ГОСУДАРСТВЕННЫЙ КОМИТЕТ РОССИЙСКОЙ ФЕДЕРАЦИИ
ПО ВЫСШЕМУ ОБРАЗОВАНИЮ

РОССИЙСКИЙ ГОСУДАРСТВЕННЫЙ
ГИДРОМЕТЕОРОЛОГИЧЕСКИЙ ИНСТИТУТ

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УЧЕБНИК АНГЛИЙСКОГО ЯЗЫКА ДЛЯ СТУДЕНТОВ ГИДРОМЕТЕОРОЛОГИЧЕСКИХ СПЕЦИАЛЬНОСТЕЙ

Рекомендовано Государственным комитетом
Российской Федерации по высшему образованию
в качестве учебника для студентов высших учебных заведений,
обучающихся по направлению «Гидрометеорология»,
специальностям «Метеорология», «Гидрология», «Океанология»

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Учебник предназначен для студентов II—III курсов, изучающих дисциплины гидрометеорологического профиля. Его цель — обучение студентов чтению и пониманию специальной литературы, а также обогащение их словарного запаса.

Учебник состоит из трех разделов: «Метеорология», «Гидрология», «Океанология» и трех приложений. Каждый из разделов рассчитан на 85—100 часов аудиторных занятий.

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ПРЕДИСЛОВИЕ

Данный учебник предназначен для студентов II—III курсов, изучающих гидрометеорологические специальности. Целью учебника является обучение чтению и пониманию литературы по специальности на английском языке. Все тексты, включенные в учебник, взяты из оригинальных английских и американских источников. Учебник состоит из трех разделов: «Метеорология», «Гидрология», «Океанология» и трех приложений: «Структурно-смысловые особенности английских научно-технических текстов», «Связующие элементы предложения и текста», «Цифры в английской научно-технической литературе». Каждый из разделов учебника рассчитан на 85—100 часов аудиторных занятий.

Структура учебника. Разделы учебника состоят из нескольких блоков объединяющих тексты определенной тематики. В свою очередь каждый блок включает в себя несколько уроков, содержащих вводные упражнения, базовый текст, лексические, текстовые и грамматические упражнения. Блок завершается соответствующим тестовым комплексом, состоящим из лексических, текстовых и грамматических тестов, обозначенных соответственно как ТЛ, ТТ, ТГ.

Вводные упражнения имеют целью развитие навыков прогнозирования содержания предлагаемых текстов по некоторым из его компонентов (заглавию, ключевым словам, отдельным предложениям и т. д.). Лексические упражнения предназначены для снятия лексических трудностей при ознакомительном и изучающем чтении. Так же как и вводные упражнения, комплекс лексических упражнений рекомендуется выполнять в аудитории после введения соответствующего материала преподавателем. Текстовые упражнения предназначены для развития навыков поискового и изучающего чтения, а также для совершенствования навыков перевода. Для этой цели используется также ряд дополнительных текстов, совпадающих по своей тематике с содержанием базового текста. Большинство уроков завершается грамматическими упражнениями, предназначенными главным образом для развития навыков перевода предложений, содержащих наиболее характерные для английского языка трудности грамматического характера. Следует отметить, что учебник не предполагает системного изучения грамматических структур; внимание акцентируется главным образом на тех грамматических явлениях, которые присутствуют в изучаемом тексте и наиболее часто встречаются в английской литературе гидрометеорологического характера.

МЕТОДИЧЕСКАЯ ЗАПИСКА

При использовании данного учебника на занятиях по английскому языку наиболее целесообразной является следующая система выполнения заданий.

— Вводные, лексические и часть текстовых упражнений выполняется на аудиторных занятиях, в основном парным методом.

— Дома студенты должны более подробно изучить базовый текст урока, самостоятельно проработать лексические задания с целью усвоения новой лексики, а также выполнить оставшиеся текстовые упражнения.

— Часть следующего аудиторного занятия целесообразно посвятить проверке выполнения домашнего задания. Для этой цели могут быть использованы как отдельные задания самого учебника, так и краткие лексические диктанты, тесты и упражнения переводного характера, подготовленные преподавателем. Занятие завершается повторением определенных грамматических тем и выполнением соответствующих упражнений. Повторение пройденного раздела грамматики и упражнения, направленные на его закрепление, составляют домашнее задание к следующему аудиторному занятию.

— Изучение очередного урока целесообразно начинать на новом аудиторном занятии.

Особое внимание следует уделить работе по развитию скорости чтения. В ряде упражнений, главным образом переводного характера, указывается контрольное время, отведенное на выполнение данного задания. Если скорость чтения остается ниже указанной, студентам следует рекомендовать перечитывать указанный текст (сосредоточиваясь на его содержании) до тех пор, пока не будет достигнута необходимая скорость. В то же время необходимо учитывать, чтобы повышение скорости чтения не шло в ущерб пониманию содержания.

МЕТЕОРОЛОГИЯ

Блок 1. THE EARTH — ATMOSPHERE SYSTEM

LESSON 1

Упражнение 1. (Парная работа). Прочитайте заголовок приводимого ниже текста. Подумайте, о чем в нем может идти речь. Приведите 10—15 слов, которые, с вашей точки зрения, должны встретиться в тексте.

Прочитайте текст про себя (контрольное время — 5 минут) и определите, совпали ли ваши предположения с его содержанием.

Text 1A. The Global Hydrological Cycle

There are several important pathways of matter within the Earth — Atmosphere system, including rock erosion and deposition, and various nutrient systems. However, the passage of water, in its vapour, liquid and solid states, is unique in what it forms a significant component of nearly all parts of the system.

Water in the oceans evaporates under the influence of solar radiation, and the resulting water vapour, some of it in the form of clouds, is transported to the land areas by atmospheric circulation. The solar energy expended in bringing water to this elevated position is considerable, although some of the latent heat required in evaporation is returned to the atmosphere in condensation when clouds are formed. The fall of precipitation over the land converts potential energy to kinetic energy, but much of this is dissipated by friction due to air resistance, and only a fraction remains as potential energy on the land to be used in geomorphological systems. Some of the precipitation reaching the land is intercepted by vegetation; some infiltrates the soil, some percolates down to the ground water system and flows underground towards the sea; and the remainder flows as run-off, mainly in rivers. Evaporation from the land and transpiration from plants returnes some of the moisture back to the atmosphere to be recycled.

In addition to its circulation patterns, the hydrological cycle also embodies a number of reservoirs or storages. Surprisingly large inequalities exist in the global amounts stored. The oceans contain 93 % of the total; glaciers about 2 %; and terrestrial water constitute 5 % of which the vast majority is groundwater storage. Only a fraction therefore is held on or near the surface in the soil, yet this very small quantity sustains all life on land.

An ever smaller amount (0.001 %) is held in the atmosphere as water vapour.

Упражнение 2. (Парная работа). Прочитайте следующие слова и определите их соответствия в русском языке:

atmosphere, erosion, system, component, ocean, radiation, solar, circulation, energy, position, condensation, potential, kinetic, dissipate, resistance, fraction, infiltration, evaporation, transpiration, reservoir, global, contain.

Упражнение 3. (Парная работа). Определите значение выделенных слов по контексту.

1. Water in the oceans **evaporates** under the influence of solar radiation.
2. The resulting water vapour is **transported** to the land areas by atmospheric circulation.
3. The fall of precipitation over the land **converts** potential energy to kinetic energy.
4. Some of the precipitation reaching the land is **intercepted** by vegetation.
5. In addition to its circulation patterns, the hydrological cycle also **embodies** a number of reservoirs or storages.

Упражнение 4. Выберите русские эквиваленты приведенных английских слов.

matter — вода
движение
материя

terrestrial — земной
космический
солнечный

passage — прохождение
проникновение
колебание

dissipate — концентрировать
рассеивать
передавать

solar — земной
космический
солнечный

infiltrate — преодолевать
просачиваться
испаряться

Упражнение 5. Какие части речи обозначаются в словарях следующими сокращениями:

a., adv., cj., n., num., part., prep., pron., v.?

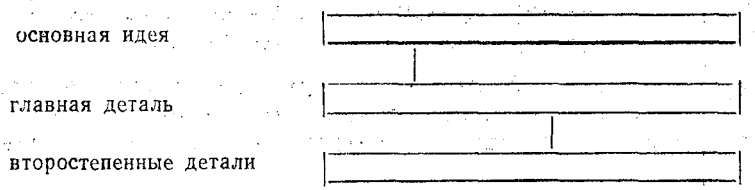
Определите, к каким частям речи принадлежат следующие слова; напишите соответствующие английские сокращения для каждого из них:

several, within, including, its, nearly, evaporate, some, circulation, embody, therefore, quantity.

Упражнение 6. Предварительно ознакомившись с приложением 3, прочитайте по-английски все цифры, встретившиеся вам в тексте 1А.

Упражнение 7. (Парная работа). Предварительно прочитав приложение 1, найдите в 3-м абзаце основную идею, глав-

ные и второстепенные детали. Заполните в своих тетрадях графы следующей таблицы:



Упражнение 8. (Парная работа). Выберите подзаголовки для каждого из трех абзацев текста 1А.

1. Способы переноса вещества в системе «Земля — атмосфера».
2. Структура атмосферы.
3. Роль воды в системе «Земля — атмосфера».
4. Переход потенциальной энергии в кинетическую.
5. Испарение и транспирация.
6. Накопление влаги.

Упражнение 9. Опираясь на содержание прочитанного текста 1А, расскажите по-русски:

— о способах переноса вещества в системе «Земля — атмосфера»;
— о круговороте воды в природе;
— о запасах воды в системе «Земля — атмосфера».

Упражнение 10. (Парная работа). Составьте план пересказа текста 1А.

Упражнение 11. Поставьте глаголы-сказуемые данных предложений в форму Present Indefinite.

1. There (to be) several pathways of matter within the Earth — Atmosphere system.
2. Water in the oceans (to evaporate) under the influence of solar radiation.
3. The fall of precipitation over the land (to convert) potential energy to kinetic energy.
4. Some of the precipitation (to infiltrate) the soil.
5. The passage of water, in its vapour, liquid and solid states, (to be) unique in that it (to form) a significant component of nearly all parts of the system.

Упражнение 12. Перепишите следующие предложения, подчеркните в них подлежащие и поставьте в скобках те глаголы, которые не согласуются с ними.

Пример: This gas has/have a greater density than air.
This gas has/(have) a greater density than air.

1. A barometer measure/measures pressure.
2. Nytrogen and oxygen is/are gases.

3. Physics is/are an important subject for an engineer.
4. The results of the experiment proves/prove the law.
5. The average monthly rainfall figures for this area show/shows a small decline in annual total over the last 30 years.

Упражнение 13. В левом столбце приводятся некоторые глагольные формы, в правом — личные местоимения. Подберите соответствующие друг другу элементы из правого и левого столбца.

a. is	1. I	2. he	3. we	4. they	5. she
b. are	1. I	2. they	3. you	4. we	5. it
s. were	1. you	2. they	3. it	4. she	5. we
d. am	1. you	2. we	3. it	4. I	5. they
e. will be	1. I	2. he	3. we	4. they	5. it

Упражнение 14. Найдите подлежащие и сказуемые в предложениях 2-го абзаца текста 1А. Объясните, какими частями речи они выражены.

Упражнение 15. Переведите третий абзац текста 1А письменно. Контрольное время для перевода — 20 минут.

LESSON 2

Упражнение 1. (Парная работа). Попытайтесь вспомнить, что вам известно об изменениях в системе «Земля — атмосфера» в прошлом.

А теперь не более чем за 5 минут прочитайте текст и найдите в нем ответы на следующие вопросы.

1. Каковы причины изменений, происходящих в системе «Земля — атмосфера»?
2. В чем состоит суть теории Миланковича?
3. Какова роль человека в изменении климата Земли?

Слова, которые помогут вам понять содержание текста:
n. realm — сфера
n. landscape — ландшафт
n. environment — окружающая среда
v. to induce — вызывать
n. interior — внутренняя часть
n. shape — форма
v. to bring about — вызывать, осуществлять
n. shift — изменение, сдвиг
n. fluctuations — колебания
n. distribution — распределение
n. curve — кривая
a. long-term — долгосрочный
n. radiation input — поступление радиации
p. angle of tilt — угол наклона

Text 1B. Changes in the Earth — Atmosphere System

From a wide variety of evidence, it is well known that the present-day pattern of activity in the Earth — Atmosphere system has been substantially different in the past. This applies to all the major realms, including the planet's climate, geomorfology, hydrology, soils and biogeography. Past changes in the system have left their mark in many respects on today's landscapes.

Although there are many immediate causes of natural change in the environment, most of them are related ultimately to geological changes induced by activity in the interior of the Earth or to climatic change. Large-scale changes have occured in the past in the position and shape of the Earth's ocean and land areas. Climatic change occures on many different spatial and temporal scales. In the geological past, a change of climate in any one area may have been brought about by continental drift rather than by changes in the atmosphere. But modern research has shown that on a shorter time-scale, climatic changes affecting the whole globe are the result of shifts in atmospheric circulation caused by fluctuations in the amount and distribution of insolation received by the Earth.

This idea is embraced in the Milankovitch curve, put forward in the 1930 as an explanation of long-term climatic change, including glaciers and interglacials. The curve is a calculation of radiation input for various parts of the Earth, taking account of the Earth's changing altitude to the sun in three respects: in the shape of its elliptical orbit; in the relation of the seasons to the orbit; and in its angle of tilt — at present 23,5°.

Finally, it must be stressed that many of the important recent changes in the Earth — Atmosphere system have nothing to do with natural causes, but have been brought about by man's activities. This may even apply to recent climatic change: it has been suggested that the general warming in the last hundred years has occured because of the output of carbon dioxide into the atmosphere by industrial processes.

Упражнение 2. В приводимой ниже таблице поставьте плюс в соответствующей колонке, предварительно определив, правильным или неправильным является то или иное утверждение.

Right	Wrong	
		1. The present-day pattern of activity in the Earth — Atmosphere system has not been different in the past. 2. Past changes in the system have left their mark on today's landscapes.

Right	Wrong	
		3. Changes have occured in the past in the position of the Earth's oceans and land areas. 4. Climatic changes are not the result of shifts in atmospheric circulation. 5. T. Chandler was the first to put out the theory explaining long-term climatic changes. 6. Many of the recent changes in the Earth — Atmosphere system have been brought about by the wind.

Упражнение 3. (Парная работа). Выберите из текста 1В 8—10 основных, с точки зрения смысловой нагрузки, слов (ключевые слова).

Упражнение 4. Переведите текст письменно. Контрольное время — 20 минут.

The Earth—Atmosphere system is supplied with energy from the Sun and from the interior of the Earth. This energy is transferred in several ways within the natural environment, and is affected by gravity and friction. The atmosphere is largely heated from below by re-radiated energy. The transference of heat in the atmosphere around the globe is the driving force behind the general circulation. Mass is also cycled in the Earth — Atmosphere system, the most important pathway being that of water, which plays a crucial role in nearly all parts of the natural environment. Long-term changes in the system are induced by tectonic activity or climatic change and, more recently, also, by man.

Блок 2. ATMOSPHERIC MOISTURE

Запомните значения следующих слов и словосочетаний, которые встретятся вам в текстах блока 2.

moisture — влажность
evaporation — испарение
precipitation — атмосферные осадки
absolute humidity — абсолютная влажность
specific humidity — массовая доля влаги
relative humidity — относительная влажность
water vapour — водяной пар
condensation nuclei — ядра конденсации
adiabatic processes — адиабатические процессы
dry adiabatic lapse rate — сухо-адиабатический градиент температуры
saturated adiabatic lapse rate — влажно-адиабатический градиент
dew point — точка росы

clouds — облака
stratiform clouds — слоистообразные облака
cumuliform clouds — кучевообразные облака
fog — туман
radiation fog — радиационный туман
advection fog — адвективный туман
steam fog — туман испарения
freezing nuclei — ядра замерзания
hail — град
thunderstorm — гроза
lightning — молния
saturation — насыщение

LESSON 3

Упражнение 1. (Парная работа). По данным ключевым словам постарайтесь определить, о чем будет идти речь в тексте 2А.

Hydrological cycle; moisture; saturation; absolute humidity; specific humidity; relative humidity; evaporation; condensation.

Упражнение 2. Прочитайте текст 2А и придумайте к нему заголовок. Контрольное время — 10 минут.

Text 2A

As part of the global hydrological cycle, moisture is continually entering the atmosphere by evaporation and transpiration, and leaving it in the form of precipitation. The amount of moisture that any part of the atmosphere can hold at any one time (saturation limit) depends on temperature: cold air can hold very little moisture, and much more moisture can be evaporated into warm air before it becomes saturated. Several expressions are used for describing the amount of moisture in the air. Absolute humidity is the mass or weight of water vapour per unit volume of air, in grams per cubic centimetre; however, as a body of air rises or sinks it undergoes volume changes, and its absolute humidity is thus not a constant figure. Meteorologists make use of the term specific humidity, the ratio of the weight of water vapour to the weight of the air, since this figure remains constant whatever the volume changes, unless water is actually added or lost from the body of air. Another expression useful to the meteorologist is relative humidity, which is the ratio of the actual amount of water in the air to the maximum amount the air could hold at that temperature, stated as a percentage.

Moisture exists in all three states of matter in the atmosphere, as vapour, liquid, or solid; changes from one to other are known as phase changes, and significant amounts of energy are involved in accomplishing these changes. In the process of evaporation,

600 calories of latent heat are required to change one gram of water from a liquid to a vapour state. Normally such a heat loss would be quickly compensated by conduction and radiation. In the reverse process of condensation, latent heat is released into the atmosphere, causing a slight rise in temperature.

Three principal factors favor evaporation. First, the initial humidity of the air: the drier the air, the greater the potential evaporation from water surfaces. Second, heat is needed to maintain evaporation, and the rate of evaporation will be proportionally higher depending on the warmth of the water surface and the air immediately above it. Third, wind force can be a significant factor, especially in turbulent conditions, where saturated air is continually replaced by fresh air. In general, the greater the wind strength, the more effective evaporation is likely to be.

Condensation occurs either when enough water is evaporated into the air mass for it to reach saturation point or alternatively, when the temperature drops sufficiently to achieve the same result. The second method is the more common. However, condensation occurs only with the utmost difficulty in the pure air which exists in the higher layers of the atmosphere. A basic requirement is some tiny particle or nucleus on which the water vapour can condense. In the lower atmosphere this is normally no problem, since abundant condensation nuclei exist, principally common salt derived from the sea, and dust particles.

Упражнение 3. Прочитайте следующие слова и определите их соответствия в русском языке.

Global; form; temperature; absolute; mass; cubic centimetre; constant; meteorologist; maximum; phase; energy; process; gram; compensate; radiation; factor; potential; proportionally; condition; result; method; nucleus; normally; problem.

Упражнение 4. В правой колонке найдите русские эквиваленты следующих английских словосочетаний:

1 hydrological cycle	1 скрытое тепло
2 amount of moisture	2 предел насыщения
3 saturation limit	3 оставаться постоянным
4 depend on something	4 становиться насыщенным
5 warm air	5 потеря тепла
6 become saturated	6 гидрологический цикл
7 absolute humidity	7 количество воды
8 remain constant	8 количество влаги
9 amount of water	9 теплый воздух
10 process of evaporation	10 поддерживать испарение
11 latent heat	11 температура падает
12 heat loss	12 абсолютная влажность
13 maintain evaporation	13 зависеть от чего-либо
14 temperature drops	14 процесс испарения
15 tiny particles	15 крошечные частицы

Упражнение 5. Абстрактные существительные, чаще всего обозначающие в научно-технической литературе процессы, качества и явления, характеризуются следующими типичными для них суффиксами:

turbidity, gustiness, disposal, production, distance, turbulence, drainage, consistency, improvement.

Образуйте абстрактные существительные от следующих прилагательных и глаголов, найдите их значение в словаре:

humid;	useful;	compensate;
evaporate;	relative;	radiate;
saturate;	actual;	conduct;
express;	exist;	dry;
constant;	significant;	maintain.

Упражнение 6. Заполните таблицу словами из текста 2А по следующему образцу, принимая во внимание значения соответствующих суффиксов:

Глагол	Существительное	Прилагательное	Причастие	Наречие
evaporate	evaporation	global	used using	actually

Упражнение 7. (Парная работа). Заполните пропуски подходящими по смыслу словами.

The air always contains . . . . . which is known as water vapour. When air cools, tiny drops of . . . . . form. These drops of water form . . . . . Water vapour that forms clouds close to the ground is called . . . . . or . . . . . At night water vapour condenses on the cool ground to form . . . . . .

Mist; dew; moisture; fog; water; clouds.

Упражнение 8. (Парная работа). Заполните пропуски подходящими по смыслу терминами.

1. . . . . is the transformation of a liquid into a gas by the escape of molecules from the free surface of the liquid.
2. . . . . is the weight of water vapour in a unit weight of air.
3. The ration between the actual amount of water vapour present in the air (its absolute humidity) and the possible amount at that temperature is the . . . . . .
4. Humidity of the air is measured by means of a . . . . . .

Упражнение 9. (Парная работа). Прочитайте приложение 2 и определите, к каким разновидностям принадлежат те связующие элементы, которые встретились вам в прочитанном тек-

сте. Выпишите эти слова и словосочетания, запомните их значения.

Упражнение 10. Еще раз прочитайте текст 2А и расскажите по-русски:

— о влажности атмосферы;

— об абсолютной, относительной влажности и массовой доли влаги;

— о факторах, способствующих испарению;

— об условиях возникновения конденсации.

Упражнение 11. Если вы не поняли содержание той или иной части текста 2А, переведите ее письменно.

Упражнение 12. (Парная работа). Найдите в 1-м абзаце текста 2А основную идею, главные и второстепенные детали.

Упражнение 13. (Парная работа). Озаглавьте каждый абзац текста 2А.

Упражнение 14. (Парная работа). В приводимом ниже отрывке текста имеются два предложения, которые по своему смыслу не соответствуют его общему содержанию. Определите эти предложения.

1. The changes in wind direction are an important element of the climate. 2. The water vapour, like the other gases of the air, exerts a pressure proportional to its density — that is, to the number of molecules present in a given volume. 3. This is the vapour pressure of the air, and is one means of expressing the amount of moisture in the air. 4. The amount may also be stated in terms of the weight of water vapour in a given volume of air. 5. This is the usual method of expressing absolute humidity. 6. Specific humidity is the weight of water vapour in a unit weight of air. 7. Strong winds usually prevail on mountain summits.

Упражнение 15. Данные утверждения не соответствуют действительности. Внимательно прочитайте текст 2А и сравните его с этими утверждениями; исправьте их и объясните, почему они неверны.

1. Specific humidity is the mass of weight of water vapour per unit volume of air. 2. Moisture exists in all four states of matter in the atmosphere. 3. Condensation occurs neither when enough water is evaporated into the air mass for it to reach saturation point, nor when the temperature drops sufficiently to achive the same result. 4. Meteorologists make use of the term specific humidity, the ratio of the condensation of water vapour to the weight of the air. 5. As a body of air rises or sinks it undergoes volume changes, and its absolute humidity is thus a constant figure.

Упражнение 16. Определите исходные формы следующих слов:

could; started; exists; known; involved; accomplishing; more effective; higher; saturated; depending; occurs; more common; nuclei; wettest.

Упражнение 17. В приводимом ниже тексте поставьте глаголы-сказуемые в форму Past Indefinite.

Rainfall. August 1987

Monthly rainfall totals (to be) above normal in southern Scotland, Northen Ireland, nothern and eastern England. Rainfall amounts (to range — колебаться) from as little as 13 per cent at Plymouth to 273 per cent in Norfolk.

East Anglia (to have) the wettest August for 30 years, while south-west England (to have) the driest August since 1981. North Wyke, Devon (to report) the driest August since records (to begin) there in 1959. While southern areas (to enjoy) a hot spell on the 16th, Scotland and Northen Ireland (to have) heavy rain and storms; some minor roads in the Highlands (to be) almost impassable because of flooding.

Упражнение 18. Заполните таблицу прилагательными и наречиями, встретившимися вам в прочитанных текстах, по следующему образцу:

Положительная степень	Сравнительная степень	Превосходная степень
cold	drier	wettest

Упражнение 19. Выберите правильный перевод выделенных слов:

1. **The drier the air**, the greater the potential evaporation from the water surface.
   a. когда воздух сухой
   b. чем суше воздух
   c. если воздух сухой
2. The higher the temperature, **the more rapid** the evaporation will be.
   a. тем быстрее
   b. быстро
   c. очень быстро
3. **The greater the wind strength**, the more effective evaporation is likely to be.
   a. чем больше сила ветра
   b. сила ветра большая
   c. когда сила ветра большая

4. **The larger the continent**, the more pronounced is the continental character of the climate of its interior.

a. если континент большой
b. континент большой
c. чем больше континент.

LESSON 4

Упражнение 1. Ниже приводится текст, содержащий, по всей вероятности, некоторое количество незнакомых для вас слов. Тем не менее, следующие слова не должны вызывать каких-то сложностей при их переводе на русский язык:

air; atmosphere; orographic uplift; turbulence; condensation; process; frontal surface; conventional heating; adiabatic changes; saturation air.

Исходя из значения этих слов, подумайте, о чем говорится в тексте. Выберите наиболее подходящий, на ваш взгляд, вариант из предлагаемых названий этого текста.

1. Atmospheric energy balance.
2. Adiabatic cooling and warming.
3. Atmospheric pollution.

А теперь прочитайте текст и проверьте правильность своих предположений. Контрольное время — 4 минуты.

Text 2B

Bodies of air frequently move from one level to another in the atmosphere for a variety of reasons, including conventional heating of the ground below, orographic uplift, turbulence in the airflow, and uplift at frontal surfaces. Rising air expands because of the decrease of pressure with height, the expansion process requires energy, and therefore the body of air cools. This is responsible for much of the condensation occuring at all levels in the atmosphere. Descending air is compressed and warms up. These temperature changes, involving no external heat-exchange but accomplished within the air parcel, are termed adiabatic and they should be distinguished from non-adiabatic changes which invlove the physical mixing of air.

In dry air, adiabatic cooling and warming takes place at a fixed rate of 10 °C/km, and this is known as the dry adiabatic lapse rate. The saturated adiabatic lapse rate, for air in which condensation is occuring, has lower values, between 4 °C/km and 9 °C/km, because latent heat released in the condensation process partly offsets the adiabatic temperature loss. The rate varies because the amount of latent heat released will be much greater for warm saturated air than for cold saturated air. Adiabatic lapse rates should not be confused with the normal lapse rate of the atmosphe-

re; the adiabatic rates apply only when air is actually moving up or down.

Упражнение 2. Письменно переведите первый абзац текста 2B. Контрольное время — 15 минут.

LESSON 5

Упражнение 1. Ниже приводятся первые предложения каждого из трех абзацев текста 2C. Этого должно быть достаточно для того, чтобы вы могли сделать выводы о содержании текста и его заглавии.

— Clouds are a visible manifestation of condensation in the atmosphere.

— Four main cloud «families» are recognized.

— Fog is cloud that forms close to the ground.

Парная работа. Обсудите: какое название лучше всего подходит для данного текста; о чем в нем будет идти речь. Выпишите 10—15 слов, которые, с вашей точки зрения, должны встретиться в тексте с выбранным вами названием.

Прочитайте текст и проверьте правильность своих предположений. Контрольное время — 6 минут.

Text 2C

Clouds are a visible manifestation of condensation in the atmosphere. There is great profusion of cloud forms, but one can draw a distinction between stratiform clouds, which have a layer-like appearance, and cumuliform clouds, which are heaped or massive in shape. Two related factors are important in determining cloud shape, that of air stability and the mode of uplift. In unstable conditions, the dominant form of uplift is convection, and this is primarily responsible for the vertically-developed cumuliform clouds. Stratiform types on the other hand, tend to be product of stable air conditions, in which turbulence is the principle cloud-forming mechanism. Frontal uplift gives rise to a variety of clouds, depending on the type of front and the stability of the air. Similarly, clouds formed by orographic uplift can be either stratiform or cumuliform, depending on the stability of the air.

Four main cloud «families» are recognized, embracing ten cloud genera. The high clouds are composed largely of icecrystals, and include the wispy cirrus and the mackerel-sky* effect of cirrocumulus. The prefix alto defines the middle clouds, and these are generally found at heights of between 3 and 6 km. The low clouds are often indicative of dull weather: stratus, for instance, is a dence low-lying cloud, and in the form of stratonimbus indicates the presence of precipitation. The fourth family, clouds

* Mackerel-sky — «барашки» (высоко-кучевые и перисто-кучевые облака).

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with vertical development, are clearly cumuliform, reflecting in their shape something of the upcurrents within them. Cumulus is the familiar white woolpack cloud.

Fog is cloud that forms close to the ground. There are three principal types, each indicative of different ways in which cooling takes place. Radiation fog is caused by radiation cooling of the land at night; un turn, the ground chills the adjacent air layers by conduction. This type of fog is common in calm conditions under clear skies in late autumn and early winter. Advection fog forms when moist air is blown over a cool surface and is chilled by contact. Typically this occurs over sea areas in early summer, creating a sea fog. Steam fog is generally much more localized than the other two types, and develop where cold air blows over much warmer waters.

Упражнение 2. Прочитайте следующие слова и определите, какие слова в русском языке могут помочь понять их значение:

visible; form; massive; factor; stability; condition; dominant; vertically; type; tend; product; mechanism; frontal variety; indicate; reflect; different; contact; local.

Упражнение 3. (Парная работа). Определите значения выделенных слов, исходя из контекста:

1. There is a great **profusion** of cloud forms.
2. Clouds are a visible **manifestation** of condensation in the atmosphere.
3. Frontal uplift **gives rise** to a variety of clouds.
4. Four main cloud «families» are **recognized**.
5. The high clouds are **composed** largely of icecrystals.
6. There are three **principal** types of fog.
7. Radiation fog is **caused** by radiation cooling of the land at night.
8. This type of fog **is common** in calm conditions under clear skies.
9. Steam fog is generally much more **localized** than the other two types and **develop** when cold air blows over much warmer waters.

Упражнение 4. В правой колонке найдите русские эквиваленты соответствующих английских словосочетаний:

1 a great profusion (of)	1 фронтальный подъем
2 related factors	2 устойчивость атмосферы
3 cloud shape	3 пасмурная погода
4 air stability	4 радиационное выхолаживание
5 unstable conditions	5 большое изобилие
6 frontal uplift	6 форма облака
7 dull weather	7 влажный воздух

8 vertical development	8 ясное небо
9 principal types	9 неустойчивые условия
10 radiation cooling	10 основные типы
11 clear skies	11 вертикальное развитие
12 moist air	12 связанные (с чем-л.) факторы

Упражнение 5. Найдите в тексте 2С эквиваленты следующих словосочетаний:

давать начало; определять формы облаков; быть ответственным за что-либо; зависеть от чего-либо; состоять из чего-либо; включать в себя; указывать на присутствие; иметь место.

Упражнение 6. (Парная работа). Подлинное название текста 2С «Clouds and Fog». Прочитайте этот текст еще раз и выпишите все термины, относящиеся к понятию «облака» в одну колонку, а термины, относящиеся к понятию «туман», — в другую.

После этого составьте краткую классификацию облаков и туманов на основе информации, полученной из текста.

Упражнение 7. Найдите в тексте 2С доказательства справедливости следующих утверждений:

1. There is a great profusion of cloud forms.
2. Four main cloud «families» are recognized.
3. The low clouds are often indicative of dull weather.

Упражнение 8. Дайте ответы на следующие вопросы:

1. What is the name of the invisible particles of moisture which rise into the air from the sea, lakes and rivers?
2. What features of clouds enable us to identify them?
3. Look at the window and describe the clouds you see. Can you work out what type of clouds they are?
4. What are the principal types of fog?

Упражнение 9. Выпишите из текста 2С 8—10 ключевых слов.

Упражнение 10. (Парная работа). В каждом абзаце текста 2С найдите:

— основную идею;
— главные детали;
— второстепенные детали.

Подберите заголовки для каждого из трех абзацев текста 2С.

Упражнение 11. Какие из данных положений, с вашей точки зрения, наиболее точно отражают основные идеи текста 2С.

1. There is a great profusion of cloud forms.
2. The main process in the formation of clouds is the dynamic cooling by expansion of rising air (adiabatic cooling).
3. Frontal uplift gives rise to a variety of clouds.
4. There are three principal types of fog.
5. Four main cloud «families» are recognized.

6. Steam fog develops where cold air blows over much warmer waters.

d. The prefix alto-defines the middle clouds.

8. Cumulus is the familiar white woolpack cloud.

9. Stratus is a dense low-lying cloud.

Теперь выберите пять наиболее важных положений и расположите их в порядке следования в тексте. Если задание выполнено правильно, выделенные предложения должны представлять собой основу резюме анализируемого текста.

Упражнение 12. (Парная работа). Прочитайте текст 2С еще раз и переведите те его части, которые представляют для вас какие-либо сложности. Обсудите перевод наиболее сложных отрывков текста между собой.

Упражнение 13. Письменно переведите следующий текст. Контрольное время — 10 минут.

Clouds

Clouds are formed when invisible particles of moisture, called water vapour, evaporate into the air from the sea, lakes, rivers and plants. As the water vapour rises it is cooled and eventually condenses back into drops of water. As these drops increase in number they bump into each other and join together, forming clouds. When the droplets become too heavy to stay in the air they fall as rain.

Упражнение 14. Прочитайте по-английски следующие числительные:

Weather around Britain

City	Sunshine hrs	Rain in	Max temp °C	°F	Weather (day)
Birmingham	0.2	.13	15	59	Rain
Bristol	1.8	.32	18	64	Shwrs pm
London	2.1	.02	18	64	Rain pm
Manchester	0.5	.20	13	55	Rain
Newcastle	—	.66	13	55	Rain
Nottingham	—	.28	15	59	Rain
Plymouth	5.9	.05	18	64	Shwrs am

Упражнение 15. Среди приведенных ниже глагольных форм укажите формы Participle II:

to form; heaped; related; to shape; developing; depending forming; developed; to give rise; recognized; embracing; to include; found; low-lying; reflecting.

Упражнение 16. Переведите следующие предложения на русский язык, обращая внимание на перевод выделенных слов.

1. It seems that the receipt of solar energy by the Earth — Atmosphere system **has fluctuated** regularly in the past.

2. It has been suggested that the general warming trend in the last hundred years **has occurred** because of the output of carbon dioxide into the atmosphere by industrial processes.

