ВЫСШЕЕ ПРОФЕССИОНАЛЬНОЕ ОБРАЗОВАНИЕ

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АНГЛИЙСКИЙ ЯЗЫК ДЛЯ ГЕОГРАФИЧЕСКИХ СПЕЦИАЛЬНОСТЕЙ

ENGLISH FOR GEOGRAPHERS

Допущено
Министерством образования и науки Российской Федерации
в качестве учебника для студентов высших учебных заведений,
изучающих дисциплину «Иностранный язык» и обучающихся
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Учебник содержит профессионально ориентированные тексты, заимствованные из учебников по географии, страноведению и экологии на английском языке и других оригинальных источников. Цель книги — научить студентов быстро извлекать информацию при чтении аутентичных текстов и обсуждать научные темы, используя самые употребительные языковые стредства и основные термины специальности.

Для студентов географических и экологических факультетов высших учебных заведений.

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ПРЕДИСЛОВИЕ

Предлагаемый учебник предназначен для обучения английскому языку студентов географических и экологических факультетов университетов, педагогических институтов и колледжей, специальностью которых является география и другие смежные эколого-географические и экономико-географические дисциплины: природопользование, геоэкология, картография, метеорология, океанология, гидрология, ландшафтоведение, география мирового хозяйства, социально-экономическая география, страноведение, регионоведение, туризм и др. Он также может быть использован для более широкого круга изучающих английский язык на основе познавательных материалов о природе Земли, хозяйственной деятельности людей и их воздействии на окружающую природную среду. Учебник рассчитан на общую трудоемкость 340 академических часов (не менее 175 из них должны быть аудиторными). В соответствии с требованиями Государственного образовательного стандарта Российской Федерации по профессиональной подготовке студентов высших учебных заведений по дисциплине «Иностранный язык» данный учебник нацелен на развитие и совершенствование у студентов практических умений и навыков во всех видах речевой деятельности: чтении, говорении, аудировании, письме в сфере профессионального общения. Основная цель учебника — научить быстро извлекать информацию при чтении, излагать содержание по-английски просто и понятно, делать сообщения и обсуждать научные темы, используя самые употребительные языковые средства и основной словарный фонд английского языка, т. е. освоить стиль нейтрального научного изложения. Учебные тексты содержат и позволяют студентам усвоить основную географическую терминологию, а также термины по экологии и охране природы.

В понятийном плане учебник имеет четкую структуру, обусловленную логикой данной предметной области как целостной дисциплины с широким охватом современных интересов и направлений. Он состоит из 22 разделов (Units), сгруппированных в 3 части: часть I — *Физическая география*; часть II — *Социально-экономическая география*; часть III — *Экология и окружающая среда*. Учебный текстовой материал дается так, что английские тексты, взятые вместе, представляют географию как систему естественных и обще-

ственных наук, изучающих природные и антропогенные процессы и явления, происходящие на поверхности Земли и в окружающих ее сферах, а также территориальные особенности их проявления. Каждый раздел (Unit) посвящен базовой теме общей физической географии (часть I), социально-экономической географии (часть II) и актуальным экологическим проблемам взаимодействия человека и окружающей среды (часть III). Разделы повторяют последовательность изложения материала в систематических курсах по общей географии и вместе представляют, по существу, географию «в миниатюре», охватывая основы геоморфологии, метеорологии, гидрологии, биогеографии, ландшафтоведения, почвоведения, геоэкологии, рационального природопользования, океанологии и др. Разнообразный и интересный текстовой материал, связанный общей тематикой и представленный в логической последовательности, способствует закреплению у студентов знаний по основам специальности и расширяет их кругозор. При отборе текстов учитывалась их информативность, познавательная ценность и актуальность тематики.

Конечно, учебник по иностранному языку не может претендовать на исчерпывающее изложение предмета во всей его полноте, да этого от него и не требуется. Но предлагаемый систематический отбор текстового материала обеспечивает знакомство студентов с основами географии и ее базовой терминологией, так как каждая отрасль географии представлена в одном из тематически ориентированных разделов тем ограниченным, но достаточным количеством ключевых слов, которые отражают ее существо и главные понятия на английском языке.

В плане языковой организации тексты выдержаны в стиле достаточно простого, стилистически нейтрального изложения, оптимального для активного овладения и практического использования студентами в их собственной речи на английском языке. Запоминание и усвоение таких образцов речи учит студентов выражать свои мысли на английском языке максимально просто и четко и тем самым достигать понимания, что и является в конечном счете целью обучения иностранным языкам для профессионального общения. С языковой точки зрения учебник представляет собой пособие по практической стилистике английской научной речи в области географии и экологии.

Весь текстовой материал пособия аутентичный. Тексты отобраны главным образом из учебников по географии и экологии на английском языке, а также из других оригинальных источников. Отбор текстов проводился в соответствии со строгими принципами современной лингвистики, теории функциональных стилей и практики преподавания «языка для специальных целей». Наличие нескольких текстов в разделе позволяет обучать навыкам разноцелевого чтения в сочетании с другими видами речевой деятельно-

сти: говорением, аудированием, письмом. Каждый раздел включает в себя грамматические, лексические, переводческие и коммуникативные упражнения и задания, обеспечивающие вместе активную деятельность в области речевой практики. Учебник можно использовать на занятиях со студентами с различным уровнем знаний английского языка и в комплексе с другими учебниками и учебными пособиями.

Учебник написан на основании опыта работы по преподаванию иностранных языков на естественных факультетах Московского Государственного университета им. М. В. Ломоносова, а также на основании лингвистических исследований в области функциональной стилистики, текстологии английской научной речи и методики преподавания иностранных языков.

В текстовых материалах сохранена орфография первоисточника (британская или американская), чтобы студенты знакомились с основными вариантами написания самых распространенных слов, относящихся к их профессиональной сфере.

Каждый раздел (Unit) учебника включает следующие рубрики, направленные на развитие основных навыков речевой деятельности и контроль усвоения языкового материала:

1. **Reading and Learning (Чтение и запоминание)** направлена на развитие навыков понимания при чтении (извлечения информации) и включает в себя три базовых текста. Содержание текстов раскрывает основные аспекты темы, заявленной в заголовке раздела. Предлагаемые тексты — это связные произведения речи, законченные в смысловом отношении и хорошо структурированные по содержанию. В языковом плане — это простые, написанные на хорошем английском языке фактологические тексты (clearly written texts in easy-to-follow language), в которых соотношение информации и языкового выражения оптимально для целей обучения. Они легки для запоминания и воспроизведения. Данные тексты можно использовать для тренировки разноцелевого чтения. Каждый из трех текстов (в первой и второй частях) сопровождается вопросами, которые следует воспринимать как материал для тренировки говорения, умения реагировать на вопрос и отвечать на него по возможности распространенно и полно. В третьей части учебника вопросы к текстам предлагается сформулировать самим учащимся.

2. **Lexical and Grammatical Exercises (Лексические и грамматические упражнения)** содержит несколько упражнений, направленных на закрепление лексики общего языка, общенаучной лексики и основных терминов по географии, правил словообразования и словоизменения и т. п. Особое внимание уделяется использованию слов в составе наиболее употребительных, стандартных словосочетаний и умению употреблять их в своей собственной речи. Упражнения обращают внимание на языковые элементы, часто

встречающиеся в речи, направленной на передачу информации и четкое изложение фактов. Они не дают обзора всех грамматических явлений английского языка, а высвечивают только самые главные, наиболее употребительные в нейтральном научном стиле явления, а значит, первоочередные для обучения.

3. **Translation into Russian (Перевод на русский)** содержит отдельные предложения, представляющие собой тезисы основных положений данного раздела, или небольшой текст. Они предназначены для письменного или устного перевода на русский язык.

4. **Complementary Text (Дополнительный текст)** включает в себя текст, связанный с тематикой раздела и содержащий дополнительную информацию по теме. Текст предназначен для понимания, запоминания и пересказа или, возможно, прочтения преподавателем вслух для аудирования. В третьей части книги эта рубрика носит название **Complementary Activities** и содержит задания и рекомендации, направленные на развитие навыков работы с текстом: понимания содержания, выделения главной мысли, перефразирования, написания эссе, реферата и т. д.

5. **Writing (Письмо)** направлена на развитие навыков письма и перевода, содержит текст на русском языке, соответствующий основной теме раздела. Текст предназначен для письменного перевода на английский язык, причем в зависимости от задач обучения и уровня знаний студентов они могут делать либо подробный перевод, либо вольный перевод, передавая содержание русского текста на английском языке более свободно.

6. **Speaking (Говорение)** направлена на развитие навыков устной речи. Содержит текст, который следует прочитать, понять, уметь пересказать, а потом высказать свое мнение или комментарий по данной проблеме. Преподаватель может организовать дискуссию студентов по предложенной проблематике, воспользовавшись сформулированными после текста темами.

7. **Summarizing the Unit (Конспектирование)** предлагает в завершение работы составить план всего раздела с учетом дополнительной информации, полученной как на занятиях, так и в процессе самостоятельной работы, а затем суммировать ее в виде конспекта и краткого 4—5-минутного доклада, который излагается на уроке и обсуждается в виде ролевой игры, имитирующей выступление на конференции и участие в дискуссии.

После основного курса в приложении 1 даны названия частей света и стран.

В приложении 2 помещен **Словарь основной лексики (Vocabulary)**. Он составлен с помощью созданной нами компьютерной программы анализа слов, которая позволила подсчитать, сколько раз каждое слово встретилось в текстах учебника. Полученный достаточно длинный алфавитный список слов был сокращен: исключены служебные слова и слова, встретившиеся менее 5 раз

(при этом слова, встретившиеся хотя и менее 5 раз, но понятийно относящиеся к географии и экологии и важные для научного изложения, сохранены в списке). Таким образом, удалось надежно, на основании сплошного компьютерного анализа, показать базовый словарь, необходимый студентам для активного усвоения. Он включает самые употребительные и необходимые слова, функционирующие в научном регистре речи по географии. Студенты и преподаватели могут любое слово из текста сравнить со словарным списком и выяснить, насколько оно распространено и входит ли в базовый словарный состав учебника, что помогает понять, в какой степени то или иное слово следует усваивать: должно ли оно войти в активный словарный запас студента, или же оно рекомендовано для рецептивного (пассивного) восприятия.

В приложении 3 дан **Частотный список слов (Frequency Wordlist)**, наиболее часто встречающихся в текстах учебника. Слова представлены в порядке убывания частотности. Некоторые из них указаны в разных формах, каждая из которых весьма употребительна (так, как они встречались в текстах).

Авторы

PART I

PHYSICAL GEOGRAPHY

UNIT 1

THE NATURE AND PURPOSE OF GEOGRAPHY

1. Reading and learning

Scan each text and formulate the main ideas. Read the text again carefully and memorize it, then retell the text close to the original.

