for the potential 'tropicalization' of the northern desert coast, which some climate models hove forecast as temperatures rise.

'We need more and better bridges, we need highways and cities with drainage systems', said Chavez. 'We can't count on nature being predictable'.

Ex.7.43. Match the words with their definitions.

1) unleash	a) be violent
2) rage	b) release
3) clog	c) sewage
4) debris	d) waste, remains
5) drainage	e) block, obstruct

Ex.7.44.The following root words appear in the story above with suffixes. Find these words and write them next to the root words (*e.g. dead – deadliest*).

1) home _____
2) hard _____
3) most _____
4) equator _____
5) precipitate_____
6) power _____
7) broad_____
8) electric_____

Ex.7.45. Combine the words in the first column with the words in the second column to form new words.

rain	slide
make	fall
mud	plain
flood	slide
land	shift

Ex.7.46. Turn these active sentences into the passive form.

1. People recorded scenes on cellphones.
2. The government has suspended classes.
3. The government has restricted running water.
4. The water flooded the streets.

Ex.7.47. Decide whether the statements are true or false according to the article above.

1. It is possible there will be more flooding later this year.
2. The 2017 floods were worse than the 1998 floods.
3. El Ninos will lessen as time goes by.
4. Water restrictions caused bottled water supply problems.
5. Chavez thinks that nature is predictable.

Ex.7.48. Complete the text with the words from the box.

a) warnings	b) outages	c) storm	d) visability	e) snowfall

Blizzard

A blizzard is a (1) ... with high winds and blowing snow. Sometimes a blizzard consists of heavy (2) ... and extreme cold temperatures. The National Weather Service issues (3) ... when winds exceed 33 miles an hour and (4) ... is low. Blizzards can cause a variety of problems including power (5) ... .

Ex.7.49. Complete the article. Use past tenses of the verbs in brackets.

Avalanche Survivors in Good Health

A survivor of Monday's avalanche (1)_____(describe) his experience to reporters yesterday.

Duncan Wood and his friend Steven Taylor (2)_____ (return) from a climb when the avalanche (3)_____(hit) them. 'We (4)_____(check) the weather reports before leaving, of course, and we (5)_____(chose) an area that was safe – we thought', Mr Wood said. 'The weather was OK – it (6)_____(not snow). We (7)_____(walk) down the mountain when suddenly, the snow under me (8)_____(start) moving and (9)_____(carry) me

down the mountain. I was terrified! Snow and rocks (10)_____ (fall) everywhere around me! ‘When it (11)_____(stop), I was covered in snow, but I could still see the sky above me. I (12)_____(manage) to dig a hole and get out. Then I (13)_____(see) an arm in the snow near me. Steven (14)_____(land) right next to me! I (15)_____(dig) a hole for him and he (16)_____(get) out. We weren’t badly injured and we feel fine now. We were very lucky’.

Ex.7.50. Complete the sentences with the words from the box.

Extreme Weather

drought	blizzard	hurricane	earthquake	tornado

1. After the ... was over, we had over 3 feet of snow!
2. The swirling winds of the ... picked up houses and cars and tossed them aside.
3. Last autumn’s ... brought strong winds and huge waves into New York and New Jersey.
4. An ... shook my house and knocked things off my shelves and walls.
5. The summer’s long ... left farms with loose soil and dried creeks and rivers.

REFERENCES

1. The New Book of Popular Science. In 6 vol. Earth Sciences. Danbury : Grolier incorporated, Connecticut, 1998. V. 2. 522 p.

2. Cunningham W. Saigo B. Environmental Science. A global concern. 3-d edition. WCB Communication, Inc., 1995. 640 p.

3. Hill M. K. Understanding Environmental Pollution. CUP, 2004. 468 p.

4. Pankratz T. M. Environmental Engineering Dictionary and Directory. CRC Press LLC, 2001. 335 p.

5. Walker P. Wood E. Environmental science. Experiments. NY. Infobase Publishing, 2010. 153 p.

6. Environmental Science. Managing Biological. Dubugue, Lowa-Melborne, Australia – Oxford, England, 1993. 153 c.

7. Carattoli M. C. Nature & Environment. London. Rochmond Publishing, 2002. 65 p.

8. Английский язык для студентов-экологов «English for Ecology Students» : учеб.-метод. пособие для студентов геогр. фак. БГУ / сост.: Т. В. Елисеева, И. Г. Шалимо, И. Л. Шарейко. Минск : БГУ, 2010. 139 с.

9. Савельев Л. А. Учебное пособие английского языка «English for the Students of Ecology» для экологов. СПб: изд. РГГМУ, 2007. 148 с.

10. Положинцев Б.И. Introduction to Ecology : учеб. пособ. СПб. : ООО «Изд-во «Химера», 1999. 96 с.

11. Электронный словарь Abby Lingvo. 2013. URL: http://www.lingvo.ua/ru/

12. Wikipedia: the free encyclopedia. 2001. URL: http://en.wikipedia.org/

NOTES

NOTES

Навчальне видання

МІНЯЙЛОВА Алевтина Володимирівна
ШЛЯХТІНА Олена Семенівна

ENGLISH FOR ECOLOGISTS

Навчальний посібник з англійської мови для студентів спеціальності 101 «Екологія»

(*англійською мовою*)

Коректор – М. О. Паненко
Верстка – Ю. С. Семенченко

Підписано до друку 17.09.2020 р. Формат 60×84/16.
Папір офсетний. Гарнітура Times New Roman. Цифровий друк.
Умовно-друк. арк. 8,14. Наклад 100. Замовлення № 1009-47.
Ціна договірна. Віддруковано з готового оригінал-макета.

Видавець і виготовлювач
Національний університет кораблебудування імені адмірала Макарова
просп. Героїв України, 9, м. Миколаїв, 54025
E-mail: publishing@nuos.mk.ua
Свідоцтво суб'єкта видавничої справи
ДК № 6402 від 19.09.2018 р.

Віддруковано в друкарні Видавничий дім «Гельветика»
73034, м. Херсон, вул. Паровозна, 46-а
Телефони +38 (0552) 39 95 80, +38 (095) 934 48 28, +38 (097) 723 06 08
E-mail: mailbox@helvetica.com.ua
Свідоцтво суб'єкта видавничої справи
ДК № 6424 від 04.10.2018 р.