3. The equatorial areas **have** a positive heat budget, whereas the poles have a negative budget.

4. An object some distance above the ground **has** more gravitational potential energy than an object at ground level.

5. Past changes in the system **have left** their mark in many respects on today's landscape.

Упражнение 17. В приводимом ниже тексте поставьте глаголы-сказуемые в форму Future Indefinite.

Weather Forecast

All parts of the country (to have) sunny spells with the best of the sunshine being in north-eastern parts of England and Scotland. There (to be) also some showers, mainly in north-west Scotland and western parts of England, but the showers (to tend) to die out during the afternoon. Winds (to be) moderate to fresh from the south-west and temperatures (to rise) to near or slightly above average for the time of the year.

A band of cloud (to spread) into Ireland and western parts of England and Scotland. This (to move) slowly east across the remainder of the British Isles during Monday although the rain (to be) rather sporadic.

Упражнение 18. (Парная работа). Определите, где заканчивается одно предложение и начинается другое.

As well as recording the type of cloud we also need to know how much of the sky is covered by cloud we estimate this by dividing the sky into eight sectors and deciding how many sectors are covered by cloud for example, if half of the sky is covered we record 4/8 if the whole sky is covered we write 8/8.0 means a clear sky.

LESSON 6

Упражнение 1. Приводимые ниже словосочетания являются ключевыми к данному тексту. Если некоторые слова окажутся для вас незнакомыми, найдите их значения в метеорологическом словаре. На основании ключевых слов сделайте предположение о содержании текста.

Precipitation; clouds; raindrops; freezing nuclei; Bergeron mechanism (theory); hail; thunderstorm; developing stage; mature stage; dissipating stage; lightning; thunder.

Прочитайте текст (контрольное время — 7 минут) и определите, совпали ли ваши предположения с содержанием текста.

Text 2D

Not all clouds give rise to precipitation, and it is important to realize that there is a difference between the tiny droplets that make up clouds and the much larger drops that fall as rain. The process of producing raindrops is not simply a case of droplets getting bigger by normal condensation. It requires the coexistence of both water and ice in clouds at temperatures well below freezing. The water exists in unfrozen super-cooled form because of the rarity of special freezing nuclei which are required to form ice crystals. In this situation, the water vapour in the cloud tends to condense on the ice crystals rather than the water droplets. The crystals eventually become sizeable enough to fall and coalesce with other crystals to form snowflakes on the way down. Normally, they melt into raindrops before reaching the ground. This process of rainmaking is known as the Bergeron mechanism.

Hail is of a rather different origin from the rain, snow, or sleet (partially melted snow) described in the Bergeron theory. A hailstone is composed of alternate concentric rings of clear and opaque ice, and is formed when an ice crystal is repeatedly carried up and down in the vertical currents of a large cumulonimbus cloud. Freezing and partial melting may occur several times before the pellet is large enough to escape from the cloud.

Thunderstorms develop when unstable conditions extend to great height, and this allows powerful updraughts to develop within cumulonimbus clouds. Within a storm there may be several convective cells, each of which goes through a life-cycle. In the developing stage, the initial updraught, formed in response to convection, is considerably accelerated by the energy released as condensation occurs. The great strength of the updraught initially prevents rain from falling. In the mature stage, heavy rain accompanied by thunder and lightning occurs, and the top of the cloud spreads out under the tropopause in a characteristic anvil shape. The storm passes into the dissipating stage as the supply of moisture in the cell is gradually exhausted. Downdraughts become predominant, spreading out below the cloud and preventing any further convective instability in the immediate vicinity. Lightning occurs in thunderstorms to relieve the electrical tension between oppositely charged areas within the cloud. Thunder occurs because lightning heats the immediate air to very high temperatures, causing rapid expansion and vibration of the air column, which is heard as thunder.

Упражнение 2. (Парная работа). В первом абзаце приведенного текста 2D, вероятно, есть слова, которые вы не знаете. Выпишите их, сравните с теми, которые выписал ваш товарищ и обсудите их значение. Правильность своих предположений проверьте по словарю.

Упражнение 3. (Парная работа). Определите значение выделенных слов, исходя из контекста.

1. **A hail stone** is formed when an ice crystal is repeatedly carried up and down in the vertical currents of a large cumulonimbus cloud.
2. **Sleet** is partially melted snow.
3. Thunderstorms develop when unstable conditions **extend** to great heights, and this allows powerful **updraughts** to develop within cumulonimbus clouds.
4. **Downdraughts** become predominant, spreading out below the cloud and presenting any further convective **instability** in the immediate vicinity.
5. In the mature stage, heavy rain **accompanied** by thunder and lightning occurs.
6. ... the initial updraught ... is considerably **accelerated** by the energy released as condensation occurs.

d. Thunder occurs because lightning **heats** the immediate air to very high temperatures.

Упражнение 4. Найдите в правой колонке русские эквиваленты следующих словосочетаний:

1 tiny droplets	1 вертикальные потоки
2 below freezing	2 жизненный цикл
3 concentric rings	3 быстрое расширение
4 vertical currents	4 частичное таяние
5 partial melting	5 крошечные капельки
6 powerful updraughts	6 сильный дождь
7 convective cell	7 ниже нуля
8 life-cycle	8 концентрические окружности
9 heavy rain	9 конвективная ячейка
10 rapid expansion	10 мощные восходящие потоки

Упражнение 5. Выпишите из текста 2D все существительные, связанные по своим значениям с понятием «осадки».

Упражнение 6. Разместите предлагаемые здесь слова по следующим тематическим группам:

Метеорологические термины	Связующие элементы	Общенаучная лексика

precipitation; difference; and; condensation; coexistence; freezing; both ... and; crystal; because of; to coalesce; to melt;

a process; rainmaking; hail; sleet; eventually; dissipating stage; life-cycle; because.

Упражнение 7. Заполните пропуски в тексте соответствующими связующими элементами.

Variation of Precipitation with Latitude

. . . precipitation is greatest at the equator and becomes gradually less towards the poles. In the regions of the tropics of Cancer and Capricorn the precipitation is less on either side of this region, . . . downward air currents.

Precipitation increases with altitude up to about 3,000 feet and . . . decreases . . . this does not hold for mountain regions . . . the winds are off the ocean. . . . the air currents are off the ocean and upward motion is induced by the elevation of the land, precipitation increases with altitude to greater elevations than 3,000 feet.

where; wherever; on account of; although; in general; then.

Упражнение 8. Прочитайте текст 2D еще раз и укажите в нем те строчки, в которых говорится о:

— условии, которое является обязательным для образования дождевых капель;
— роли ядер замерзания в образовании осадков;
— авторе теории зарождения осадков в облаке;
— структуре градины;
— условиях образования града;
— физической сущности молнии и грома.

Упражнение 9. (Парная работа). Из приводимых ниже слов и словосочетаний выберите те, которые наиболее подходят в качестве заглавия к тексту 2D:

1. Hail.
2. Stages of thunderstorms.
3. Precipitation and thunderstorms.
4. Lightning and thunder.
5. Bergeron mechanism.

Упражнение 10. На основе прочитанного текста 2D нарисуйте схему, отражающую последовательность процессов образования грозы.

Упражнение 11. В двух предложениях приводимого ниже отрывка текста содержатся смысловые ошибки. Найдите эти предложения и исправьте ошибки.

In the developing stage the supply of moisture in the cell is gradually exhausted. The great strength of the updraught initially prevents rain from falling. In the mature stage, heavy rain accompanied by thunder and lightning occurs, and the top of the

cloud spreads out under the tropopause in a characteristic anvil shape. The storm passes into the developing stage, in which the initial updraught, formed in response to convection, is considerably accelerated by the energy released as condensation occurs.

Упражнение 12. Следующие положения упоминаются в тексте 2D. Определите, какие из них представляют основную идею, какие — второстепенные детали.

1. Freezing may occur several times before the pellet is large enough to escape from the cloud.
2. Not all clouds give rise to precipitation.
3. Hail is of a rather different origin from the rain, snow, or sleet.
4. The storm passes into the dissipating stage as the supply of moisture in the cell is gradually exhausted.
5. Normally, ice crystals melt into raindrops before reaching the ground.
6. Thunderstorms develop when unstable conditions extend to great heights.
7. In the mature stage, heavy rain accompanied by thunder and lightning occurs.

Упражнение 13. Письменно переведите следующий текст. Контрольное время — 15 минут.

Rainfall

Rainfall has an important influence on our lives. We depend upon rainfall for our water supply. If there is too little rain people and plants may die; if there is too much rain there may be floods, which cause damage.

It is not surprising that Britain has so much rainfall, as it is surrounded by sea. Winds blowing across the sea pick up invisible moisture called water vapour, which slowly rises from the sea. As the water vapour rises higher it becomes cooler and condenses into tiny droplets of water which form clouds. When these clouds reach land they are forced to rise over any hills or mountains and they become cooler. The droplets of water grow larger and heavier eventually falling to the ground as rain.

Упражнение 14. В тексте 2D найдите предложения, глаголы-сказуемые которых выражены формами страдательного залога.

Упражнение 15. Перепишите предложения, поставив их глаголы-сказуемые в форму страдательного залога соответствующего времени

1. The water exists in unfrozen super-cooled form because of the rarity of special freezing nuclei which (to require — Present Indefinite) to form ice crystals.

2. This process (to know — Present Indefinite) as the Bergeron mechanism. It (to use — Present Perfect) successfully as the theoretical basis for artificial rain-making in which clouds (to seed — Present Indefinite) with dry ice or similar substances.

3. In tropical areas it (to observe — Present Perfect) that rain comes from clouds which have great vertical development but do not reach the temperature levels required by the Bergeron theory.

4. In the developing stage, the initial updraught, formed in response to convection (to accelerate — Future Indefinite) by the energy released as condensation occurs.

5. Thunder occurs because lightning heats the immediate air to very high temperatures, causing rapid expansion and vibration of the air column, which (to hear — Present Indefinite) as thunder.

Упражнение 16. Выберите правильный вариант перевода выделенных словосочетаний.

1. The depth of rain **is measured**...	a измерять b была измерена c измеряется
2. Meteorologists **make use of the term**...	a используется b используют c принесли пользу
3. A lot of people think that snow **is frozen** rain, but this is not true.	a замерз b замерзает c замерзший
4. Heat **is needed** to maintain evaporation.	a требует b потребовалось c требуется
5. The amount of latent heat released will be much greater for warm **saturated** air.	a насыщается b насыщенный c насыщение

Упражнение 17. Определите исходные формы следующих слов:

nuclei; tends; larger; required; known; melted; carried up, occurs; spreading out; exhausted; causing; heard; allows; rings; released.

Упражнение 18. Найдите в тексте 2D глагольные формы, оканчивающиеся на -ed; определите, к какой части речи они принадлежат и переведите их на русский язык.

Упражнение 19. Составьте предложения по их частям.

Thunderstorms /in the summer/most often/occur/. /They/during the afternoon/happen/and/on hot days/early evening/. /The clouds/cumulonimbus/are/build up/to a great height/which/in the sky/. /The rainfall/very heavy/can be/may fall/hailstones/and/.

Упражнение 20. Расставьте предложения, исходя из их логической последовательности.

1. Sheet lightning is between one cloud and another.
2. There are two types of lightning.
3. Forked lightning reaches the ground.
4. Lightning is a big spark caused by static electricity.

Упражнение 21. Составьте резюме текста 2D.

Тесты к блокам 1—2

ТЛ

I. Заполните пропуски подходящими по смыслу словами.

1. Clouds that look like heaps of cotton wool are called...
a. cumulus, b. nimbus
2. Layer of clouds, which may cover the whole sky, is called...
a. stratus, b. cumulus
3. Layer clouds, or ... are low in the sky.
a. cirrus, b. stratus
4. When clouds form at ground level they give ...
a. thunder, b) fog
5. If the droplets of water or ice in clouds grow so heavy that the air cannot support them, they fall to the ground as rain, hail, snow or sleet. We call this ...
a) precipitation, b. evaporation

II. Укажите цифрами слова, которые по своему значению не соответствуют данной тематической группе:

1 2 3 4 5
saturation; humidity; satisfaction; evaporation; joy;
6 7 8 9 10
condensation; improvement; lapse rate; championship; cloudiness;
11 12
fog; freezing nuclei.

III. В левом столбце определите слово, **после** которого должно следовать слово из правого столбца. В своей работе укажите букву, соответствующую той или иной строчке и цифру, обозначающую искомое слово, например, a-1, b-1, и т. д.

1 2 3 a. Hailstones begin raindrops.	as
1 2 3 4 5 6 7 b. If a small raindrop is carried an	by
1 2 3 4 5 c. upward air current high an	into
1 2 3 4 5 d. cumulus cloud will freeze. Each	it
1 2 3 4 e. time happens an extra	this

1 2 3 4 5 6
f. layer ice is added making the of
1 2 3 4
g. hailstone bigger bigger. When and
1 2 3 4 5 6
h. cut half the layers forming the In
1 2 3 4
i. hailstone can clearly seen be

IV. Каким термином можно заменить следующие слова и словосочетания:

давление
влажность
осадки precipitation

a. weight of air pressing down;
b. how damp the air is;
c. drizzle, rain, sleet, snow and hail;
d. dew, frost, mist, fog.

ТГ

I. По выделенным словообразовательным элементам определите, к какой части речи принадлежат следующие слова:

1. fogginess: a. прилагательное, b. существительное, c. причастие
2. responsible: a. существительное, b. наречие, c. прилагательное
3. descending: a. глагол, b. наречие, c. причастие.

II. Выберите правильный вариант перевода выделенных форм и словосочетаний.

1. **has been used**

a. используется, b. имеет использование, c. использовалось

2. **is formed**

a. формируется, b. было сформировано, c. формирующийся

3. **is dissipating**

a. диссипирует, b. диссипировало, c. будет диссипировать

4. **will spread**

a. будет распространяться, b. распространено, c. распространялось

5. **the results obtained**

a. результаты получены, b. результаты получили, c. полученные результаты

6. **moving air**

a. движение воздуха, b. движущийся воздух, c. двигавшийся воздух

7. **less important**

a. более важные, b. самые важные, c. менее важные

8. **The higher** we ascend, the rarer becomes the atmosphere.

a. высоко, b. чем выше, c. более высокий

I. Расставьте предложения в их логической последовательности. (В своей работе укажите только последовательность номеров предложений.)

1. When cooled enough the water vapour condenses into millions of tiny water droplets.

2. Humidity is the dampness of the air, or the amount of water vapour it contains.

3. These come together to form clouds.

4. When air rises, it cools.

II. В данном тексте два предложения не соответствуют, с точки зрения смысла, его общему содержанию. Укажите номера этих предложений.

1. All forms of moisture that fall to the ground are called precipitation. 2. We often use a weather forecast to help us plan the following day's actions. 3. If there is a lot of moisture in the air the drops of water may become too heavy for the clouds and fall as rain. 4. If it is very cold the moisture may freeze into ice crystals and fall as snow or sleet. 5. Precipitation is measured in millimetres. 6. Symbols are used on weather maps to illustrate the type of weather we can expect.

III. Письменно переведите следующий текст. Контрольное время — 20 минут.

Of the various expressions used to describe atmospheric moisture amounts, relative humidity is the most common, although it can be a misleading quantity. Evaporation and condensation processes are basic to many meteorological phenomena. The vertical movement of air causes adiabatic changes of temperature and the relation between the dry and saturated adiabatic lapse rates and the environmental lapse rate is fundamental in determining stability conditions. The many types of cloud form are all composed of tiny condensed water droplets, whereas precipitation drops are much bigger. The Bergeron mechanism accounts for most of the precipitation of middle and high latitudes, including that in thunderstorms.

Блок 3. CIRCULATION PATTERNS

LESSON 7

Упражнение 1. (Парная работа). Определите, какие из приведенных ниже слов и словосочетаний могут, на ваш взгляд, встретиться в тексте с таким заглавием. Если среди этих слов вам встретятся незнакомые, найдите их значения в словаре.

eddy; energy budget; evaporation; Coriolis force; moisture; condensation; precipitation; centripetal force; frictional force; lightning; pressure; hemisphere; to deflet; geostrophic wind; freezing nuclei; cyclone; anticyclone.

А теперь прочитайте текст и проверьте правильность своих предположений. Контрольное время — 8 минут.

Text 3A. Forces Governing Winds

Horisontal air movement or wind occurs on many scales, from small eddies to major circum — planetary wind systems. The basic impulsion to air movement is provided by the inequalities in the atmospheric energy budget. Variable heating sets up variations in pressure, and this becomes one of the basic forces governing air movement. Once air is in motion, other factors come into play, including Coriolis force, the deflection caused by the Earth's rotation; centripetal force, which acts around circulatory pressure systems; and the frictional force exerted by the Earth's surface.

Pressure is normally measured in millibars, spatial variations of pressure being depicted on maps by isobars, lines connecting places having the same barometric pressure. The gradual change of pressure between different areas is known as the barometric slope or the pressure gradient. The pressure gradient force always acts down the pressure gradient, attempting to cause the general movement of air away from high-pressure towards low-pressure areas.

Coriolis force is named after the French physicist Coriolis, who in the 19th century formalized the concept of the Earth's deflecting force. This causes a deflection of moving air to the right in the Northern Hemisphere and to the left in the Southern, whatever the original direction. The phenomenon affects all freely moving objects, including ocean currents and projectiles. To the observer on the ground, the deflecting force varies with the speed of the moving air and with latitude: the faster the wind, the more ground it covers in a given time, and the greater the effect of rotation can be. Near the equator the Coriolis force is very slight, but it has marked effects in higher latitudes.

In the free atmosphere, above the level of flow affected by surface topography, the flow of wind parallel to the isobars indicates that the two forces are exactly balanced. This sort of air motion is known as the geostrophic wind. A qualitative expression of the geostrophic situation is Buys Ballot's Law, which states that if one stands with one's back to the wind, then in the Northern Hemisphere low pressure always lies to the left, and high pressure to the right. The reverse applies in the Southern Hemisphere.

Centripetal force applies to winds when the isobaric pattern is markedly curved. Wind which is in balance with these three forces is known as the gradient wind. Motion around a low-pressure

area, anticlockwise in the Northern Hemisphere, is termed cyclonic, and in this case the result of the centripetal force is to make the Coriolis force weaker than the pressure gradient force: the wind is subgeostrophic. The anticyclonic flow in the high-pressure case is supergeostrophic, since the Coriolis force exceeds the pressure gradient force. Frictional forces will apply in both these cases if the winds are near the surface.

Упражнение 2. В двух первых абзацах текста 3А найдите английские эквиваленты следующих слов и словосочетаний:

1. движение воздуха
2. небольшие вихри
3. ветровые системы
4. энергетический баланс
5. изменения давления
6. находиться в движении
7. отклонение
8. вращение Земли
9. центростремительная сила
10. сила трения
11. пространственные изменения
12. давление
13. постепенное изменение
14. наклон изобарических поверхностей
15. сила барического градиента
16. область высокого давления

Упражнение 3. Прочитайте следующие слова из 3-го и 4-го абзацев текста 3А и определите их соответствия в русском языке.

physicist; formalize; concept; original; phenomenon; object; vary; effect; rotation; equator; topography; parallel; isobar; balance; sort; motion; geostrophic; reverse.

Упражнение 4. Найдите в правой колонке английские эквиваленты следующих слов и словосочетаний, содержащихся в последнем абзаце текста 3А.

1. изобарическая модель
2. изогнутый (криволинейный)
3. градиентный ветер
4. северное полушарие
5. в этом случае
6. сила барического градиента
7. циклоническое движение
8. превышать
9. сила трения
10. вблизи поверхности

1. in this case
2. near the surface
3. to exceed
4. frictional force
5. cyclonic motion
6. isobaric pattern
7. curved
8. gradient wind
9. Northern Hemisphere
10. pressure gradient force

Упражнение 5. Прочитайте по-английски числительные, содержащиеся в следующей таблице:

Relation of Insolation to Season and Latitude

Latitude	0	+20°	+40°	+60°	+90°	—90°
March 21	1.000	0.940	0.766	0.500	0.000	0.000
September 22	0.087	0.927	0.756	0.494	0.000	0.000
June 21	0.882	1.044	1.107	1.093	1.201	0.000
December 21	0.941	0.676	0.357	0.056	0.000	1.283

Упражнение 6. Прочитайте текст 3А еще раз и найдите в нем определения:

— ветра;
— изобары;
— барического градиента;
— геострофического ветра;
— закона Бейс-Балло;
— силы Кориолиса.

Упражнение 7. (Парная работа). Заполните графы приводимой ниже таблицы существительными и прилагательными, относящимися к следующим понятиям:

Wind	Pressure	Force

Упражнение 8. В правой колонке найдите часть предложения, которая больше всего подходит по смыслу к части предложения, расположенной в левой колонке. Обратите внимание на значения связующих элементов.

1. **Once** air is in motion,
2. **If** one stands with one's back to the wind,
3. **Since** the Coriolis force exceeds the pressure gradient force

1. then in the Northern Hemisphere low pressure lies to the left.
2. other factors come into play.
3. the anticyclonic flow in the high-pressure case is supergeostrophic.

Упражнение 9. (Парная работа). В этом отрывке текста одно из предложений находится не на своем месте; найдите это предложение и то место, которое оно должно занять.

In the free atmosphere, above the level of flow affected by surface topography, the flow of wind parallel to the isobars indicates that the two forces are exactly balanced. A qualitative expression of the geostrophic situation is Buys Ballot's Law, which states that if one stands with one's back to the wind, then in the Northern Hemisphere low pressure always lies to the left, and high pressure to the right. This sort of air motion is known as the geostrophic wind. The reverse applies in the Southern Hemisphere.

Упражнение 10. (Парная работа). Если бы перед вами стояла задача выбрать **одно** предложение в качестве ключевого ко всему тексту 3А, какое предложение вы бы выбрали? Выпишите из текста это предложение.

Упражнение 11. Найдите в тексте 3А данные, которыми можно было бы заполнить следующую таблицу:

Who	When	What

Упражнение 12. (Парная работа). Выберите один из абзацев текста 3А, придумайте 3—5 вопросов к нему. Попросите ответить на них другую пару студентов. Обменяйтесь вопросами.

Упражнение 13. Выберите правильный вариант ответа на поставленные вопросы:

1. Which of the factors provides the basic impulsion to air movement?
   a. Coriolis force;
   b. inequalities in the atmospheric energy budget;
   c. centripetal force.
2. What is the pressure gradient?
   a. It is the gradual change between different areas;
   b. it is the flow of wind parallel to the isobars;
   c. it is a motion around a low-pressure area.
3. Which of the scientists formalized the concept of the Earth's deflecting force in the 19th century?
   a. Buys;
   b. Ballot;
   c. Coriolis.
4. Near the equator the Coriolis force is very slight, isn's it?
   a. Yes, it is.
   b. No, it isn't.

5. When does centripetal force apply to winds?

a. When the flow of wind is parallel to the isobars.
b. When the isobars pattern is markedly curved.
c. When the pressure gradient force acts down the pressure gradient.

Упражнение 15. В данной таблице поставьте плюс в соответствующей колонке, предварительно определив, правильным или неправильным является то или иное утверждение.

Right	Wrong	
		1. Wind occurs on many scales. 2. Variable heating sets up variations in the force of gravity. 3. Pressure is normally measured in percent. 4. The pressure gradient force always acts down the pressure gradient. 5. Coriolis force is named after the French physician Coriolis. 6. The faster the wind, the more ground it covers in a given time. 7. The anticyclonic flow in the high-pressure case is super-geostrophic.

Упражнение 16. Переведите текст письменно. Контрольное время — 10 минут.

Wind Speed

Wind speed is usually given as a force number which corresponds to a range of kilometres per hour. A wind scale that is commonly used has forces ranging from 0 to 12, though winds of more than 10 are very uncommon. Whatever measuring method is used it is important to agree on how strong the winds have to be for each number on the scale. Once this is established then the wind speed can be described by the force number and can be recorded easily. Wind direction can be recorded by using a compass. The wind direction is the direction from which the wind is blowing.

Упражнение 17. (Парная работа). Ознакомьтесь с приводимой ниже информацией и выполните предлагаемые задания.

In the early nineteenth century Sir Francis Beaufort worked out a system for judging wind speed. He was an admiral in the navy and wanted a guide to wind speed that ships at sea could use. He made up a scale of 13 points (0 to 12) and at each point

he gave the wind a number, a name, a range of speeds and a description of its effects. The scale was named after him.

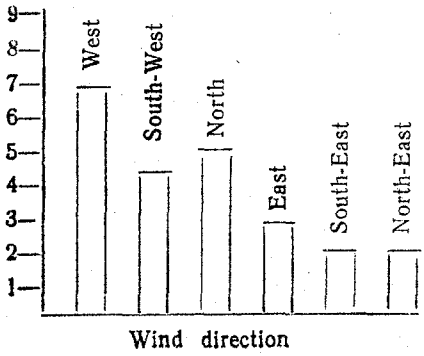
Below is a modern version of the Beaufort scale.

Force No	Wind speed	Speed km/hr	Description of effects
0	Calm	0	Smoke rises vertically
1	Light air	1—5	Smoke drift but no wind vane movement
2	Light breeze	6—11	Wind felt on face. Leaves rustle. Wind-vane moves.
3	Gentle breeze	12—19	Leaves and twigs in constant motion. Light flags extend.
4	Moderate breeze	20—38	Dust and loose paper raised. Small branches move.
5	Fresh breeze	29—38	Small trees begin to sway. Crested waves on inland waters.
6	Strong breeze	39—49	Large branches move; whistling in telegraph wires.
7	Moderate gale	50—61	Whole trees in motion. Difficult to walk against.
8	Fresh gale	62—74	Twigs break off trees. Walking very difficult.
9	Strong gale	75—88	Slight damage to buildings (chimney pots and slates removed)
10	Whole gale	89—102	Trees unrooted. Considerable damage to buildings.
11	Storm	103—117	Very rare. Widespread damage.
12	Hurricane	118+	Severe destruction.

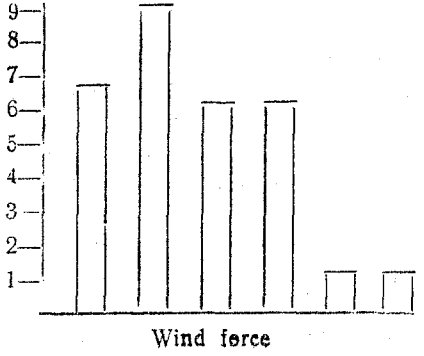
Here are wind records for April. Look at the wind record table and two frequency bar charts and answer the questions.

Date	Direction	Force	Date	Direction	Force
1	West	2	16		0
2	West	3	17	South-East	2
3	South-West	1	18	South-East	2
4	South-West	1	19	East	3
5	South-West	1	20	East	3
6		0	21	North	3
7		0	22	North	2
8	North	3	23	North-East	2
9	North	3	24	North-East	1
10	East	4	25		0
11	North	5	26		0
12		0	27		0
13	West	1	28	West	1
14	South-West	2	29	West	1
15	West	1	30	West	1

Frequency of wind direction in April



Frequency of wind force in April



1. Which wind direction was most common?
2. From which of the eight main compass directions did the wind not blow?
3. Which wind force was most common?
4. Which wind forces were least common?
5. From which direction did the strongest wind come?
6. Which direction always gave a force above 2?
7. Which direction always gave a force below 3?
8. Was April a windy month or was it fairly calm?

Упражнение 18. Укажите, в каких предложениях текста 3А формы на -ing соответствуют русскому причастию с окончаниями на -щий/-щая/-щее.

Упражнение 19. Выберите правильную форму причастия в следующих предложениях.

1. Once air is in motion, other factors come into play (including/included) Coriolis force, the deflection (causing/caused) by Earth's rotation.

2. Pressure is normally (measured/measuring) in millibars.

3. In the free atmosphere, above the level of flow (affecting/affected) by surface topography, the flow of wind indicates the two forces are exactly (balanced/balancing).

4. (Increased/increasing) movement is usually (attended/attending) by increased evaporation from water and soil surfaces.

5. Complete climatic tables must include the (prevailing/prevailed) direction average of the wind by month.

6. The temperature (shown/showing) on the graph are given in degrees centigrade.

Упражнение 20. Выберите наиболее подходящий вариант перевода сочетаний типа «существительное + существительное».

1. pressure system	a. системное давление b. система давления
2. energy budget	a. сбалансированная энергетика b. энергетический баланс
3. air movements	a. движение воздуха b. воздух движется
4. summer rains	a. дождливое лето b. летние дожди
5. pressure gradient force	a. сила барического градиента b. градиентная сила давления

Упражнение 21. Переведите следующие предложения, содержащие причастные конструкции, на русский язык:

1. All objects give off some radiant energy of various wavelength, including the visible (light) and infrared sections.

2. Pressure is normally measured in millibars, spatial variations of pressure being depicted on maps by isobars, lines connecting places having the same barometric pressure.

3. The relative humidity during the day changes quite markedly, being lowest around midday when temperatures are highest.

4. Temperature generally drops with height, this being refferred to as a lapse rate.

5. All solid objects at night cool more rapidly than the air, this being especially true when the sky is clear and affords but little radiation itself.

LESSON 8

Упражнение 1. (Парная работа). Прочитайте текст 3B (контрольное время — 3 минуты) и постарайтесь понять его содержание. Среди приведенных после текста русских предложений укажите те, которые, на ваш взгляд, соответствуют его содержанию.

Text 3B. The General Circulation

Much new knowledge has been added to our understanding of the general circulation of the atmosphere in recent years through the information supplied by satellites about conditions in the upper troposphere. In its simplest form, the general circulation should operate like a gigantic heat engine and produce, in vertical cross-section, a single cell circulation in each hemisphere, in which there is rising air at the equator, high-level outflow towards the poles, and a return surface flow in the opposite direction. Takind into account the Earth's rotation, the upper flow should be predominantly westerly and with the additional effects of friction, the surface flow should be slightly south of easterly; but several important factors disguise this pattern. Perhaps the most significant is that the interchange of heat between equator and poles does not take place only in a vertical sense, but is also accomplished in a horizontal sense; particularly in middle latitudes, where large masses of air penetrate north and south past each other in upper air waves and surface frontal patterns. This means that frontal systems are a major force in the maintenance of the general circulation.

1. Общая циркуляция подобна гигантской тепловой машине.

2. Принимая во внимание вращение Земли, циркуляция в верхних слоях атмосферы в целом должна осуществляться в заданном направлении.

3. Предельная температура, которую может выдержать человек, —160 °С.

4. В настоящее время нет оснований говорить о начавшемся общем похолодании земного климата.

5. Некоторые факторы оказывают значительное влияние на общую модель циркуляции.

6. Разряды атмосферного электричества при грозах могут происходить внутри грозовых облаков.

7. Фронтальные системы — основная сила, поддерживающая общую циркуляцию.

8. Основной чертой континентального климата является большая амплитуда колебаний температуры между зимой и летом.

Упражнение 2. Определите русские соответствия следующих слов:

information; satellite; condition; troposphere; circulation; gigantic; engine; vertical; hemisphere; equator; opposite; rotation; friction; horizontal; mass.

Упражнение 3. (Парная работа). Определите значение выделенных слов по контексту.

1. Much new knowledge has been added to our understanding of the general circulation of the atmosphere through the information **supplied** by satellites.

2. The general circulation should **operate** like a gigantic heat engine.

3. The upper flow should be predominantly westerly and the surface flow should be slightly south of easterly, but several important factors **disguise** this pattern.

4. The interchange of heat between equator and poles does not take place only in a vertical direction, but is also **accomplished** in a horizontal direction.

5. Large masses of air **penetrate** north and south.

Упражнение 4. (Парная работа). В тексте 3В, вероятно, остались слова, значения которых вы не знаете. Выпишите их, сравните с теми, которые выписал ваш сосед, и обсудите их возможные значения. Правильность своих предположений проверьте по словарю.

Упражнение 5. Разместите приводимые слова и словосочетания по соответствующим тематическим группам:

Термины	Общенаучная лексика	Связующие элементы

information conditions; upper troposphere; general circulation; to operate; to produce; cross-section; but; direction; Earth's rotation; perhaps; friction; predominantly; masses of air; frontal systems.

Упражнение 6. Найдите подлежащее и сказуемое в каждом предложении текста 3В.

Упражнение 7. Устно переведите текст 3В.

Упражнение 8. Прочитайте по-английски следующие числительные:

9; 19; 90; 200; 500; 10,000; 123; 456; 9,327; 1.008; 5,247; 1/2; 1/6; 1/10; 9/10; 0.1; 0.01; 0.001; 0.0001; 2.35; 32.305; 164.887; 647.356; 75 %; 1st; 2nd; 3rd; 10th; 80th; 124th; 1000th.

Упражнение 9. Выберите правильный перевод выделенных слов и словосочетаний.

1. Before radio and television were invented and newspapers were published, **there were no** weather forecasts.	a. там не было b. не имеется c. не было
2. **There are** several different types of clouds.	a. имеется b. там есть c. не переводится
I II 3. **If there is** too much rain, **there may be** floods, which cause damage.	I. a. имеется b. там есть c. не переводится II. a. могут быть b. там могут быть c. должно быть
4. As we **have seen**, the weather is made up of a number of elements.	a. видим b. видели c. должны видеть
5. The whole area has already **been photographed** from the air.	a. фотографируется b. была сфотографирована c. могла бы быть сфотографирована
6. Many measurements of solar radiation **have been made** with specially designed instruments.	a. было сделано b. делается c. имелось
7. Most of the rain **that** falls to the ground drains into streams and rivers.	a. тот b. который c. именно
8. It is not surprising **that** they have so much rainfall in Britain.	a. что b. который c. не переводится
9. The distribution of cloudiness and humidity follows **that** of rainfall in a general way.	a. распределению b. который c. что

LESSON 9

Упражнение 1. Прочитайте про себя предлагаемый ниже текст (контрольное время — 6 минут) и определите, на какие из данных вопросов можно найти в нем ответы.

1. Каковы особенности распределения приземных ветров?
2. Что такое стандартная атмосфера?
3. Одинаков ли состав воздуха на разных высотах в атмосфере?
4. В каких районах Земли наблюдаются пассаты?
5. Чем отличаются западные ветры южного полушария от аналогичных ветров северного полушария?
6. Как высоко простирается атмосфера Земли и какова ее масса?
7. В каких районах дивергенция является основополагающим климатологическим фактором?