1.1. THE SCIENCE OF GEOGRAPHY

Geography, which comes from the Greek words *geo*, meaning "earth", and *graphein*, meaning "description", is literally a study of the planet Earth. As trained scientists, geographers describe and analyze the physical characteristics of our planet and the ways in which people interact with these physical characteristics and with each other.

Throughout history people who went even short distances from where they lived became keenly aware of differences that distinguish one place from another and one group of people from another. Many of these travelers formed mental images of the places that they had visited and told others what they had seen. They sometimes scratched crude maps on rocks or on pieces of cloth or leather to improve the accuracy of their descriptions.

Geography, the study of the relationship between people and their physical surroundings, or environments, grew directly out of these attempts by early explorers to describe what they had seen on their travels. Today those who study geography describe and analyze the earth to explain what is where, why it is there, and what significance it has.

The study of the earth. Earth is only one of nine planets in our solar system that revolves around the sun — a minor star in the universe. A planet is an object or body that is made of various solids and gases and

that circles a star. A star and the planets and other related bodies such as asteroids that revolve around it are known as a solar system.

Earth is the third planet in distance from the sun, which is 150 million kilometers away. Even though the sun ranks as one of the smaller stars in the universe, it is huge when compared to Earth. The sun's heat and light provide most of the energy that makes life on Earth possible. It is this life and the physical features of the earth that geographers attempt to describe and analyze.

Most geographers focus on one of the two major branches of geography, physical geography and cultural geography, or on one of its more specialized fields. The earth offers many different natural, or physical, features. Low-lying jungles mark some places on the earth. Ice-covered mountain peaks dominate other places. Each location derives its physical character from combinations of the shapes of the land, climate, soils, plants, animals, and other naturally occurring phenomena. These combinations of physical features and their variations from place to place are the subject of physical geography, the study of the physical features and changes of the earth's surface.

Cultural geography. In contrast to physical geography, cultural geography focuses on the impact of human ideas and actions on the earth. The sum of what a human group acquires through living together, such as language, knowledge, skills, art, literature, laws, customs, and life styles, is known as that group's culture. Cultural features are evident in a group's tools, foods, government, religions, and other characteristics.

Each group of people leaves a distinct imprint (has a strong effect) on its human habitat, or the place where that group lives. This imprint, or effect, is known as the cultural landscape. Examples of cultural landscapes include the fields people clear and farm, the crops and livestock they raise, and the style and distribution of the villages and cities they build.

The skyscrapers of New York City's cultural landscape, for example, show how humans there have changed the environment. People constructed multistorey buildings to make better use of a very limited amount of space. Even remote villages in the Himalayas or in the Amazon Basin show how a society, or group of people who share traditions, institutions, activities, and interests, changes its habitat.

Along with the cultural landscape, geographers also study the process of cultural diffusion, or the spread of parts of a culture from one area to another. The spread of Christianity from Palestine to other parts of the Middle East and to Europe between the years A. D. 100 and 600 is one example of cultural diffusion. The spread of the alphabet is another example. The alphabet originated in the Middle East about 2000 B. C. and gradually spread to most parts of the world. Today many different cultures use various forms of the alphabet to write their languages. The process of cultural diffusion continues. The spread of rock music from

Great Britain and the United States to other parts of the world illustrates modern cultural diffusion.

1. How did the study of geography develop?
2. What do modern geographers study?
3. What are the two main branches (subdivisions) of geography?
4. Give examples of cultural diffusion today.

1.2. THE ROUND EARTH ON FLAT PAPER

Geographers use a variety of tools to carry out their work. The tools that most people identify with geography are those that are still most important to geographers today — globes and maps. Modern geographers, however, also use tools such as aerial photographs, satellite images, and computer programs to help them analyze the interactions between people and their environments. The best tool to use often depends on the geographic theme that is the focus of the research. Globes and maps are useful models of the earth. However, globes and maps do not provide perfect representations of the earth. Each has specific advantages as well as disadvantages.

Globes. The most important advantages of globes relate to their shape. A globe is the only model of the earth in the shape of a sphere, just like the earth. A globe, then, provides the most accurate representation of the shape of the earth. Because it is true to scale, the landmasses and bodies of water the globe illustrates have the same shapes as they do on the earth's surface. When you look at Greenland on a globe, for example, its true shape is what you see. You can also compare its size to any other land body. In addition, a globe accurately represents the earth's grid of parallels and meridians, as well as direction and distance from one place to another.

Among the disadvantages of globes is that they often are not practical to use. Globes are expensive and most are too big and bulky to carry around. In addition, people can view only one-half of a globe at a time. This makes it impossible, for example, to look at Canada and India at the same time because they lie on opposite sides of the globe, just as they lie on opposite sides of the earth. Another disadvantage of globes concerns the problem of detail. Because globes represent the entire earth, the individual areas that they illustrate are relatively small. As a result, globes cannot show the detailed features of an area, such as roads, streams, forests, and parks.

The oldest preserved globe is kept and displayed to the public in a museum in Germany. This wooden globe was made in 1492. It is 15 cm in diameter. The globemaker drew on it the land and water bodies that he thought existed. What is interesting about this globe is that it shows the world as Columbus thought of it.

Maps. Maps are flat representations of the earth. Maps vary in size from small maps that appear in pocket size to huge wall maps. Maps also vary in purpose.

One of the most obvious advantages of maps over globes is that they are more convenient to use. Maps can be rolled and folded and are easy to carry around. Maps and related material can also be collected in an atlas to provide an easy-to-use reference. Another advantage of maps is that they can show the earth's entire surface at one time, or can show specific details. Maps can also present information about a wide range of topics related to both physical and cultural features of the earth. Using different colors and symbols, maps can illustrate many kinds of topics, including rainfall, mineral resources, and religions. Presenting such a variety of information about an area often helps geographers to see regions and relationships otherwise difficult to visualize.

On the other hand it is impossible to accurately show a three-dimensional object like the earth on a flat, two-dimensional map. For this reason all maps have one or more inaccuracies, called distortions. The problem of distortion remains the major disadvantage of maps.

1. What tools do geographers use?
2. What are the major advantages and disadvantages of a) globes and b) maps?
3. Why is cartography related to all the fields of geography?
4. Why do maps have distortions?

1.3. CONVENTIONAL AND MODERN TOOLS OF GEOGRAPHY

Mapping

Despite their variety, all maps have similar components, or parts. These include a title; a legend or key; a direction indicator; and a scale.

The title of a map. It identifies what the map is about and what parts of the earth it shows. The title of some maps includes a date. Dates are useful on maps showing features that change over time. A map with the title "Distribution of Population in France: 1920", for example, should not be used when looking for figures on the present population of France.

A legend. A legend or key explains the meaning of colors and symbols used on a map. A map with areas shown in green, red, and blue might be misunderstood unless the user knows what the green, red, and blue represent. The legend also explains the meaning of symbols used on a map, such as stars for capital cities.

A direction indicator. Every map should have a direction indicator. One such indicator is an arrow that points north. A different way to find directions on a map is to study the parallels and meridians. East and west directions follow parallels, or lines of latitude. North and south directions

follow meridians, or lines of longitude. Parallels and meridians cross each other to form an imaginary grid over the earth. Because each degree can be broken into 60 minutes (′) and each minute can be broken into 60 seconds (″), this grid can be used to fix the precise location of any point on the earth's surface.

The most important longitude is called the Greenwich Meridian, because it passes through a place called Greenwich in London where there is a famous observatory. The longitude of the Greenwich Meridian is 0 degrees. At Greenwich local time is called Greenwich Mean Time (GMT). All places on the same meridian have the same local time. When it is noon at a given meridian, it is after noon or *post meridiem* (p.m.) at places which lie to the east of it. This is because the earth rotates from west to east. At the same time the sun will be before noon or *ante meridiem* (a.m.) at places lying to the west.

Map scales and projections. A map scale provides statistical information used to measure distances on a map. While maps have similar components, they do not always show areas of the world in exactly the same way. The size and shape of North America, for example, may look somewhat different on two different maps. The differences occur because the two maps use different map projections, or methods by which the features of the earth's curved surface are transferred onto a flat map.

No matter which projection is used, every map has some distortions that are inevitable in the process of illustrating the earth's spherical surface on a flat map. Certain distortions, however, are worse on some projections than on others. Mapmakers choose which projection to use depending on what undistorted features, or map properties, are most important to be illustrated. The four most useful map properties are correct shape, correct size, correct distance, and correct direction. No world map can have all four map properties. Maps of smaller areas, however, may have less distortion than maps of larger areas.

Remote sensing

Rapid developments in technology have made several new tools available. These tools already have provided a wide range of valuable information about the earth's surface. Remote sensing, the gathering and recording of information through aerial photographs and satellite images, ranks among the most important of the new methods.

Aerial photographs. Geographers use aerial photographs — pictures taken from above the earth — to study relationships involving people and places that are not easily seen from ground level. Aerial photographs of traffic patterns, for example, can be used to help plan new highways. Military planners can see troop movements and rocket launch sites. Foresters can spot diseased or insect-infested trees in rugged terrain that would be hard to reach on foot. Aerial photographs even show features of the ocean floor.

Because aerial photographs provide such accurate and detailed information, cartographers rely on them as a source of information when making maps. Most aerial photographs used to make maps are taken by cameras in high-altitude airplanes and are developed in strips of overlapping pictures. An instrument called a stereoscope converts a pair of overlapping aerial photographs into a three-dimensional view of the area.

Elevations appear somewhat distorted on aerial photographs because the camera taking the pictures is closer to the tops of the mountains than to the valleys. As a result, mountains appear larger than the more distant valleys. This distortion is corrected by using a viewing instrument called a stereoplotter, which gives a more accurate three-dimensional view of the earth.

Satellite images. Many of the satellites circling (revolving around) the earth have special sensors called multispectral scanners. These scanners record observations electronically and send them to ground stations. Computers then translate the data into electronic images, making false-color pictures. Even though the pictures are taken from far in space, they are so detailed that they can show houses or even sailboats on a lake.

An extraordinary group of earth satellites known as Landsats take many of the satellite images. These satellites circle the earth 14 times every 24 hours, silently scanning, collecting, and sending back a greater view of the world than any eye could ever see.

In addition to globes, maps, and remotely sensed images, geographers use tables, charts, graphs, and diagrams to help them in their work. Geographers also use computers to solve geographic problems as well as to make maps and graphics.

1. What components do maps have?
2. What is the unit for measuring latitude and longitude?
3. Why is the global grid significant?
4. What are the four most useful map properties?
5. Why are aerial photographs and satellite images especially useful to geographers?
6. Why do elevations appear somewhat distorted on aerial photographs?
7. How do computers help geographers?

2. Lexical and grammatical exercises

2. 1. Rearrange the letters in the anagrams to form equivalents for the Russian words.