Text 3C

Broadly speaking, all the major wind systems around the globe are predominantly zonal or latitudinal in character, especially the upper winds. The surface wind pattern is dominated by two wind belts in each hemisphere. One of these is the trade-wind belt, which covers nearly half the surface of the globe, between latitudes 30° N and S. The permanency of the subtropical high-pressure zones has an important bearing on the constancy of these winds. The two trade-wind systems converge towards each other in the equatorial low-pressure trough. With the annual migration of the trough with the overhead sun, the trade winds sometimes cross into their opposite hemisphere, giving a narrow zone of equatorial westerlies, the south-west monsoons of Asia is an exaggerated version of these winds. The second major surface wind belt in each hemisphere is the midlatitude westerlies, which develop out of the poleward sides of the subtropical high-pressure cells. The westerlies of the Southern Hemisphere are the stronger and more persistent, as there is minimal interference from land masses in contrast to the Northern Hemisphere. Polewards of the westerlies, high-latitude areas are generally regarded as being in the regime of the polar easterlies, but in the Arctic, where the polar high-pressure area is only a winter phenomenon, these winds tend to be seasonal.

Important zones of surface convergence and divergence exist in the general circulation. The most important regions of divergence on the globe are the two subtropical high-pressure zones. There are areas of relatively calm winds, sometimes given the name «horse latitudes». Three major zones of net convergence encircle the globe. Two of these are the polar front zones of each hemisphere, between the westerlies and polar easterlies. The third lies in the equatorial trough between the inblowing trade winds and is termed the inter-tropical convergence zone.

The upper air general circulation is characterized all year by upper westerlies from about 15° of latitude almost to the poles. In low latitudes there is a much narrower belt of upper easterlies, whose extension again depends on the seasonal migration of the equatorial trough. With the July monsoon in India these winds

reach as far as about 20°N, and are accompanied by a marked tropical jet stream, but at other times of the year the upper easterlies are limited.

Упражнение 2. (Парная работа). Выберите наиболее подходящий, на ваш взгляд, заголовок для текста 3С:

1. Trade-Wind Systems.
2. Zones of Convergence and Divergence.
3. Climate of the Earth.
4. Planetary Wind Belts.
5. Seasons and Climate.

Упражнение 3. (Парная работа). В правой колонке найдите русские эквиваленты следующих слов и словосочетаний:

1. wind belt	1. зависеть от чего-л.
2. trade-winds	2. опоясывать
3. high pressure zone	3. пояс ветров
4. to have a bearing on	4. постоянство ветров
5. constancy of winds	5. зона высокого давления
6. equatorial troigh	6. западный перенос в средних широтах
7. mid-latitude westerlies	7. экваториальная депрессия (ложбина)
8. in contrast to	8. крупномасштабная конвергенция
9. net convergence	9. иметь отношение к чему-л.
10. encircle	10. в отличие от
11. depend on	11. струйное течение
12. jet stream	12. пассаты

Упражнение 4. Выпишите из текста 3С все слова, которые имеют отношение к понятию «ветер». Если вы не знаете значения какого-либо слова, определите его по метеорологическому словарю.

Упражнение 5. (Парная работа). Используя две колонки слов, составьте как можно большее количество словосочетаний:

predominantly	
wind	
subtropical	
sometimes	belt
major	zone
equatorial	region
important	system
polar	
pressure	

Упражнение 6. (Парная работа). Из приводимых ниже предложений выберите те, которые отражают основные идеи первого и второго абзацев текста 3С.

Первый абзац

1. All the major wind systems around the globe are predominantly zonal or latitudinal in character.
2. In the Arctic the polar easterlies tend to be seasonal.
3. The westerlies of the Southern Hemisphere are the stronger and more persistant than those of the Nothern Hemisphere.
4. The permanency of the subtropical high-pressure zones has an important bearing on the constancy of trade winds.

Второй абзац

1. Three major zones of net convergence encircle the globe.
2. Subtropical high-pressure zones are areas of relatively calm winds.
3. Important zones of surface exist in the general circulation.
4. The third zone lies in the equatorial trough between the inflowing trade winds.

Упражнение 7. (Парная работа). В приведенном отрывке текста имеются три смысловые ошибки. Не заглядывая в текст 3С, попытайтесь найти их; приведите правильные варианты.

Important zones of surface convergence and divergence exist in the general circulation. The less important regions of divergence on the globe are the two subtropical high-pressure zones. These are areas of severe winds, sometimes given the name «horse latitudes». Three major zones of net convergence encircle the globe. Two of these are the inter-tropical convergence zones of each hemisphere, between the westerlies and polar easterlies.

Упражнение 8. Прочитайте текст и определите, где заканчивается одно и начинается другое предложение.

Equatorial Low-pressure Belt

This belt of moderately low pressure is well-defined in the annual and January data but becomes irregular in July connecting with centers of low pressure over the heated interiors of south-western North America and south-western Asia the equatorial belt is a region of warm and rising air and of light and variable winds with frequent calms humidity is high rainfall is heavy and thunderstorms are more numerous than in any other part of the world in general the climate is enervating and oppressive.

Упражнение 9. (Парная работа). В этом отрывке текста пропущено два предложения. Прочитайте его и определите, в каком месте должны находиться пропущенные предложения.

The Prevailing Westerlies

Air moving out of the poleward border of the subtropical highs toward the Polar Circle belts of low pressure is deflected to the east

in each hemisphere, and forms what are known as the prevailing westerly winds. This belt of prevailing westerlies lies roughly between latitudes 35° and 60° in each hemisphere, and includes chiefly the intermediate climates of the globe. The frequent changes of weather in these middle altitudes are associated with frequent disturbances in the smooth flow of the westerlies.

1. These winds come from directions between west and south-west in northern latitudes and between west and north-west in southern latitudes.

2. The climate of the belt is characterized by great inconstancy of weather and by considerable storminess of moderate intensity.

Упражнение 10. (Парная работа). Прочитайте текст 3С, подлинное название которого Planetary Wind Belts, еще раз и переведите те его предложения, которые показались вам непонятными. Обсудите перевод этих предложений между собой.

Упражнение 11. Используя как можно большее количество выученных слов, напишите по-английски короткие сообщения на одну из следующих тем:

— основные ветровые системы на земном шаре;
— системы пассатов;
— основные зоны крупномасштабной конвергенции.

Упражнение 12. (Парная работа). Заполните пропуски подходящими по смыслу словами.

Trade Wind Belts

Blowing out of the subtropical highs . . . . the equatorial low, there are steady . . . . winds known as trade winds. These . . . . are from the north-east in the . . . Hemisphere and from the south-east in . . . Southern Hemisphere. The north-east trades are . . . . and steadiest between the Tropic of . . . . and 5°N latitude on the . . . . and south sides of the oceanic . . . . of high pressure.

1. strongest 2. east 3. moderate 4. winds 5. the 6. centres 7. Cancer 8. Northern 9. toward

Упражнение 13. Заполните там, где это возможно, соответствующие графы в следующей таблице. При необходимости проверьте себя по словарю.

1	2	3	4
persist	persistence	persistent permanent	persistently
		constant	predominantly
	extension		generally

Упражнение 14. Заполните следующую таблицу прилагательными и наречиями, встретившимися в тексте 3С, по следующему образцу:

Положительная степень	Сравнительная степень	Превосходная степень
important	more important	(the) most important

Упражнение 15. Выберите правильный вариант перевода выделенных форм и словосочетаний.

1. **surface wind pattern**	схема приземных ветров приземная схема ветров
2. **surface wind belt**	приземный пояс ветров пояс приземных ветров
3. **low-pressure trough**	ложбина низкого давления низкая ложбина давления
4. Where two airstreams meet, the warmer **one** will be lighter.	один поток
5. **One** of these belts is the tradewind belt.	один не переводится
6. In representing the temperature distribution **one** encounters the difficulty that ...	один не переводится
7. The permanency of the subtropical high-pressure zones **has** an important bearing on the constancy of these winds.	произошло имеет имело
8. Attention **has** already **been called** to the fact that ...	было привлечено имеет должно быть привлечено
9. Studies of the tropopause **have shown** that ...	показали показывают имеют

LESSON 10

Упражнение 1. (Парная работа). Переведите заглавие к тексту 3D и подумайте, о чем может идти речь в тексте с таким заглавием.

Теперь напишите 10—15 слов, которые, с вашей точки зрения, должны встретиться в тексте с таким заглавием. После того, как вы прочитаете текст, проверьте правильность своих предположений. Контрольное время — 5 минут.

Text 3D. Influence of the Earth's Surface

The differences between the Northern and Southern Hemispheres in the wind belts largely arise from the differences in land area. The Southern Hemisphere circulation is more uniform, more vigorous, and less affected by seasonal contrasts than the Northern Hemisphere. Marked summer heating of Asia and Africa north of the equator sets up monsoonal effects which occur only to a minor degree in the Southern Hemisphere, where the conservative heating characteristics of the oceans impose a tempering influence. On the other hand, the great coldness of Antarctica ensures that a strong thermal gradient between the south polar regions and the equator drives a vigorous circulation all year.

The world's major mountain chains also have a marked influence on the general circulation. At lower levels, north-south orientated topographic barriers obstruct zonal flow, as in the case of the Rockies, which effectively prevent the penetration of west coast maritime air into the continental interior. East-west aligned mountains inhibit meridional flow: the Himalayas, for instance, form an extremely effective barrier to the northward movement of the summer monsoon. High mountains also interfere with the upper air flow. The best studied example is again the Rockies which cause the upper westerlies to contract (high pressure) on their western side but expand vertically (low pressure) on their lee side. The latter then becomes one of the favoured locations of a Rossby wave trough, which encourages high-level cold air to more southwards over the continental interior of North America in summer, helping to counteract the development of any large monsoonal effect in the continent.

Упражнение 2. (Парная работа). Найдите соответствия следующих слов и словосочетаний в русском языке:

uniform; seasonal contrast; conservative; characteristics; thermal gradient; polar regions; topographic barriers; continental interior; meridional; to expand.

Упражнение 3. Определите эквиваленты следующих связующих элементов в русском языке:

also	так как	on the other hand	например
	так что		поскольку
	также		с другой стороны
but	но	for instance	например
	прежде чем		так как
	чтобы		несмотря на
then	чем	between	после того, как
	затем		посредством
	они		между

Упражнение 4. Найдите в тексте 3D эквиваленты следующих словосочетаний:

циркуляция южного полушария; к северу от экватора; летнее нагревание; влияние муссонов; в меньшей степени; термический (температурный) градиент; горные цепи; заметное влияние; зональный поток; препятствовать проникновению; морской воздух; волны Россби; противодействовать развитию.

Упражнение 5. Укажите английские эквиваленты приведенных глаголов:

влиять	prevent	становиться	penetrate
	protect		become
	affect		come
	supply		encourage
препятствовать	pretend	возникать (из)	ensure
	obstruct		encounter
	apply		inhibit
	support		arise from
заставлять	impose	оказывать	interfere
	interfere	(влияние)	impose
	cause		form
	expand		mark

Упражнение 6. Выпишите из текста 3D все слова, относящиеся к понятиям «flow», «air», «circulation».

Упражнение 7. Из правой колонки подберите антонимы к следующим словам:

1. difference	1. high
2. heating	2. encourage
3. strong	3. stand
4. low	4. plain
5. contract	5. cooling
6. prevent	6. expand
7. mountain	7. similarity
8. uniform	8. horizontally
9. vertically	9. weak
10. move	10. irregular

Упражнение 8. (Парная работа). Определите значения выделенных слов по контексту.

1. The difference between the Northern and Southern Hemisphere in the wind belts largely **arises from** the differences in land area.
2. Marked summer heating of Asia and Africa **sets up** monsoonal effects.
3. A strong thermal gradient between the south polar regions and the equator **drives** a vigorous circulation all year.
4. The world's **major** mountain chains also have **a** marked influence on the general circulation.
5. The Rockies effectively **prevent** the penetration of west **maritime** air into the continental interior.

Упражнение 9. Прочитайте текст 3D еще раз и выпишите из него 10—15 ключевых слов.

Упражнение 10. В приводимой ниже таблице поставьте плюс в соответствующей колонке, предварительно определив, правильными или неправильными являются следующие утверждения:

Right	Wrong	
		1. The world's major mountain chains have a marked effect on the pollution of the atmosphere. 2. At lower levels north-south oriented topographic barriers facilitate zonal flow. 3. Small plains also interfere with the upper air flow. 4. Marked summer heating of Asia and Africa north of the equator sets up trade-wind effects. 5. The Himalayas form an extremely effective barrier to the southward movement of the summer monsoon.

Упражнение 11. (Парная работа). Найдите в тексте 3D доказательства справедливости следующих утверждений:

1. The Southern Hemisphere circulation is more uniform and more vigorous than the circulation in the Northern Hemisphere.
2. The world's major mountain chains have a marked influence on the general circulation.

Упражнение 12. Напишите, не более чем в трех предложениях, резюме текста 3D.

Упражнение 13. (Парная работа). Заполните пропуски приводимыми ниже словами.

Mountains as Barriers

Not only do mountains have characteristic climates due to . . . . elevation, but mountain ranges influence the climates of great . . . . on either side of them. Mountains modify the air . . . . passes over them and they deflect the air currents: . . . . often results in marked differences of climate in the . . . . which mountains separate. Mountain systems serve as divides between . . . . regions in somewhat the same way as they divide . . . . drainage areas.

regions; their; which; areas; the; climatic; this.

Упражнение 14. Переведите следующий текст письменно. Контрольное время — 10 минут.

Precipitation in Highland Regions

Broad plateaus usually have light rainfall either because most of the air's moisture is lost before it has risen to the level of the plateau, or because surrounding mountains tend to produce subsidence of air over the plateau. Because of the great temperature

contrasts which develop between the heated air near the surface of the plateau and free air not affected by surface heating, however, plateaus are subject to intense thunderstorms and hailstorms. Nevertheless there is generally little cloudiness and much sunshine in plateau areas.

Упражнение 15. Среди приведенных ниже форм укажите формы инфинитива:

heating; is cooling; to have been formed; having measured; encourages; affected; to set up; to be moving; to have travelled; expanding; to be done; to evaporate.

Упражнение 16. Выберите из данных предложений те, перевод которых следует начинать со слова «чтобы».

1. A thermometer enables meteorologists to measure temperature.
2. To know the highest and lowest temperature of a day is very important in forecasting weather.
3. To form a water drop in the atmosphere there must be already existing a nucleus upon which the drop can form.
4. To be able to forecast accurately a lot of detailed and precise information is needed.
5. In order to combine all the information about the wind on one chart meteorologists often draw wind-roses.
6. To measure the relative humidity of the air we compare the temperature recorded on a dry bulb thermometer with that recorded on a wet bulb thermometer.

Упражнение 17. Выберите правильный вариант перевода выделенных форм и словосочетаний.

1. Relative humidity and air temperature are among the most important factors **to be considered** in making local forecasts.

a. которые необходимо рассматривать, b. чтобы рассматривать, c. рассмотреть

2. The word «nimbus» is usually combined with one of the other cloud names **to describe** the type of rain-cloud.

a. для описания, b. описывая, c. которое описывает

3. At sea level air pressure is strong enough **to hold up** a column of mercury some 76 cm high.

a. удерживая, b. чтобы удерживать, c. должно удерживать

4. **In order to study** the records clearly two bar charts were made.

a. в порядке изучения, b. для того, чтобы изучить, c. если необходимо изучить

5. **To measure** the relative humidity of the air we compare the temperature records on a dry bulb thermometer with that recorded on a wet bulb thermometer.

a. измерять, b. измерение, c. чтобы измерить

6. Wind tends **to prevent** the formation of dew.

a. чтобы препятствовать, b. препятствовать, c. который препятствует

7. In temperate latitudes the tendency of the wind **to back** into southerly direction is very frequently a sign of an approaching cold front.

a. поворачивает, b. который поворачивает, c. поворачивать

8. A device **to determine** the direction of the wind is called a wind vane.

a. для определения, b. определять, c. должен определять

Упражнение 18. Прочитайте по-английски:

$$14 - 9 = 5; \quad 9 \times 2 = 18; \quad 10 : 5 = 2; \quad x^3 + y^3;$$

$$x = 0{,}46\,\frac{a^2 - b^2}{3a - 3b}; \quad x_2 = ab; \quad 4.046 + 0.022 = 4.068; \quad 64; \quad x^4 + y^{-3} = b.$$

Упражнение 19. Пользуясь географической картой и приложением 3, расскажите о географическом положении Великобритании, Новой Зеландии, Японии и о. Шпицберген.

Упражнение 20. Просмотрите еще раз тексты 3A, 3C, 3D; определите в каждом из них ключевые предложения и составьте резюме к блоку 3 «Circulation Patterns».

Тесты к блоку 3

ТЛ

I. В каждом ряду укажите цифрой слово, «выпадающее» по своему значению из данной тематической группы.

a. pressure^{1}, isobars^{2}, congratulation^{3}, gradient^{4};

b. force^{1}, direction^{2}, defeat^{3}, phenomenon^{4};

c. memorial^{1}, cyclonic^{2}, anticyclonic^{3}, centripetal^{4};

d. tropics^{1}, equator^{2}, poles^{3}, sensibility^{4};

e. trade-winds^{1}, monsoons^{2}, westerlies^{3}, hardships^{4};

f. to heat^{1}, to decide^{2}, to contract^{3}, to expand^{4}.

II. Закончите следующие предложения, выбрав соответствующий вариант предлагаемых слов.

a. Approximately horizontal movements of the air caused by variations in pressure are known as . . . . .

b. Difference in pressure per unit distance is called . . . . .

c. Deflection of moving air to the right in the Northern Hemisphere and to the left in the Southern is caused by the deflecting force of the Earth, known as . . . . .

d. Motion around a low-pressure area, anticlockwise in the Northern Hemisphere, is termed . . . .

e. The belt which covers nearly half the surface of the globe between latitudes 30 °N and S is known as . . . . .

1. Coriolis force; 2. cyclonic; 3. wind; 4. trade-wind belt; 5. pressure gradient;

III. Укажите буквой английские эквиваленты приведенных слов:

1. движение	a. gradient b. motion c. surface	7. however	a. так как b. однако c. поэтому
2. сила	a. pressure b. rotation c. force	8. perhaps	a. вероятно b. следовательно c. соответственно
3. отклонять	a. deflect b. depict c. affect	9. but	a. но b. затем c. так как
4. взаимообмен	a. penetration b. flow c. interchange	10. towards	a. в направлении к b. по отношению к c. в связи с
5. пассаты	a. monsoons b. westerlies c. trade-winds	11. sometimes	a. иногда b. всегда c. никогда
6. происходить	a. operate b. take place c. account for	12. same	a. несколько b. этот же самый c. некоторый

I. Обозначьте принадлежность приведенных форм к соответствующим частям речи:

a. причастие.

b. инфинитив.

c. существительное.

1. to have been done. 2. to be reaching. 3. having passed. 4. flowing. 5. isobar. 6. acting. 7. known. 8. pressure. 9. weaken. 10. to set up.

II. Выберите правильный вариант перевода выделенных форм и сочетаний.

Часть 1.

1. Alcohol is used **to record** low temperatures because it does not freeze.

a. для регистрации, b. регистрируя, c. должен регистрировать

2. **In order to produce** a significant amount of precipitation an updraft must provide a continuous supply of moisture to the cloud.

a. в порядке создания, b. чтобы создать, c. создавая

3. As well as recording the type of cloud we also need **to know** how much of the sky is covered by cloud.

a. чтобы знать, b. знать, c. знали

4. The air remains cold and the sun's rays have much energy left **to be absorbed** by objects at the surface.

a. которая будет поглощаться, b. поглощаемая, c. которая была поглощена

5. Air **having** a vapour pressure of 0.360 m has a dew point 50 °F.

a. имеющий, b. имевший, c. который имел

6. Regions near the ocean may have high or low precipitation, **depending** almost entirely upon whether the winds are off the land or of the ocean.

a. в зависимости от ... , b. зависящие от, c. зависят

7. It is often warm in winter days in the mountain sunshine, but cold in the shade, **the difference between sunshine and shade being much greater than in lowlands**.

a. поскольку разница между солнечной стороной и теневой ...,

b. причем разница между солнечной стороной и теневой ...,

c. если разница между солнечной стороной и теневой... .

8. **There have been** many more environmental problems caused by humans in the last 200 years than in the whole of previous history.

a. было, b. должно было быть, c. там было

9. The Earth **has** many component parts, such as continents, oceans, atmosphere, rocks.

a. имела, b. имелось, c. имеется

10. Attention **has already been called** to the fact that ...

a. обращалось, b. имеет обращение, c. должно быть обращено

Часть 2.

The weather of the period **was affected** by three different airstreams. On April 13th **there was** a north-westerly airstream over Britain. This was replaced on April 14th by a westerly airstream **bringing** different weather. It remained until April 16th when the airstream changed to a north-westerly and northerly **one**. The weather **brought** by each of these three airstreams was different. Between each airstream a front **passed**, on these occasions it became cloudy or completely overcast and there was snow, sleet or rain.

1. was affected

a. находилась под влиянием, b. влияла, c. оказывает влияние

2. there was

a. там существовала, b. существовало, c. имеется

3. bringing

a. принеся, b. принесшим, c. приносящим

4. one

a. один, b. воздушный поток

5. brought
a. принесла, b. принесенная, c. приносящая
6. passed
a. прошедший, b. проходил, c. проходя

TT

I. Заполните пропуски подходящими по смыслу словами. (В своей работе укажите только последовательность цифр, обозначающих соответствующие слова.)

The temperature and moisture of the . . . . air at any place largely depend . . . . the previous history of the air . . . . upon the influences to which it . . . . been subjected as it has moved . . . . warm or cold, land or water, surfaces. Hence the wind that is blowing at . . . . given time and place, and . . . . prevailing winds largely determine the climate.

1 2 3 4 5 6 7 8 9

has; moving; and; at; surfaces; a; upon; over; the.

II. Письменно переведите следующий текст. Контрольное время — 15 минут.

Impulsion to winds is created by pressure gradients, but they are also affected by friction, the Earth's rotation, and centripetal force. Under certain conditions, upper and surface wind systems are linked by convergence and divergence. In the general global circulation both vertical and horizontal interchange of air masses takes place. The planetary wind systems are dominated by trade winds and westerlies at the surface, and by westerlies at high level. Complications are imposed by differences in amounts of land and sea in the Northern and Southern Hemispheres, and by large-scale topographic barriers.

Блок 4. WEATHER SYSTEMS

LESSON 11

Упражнение 1. (Парная работа). Подумайте, о чем может идти речь в этом блоке текстов. Приведите 10—15 слов, которые, с вашей точки зрения, должны встретиться в нем. Попробуйте также определить, из каких разделов будет состоять данный блок. Быстро просмотрите тексты, проверьте правильность своих предположений.

Упражнение 2. Не более чем за 5 минут прочитайте приводимые ниже предисловие и текст 4A, а затем постарайтесь максимально полно воспроизвести их содержание на русском языке.

Although all areas of the world experience meso-scale weather systems occasionally, mid-latitude regions lying in the westerlies belt, including the British Isles, can be said to be characterized by them. Here, description of the weather is formulated in terms of air masses, fronts, depressions and anticyclones.

Text 4A. Air Masses

Large bodies of air whose physical properties, particularly those of temperature and humidity, are more or less uniform over considerable areas, are referred to as air masses. Since the lower layers of the atmosphere acquire these properties via the Earth's surface it is possible to recognize air mass source region in which air masses pick up their features. These source regions are areas where the Earth's surface is fairly uniform, such as oceas, deserts, or large ice- and snowcovered areas. In addition, they are also regions of relative calm in the general circulation where homogeneous air mass characteristics can develop. Although air masses can become considerably modified as they travel, it is usual to describe the main types in terms of their region of origin.

There are several principal air masses which affect the British Isles. The most important of them are Polar and Tropical air masses. The Polar Front represents the fluctuating boundary between these two types. The Polar air masses actually originate in cool-temperate regions rather than the polar areas themselves. Two additional groups are sometimes encountered, Arctic and Equatorial air masses which occasionally migrate well beyond their source regions. Each of these major groups may further be described on the basis of their humidity characteristics as either maritime or continental. In the Northern Hemisphere, Polar continental air masses have their source regions over central Canada and Siberia, and air masses emanating from here are extremely cold and very dry, bringing some of the coldest weather experienced by the British Isles. Polar maritime air masses originate over the northern ocean areas, and are essentially cool and moist, and unstable in their lower layers. They are frequent visitors to the British Isles, bringing dull rainy conditions. The subtropical high-pressure centres over oceans act as source regions for Tropical maritime air masses; these are typically warm, moist and unstable, especially in summer. Tropical continental air masses originate over warm desert areas, such as Sahara and, not unexpectedly, they are hot, dry and unstable, although too deficient in moisture to cause cloud development.

Air masses move away from source areas in accordance with the pattern of the general circulation, and their basic characteristics may change in two ways: either by internal modification, for example by subsidence, bringing about adiabatic changes, or by the external influence of the surfaces over which they are passing. The end-result is to produce secondary air masses. One typical example is Polar continental air originating from the high-latitude interior of North America. This frequently travels eastwards across the Atlantic towards the British Isles, increasing in temperature and moisture content in its lower layers, and being transformed into a Polar maritime air mass.

Упражнение 3. Определите русские соответствия следующих слов и словосочетаний, встретившихся вам в тексте 4А:

mass; front; depression; anticyclone; temperature; ocean; homogeneous; Polar front; Equatorial air mass; maritime air mass; adiabatic changes.

Упражнение 4. (Парная работа). Найдите в правой колонке английские эквиваленты следующих словосочетаний:

1. физические свойства	1. homogeneous mass
2. область формирования	2. dull weather
3. отличительные черты	3. desert areas
4. пасмурная погода	4. unstable air mass
5. пустынные районы	5. source region
6. развитие облаков	6. cloud development
7. однородная масса	7. physical properties
8. неустойчивые массы воздуха	8. distinctive features

Упражнение 5. Выберите русские эквиваленты выделенных английских слов.

1. **temperate** regions	температурные умеренные теплые
2. **to emanate** from	происходить направляться перемещаться
3. **to acquire** properties	приобретать предоставлять завершать
4. **internal** modifications	внешние внутренние важные
5. **external** influence	внутреннее внешнее незначительное

Упражнение 6. В данных предложениях заполните пропуски подходящими по смыслу связующими элементами.

1. Air masses move away from source areas . . . . the pattern of the general circulation.

2. Tropical continental air masses originate over warm desert areas, ... the Sahara.

3. . . . . air masses can become considerably modified as they travel, it is usual to describe the main types in terms of their region of origin.

4. The source regions are areas where the Earth's surface is fairly uniform, such as oceans, deserts or large ice- and snow-covered areas. . . . . they are also regions of relative calm in the general circulation.

5. . . . . the lower layers of the atmosphere acquire these properties via the Earth's surface, it is possible to recognize air mass source regions in which air masses pick up their distinctive features.

since — так как; although — хотя; such as — такие, как; in addition — кроме того; in accordance with — в соответствии с.

Упражнение 7. Найдите по словарю значения приведенных ниже наречий; определите, от каких слов они образованы:

particularly; eventually; occasionally; typically; especially; unexpectedly.

Упражнение 8. (Парная работа). На основе данных, которые содержатся во втором абзаце текста 4А, составьте схему, иллюстрирующую классификацию воздушных масс, определяющих погоду в Великобритании.

Упражнение 9. (Парная работа). Найдите в тексте 4А ответы на следующие вопросы:

1. Чем характеризуются районы формирования воздушных масс?
2. Какие воздушные массы оказывают определяющее влияние на погоду Британских островов?
3. Где формируются полярные континентальные воздушные массы?
4. Какие характеристики лежат в основе выделения морских и континентальных воздушных масс?
5. Какие воздушные массы приносят с собой теплую, влажную и неустойчивую погоду на Британские острова?
6. Каким образом могут видоизменяться основные характеристики воздушных масс?

Упражнение 10. Закончите следующие предложения, исходя из содержания текста 4А.

1. In the Northern Hemisphere Polar continental air masses have their source regions ...
2. Air mass source region is a region in which ...
3. Air masses are large bodies of air whose...
4. Secondary air masses is a result of...
5. The principal air masses which affect the British Isles are...

Упражнение 11. (Парная работа по тексту 4А). Задание 1. Озаглавьте все абзацы текста.

Задание 2. Если бы перед вами стояла задача выбрать **одно** предложение в качестве ключевого ко всему тексту, какое предложение вы бы выбрали?

Задание 3. Найдите ключевые предложения в каждом абзаце текста.

Задание 4. Какие положения из первого абзаца находят развитие во втором и третьем абзацах текста?

Задание 5. Найдите в тексте 4А пример, который иллюстрирует какую-либо идею. Какие слова используются автором для описания такого рода иллюстраций?

Упражнение 12. Задание 1. Просмотрите приводимый ниже текст и передайте его содержание по-русски. Контрольное время — 5 минут.

The weather is important to many people in all sorts of ways because it affects their jobs and lives. It is essential that we can tell in advance or predict what the weather is going to be. This is known as forecasting. To be able to forecast accurately a lot of detailed and precise information is needed. This is collected by the meteorological office through observations from satellites, airoplanes and ships, weather balloons and from a network of weather recording stations. Hourly around Britain, scientists record the weather details. The information is sent to the Central Meteorological Office at Bracknell in Berkshire. They also receive similar information from weather stations throughout the world.

With the help of a computer and past records the meteorological office is able to produce a chart and forecast the weather. This forecast is continually updated as more information is sent in and is what is seen or heard on television or radio and in the newspapers.

People sometimes say that the weather reports are misleading. This is not true. Most forecasts are right, nine times out of ten.

Задание 2. (Парная работа). Заполните пропуски подходящими по смыслу словами и словосочетаниями.

The Central Meteorological Office at . . . ., gathers in information from all over the world. Among the sources of this . . . . are . . . orbiting the Earth, ..., ships and planes and above all the . . . . With the help of the . . . the Meteorological Office . . . . the results, compares what is happening to what has happened in the past and prepares . . . . . There are many customers for these. . . . and radio, . . . and the British Telecom recorded weather service all give the details. People with special needs can pay for . . . . . .

data; computer; forecasts; satellites; Bracknell; weather balloons; analyses; television; weather recording stations; newspapers; specialist forecasts.

Упражнение 13. (Парная работа). Задание 1. Прочитайте прогноз погоды и передайте его содержание на русском языке. Контрольное время — 3 минуты.

Weather: General Outlook

Forecast for 6 am to midnight today. General situation. A ridge of high pressure over England will be displaced southeastwards as an Atlantic frontal system moves across north-west Britain.

Many areas will have a dry and reasonably sunny day after a frosty start, perhaps with some patchy freezing fog in some rural areas at first. However, it will be milder but rather cloudy in Northern Ireland and Western Scotland and this cloud will soon thicken to give some rain. This cloud and rain will then extend slowly to the remainder of Scotland and to some northern parts of England by midnight, whilst western Wales and south-west England will become cloudier but should remain dry.

Outlook for Sunday and Monday. Becoming generally dry after a little rain in places on Sunday. Rather cold with early frost and fog in many areas.

Задание 2. Опишите по-английски погоду сегодняшнего дня, а затем составьте свой прогноз погоды на завтра. Запишите его. К следующему занятию подготовьте сообщение о том, подтвердился ли ваш прогноз. Если он оказался неверным, расскажите о различиях между своим прогнозом и реальной погодой.

При составлении прогнозов вам могут понадобиться следующие слова:

При описании погоды:

ясная, хорошая погода	bright, fair weather;
неустойчивая погода	changeable weather;
пасмурная погода	dull weather;
небольшой, слабый дождь	light rain;
сильный дождь	heavy rain.

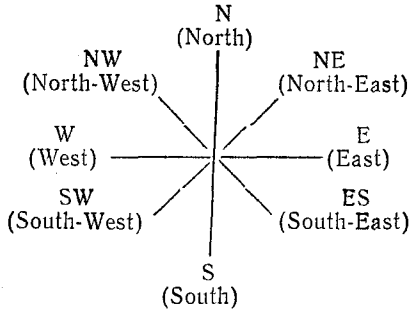
При описании температуры воздуха 0 °C (32 °F):

морозная	freezing
холодная	cold
прохладная	cool
умеренная	mild
теплая	warm
жаркая	hot

При описании силы ветра:

безветрие	calm
слабый	light
умеренный	moderate
свежий	fresh
сильный	strong
ураганный	gale-force
неустойчивый (по направлению)	variable

При описании направления ветра:



При описании некоторых погодных явлений:

дымка, слабый туман	mist;
густой туман	fog;
морось, изморось	drizzle;
ливень	shower;
гроза	thunderstorm.

При описании локальных погодных явлений:

небольшие участки, например, облаков, тумана	patches;
короткий период какого-либо явления погоды	spell;
о каком-либо явлении погоды в данном месте (ср. «местами ливневые дожди»)	scattered (eg. scattered showers).

Упражнение 14. Среди приведенных предложений выберите те, которые содержат инфинитивные конструкции и переведите их письменно.

1. The effect of water vapour in controlling and regulating temperatures can be shown vary convincingly.
2. The air itself is found to be quite cool in the shade.
3. The air having little water vapour absorbs only a slight amount of heat while the sun is shining.
4. It is not to be expected that any accurate forecast of coming weather conditions can be expected without a rather complete knowledge of the air mass properties.
5. To compare two common systems of scales in measuring temperature we note that the boiling point of water is arbitrarily put at 212° on the Farenheit scale and at 100° on the centigrade scale.
6. The air is found to be a complex affair.
7. Liquid and solid forms of water are also known to occur in the air.
8. The air always contains very great number of solid particles of various nature, but they are not considered to be essential ingredients of the air.

9. The time of maximum velocity is commonly in the early afternoon hours when thermal convection appears to have reached its maximum.

10. The minimum velocity has been observed to be reached in the early morning hours.

Упражнение 15. Выберите правильный перевод выделенных форм и словосочетаний.

1. In that condition the air **is said to be supersaturated.**

a. говорят, что воздух перенасыщен,

b. воздух перенасыщается,

c. было сказано, что воздух перенасыщен,

2. **To get the temperature** of the air a thermometer is set up in a shelter.

a. изменение температуры,

b. чтобы измерить температуру,

c. измерять температуру,

3. Radiation **appears to be** the only important form of heat transfer.

a. оказывается, b. появляется, c. считалось

4. The degree of turbulence **has been found** to depend on the speed of the wind.

a. должно быть обнаружено,

b. обнаруживается, что,

c. было обнаружено, что,

5. Silver iodide **was shown to be** effective in modifying natural supercold clouds.

a. показало,

b. было показано, что,

c. следует показать, что,

Упражнение 16. Выпишите из текста 4A и упражнения 13 все предложения, содержащие модальные глаголы и их эквиваленты, переведите их на русский язык.

Упражнение 17. Из приведенных ниже предложений выберите те, в которых подчеркнутые формы следует переводить с помощью слов «необходимо», «должно».

1. Snow **has to be melted** before it can be measured.

2. A rain-gauge **has to be kept** away from buildings and trees.

3. **In order to combine** all the information about the wind on one chart meteorologists often draw wind-roses.

4. The detailed weather forecasts **are said to be correct** nine times out of ten.

5. You **will have to keep** a weather diary up for a long time if it is to be really worth-while.

6. **It is to be noted** that the strongest horizontal temperature gradients are in middle latitudes.

7. In considering the wind, three characteristics **are to be observed**: the direction, the velocity, and the pressure that it exerts on a surface.

8. The degree of turbulence **has been found to depend** on the speed of the wind, the roughness of the surface, the vertical temperature lapse rate, and certain lesser factors.

9. **There is reason to believe** that...

10. It **is** helpful **to make** a list of the predominating types of modifying influences the air mass undergoes.

LESSON 12

Упражнение 1. (Парная работа). Ниже приводятся первые предложения начального и завершающего абзаца текста 4B. Этих двух предложений должно быть достаточно для того, чтобы вы смогли определить, о чем идет речь в данном тексте.

Where air masses of different characteristics are in juxtaposition, broad mixing zones occur which are called fronts.

Cold fronts over Britain tend to include both ana- and kata-types.

Упражнение 2. (Парная работа). Найдите в тексте 4B ответы на следующие вопросы (контрольное время — 5 минут).

a. Какие факторы обусловливают преобладающую в определенный момент погоду?

b. В чем состоит основное различие между активным и неактивным типом холодного фронта?

Text 4B

Where air masses of different characterisitcs are in juxtaposition, broad mixing zones occur which are called fronts. These are commonly represented on weather maps as single lines, but the associated weather may cover an area several hundred kilometres wide. Frontal zones also have considerable vertical extent, reaching right up to the tropopause. The colder (denser) of the two air masses forms a wedge underlying the warmer air mass.

The weather associated with moving fronts is very variable. Two factors largely determine the weather experienced: whether the front is warm or cold, and the degree of activity. Where a front passes in which cold air is replaced by warmer air, it is a warm front; a cold front passes when the cold air comes second. The activity on both types of front is mainly dependent on the vertical motion of air in the warm air mass. If the air here is unstable and rising rapidly, the resultant active front is called an ana-front by meteorologists. Kata-fronts are those characterized by the general sinking of warm air which supresses weather activity.

The ana-type of warm front is the most common in Britain. The rising motion in the warm air mass often proceeds at different rates at different levels, and this, together with varying relative humidity, produces a multilayered effect rather than one

solid mass of cloud. As the front approaches, normally at an average speed of about 50 km/hr, the typical cloud sequence will be: cumulus and stratocumulus in the cold air mass well ahead of the front, dying out as it approaches; isolated cirrus in the warm air above the front, gradually increasing and merging into cirrostratus; then a thickening and lowering of those clouds to altostratus, obscuring the sun and giving precipitation. Near the surface front nimbostratus predominates, giving persistent rather than heavy rain. Frontal fog may form in the cold air mass near the frontal zone as this moisture condenses. The precipitation behind the frontal zone usually comes from stratocumulus clouds but gradually dies out, being replaced by unsettled weather. The changes of temperature as the front passes may be of the order of 4 to 5 °C over a period of one or two hours. Pressure levels, which would have been falling steadily as the front approached, recover slowly.

On kata-warm fronts, the downward motion of the air in the warm air mass restricts the development of medium and high-level clouds. Changes in temperature, pressure and winds occur in similar fashion to those for an ana-front, although they are usually much smaller in amplitude.

Cold fronts over Britain tend to include both ana- and kata-types. In the active type the distribution of clouds and precipitation is very similar to an ana-warm front, but in reverse. The most important difference in that the frontal slope is two to three times greater, so the cloud belt passes more quickly. There is typically a rather abrupt change in the weather, from the heavy rain of nimbus clouds at the front itself to bright showery weather in the cold air mass. The inactive variety is dominated by thick stratus clouds. The front passes through almost unnoticed with only gradual changes in temperature, pressure, wind, and precipitation.

Упражнение 3. (Парная работа). Прочитайте текст 4В еще раз и подберите 2—3 варианта заглавия к нему. Выпишите 10—15 слов, которые наиболее полно отражают его содержание.

Упражнение 4. Проверьте, насколько хорошо вы помните слова, которые встретились вам в предыдущих текстах. Назовите эквиваленты следующих английских существительных в русском языке:

pressure;	humidity;	stratocumulus clouds;
wind;	fog;	cirrus clouds;
precipitation;	moisture;	cirrostratus clouds;
motion;	cumulus clouds;	altostratus clouds;
air mass;	stratus clouds;	nimbostratus clouds.

Упражнение 5. Расставьте приводимые ниже слова в алфавитном порядке в их изначальной форме и найдите значения этих слов по словарю:

juxtaposition; represented; extent; reaching; denser; wedge; experienced; passes; sinking; supresses; most common; proceeds; multilayered; approaches; merging; obscuring; unsettled; steadily; showery.

Упражнение 6. В правой колонке найдите эквиваленты следующих словосочетаний и предложений:

1. резкое изменение погоды
2. ветер меняет направление
3. происходит изменение давления
4. схожим образом
5. может сформироваться фронтальный туман
6. два фактора определяют погоду
7. проходит холодный фронт
8. холодный воздух замещается более теплым
9. опускание теплого воздуха
10. в обратном порядке

1. in similar fashion
2. two factors determine the weather
3. cold air is replaced by warmer air
4. the wind veers
5. a cold front passes
6. in reverse (order)
7. abrupt change in the weather
8. sinking of warm air
9. changes in pressure occur
10. frontal fog may form

Упражнение 7. Выпишите из текста 4В все глаголы, которые обозначают тот или иной способ перемещения в пространстве.

Упражнение 8. Заполните пропуски в предложениях соответствующим глаголом. В случае необходимости найдите значения незнакомых слов по словарю.

1. Changes in temperature, pressure and wind (1. approach, 2. achieve, 3. occur) in similar fashion.

2. Frontal fog (1. can, 2. may, 3. must) form in the cold air mass near the frontal zone.

3. The precipitation behind the frontal zone usually (1. comes from, 2. depend, 3. reach) stratocumulus clouds but gradually dies out.

4. Frontal zones (1. have, 2. represent, 3. replace) considerable vertical extent, reaching right up to the tropopause.

5. The wind usually (1. sinks, 2. veers, 3. determines) on the passage of the front.

Упражнение 9. (Парная работа). Заполните пропуски подходящими по смыслу связующими элементами.

A cold front . . . . the south-west marks the line along the ground . . . . which the cold air is overtaking, underruning and pushing up the lighter air and causing a narrow band of cloudiness and snowers. . . . . the south, between the two fronts, is a large sector . . . . . warm air. . . . . the development continues, the cold front approaches the warm front; finally the northern portions

. . . . the fronts unite and lift the warm air off the ground, forming what is called an occluded front.

as; of; of; at; on; on.

Упражнение 10. Переведите предложения на русский язык, обращая внимание на выделенные слова.

1. It is evident that changeableness of the **weather** is an important climatic factor in relation to health.

2. We must know that the average condition of the atmosphere is — how hot in summer, how cold in winter, **whether** the air is moist or dry, and innumerable other questions of this kind.

3. **Whether** light or heavy rains are more valuable depends on conditions.

4. Two factors determine the **weather** experienced: **whether** the front is warm or cold, and the degree of activity.

5. In the meeting and interaction of these warm and cold air masses we get the formation of cyclones and anticyclones, and frequent and sudden **weather** changes.

Упражнение 11. (Парная работа). Выберите один из абзацев текста 4В, придумайте 3—5 вопросов к нему. Попросите ответить на них другую пару студентов. Обменяйтесь вопросами.

Упражнение 12. Составьте краткий план пересказа текста 4В; используйте его основные положения для того, чтобы написать резюме текста.

Упражнение 13. Прочитайте и устно переведите текст.

Recording the features of weather needs accurate observation of each feature. This is done at weather recording stations. These stations contain a number of instruments such as:

— thermometer which measures temperature;

— hygrometer — a wet and dry bulb thermometer to measure humidity;

— rain gauge which measures precipitation;

— sunshine recorder to record hours of sunshine;

— barometer for measuring air pressure;

— anemometer to measure wind speed;

— wind vane to show the wind direction.

Other weather components are observed and recorded directly: types of clouds, amount of clouds, visibility and special weather events such as thunder, lightning, dew, fog, frost and mist.

Упражнение 14. (Парная работа). Заполните пропуски подходящими по смыслу словосочетаниями:

an alcohol thermometer; a gas thermometer; a maximum and minimum thermometer; a medical thermometer.

1. . . . . is a highly accurate thermometer which works on the principle that a small rise in temperature causes a comparatively large expansion in a volume of gas.

2. . . . . is a thermometer used to record the highest and lowest temperatures over a period of time.

3. . . . . is a narrow range thermometer containing a constriction so that body temperature can be read afterwards.

4. . . . . is a thermometer used principally for measuring temperatures below the freezing point of mercury.

Упражнение 15. Письменно переведите последний абзац текста 4B. Контрольное время — 10 минут.

Упражнение 16. (Парная работа). Прочитайте и устно переведите на русский язык следующий прогноз погоды:

Today's Forecast: (November 11), Rain, much of it heavy in Wales and the south-west will spread quickly east to reach most of the country by the afternoon. The east will start mostly cloudy with a few showers and one or two bright intervals, but the rain will reach here by early afternoon too. It will become very windy everywhere with gales or severe gales on the south and west coasts.

Outlook: The rain clearing all except the North-east on Thursday, followed by heavy showers, some with hail and thunder. A very stormy day on Friday. Gales are expected inland in central and southern Britain then with storm force winds on the south and west coasts.

Расскажите по-английски о погоде за прошедшие сутки; составьте ориентировочный прогноз на следующий день.

Упражнение 17. Из приводимых ниже предложений выберите те, в которых глаголы-сказуемые выражены формой сослагательного наклонения. Переведите эти предложения на русский язык:

1. Without a heat source, equilibrium would soon be reached and evaporation would cease.

2. In tropical regions there is little seasonal variation in the amount of heat received from the sun.

3. Attention has already been called to the fact that clouds and water vapour intercept both the incoming radiation by day and the earth radiation by night.

4. If the air be cooled to 50°, saturation is reached, since 0.360 inch is the saturation vapour pressure at 50 °F.

5. It is desirable that the thermometer shelter be placed ten feet above a roof or the ground.

Упражнение 18. Выберите правильный вариант перевода выделенных форм и словосочетаний.

1. If a small raindrop is carried by an upward air current into a cumulus cloud it **will freeze**.

a. замерзла бы, b. замерзает, c. замерзнет

2. If the ozone layer were thicker and absorb all of the ultraviolet, we **should** also **suffer.**

a. пострадали бы, b. пострадаем, c. можем пострадать

3. If the dew-point temperature **is below** 32 °F and the night cool, moisture may be condensed out in the form of hoar frost.

a. ниже, b. была бы ниже, c. могла бы быть ниже

4. If the air is quiet, the cooling of the lower air **produces** an inversion of temperature.

a. создавало бы, b. создает, c. могло бы создать

5. The shelter itself **should be** properly **exposed.**

a. был бы установлен,
b. должен быть установлен,
c. будет установлен,

6. **But for the turbulent diffusion,** the air near the ground would become saturated.

a. помимо турбулентной диффузии,
b. но не турбулентная диффузия,
c. если бы не турбулентная диффузия.

LESSON 13

Упражнение 1. (Парная работа). Данные слова вы встретите в следующем ниже тексте. Прежде чем прочитать его, ознакомьтесь с этими словами. Обсудите вместе с другими студентами предполагаемое содержание текста. Попробуйте озаглавить его. Изложите свои предположения о содержании текста письменно.

Frontal depression; wave distortion; warm sector; occlusion; secondary depressions; orographic depressions; hurricanes.

Теперь прочитайте текст и проверьте правильность своих предположений. Контрольное время — 7 минут.

Text 4C

The majority of fronts occur in association with areas of low pressure known as frontal depressions. These have a typical life cycle of 4 to 7 days. The initiation of these depressions depends on the upper air situation and related to convergence and divergence. The first sign of a developing depression at surface level comes with the formation of a wave distortion on the polar front. The apex of the wave becomes the centre of the low pressure area, and warm air becomes trapped in the warm sector between the cold air in front and behind. At this stage, with the depression moving eastwards in the westerlies, an observer on the ground would experience the warm front/cold front sequence of weather described earlier. In the majority of frontal depressions which reach the warm

sector stage the cold front travels faster than the warm, overtaking and wedging beneath it, first of all near the centre of the low and then progressively further outwards. This is the process of occlusion, in which the warm sector is raised aloft and the two cold air masses meet beneath it. A new front is nearly always formed here, since the two cold air masses, originally the same, have been modified in different ways. If the second cold air mass is warmer than the first then we have a warm occlusion; a cold occlusion occurs if the second mass is colder. Occlusions reaching the British Isles tend to be of the warm type in winter, and cold in summer.

Frontal depressions rarely occur in isolation, but in series known as depression families. This complex waving of the polar front can give spells of unsettled weather lasting a week or more. The sequence is eventually terminated when the polar front, having been pushed further and further south with each successive depression, is replaced by an extensive wedge of high pressure. Secondary depressions commonly occur within the circulation of the main depression. They may form at the point of occlusion, or as the result of renewed waving on the trailing cold front, in which case they may develop into new main depressions.

It needs to be stressed that not all depressions are frontal. Shallow thermal lows may develop at a wide variety of scales because of local overheating of the Earth's surface; lee or orographic depressions may form on the downwind side of mountains because of divergence of the airstream; tropical depressions, variously known as hurricanes, cyclones or thyphoons, are a feature of subtropical areas, originating where sea surface temperatures are greater than 27 °C. All depressions share in common the characteristic of rising air, which in most cases inevitably leads to cloud and precipitation.

Упражнение 2. Не более чем за 3 минуты найдите в тексте 4С ответы на следующие вопросы:

a. Какие причины обусловливают образование ураганов?

b. Что можно сказать о характере окклюзий, достигающих Британских островов?

c. Каковы причины образования вторичных депрессий?

Упражнение 3. (Парная работа). В прочитанном тексте 4С, вероятно, вам встретились незнакомые слова. Выпишите их, сравните с теми, которые выписал ваш сосед, и обсудите их предполагаемое значение. Проверьте правильность своих предположений по словарю. Постарайтесь теперь определить те слова, без которых вы все равно смогли бы понять содержание текста.

Упражнение 4. (Парная работа). Выберите из данных предложений те, которые наиболее полно отражают содержание текста 4С.

1. The majority of fronts occur in association with areas of low pressure known as frontal depressions.

2. In the majority of frontal depressions which reach the warm sector stage the cold front travels faster than the warm.

3. Secondary depressions may form at the point of occlusion.

4. Frontal depressions rarely occur in isolation, but in series known as depression families.

5. If the second cold air mass is warmer than the first then we have a warm occlusion.

6. Hurricanes originate where sea surface temperatures are greater than 27 °C.

7. In the process of occlusion the warm sector is raised aloft and two cold air masses meet beneath it.

Упражнение 5. (Парная работа). Опираясь на информацию, содержащуюся в тексте 4С, составьте классификацию депрессий.

Упражнение 6. Укажите, какие предложения текста 4С содержат новую для вас информацию.

Упражнение 7. Не заглядывая в текст 4С, заполните пропуски в следующих предложениях.

1. If the second cold air mass is warmer than the first then we have . . . . .

2. Frontal depressions have a typical life cycle of . . . . .

3. The first sign of a developing depression at surface level comes with the formation of . . . . .

4. Occlusions reaching the British Isles tend to be of the . . . . in winter, and . . . . in summer.

5. Frontal depressions rarely occur in insolation, but in series known as . . . . .

6. Tropical depressions, variously known as . . . . ., cyclones or typhoons, are a feature of subtropical areas, originating where sea surface temperatures are greater than 27 °C.

Упражнение 8. (Парная работа). Ниже приводятся утверждения, не соответствующие действительности. Прочитайте текст 4С еще раз и объясните, почему они неверны.

1. Frontal depressions always occur in insolation.

2. All depressions are frontal.

3. Secondary depressions seldom occur within the circulation of the main depression.

4. Tropical depressions are a feature of polar areas.

5. In the majority of frontal depressions which reach the warm sector stage the cold front travels slower than the warm.

Упражнение 9. (Парная работа). Составьте 5—6 предложений по теме текста 4С, которые содержали бы следующие словосочетания:

are known as, to depend on, in the majority of, is nearly always, tend to be, rarely occur, commonly occur, are a feature of.

Упражнение 10. Составьте краткий план пересказа текста 4С.

Упражнение 11. Заполните пропуски подходящими по смыслу словами:

A Maximum and Minimum Thermometer

This records the highest (maximum) and lowest (minimum) . . . . in any one day. It contains . . . . and alcohol. The mercury and alcohol . . . . as the temperature changes and push . . . . metal springs, called indexes, along the . . . . . The indexes stay at the highest . . . . they reach even after the liquids . . . . moved back. The highest and lowest temperatures can . . . . seen when the recording is . . . .; this should be done at the . . . . time each day. Readings are taken . . . . the bottom edge of the indexes. . . . . the temperature has been recorded a . . . . is used to reset the indexes.

when; points; have; move; temperature; at; be; tubes; two; mercury; magnet; same; taken.

Упражнение 12. Письменно переведите предлагаемый ниже текст. Контрольное время — 20 минут.

Cyclone and Weather Changes

As a cyclone moves across a given area, the following succession of weather changes occurs: first, there are high, thin clouds considerably ahead of the warm front, then increasing cloudiness and steady rain as the warm front approaches. With the passage of the front, there is a change in wind direction, an increase in temperature, and usually a cessation (прекращение) of the rain, but scattered clouds may be present in the warm sector, and sometimes scattered showers occur. The arrival of the cold front is marked by a rapid development of dark, heavy clouds, the occurrence of showers and thunderstorms, and a sudden shift in the wind direction from southerly to northerly attended by a sudden drop in temperature and a rise in pressure. The cold front is usually followed after a few hours by clear and cool or cold weather.

Упражнение 13. (Парная работа). Прочитайте и устно переведите данный прогноз погоды. Выпишите и запомните все незнакомые слова, которые в нем встретятся.

Weather forecast for 6 am to midnight today

General situation: A cold front will move SE across Britain. The southern half of England will have another mainly dry day with some warm sunshine in the East, although it will become more generally cloudy during the evening, perhaps with a little rain

by midnight. Wales and northern England will be cloudy, with outbreaks of rain arriving during the day — this being followed in the evening by cooler air with broken cloud and occasional showers. Remaining areas should become brighter and fresher.

London Readings

From 6pm Monday to 6am yesterday: Min. temp. 11 °C (52 °F). From 6am to 6 pm yesterday: Max. temp. 21 °C (70 °F). Total period: sunshine, 8.8hrs, rain, nil.

Lighting-up Times

Belfast — 8.29pm to 6.15am
Glasgow — 8.23pm to 6.0am
London — 8.01pm to 5.5am
Manchester — 8.12pm to 6.02am

Упражнение 14. (Парная работа). Составьте свой прогноз погоды на ближайшие 12 часов. Сравните свой прогноз с прогнозами, составленными другими студентами. На следующем занятии выясните, чей прогноз был точнее.

Упражнение 15. Выберите правильный вариант перевода выделенных слов:

As a well formed low continues its development and progress across the country, a significant change occurs, owing to the fact **that** the cold front at the rear of the warm sector travels **faster** than the warm front ahead of it. **Considering** the warm sector as a gigantic wave progressing from west to east, **it** might be said to act like a surf wave whose base travels faster than its top, instead of the usual case of a surf wave whose top travels faster than its base. This **results in** the cold front overtaking the warm front and the cold air from both sides uniting. When the two fronts are thus **combined** into one, it is called an occluded front. **As** the occluded front approaches the change in barometric pressure and the clouds are about the same as **those** preceding the warm front.

a. который; b. что

a. быстро; b. быстрее

a. рассматривая; b. рассмотрев

a. это; b не переводится

a. является результатом; b. приводит к

a. соединились; b. соединяются

a. так как; b. когда

a. изменения; b. облака

Упражнение 1. (Парная работа). Найдите в тексте 4D ответы на следующие вопросы. Контрольное время — 5 минут.

1. К какому типу принадлежит большинство антициклонов, проходящих над Великобританией?

2. Что является причиной высокого давления в антициклоне?

3. В чем состояли особенности погоды в Великобритании зимой 1962—63 гг.?

Text 4D. Anticyclones

In contrast to depressions, anticyclones usually cover a wider area, they tend to be more persistent, and they are slower moving. In the Northern Hemisphere they have a clockwise circulation of winds. The high pressure in an anticyclone is the result of cold dense air somewhere in the vertical column and, on the basis of where this cold air occurs, can be classified into warm and cold types. In cold anticyclones, the cold air is confined to the lower parts of the atmosphere, and is chilled by contact with the Earth's cold surface in winter. The great seasonal anticyclones which develop over Siberia and Canada are of this type. Warm anticyclones are characterized by relatively warm air, in the lower parts of the troposphere, and the excess of pressure arises from the coldness of air in the upper troposphere and lower stratosphere. The permanent subtropical anticyclones are of this type. Some of the summer anticyclones which affect Britain originate as ridges of warm air which encroach northwards when a low zonal index situation prevails.

The subsidence of air in all anticyclones imposes generally calm weather conditions, with stable air. However, although most anticyclones passing over Britain are of the warm type, the weather varies considerably with the air mass and time of year. Summer anticyclonic spells are usually fine, but in winter, when moist polar maritime air is present, continuous stratus cloud may persist, trapped beneath an inversion formed in the subsiding air above. Other, drier winter anticyclones give clear skies and low temperatures, leading to frosts. Some of these anticyclones may be little more than ridges of high pressure between passing depressions, but others may be much longer lasting, developing when the upper air flow breaks down into a cellular pattern. A blocking situation may be created in which the surface anticyclone blocks the passage of surface depressions, steering them well to the north or south. Such a situation developed over Britain in the long hot summer of 1976. Similarly, in the notable winter of 1962-63 a blocking anticyclone centred to the north of the British Iles persisted for

several weeks, bringing easterly winds and extremely low temperatures.

Упражнение 2. Вспомните значения следующих слов, встретившихся вам в тексте 4C.

Depression; pressure; anticyclone; air; area; surface; low; cloud; to lead; to develop.

Упражнение 3. Прочитайте следующие слова и найдите их соответствия в русском языке.

Contrast; result; vertical column; basis; classify; type; contact; season ;characterize; troposphere; stratosphere; permanent; subtropical; zonal index situation; conditions; inversion; blocking situation; to centre.

Упражнение 4. Выпишите приводимые ниже слова в их изначальной форме и определите, если это необходимо, их значение по словарю.

Wider; occurs; classified; confined; relatively; arises; prevails; passing; anticyclonic; spells; subsiding; leading; breaks; created; steering; developed.

Упражнение 5. Выпишите из текста 4D все слова, которые так или иначе связаны с понятием «антициклон».

Упражнение 6. В правой колонке найдите русские эквиваленты следующих словосочетаний:

1. blocking situation	1. ячеистая система
2. cold anticyclone	2. постоянный антициклон
3. warm anticyclone	3. ограничиваться чем-либо
4. permanent anticyclone	4. сезонные антициклоны
5. to be confined to	5. избыток давления
6. seasonal anticyclones	6. верхняя тропосфера
7. excess of pressure	7. оседание воздуха
8. upper troposphere	8. холодный антициклон
9. subsidence of air	9. гребень высокого давления
10. ridge of high pressure	10. обстановка блокирования
11. cellular pattern	11. теплый антициклон

Упражнение 7. Какое из приведенных в скобках слов надо использовать, чтобы данные предложения соответствовали реальным фактам.

1. In contrast to depressions (1. cyclones, 2. anticyclones, 3. lows) usually cover a wider area.

2. The great (1. seasonal, 2. permanent, 3. subtropical) anticyclones which develop over Siberia and Canada belong to cold anticyclones.

3. The (1. high, 2. low) pressure in an anticyclone is the result of cold dense air in the vertical column...

4. Some of summer anticyclones which affect Britain (1. bring, 2. lead, 3. originate) as ridges of warm air...

5. However (1. in contrast to, 2. although, 3. since) most anticyclones passing over Britain are of the warm type, the weather varies considerably with the air mass and time of year.

6. Summer anticyclonic spells are usually fine, but in winter (1. where, 2. when, 3. there) moist polar maritime air is present, continuous stratus cloud may persist.

7. A blocking situation (1. brought, 2. imposed, 3. developed) over Britain in the long hot summer of 1976.

Упражнение 8. Разместите приводимые ниже слова по следующим тематическим группам: 1. связующие элементы предложения; 2. термины; 3. общенаучная лексика.

In constrast to; depressions; to cover; persistent; hemisphere; circulation; to occur; cold anticyclones; to confine; troposphere; excess; subtropical anticyclones; to affect; to impose; polar maritime air; generally; however; between; low temperatures; cellular pattern; although.

Упражнение 9. (Парная работа с текстом 4D). Задание 1. Продумайте подзаголовки для первого и второго абзацев текста.

Задание 2. Если бы перед вами стояла задача выбрать одно предложение в качестве ключевого к тексту, какое предложение вы бы выбрали?

Задание 3. Найдите ключевые предложения в каждом абзаце текста.

Задание 4. Выберите из текста 10—15 ключевых слов.

Задание 5. Найдите в тексте по крайней мере один пример, который иллюстрирует какую-либо идею. Какие слова используются для описания такого рода иллюстраций?

Задание 6. Проведите классификацию следующих положений в соответствии со степенью их обобщения: самые общие → наименее общие.

1. The high pressure in an anticyclone is the result of cold dense air somewhere in the vertical column.

2. In cold anticyclones, the cold air is confined to the lower parts of the atmosphere, and is chilled by contact with the Earth's cold surface in winter.

3. In contrast to depressions, anticyclones usually cover a wider area, they tend to be more persistent, and they are slower moving.

1. Although most anticyclones passing over Britain are of the warm type, the weather varies considerably with the air mass and time of year.

2. The subsidence of air in all anticyclones imposes generally calm weather conditions, with stable air.

3. In the notable winter of 1962-63 a blocking anticyclone centred to the north of the British Isles persisted for several weeks, bringing extremely low temperatures.

Упражнение 10. Приведите или составьте предложения, в которых описывалось бы:

a. Отличие циклонов от антициклонов;
b. Характеристики теплых антициклонов;
c. Влияние антициклонов на изменение погоды.

Упражнение 11. Письменно переведите первую половину второго абзаца текста 4D (до слов Some of these anticyclones...). Контрольное время — 20 минут.

Упражнение 12. (Парная работа). Устно переведите приводимый ниже прогноз погоды на русский язык.

Weather forecast for 6 am to midnight today

General situation: A westerly airstream covers much of Britain. Scotland, Northern Ireland and Northern England will have a fresh and rather breezy day with spells of bright sunshine but also one or two showers. In the far North some of these may be heavy, possibly with thunder.

Wales, Central and Eastern England will start rather cloudy but the sun should soon break through to give quite a pleasant afternoon, with just the odd light shower here and there.

Упражнение 13. Выберите подходящий по смыслу связующий элемент.

1. (a. Though; b. Where; c. If) most anticyclones passing over Britain are of the warm type, the weather varies considerably with the air mass and time of year.
2. A blocking situation may be created in (a. how; b. which; c. that) the surface anticyclone blocks the passage of surface depression.
3. Some of the summer anticyclones (a. where; b. when; c. which) affect Britain originate as ridges of warm air (a. how; b. though; c. which) encroach northwards (a. where; b. when; c. which) a low zonal index situation prevails.
4. The high pressure in an anticyclone is the result of cold dense air somewhere in the vertical column and on the basis of (a. how; b. where; c. provided that) this cold air occurs, can be classified into warm and cold types.
5. The great seasonal anticyclones (a. which, b. what, c. where) develop over Siberia and Canada belong to cold ones.

Упражнение 14. Переведите следующие предложения на русский язык:

1. This experiment can not be carried out to-day.
2. They must be shown those new instruments.
3. The temperature must be kept constant during the experiment.
4. They had to change the procedure of the experiment.

5. They will have to verify the data obtained.
6. They are to study this phenomenon carefully.
7. It should be noted that the results are quite unexpected.

Тесты к блоку 4

ТЛ

I. Укажите буквой соответствующие английские эквиваленты следующих словосочетаний:

1. область формирования	5 a. frontal passage
2. развитие облаков	9 b. weather conditions
3. пасмурная погода	1 c. source region
4. распределение облаков	8 d. clockwise circulation
5. прохождение фронта	10 e. thermal low
6. серия циклонов	2 f. clouds development
7. подветренная депрессия	6 g. depression family
8. циркуляция по часовой стрелке	7 h. lee depression
9. погодные условия	3 i. dull weather
10. термическая депрессия	4 g. distribution of clouds

II. В правой колонке найдите и обозначьте буквой слова, обратные по значению соответствующим словам, расположенным в левой колонке:

1. a low	5 a. moist
2. wide	9 b. upward
3. fast	1 c. a high
4. cold	6 d. unstable
5. always	4 e. hot
6. stable	8 f. horizontal
7. dry	3 g. slow
8. vertical	2 h. narrow
9. downward	5 i. never
10. fall	10 g. rise

III. Заполните пропуски в предложениях, выбрав соответствующий вариант предлагаемых словосочетаний:

a. Regions in which air masses pick up their distincive features are known as frontal depression air mass source regions.

b. The majority of fronts occur in association with areas of low pressure known as frontal depressions.

c. Frontal depressions rarely occur in insolation, but in series known as depression family.

d. ... may form on the downwind side of mountains because of divergence of the airstream.

cold anticyclones

e. In . . . ., the cold air is confined to the lower parts of the atmosphere and is chilled by contact with the Earth's cold surface in winter.

1. Lee depressions. 2. Cold anticyclones. 3. Depression families. 4. Air mass source regions. 5. Frontal depressions.

ТГ

I. Обозначьте соответствующими буквами предложения, в которых подчеркнутые формы и сочетания являются:

a — модальным глаголом;

b — инфинитивной конструкцией;

c — формой сослагательного наклонения.

1. A weather satellite protographs **can** be often seen on TV.

2. Layers of clouds, which **may** cover the whole sky, are called stratus.

3. When the surface air temperature is higher than the dew point any existing fog and low clouds **are likely to dissipate.**

4. If the thunderstorms are scattered most people **would refer** to them as air mass thunderstorms.

5. In extreme cases cold fronts **have been observed to move** with speeds of 60 or more miles per hour.

6. We don't regard the diurnal variations along coasts **to be** solely **a function** of vertical convection.

7. It is desirable that the thermometer **be placed** 10 feet above the ground.

II. Выберите правильный вариант перевода подчеркнутых форм и сочетаний:

1. **It would be desirable** to use the information obtained as soon as possible.

a. было бы желательно, b. желательно, c. было желательно

2. Unfortunately we **are not able** to use as short a period as the past few thousand years to determine the climate of a region.

a. не должны, b. не имели возможности, c. не можем

3. The cooling of the air by such a large ice sheet **would reduce** the mean temperature of the globe.

a. уменьшает, b. должно уменьшать, c. уменьшило бы

4. The reason for the relatively cold winters **is to be found** in the fact that...

a. следует искать, b. находится, c. будет найдено

5. It **should not be forgotten** that...

a. не надо было бы забывать, b. не было забыто, c. не следует забывать

6. The properties of these elements **are known** to vary widely.

a. было известно, b. известно, c. не переводится

7. These areas are anticyclones and the circulation around them **is said** to be anticyclonic.

a. говорили, b. говорилось, c. известна как

8. These temperature changes **appear to be** in general accordance with accompanying changes in pressure distribution.

a. появляются, b. оказывается что..., c. являются

TT

I. Расставьте предложения в их логической последовательности. (В своей работе укажите только последовательность номеров предложений.)

1. Highs and lows often follow each other in regular succession, but the highs are more likely to become stationary or to spread slowly.

2. Between the depressions formed by the meeting of air masses, there are areas of higher pressure consisting of a single polar air mass, and the weather is therefore generally clear and cold.

3. Hence, their average velocity is less than that of the lows, and their average size is greater.

4. From the centre of such areas the air moves spirally outward, clockwise, in the Northern Hemisphere and counter-clockwise south of the equator.

5. These areas are anticyclones, or highs, and the circulation around them is said to be anticyclonic.

II. Ниже приводится текст и 2 вопроса по его содержанию. Выберите правильные варианты ответов на поставленные вопросы.

a. Какая погода ожидается в Великобритании 14 сентября?

1. преимущественно без осадков;
2. дождливая;
3. штормовые ветры.

b. В каком направлении, по данным прогноза, перемещается глубокий атлантический циклон?

1. на юго-восток;
2. на северо-восток;
3. на северо-запад.

Weather forecast for 6 am to midnight today

General situation: A ridge of high pressure will cross southern areas today but a deep Atlantic low moving NE towards the Faeroes will maintain the changeable pattern of weather.

England and Wales will have a mostly dry day with some sunshine, after a few early morning patches of mist and fog, but there may be a light shower or two in Eastern England around early afternoon. Western areas will become cloudier towards evening and rain will reach parts of Wales and North-west of England after dusk. Scotland and Northern Ireland will have sunny

intervals with some showers, especially in Northern Scotland, and as these die out, cloudy weather will bring rain to Northern Ireland and Western Scotland in the evening. It will be a little warmer.

III. Заполните пропуски подходящими по смыслу словами. (В своей работе укажите только последовательность цифр, обозначающих соответствующие слова.)

We know that the weather is changing almost constantly with the passage of cyclones (low pressure systems) and anticyclones (high pressure systems). These migrating systems move from west . . . . east with the prevailing westerly winds. . . . . are accompanied by wind shifts and . . . . some exceptions, large and rapid changes . . . . temperature and broad moving areas of . . . . . Migrating cyclones and anticyclones are the . . . . important means through which heat is . . . . between high and low latitudes. Cyclones . . . . usually a few hundred miles in . . . . . Anticyclones are generally larger and the . . . . axes are up to 2,000 miles.

1 are; 2 in; 3 they; 4 with; 5 diameter; 6 to; 7 largest; 8 exchanged; 9 most; 10 precipitation.