изменять(ся) — **arvy**
предоставлять — **pdroevi**
сравнивать — **crepoma**
делить, разделять — **srahe**
распространять(ся) — **sadepr**
сгибать, складывать — **dflo**
накрывать, покрывать — **cvero**
широкий диапазон — **dwie nerag**
сознающий — **arwae**
развитие — **ntvopeldeme**
поверхность — **sfuraec**
с.-х. культура — **orpc**
навык, умение — **silkl**
привычка, обычай — **omcust**

включать в себя — **inuclde**
замечать — **nicote**
измерять — **msueare**
искажать — **doristt**
среда обитания — **btahait**
характерная черта — **fateeur**
исследование — **rrchease**
преимущество — **aantadvge**

2.2. Match the words close in meaning in A and B.

1) **A.** to come from; to occur; to carry out; to include; to attempt; to circle; to focus (on); to preserve; to provide; to acquire; to distinguish
   B. to differentiate (between); to derive; to revolve; to try; to involve; to keep; to concentrate (on); to give; to get; to perform; to happen
2) **A.** distortion; environment; impact; branch; significance; location; elevation; spread
   B. diffusion; surroundings; influence; field; importance; altitude; inaccuracy; place
3) **A.** crude; obvious; remote; aware; gradually
   B. conscious; slowly; isolated; raw; distinct

2.3. Match the words in A with the words in B to form word combinations. Make up sentences with them.

A. physical; cultural; detailed; natural; obvious; specific; important; major; accurate; distorted; perfect; flat; valuable; detailed; new; various; mental; satellite; electronic; remotely sensed
B. representation; advantages; image; features; information

2.4. Match each of the following terms with the correct definition.

a) *remote sensing*; b) *stereoscope*; c) *multispectral scanner*; d) *aerial photograph*; e) *distortion*; f) *map projection*; g) *Landsat*; h) *legend*

_____ 1. Gathering and recording information from a distance through aerial photographs and satellite images.
_____ 2. Picture taken from above the earth.
_____ 3. Instrument that takes a pair of overlapping aerial photographs.
_____ 4. Instrument that records observations from space electronically and sends them to ground stations where computers translate the data into electronic images.
_____ 5. Satellite that views the earth.
_____ 6. One of the many different ways to show the spherical earth's surface on a flat map.
_____ 7. It explains the meaning of symbols and colors used on a map.
_____ 8. Inaccuracy contained on maps, which is a major disadvantage.

2.5. Match the words in A with the words in B to form word combinations.

1) **A.** to raise; to acquire; to share; to scratch
   B. crude maps; crops; skills; traditions

2) **A.** distinct; ice-covered; cultural; naturally occurring; inevitable; rugged; remote; low-lying; human; physical; obvious; folded
   B. distortions; phenomena; terrain; imprint; map; landscape; habitat; advantages; village; mountains; jungles; features
3) **A.** to spread; to represent; to vary; to mean; to record; to occur
   B. electronically; greatly; literally; accurately; naturally; gradually

2.6. Fill in the missing forms of the words.

Noun	Verb	Noun	Adjective
description		difference	
	compare		evident
	interact	distinction	
attempt			various
	relate	inaccuracy	
reference			spatial
	distort	characteristic	
	explore		important
analysis			practical
	develop	science	
	discover	significance	

3. Translation into Russian

1. Geographers study the earth to determine what is where, why it is there, and what significance it has.
2. Different approaches to the study of geography have led to the development of other fields of study.
3. Physical geography is the study of the natural environment and the interrelationships of all the living things in that environment. It examines the shapes of the land and bodies of water, or topography, of a given location, along with its climate, soil, plants, and animals.
4. Political geography focuses on the political organization of areas. It deals with the administration of areas, territorial acquisitions, political boundaries, and patterns of government. Political geography is closely tied to social geography, the study of the interrelationships of groups and communities. This field includes the study of human movements within and between communities.
5. Economic geography focuses on resources and resource use, agriculture and land use, and global trade interactions. It also examines such diverse

geographic ideas as factory locations, transportation networking, and market distribution. Economic geography forms one of the broadest subdivisions of cultural geography and relies heavily on information from other fields.

6. Historical geography examines the ways in which the relationship between people and their environments has changed over time. This field attempts to bring time and space together. Because understanding the present requires knowledge of the past, geographers place a great deal of emphasis on the study of historical geography.
7. Urban geography focuses on the locations of cities, the services cities provide, and the movements of goods and people to and from cities. The rapid growth of cities in the modern world has made this field an increasingly important for study.
8. Cartography is the art and science of mapmaking. Recent developments in mathematics, computers, and electronics have expanded cartography to include the study and analysis of aerial photographs and remotely sensed images.
9. Remotely sensed images, including aerial photographs and satellite images, have greatly improved the making of maps. Their "bird's eye view" permits mapmakers to depict terrain changes far more accurately than it could be done from surveys made at ground level.
10. Geographers use a wide variety of graphics to present the information they have gathered.

4. Complementary text

GEOGRAPHY AND PEOPLE: PTOLEMY

Ancient geography came to an end with the work of Ptolemy, the best-known and most widely acclaimed astronomer and geographer of the ancient world. Little is known about Ptolemy's life other than that he worked in the Roman Empire's great library in Alexandria, Egypt, between A.D. 127 and 150. It was in Alexandria, the cultural center of the ancient world, that he wrote his most important work on astronomy. It was so admired, however, that it became known as the *Almagest*, a combination of Greek and Arabic terms meaning "the greatest".

"A Guide to Geography". After completing his work on astronomy, Ptolemy began preparing "A Guide to Geography", an eight-volume work on all aspects of geography. Ptolemy began the work with a detailed discussion of different methods of mapmaking and a lengthy list of all the known places in the world, together with their latitudes and longitudes. The book also contained 26 colored maps and a carefully planned new map of the world. Ptolemy adopted the grid of latitude and longitude lines developed by the Greek geographer Hipparchus nearly

300 years earlier. This grid was based on the division of a circle into 360 parts. Using this system, every place on the earth could be given a precise location.

The problem of accuracy. Despite its appearance of accuracy, however, Ptolemy's geography was full of errors. In his time, for example, latitude could only be approximated and there was no exact way of determining longitude at all. Therefore each listing of latitude and longitude was, at best, only a rough estimate.

Besides, Ptolemy greatly exaggerated the size of the land area from Spain to China, vastly underestimated the size of the Atlantic Ocean, and estimated the circumference of the earth to be about half its actual size. Based on Ptolemy's inaccurate calculations, Christopher Columbus believed that Asia was close to Europe on the west. It was actually Ptolemy's error that encouraged Columbus to set forth on his westward voyage across the Atlantic Ocean.

A lasting impact. In spite of mistakes made more from the lack of accurate instruments than from ignorance, Ptolemy was extremely well-respected. "A Guide to Geography" was such a monumental work that its significance to the development of the field of geography cannot be overestimated. His work remained the major geographic study for nearly 1,000 years.

5. Writing

Write the translation of the following text or render its content in English.

ГЛОБАЛЬНАЯ НАВИГАЦИОННАЯ СИСТЕМА GPS

За последние 10 — 15 лет в нашу жизнь буквально ворвалось несколько технических новшеств, сразу получивших глобальное распространение и самое широкое применение, причем не только для сложных научных и технологических целей, но и активно востребованных на бытовом уровне: персональные компьютеры, Интернет, сотовые телефоны... В этот ряд вполне по праву можно включить Глобальные Навигационные Спутниковые Системы: американскую GPS и российскую ГЛОНАСС.

Глобальность этих систем обеспечивается функционированием на орбитах набора видимых из любой точки Земли спутников, непрерывно передающих высокоточные измерительные сигналы. Тем самым вокруг нашей планеты создано как бы информационное координатно-временное поле, находясь в котором пользователь с помощью специального приемника может черпать из него данные о своем положении в пространстве и времени.

Космический сегмент, иначе называемый «орбитальная группировка», образуют действующие на орбитах спутники. Они распределены пространственно с таким расчетом, чтобы в любой точке Земли выше 15° над горизонтом находилось бы всегда от 4 до 8 спутников. Для этого запущено 24 основных и несколько резервных спутников (в 2001 г. их общее количество было 28), распределенных по 6 круговым орбитам на высоте около 20 200 км над поверхностью Земли. Плоскости орбит наклонены к плоскости экватора под углом 55° и равномерно развернуты друг относительно друга так, что их узлы (точки пересечения орбит с экватором) отстоят по долготе на 60°. Период обращения спутников составляет 11 час. 58 мин., т.е. ровно половину звездных суток, и, значит, видимая с земли конфигурация созвездия спутников повторяется каждый день на 4 минуты раньше, чем в предыдущий.

Первый космический аппарат GPS типа Block-I был запущен на орбиту 22 февраля 1978 г. С тех пор было последовательно разработано несколько новых модификаций космических аппаратов: Block-II, Block-IIA, Block-IIR, имеющих все более сложное и надежное оборудование и рассчитанных на срок службы 7 — 10 лет. Сейчас в основном на орбитах действуют космические аппараты последних двух типов.

6. Speaking

6.1. Retell the following text in English.

THE PUZZLE OF GEOGRAPHIC NAMES

One of the most puzzling problems in cartography is the selection of the correct spelling of place names. This problem involves language, changes in government, and changes in national policy.

Language. In general, cartographers print names in their own language, even though the inhabitants of the region call the place by a different name. For example, on an American-made map of Europe you will probably see a label for the Danube River. The same river would be labeled *Donau* on a German map, *Duna* on a Hungarian map, and *Duna-rea* on a Romanian map. On the same American-made map you would see labels for Finland and Hungary, even though the people of these nations call their countries *Suomi* and *Magyarorszag*.

Another language problem involves repetition. For example, *rio* means "river", *sierra* means "mountain", and *sahara* means "great desert". Therefore labels such as Rio Grande River, Sierra Nevada Mountains, and

Sahara Desert are repetitious. They actually mean "River Grande River", "Mountain Nevada Mountains", and "Desert Desert".

Maps of China create special problems for American cartographers. Until recently maps used a system of transcribing the Chinese alphabet into English. In 1979, however, the Chinese government adopted a new system of transcription that more accurately reflects the sounds of the Chinese words for places.

Changing names. Cartographers also must deal with name changes. In recent years many nations have taken on new names. After World War II, for example, Germany was divided into the Federal Republic of Germany (West Germany) and the German Democratic Republic (East Germany). As European colonies throughout the world gained their independence, many changed their names. In Africa the former Belgian Congo became Zaire, the former British colony of Southern Rhodesia became Zimbabwe, and the former French colony of Dahomey became Benin. In the Pacific the New Hebrides became the Republic of Vanuatu and the islands of Yap, Kusaie, Truk, and Ponape became the Federated States of Micronesia.

Even internal political changes in a nation can bring about important place-name changes. In the Soviet Union, for example, the nation's second largest city, Leningrad, had three names since 1915. Before 1914 the city was called St Petersburg. It was named for Saint Peter, the keeper of the heaven keys. After Russia went to war with Germany in 1914 the name was changed to Petrograd. This name change took place in order to drop the German ending (burg) in the original name. In 1924, the Communist government changed the city's name again to honor the founder of the Soviet Communist party, Vladimir Lenin.