IV. Письменно переведите следующий текст. (Контрольное время — 15 минут.)

Air masses can be classified according to the temperature and humidity characteristics of their source region. Many of those affecting the British Isles have been modified during their passage. The mixing of air masses on the polar front creates warm and cold surface fronts which give rise to typical weather sequences. Most frontal systems are associated with depressions which are initiated by divergent flow in the upper air. Occlusions develop on many frontal systems. Anticyclones are characterized by cold dense air somewhere in their vertical structure, and this leads to subsidence and generally calm weather.

Блок 5. CLIMATES

LESSON 15

Задание 1. (Парная работа). Прочитайте введение к текстам блока и подумайте о том, какие вопросы, связанные с климатом, будут рассмотрены в этих текстах.

In describing the climate, or average state of the weather of any area, we need to consider not only the statistical record of the various climatic elements, such as temperature, precipitation and winds, but also the dynamic backgrounds to the figures. Explanation

is as important as description in climatology. For large-scale climates, the general circulation provides the essential background for the characteristics of each climatic zone. For local climates, small-scale weather systems are set up by detailed geographical features in certain places at times when the general circulation is slack.

Упражнение 1. (Парная работа). Задание 1. Прочитайте заглавие к тексту. Обсудите с другими студентами: а) о чем пойдет речь в тексте? б) что вы знаете по существу данного вопроса?

Задание 2. Выпишите 10—15 слов, которые, с вашей точки зрения, должны встретиться в тексте с таким заглавием.

Задание 3. Прочитайте текст и постарайтесь наиболее полно воспроизвести его содержание на русском языке. Контрольное время — 5 минут.

Text 5A. Classification of Climates

Despite the seemingly endless variety of climates, patterns of weather repeat themselves in various parts of the world where the essential governing factors are similar. In attempting to categorize these similarities, most climatic classifications make use of temperature and precipitation data. However, there are two problems: first, the availability of data is very uneven throughout the world, and second, what values or boundaries are meaningful? In order to overcome these difficulties, many classifications have zones which are based on the effects of climate, such as natural vegetation boundaries. Investigations have been carried out to determine what temperature and rainfall amounts control the boundaries at certain places and these figures have then been extrapolated for apparently similar boundaries in the rest of the world. Examples of this type of classification include those by W. Köppen and A. A. Miller. However, the difficulty with all effect-type classifications is that the so-called effects are rarely the result of climate alone. For instance vegetation is also a function of soils, past climates, and man.

Another approach is to base classification on the causes of climate. The main difficulty here is to ensure that the causes are fully understood. Inevitably, these genetic classifications use less precise boundaries than «effect» classifications, but this is perhaps a much more realistic approach to the real world. Recently, as more has become known of the workings of the atmosphere, new attempts have been made to use genetic classifications. Some have been based on air mass types, but probably the most fruitful approach is simply to use the major features of the general circulation as a basis for division. This is the approach followed in this chapter, based on the categories suggested by H. Flohn. It builds directly on the information about the dynamics of the

general circulation and its causes that has been outlined in previous chapters.

Задание 4. Проверьте, встретились ли вам в тексте 5А те слова, относительно которых вы делали предположение в задании 2.

Упражнение 2. В правой колонке найдите русские эквиваленты английских словосочетаний:

1. endless variety	1. использовать что-либо
2. patterns of weather	2. границы растительности
3. to make use of	3. предпринять попытку
4. availability of data	4. бесконечное разнообразие
5. to overcome difficulties	5. наличие данных
6. vegetation boundaries	6. проводить исследование
7. to carry out an investigation	7. менее точные
8. to make an attempt	8. плодотворный подход
9. less precise	9. модели погоды
10. fruitful approach	10. преодолевать трудности

Упражнение 3. (Парная работа). Заполните пропуски в предложениях подходящими по смыслу словами.

1. As more has . . . . (affected; appeared; become) known of the workings of the atmosphere, new attempts have been made to use genetic classifications.

2. The most fruitful approach is to . . . . (cause; attempt; use) the major features of the general circulation as a basis for division.

3. Another approach is to . . . . (follow; base; understand) classification on the causes of climate.

4. Examples of this type of classification . . . . (include; govern; determine) those by W. Köppen and A. Miller.

5. Investigations have been . . . . (overcome; carried out; called) to determine what temperature and rainfall amounts control the boundaries at certain places.

6. There . . . . (is; are; have) two problems: first the availability of data is very uneven and second, what values or boundaries are meaningful?

Упражнение 4. Выберите необходимые по смыслу связующие элементы.

1. Many classifications have zones which are based on the effects of climate (despite of; thanks to; such as) natural vegetation boundaries.

2. These genetic classifications use less precise boundaries than «effect» classifications (but; however; instead of) this is perhaps a much more realistic approach to the real world.

3. (perhaps; despite; such as) the seemingly endless variety of climates, patterns of weather repeat themselves in various parts of the world.

4. Some classifications have been based on air mass types but (if; probably; nevertheless) the most fruitful approach is simply to use the major features of the general circulation as a basis for division.

5. The difficulty with all effect-type classifications is that the so-called effects are rarely the result of climate alone. (But; Thus; For instance) vegetation is also a function of soils, past climates, and man.

Упражнение 5. (Парная работа). В первом абзаце текста 5А определите предложения, отражающие: a. основную идею; b. главные детали; c. второстепенные детали.

Упражнение 6. (Парная работа). Придумайте 3—5 вопросов ко второму абзацу текста. Попросите ответить на них другую пару студентов. Обменяйтесь вопросами.

Упражнение 7. (Парная работа). Определите, какие из приведенных ниже положений наиболее полно отражают содержание текста 5А.

1. Vegetation is also a function of soils, past climates, and man.
2. Patterns of weather repeat themselves in various parts of the world, where the essential governing factors are similar.
3. Most climatic classifications make use of temperature and precipitation data.
4. Investigations have been carried out to determine what temperature and rainfall amounts control the boundaries at certain places.
5. Some genetic classifications have been based on air mass types.

Упражнение 8. В данной таблице поставьте плюс в соответствующей колонке, предварительно определив, правильным или неправильным является то или иное утверждение.

Right	Wrong	
		1. Recently, as less have become known of the workings of the atmosphere, new attempts have been made to use genetic classifications. 2. The approach based on the categories suggested by H. Flohn builds directly on the information about the dynamics of the general circulation and its causes. 3. Patterns of weather repeat themselves in various parts of the world where the essential governing factors are similar. 4. Most climatic classifications make use of humidity and pressure data. 5. Very few classifications of climate have zones which are based on the effects of climate, such as natural vegetation boundaries. 6. Past climate is also a function of vegetation and soils.

Упражнение 9. Письменно переведите 2-й абзац текста 5А. Контрольное время — 20 минут.

Упражнение 10. (Парная работа). Составьте краткий план пересказа текста 5А.

Упражнение 11. Напишите резюме текста 5А, состоящее не более чем из 100—120 слов.

Упражнение 12. (Парная работа). В приводимом ниже тексте в каждой строчке найдите ту позицию, которую должно занимать слово из правой колонки.

A discussion of the phenomena of climate the province	is
of the science climatology. Climatology treats of	of
the component elements of weather climate such	and
as temperature and rainfall, of actual distri-	their
bution the Earth and of the factors which	over
determine control their distribution. Since climate	and
has many far-reaching, practical, and	so
direct applications the activities of man,	to
climatology emphasizes relations and is	human
largely descriptive character. Meteorology is	in
closely related physics, climatology is intimately	to
connected geography. These statements apply	with
more particularly to that phase of subject known	the
as descriptive climatology. There another aspect,	is
called physical climatology is concerned	which
with the physical processes produce climate.	that

Упражнение 13. Выберите правильный перевод выделенных слов.

1. We are often interested in **knowing** what the weather is going to be like.

a. узнавая, b. знать, c. знающий

2. A fundamental axiom in **forecasting** is that weather conditions in the middle latitudes move generally eastward.

a. при прогнозировании, b. составив прогноз, c. прогнозирующий

3. Errors in **anticipating** weather conditions may not necessarily be ascribed to poor interpretation.

a. предсказывая, b. в предсказании, c. предсказывая

4. The **heating** of the lower strata of air during the forenoon accentuates the upward movement, **causing** daily rains during the afternoon.

a. нагревшийся, b. после нагревания, c. нагревание

a. вызывая, b. вызывающий, c. вызвав

5. It is only upon **reaching** the surface of the Earth than the sun's rays are converted into heat.

a. достигая, b. достижения, c. достигающий

6. Convective thunderstorms may receive their necessary lift by **heating** from below or by convergence of the wind flow.

a. нагревающий, b. нагревая, c. за счет нагревания

Упражнение 14. Переведите следующие предложения на русский язык.

I. 1. The strongest horizontal temperature gradients are in middle latitudes, corresponding to the region of greatest slope of the tropopause.

2. The most obvious way of determining the cloud base or ceiling is from an airplane flying at cloud levels.

3. An instrument for measuring both cloud direction and speed is the mirror nephoscope.

4. It is interesting to know the highest and lowest temperatures reached during any specified period.

5. For measuring and recording temperature accurately with great sensitivity or in a very small space, electrical methods have proved to be most reliable.

6. In convection, the moving masses carry with them heat acquired by conduction in their previous positions.

II. 1. Investigations have been carried out to determine what temperature and rainfall amounts control the boundaries at certain places.

2. These figures have been extrapolated for similar boundaries in the rest of the world.

3. Recently, as more has become known of the workings of the atmosphere, new attempts have been made to use genetic classifications.

4. Some classifications have been based on air mass types.

5. Some attempts have been made to study evaporation on the molecular scale.

LESSON 16

Упражнение 1. (Парная работа). Задание 1. Прочитайте заглавие текста 5B. Обсудите с другими студентами, о чем в нем будет идти речь. Вспомните, что вы знаете по существу данного вопроса.

Задание 2. Ниже приводится описание двух климатических зон Земли. По следующим фрагментам текста постарайтесь определить, о каких зонах будет идти в нем речь. Затем сверьте свои предположения с текстом.

The climate of large areas of the globe between 20° and 30° of latitude is controlled all year round by dry trade-wind air originating from the subtropical high-pressure cells. The subsiding anticyclonic circulation makes rainfall very rare in these areas.

Most of this zone has surprisingly little snowfall, summer temperatures rarely rise above freezing: so much latent heat is

required in melting that temperatures are inhibited from rising any higher. In winter, the average monthly temperatures fall to —30 °C...

Задание 3. Прочитайте приводимый ниже текст и найдите в нем ответ на следующий вопрос: какие факторы определяют характерные особенности описываемых типов климата? Контрольное время — 3 минуты.

Text 5B. World Climatic Zones

As example here are some descriptions of the major climatic zones of the world.

Subtropical dry zone. The climate of large areas of the globe between 20° and 30° of latitude is controlled all year round by dry trade-wind air **originating** from the subtropical high-pressure cells. Such regions include all the hot **deserts** of the world. The **subsiding** anticyclonic circulation makes rainfall very rare in these areas but there are perhaps only a few places where no rain falls at all; intermittent **disturbances** in the trade winds or in **encroaching** westerly air masses in winter bring occasional precipitation to most localities. With so few clouds temperatures reach considerable extremes, with daily maxima up to 50 °C not uncommon. On the western sea margins of many of the major deserts upwelling cold currents cool the **adjacent** air, giving clammy and often foggy conditions. However, rainfall amounts still remain very low as the moist air is usually only shallow and **replaced** above by the more characteristic subsiding air of the subtropical belt.

High polar zone. The three largest areas of ice in the world, Antarctica, Greenland, and the Arctic Ocean, differ from the subpolar zone by lying **entirely** within easterly zonal circulation all year, having fewer depressions and lower average temperatures. Most of this zone has surprisingly little snowfall, the maximum amounts falling around the periphery of the two land ice sheets, Antarctica and Greenland. Summer temperatures rarely rise above **freezing**: so much latent heat is required in melting that temperatures are **inhibited** from rising any higher. In winter, the average monthly temperatures fall to —30 °C in the Arctic Ocean near the North Pole, to —45 °C in central Greenland, and to —70 °C in Antarctica. These conditions occur under the influence of intense cold anticyclones which develop in the polar regions during the long winter night.

Упражнение 2. (Парная работа). Укажите английские эквиваленты приведенных русских слов.

сухой	1. arid	редко	1. rarely
	2. moist		2. although
	3. dry		3. uncommonly
	4. normal		4. certainly

обычный	1. significant	иметь	1. take place
	2. common	место	2. develop
	3. usual		3. occur
	4. seasonal		4. cause
включать	1. switch	достигать	1. attain
(в себя)	2. include		2. create
	3. contain		3. reach
	4. comprise		4. stretch
средние	1. primary	количество	1. amount
	2. average		2. sum
	3. mean		3. total
	4. rapid		4. major

Упражнение 3. Разместите приведенные ниже слова в соответствующие тематические группы: метеорологические термины, связующие элементы, общенаучная лексика:

to control; trade-winds; high-pressure cells; circulation; but; precipitation; extremes; maximum; foggy conditions; however; rainfall; within; average; zonal circulation; amount; above; latent heat; perhaps.

Упражнение 4. (Парная работа). Выберите русские эквиваленты соответствующих английских слов. В правильности выбора вам может помочь контекст. (В тексте приводимые ниже слова выделены.)

originate —	возникать	replace —	отклоняться
	продолжаться		заменять
	оригинальный		помещать
desert —	возвышенность	entirely —	полностью
	теплый		независимо от...
	пустыня		в пределах
subside —	подниматься	freezing —	оледенение
	опускаться		испарение
	выравнивать		замерзание
disturbance —	возмущение	inhibit —	препятствовать
	столкновение		способствовать
	распределение		взаимодействовать
encroach —	вторгаться		
	отходить		
	перемещаться		

Упражнение 5. (Парная работа). Заполните пропуски необходимыми связующими элементами.

Middle latitudes come . . . . the influence of the circulation of the westerlies wind belt . . . . most of the year. . . . . tropical . . . . polar air masses are brought . . . . this wind system, whose interchange along the polar front plays a major role . . . . the weather . . . . the whole zone. Truly temperate conditions,

in the sense of being mild and equable are found only . . . . coastal locations on western margins of continents.

of, on, in, both, and, under, into, for.

Упражнение 6. Выберите из текста 5B 8—10 ключевых слов.

Упражнение 7. (Парная работа). Задание 1. Закончите следующие предложения, используя информацию, содержащуюся в тексте 5B:

1. The three largest areas of ice in the world are . . . . .
2. In winter the average monthly temperatures fall to . . . . in the Arctic Ocean near the North Pole.
3. The subsiding anticyclonic circulation in the subtropical dry zone makes rainfall . . . . .
4. On the western sea margins of many of the major deserts upwelling cold currents . . . . .

Задание 2. Исходя из содержания прочитанного текста 5B, заполните пропуски в предложениях подходящими по смыслу словами и словосочетаниями.

1. Antarctica, Greenland and the Arctic Ocean lie entirely within (westerly/easterly) zonal circulation all year.
2. The climate of large areas of the globe between 20° and 30° of latitude is controlled by (trade-wind/monsoon) air, originating from the subtropical high-pressure cells.
3. Most of the high polar zone has (little/much) snowfall.
4. The regions of the globe between 20° and 30° of latitude include all the (high mountains/hot deserts) of the world.

Упражнение 8. (Парная работа). Заполните приводимую ниже таблицу данными, которые вы можете получить, сравнив особенности описанных в тексте 5B климатических зон.

	Subtropical dry zone	High polar zone
1. Precipitation		
2. Temperature extremes		
3. Geographical position		
4. Air-mass circulation		
5. Cloudiness		

Упражнение 9. Составьте как можно большее количество предложений, которые содержали бы следующие слова и словосочетания:

is controlled by...; reach considerable extremes...; rainfall amounts...; anticyclonic (cyclonic) circulations; little snowfall; average monthly temperatures...; rise above freezing...; melting...; under the influence of intense anticyclones (cyclones).

Упражнение 10. Используя как можно большее количество выученных новых слов, напишите сообщение на одну из следующих тем:

— климат Великобритании;
— климат Прибалтики;
— климат Финляндии.

Упражнение 11. Письменно переведите текст. Контрольное время — 20 минут.

May 1987

Cool, dry with ocasional warmer spells

After a cold front cleared south-east England late on the 1st, low pressure moved away eastwards and was replaced by an anticyclone moving slowly into western areas from the Atlantic. The anticyclone gradually declined and slipped away over the continent early on the 9th, allowing a weak cold front to move southwards across all areas during the next 36 hours. A developing anticyclone in mid-Atlantic became slow moving and a series of depressions running round its northern and eastern flanks influenced the British Isles over the next two weeks. On the 12th a deepening depression over the North Sea affected East Anglia and on the 14th and 17th further depressions moved south-eastwards across eastern parts of the United Kingdom.

Упражнение 12. Запишите следующие выражения с помощью математических символов:

1. The product of 45 and the number n.
2. The ratio of the number n to 10.
3. The difference between the number n and 26.
4. Half x increased by the product of 25 and y.
5. Five times a decreased by one third of b.
6. The average of 5, t and 90.
7. 80 diminished by one fifth the product of 7 and x.
8. Twice the sum of p and 5 diminished by 30.
9. Two thirds the sum of n and three eighth of p.
10. The product of 2 and b decreased by twice the difference between c and d.

Упражнение 13. Устно переведите следующий отрывок текста, обращая внимание на выделенные слова.

The Marine Climate of Western Europe

The middle latitude west coast marine type of climate **has** its **greatest** extent in Western Europe. In winter the Ireland Low **is** strongly **developed** and extends from Greenland to north of Norway. South of this deep low **pressure centre,** between it and the weak subtropical **high-pressure belt** of the Atlantic, **there is** a strong cyclonic circulation, **giving** Western Europe in winter prevailingly south-west winds, warm and moist from the middle Atlantic Ocean. **These** are subject, however, to rather frequent interruptions by **traveling** depressions **moving** eastward across the Atlantic. These lows **are attended** by north-east winds in their north-eastern sectors and by south-east winds in their south-eastern portions.

LESSON 17

Упражнение 1. (Парная работа). Данный текст называется «Local Climate». Прежде чем прочитать его, постарайтесь вспомнить, какие факторы могут оказывать влияние на особенности местного климата.

А теперь найдите в тексте ответы на следующие вопросы:

а. Какое влияние оказывают на местный климат водоемы?

б. В чем различие между анабатическими и катабатическими ветрами?

в. На каких склонах гор выпадает большее количество осадков?

Контрольное время — 7 минут.

Text 5C. Local Climate

Relief effects give rise to probably the most significant local variations of the major patterns of climate. Precipitation, temperature, pressure and air flow are all affected, so much so that large mountain regions can be regarded as having a unique climatic type, a mosaic of local climates.

Not only do temperatures drop with height, but aspect can have an important bearing on temperatures in any area of accentuated relief. In the Alps, large mountain valleys running east-west are well noted for having a south-facing side receiving large amounts of insolation and a north-facing side which may be in constant shadow all winter. In the United States in areas of low rainfall a different pattern results: thick forests grow on shaded north-facing slopes, but scrub and cactus on heated south-facing slopes.

Orographic precipitation effects are also universal, provided that the air has sufficient moisture. The uplift of air caused by relief tends to reinforce whatever other rain-giving mechanism may

be in operation, and even stable air may be induced to part with some moisture. A rainfall map will confirm that the wind-ward side of hills and mountains have much heavier amounts than the lee sides, where marked rain-shadow areas may exist.

Airflow is affected by high relief, both on a broad scale and also locally: the lee sides of mountains are generally considerably calmer than wind-ward sides and summit areas. In some cases, a Föhn effect may also be produced. In addition to these direct mechanical influences, elevated areas can create special mountain and valley winds. During the day, warm air tends to blow up the valley in response to the heating of air in contact with the upper slopes of the valley and the surrounding upland. Such winds are termed anabatic. At night the situation reverses: the upper slopes cool more quickly and dense cold air drains down towards the valley bottoms. This night-time or katabatic wind is generally stronger than its day-time counterpart and has more noticeable effects.

The effect of water bodies on local climate reinforces the moderating effect of the oceans in general. Coastal areas tend to have the smallest range of temperature. On the other hand, they frequently suffer from fog: in summer this is of the advection type, whereas in autumn and winter fog often occurs because of the cooling of moist sea air as it moves inland. On warm days coastlines may experience a land-and-sea breeze mechanism, which is caused by expansion of the air column over the land tilting the local pressure gradient landwards near the ground surface and seawards higher up. The net result is a small circulatory system in which a sea breeze blows landward during the day. At night the air over the sea is warmer, and an offshore land-breeze results.

Упражнение 2. Проверьте, помните ли вы значения следующих слов и словосочетаний из текста 5С, которые уже встречались вам в предыдущих текстах:

precipitation; pressure; moisture; heat; rainfall; fog; to blow; dense air; air flow; ground surface; range of temperature; constant; pressure gradient; to cause; amounts of insolation; in addition to.

Если вы забыли значение какого-либо слова, найдите его в словаре.

Упражнение 3. (Парная работа). В правой колонке найдите русские эквиваленты следующих слов и словосочетаний:

1. to regard	1. горно-долинные ветры
2. to drop	2. прямое воздействие
3. shaded slopes	3. полный суточный цикл морского бриза
4. uplift of air	4. падать

5. to reinforce
6. rainfall map
7. windward side
8. rain-shadow area
9. direct influence
10. mountain and valley winds
11. land-and-sea breeze
12. net result

5. наветренная сторона
6. усиливать
7. считать, рассматривать
8. конечный результат
9. область, защищенная от осадков
10. карта осадков
11. затененные склоны
12. подъем воздуха

Упражнение 4. (Парная работа). Задание 1. Определите значения выделенных слов и словосочетаний, исходя из контекста.

1. In the Alps, large mountain valleys **running** east-west are well noted for having a south-facing side receiving large amounts of insolation.

2. At night the situation **reverses**: the upper slopes cool more quickly and dense cold air drains down towards the valley bottoms.

3. A rainfall map will **confirm** that the windward side of hills and mountains have much heavier amounts than the lee sides.

4. During the day, warm air tends to blow up the valley **in responce to** the heating of air in contact with the upper slopes of the valley and the surrounding upland.

5. Such winds are **termed** anabatic.

Задание 2. Еще раз внимательно прочитайте второй абзац текста 5С и постарайтесь определить, исходя из его содержания, значение слова «aspect».

Упражнение 5. Определите эквиваленты выделенных связующих элементов в русском языке.

1. Orographic precipitation effects are universal, **provided that** the air has sufficient moisture.

a. поскольку, b. при условии, что..., c. после того, как...

2. The uplift of air caused by relief tends to reinforce **whatever** other rain-giving mechanism may be in operation.

a. ни тот, ни другой, b. как...так, c. какой бы ни...

3. Airflow is affected by high relief, **both** on a broad scale **and** also locally.

a. ни...ни, b. как...так, c. не только, но и...

4. **On the other hand**, coastal areas frequently suffer from fog.

a. с другой стороны, b. вероятно, c. очевидно

5. In summer fog is of the advection type, **whereas** in autumn and winter fog often occurs because of the cooling of moist sea air as it moves inland.

a. где бы то ни было, b. когда, c. тогда как

Упражнение 6. (Парная работа). Заполните пропуски подходящими по смыслу связующими элементами.

Marine Climate of Western Europe

The coldest weather of winter and the warmest and driest weather of summer occur with north-east or east winds. They bring continental air from the interior of Europe which is somewhat modified by its passage over the North Sea. . . . . temperature conditions resemble those on the coast of British Columbia and Southern Alaska. . . . . London and Valencia correspond in latitude with Victoria, B. C., and . . . . winter . . . . summer temperatures are similar.

. . . . the large number of barometric depressions there is much variability of wind direction . . . . the prevailing direction is westerly all year. These depression . . . . result in frequent gales. The lows are attended by rains that . . . . are well-distributed, seasonally and geographically. The changing direction of the wind with their passage produces rain . . . . the direction of the slope.

For example; whatever; but; in general; also; both... and; on the whole; because of.

Упражнение 7. В приводимой ниже таблице поставьте плюс в соответствующей колонке, предварительно определив, правильными или неправильными являются следующие утверждения:

Right	Wrong	
		1. Coastal areas tend to have the greatest range of temperature. 2. On warm days coastlines may experience a land-and-sea breeze mechanism which is caused by expansion of the air column over the land. 3. Orographic precipitation effects are also universal unless the air has sufficient moistutre. 4. This night-time or katabatic wind is generally stronger than its day-time counterpart. 5. Aspect can have an important bearing on temperatures in any area of accentuated relief. 6. At night the air over the sea is warmer.

Упражнение 8. (Парная работа). Найдите в тексте 5С доказательства справедливости следующих утверждений:

1. Aspect can have an important bearing on temperatures.
2. Airflow is affected by high relief.
3. Oceans have moderating effect on local climate.

Упражнение 9. В приводимом ниже тексте содержится два предложения, которые не соответствуют его общему содержанию. Найдите эти предложения.

Rocks are normally classified into three major groups according to their origin. Four factors — solar radiation, Earth movements,

composition of atmosphere, and distribution and elevation of land — govern the general climate of the world as it is, and presumably have governed the climates of the past. Movements of the plates cause pressure and tensions to build up at the Earth's surface, in many cases leading to deformation of the land. All four factors may have been influential in the pulsatory changes of past ages, but when examined in detail, they do not offer a satisfactory explanation of the actual climatic changes indicated by accepted geological evidence.

Упражнение 10. В тексте 5С найдите пример, который иллюстрирует какое-либо положение, выдвинутое автором.

Упражнение 11. Выберите правильный перевод выделенных форм и словосочетаний.

1. The temperature most favorable for vegetative growth is often considerably lower than **that** which is most favorable for the formation of flowers.

a. которая, b. температура, c. что

2. The reason for the relatively cold winters **is to be found** partly in the elevation and partly in the fact **that** this region is opened to the invasion of cold northers.

a. следует искать; который
b. была найдена; что
c. могла бы быть найдена; причина

3. After detailed daily records **have been maintained** continuously over a long period, the monthly averages and extremes become climatic data of great value.

a. продолжались, b. продолжались бы, c. должны продолжаться

4. Centered at about latitude 35 °N and 30 °S there are belts of high pressure with dry, slowly **descending** air.

a. опускающимся, b. опустившимся, c. опустившись

5. These processes of absorption and radiation are usually **less important** in changing the temperature of the lower air than are the two other processes, conduction and convection.

a. более важные, b. важнейшие, c. наименее важные

6. Cloudiness and rainfall, as well as temperature, **are** directly **affected** by continents and oceans.

a. повлияли, b. были под влиянием, c. находятся под влиянием

7. The cold **front is** usually **followed** after a few hours by clear and cool or cold weather.

a. фронт следует за ...,
b. за фронтом последовала,
c. за фронтом следует

Упражнение 1. (Парная работа). Ниже приводятся 2 предложения из первого и последнего абзацев текста 5D. Подумайте, о чем пойдем речь в этом тексте; придумайте заглавие к нему.

Large towns and cities create climates no less distinctive than those of forests or mountain valleys.

Some city atmospheres are notoriously liable to pollution, and this has the effect of blanketing the radiation over the area.

Упражнение 2. А теперь прочитайте текст и передайте его содержание на русском языке в одном предложении. Контрольное время — 4 минуты.

Text 5D

Large towns and cities create climates no less distinctive than those of forests or mountain valleys. As within forests, urban structures tend to reduce wind speeds to lower values than those recorded in open country. Unlike forests, cities tend to have lower humidities than their surroundings: the general absence of vegetation and large bodies of water and the rapid removal of surface run-off all contribute to decrease local evaporation. One of the most notable features of urban climates is that they are generally warmer than the surrounding countryside, producing a heat island effect. There are three main factors responsible for this: the direct production of heat from fires, industry, and central heating systems; the heat-conserving properties of brick and stone in the city; and the blanketing effect of atmospheric pollution on outgoing radiation. Measurements in the London area and elsewhere have shown that the greatest contrasts between town and country occur in summer, especially at night after a fine sunny day. From this we must conclude that the strongest factor at work in creating a heat island is the storage of heat from day-time insolation in the brickwork.

Some city atmospheres are notoriously liable to pollution, and this has the effect of blanketing the radiation over the area, cutting down the sunlight and providing abundant condensation nuclei. On days with some wind most of this waste is dispersed, but under stable anticyclonic conditions radiation fog may combine with excessive pollution and become trapped under a temperature inversion, forming a smog, as used to occur in London. In Los Angeles, recent summer and autumn smogs have been caused largely by the concentration of pollution from car exhausts under a day-time temperature inversion.

Упражнение 3. (Парная работа). В тексте 5D, который называется «Urban Climate»,вам, вероятно, встретились незнакомые слова. Выпишите их, сравните с теми, которые выписал

ваш сосед, и обсудите их предполагаемые значения. Правильность своих предположений проверьте по словарю.

Упражнение 4. (Парная работа). В правой колонке найдите русские эквиваленты следующих словосочетаний.

1. urban climate	1. уходящая радиация
2. tend to reduce	2. поверхностный сток
3. absence of vegetation	3. быть ответственным за...
4. body of water	4. отличительная черта
5. surface runoff	5. городской климат
6. notable feature	6. парниковый эффект
7. heat island	7. отсутствие растительности
8. to be responsible for	8. иметь тенденцию к снижению
9. blanketing effect	9. водная масса
10. outgoing radiation	10. (эффект) острова тепла
11. excessive pollution	11. избыточное загрязнение

Упражнение 5. Придумайте 5—6 предложений, в которые входили бы следующие словосочетания:

cities climates; forests climates; absence of vegetation; large bodies of water; local evaporation; surrounding countryside; blanketing effect; atmospheric pollution; contrasts between town and country; storage of heat; city atmosphere; liable to pollution; radiation fog and excessive pollution; car exhausts.

Упражнение 6. Заполните пропуски подходящими по смыслу связующими элементами.

Climate and Business

Differences of climate are responsible . . . . a large part . . . . the commerce of the world. . . . . the United States lacks a tropical climate, it must import all the coffee . . . . rubber . . . . it uses. Again, because the United States has large areas climatically suited . . . . cotton and wheat, it has large quantities of these products to export. . . . . the United States and other large and diversified countries, climatic differences are important in promoting internal trade. The basic industry of agriculture rests . . . . climate, and is the foundation of the prosperity of other industries.

and; that; for; because; of; on; to; in.

Упражнение 7. Вспомните значения следующих слов, встретившихся вам в тексте 5C:

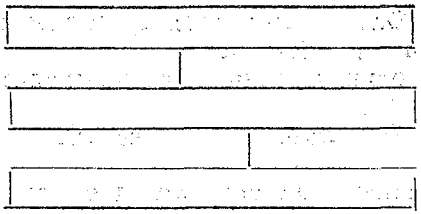
windward; influence; uplift; breeze; whereas; whatever; valley; sufficient; to experience; pattern; low.

Упражнение 8. Заполните следующую таблицу, исходя из содержания 2-го абзаца текста 5D:

1. Основная идея —

2. Второстепенная идея —

3. Примеры —



Упражнение 9. Закончите следующие предложения, опираясь на содержание текста 5D.

1. It is common knowledge that...
2. It is generally believed...
3. We must conclude that...
4. One of the most notable features of urban climates is...
5. There are three main factors responsible for a heat island effect:
6. Some city atmospheres are notoriously liable to...
7. The strongest factor at work in creating a heat island is...

Упражнение 10. Прочитайте текст 5D еще раз и выберите из него те предложения, которые наиболее полно отражают его содержание.

Упражнение 11. Составьте план пересказа текста 5D.

Упражнение 12. Используя как можно большее количество выученных слов из текста, напишите короткое сообщение на одну из следующим тем:

— особенности климата Санкт-Петербурга;
— климатические условия вашего родного города;
— климат Лондона.

Упражнение 13. Письменно переведите 2-й абзац текста 5D.

Упражнение 14. Выберите правильный перевод выделенных слов.

1. In Shetland February temperatures were only about **one** degree centigrade below normal.

a. градус, b. один, c. не переводится

2. Meteorology is the study of the air and the changes **that** take place in the air.

a. не переводится, b. которые, c. те

3. Only rarely does **one** observe a fog which is produced by a single process.

a. один, b. не переводится, c. туман

4. It is evident, **that** storminess is an important climatic factor in relation to health.

a. который, b. что, c. тот

5. **One** is often warm in winter days in the mountain sunshine but cold in the shade.

a. один, b. день, c. не переводится

6. This water is mingled with **that**[1] derived from the oceans in proportions **that**[2] vary with the movement of air current.

1. a. водой, b. который, c. что
2. a. что, b. которые, c. не переводится

Упражнение 15. Заполните пропуски одним из следующих слов: one, that, those.

1. The skies of north-west Europe are cloudy; indeed, this is . . . . of the very cloudy regions of the Earth.

2. The winters of the south-west of Ireland are as mild as . . . . of Italy.

3. The period from May to September in 1959 was in England drier than any of the last 200 years although there were . . . . or two thundery periods.

4. It has been found . . . . the ozone content in the middle atmosphere is markedly related to weather conditions in the troposphere.

5. Most advection fogs are relatively deep, and the deeper . . . . will withstand the diurnal heating.

6. The changes in such an air mass are completely analogous to . . . . occuring in air over land . . . . is heated by sunshine on the Earth's surface.

7. Air . . . . comes in contact with cold surfaces may thus be cooled below its dew point.

LESSON 19

Упражнение 1. (Парная работа). Ниже приводятся первые предложения пяти абзацев текста 5E. Этого должно быть достаточно, чтобы вы смогли сделать выводы о содержании текста. Запишите свои предположения в 2—3 английских предложениях.

Pollution is the introduction by man of materials at a harmful level.

Recently pollution has become a problem of major significance.

Air pollution comes in two main forms: visible... and invisible...

Any increase in pollution affects... the absorbing power of the natural resources.

One finds little pollution at the North Pole or in the Antarctica...

Упражнение 2. Прочитайте текст и проверьте правильность своих предположений. Контрольное время — 5 минут.

Text 5E. Pollution

Pollution is the introduction by man of materials at a harmful level. All aspects of pollution of the environment are directly or indirectly related to man's health.

Recently pollution has become a problem of major significance. Pollution is connected with density of population and technical development. The Earth can absorb a certain amount of polluting materials thus acting as a protecting and buffering agent. This mechanism was adequate until recently. But rapidly increasing population and its advancing technologies are giving rise to increasing amounts of pollution, much of which has a residual or persistent effect.