Choosing the correct names. Governments around the world have established agencies to help cartographers choose the correct place names and spellings on maps. In the United States this agency is the United States Board on Geographic Names. In Britain it is the British Permanent Committee on Geographical Names. Argentina, Brazil, Canada, and most European countries have similar agencies. Does Russia have a similar agency?

6.2. Find other examples concerning the history of geographic names and give a talk on the subject. Continue the story about the names of Leningrad — St Petersburg and Germany.

7. Summarizing the Unit

Make an outline of the Unit and render its content in a 4 — 6 min talk.

UNIT 2
LAND

1. Reading and learning

Scan each text and formulate the main ideas. Read the text again carefully and memorize it, then retell the text close to the original.

1.1. THE EARTH AND ITS STRUCTURE

The features of the earth's surface range from vast plains to towering mountain peaks, from tablelike plateaus to deep ocean floors. For centuries scientists have devised theories to help explain the diversity of the earth's surface features and the forces that change those features.

The Earth's origin. Scientists have only theories, or scientific guesses, about how the earth appeared. According to one theory, a hot, spinning cloud of dust and gas formed in space. Parts of this dust and gas cloud separated, forming the sun, the earth, and other planets. The part of the dust and gas cloud that became the earth slowly cooled. As it cooled, it gradually became a solid mass. There are scientists who believe the earth became a solid mass about 5.5 billion years ago.

The Earth's interior. Scientists have studied the surface of the earth for centuries. Yet each year brings new information about the earth's surface that is added to the data already known. Direct observation of the earth's deep interior, however, remains impossible. Currently scientists can gather information about the center of the earth only through indirect evidence.

Vibrations of the earth caused by earthquakes, or seismic waves, tell what the earth's inner structure is like. These waves change speeds as they move through different kinds of rocks: faster through solid material, slower through molten material. By studying the wave patterns, scientists can learn a great deal about the earth's interior. From such studies they have concluded that the three major layers of the earth's interior are the core, the mantle, and the crust.

Drifting continents. The earth today is very different from the earth of millions of years ago. The texture of the land, the locations of the landmasses, and the climate have undergone tremendous changes — changes that scientists even now can only begin to understand.

Most scientists are convinced that the earth's continents are slowly moving, or drifting. One of the first proponents of this idea was Francis Bacon, a seventeenth-century British scientist. After studying the latest maps of the earth and trying to piece together the shapes of the

continents, Bacon concluded that the continents once were joined, forming one huge landmass.

In 1912 a German geographer named Alfred Wegener proposed the theory of continental drift. Wegener believed that there was once a single supercontinent that he called Pangaea, from the Greek words *pan*, meaning "all", and *ge*, meaning "the earth". According to Wegener, Pangaea split apart millions of years ago to form two huge continents — Laurasia in the Northern Hemisphere and Gondwanaland in the Southern Hemisphere which later broke up to form continents. Wegener believed that the landmasses drifted for millions of years to their present locations. He also claimed that the continents are still drifting.

Wegener's theory caused a storm of controversy. Despite fossil and geological evidence, most scientists could not accept the idea. They argued that it was scientifically impossible for the continents to move across the solid seafloor. At the time Wegener and his supporters could not conclusively prove their arguments. New studies of the seafloor, however, have given more scientific evidence to support the theory of continental drift.

1. How can scientists obtain information about the deep interior of the earth?
2. Why have scientists concluded that the interior of the earth consists of different layers of solid and molten materials?
3. What are the three major layers of the earth?
4. What does the theory of continental drift state?
5. How did the work of Alfred Wegener support Francis Bacon's theory?
6. Why did Wegener's theory cause controversy?

1.2. INNER FORCES CHANGE THE EARTH'S SURFACE

Plate tectonics. In the 1950s scientists began studying the ocean floor in more detail than ever before. Their observations showed that the seafloors were slowly spreading apart along well-defined oceanic ridges. The discovery of seafloor spreading provided the evidence for the theory of plate tectonics. The theory of plate tectonics states that great faults, or cracks in the crust of the earth, divide it into huge sections called plates — 7 larger ones and several smaller ones. According to this theory, these plates, on which the continents and ocean lie, are continuously moving, as they "float" on the heavier rock of the earth's mantle. The plates move very slowly, perhaps no more than 1 to 6 cm a year.

Some plates move away from each other, while others move closer together. Plates moving closer together sometimes collide. Other plates brush against each other as they move side by side. This movement, for example, takes place along the San Andreas Fault, which separates the two plates in California.

In general, changes on the earth's surface always take place along the edges of the plates. Some of these changes occur in a matter of a few seconds. Others, however, occur over millions of years.

Earthquakes. Any shift in the earth's crust, no matter how small, causes the earth to tremble. About 800,000 earthquakes are recorded each year. But only 50,000 of them are strong enough to be felt by people living in the areas where they occur. Earthquakes usually take place along faults or at the edges of the earth's plates. About three quarters of the world earthquakes occur in a zone which borders the Pacific Ocean from New Zealand to the southern tip of South America. Because of its volcanic activity, this belt is known as the "Ring of Fire".

In 1935 an American seismologist named Richter created a scale for measuring the intensity of earthquakes. The Richter scale uses numbers ranging from 0 to 9 to describe an earthquake's intensity. An earthquake with a force of 8 or more on the Richter scale causes enormous damage. In some cases buildings collapse, dams burst, gas lines break, and roads are destroyed.

Seismologists estimate that the earthquake that shook San Francisco, California, in 1906 measured 8.3 on the Richter scale. That earthquake and the fires that resulted destroyed most of San Francisco. Even smaller earthquakes that take place in heavily populated areas can cause much damage and great loss of lives.

In 1988 a very severe earthquake was responsible for the death of many thousands of people in Armenia in the USSR.

Volcanic eruptions. Like earthquakes, volcanic eruptions usually occur near the boundaries of the earth's plates, either on land or under the sea. During a volcanic eruption, molten rock, or lava, flows out of the crater resulting in the formation of a volcanic cone. These mountains are called volcanoes.

An active volcano is one that always shows signs of volcanic action. Volcanic gas, steam and hot gases may release into the air. This type of activity might signal a forthcoming eruption. At the time of a full-scale eruption ash, lava and volcanic "bombs" might also be thrown out from the crater.

Paricutin, a volcano in western Mexico, erupted suddenly in 1943 and stopped erupting just as suddenly in 1952. The first sign was a crack in the ground of a cornfield, followed by rising hot gas and steam. Thirty minutes later, explosions began. Clouds of gas and ashes shot as high as 6 km into the air. For the rest of its active life, the explosions continued. The ashes that fell to the ground formed a cone-shaped mountain that now rises 410 m above the level of the cornfield. Because Paricutin has shown no further signs of volcanic actions since 1952, it is said to be dormant, or sleeping. At some future time, it may once again wake up to send more ashes to fall on the earth.

Mount St Helens, located in southwestern Washington, had been dormant for over 100 years when it erupted on May 18, 1980. The

eruption blew off 390 m of the mountain's top, sent smoke and ash as high as 18 km, and took 61 lives. It was the first volcanic eruption to take place in the United States since 1917.

Volcanic eruptions have killed nearly 200,000 people in the last 600 years. Despite their destructiveness, volcanic eruptions provide useful materials. Volcanic rock is widely used for road building. Volcanic ash fertilizes land, and some chemicals can be made from volcanic sulfur.

1. What is seafloor spreading?
2. What does the theory of plate tectonics state?
3. According to the theory of plate tectonics, on what do the plates move?
4. How does this theory relate to scientific knowledge about earthquakes and volcanic eruptions?
5. Why is the Pacific rim called the «Ring of Fire»?
6. How do seismologists measure the intensity of earthquakes?

1.3. THE EARTH'S SURFACE HAS A VARIETY OF LANDFORMS

Mountain building. As you have read, earthquakes and volcanic eruptions can change the earth's surface in a matter of seconds. However, the process of mountain building can take millions of years. Depending on how the mountains are formed, geographers classify them as fault block or folded mountains. Under pressure, the earth's crust may fold and the mountain ranges are formed. The Andes of South America, the Alps of Europe and the Himalayas of Asia are examples of folded mountains.

Sometimes sections of the earth's crust break up into blocks and mountains develop. One block, with its layers of rock, moves up or sinks down. In the eastern part of Africa faulting has been responsible for the formation of great depressions called rift valleys. Faulting helped give the Sierra Nevada Range in California its block shape.

Surface forces create distinctive landforms. As plate movements reshape the earth's continents and ocean floor, certain external processes are at work, changing surface features. These processes are weathering and erosion. They work much more slowly than earthquakes and volcanoes. In fact, like the process of mountain building, they often go unnoticed for generations. Over time, however, they can produce results as dramatic as the Grand Canyon, carved out by erosion — and it is more than 1.5 km deep.

Physical weathering breaks rocks down into smaller and smaller pieces. Chemical weathering alters the composition of rocks. When the minerals that make up limestone, for instance, dissolve in water it is called chemical weathering. Both types of weathering often occur simultaneously. Even

granite, one of the hardest rocks, slowly decomposes. The chemicals present in acid rain speed the process of weathering even more.

Erosion moves weathered products from one place and deposits them in another. The major agents of erosion include running water, waves, moving ice, and wind. Running water, found almost everywhere, probably, does more to change the earth's surface than any other agent of erosion.

Waves cause erosion and other changes along the shores of the ocean and large lakes. Along rocky coasts waves cut into the land causing parts of cliffs to drop into the water. In other spots waves wash up eroded materials to form sand beaches.

Large masses of moving ice, known as glaciers, erode the land in the colder regions of the world. As the glaciers move through mountain passes, they create distinctive U-shaped mountain valleys by eroding soil and rocks from the valley floor and walls.

Wind is a powerful agent of erosion, especially in regions that receive little rainfall. Winds carry sand, volcanic ash, and even gravel. High winds carrying such windblown materials cut even the hardest rocks into many different and often fantastic shapes.

Because of all these forces and processes, the surface of Earth has a tremendous variety of landforms or shapes of the earth's surface. Plain, plateau, hill, mountain, canyon, valley, island, ridge, and fjord are a few of the names given to these landforms. Landforms help to characterize the natural landscape of each place which is the combination of a place's physical features. Other aspects of the physical environment include climate, vegetation, and soils. Landforms have an important impact on human activity. Most landforms have both advantages and disadvantages for human use and settlement.

1. How do mountains form?
2. How does physical weathering differ from chemical weathering?
3. What are the most important agents of a) physical weathering; b) chemical weathering; and c) erosion?
4. How can erosion change the appearance of a landscape over time?
5. Why does acid rain speed the chemical weathering process?
6. Which changes — those caused by weathering or those caused by erosion — have had the greatest impact on human activity?
7. How do landforms affect human activity?

2. Lexical and grammatical exercises

2.1. Supply the geographic term that correctly completes each sentence.

1. The shapes on the earth's surface are called _____.
2. The _____ forms the solid outermost layer of the earth.
3. An idea for explaining something that is not proven is called a _____.

4. A _____ is characterized by a generally flat area that rises far above the surrounding land on at least one side.
5. _____ _____ are formed as molten rock from within the earth pushes up layers of soft rock.
6. The _____ _____ uses numbers to measure the intensity of an earthquake.
7. The slow process of breaking down rocks into smaller and smaller pieces is called _____.
8. _____ are solids deposited by water.

2.2. Fill in the missing forms of the words.

Noun	Verb	Noun	Verb
	appear	eruption	
argument		collision	
border			explode
	cause		observe
	change	loss	
conclusion		destruction	
erosion			fertilize

2.3. Underline one word in each line that is different. Explain your choice.

diversity	distortion	range	variety
boundary	edge	habitat	border
convinced	sure	certain	compared
devise	invent	derive	design
observe	gather	scan	notice
separate	divide	collide	break
collide	brush	float	occur
collapse	burst	release	explode
dissolve	fold	erode	decompose
estimate	measure	alter	calculate
undergo	cause	suffer	experience
develop	alter	change	vary
state	claim	remain	argue
join	separate	connect	unite
destroy	invent	devise	create

2.4. Match the words in A with the words in B to form word combinations.

A. to devise; deep; to occur; severe; geological; volcanic ash; chemical; to undergo; seismic; the Richter

B. waves; in a matter of a few seconds; interior; earthquakes; scale; tremendous changes; weathering; fertilizes land; a theory; evidence

2.5. Rearrange the letters in the anagrams to form equivalents for the Russian words.

собирать(ся) — **gheatr**	претерпевать (изменения) — **udergno**
удобрять — **flitizere**	происходить — **orcuc**
растворять(ся) — **dvesisol**	поддерживать — **sporupt**
выпускать — **reelsea**	дрейфовать — **dftri**
оставаться — **rinmea**	раскалывать(ся) — **siltp**
убеждать — **cvincone**	утверждать — **cimla**
изменять(ся) — **arlet**	суровый — **seeevr**
сделать вывод — **ccondelu**	доказательство — **cedevine**

2.6. Match the verbs in A with the adverbs in B.

A. to move; to mean; to represent; to occur; to be used; to prove; to be populated; to erupt
B. continuously; literally; accurately; simultaneously; scientifically; heavily; suddenly; widely

2.7. Form sentences by combining the lines from the columns below. Use the correct form of the verb *cause*.

Any shift in the earth's crust	cause	enormous damage.
Earthquakes		a storm of controversy.
Theory		the earth to tremble.

2. 8. Match the words from the list below with the correct line below.

ridge; lava; earthquakes; valley; plain; ash; cone; core; to prove; liquid; mantle; to propose; hill; crust; solid; molten; to accept; plateaus; gaseous; indirect; fossil; geological; volcanic; forthcoming; to devise; full-scale; volcanic eruption; to support

1. Features of the earth's surface: _____ .
2. Natural phenomena: _____ .
3. States of matter: _____ .
4. Adjectives used with 'eruption': _____ .
5. Major layers of the earth's interior: _____ .
6. Products of volcanic eruption: _____ .
7. Adjectives used with 'evidence': _____ .
8. What can be done with a theory: _____ .

3. Translation into Russian

1. The earth's surface displays an amazing variety of landforms.
2. The variety of landforms that cover the face of the earth have advantages and disadvantages for human settlement.
3. Geographers use slope, local relief, and other characteristics to classify landforms as plains, plateaus, hills, or mountains.
4. Fossils and geological evidence help scientists understand the changes the earth has undergone over the years. Scientists are also seeking answers about the earth's interior — the exact structure of the core, the mantle, and the crust.
5. Many theories have been presented about how the earth has changed over time. Francis Bacon was among the first to suggest that the continents were once joined as one huge landmass.
6. The evidence to support the theory of plate tectonics was provided by the discovery of seafloor spreading. The theory of plate tectonics states that the earth's outer shell is not one solid piece but is broken into plates that are constantly moving.
7. Earthquakes and volcanoes, which cause violent changes on the earth's surface, occur most often near major faults on the edges of the earth's plates.
8. Weathering and erosion can produce dramatic changes in the surface of the earth over time. They create distinctive landforms.
9. Movements of the earth's plates have changed its surface features.

4. Complementary text

Find geographic terms from the text below and give definitions to them.

THE CONTINENTAL SHELVES

The edges of continents slope under the surface waters of oceans and seas. These sloping edges are called continental shelves. From the shoreline, a continental shelf extends outward along most continents for an average of about 160 km. The average underwater depth is less than 200 m. The continental shelf hardly exists at all off the coast of Peru and Chile. There, it extends only a short distance before it drops off into a deep trench. Along the coast of Siberia in the Arctic Ocean, the continental shelf is much wider. There, it extends for almost 800 km. Where the shelf ends, the continental slope begins. The slope makes a steep drop of 1,800 to 2,700 m. After this steep drop, the continental edges merge with the crust that forms the ocean floor.

For people living on the earth, the continental shelves are very important. Many of the world's great fishing areas are in the shallower

waters over the continental shelves. A few of these areas are in the North Sea, in the Atlantic Ocean off the coast of Newfoundland, and in the Bering Sea. Special conditions in these places attract fish in great numbers.

The continental shelves also hold oil and natural gas trapped in pockets between layers of rock. Scientists and engineers now have the tools and equipment to discover these pockets and to bring the oil and gas to the surface. They have set up off-shore drilling and pumping platforms in the Gulf of Mexico, in the Pacific off the coasts of California and Mexico, and in the North Sea off the coast of Norway. As new pockets of oil and gas are discovered under the seafloor, other platforms will be set up. Many nations recognize the economic importance of the continental shelves and the waters over them. So they claim them as part of their national territories.

5. Writing

Write the translation of the following text or render its content in English.

КТО ПЕРВЫМ ИЗМЕРИЛ ЗЕМЛЮ?

Первое приблизительное определение размеров земного шара более 2 тыс. лет назад сделал древнегреческий ученый, хранитель Александрийской библиотеки Эратосфен Киренский. Он заметил, что в городе Сиене (современный Асуан), расположенном к югу от Александрии, 22 июня полуденное Солнце освещает дно самых глубоких колодцев, а в Александрии в этот же день солнце в полдень не доходит до зенита и предметы дают тень. Измерив, насколько полуденное солнце в Александрии отклонено от зенита, он получил величину, равную 7°12', что составило 1/50 окружности. Из чего он справедливо заключил, что Сиена отстоит от Александрии на 1/50 окружности Земли. Для вычисления длины окружности земного шара оставалось измерить расстояние между Александрией и Сиеной, а затем умножить его на 50. Единственным доступным Эратосфену «прибором» для измерения такой большой дистанции был верблюжий караван. Зная, сколько времени верблюды тратят на переход от Александрии до Сиены, ученый определил, что эти города отстоят друг от друга на расстоянии 5000 египетских стадий (около 800 км). Окружность же всей планеты в 50 раз больше, она равна примерно 40 тыс. км. Теперь Эратосфен мог без труда вычислить радиус Земли — согласно его расчетам, радиус Земли оказался равным 6311 км. Это явилось первым и довольно точным представлением о размерах нашей планеты.

6. Speaking

6.1. Render the texts in English.

PREDICTING EARTHQUAKES

Picture this scene. It is the middle of the night. Thousands of people are sitting in open spaces far from buildings, bridges, and other structures. They have left their homes, even though the temperature is below zero. Fear shows on their faces as they crowd in small groups and try to keep warm. This actually happened in Haicheng, China, in 1975. The people in this town in northeastern Manchuria were told that an earthquake would strike within hours. And it did. Because they left their homes when they were warned, over 10,000 people saved their lives.

Only in the last half of this century progress has been made in predicting earthquakes. Seismologists (people who study earthquakes) now have many of the instruments they need to measure changes in the earth's crust.

Recording shock waves. Seismometers record shock waves — strong ones, weak ones, even the ones people do not feel. In using these instruments, seismologists look for changes in the number and speed of shock waves. Such changes often signal that an earthquake is likely to happen soon.

In warning about the Haicheng earthquake, the Chinese also used reports from farmers and other workers they had trained to read nature's signs. The Chinese believe that animals behave differently just before a quake strikes. The Chinese workers reported strange behavior in their barn-yard animals. They also reported that water in their deep wells turned very muddy. The seismologists knew that earth vibrations could muddy water. Adding these reports to what they had learned from their instruments, the Chinese were able to tell the place and the time of the earthquake.

Problems in predicting earthquakes. Accuracy is one problem, because earthquake predicting is in an early stage. Many instruments need to be set up in areas where earthquakes are likely to occur. Many sets of data need to be recorded and studied. Much more needs to be discovered about what triggers earthquakes and what signs coming earthquakes give.

Time is another problem. As yet, very accurate predictions for short time periods cannot be made. Seismologists can say that an earthquake is likely to strike a certain place every 50 to 100 years. They can say one is likely to strike within a year. But they often cannot tell the exact time or even the exact place. Accurate earthquake predicting on more than a hit-or-miss basis, is years away.

Volcano prediction. Volcanic eruptions are more predictable than the earthquakes. Although predicting volcanic eruptions is generally

difficult, some volcanoes give signs of a forthcoming eruption. In Hawaii, for example, some volcanoes expand and release gases before erupting. Minor earthquakes and a rise in temperatures are also early signs. Measuring these changes can help determine when an eruption is likely to occur.

MOUNT ST HELENS

In the spring and summer of 1980 a volcano named Mount St Helens suddenly and violently awoke after 120 years of inactivity. The volcano is located in the Cascade Range about 120 km south of Seattle, Washington. On March 27 a huge new crater opened at the top of Mount St Helens, and steam and smoke poured out for the first time in memory. The emissions continued sporadically for the next 51 days.

May 18 brought an enormous and devastating blast that drew the attention of all Americans on the erupting volcano. An earthquake registering about 5 on the Richter scale shook the north slope of the mountain. Gases within the mountain suddenly escaped with a force great enough to send a column of steam and volcanic ash 21,300 m into the air. No lava erupted, but the blast blew away the entire north slope of the once cone-shaped volcano. Trees in the way of the blast were blown down like match sticks. Torrents of boiling mud and water, traveling at over 320 kilometers an hour, flowed down the mountain into the Toutle River and eventually into the Columbia River. Seventy people died or were declared missing because of the blast. More than 11 million fish died in the heated water of the rivers. Thousands of birds and animals also died.

Prevailing winds picked up volcanic ash from the eruption and carried it eastward across the Cascades. The ash-choked skies reduced visibility to zero in Yakima, Washington, and other nearby cities. Road and rail traffic came to a standstill. Airplane travel within a radius of several hundred miles was canceled. A 5-centimeter layer of ash blanketed the land as far away as Idaho. Smaller particles stayed aloft in the air surrounding the entire earth during the next 17 days.