Air pollution comes in two main forms: visible air pollution by smoke, soot, ash and dust from chimneys, and invisible pollution which comes from car, exhausts, as well as from chimneys. Air pollution affects health. In 1952, London experienced a 'smog' — a mixture of smoke and fog — which lasted for many days. Most people had sore throats and coughed, and it is thought that more than 4,000 people died as a result of the smog. London smog was extreme, but many places do have high rates of air pollution.

Any increase in pollution affects, directly or indirectly, the absorbing power of the natural resources. For example, toxic chemicals in an effluent may affect the biological activity of a river, pesticides may upset the ecology or balance of different forms of life in a particular environment; similarly, factory chimney deposits may affect the fertility of a fields and even poison animal life.

One finds little pollution at the North Pole or in the Antarctica, partly because the human population is not numerous and partly because temperature is a factor affecting pollution. Pollution is greatest in the temperate and subtropical regions where man is most numerous and most active technologically.

Упражнение 3. Определите русские эквиваленты приведенных английских слов.

absorb	отталкивать поглощать переносить	visible	видимый примечательный относительный
major	основной незначительный минимальный	extreme	близкий экстремальный вероятный

protect	помещать	toxic	полезный
	проникать		токсичный
	защищать		активный
adequate	соответствующий	indirectly	непосредственно
	дополнительный		косвенно
	приблизительный		направленно
rapidly	медленно	numerous	малочисленный
	равномерно		многочисленный
	быстро		численный

Упражнение 4. (Парная работа). Определите значение выделенных слов, исходя из контекста.

1. Pollution is the introduction by man of materials at a **harmful** level.

2. Recently pollution has become a problem of major **significance.**

3. Pollution is **connected** with density of population and technical development.

4. The Earth can absorb a certain amount of polluting materials thus acting as a protecting and **buffering** agent.

5. London **experienced** a 'smog' — a mixture of smoke and fog — which lasted for many days.

6. Toxic **chemicals** may affect the biological activity of a river.

Упражнение 5. Найдите в тексте 5E эквиваленты следующих словосочетаний:

загрязнение окружающей среды; прямо или косвенно; здоровье человека; плотность населения; загрязняющие вещества; передовая технология; так же как и...; загрязнение атмосферы; влиять на здоровье; продолжаться несколько дней; в результате...; поглощающая способность; природные ресурсы.

Упражнение 6. Из приведенных ниже предложений и словосочетаний выберите те, которые наиболее подходят в качестве заголовков к трем последним абзацам текста.

1. Pesticides may upset the ecology.
2. Pollution at the poles.
3. At the poles the human population is not numerous.
4. Forms of pollution.
5. Pollution and natural resources.
6. Most people had sore throats and coughed.

Упражнение 7. Выберите один из абзацев текста 5E, придумайте 3—5 вопросов к нему. Попросите ответить на них другую пару студентов. Обменяйтесь вопросами.

Упражнение 8. (Парная работа). Поставьте плюс в соответствующей колонке таблицы.

No evidence	No	Yes	
			1. Air pollution is most dangerous to man's health.
			2. Now the problem of pollution is solved.
			3. The South Pole is more polluted than the North Pole.
			4. Any increase in pollution affects the absorbing power of the natural resources.
			5. There is no possibility to prevent air pollution.
			6. People may die as a result of smog.
			7. London smog of 1952 was extreme.

Упражнение 9. (Парная работа). Заполните пропуски подходящими по смыслу словами.

Pollution spoils our environment in many ways. The air we breathe, for instance, ... constantly polluted by smoke and . . . . chemicals such as carbon monoxide in . . . . exhaust fumes of cars and other . . . . of motor vehicles.

For wild life, ..., there are even greater dangers . . . . the pollution of water — of rivers, ... example, or lakes and seas. A . . . . illustration of this is the oil . . . . from tankers at sea. It kills . . . . kinds of sea animals, including birds, ... feathers become covered with oil so . . . . cannot fly, as well as fish . . . . other forms of marine life. Other . . . . of water pollution include power stations, ... release warm water into rivers. This kills the fish and plants which live there.

causes; they; good; in; by; however; for; which; whose; the; is; kinds; all; and; released.

Упражнение 10. В данном тексте определите, где заканчивается одно предложение и начинается другое. После этого переведите текст письменно.

The Clean Air Act of 1956 enabled local authorities to create 'smokeless zones', where it is against the law to produce dense smoke since the Act was passed, smoke has been reduced, but invisible gases remain industries pour out a gas called sulphur dioxide, which is very unpleasant the fumes from vehicles account for more than half of our air pollution there are five times as many cars now, in Britain as in 1956 cities, where most cars and industry are to be found, remain unhealthy places in which to live.

Упражнение 11. Используя как можно большее количество выученных новых слов, напишите короткое сообщение на одну из следующих тем:

1. Причины загрязнения атмосферы.
2. Меры, необходимые для защиты атмосферы от загрязнения.
3. Проблемы загрязнения воздушного бассейна Санкт-Петербурга.

Упражнение 12. Выберите правильный вариант перевода выделенных слов.

I. 1. **It** was exceptionally dry in north-west Scotland.

a. это, b. не переводится, c. оно

2. We cannot isolate a portion of the atmosphere and subject **it** to rigorously controlled conditions.

a. это, b. ее, c. не переводится

3. **It** is very essential to be able to recognize the existing cloud types.

a. не переводится, b. это, c. именно

4. Meteorology is the whole science of the atmosphere. **It** is concerned with the basic understanding of atmospheric conditions and processes.

a. это, b. она, c. не переводится

5. **It** is the need for good observational data **that** creates the need for meteorological satellites.

a. это, b. именно, c. не переводится

6. **It** is probable **that** many of the fogs observed on the Grand Banks were originally tropical-air fogs.

a. это, b. не переводится, c. именно

7. **It** is the severe winters and hot summers of continental interiors **that** make the most important difference between continental and marine climates.

a. именно, b. это, c. не переводится

8. When rain falls into the funnel **it** drains into the container.

a. это, b. оно, c. он

II. 1. It is clear that the quantity of water vapour must vary directly with the temperature. This does not **mean** that the capacity of the air is always reached.

a. означает, b. среднее значение

2. **Mean** temperatures were above normal in all parts of Britain.

a. среднее значение, b. означает

3. A direct **result** of the decrease pressure is a decrease in the boiling point of water.

a. приводит к, b. результат

4. This diffraction **results in** the formation of coronas around the Sun or Moon.

a. результаты, b. приводит к

5. How does the meteorologist **approach** the problem he faces?
a. подходит, b. подход
6. One **approach** is through experience.
a. подходит, b. подход
7. Regardless of the quantity of theoretical knowledge, **experience** is equally important in forecasting weather.
a. испытывает, b. опыт
8. Several cities **experience** a smog — a mixture of smoke and fog.
a. испытывают, b. опыт
9. The varying cloud **forms** are among the greatest beauties of nature.
a. формирует, b. формы
10. Radiation travels in the **form** of waves with the speed of light.
a. формирует, b. формы

LESSON 20

Упражнение 1. (Парная работа). Прочитайте заглавие текста. Приведите 10—15 слов, которые, с вашей точки зрения, должны в нем встретиться. Теперь прочитайте текст и проверьте свои предположения. Контрольное время — 8 минут.

Text 5F. Climatic Change

The connection between long-term climatic change, the general circulation and solar radiation was considered previously. The evidence for changes of this scale is largely geological, deriving from glacial and interglacial deposits, traces of the former distributions of plants and animals, and isotope records from deep ocean sediment cores. There is also ample evidence of a different kind that climate has fluctuated in the historical period on much shorter time-scales. Contemporary observations, records of floods, harvest and instrumental records in the last one hundred and fifty years, are used to reconstruct the general trends. The evidence indicates that for Northern Europe, the period AD 400—1200 was on the whole dry and warm, with relatively few major storms. This was the time of the great Viking voyages to Greenland and possibly to America. After 1200, a period of weather variation and general decline set in, with a number of devastating floods recorded around 1300 and the abandonment of Viking colonies in Greenland and Iceland. The period 1550 to 1800 has been called the Little Ice Age. Then, glaciers reached their most advanced positions in the Alps and Norway since the end of the last major glaciation 10 000 years ago. It was also a time of general agrarian stress in the northern countries of Europe, and in England the Thames froze over frequently.

The beginning of the period of instrumental records in the first part of the nineteenth century witnessed a gradual amelioration of climate. This warming trend appears to have begun about 1820, and continued up to the 1940s. The trend also seems to have been worldwide, as expressed by a general rise in the temperatures of the World Ocean by 0.7 °C. Since 1950, average temperatures in Northern Europe appear to have declined slightly.

There seems little doubt that the immediate cause of these recent climatic fluctuations is linked to the strength of the general circulation, especially the westerlies. The effect of an intensified circulation is to increase oceanic influence, especially in winter, thereby raising mean temperatures. H. H. Lamb has shown that the climatic amelioration in the 1820s was linked to an increase in the vigour of the westerlies in the North Atlantic, together with a northward shift in depression tracks. In other parts of the world, similar relationships between climate and circulation intensity have been observed. In the past 35 years, the atmospheric circulation has been weakening, with an increasing occurrence of low zonal index situations. This first became evident a little before 1940, but it was not until the 1950s and 1960s that an extension of polar ice in the Icelandic and Northern European sectors became apparent.

Упражнение 2. Найдите в правой колонке русские эквиваленты следующих словосочетаний.

1. long-term changes	2 1. общая циркуляция
2. general circulation	4 2. колонки осадочных пород
3. glacial depositions	9 3. тенденция к потеплению
4. sediment cores	3 4. ледниковые отложения
5. ample evidence	10 5. колебания климата
6. contemporary observations	11 6. траектория циклона
7. devastating floods	5 7. становится очевидным
8. gradual amelioration	1 8. долгосрочные изменения
9. warming trend	9. многочисленные свидетельства
10. climatic fluctuations	7 10. опустошительные наводнения
11. depression track	12 11. низкое значение зонального индекса
12. low zonal index	6 12. современные наблюдения
13. to become apparent	8 13. постепенное улучшение

Упражнение 3. Заполните пропуски подходящими по смыслу словами и словосочетаниями, расположенными в правой колонке.

1. The immediate cause of recent climatic fluctuations is linked to the strength of	Little Ice Age

2. Contemporary observations, records of floods and instrumental . . . . in the last 150 years are used to reconstruct the general trends.	amelioration
3. The period 1550 to 1800 has been called the	general circulation
4. The evidence . . . . that for Northern Europe, the period AD 400—1200 was on the whole dry and warm.	indicates
5. The beginning of the period of instrumental records in the first part of the 19th century witnessed a gradual	records

Упражнение 4. (Парная работа). Выпишите из текста 5F все существительные, которые тем или иным образом отражают процессы, связанные с климатическими изменениями.

Упражнение 5. Выберите из текста 5F 8—10 ключевых слов.

Упражнение 6. (Парная работа). Заполните графы следующей таблицы, используя информацию, содержащуюся в тексте 5F.

Period	Climate Characteristics	Causes of Climatic Fluctuations

Упражнение 7. Заполните пропуски подходящими по смыслу связующими элементами.

1. There seems little doubt . . . . the immediate cause of recent climatic fluctuations is linked to the strength of the general circulation.	for
2. Glaciers reached their most advanced positions in the Alps and Norway . . . . the end of the last major glaciation 10 000 years ago.	since
3. The evidence . . . . changes of this scale is largely geological, deriving . . . . glacial and interglacial deposits.	that from
4. There is ample evidence of a different kind . . . . climate has fluctuated in the historical period on much shorter time-scales.	thereby
5. The effect of an intensified circulation is to increase oceanic influence, especially in winter . . . . raising mean temperatures.	that

Упражнение 8. Напишите по-английски резюме текста 5F, состоящее не более чем из 50—70 слов.

Упражнение 9. (Парная работа). Прочитайте текст 5G и сравните его с предыдущим текстом. Что нового содержится в нем по сравнению с текстом 5F? Контрольное время — 10 минут.

Text 5G. Is the Earth's Climate Changing?

18 000 years ago much of Europe lay buried beneath vast sheets of ice, hundred of metres thick. Ever since this astonishing fact was discovered in the last century, scientists have speculated on the nature of the Ice Age climate, and the circumstances that brought it to an end.

More recently, people have wondered if climatic changes could be taking place in our own time. During the early 1970s there were disastrous droughts in Africa, and frequent failures of the Indian monsoon. In 1976, Europe sweltered in the hottest summer for over a century, and experienced one of the worst droughts since records began. Could such events as these be symptoms of a world-wide climatic shift?

Even small changes in climate that occur from time to time can have a highly damaging effect on agriculture. With food reserves now standing at only a few per cent of annual production, the world is extremely vulnerable to adverse shifts in climate. It is therefore vitally important for us to understand how climatic changes take place.

Equally important is the need to understand why such changes occur. Until recently we have assumed that variations in regional and global climate observed over the centuries resulted from natural phenomena. But there is now some tentative evidence suggesting that man's activities are already affecting local climates, and may affect regional and even global climatic patterns in the future.

There are several ways in which man could be altering regional and global climate. First, the carbon dioxide content of the atmosphere is increasing, as a result of burning fossil fuels. Second, the atmospheric transparency is decreasing, because of particulate matter (dust, sulphates, liquid droplets, etc) being injected into the atmosphere from such activities as industry, cars and agriculture. Next-deforestation, irrigation, urbanisation and agriculture are changing the albedo of the Earth's surface. (The albedo is the percentage of incoming solar radiation that is directly reflected outward.) Fourth, the atmosphere is being directly heated by the burning of fossil and nuclear fuels. And finally, oil films from spills and blowouts are altering the rate of thermal energy transfer between the oceans and the atmosphere.

Упражнение 10. Письменно переведите последний абзац текста 5G. Контрольное время — 15 минут.

Упражнение 11. Прочитайте и устно переведите приводимый ниже текст. Контрольное время — 20 минут.

Text 5H. Is Britain's Weather Getting Worse?

As Britain counts its toll of 14 deaths, damaged buildings, lost trees and disrupted lives from Friday's storm, the question emerges this weekend: is the nation's weather getting worse? And — if not worse — is our celebrated mild climate becoming more extreme?

This year opened with the coldest January since comprehensive records began .Londoners watched thermometers drop to —4.4 °C, which was colder than Iceland. Manchester experienced its third coldest day of the century and in Southhampton the temperature fell to —5.5 °C.

Within three months, however, we were enjoing the hottest April for 40 years — up to 22 °C in London, five degrees warmer than on the Costa Brava. But a week later the spring Bank holiday was washed out.

These are examples of the kind of violent swing that some climatologists now attribute to the «greenhouse effect». Carbon dioxide released by coal and oil burning acts as a blanket around the Earth, trapping more of the Sun's warmth in the atmosphere — just as glass holds heat in a greenhouse — and causing temperature to rise.

A European Community study four years ago confirmed that the climate is changing, and forecast that rainfall and temperature patterns would show big changes in the next 100 years, with northern areas like Scotland and Scandinavia probably getting warmer, while Central and Southern Europe gets hotter and drier.

Climatologists at the University of East Anglia say British weather is becoming more unstable and will continue to do so for another 20 years, when it will settle into a new pattern.

But other climatologists refused to see any pattern in our climate. The official word from the London Weather Centre was that there is not enough evidence to support the claim that Britain's weather is getting worse.

Yet another view put forward was that Britain's weather is NOT getting worse, but is returning to normal after a few generations of exceptionally fine conditions. Under this thesis, elderly people who talk wistfully of the summers of their youth are right.

Упражнение 12. Выберите правильный перевод выделенных форм и словосочетаний.

1. **It is here that** the water vapour shows much of its influence on the atmosphere.

a. это здесь, где; b. именно здесь

2. **It was not until** 1950s and 1960s that an extension of polar ice in the Icelandic sector became apparent.

a. это было до 1950-х — 60-х годов, когда...;

b. лишь в 1950-х — 60-х годах...

3. **It has been indicated earlier that winds** can produce excessively high or low tides.

a. Именно раньше указывалось, что ветры...;

b. Ранее уже указывалось, что ветры...

4. Satellite pictures **have proved to be** particularly valuable in the Eastern Pacific.

a. оказалось, что...; b. было доказано, что

5. All attempts **to model** the atmosphere in a laboratory have significant limitations.

a. смоделировать; b. которые будут смоделированы

6. In extreme cases cold fronts **have been observed to move** with speeds of 60 or more miles per hour.

a. наблюдались, что...; b. следует проводить наблюдение

7. Altocumulus clouds **appear** on the horizon in the direction from which the front is approaching.

a. оказывается, что...; b. появляются

8. Radiation **appears to be** the only important form of heat transfer.

a. появляется; b. оказывается, что...

9. For this reason, the stars **may appear** near the horizon as vertical lines containing the usual spectral distribution of colour.

a. могут появляться; b. может оказаться, что...

10. Cloud particles must grow enormously **in order** for precipitation **to be** produced.

a. для того, чтобы...; b. в порядке...

Упражнение 13. Переведите следующие предложения, обращая внимание на перевод слов since, for, as.

1. **Since** a fog, by definition, is a cloud that touches the ground, it is profitable to consider these processes in so far **as** they are modified by the proximity of the Earth's surface.

2. **Since** fog occurs at the surface, it is primarily a hazard during landing and takeoff.

3. **As** the jet stream moves southward, its core rises to a higher altitude.

4. **For** example, in Western Europe during most of the year the surface isotherms run mainly north and south.

5. **As** the temperature rises, the liquid leaves the index.

6. **For** measuring and recording temperature accurately, electrical methods have proved to be most reliable.

7. The study of clouds is one of the most popular phases of meteorolgy, **for** it is a subject in which everyone is more or less interested.

8. **Since** ancient times people have been aware of differences in the average temperature conditions from place to place over the surface of the Earth.

9. **As** the transportation agency **for** water vapour, wind has an important effect on the formation of fogs and clouds.

10. **For** this reason, climatologists favour having all temperatures reduced to sea level.

Тесты к блоку 5

ТЛ

I. В каждом ряду обозначьте цифрой слово, которое по своему значению не соответствует данной тематической группе.

a. disturbances (1), extremes (2), westerlies (3), despite (4), easterlies (5).

b. maritime (1), continental (2), beautiful (3), subtropical (4), equatorial (5).

c. aspect (1), relief (2), water body (3), airflow (4), chair (5).

d. inspite of (1), although (2), environment (3), nevertheless (4), without (5).

e. to fluctuate (1), to indicate (2), to entertain (3), to advance (4), to affect (5).

II. Укажите буквой русские эквиваленты приведенных слов.

1. investigation	a. исследование b. влияние c. вклад	7. despite	a. несмотря на b. благодаря c. вследствие
2. boundary	a. распределение b. граница c. сравнение	8. reduce	a. сокращать b. увеличивать c. создавать
3. data	a. данные b. дата c. давление	9. westerlies	a. восточные ветры b. западные ветры c. северные ветры
4. dry	a. влажный b. сухой c. насыщенный	10. cause	a. следствие b. причина c. явление
5. reach	a. достигать b. насыщать c. обогащаться	11. smog	a. туман b. дым c. смог
6. uplift	a. опускание b. равновесие c. подъем	12. to result in	a. быть результатом b. приводить к чему-л. c. стремиться к чему-л.

III. В левом столбце определите слово, **после** которого должно следовать слово из правого столбца. В своей работе укажите

буквой соответствующую строчку, а цифрой — искомое слово, например, а-2.

1 2 3 4 5 a. Man's relationship his natural environment	with
1 2 3 4 5 6 7 8 b. is a complex one he is subject to	Although
1 2 3 4 5 6 7 c. certain natural controls and events he acts	also
1 2 3 4 5 6 7 8 d. the dominant force in many of the Earth's	as
1 2 3 4 5 6 e. physical and biological systems some parts	In
1 2 3 4 5 6 7 f. of the world, man has transformed the	so
1 2 3 4 5 6 g. environment few elements of its original	that
1 2 3 4 5 h. nature are detectable extreme habitats	Even
1 2 3 4 5 6 i. such the tundra or hot deserts,	as
1 2 3 4 5 6 f. have not escaped untouched, they are	since
1 2 3 4 5 6 7 k. often the most sensitive the slightest interference.	to
1 2 3 4 5 6 l. Many apparently natural systems are fact	in
1 2 3 4 5 6 m. control systems in man acts either	which
1 2 3 4 5 n. consciously inadvertently as a regulator.	or

TT

I. Заполните пропуски подходящими по смыслу словами. (В своей работе укажите только последовательность цифр, обозначающих соответствующие слова.)

Of the main natural gases in the atmosphere, those most critical from an environmental point of view are carbon dioxide, oxygen and water vapour. Although nitrogen comprises four fifths of the . . . . it has an inert chemical nature . . . . this form. Since the Industrial Revolution, ... dioxide levels appear to have increased . . . . about 10 %, largely because of the . . . . of fossil fuels. The long-term . . . . of this trend, especially for climatic . . . ., are not clear but it has . . . . suggested that it will increase the . . . . of the atmosphere. Similarly, the large-scale . . . . of hydrocarbon fuels requires large quantities . . . . oxygen to be withdrawn from the atmosphere . . . . this may have undesirable long-term effect . . . . animal life.

1 2 3 4 5 6 7 8 9
and; by; been; temperature; on; use; change; of; atmosphere;
10 11 12 13
carbon; in; effects; combustion (сгорание)

II. В данном тексте определите, где кончается одно и начинается другое предложение. В своих работах укажите лишь слова, **после** которых начинается новое предложение.

One of the most valuable means of predicting climatic change is to explore climates of the past we have only recently begun to realise the sources of information on past climates that are open to us one such source is the remains of the many thousands of tiny shelled animals and plants that once lived near the surface of the ocean when they died, they settled towards the ocean bottom and they accumulated to form a continuous record of temperature change.

III. Письменно переведите следующий текст. Контрольное время для перевода — 20 минут.

Global Climates

Global climates can be classified according to effects or causes. Based on the pattern of the general circulation, seven major climatic zones can be recognized, plus mountain climates. The equatorial rain zone is dominated by the equatorial trough all year, the tropical summer rain zone partly by the trough and partly by the trade-wind, and the subtropical dry zone by dry trade winds throughout. The subtropical winter rain zone has summer trades and winter westerlies, whereas the large temperate westerlies belt receives westerlies at all seasons. The influence of the westerlies is still felt in the subpolar zone, but the high polar zone is dominated by polar easterlies. Significant local variations within these zones are caused by the effects of relief and the presence of water bodies. The character of the ground surface also influences local climate and is particularly distinctive in cities. Recent changes in climate are linked to fluctuations in the strength of the general circulation.

ТГ

I. Укажите буквой правильный перевод выделенных форм и словосочетаний.

1. The jet stream is a narrow, shallow river of strong winds. **It** is located in regions where there are large horizontal differences in temperature between warm and cold air masses.

a. это, b. он, c. именно

2. Aircraft icing is **one** of the major weather hazards to aviation.

a. не переводится, b. одна, c. оледенение

3. **It** is difficult to distinguish between cause and effect of wind, pressure and temperature because of their close interrelationship.

a. это, b. не переводится, c. именно

4. When **one** moves from one climate to another of different characteristics, the process of acclimatization is largely a physiological adaptation to new levels of heat production.

a. один, b. не переводится, c. климат

5. **It** is the brightness of the daytime sky **that** prevents the observation of the other astronomic objects.

a. это ..., которая, b. именно

6. A fundamental axiom in **forecasting** is that weather conditions in the middle latitudes move generally eastward.

a. при прогнозировании, b. прогнозируя, c. прогнозирующий

7. Physically, a hail stone **appears to be** formed by collision and coalescence of undercooled water drops with some kind of ice pellet.

a. как оказывается, b. появляется, c. существует

8. The artificial supply to clouds of hygroscopic nuclei **to accelerate** the Bergeron rain-making mechanism has been applied in different countries.

a. необходимо ускорить, b. для того, чтобы ускорить, c. ускорять

9. Both the amount and the intensity of rainfall are important in **modifying** the forms of the land.

a. при изменении, b. изменяющий, c. изменяя

10. **In order to** form a picture of the climate we must know the distribution of rain throughout the year.

a. в порядке..., b. для того, чтобы..., c. необходимо, чтобы...

ГИДРОЛОГИЯ

Блок 1. THE SCIENCE OF HYDROLOGY

LESSON 1

Упражнение 1. (Парная работа). Прочитайте заглавие приводимого ниже текста. Подумайте, о чем в нем может идти речь; приведите 10—12 слов, которые, с вашей точки зрения, должны в нем встретиться.

Прочитайте текст про себя (контрольное время — 3 минуты) и определите, совпали ли ваши предположения с содержанием текста.

Text 1A. The Central Concept of Hydrology

Hydrology is the science that relates to water. It is concerned with the occurrence of water in the earth, its physical and chemical reactions with the rest of the Earth, and its relation to the life of the Earth. It includes the description of the Earth with respect to its waters. It is not concerned primarily with the physical and chemical properties of the substance known as water. Like geology and other Earth sciences, it uses the basic sciences as its tools, but in doing so, it has developed a technique and subject matter that are distinct from those of the basic sciences.

The central concept in the science of hydrology is the so-called hydrologic cycle — a convenient term to denote the circulation of the water from the sea, through the atmosphere, to the land; and hence, with numerous delays, back to the sea by overland and subterranean routes, and in part, by way of the atmosphere; also the many short circuits of the water that is returned to the atmosphere without reaching the sea.

The science of hydrology is especially concerned with the second phase of this cycle — that is, with the water in its course from the time it is precipitated upon the land until it is discharged into the sea or returned to the atmosphere. It involves the measurement of the quantities and rates of movement of water at all times, and at every stage of its course.

Упражнение 2. Прочитайте следующие слова и определите их соответствия в русском языке.

Physical; chemical; reactions; substance; geology; subject; central; concept; hydrologic; cycle; circulation; atmosphere; phase; course.

Упражнение 3. (Парная работа). Определите значения выделенных слов, исходя из контекста.

1. Hydrology is the science that **relates** to water.
2. Hydrology is **concerned** with physical and chemical reactions of water with the rest of the Earth.
3. Hydrology is not concerned with the physical and chemical **properties** of water.
4. Hydrologic cycle is a convenient **term** to denote the circulation of the Earth's waters.

Упражнение 4. (Парная работа). Определите русские эквиваленты английских слов.

basic	a. база	especially	a. специальный
	b. основывать		b. особенно
	c. основной		c. специальность
route	a. путь	stage	a. распределять
	b. рубеж		b. перемещение
	c. двигаться		c. стадия
measurement	a. измерение	description	a. измерение
	b. измерять		b. разрушение
	c. мера		c. описание

Упражнение 5. Какие части речи обозначаются в словарях следующими сокращениями:

v.; adv.; a.; n.; pron.; part.; prep.

Упражнение 6. Определите изначальные формы следующих слов; найдите их значения в словаре.

Relates; concerned; includes; properties; known; uses; developed; called; reaching; involves.

Упражнение 7. (Парная работа). Выпишите из каждого абзаца текста 1А 3—4 ключевых слова.

Упражнение 8. (Парная работа). Из приведенных ниже предложений выберите те, которые можно использовать в качестве подзаголовков к двум первым абзацам текста.

1. Предмет гидрологии как науки.
2. Физические и химические свойства воды.
3. Гидрологический цикл.
4. Морские воды.
5. Испарение с водной поверхности.
6. Описание Земли.

Упражнение 9. Используя информацию, полученную из прочитанного текста 1А, расскажите по-русски:

— о предмете гидрологии как науки;
— о взаимосвязи гидрологии с другими науками;
— о гидрологическом цикле как основном понятии гидрологии.

Упражнение 10. (Парная работа). Выберите в тексте 1А 2—4 предложения, которые наиболее полно отражают его содержание.

Упражнение 11. Составьте краткий план пересказа текста 1А.

Упражнение 12. В левом столбце приводятся некоторые глагольные формы, в правом — личные местоимения. Подберите соответствующие друг другу элементы из правого и левого столбца.

a. am	1. you	2. we	3. I	4. she
b. are	1. I	2. she	3. you	4. they
c. is	1. I	2. he	3. it	4. we
d. was	1. you	2. I	3. she	4. they

Упражнение 13. Поставьте глаголы-сказуемые данных предложений в форму Present Indefinite.

1. Hydrology (to be) the science that (to treat) of the waters on the Earth.
2. Hydrology in a broad sense (to be) the science of water, its properties, phenomena and distribution.
3. The domain of hydrology (to embrace) the full history of water on the Earth.
4. Hydrology (to include) the description of the Earth with respect to its waters.
5. Hydrology (to use) the basic sciences as its tools, but it has developed a technique and subject matter that (to be) distinct from those of the basic sciences.

Упражнение 14. Найдите подлежащее и сказуемое в предложениях первого абзаца текста 1А.

Упражнение 15. Письменно переведите первый абзац текста 1А. (Контрольное время — 15 минут.)

Блок 2. HYDROLOGIC CYCLE

LESSON 2

Упражнение 1. (Парная работа). До того, как вы прочитаете текст 2А, попытайтесь вспомнить, что вам известно о гидрологическом цикле и его компонентах. Постарайтесь определить 8—10 терминов, связанных с понятием гидрологического цикла, которые, на ваш взгляд, должны встретиться в этом разделе.

Упражнение 2. Прочитайте текст 2А (контрольное время — 5 минут) и найдите в нем ответы на следующие вопросы:

1. Что такое «гидрологический цикл»?
2. Какие формы воды находятся в атмосфере?

3. В чем заключается механизм образования осадков?

4. Где и как происходят потери осадков при их выпадении?

5. Что происходит с осадками, достигающими поверхности Земли?

Text 2A. Atmospheric Moisture. Precipitation

The movement of water as it relates to the Earth is called the «hydrologic cycle». The major elements in the hydrologic cycle are clearly indicated, but further elaboration is desirable.

Atmospheric Moisture. — All moisture with which man is concerned practically is assumed to originate from atmospheric moisture. This is merely a convenient starting point from which to trace the complete water cycle. Atmospheric moisture consists of water vapour, clouds, and fog. Water vapour is the gaseous state of water, and is present in the atmosphere because of evaporation processes on the land or from water surfaces. Clouds and fog are created by the condensation of water vapour upon small nuclei in the atmosphere, such as salt or dust particles.

Precipitation. — When water vapour in the atmosphere is cooled, condensation results, and when the resulting water droplets obtain a sufficient size, they fall as «rain». If the raindrops pass through zones of temperature below freezing, hail results. If condensation occurs at temperatures below freezing, snow is formed. If condensation of water vapour takes place directly on a surface cooler than the air, either dew or frost is formed, depending upon whether the temperature at which condensation occurs is above or below freezing.

Precipitation Not Reaching the Ground. Some precipitation is evaporated during its fall. Some precipitation is intercepted by vegetation, from which a part is subsequently evaporated into the atmosphere; this is called «interception», and may amount to a considerable part of the precipitation.

Precipitation Reaching the Ground. — Of the precipitation which reaches the ground some infiltrates into the ground, some runs off over the surface, and some evaporates or is transpired back into the atmosphere.

Упражнение 3. (Парная работа). Прочитайте следующие слова и найдите их соответствия в русском языке; определите, к каким частям речи они относятся.

Indicate; element; practically; atmospheric; starting; consist; gaseous; condensation; nucleus; zone; temperature; infiltrate.

Упражнение 4. Заполните таблицу словами из текста 2А по следующему образцу, принимая во внимание значение соответствующих словообразовательных элементов:

Глаголы	Существительные	Прилагательные	Причастия	Наречия
precipitate	precipitation	gaseous	reaching created	directly

Упражнение 5. В научно-технической литературе часто встречаются абстрактные существительные, служащие для обозначения процессов, явлений, качеств каких-либо предметов. Характерными суффиксами таких существительных являются: -tion (penetration); -ance (distance); -ty (equality); -ing (freezing); -ment (displacement); -ence (correspondence) и др

Образуйте абстрактные существительные от следующих слов; проверьте их значения по словарю.

to move	to occur	constant
to assume	to intercept	direct
to evaporate	to complete	dry
to condense	important	to depend

Упражнение 6. Заполните пропуски подходящими по смыслу словами.

1. The movement of water as it relates to the Earth is called . . . . . .
2. Atmospheric moisture consists of . . . . . .
3. When water in the atmosphere is cooled . . . results.
4. If condensation occurs at temperatures below freezing . . . . . is formed.
5. Of the precipitation which reaches the ground some . . . into the ground, some . . . over the surface.

Упражнение 7. В правой колонке найдите русские эквиваленты следующих словосочетаний.

1. movement of water	1. газообразное состояние
2. major elements	2. ниже точки замерзания
3. starting point	3. часть осадков
4. water cycle	4. движение воды
5. atmospheric moisture	5. процесс испарения
6. gaseous state	6. водный цикл
7. salt particles	7. солевые частицы
8. water vapour	8. основные элементы
9. below freezing	9. атмосферная влага
10. part of precipitation	10. отправная точка
11. evaporation process	11. водяной пар

Упражнение 8. (Парная работа). Прочитайте приложение 2, в котором говорится о связующих элементах, и определите, к каким разновидностям принадлежат те связующие элемен-

ты, которые встретились вам в прочитанном тексте 2А (например, but, with, because, etc.). Выпишите эти слова и запомните их значения.

Упражнение 9. (Парная работа). Прочитайте приложение 1. Найдите в первом абзаце текста 2А основную идею, главные и второстепенные детали. Заполните в тетрадях графы следующей таблицы:

основная идея	
главная деталь	
второстепенные детали	

Упражнение 10. Переведите первый абзац текста 2А письменно. (Контрольное время — 15 минут.)

Упражнение 11. В приводимом ниже отрывке текста содержится два предложения, которые по своему смыслу не соответствуют его общему содержанию. Определите эти предложения.

1. Hydrology is an Earth science dealing with the occurrence and movement of water upon and beneath the land areas of the globe. 2. With this definition, we may think of hydrology as being bounded above by meteorology, below by geology, and at land's end by oceanography. 3. Glaciation has important effects on the landscape. 4. Geomorphologically, periglacial regions are very active. 5. The several sciences are not blocks to be fitted into individual compartments, and perhaps none of them represents a distinct body of subject matter so much as it represents a different point of view.

Упражнение 12. (Парная работа). В приведенной ниже таблице поставьте плюс в соответствующей колонке, предварительно определив, правильным или неправильным является то или иное утверждение.

Right	Wrong	
		1. If condensation occurs at temperatures below freezing rain results. 2. Water vapour is the solid state of water. 3. All moisture with which man is concerned practically is assumed to originate from underground moisture. 4. Clouds and fog are created by condensation of water vapour upon small nuclei in the atmosphere. 5. Some precipitation is evaporated during its fall.