Mount St Helens looked like a completely different place, when after four more big blasts, it finally became quiet. It had a different shape, a lower elevation, and upper slopes that were totally devastated. Yet life began to return to the mountain immediately. Within a week, spiders busily spun webs. By the end of the summer ferns, other ground covers, and even trees sprouted from the ashes.

Peace and quiet once again prevail in the scenic Cascade Range. But the mountains, located on the North American plate, lie directly above the descending edge of the Juan de Fuca plate. Will it happen again? Geologists fear that another eruption will occur somewhere in the Cascades in the near future.

6.2. Find material about an earthquake or an active volcano, prepare a short speech. Your speech should include information on where the earthquake occurred, what its Richter scale measurement was, how much damage it caused, and what people felt while it was taking place. Speeches on volcanoes should include such points as the location of the volcano, the last time it erupted, the amount of damage this eruption caused, and what people feel being so close to a potentially dangerous area.

6.3. Discuss why people live in areas that have some disadvantages for human use and development. Provide examples to support your answer.

7. Summarizing the Unit

Make an outline of the Unit and render its content in a 4 — 6 min talk.

UNIT 3
WATER

1. Reading and learning

Scan each text and formulate the main ideas. Read the text again carefully and memorize it, then retell the text close to the original.

1.1. WONDERS OF WATER

Water is everywhere. It covers over three fourths of the earth's surface, lies underground, and is present in the air that surrounds the earth.

Water supports all forms of life — plants, animals, and humankind. Some very simple forms of life can exist without air. But no form of life can exist without water. Two thirds of the human body is made of water. Potatoes consist of about 80 per cent of water, and tomatoes about 90 per cent.

Water shapes and reshapes the crust of the earth. It does this whether it falls as rain, flows in rivers, collects in deep and shallow places, or freezes into ice. Water plays an important role in determining climate, in weathering rock and forming soil, and in making other natural resources usable. Water does all these things because it has special qualities that few other materials on the earth have. These special qualities make water a wonder on the earth and the earth a fit place on which to live. Water is present on the earth not only as a liquid — its most abundant form — but also as a gas and as a solid.

Qualities of water. One of water's most important qualities is its ability to store huge amounts of heat energy from the sun. Because water releases heat even as it freezes, it helps to keep air temperatures from getting too cold too fast.

Water dissolves materials. Many minerals and other materials that come in contact with water dissolve in it. Plants and animals need these materials to grow and to build healthy bodies. So do humans. All living things take in dissolved materials when they soak up or drink water. And the water that humans and animals drink helps them to digest the foods they eat.

Water-supply problems. Day after day, the movement of water from earth to the air and back again to earth takes place. The water cycle never stops renewing the earth's water supply. As you know, 2 per cent of earth's total water supply is locked in ice caps and glaciers. This is enough fresh water to supply each person on earth with a million gallons of water each year. Then why do people talk about water shortages?

One problem is distribution. Fresh water is not distributed evenly over the earth. Lands along the equator usually receive more than enough rain. But lands north and south of the equator often receive less than they need. There are some places where a dry season and a rainy season follow each other every year. There are other places that are dry all year. Parts of India receive over 200 cm of rainfall each year. But they receive most of it from May to October. From November to April, these parts receive less than 25 cm of rainfall a year. In one part of South America, hardly a drop of rain has fallen in over 20 years.

Another problem is pollution. Where water is available, it often has been polluted by the disposal of wastes from homes and factories. One city dweller out of five does not have safe water to drink. In rural areas, three persons out of four do not have safe drinking water. Every day about 15,000 persons around the world die of illnesses caused by polluted water. To support life, water needs to be kept free from pollution in any form.

1. What is the role of water on the earth?
2. What do we call the change of water from a liquid to a gas? From a gas to a liquid?
3. What are some of the water's special qualities?
4. What are the problems that affect the world's water supply?

1.2. STOPS IN THE WATER CYCLE: WATER ON LAND

A drop of water travels through the water cycle in a never-ending journey from sea to land and back to the sea. It travels thousands upon thousands of miles as the journey is repeated time and time again. A drop of water may make several stops on land in its journey, staying in

one place for a short time — a few hours, a day, or a month. It may stay for a year, even thousands of years. But eventually every drop of water finds its way back to the sea. Consider the stops a drop of water may take once it rises from the sea as water vapor, condenses in the air, and falls back to earth in some form.

Lakes. One possible stop for a drop of water is a lake. Lakes form whenever two things are present. There must be a place lower than the surrounding land. And there must be a source of water to fill it. The scraping of glaciers over the land has dug out most of the places that form lakes. The eroding action of fast running water has dug out others. Still others have been formed when rocks within the earth shifted, leaving gaps in the earth's crust, or surface rocks have shifted, blocking valleys. Lake Nyasa in Africa is an example of a lake formed by the shifting of the earth's crust.

People also form lakes by moving earth, or building dams to block the flow of water. Once formed, these low places fill with water from melting glaciers, snow, and ice. They fill with rainwater flowing down from higher places. They also fill with water from underground springs or from layers of water that lie below the earth's surface.

Most of the world's lakes are freshwater lakes. Freshwater lakes have surface rivers or underground streams and springs flowing into them. They also have surface streams and rivers or underground streams flowing out of them. A few of the world's lakes are saltwater lakes. Saltwater lakes have streams flowing into them. But they have no streams flowing out. Lakes that have no outlet streams cannot renew themselves. As water evaporates, these lakes build up a heavy salt content in their water.

Some inland seas are really saltwater lakes. Because they are surrounded on all sides by land, the Caspian Sea, the Dead Sea, and the Aral Sea are really lakes. They are called seas only because their water is salty. The Dead Sea, the lowest surface lake in the world, is nearly 390 m below sea level.

Lakes, especially large ones, modify the climates of their surrounding lands. They do it in much the same way that oceans modify climate. Large bodies of water heat and cool more slowly than land. In summer, the water is cooler than the land. Breezes blowing off a lake cool the land. In winter, the water is warmer than the land. Breezes blowing off a lake warm the land.

The use of lakes. Lakes serve many of the purposes. People use them for swimming. They draw fish from lakes for sport and food. They build summer homes around them. Lakes also serve as transportation routes. For example, along with the St Lawrence River, the Great Lakes form an important inland waterway in the United States.

The freshwater lakes of the world have other uses. Lakes provide water for drinking and home use, for irrigation, and for industrial purposes. People living in the area around Lake Titicaca even harvest the reeds growing in the lake and use them to make boats.

Wetlands. Wetlands are shallow places in the land where water collects, or stands, either all year long or for only part of a year. Wetlands are often found along the edges of other water bodies. Where wetlands lie near the edges of oceans and seas, their water is salty.

Both saltwater and freshwater wetlands play an important role in nature. Wetlands "clean" the waters that flow into them by removing pollutants, such as nitrates, from fertilizers. Wetlands hold the overflow from other water bodies. They reduce flooding from heavy storms or from the melting of snow and ice in spring.

Certain plants — mangrove trees and some kinds of reeds and mosses — grow in wetlands and nowhere else. Many insects and some kinds of marine animals begin their life cycles in wetlands before moving to other places. And many wetlands provide nesting places for different kinds of waterfowl, such as ducks, herons, and egrets. Without wetlands, the plants and animals that live in them or depend on them in some way would disappear.

People and wetlands. Many people do not realize how important wetlands are. They think of them as places with land that could be put to better use. So they drain them and fill them up with trash and land from other places. Then they build homes, offices, factories, or shopping centers on them. As a result of this large areas of wetlands have disappeared. Still more wetlands disappear every year. Protecting wetlands has become a special concern of many countries.

One of the greatest wetland areas in the world is the Everglades, in Florida. Much of the Everglades has been made into a park and conservation area to protect the area and its wildlife from human abuse.

1. What is the water cycle?
2. In what different ways are lakes formed?
3. Why are some lakes saltwater lakes?
4. How do lakes modify climates?
5. What is the world's largest natural lake? Where is it found?
6. What are wetlands? Why are wetlands important?
7. How might heavy pollution in lakes, wetlands, rivers, and other water bodies affect the agriculture of a nation?
8. What are some of the things industries can do to prevent factories from polluting lakes, rivers, streams, other water bodies, and groundwater?

1.3. RIVERS AND STREAMS

Rain falls on the earth, snow and ice melt, and springs gush out of the ground. The water from these sources flows down mountainsides and hillsides, forming tiny streams that run into bigger ones. These streams join small rivers that flow into still larger rivers. Eventually they join a main river, one that empties into the sea. A main river and all its

tributaries, or branches, form a river system. All of the rivers and streams flowing into a main river form a larger drainage basin, one usually determined by the higher peaks and ridges of a mountain range. Every river and stream has a river source — a place where it begins, a river's mouth — a place where it empties into another body of water and a river's flow.

The work of rivers and streams. Rivers and streams are always at work on the land, destroying rock and soil (erosion), washing them away (transportation), and putting them down some place else (deposition). The first two processes — erosion and transportation — wear down the land, changing highlands into lowlands. The last process — deposition — builds up the land. Together these three processes keep a balance between the high places and the low places of the earth.

As a standing liquid, water changes rocks and soil chemically through its dissolving action. As ice, it breaks up rocks mechanically. But when it moves as ice or flows as water, it does its work of erosion.

Streams and rivers, like mountains, can be described as young or old. Streams flowing down steep slopes are considered young. They have fairly straight courses. Young streams are still cutting into their streambeds and forming their valleys, which are narrow and V-shaped. The land between stream valleys is usually high and broad.

As rivers become older, their currents slow down. Less erosion takes place, and more materials are deposited along their banks. Streambeds gradually widen and flatten out. Then floodplains build up. The soil of floodplains is extremely fertile. The world's four earliest civilizations developed along the fertile floodplains of the Tigris-Euphrates, Nile and Indus rivers. As the rivers advance into old age, they begin to change course. Instead of flowing straight through the land, they move from side to side, forming wide bends. At times of flash floods, old bends may be cut off. As new bends form, the old bends may remain as lakes.

The world's great rivers. There are many different things that make a river great. One thing is length. Even though the Amazon flows through an area where few people live, it is a great river. It is not only about 6,440 km long, but it also carries more water in its system than the Mississippi River, the Nile River, and the Yangtze River put together. The flow of the Amazon River is so powerful that the water of the Atlantic Ocean is fresh to many miles past the river's mouth.

On the other hand, the Rhine River in Europe is only about 1,500 km long. But it, too, is a great river. It flows through an area where great numbers of people live. Its waters are used to manufacture many industrial products, to generate power, to transport goods and people, and to provide water for home use, for sport and recreation, and for agriculture. Use is another measure of a river's greatness.

1. What is a river system? A drainage basin?
2. What is a stream or river called if it flows into another stream or river? What is it called if it flows out of a stream or river?

3. How do erosion, transportation, and deposition help rivers do their work of shaping the land?
4. How does the speed of a river's current affect the buildup of land along its bank and at its mouth?
5. What makes a river great?
6. What are some of the ways people use rivers?

2. Lexical and grammatical exercises

2.1. Make up sentences by combining the words and phrases from the columns below.

Water	is; dissolves; has; reshapes; lies; collects; covers; plays; flows; falls; releases	an important role in weathering rock; as rain; everywhere; heat even as it freezes; the crust of the earth; in rivers; over three fourths of the earth's surface; different materials; underground; some special qualities; in deep and shallow places

2.2. Underline one word in each line that is different. Explain your choice.

store	keep	release	hold
build up	reduce	increase	accumulate
gap	space	break	crust
luck	lack	need	shortage
stream	drop	flow	current
abundant	rich	scarce	fertile
widen	often	shorten	flatten
consist of	provide	include	be made up of

2.3. Cross out a word in a line which is different. Number each line according to the headings given below.

evaporation	precipitation	irrigation	condensation
irrigation	fishing	pollution	transportation
tributary	nest	source	mouth
shore	insect	estuary	floor
diffusion	erosion	deposition	transportation
fertilizer	nitrate	wetland	waste
polluted	available	fertile	fresh
stream	snow	glacier	ice

1. Something that can melt.
2. Purposes that lakes serve.
3. Words associated with seas.
4. Water pollutants.
5. Processes involved in the water cycle.

6. Words associated with rivers.
7. Work of rivers and streams.
8. Adjectives describing water.

2.4. Rearrange the letters in the anagrams to form equivalents for the Russian words.

край, граница — **gdee**
содержимое; содержание — **cnontte**
определять, обусловливать — **deetrnemi**
рассматривать, обдумывать — **sicdeonr**
отдых — **rreceaotin**
орошение — **rintirioga**
переваривать (пищу) — **diegts**
снабжать — **plupys**
избавляться — **dpissoe of**
получать — **irveeec**
уменьшать — **rucede**

2.5. Make up sentences by combining the words and phrases from the columns.

Animals	take	of	80 per cent of water.
Potatoes	consist	in	dissolved materials.
City dwellers	depend	on	wetlands.
All living things	dispose		waste.

2.6. Match the words in A with the words in B to form word combinations.

1) **A.** water; fertile; steep; city; fresh; marine; river; mountain
   B. slope; soil; water; bank; shortage; range; dweller; animal
2) **A.** to digest; to surround; to support; to determine; to manufacture; to drain
   B. food; wetland; climate; the earth; product; life

2.7. Match the words in A with their opposites in B.

A. abundant; surface; dry; safe; shallow; rugged; tiny; high; narrow; fresh
B. dangerous; wide; low; flat; scarce; underground; huge; rainy; deep; salt

2.8. Fill in the missing words in this paragraph.

As heat from the sun warms water on the earth's surface, some of the water turns into _____, a gas that rises into the air. At higher altitudes, the water vapor _____ or cools into water droplets. The water droplets join together to form _____ in the air. Eventually, the water droplets become heavy enough to fall back to earth in some form of _____. Some of the water seeps into the ground to become part of the _____. Most of it, after a few stops on land, finds its way back to one of the four great _____ of the world. Because of the work of the

_____, the earth's water supply has stayed the same for millions of years.

2.9. Select a good title for the above paragraph:

1. How clouds form.
2. The unending water cycle.
3. Why water changes form.

3. Translation into Russian

1. Because of its special qualities, water supports all forms of life, shapes and reshapes the crust of the earth, influences weather and climate, and makes other natural resources usable.
2. Water's special qualities include its ability to store and release energy; its presence on the earth as a liquid, gas, and solid; its dissolving power; its surface tension; and its ability to climb up a surface against the pull of gravity.
3. The water cycle is the movement of water from earth to the air and back again to earth by the processes of evaporation, condensation, and precipitation.
4. About 70 per cent of the earth's surface is covered with water. Of this water supply, 3 per cent is fresh water. Because 2 per cent is frozen in ice caps and glaciers, only about 1 per cent is available for use in lakes, in rivers, in streams, and underground.
5. Rivers wear down the land through the processes of erosion and transportation. They build up the land through the process of deposition.
6. The Colorado River is a young river that is still cutting its bed; in a million years the Grand Canyon will probably be deeper; the area will be more populated and more industrialized.
7. The earth's water supply stays the same year after year because of the water cycle.
8. Polluted water carries germs. People who drink polluted water often get sick and may even die.

4. Complementary text

WATERFALLS

In places a river may descend vertically giving rise to a waterfall. The term cataract, usually designating a series of rapids in a large river, is often applied to waterfalls of large volume. Waterfalls develop due to many causes. The most common one is the presence in the river's course of rocks of unequal hardness or resistance.

The beautiful Lower Falls in the Yellowstone National Park appeared due to a body of resistant, igneous rock which here extends across the Yellowstone River. The rocks on either side of the river are of a rich yellow color, giving the river its name.

Some waterfalls appear as a result of different rates of erosion where a resistant layer of rock in a streambed lies over a less resistant rock. Subsequent erosion of the softer rock by the falling water periodically breaks off portions of the harder cap rock. Some of the largest cataracts in the world, Niagara Falls in North America and Victoria Falls in Zimbabwe, Africa, originated in this way.

Niagara Falls. Between Lake Erie and Lake Ontario the Niagara forms the famous Niagara Falls. The Niagara River was born near the end of the Glacial Period; it flowed northward as now, and about 10 km below the present falls it plunged over the edge of a limestone, which there forms an escarpment, or steep rock-slope. The limestone is resistant, but the swirling water at the base of the fall gradually undercuts the softer rocks below and the heavy limestone, robbed of its support, breaks off in huge blocks. Each time this occurs the crest of the cataract recedes a few feet father upstream. Century by century the fall has worked its way upstream, leaving a deep gorge.

At the present time the cataract is divided into two parts. The lesser falls is on the American side and the great horse-shoe fall is on the Canadian side. So much more water pours over the latter that its crest is receding faster than that of the American fall. Millions of people come each year to see this spectacular natural wonder.

Victoria Falls. One of the world's largest and most magnificent waterfalls Victoria Falls lies on the border between Zambia and Zimbabwe in South Africa. These falls of the Zambezi River are said to be more imposing than Niagara. Beautiful Victoria Falls lies at the southern end of the Great Rift Valley. They are formed due to inequalities in a vast body of solidified lava in which the river is cutting this portion of its channel. The mist and noise produced by the 122-m drop of the Zambezi River inspired the waterfall's alternate name "smoke that thunders". Many tourists visit the falls each year.

Iguaçu Falls. Iguaçu Falls on the border between Argentina and Brazil is one of South America's great natural wonders. The falls range between 60 and 80 m high. In the dry season the river drops in two crescent-shaped falls, but in the wet season the water merges into one large fall more than 4 km wide.

Summarizing, we may say that waterfalls belong to the youthful stage of a river, are usually due to the presence of unequally resistant rocks in the stream channel. Waterfalls are often of imposing grandeur, but in time disappear by erosion.

Compare the waterfalls described in the text with other famous waterfalls. Especially voluminous or spectacular waterfalls are Angel Falls (979 m) in Venezuela,

the world's highest uninterrupted cataract; Tugela (948 m) in KwaZulu/Natal, South Africa; Cuquenán (610 m) in Venezuela; Takakkaw (503 m) in British Columbia; King George VI Falls (488 m) in Guyana; Krimmler (381 m) in Austria; Silver Strand Falls (357 m) in California; Wollomombi (335 m) in Australia and Gersoppa (253 m) in India.

5. Writing

Write the translation of the following text or render its content in English.

КАКОГО ЦВЕТА МОРЕ?

Синим море кажется не всегда. Синий цвет — это цвет «океанских пустынь». Моря имеют различные цвета. В северных морях вода темно-зеленая; у берегов, особенно у впадения рек, — бурая или желтая. В штормовую погоду, когда ураганный ветер вздымает огромные волны и мчит по небу изорванные клочья дождевых облаков, море приобретает мрачный свинцово-серый цвет.

Что же придает поверхности моря тот или иной цвет или оттенок? Цвет моря зависит от толщи воды, в которой рассеивается и отражается дневной свет. Молекулы чистой морской воды отражают и возвращают к поверхности моря синие лучи. Если в воде много микроскопических зеленых водорослей, море кажется зеленым. Минеральные частицы и растворенное в воде органическое вещество (гумус), выносимые реками, а также бурые одноклеточные водоросли придают поверхности моря бурый или желтый цвет. Реки приносят с суши огромное количество глинистых частиц в Желтое море, и вода его имеет желтую окраску. Красный цвет воде Красного моря придают периодически развивающиеся в нем бурые микроскопические водоросли. Каспийская вода совершенно желтая в устье Волги, а по мере удаления в море приобретает цвет темного изумруда.

На цвет поверхности моря влияет цвет неба — безоблачное голубое небо усиливает синие тона, темные облака придают морю унылый свинцово-серый цвет.

6. Speaking

6.1. Render the text in English.

EROSION AND NATURAL SCENERY

Rocky gorges and mountains. Running water has been the master sculptor of the ages. Without its work the surface of the Earth would present an aspect of dull monotony, with stretches of featureless plains,

and dreary plateaus devoid of scenic beauty. Instead of majestic peaks we should have only huge swells or blocks of uplifted rock without pass, valley, or canyon; no gorge of the Rhine, no Alpine peaks, no gorgeous the Grand Canyon in Arizona, or Iron Gates of the Danube, or Niagara. It is the work of weathering and erosion that gives us the endless variety of mountain sculpturing, and much of the charm of all natural scenery.

Rising in the heart of the Rocky Mountains, the Colorado River in its lower course traverses the arid plateaus and pours its muddy current into the Gulf of California. The river is more than 1,000 km long, but the Grand Canyon is about 200 km in length. The Colorado plateau has been slowly rising during long ages that the river has been eroding the deep gorge which is now 1.5 km deep and scarcely wider than the river at the bottom. Tributary gorges, into whose depth the sun penetrates scarcely two hours a day, branch out from either side. The nearly horizontal beds of rock, of gorgeous colors, and unequal hardness, weather into castellated forms and complete the most impressive example of river erosion that the world affords.

Speaking of the charm of the Grand Canyon of the Colorado a noted geologist has said: "Of all the gorges and canyons of the world, and perhaps of all works of nature, the most wonderful example is the Grand Canyon of the Colorado. It is not magnitude alone that gives this marvelous canyon its preeminence; it is the gorgeous and varied coloring of its mighty walls, the endless details in the sculpturing of its battlements and towers, the ever changing atmospheric effects of its profound depths and the wonderful stimulus to the imagination with which it feeds the mind."

Limestone scenery. Karst limestones are those rocks which contain at least 50 per cent calcium carbonate. Limestones are found in several places in the world. As rain water falls through the atmosphere it picks up carbon dioxide. As a result, the water becomes a weak solution of carbonic acid. This weak acid is capable of very slowly dissolving calcium carbonate as it makes its way in limestone rocks. In those areas where the surface rock is limestone, a distinctive type of landscape develops. This is known as karst scenery after the Karst region in Yugoslavia where it is very extensively found. Karst scenery has a number of typical features.