Упражнение 13. Поставьте приведенные ниже глаголы в форму Past Indefinite:

concern; relate; call; originate; consist; obtain; fall; freeze; take; depend; be; run; evaporate.

Упражнение 14. В данном тексте поставьте глаголы-сказуемые в форму Past Indefinite.

How River Valleys are Formed

In the meantime other forces (to be) at work. Rainstorms (to form) streams that (to cut) grooves in the side of the canyon. Lichens (to grow) on the rock and (to help) crumble it. Tree roots (to push) their way into cracks in the rock and (to split) it into pieces.

LESSON 3

Упражнение 1. (Парная работа). Определите, какие из перечисленных ниже слов и словосочетаний могут, на ваш взгляд, встретиться в тексте 2B. Если среди этих слов вы встретите незнакомые, найдите их значения в словаре:

precipitation; volcanoes; infiltration capacity; porous strata; stream channel system; warm glaciers; surface of the ground; erosion; percolation; discharge into the ocean; water table.

Теперь прочитайте текст и проверьте правильность своих предположений. Контрольное время — 5 минут.

Text 2B. Surface Runoff and Ground Water

Surface Runoff. When the rate of precipitation exceeds the rate at which water may infiltrate into the soil (infiltration capacity), surface runoff usually occurs. This part of the precipitation after filling the surface depressions finds its way over the surface of the ground until it reaches the beginning of a definite stream channel system, through which it passes and is discharged ultimately into the ocean or some inland water body. There is some loss in transit because of evaporation to the atmosphere and infiltration to the bottom and sides of the channel. The latter may vary from practically zero to nearly 100 %.

Ground Water. A portion of the precipitation penetrating the ground surface as infiltration will percolate into the ground. If not absorbed by soil deficient in moisture, or by porous rocks, this water eventually reaches a level which is completely saturated — the «ground water table». The slope and confining structure surrounding the ground water body may be such as to prevent its immediate release; or the ground water body may intersect

a stream bed where part of it will be returned to a body of surface water. Ground water may also flow through porous strata and reach a level where it may be confined by tighter soils and thus subjected to pressure. If a well penetrates to this level, it may be artesian and the water discharged will likewise become part of the surface water. The same pressure zone may contact the ocean bed and discharge water into the sea.

Thus, the atmospheric moisture with which this description of the cycle started may follow paths of various lengths and complexity before it can complete the circuit.

Упражнение 2. Прочитайте следующие слова и найдите их соответствия в русском языке.

Infiltrate; depressions; channel; system; ultimately; transit; vary; practically; portion; absorb; deficient; structure; prevent; contact; complexity.

Упражнение 3. В правой колонке найдите русские эквиваленты соответствующих словосочетаний:

1. rate of precipitation	1. испарение в атмосферу
2. water body	2. просачивание в землю
3. surface of the ground	3. дефицит почвенной влаги
4. stream channel	4. русло потока
5. evaporation to the atmosphere	5. водное зеркало
	6. речное русло
6. percolation into the ground	7. пористый пласт
7. soil moisture deficit	8. норма осадков
8. water table	9. водоем, водная масса
9. stream bed	10. поверхность Земли
10. porous stratum	

Упражнение 4. Найдите в тексте 2В эквиваленты следующих словосочетаний:

иметь место; часть осадков; заполнять впадины; потери при переходе; стороны канала; пористые породы; пересекать русло потока; протекать через пористые пласты; достигать уровня; проникать в поверхность земли; атмосферная влага; поглощаться почвой.

Упражнение 5. (Парная работа). Выпишите из текста 2В все термины, относящиеся к понятиям «грунтовая вода», «поверхностный сток».

Упражнение 6. Закончите приведенные ниже предложения.

1. When the rate of precipitation exceeds the rate at which water may infiltrate into the soil (имеет место поверхностный сток).

2. A portion of the precipitation penetrating the ground surface as infiltration (просачивается в землю).
3. If a well penetrates to a level where it may be confined by tighter soils (он может быть артезианским).
4. The atmospheric moisture may follow paths (различной длины и конфигурации).
5. There is some loss in transit because of (испарения и просачивания в дно и стенки русла).

Упражнение 7. (Парная работа). Какие из данных положений, с вашей точки зрения, наиболее полно отражают основные идеи текста 2B.

1. Surface runoff occurs when the rate of precipitation exceeds the rate of water infiltration into the soil.
2. Precipitated water fills the surface depressions.
3. A portion of the precipitated water percolates into the ground.
4. Percolated water eventually reaches a level at which is completely saturated — «the ground water table».
5. The ground water body may intersect a stream bed.
6. The atmospheric moisture may follow paths of various lengths and complexity before it can complete the circuit.

Упражнение 8. (Парная работа). Во втором абзаце текста 2B найдите:

— основную идею;
— главные детали;
— второстепенные детали.

Упражнение 9. Письменно переведите следующий текст. Контрольное время — 20 минут.

Ground water

Ground water as defined by geologists and engineers, comprises only that portion of the water which lies within the zone of saturation or below the water table. It does not include the suspended water which is held in the ground above that zone but does include the water which lies below a perched water table. Water above the zone of saturation and near the ground surface is of major importance in connection with agriculture because of its relation to plant growth. Much of this water, of course is utilized and transpired by vegetation and is thus returned to the atmosphere without penetrating deeply below the surface or becoming a part of the body of ground water.

Упражнение 10. Среди приведенных ниже глагольных форм укажите формы Participle II.

Exceeds; to infiltrate; occurs; passing; discharged; been; may; to percolate; absorbed; known; saturated; confining; surrounding; to prevent; returned; flows.

Упражнение 11. В приводимом прогнозе погоды поставьте глаголы-сказуемые в форму Future Indefinite.

Weather Forecast. General Situation

South-eastern parts of England (to be) cloudy and windy with rain, some heavy and thundery. This (to spread) north during the day to some northern and eastern parts of England. Eastern parts of Scotland (to stay) rather cloudy with rain at times, but other parts of Britain (to have) some sunny intervals.

Упражнение 12. Заполните таблицу приведенными ниже прилагательными и наречиями по следующему образцу:

Положительная степень	Сравнительная степень	Превосходная степень
porous	more porous	most porous

tight; various; long; much; little; hard; soon; important; late; near; dependent; far; interesting.

Упражнение 13. В данном тексте определите, где заканчивается одно предложение и начинается другое.

Some of the water that falls on to a drainage basin runs off the land into streams and rivers while some goes underground the rest of the water however, unless it is used by man, is returned to the atmosphere by evaporation and transpiration.

LESSON 4

Упражнение 1. (Парная работа). Прочитайте текст 2С (контрольное время — 5 минут).

Среди приведенных после текста русских предложений укажите те, которые, на ваш взгляд, соответствуют его содержанию.

Text 2C. Evaporation and Transpiration

Evaporation. Water in the liquid state, when sufficiently subjected to heating by solar energy or otherwise, passes into the gaseous state. This phenomenon is called «evaporation».

Evaporation from Water and Snow Surfaces. — Of the total precipitation, a very large proportion falls directly upon the oceans, large inland lakes, and other water surfaces such as rivers and ponds. That falling on the ocean, together with the water returned as **runoff**, maintains the equilibrium evidenced by the substantially constant sea elevation. Parts of this precipitation on water surfaces are ultimately evaporated into the atmosphere and become part of the atmospheric moisture. In the Arctic and

in the northern areas of the temperate zones, evaporation from water and snow surfaces is frequently less than the precipitation, but the surplus in ultimately discharged to the oceans from which it is evaporated. Elsewhere, evaporation from water surfaces is generally equal to or greater than the precipitation falling on them.

Transpiration. One of the basic functions in the life processes of vegetation involves the process of taking water from the soil through the roots, utilizing it in producing growth and maintaining life, and discharging it from pores into the atmosphere as water vapour. This process of returning soil moisture to the atmosphere is called «transpiration». The amount of precipitation thus returned varies greatly with the character of vegetation and the moisture available to the root system of the plants.

1. Испарение — это переход вещества из жидкого состояния в газообразное.

2. Большинство известняков — морского происхождения; они образуются из осаждений, сформированных на дне древних морей.

3. В некоторых районах испарение с поверхности воды и снега меньше, чем количество осадков, выпадающих над этими районами.

4. Транспирация — это процесс испарения воды с поверхности растений.

5. Наиболее важными причинами береговой эрозии являются: ветер, волны, прибрежные течения.

Упражнение 2. (Парная работа). В разделе «Transpiration» текста 2С вам, вероятно, встретились незнакомые слова. Выпишите их, сравните с теми, которые выписал ваш сосед, и обсудите их значение. Правильность своих предположений проверьте по словарю.

Упражнение 3. (Парная работа). Определите значения выделенных слов, исходя из контекста.

1. Water when subjected to heating by **solar** energy passes into the gaseous state.

2. A very large proportion of precipitation falls directly upon the oceans, lakes and other water surfaces such as rivers, **ponds**.

3. That falling on the ocean, together with the water returned as runoff, maintains **equilibrium.**

4. Parts of this precipitation on water surfaces are **ultimately** evaporated into the atmosphere.

5. In the Arctic and in the northern areas of the **temperate** zones evaporation from water and snow surfaces is less than precipitation.

6. **Elsewhere,** evaporation is generally equal to precipitation.

Упражнение 4. Найдите в правой колонке русские эквиваленты следующих словосочетаний:

1. liquid state	1. внутриматериковое озеро
2. total precipitation	2. поддерживать равновесие
3. inland lake	3. основная функция
4. water surface	4. умеренный пояс
5. to maintain equilibrium	5. сумма осадков
6. temperate zone	6. почвенная влага
7. basic function	7. жидкое состояние
8. soil moisture	8. характер растительности
9. character of vegetation	9. водная поверхность
10. root system	10. корневая система.

Упражнение 5. Выпишите из текста 2С все существительные и прилагательные, которые по своим значениям так или иначе связаны с понятием «вода».

Упражнение 6. Разместите предлагаемые ниже слова и словосочетания по следующим тематическим группам.

Гидрологические термины	Связующие элементы	Общенаучная лексика

To maintain; upon; function; equilibrium; otherwise; heating; solar energy; elsewhere; discharge; phenomenon; liquid state; transpiration; amount; to pass; inland lakes; pond; together with; runoff.

Упражнение 7. (Парная работа). Заполните пропуски в тексте приводимыми ниже связующими элементами.

The loss of moisture . . . the atmosphere . . . leaves and other parts of plants is called transpiration. A field . . . corn . . . the growing season may transpire an amount of soil moisture . . . equal to a depth of 30 cm of water covering the entire field. Hydrologists and climatologists use the term evapotranspiration . . . a soil moisture loss . . . . . evaporation . . . transpriation.

during; both...and; to; of; for; by; almost; due to.

Упражнение 8. Прочитайте текст 2С еще раз и укажите в нем те строчки, в которых говорится о:

— районах, где количество осадков превышает испарение;

— процессе возвращения почвенной влаги в атмосферу;

— соотношении между количеством осадков, возвращающихся в атмосферу, и характером растительного покрова;

— испарении.

Упражнение 9. Выпишите по пять ключевых слов из каждого абзаца текста 2С.

Упражнение 10. (Парная работа). На основе прочитанных текстов 2А — 2С нарисуйте схему гидрологического цикла, обозначив по-английски каждую из его фаз.

Упражнение 11. В данных предложениях содержатся смысловые ошибки. Найдите и исправьте их.

The Moon is the source of the energy that activates the hydrologic cycle. The consumption of heat from the Sun in the evaporation of moisture from land and water surfaces and in transpiration of soil moisture by vegetation is the process by which precipitated water is accumulated in the ground.

Упражнение 12. Следующие положения упоминаются в тексте 2С. Определите, какие из них представляют основную идею, какие — второстепенные детали.

1. Water in the liquid state, when subjected to heating, passes into the gaseous state.
2. Parts of precipitated water are evaporated into the atmosphere.
3. In the Arctic evaporation from water and snow surfaces is frequently less than the precipitation.
4. One of the basic functions in the life processes of vegetation is transpiration — that is the process of returning soil moisture to the atmosphere.
5. The amount of transpiration varies greatly with the character of vegetation.

Упражнение 13. Письменно переведите следующий текст. Контрольное время — 15 минут.

Evaporation

Moisture exists in all three states of matter in the atmosphere, as vapour, liquid, or solid; changes from one to the other are known as phase changes, and significant amounts of energy are involved in accomplishing these changes. In the process of evaporation, 600 calories of latent heat are required to change one gram of water from a liquid to a vapour state. Normally such a heat loss would be quickly compensated by conduction and radiation. In the reverse process of condensation, latent heat is released into the atmosphere, causing a slight rise in temperature.

Упражнение 14. В тексте 2С найдите предложения, глаголы-сказуемые которых выражены формами страдательного залога.

Упражнение 15. Перепишите предложения, поставив глаголы-сказуемые в форму страдательного залога соответствующего времени.

1. The moisture evaporated (to lift, to carry) and temporarily stored in the atmosphere (Present Indefinite).
2. Evaporation (to determine) from records of the water level changes in the pan (Present Indefinite).
3. Man (to affect) by water in the development of his civilization (Present Perfect).
4. If there is a vegetative cover over the soil surface, then any precipitation (to catch) and (to redistribute) (Future Indefinite).
5. The void spaces in the soil and rock function as a tremendously large reservoir to which water (to add) by infiltration (Present Continuous).

Упражнение 16. Найдите в тексте 2С глагольные формы, оканчивающиеся на -ed; определите, к каким частям речи они относятся; переведите их на русский язык.

Упражнение 17. Расставьте предложения, исходя из их лексической последовательности.

1. Since the air contains water vapour, it will condense into millions of tiny droplets of water and ice.
2. As air rises, it becomes cooler.
3. These form clouds.
4. They fall as rain, hail, snow or sleet.
5. If the condensation continuous, the droplets become too heavy to be held up.

Упражнение 18. Предварительно ознакомившись с приложением 3, прочитайте вслух цифры, содержащиеся в данной таблице:

Water of the Earth

Water	Cubic Kilometers
Oceans	1,330,000 000
Glaciers, ice fields	29,400,000
Lakes, inland seas, rivers	230,000
Subsurface	8,500,000

Тесты к блокам 1—2

ТЛ

I. Заполните пропуски в предложениях, выбрав соответствующие варианты предлагаемых слов:

1. The study of the origin, history, occurrence, and structure of rocks is called . . . . .
a. petrology, b. hydrology

2. . . . . is the interchange of water substance between the ocean, the atmosphere and the land areas of the Earth.

a. evaporation, b. hydrologic cycle

3. When the rate of precipitation exceeds the rate of infiltration of water into the soil . . . . usually occurs.

a. surface runoff, b. ground evaporation

4. Water vapour is the . . . . .

a. liquid state of water, b. gaseous state of water, c. solid state of water.

5. Rain or melting snow enter the interstices of the soil. This process is called . . . . .

a. saturation, b. condensation, c. infiltration

II. Укажите цифрой слова, которые по своему значению не соответствуют данной тематической группе:

1 2 3 4 5 6
moisture: evaporation; process; dream; precipitation; congratu-
7 8 9 10
lation; car; condensation; channel; discharge.

III. В левом столбце определите слово, **перед** которым должно находиться слово из правого столбца. В своей работе укажите букву, соответствующую той или иной строчке и цифру, обозначающую искомое слово, например, а-1, с-2 и т. д.

1 2 3 4 5 a. Water continually evaporates the atmosphere	into
1 2 3 4 5 6 7 b. land areas, from ocean, lake and stream	from
1 2 3 4 5 6 c. surfaces from plant transpiration. Winds carry	and
1 2 3 4 5 6 d. the water vapour it eventually precipitates	until
1 2 3 4 5 6 7 8 9 e. to the Earth again rain or snow. The water	as
1 2 3 4 5 6 f. is temporarily stored underground and glaciers	in
1 2 3 4 5 6 7 8 g. and lakes returning to the sea by surface	before
1 2 3 h. runoff underground seepage.	and

IV. Найдите термины, которыми можно было бы заменить следующие словосочетания:

a. the circulation of water from sea, through the atmosphere, to the land;

b. gaseous state of water;

c. the loss of moisture to the atmosphere by leaves and other parts of plants;

d. the residual amount of rainfall that remains after evaporation and transpiration.

ТГ

I. По выделенным словообразовательным элементам определите, к какой части речи принадлежат следующие слова:

1. central — a. существительное, b. прилагательное, c. наречие
2. primarily — a. существительное, b. прилагательное, c. наречие
3. property — a. существительное, b. прилагательное, c. наречие
4. intensify — a. существительное, b. глагол, c. числительное
5. movement — a. существительное, b. причастие, c. глагол

II. Выберите правильный перевод следующих форм и словосочетаний.

1. **is called**	a. называлось b. называется c. названный
2. **have been utilized**	a. используется b. используемый c. использовалось
3. **most common**	a. обычный b. самый обычный c. более обычный
4. **absorbed water**	a. поглощенная вода b. поглощаемая вода c. вода поглощалась
5. **is evaporated**	a. испаряется b. испаряемый c. испаренный
6. **melting snow**	a. растаявший снег b. таяние снега c. тающий снег
7. **will evaporate**	a. испарился b. испарится c. испаряемый
8. **The shallower the lake, ...**	a. мелкое озеро b. чем мельче озеро c. более мелкое озеро

ТТ

1. Найдите в тексте 2В и обозначьте цифрами два предложения, которые не соответствуют его общему содержанию.

1. Runoff is the total amount of rainfall which reaches a stream channel and flows out of the watershed. 2. Runoff includes water flowing over the surface to the channel as well as that which reaches the stream by infiltration. 3. Runoff is the residual amount

of rainfall that remains after evaporation and transpiration takes place. 4. It has been estimated that approximately 80 % of the world's rainfall is lost to rivers and only the residual 20 % becomes runoff. 5. Polar front is a dense, cold air mass sliding under tropical air like a wedge. 6. As the lighter warm air rises, it cools and clouds and precipitation follow.

II. Укажите буквами те утверждения, которые, на ваш взгляд, являются правильными:

a. Fog is created by condensation of vater vapour upon small nuclei in the atmosphere.

b. Parts of precipitation on water surfaces are evaporated into the atmosphere.

c. The amount of precipitation returned to the atmosphere by transpiration does not depend on the character of vegetation.

d. Two phases of the hydrologic cycle are rainfall and runoff.

e. Lithosphere includes surface water, subsurface water, snow, ice fields, glaciers, etc.

III. Письменно переведите следующий текст. Контрольное время — 20 минут.

Hydrosphere

All the water, both liquid and frozen, found in the oceans, on land and underground as well as the water vapour in the atmosphere is called hydrosphere. It is an envelope of irregular thickness around the planet. Along with the atmosphere, lithosphere, biosphere and centrosphere, it is one of five spheres of the Earth. It includes surface water, subsurface water, snow, ice fields, glaciers, ice in the ground, and the gases, liquids and solids suspended or dissolved in water. It was formerly believed that the hydrosphere condensed out of a primitive atmosphere as it slowly cooled. However, evidence now suggests that it was derived from the interior of the Earth and reached the surface by way of volcanic vents.

Блок 3. ROCKS AND SOILS

LESSON 5

Упражнение 1. Исходя из названия текста, определите, какие из приведенных ниже слов и словосочетаний могут, на ваш взгляд, в нем встретиться. Если среди приведенных слов вам встретятся незнакомые, найдите их значения в словаре.

Geography; branch; transpiration; relief; infiltration; crops; features; landforms; evaporation; droplets; agency; endogenous processes; exogenous processes; hydrograph; mountains; plateaux; crust; tectonics.

Теперь прочитайте текст и проверьте правильность своих предположений. Контрольное время — 3 минуты.

Text 3A. Geomorphology

The branch of geography which studies the Earth's relief features is known as geomorphology. This is concerned not only with the shape of landforms, but also with the agencies which create them. Land-forming processes may be grouped broadly into two types: internal or endogenous processes stemming from the tectonic forces beneath the Earth's surface; and external or exogenous processes related to surface weathering, water, wind, ice and the sea. Nearly all the Earth's major relief features, such as mountain chains, ocean trenches, basins and plateaux, are tectonically formed, even though their detailed landforms may be the result of exogenous sculpturing. It is important that we know something of the structure of the Earth's crust and the forces at work within it, particularly in the context of the modern concept of plate tectonics. Another way, in which geological considerations are important in landform studies is that different rocks vary considerably in their resistance to erosion.

Упражнение 2. Прочитайте следующие слова и определите их соответствия в русском языке:

geography; relief; geomorphology; process; tectonics; endogenous; exogenous; major; ocean; basin; plateaux; detail; result; sculpture; structure; context; concept; erosion.

Упражнение 3. Найдите в тексте 3А эквиваленты следующих словосочетаний:

отрасль географии; форма рельефа; внутренние процессы; внешние процессы; тектонические силы; горные цепи; океанический желоб; земная кора; тектоника плит; сопротивление эрозии.

Упражнение 4. Найдите в тексте 3А ответы на следующие вопросы:

1. Что изучает геоморфология?
2. Что такое «эндогенные процессы»?
3. С какими явлениями связаны «экзогенные процессы»?
4. Каков характер происхождения таких форм рельефа, как горные цепи, океанические желоба, горные плато и т. д.?

Упражнение 5. Заполните графы приводимой ниже таблицы словами, относящимися к следующим понятиям:

Land-forming processes	Relief features

Упражнение 6. Заполните пропуски соответствующими словами из текста.

1. The branch of geography which studies the Earth's relief features is called . . . .
2. Land-forming processes may be grouped broadly into two types . . . . and . . . .
3. Nearly all the Earth's major relief features are . . . . formed.
4. Exogenous processes may result in formation of . . . . . .
5. Different rocks . . . . considerably in their resistance to erosion.

Упражнение 7. (Парная работа). Если бы перед вами стояла задача выбрать **одно** предложение в качестве ключевого ко всему тексту, какое предложение вы бы выбрали?

Упражнение 8. (Парная работа). Придумайте 3—5 вопросов к тексту 3А. Попросите ответить на них другую пару студентов. Обменяйтесь вопросами.

Упражнение 9. Выберите правильный вариант ответа на поставленные вопросы:

1. What science studies the natural and human systems which make up the Earth?	a. Geomorphology b. Geography c. Biology
2. What instrument is used to measure earthquakes?	a. Thermometer b. Seismograph c. Anemograph
3. Nearly all the Earth's major relief features are tectonically formed, aren't they?	a. Yes b. No c. I don't know

Упражнение 10. Переведите текст письменно. Контрольное время — 20 минут.

Geomorphology Defined

Geomorphology is a geologic science dealing with the surface features of the Earth, including those on land and under the oceans, and, in particular, with the characteristics, origin and geologic history of all landforms. It also deals with the physical and chemical processes that act at or near the Earth's surface, such as weathering, rivers, groundwater, glaciers, wind and so on.

Geomorphography is the description of geomorphic features, Geomorphogeny* deals with the origin of geomorphic features. Paleogeomorphology deals with ancient erosion surfaces and other kinds of ancient topography, whether buried or at the Earth's surface.

* Геоморфогения.

Упражнение 11. Прочитайте следующий текст вслух. Особое внимание обратите на чтение цифровых данных.

Do you know that:

— the Earth is not a perfect sphere, it is widest at the equator (12,756 km diameter) and shortest at the poles (12,714 km diameter);

— a journey round the equator is 40,076 km;

— the Earth spins once every 23 hrs 56 min and 4 secs;

— 70 % of the Earth's surface is covered by oceans;

— 7 large land masses called continents cover the remaining 30 %;

— the difference between the highest point of land (Mount Everest at 8,848 m) and the deepest part of the ocean (the Marianas Trench at 11,035 m) is small compared to the size of the Earth.

Упражнение 12. Укажите, в каких предложениях текста 3А формы на -ing соответствуют русскому причастию с окончаниями на -щий, -щая, -щее.

Упражнение 13. В следующих предложениях выберите правильную форму причастия.

1. Crustal material (forming/formed) the continents is (composing/composed) of two sublayers.

2. The activities of animals (included/including) humans and plants are also (including/included) as exogenic processes.

3. These processes erode, transport and deposit (produced/producing) many of the rocks and (formed/forming) most landforms.

4. Tectonics is a branch of Earth science (dealt/dealing) with the larger structure features (finding/found) on or near the Earth's surface.

5. The average amount of water (held/holding) as soil moisture at any (giving/given) time is in the order of 6,000 cubic miles for the world as a whole.

Упражнение 14. Переведите следующие сочетания имен существительных на русский язык. При необходимости используйте словари по специальности.

Water losses, forest cover, infiltration capacity, infiltration capacity values, soil moisture measurement, snowmelt problems, stream flow hydrograph, surface water storage problem.

LESSON 6

Упражнение 1. Прочитайте текст и постарайтесь понять его содержание. Среди приведенных после текста русских предложений укажите те, которые, на ваш взгляд, соответствуют его содержанию. Контрольное время — 5 минут.

Text 3B. Layers of the Earth

From a study of earthquake waves, it is known that the Earth is made up of a series of concentric zones: the crust, mantle, outer core and inner core. The crust varies greatly in thickness: beneath the oceans it is as little as 5 km in places, but extends down to 70 km beneath mountain ranges. Although many kinds of rock are found in the crust, they fall into two main groups. The ocean basins are underlain mainly by basaltic rocks containing much iron and magnesium and having densities of between 2.8 and 3.0. In continental areas, granitic rocks predominate; these are rich in silicon and magnesium and are lighter in both colour and weight.

The base of the crust is marked by a surface called the Moho, named after the seismologist Mohorovicic who discovered it. Below the Moho lie the even denser rocks of the mantle. The upper part of the mantle is solid to depths of about 100 km and, together with the crust, forms a relatively rigid shell round the Earth called the lithosphere. Underneath this in the mantle there exists a partially-molten layer which is capable of slow flowage. This zone is known as the astenosphere and reaches minimum strengh at depths of around 200 km; below this strength again increases. The recognition of these two zones is fundamental to the understanding of large-scale crustal movement.

1. Земля состоит из нескольких концентрических зон: коры, мантии, внешнего и внутреннего ядра.

2. Эрозия происходит тогда, когда поток обладает избытком энергии, но избыточная энергия не всегда приводит к эрозии.

3. Кора Земли неоднородна по толщине.

4. Общая площадь поверхности воды и суши на Земле составляет приблизительно 197 000 000 квадратных миль.

5. Шельф — это часть континентальной платформы, которая находится ниже уровня моря.

6. Горные породы, образующие кору Земли, делятся на 2 основных типа: базальт и гранит.

7. Характерной особенностью основания коры Земли является поверхность Мохоровичича.

8. Выделение двух оболочек Земли — литосферы и астеносферы — важны для понимания крупномасштабных движений земной коры.

Упражнение 2. Определите, какие соответствия в русском языке имеют следующие слова:

series; concentric; zone; mantle; extend; group; basin; basalt; granite; colour; lithosphere; fundamental.

Упражнение 3. (Парная работа). Определите значения выделенных слов по контексту.

1. From **a study** of earthquake waves, it is known that the Earth is made up of a series of concentric zones.

2. The crust varies greatly in **thickness**; beneath the oceans it is as little as 5 km, but extends down to 70 km beneath mountain ranges.

3. Although many kinds of rock are found in the crust, they **fall** into 2 main groups.

4. The ocean basins are **underlain** mainly by basaltic rocks.

5. In continental areas, granite rocks **predominate**.

6. The base of the crust is **marked** by a surface called the Moho.

Упражнение 4. (Парная работа). В тексте 3В, вероятно, остались слова, значения которых вы не знаете. Выпишите их, сравните с теми, которые выписал ваш сосед, и обсудите их предполагаемое значение. Правильность своих предположений проверьте по словарю.

Упражнение 5. Разместите приведенные ниже слова и словосочетания по соответствующим тематическим группам:

Термины	Общенаучная лексика	Связующие элементы

mantle; crust; to vary; although; groups; basaltic rocks; to contain; density; by; predominate; both ... and; weight; Moho surface; together with; lithosphere; underneath; flowage; again; below.

Упражнение 6. В каждом предложении первого абзаца текста 3В найдите подлежащее, сказуемое.

Упражнение 7. Устно переведите второй абзац текста 3В.

Упражнение 8. Прочитайте вслух по-английски следующие числительные:

7; 17; 70; 300; 700; 70,000; 226; 387; 8,472; 0,008; 6,282; 1/2; 1/5; 1/10; 8/9; 0.2; 0.002; 0,0002; 3.65; 26.407; 286.993; 124.944; 34 %; 1-й; 2-й; 9-й; 155-й; 1000-й.

Упражнение 9. Выберите правильный вариант перевода выделенных форм и словосочетаний.

1. **There are** in the United States nearly 12,000 observing stations, practically all of which take measurements of precipitation.
   a. там есть
   b. имеется
   c. имелось
2. **There exists** a partially-molten layer which is capable of slow flowage.
   a. там существует
   b. существует
   c. находится
3. Basaltic rocks **have** densities of between 2.8 and 3.0.
   a. имеют
   b. имели
   c. имеет

4. Scientists **have measured** the speed with which earthquake waves propogate through Earth materials of different densities.	a. имеют измерение b. измеряют c. измерили
5. As we **have seen**, the Earth is made up of a series of concentric zones.	a. видим b. видели c. должны видеть
6. It is known **that** the Earth is made up of a series of concentric zones.	a. что b. который c. именно
7. Continents are the parts of the continental platforms **that** stand above the oceans.	a. континент b. которые c. именно
8. Density of the oceanic crust is greater than **that** of the overall continental crist.	a. которая b. плотность c. что

LESSON 7

Упражнение 1. Прочитайте про себя предлагаемый ниже текст (контрольное время — 5 минут) и определите, на какие из данных вопросов можно найти в нем ответы.

1. Какие процессы становятся определяющими при формировании ландшафта по мере ослабления тектонической деятельности?

2. Какие формы рельефа являются наиболее характерными для Великобритании?

3. Что такое «вулканический вал»?

4. Какой вид горных пород образуется непосредственно из магмы?

5. На какие основные группы, с точки зрения происхождения, делятся горные породы?

6. На какие типы подразделяются осадочные породы?

Text 3C

External weathering and erosion processes gradually become the dominant factors in the development of the landscape as tectonic activity ceases or becomes very slow. The influence of geology remains important but passes to a more detailed level in which rock type (lithology) and structure may strongly influence local relief features. In all landscapes, the critical factor is not so much the absolute resistance of a rock as its resistance relative to the rocks around it. It is this which creates the pattern of high and low relief. For instance, in south-east England chalk is a relatively resistant rock in relation to adjacent strata, but in Northern Ireland it is soft compared to surrounding basalts.

Rocks are normally classified into three major groups according to their origin. Igneous rocks are those formed directly from magmas. These can be classed into extrusive (volcanic) and intrusive (plutonic) types, the latter cooling within the crust. Sedimentary rocks are composed of the broken-down products of older rocks, redeposited on land or under water by surface processes. Sedimentaries are subdivided into clastic rocks, formed by the mechanical aggregation of materials (as in shales or sandstones), and organic or chemical rocks, formed by the precipitation of soluble minerals (as in limestone). Metamorphic rocks are those which have undergone change because of great heat or pressure. This may occur to igneous, sedimentary, or even rocks that are already metamorphic. However, from the point of view of landforms it is the mineralogical composition of rocks that is more significant than their origin, especially in determining weathering characteristics.

Упражнение 2. (Парная работа). Выберите наиболее подходящий, на ваш взгляд, заголовок для текста 3С.

1. Weathering and Erosion.
2. Tectonic Activity.
3. Lithology.
4. Igneous and Sedimentary Rocks.
5. Resistance of Rock.

Упражнение 3. (Парная работа). В правой колонке найдите русские эквиваленты следующих слов и словосочетаний:

1. weathering process	1. изверженные породы
2. dominant factor	2. точка зрения
3. tectonic activity	3. тектоническая деятельность
4. relief features	4. преобладающий фактор
5. igneous rocks	5. осадочные породы
6. sedimentary rocks	6. механическое накопление
7. clastic rocks	7. растворимые минералы
8. mechanical aggregation	8. форма рельефа
9. soluble minerals	9. обломочные породы
10. point of view	10. процесс выветривания

Упражнение 4. Выпишите из текста 3С все существительные и прилагательные, которые имеют отношение к понятию «горные породы». Если вы не знаете значения какого-либо слова, найдите его в словаре.

Упражнение 5. Используя две колонки слов, составьте как можно большее количество словосочетаний:

important	processes
high	factor
metamorphic	rocks

surface	relief
organic	
low	
erosion	
critical	

Упражнение 6. (Парная работа). Найдите в тексте 3С, к каким существительным относятся следующие прилагательные; переведите эти словосочетания на русский язык.

Significant; dominant; external; tectonic; local; absolute; adjacent; major; extrusive; chemical.

Упражнение 7. Из приведенных ниже предложений выберите те, которые отражают основные идеи текста 3С.

1. In south-east England chalk is a relatively resistant rock in relation to adjacent strata.

2. In all landscapes, the critical factor is not so much the absolute resistance of a rock as its resistance relative to the rocks around it.

3. External weathering and erosion processes gradually become the dominant factors in the development of landscape.

4. Rocks are normally classified into three major groups according to their origin.

5. Metamorphic rocks are those which have undergone change because of great heat or pressure.

6. Sedimentaries are subdivided into clastic and organic rocks.

Упражнение 8. В приведенном отрывке текста содержится 3 смысловые ошибки. Не заглядывая в текст 3С, найдите эти ошибки и приведите правильные варианты.

Rocks are normally classified into three major groups according to their origin. Igneous rocks are composed of the broken-down products of older rocks redeposited on land or under water by surface processes. Sedimentary rocks are those which have undergone change because of great heat or pressure. Metamorphic rocks are those formed directly from magmas.

Упражнение 9. (Парная работа). Предложения данного текста написаны без знаков препинания. Обсудите, где кончается одно предложение и начинается другое.

Some rocks are formed when molten lava cools and hardens the minerals in the lava form interlocking crystals when they cool volcanic lava normally contains very small crystals since they do not have time to grow when lava can cool quickly if the lava cannot reach the surface it cools much more slowly so that there is time for the crystals to grow this type of rock therefore has larger crystals.

Упражнение 10. (Парная работа). В приводимом ниже тексте пропущено два предложения, которые приводятся ниже. Прочитайте текст и определите их место в нем.

1. Sideways pressure compresses thin grains of clay and re-arranges them to form slate. 2. Gneiss and schist are crystalline rocks which have been formed by a mixture of great heat and pressure in regions of mountain building. 3. Rocks like these often contain new and unusual minerals such as garnets.