Limestone is a permeable rock. Streams flowing on the limestone soon disappear underground down enlarged vertical holes or shallow holes. Hidden below the surface there is a complex drainage system of streams, caves and caverns. Streams flow underground along channels which they create by dissolving the limestone rock. In some places so much solution takes place that eventually large underground caves are formed and a great variety of passages reaching on and on, up and down, in and out. If you were to enter a cave in a limestone area, you would probably hear the sound of water dripping from the roof. Over a long period of time dissolved limestone may be deposited in the form of long,

finger-shaped stalactites which, like icicles, hang from the roof of caves. As a stalactite grows downward from the roof and a stalagmite grows upward from the floor of the cave, they meet and form a rock pillar.

6.2. Select one of the world's major rivers or lakes to report on. Mention whether a lake is naturally or artificially formed, note the source that keeps it filled, describe the cities or towns along its shores, and generalize about its importance to the economy of the surrounding area.

7. Summarizing the Unit

Make an outline of the Unit and render its content in a 4 — 6 min talk.

UNIT 4
CLIMATE, SOILS AND VEGETATION

1. Reading and learning

Scan each text and formulate the main ideas. Read the text again carefully and memorize it, then retell the text close to the original.

1.1. THE ATMOSPHERE MAKES LIFE ON EARTH POSSIBLE

Earth is unique among the planets in the solar system. One of the most unique features of Earth is the presence of a stable atmosphere. The various gases that surround a planet make up its atmosphere. Earth's atmosphere shapes our weather, climate, and vegetation patterns and makes life as we know it possible. Without air there would be no day-to-day weather changes. It would be extremely hot during the day and very cold at night. And, there would be no oxygen and no carbon dioxide to support human and plant life.

Components of the atmosphere. A great "ocean" of gases surrounding the earth for thousands of miles forms the earth's atmosphere, usually known simply as the air. More than 98 per cent of the gases that make up the atmosphere, however, are found within 26 km of the earth's surface. Farther above the earth, the gases — and the air — gradually thin out. Air in its natural state is a colorless, odorless, tasteless mixture of gases. Nitrogen makes up 78 per cent of dry air, oxygen makes up 21 per cent, and other gases such as carbon dioxide, helium, and ozone make up the remaining 1 per cent.

Along with gases, air nearly always contains small amounts of water vapor, dust, soot, pollen, seeds, and other particles. Winds, forest fires, and volcanic eruptions sweep many of these particles into the air naturally. Other particles release from chimneys, smokestacks, automobiles, and other polluters. Together, these particles create polluted air, such as the haze and smog that hangs over many cities today.

Weather is the condition of the atmosphere for a short period of time at a specific location. The average of daily weather conditions over a long period of time is known as climate. Certain location and place factors influence the distribution of climates over the earth's surface. These factors, known as climatic controls, are latitude, altitude, and proximity to land and water.

Climate's role in the environment. Climate has relationships to all other parts of the earth — its land, its water, and its atmosphere. These relationships work in two ways. Land, water, and the changes that take place in the air play their parts in shaping climate. At the same time, climate plays its part in helping to shape landforms and soils. Climate helps to keep the water cycle working. Climate, as average weather, also helps to determine what changes take place in the air from month to month and from year to year.

The relationships among land, water, air, and climate go even further. They have a direct influence on the kinds of plants and animals that live in a region. Climate also places limits on people's choices about how they will use the land, the water, and the forms of life found in a region.

Climate probably began to play its central role as a part of the natural environment as soon as the earth took form and settled in its orbit around the sun. Today scientists know some things about climate changes in the past. Lands around the equator have probably always been hot. But, there were periods when climates in the middle and high latitudes were warmer than they are today. There were other periods when climates outside the tropics were much cooler than they are today. These cooler periods usually resulted in the buildup of ice on the earth. Glaciers spread over large parts of the earth's land surface. Packs of ice covered large parts of the world's oceans and lakes. But always, the glacial periods were followed by warmer periods. This cycle of warming, cooling, and warming again has repeated itself several times in the past. The earth's last glacial period gave way to a warming period about 11,000 years ago.

After the last great continental glaciers withdrew (moved back) to the lands around the poles, the climates we know today emerged. Now we have hot climates around the equator, cold climates around the poles, and — as a general rule — climates with warm and cold seasons in the middle latitudes. Where temperatures are hot to warm and where precipitation is heavy to moderate, forests cover the land. Where temperatures are warm enough but where precipitation is lighter or falls only in one season, tall grasses cover the land. In very hot but dry places,

special forms of plants grow by storing water in their stems or by taking moisture from the air. In very cold places, tiny mosses and some very short grasses manage to survive.

Special forms of animal life, too, live in certain climate regions. Animals that swing from branches and climb up and down tree trunks live in forests. Animals that can hide among grasses or can outrun their enemies survive in grasslands. In very dry regions, there are animals that can go without water for long periods of time or that burrow underground to escape the heat. Animals with furs or thick skins live in very cold regions. Finally, every climate region has its own communities of insects and birds.

1. What are the components of the atmosphere?
2. Why are some scientists concerned about the atmosphere's levels of carbon and ozone?
3. Where are hot climates generally found today? Cold climates? Climates that have warm and cold seasons?
4. What are some of the ways climate limits people's choices about how they will live and meet their needs?

1.2. FOUR CONDITIONS IN THE EARTH'S ATMOSPHERE CAUSE WEATHER

There is a saying: "If you don't like the weather, wait an hour." This refers to how quickly weather conditions can change. By its nature, weather changes constantly. The term "weather" describes the condition of the atmosphere for a short period of time in a specific area. Because the atmosphere changes constantly, the weather, too, changes constantly. Four variable conditions in the atmosphere affect an area's weather: temperature, moisture, atmospheric pressure, and wind.

Temperature. The earth receives its warmth from sunlight, or solar radiation. The process by which sunlight warms the earth is called insolation. Only about 48 per cent of all sunlight actually reaches the earth's surface. Gases in the atmosphere either absorb or reflect the rest back into space. Land and water absorb the sunlight that reaches the earth's surface and change it into heat energy. This heat energy radiates back into the atmosphere, where it warms the air. At night the earth and the air slowly cool.

Moisture. It is the second variable element of weather. The air in the lower atmosphere always contains some amount of moisture. However, air higher than 6.4 km above the earth's surface rarely contains moisture. The amount of moisture in the air is called humidity. Humidity can be measured in two ways: absolute humidity and relative humidity.

As a rule warm air can hold more moisture than cold air. When air contains all the moisture it can, it becomes saturated and has a relative

humidity of 100 per cent. If the saturated air cools, the extra moisture condenses to a liquid state, forming clouds and fog. When the drops of water condensing in cooling air become large enough, they form precipitation — rain, snow, sleet, or hail. Rain forms when condensation takes place at temperatures above 0°C. Snow, sleet, and hail form when condensation takes place below 0°C.

Atmospheric pressure. The third variable element of weather is atmospheric pressure, or the weight of the air. The standard pressure exerted by the atmosphere at sea level is 760 millibars. The distance above the earth's surface — altitude — has a major effect on atmospheric pressure. At high altitudes pressure is lower because the earth's gravity holds fewer gas molecules. Temperature also affects air pressure. Warm air weighs less and exerts less pressure than cool air. As the light, warm air rises, a low-pressure center forms below it. Cool air is denser than warm air and tends to sink, forming a high-pressure area. In general, low-pressure areas tend to have unstable weather with clouds, rain, and storms. High-pressure areas tend to have clear, calm weather.

Wind. When air moves from high-pressure areas to low-pressure areas we call it wind. The winds that flow continually between global pressure belts are called prevailing winds. Prevailing westerlies, trade winds and doldrums form part of the global circulation of the atmosphere. But it is only a very general scheme of the atmospheric circulation. The real situation is more complicated due to the influence of various factors. For example, unequal heating of land and sea greatly affects weather conditions and causes the seasonal winds, such as monsoons, and also many types of local winds.

One of these wind patterns is found along the coastlines of large water bodies. During the day, the wind often blows strongly from the cooler water toward the land. A breeze blowing from the sea may lower temperatures of the adjacent land up to 6—7°C. As the sun sets, the breeze dies down. During the night the pattern reverses itself. The cooler air over the land then blows toward the water.

1. What four atmospheric conditions cause weather?
2. What are the global pressure belts? How are they formed?
3. What are westerlies, trade winds and doldrums? Where do they occur?
4. How important are weather and climate to the business and industry of your region?

1.3. VEGETATION AND SOILS

Natural vegetation regions. Vegetation is plant life. The kind of natural vegetation which a place has depends upon several factors: climate, relief, soils. Climate plays a particularly important role in the distribution of vegetation, as different kinds of plants need different amounts of heat and moisture in order to grow well. Trees, for example,

generally need more moisture than grasses. Broadly speaking, in areas which have a heavy and well-distributed rainfall, and at least one month per year with average temperatures above 10°C, the natural vegetation is likely to be forest. In forests trees are the dominant plants.

In areas where the rainfall is moderate or light and is very seasonal in its distribution, some type of grassland, where grasses are the dominant plants, is formed. In very dry or very cold conditions only a few plants can live. Plants able to live in deserts survive by adapting to the extremely dry conditions. In cold areas some vegetation survives by growing rapidly during the short period when the ground thaws.

The exact nature of the forest, grassland and desert types of vegetation, however, varies greatly. For example, the tropical rain forests of the Amazon basin are very different from the coniferous (needleleaf) forests of the interior of northern Canada and Russia or scrub forests typical for Mediterranean climate region. Similarly, the savanna grasslands of East Africa are very different from the temperate grasslands of the steppes of Russia.

Soil composition. Climate, vegetation and soil are closely related components of nature and their global distributions over the earth's surface are very similar.

Soils are a mixture of mineral and organic matter in which plants grow. Soils are of great importance to people. Compared with the total volume of the earth, the soil forms a very thin layer, from a few centimetres to several metres in thickness. Yet this thin layer of soil produces most of our food supply. This productive topsoil upon which agriculture depends has taken hundreds of years to develop, but if it is misused it can be destroyed within a very short time.

The soil has five basic components: mineral particles formed by the breakdown of rocks; decayed organic materials; water which has soaked into the ground as a result of precipitation; air; living organisms such as earthworms and many others.

The formation of the soil profile. Soil is the product of two major processes. These are the decomposition of rock and the decay of plant and animal life. The processes of physical and chemical weathering are responsible for breaking down the bedrock into fragments. These rock fragments provide the original material for the formation of soils. It is colonized by living things (organisms). Decayed plants and animals form humus, which makes up the top level. Soil rich in humus is usually fertile and is black or dark brown.

Below humus lies a layer of mineral particles that washes down from the humus. Finally there is a layer of parent material, or solid rock. This section down through a soil from the surface to the underlying rock is called the soil profile. In a mature soil, profile usually consists of successive (coming one after the other) layers — horizons. Different soil profiles are found under different conditions, and soils are recognized and classified on the basis of the parts of the profile which are present.