I. This rock can split along the lines of weakness into thin sheets or slabs.

II. They are so highly altered by the regional metamorphism that it is difficult to recognize the original rock.

Упражнение 11. (Парная работа). Прочитайте текст 3С, подлинное название которого «Lithology», еще раз и переведите те его предложения, которые показались вам наиболее сложными. Обсудите перевод этих предложений между собой.

Упражнение 12. Заполните пропуски подходящими по смыслу словами.

The plates of the Earth's crust . . . . about carrying the continents with them. . . . . continents were therefore in different positions . . . . the past, and today they are . . . . moving. The slow movement over millions . . . . years is known as continental drift.

in; of; move; the; still.

Упражнение 13. Переведите письменно следующий текст. Контрольное время — 15 минут.

Rock

Rock is a mineral aggregate constituting an appreciable part of the Earth's crust. In the broad sense rock, when of considerable extent, includes beds of sand, gravel, clay and other noncohering masses of mineral materials. However, a more restricted usage implies a consolidated and relatively hard mineral aggregate. The expression «hard as a rock» reflects the latter and more common usage. Rocks have been given many different names depending on their origin, texture and mineralogy, but in general they are grouped into three main divisions: igneous, sedimentary and metamorphic.

Упражнение 14. Переведите следующие предложения, содержащие причастные конструкции, на русский язык.

1. Hydrology is a branch of physical geography dealing with the waters of the Earth.

2. Limestone strata are permeable, allowing the transmission of water.

3. A portion of the precipitation falling to the Earth's surface, may be stored on the vegetal cover.

4. Synoptic weather maps present the more important meteorological phenomena and their relationships, the principal ones being associated with the causes and occurrence of precipitation.

5. Igneous rocks can be classes into extrusive and intrusive types, the latter cooling within the crust.

6. At its source, surface runoff is largely governed by the laws of laminar flow, velocity being directly proportional to gradient.

Упражнение 15. Переведите предложения, обращая внимание на значение слова «it».

1. From the point of view of landforms it is the meneralogical composition of rocks that is more significant than their origin.

2. It is that portion of the precipitation that appears in surface streams.

3. It is in this zone that ground water storage occurs.

4. It is obvious that losses of water from atmometers provide an index of the evaporative ability of the atmosphere or latent evaporation.

5. As the water of a river moves, it is joined by water from other rivers.

6. When lava from volcanoes cools it forms a very dark coloured rock with fine crystals.

7. At night, when it gets cold the water in the cracks of the rocks freezes and expands which causes the cracks to widen.

8. In very cold countries and high in the mountains where it is equally cold, instead of rivers we find solid masses of ice.

9. It is of interest to note that at some point in each phase there usually occurs: transportation of water, temporary storage and change of state.

Упражнение 16. Заполните следующую таблицу прилагательными и наречиями, встретившимися в тексте 3С, по следующему образцу:

Положительная степень	Сравнительная степень	Превосходная степень
old	older	(the) oldest

LESSON 8

Упражнение 1. (Парная работа). Прочитайте краткое введение к предлагаемому ниже тексту. Подумайте и обменяйтесь мнениями о возможном содержании этого текста и его названии.

Выпишите 10—15 слов, которые, с вашей точки зрения, должны в нем встретиться.

Although there is no universally agreed definition, soils can be regarded as the uppermost weathered layer of the Earth's crust, consisting of decomposed and disintegrated bedrock* which has been altered to the extent that it can support plant life. Soils are therefore an integral part of both ecosystems and geomorphological systems, and play a vital role in the link between vegetation and climate. The scientific study of soils is known as pedology and the process of soil formation as pedogenesis.

А теперь прочитайте текст 3D и проверьте правильность своих предположений. Контрольное время — 5 минут.

Text 3D

Soils contain solid, liquid and gaseous matter. The solid part is partly inogranic, made up of mineral particles derived from the weathered rock material, and partly organic, consisting of living and decayed plant and animal materials such as roots and worms. The end-product of this biological decay is humus, black amorphous organic matter. Soil is also permeated by gases and by soil water, a dilute but complex chemical solution derived from precipitation and groundwater. The soil atmosphere fills the pore spaces of the soil when these are not occupied by water. After heavy rain the pore spaces will be entirely filled with water, but the water moves out rapidly by gravitational movement until the coarser pores are empty and water is no longer being supplied to gullies and field drains. The soil is then said to be at field capacity. Further removal of water may occur by evapotranspiration, until the pore spaces are largely airfilled and the soil becomes parched.

The texture of a soil refers to the sizes of the solid particles composing the soil. These range from gravel to clay and will vary from soil to soil and from layer to layer within the soil. Standard soil textural classes can be defined according to the ratipn of sand, silt and clay. A loam is an admixture of these three main particle sizes. Texture largely determines the water retention properties of a soil: in a sandy soil, pore spaces are too small for adequate drainage. The structure of a soil is a function of the way individual particles aggregate together into lupms. These can be described as being blocky, platy, crumbly, or prismatic. Clay soils tend to have a prismatic structure whereas, some sandy soils may lack aggregation altogether, in which case they have a single grain structure. Soils with a crumb structure are best for cultivation and are said to have a good tilth.

* bedrock — коренная порода.

Упражнение 2. (Парная работа). Найдите соответствия следующих слов и словосочетаний в русском языке:

universally; definition; integral; ecosystem; geomorphological; vital; vegetation; gaseous; mineral; organic; inorganic; complex; chemical; occupy; pore; gravitationl; standard; adequate; drainage; structure; function; individual.

Упражнение 3. Определите эквиваленты приводимых ниже связующих элементов в русском языке.

although —	a. чтобы b. хотя c. также
also —	a. поскольку b. также c. хотя
both ... and —	a. ни ... ни b. как ... так и c. не только ... но и ...
after —	a. до b. после c. сейчас
until —	a. несмотря на b. до тех пор, пока c. так как
according to —	a. например b. с другой стороны c. в соответствии с

Упражнение 4. (Парная работа). Найдите в тексте 3D эквиваленты следующих словосочетаний:

общепринятое определение; слой земной поверхности; растительная жизнь; составная часть; играть важную роль; процесс формирования почвы; минеральные частицы; конечный продукт; сложный химический раствор; сильный дождь; водоудерживающие свойства почвы.

Упражнение 5. Выберите английские эквиваленты приведенных глаголов:

рассматривать (как) —	a. to look (at) b. to see c. to regard (as)
состоять из —	a. to predominate b. to consist of c. to conclude
определять —	a. to determine b. to contain c. to remain

иметь место —	a. to place b. to occur c. to find
содержать —	a. to give b. to retain c. to contain
занимать —	a. to break b. to occupy c. to occur
недоставать —	a. to consist of b. to distribute c. to lack
давать определение —	a. to loose b. to fill c. to define

Упражнение 6. Найдите в гидрологическом словаре следующие термины:

weathered rock; humus; pore space; gully; to drain; drainage; field capacity; evapotranspiration; soil texture; gravel; clay; silt; loam; lump.

Упражнение 7. Прочитайте текст 3D, подлинное название которого «Composition of Soils», еще раз и выпишите из него 10—15 ключевых слов.

Упражнение 8. В приводимой таблице поставьте плюс в соответствующей колонке, предварительно определив, правильными или неправильными являются следующие утверждения:

Right	Wrong	
		1. Humus is a black amorphous organic matter. 2. The scientific study of soils is known as pedology. 3. The texture of a soil is an admixture of sand, silt and clay. 4. The end product of biological decay is field capacity of soil. 5. The structure of a soil is a function of the way individual particles aggregate together. 6. Clay soils tend to have blocky structure.

Упражнение 9. Найдите в тексте 3D доказательства справедливости следующих утверждений:

1. Soils are an integral part of both ecosystems and geomorphological systems.
2. Soils contain solid, liquid and gaseous matter.
3. Texture largely determines the water retention properties of a soil.

Упражнение 10. Напишите, не более чем в трех предложениях, резюме текста 3D.

Упражнение 11. Переведите текст письменно. Контрольное время — 20 минут.

As in the case of many other features in physical geography, soils can be classified according to either their origins or their observable properties. Many classifications have been proposed, but one of the simpler and more intelligible frameworks is the zonal system, first suggested by the Russian pedologist Dokuchaiev at the end of the last century. Three main classes of soils are recognized: zonal soils are those that are well developed and reflect the influence of climate and/or vegetation as the major controlling factors; intrazonal types are formed where some local factor overrides the zonal factors; and azonal soils are those that are immature or poorly developed.

Упражнение 12. Придумайте название для текста, приведенного в упражнении 11.

Упражнение 13. Среди приведенных ниже форм укажите формы инфинитива:

regarding; weathered; to consist of; can; to link; known; to contain; to be derived; consisting; to have done; is being supplied; air-filled; will vary; to be flowing.

Упражнение 14. Выберите из данных предложений те, в которых формы инфинитива передаются на русский язык с помощью придаточных предложений, начинающихся со слова «чтобы».

1. Parts of the precipitation on water surfaces are evaporated into the atmosphere to become part of the atmospheric moisture.
2. Evaporation occurs when water molecules possess sufficient energy to break through the water surface and escape into the atmosphere.
3. The general purpose of hydrological measurements is to obtain values which are representative of the area.
4. Clay is used to make bricks, tile, pottery and many other products.
5. Blast sand is a coarse-grained sand used with compressed air to clean the walls of brick and stone buildings.
6. A hillside soil tends to be much better drained than those in valleys.

Упражнение 15. Выберите правильный перевод выделенных форм и словосочетаний:

1. Soils with a crumb structure **are said to be** best for cultivation.

a. было известно, что ... b. известно, что... c. сказали, что...

2. In arid environments movement of soil material **is likely to be** upward.

a. казалось вероятным, что... b. вероятно, что... c. считается, что...

3. Snow cover **appears to** exert a generally similar effect, although high intensity rains are very infrequent during the snow season.

a. оказывается, что... b. появляется c. появился

4. Some soils that **appear to be** quite coarse upon casual inspection actually contain considerable proportions of fine material.

a. кажутся b. появляются c. являются

5. When magma **appears** at the surface of the Earth, it is known as lava.

a. кажется b. появляется c. казалось, что...

Упражнение 16. Прочитайте по-английски:

$20 - 12 = 8$; $8 \times 3 = 24$; $12 : 2 = 6$; $x^3 + y^3$; $x = 2.23 \dfrac{b^2 - c^2}{3a - 2b}$;

$x_2 = y^2$; $2.023 + 0.045 = 2.068$; $x^3 + y^{-3} = z$.

Упражнение 17. Прочитайте еще раз тексты 3A, 3B, 3C и 3D, определите в каждом из них ключевые слова и составьте резюме к текстам блока 3 «Rocks and Soils».

Тесты к блоку 3

ТЛ

I. В каждом ряду найдите слово, «выпадающее» по своему значению из данной тематической группы:

a. geomorphology (1), pedology (2), lithology (3), therefore (4);

b. sand (1), science (2), silt (3), clay (4);

c. circular (1), igneous (2), desimentary (3), metamorphic (4);

d. to weather (1), to laugh (2), to decompose (3), to disintegrate (4);

e. also (1), link (2), although (3), until (4);

f. solid (1), liquid (2), significant (3), gaseous (4).

II. Заполните пропуски подходящими по смыслу словами.

a. Land-forming processes may be grouped broadly into two types . . . . and . . . . .

b. The branch of geography which studies the Earth's relief features is known as . . . . .

c. The scientific study of soils is known as . . . . .

d. The . . . . of a soil refers to the sizes of the solid particles composing the soil.

e. Rocks are normally classified into three major groups according to their origin: . . . ., ... and . . . . .

III. Укажите буквой английские эквиваленты приведенных слов:

1. выветривание —	a. weathering
	b. cooling
	c. aggregation
2. сопротивление —	a. relation
	b. influence
	c. resistance
3. определять —	a. to consist
	b. to determine
	c. to become
4. песок —	a. silt
	b. clay
	c. sand
5. осадочные породы —	a. sedimentary
	b. igneous
	c. metamorphic
6. сравнивать	a. to divide
	b. to compare
	c. to consist
7. твердый —	a. solid
	b. liquid
	c. gaseous
8. вокруг —	a. beneath
	b. around
	c. under
9. хотя —	a. though
	b. those
	c. these
10. другой —	a. their
	b. another
	c. something

ТГ

I. Обозначьте принадлежность приведенных форм к соответствующим частям речи:

a. причастие
b. инфинитив
c. существительное

1. to have filled; 2. resistance; 3. consisting; 4. having found; 5. surrounding; 6. pressure; 7. known; 8. detailed; 9. to be formed; 10. undergone; 11. is being formed.

II. Укажите номера предложений, перевод которых следует начинать со слова «чтобы».

1. To determine rainfall intensities from accumulated depth tabulation the following procedure is necessary.

2. To estimate the time that has elapsed since the continental glaciers entirely dissappeared from Europe is impossible.

3. To produce a layer of coal one foot in thickness, about 20 feet of original plant material has to be compacted.

4. Another method to estimate the age of the oldest rocks is to compare the rate of decomposition today with the total thickness of sedimentary rocks formed throughout all geologic time.

5. It is necessary to protect the instrument from the wind by a specially designed tent.

III. Выберите правильный перевод выделенных форм и словосочетаний.

1. White limestone **proved** to be very soft.

a. доказал b. оказался c. оказывается

2. Methods **to be used** in organizing precipitation data for analysis are necessarily dependent on the purpose to be served.

a. чтобы использовать b. использовать c. которые используются

3. Thunderstorms **are known to** deposit heavy amounts of rain over areas so small as to be measured in city blocks.

a. было известно, что... b. известно, что... c. известны

4. **The hydrologic cycle may be considered** to begin with the water of the oceans.

a. можно считать, что гидрологический цикл...

b. гидрологический цикл считается...

c. считалось, что гидрологический цикл...

5. Changes in soil composition **appear to** have some affect on human life.

a. появляется... b. оказывается, что... c. появились...

6. At many zones of collision one plate overrides another, **the lower plate being absorbed** into the mantle in a subduction zone.

a. поскольку нижняя плита поглощается...

b. причем нижняя плита поглощается...

c. если нижняя плита поглощается...

7. A large number of the minerals **being mined** from continental sources are marine in origin.

a. добываемых b. были добыты c. добываются

8. **It is** the number of large pores in a soil rather than the total porosity **that** is of major significance in determining permeability.

a. это b. именно c. не переводится

9. Since the infiltration capacity is affected by several soil qualities **that** cannot be duplicated in the laboratory **it**(1) is necessary to measure **it**(2) on soil in place.

that — a. которые b. что c. тот
it(1) — a. это b. именно c. не переводится
it(2) — a. это b. ее c. не переводится

10. In order to meet the needs of the US for efficient utilization of soil and water resourses, a number of watershed engineering studies **have been conducted.**

a. проводится b. было проведено c. будет проведено

TT

I. Заполните пропуски подходящими по смыслу словами. (В своей работе укажите только последовательность цифр, обозначающих соответствующие слова.)

The colour of a soil will . . . determined by its parent material, its . . . content, and the processes of soil . . . . In cool humid areas most soils . . a relatively high amount of humus . . are blackish or shades of brown. . . colours are associated with the presence . . ferric compounds, whereas greish or bluish . . . reflect reduced iron compounds.

1 2 3 4 5 6 7 8
of; and; be; reddish; humus; contain; colours; formation.

II. Расставьте предложения в их логической последовательности. (В своей работе укажите только последовательность номеров предложений.)

Igneous Rock

1. These rocks are divided into two large groups: plutonic rocks crystallized within the Earth's crust, and volcanic rocks formed from magma that has reached the Earth's surface.
2. A rock that has formed by the cooling and consequent solidification of magma is called igneous rock.
3. Many different names have been given to rocks of both types, depending on chemical and mineral composition, texture and occurrence.

III. Письменно переведите следующий текст. Контрольное время — 20 минут.

Soils are composed of both organic and mineral particles which determine the texture and structure of the soil. These characteristics vary down the profile and allow various horizons to be distinguished. Pedogenic processes* involve chemical changes as well as the movement of both water and minerals up and down

* Почвообразовательные процессы.

the profile. The processes will vary from place to place according to the influence of a number of controllong factors. On the basis of the zonal system major soil groups of the world are largely a reflection of vegetation and climate. In Britain, soils are predominantly variants of podzols and drown earths.

Блок 4. RIVERS

Упражнение 1. (Парная работа). Подумайте, о чем может идти речь в этом блоке текстов. Приведите 10—15 слов, которые, с вашей точки зрения, должны встретиться в нем. Попробуйте определить, из каких разделов будет состоять данный блок. Быстро просмотрев тексты блока 4, проверьте правильность своих предположений.

Упражнение 2. Не более чем за 3 минуты прочитайте текст 4А, а затем постарайтесь максимально полно воспроизвести его содержание на русском языке.

LESSON 9

Text 4A. Rivers Defined

A stream or river is a body of water flowing in a defined channel as distinct from surface run-off on slopes. Both types of water movement, together with groundwater flow, are important components of the basin hydrological system. Channel flow can be recorded in the form of a hydrograph, which shows the variation of discharge with time. It is usually possible to distinguish the level of base flow, resulting largely from ground water supply, from that of quick flow (flood flow), which produces sharp peaks in the hydrograph. The peak of discharge characteristically occurs sometime after the most intense rainfall has ceased. This time lapse is referred to as basin lag.

From such hydrographs a great deal of information can be gained about flood magnitude and frequency, data which is vital to the water engineer and geomorphologist. The variation in hydrograph shape from river to river shows the dependence of the discharge on the geological and morphological characteristics of the catchment area. A hydrograph with a very sharp peak, for instance, results from high immediate surface run-off, with little absorption and storage of water in the basin.

Упражнение 3. Определите русские соответствия следующих слов и словосочетаний, встретившихся вам в тексте 4А:

channel; component; basin hydrological system; hydrograph; variation; result; produce; peak; intense; engineer; variation; geological characteristics; absorption.

Упражнение 4. (Парная работа). Найдите в правой колонке русские эквиваленты следующих словосочетаний:

1. flood magnitude	1. важный компонент
2. body of water	2. изменение расхода
3. surface runoff	3. паводочный сток
4. important component	4. промежуток времени
5. variation of discharge	5. водный объект
6. time lapse	6. время добегания
7. storage of water	7. получать информацию
8. to gain information	8. запас воды
9. flood flow	9. величина паводка
10. basin lag	10. поверхностный сток
11. basin hydrological system	11. питание речной системы

Упражнение 5. Найдите значения следующих терминов в гидрологическом словаре:

quick flow; groundwater flow; base flow; channel flow; water supply; catchment area.

Упражнение 6. В данных предложениях заполните пропуски подходящими по смыслу связующими элементами.

1. Both types of water movement are important components of the basin . . . . hydrological system.

2. Channel flow can be recorded in the form of hydrograph, ... shows the variation of discharge with time.

3. The peak of discharge occurs sometimes . . . . the most intense rainfall has ceased.

4. . . . . such hydrograph a great deal of information can be gained about flood magnitude and frequency.

5. The variation in hydrograph shape from river to river shows the dependence of the discharge . . . . the geological and morphological characteristics of the catchment area.

from; on; of; after; which.

Упражнение 7. Найдите в тексте 4А ответы на вопросы.

1. Каковы основные компоненты питания речной системы?

2. Какие фазы водного режима находят свое отражения в гидросфере?

3. Что такое «время добегания»?

4. Какую информацию о паводках может содержать гидрограф?

Упражнение 8. Закончите следующие предложения:

1. Channel flow can be recorded in the form of . . . . .

2. Hydrograph shows the variation of discharge with . . . . .

3. The variation of hydrograph shape from river to river shows the dependence of the discharge on the . . . . .

4. The peak of discharge characteristically occurs sometimes . . . . .

5. A river is . . . . .

Упражнение 9. (Парная работа по тексту 4А). Задание 1. Придумайте заголовки к первому и второму абзацам текста.

Задание 2. Найдите ключевое предложение в каждом абзаце текста.

Задание 3. Найдите в тексте пример, который иллюстрирует какую-нибудь идею. Какие слова используются автором для описания такого рода иллюстрации?

Упражнение 10. Составьте краткий план пересказа текста 4А. Используйте основные положения плана для того, чтобы написать резюме текста в 3—4 предложениях.

Упражнение 11. Переведите следующий текст письменно. Контрольное время — 20 минут.

River

River is a flow of water in a natural channel. The term generally refers to the large, main trunks of a drainage system; smaller channels may be called streams, creeks, brooks, or rills, in descending order of size. Rivers may carry water all the time, and are then called perennial streams or rivers, or they may carry water part of the time, in which case they are called intermittent streams. If the base flow is from a fluctuating groundwater table, a river will carry water only when the table is above or at the level of the river bottom, and will be dry when the groundwater table lies below the bed of the channel. If the stream has a bed which is always above the water table, water will be lost by infiltration as it moves downstream; it will then be called an ephemeral stream.

Упражнение 12. В приведенных предложениях переведите выделенные слова. Обратите внимание на их принадлежность к той или иной части речи, а также на синтаксические функции, которые они выполняют в предложении.

1. The velocity of a river **changes** not only from place to place but also from time to time at the same place.
2. If **changes** occur in the cultural conditions of the large areas which increase evaporation, the result must inevitably be an increase in precipitation.
3. The **result** will confirm the basic quality of the observations or provide a method of adjusting the records for such effects as **change** in location of a station within the record period.
4. Fluctuations in the stage and discharge of rivers **result** from variations in precipitation and temperature.
5. Modern concepts of the **control** of rainfall excesses recognize the storm as the unit of hydrologic design.
6. Infiltration does not necessarily **control** total runoff for the latter normally contains subsurface flow.

7. The number and dimensions of cracks that **form** in a soil may be used as an approximate basis for classifying it.

8. Flood **control** projects range from small improvements to gigantic, basin-wide developments.

9. Hydrologic problems in projects of this type **center** on such questions as how the structure will affect flood stages, how much water will be required for lockages, and where this water can be obtained.

10. There is a calm «eye» in the **center** of the storm.

LESSON 10

Упражнение 1. (Парная работа). Ниже приводятся три предложения из текста 4В. По этим предложениям постарайтесь определить, о чем будет идти речь в тексте.

1. When water flows in a stream it is subject to two basic forces.

2. Turbulence is an important flow characteristic because it creates upward water motion which lifts and supports the finer sediments.

3. The discharge of a stream is affected by the characteristics of the channel itself.

Упражнение 2. Найдите в тексте 4В ответы на следующие вопросы. (Контрольное время для выполнения задания—5 минут.)

1. Какие факторы оказывают влияние на расход воды реки?
2. Какие силы воздействуют на русловой поток?
3. Почему течение реки замедляется у берегов?

Text 4B

When water flows in a stream it is subject to two basic forces. Gravity exerts an impelling force and is opposed by the frictional resistance between the water and the bed of the channel. A stream's ability to work, that is, to erode and transport material, is related to these two forces. Potential energy is provided by the weight and elevation of the water. This is converted by gravity into downflow and hence into kinetic energy. However, something like 95 % of this energy is lost because of the frictional forces, and the precise shape and nature of the channel bed can have a significant effect on this figure.

In all but the most sluggish streams, water flow is not steady and uniform but is affected by turbulence, which takes the form of chaotic movements and eddies. Turbulence is an important flow characteristic because it creates upward water motion which lifts and supports the finer sediments. The effect of friction ensures that water closest to the banks normally moves more slowly than that near the stream centre. The highest velocity is usually located in mid-stream about one third of the distance down from the

surface to the bed, but in an asymmetrical channel the zone of maximum velocity shifts to the deeper side, and may cause significant erosion.

The discharge (velocity × cross-sectional area) of a stream is affected by the characteristics of the channel itself, particularly width, depth, and channel roughness. The effeciency of the channel shape can be expressed by its hydraulic radius, a quantity defined as the ratio of the cross-sectional area (a) to the length of the wetted perimeter (p). The higher the ration the more efficient the stream and the smaller the loss due to the friction. Channel roughness can also have a marked effect. A rough channel creates considerable eddying and loss of energy, whereas a smooth channel minimizes the frictional loss. Channels in silt and clay tend to be deeper and narrower than those in sand and gravel, because the finer materials are cohesive and promote bank stability.

Упражнение 3. Проверьте, насколько хорошо вы запомнили значения слов, встретившихся вам в предыдущих текстах; назовите их эквиваленты в русском языке:

silt; clay; sand; stream; rock; erosion; resistance; to cease; sedimentaries; channel; flow; discharge; to relate; movement; loss; to lift.

Упражнение 4. Расставьте приводимые слова в алфавитном порядке в их изначальной форме и определите значения этих слов по словарю:

exert; impelling; opposed; erode; related; converted; lost; precise; shape; eddies; sediments; ensures; ratio; wetted; smooth; cohesive.

Упражнение 5. В правой колонке найдите русские эквиваленты следующих словосочетаний:

1. basic forces	1. течение воды
2. water flow	2. хаотическое движение
3. chaotic movement	3. заметное влияние
4. discharge of a stream	4. поперечное сечение
5. channel roughness	5. основные силы
6. hydraulic radius	6. гидравлический радиус
7. cross section	7. устойчивость берега
8. marked effect	8. расход потока
9. loss of energy	9. потеря энергии
10. bank stability	10. русловая шероховатость
11. sluggish stream	11. медленное течение

Упражнение 6. Не заглядывая в текст 4В, подлинное название которого «Characteristics of Channel Flow», найдите в правой колонке продолжение следующих предложений:

1. Gravity is opposed...	1. ... is affected by turbulence.
2. Water flow is not steady and uniform but...	2. ... is a quantity defined as the ratio of the cross-sec-

3. Hydraulic radius...
4. Channels in silt and clay tend to be deeper and narrower than...
5. The highest velocity of a river...

tional area to the length of the wetted perimeter.
3. ... by the frictional resistance between the water and the bed of the channel.
4. ... is usually located in mid-stream.
5. ... those in sand and gravel.

Упражнение 7. (Парная работа). Выберите из каждого абзаца текста 4В те предложения, которые наиболее полно отражают его содержание.

Упражнение 8. Напишите резюме текста 4В.

Упражнение 9. Письменно переведите 2-й абзац текста 4В.

Упражнение 10. (Парная работа). Заполните пропуски подходящими по смыслу связующими элементами.

Turbulent Flow

Turbulent flow is the chaotic movement . . . . water masses . . . . all directions, with much mixing and many collisions. Eddies, vortices, waves are patterns of turbulence. There are two kinds of turbulence: streaming flow . . . . shooting flow. Streaming flow is ordinary turbulence . . . . shooting flow is generated in rapids and falls . . . . very high velocities. Turbulent flow occurs . . . . the combination of density, depth and velocity of the water are much greater . . . . the viscosity.

at; of; than; and; in; whereas; when.

Упражнение 11. (Парная работа). Заполните пропуски соответствующими терминами.

When precipitation falls on to the land it forms surface water or . . . ., this collects into small channels forming streams. The head of a stream is called its . . . . . The stream flows downhill, and is joined by other streams or . . . . . The join is called a . . . . . As more tributaries join the stream, it becomes larger and forms a river. The river widens out as it enters the sea, here it becomes an . . . . . The place where the river joins the sea is called its . . . . . The area of land from which all the water comes into the river is called its . . . . . This is also the . . . . . for the precipitation which will eventually flow into the river. The edge of this area is called the . . . . .

catchment area; runoff; confluence; mouth; watershed; drainage basin; estuary; source.

Упражнение 12. Из приведенных ниже предложений выберите те, в которых выделенные формы следует переводить с помощью слов «необходимо», «должно».

1. As the river shows, the fine particles of rock it **has been carrying** settle down on to the bed of the lake or sea.
2. Deltas have been given this name because some of them **have** roughly the same shape as the Greek letter «delta».
3. For spillways designed to accomodate flood flows the maximum intensity of snow melt **has to be considered.**
4. To understand the long profile you **have to imagine** that the drainage basin of the river has been cut away so that you can see the whole length of its tributory and the main channel down to Wilmington.
5. The estimation of runoff from both rain that has fallen and that which **is to be expected** becomes the basis for determination of how the reservoir system shall be operated.
6. In general, the procedure for constructing mass curves **is to group** the stations that are under similar topographic influence.
7. Humid regions are well supplied with both surface water and ground water: arid regions **have** relatively little of either.

LESSON 11

Упражнение 1. (Парная работа). Данные слова вы встретите в приводимом ниже тексте. Прежде чем прочитать его, ознакомьтесь с этими словами. Обсудите предполагаемое содержание текста и подберите для него заглавие.

Course of a stream; variety of channel patterns; erosion; deposition; wavelength; misfit streams; meandering channel pattern; braiding; pools; riffles; bedload; river discharge.

Теперь прочитайте текст 4С и проверьте правильность своих предположений. Контрольное время — 5 минут.

Text 4C

Although geological features may determine the overall course of a stream or river, if we look at a detailed map we can observe a variety of channel patterns, including straight, crooked, meandering and braided. On natural courses, straight channels are rare, and most streams wander. Meandering and braiding are two of the most common channel habits and account for the formation of several specific features of erosion and deposition.

Meanders can be described by various geometric properties. Of these, wavelength is significant, since it is related to the square root of bankfull discharge. Wavelength is normally about ten times the channel width. This information may sometimes be useful in identifying misfit streams, those whose present discharges are too small for their meandering channel pattern. A meandering

river is typically asymmetric in cross-section at bends, the deeps being known as pools, while the shallows between bends are called riffles. On a meander bend the surface water flows towards the outer bank, while the bottom water flows towards the inner bank, setting up helical flow. This type of flow promotes local erosion and deposition in the meander.

Meandering appears to begin with the development of pools and riffles, in more or less straight channels, but it is still not possible to define precisely the ultimate cause of this behavior. We can say that straight channels are inherently unstable and that meandering is a natural state of affairs.

Braiding occurs when a stream has not the capacity to transport its load in a single channel and splits into several channels. Again the precise causes are not fully understood, but it has been found that braiding occurs most readily where the river discharge is highly variable and the bank sides are easily eroded, supplying an abundant bedload. Thus braiding is commonly found in semiarid regions and on glacial outwash plains.

Упражнение 2. (Парная работа). В тексте 4С, вероятно, вам встретились незнакомые слова. Выпишите их, сравните с теми, которые выписал ваш сосед, и обсудите их предполагаемое значение. Проверьте правильность своих предположений по словарю.

Упражнение 3. (Парная работа). Постарайтесь найти в тексте 4С те слова, без которых вы все равно смогли бы понять содержание текста.

Упражнение 4. (Парная работа). Прочитайте текст 4С еще раз. Устно переведите те предложения, содержание которых показалось вам непонятным. А теперь выберите из приводимых ниже предложений те, которые наиболее полно отражают содержание текста.

1. Wavelength is normally about ten times the channel width.
2. Meandering and braiding are two of the most common channel habits.
3. Precise causes of braiding are not fully understood.
4. We can observe a variety of channel patterns in nature.
5. Meandering and braiding account for the formation of several specific features of erosion and deposition.

Упражнение 5. Укажите те предложения в тексте 4С, которые содержат новую для вас информацию.

Упражнение 6. Заполните пропуски в следующих предложениях подходящими по смыслу терминами.

1. A stream occupying a valley that seems much too large or too small for it is called . . . . .
2. . . . . is a bend in a river channel.
3. A stream with numerous channelways that divide and rejoin is called . . . . .

4. The deeps in a meandering river are known as . . . ., while the shallows between bends are called . . . .

Упражнение 7. (Парная работа). Ниже приводится несколько утверждений, не соответствующих действительности. Внимательно прочитайте текст и сравните его с приведенными утверждениями; исправьте их и объясните, почему они неверны.

1. Braiding is commonly found in arid regions.
2. There is no difference between meandering and braiding.
3. Braided streams occur under condition of extremely uniform discharge.
4. A meandering river is typically symmetric in cross section at bends, the deeps being known as riffles, while the shallows between bends are called pools.
5. On a meander bend the surface water flows towards the inner bank.

Упражнение 8. Составьте краткий план пересказа текста 4С, подлинное название которого «Channel Patterns» (Типы русловых образований).

Упражнение 9. (Парная работа). В приводимом ниже тексте в каждой строке найдите ту позицию, которую должно занимать слово из правой колонки.

Another type of braiding occurs	where
glaciers are melting the supply of	and
debries is consistently large amount	in
and in caliber the discharge	whereas
fluctuates the ice melts and freezes.	as
This causes channelways to shift divide	and
around material is alternately	that
moved and deposited the relation of	as
load discharge varies.	to

Упражнение 10. Письменно переведите следующий текст. Контрольное время — 15 минут.

Misfit Stream

Misfit stream is a stream occupying a valley that seems much too large or too small for it. Most commonly these are underfit rivers where the meanders of a stream are smaller and more intricate than those of the valey walls. Underfit streams have been ascribed to erosion by floodwaters, the influence of rock structure, and stream capture. Misfit streams are commonly found in Northern Europe, Northern North America and other regions glaciated during the Pleistocene, when melting glasiers provided great volumes of water that excavated large valleys. With the disappearance of the ice, the discharge decreased, leaving the misfit streams.

Упражнение 11. Среди приведенных предложений выберите те, в которых выделенные слова можно перевести на русский язык именами существительными.

1. **Meandering** and **braiding** are two of the most common channel habits.
2. Information about wavelengths may be useful in identifying misfit streams, those whose present discharges are too small for their **meandering** channel pattern.
3. A meandering river is typically asymmetric in cross-section at bends, the deeps **being** known as pools while the shallows between bends are called riffles.
4. By **measuring** the rate at which water flowed from the burette the rate of flow into the soil can be determined.
5. An impervious, steeply **sloping** drainage area may shed substantially all of the rain **falling** upon it.
6. Grasses increase infiltration capacity by **affording** protection against raindrop impact by **providing** a layer of humus, and by **changing** the character of the soil itself.
7. In **determining** surface runoff by infiltration curves the principal steps are the same in all cases.

LESSON 12

Упражнение 1. (Парная работа). Найдите в тексте 4D ответы на следующие вопросы. Контрольное время — 8 минут.

1. Какие факторы определяют возникновение эрозии?
2. Когда происходит расширение русла реки?
3. Каким образом может осуществляться перенос размытого материала?

Text 4D. Erosion, Transport and Deposition

Erosion takes place when the stream has an excess of energy, but excess energy does not always result in erosion; much depends on the resistance of the bed over which the water is flowing. Some erosion can be achieved by the force of the flowing water alone which exerts a dragging effect upon the bed, eroding poorly consolidated materials. This is termed hydraulic action. Erosion may also be achieved by solution (corrosion). But the principal method of erosion is by corrasion, the mechanical impact produced by the debris carried by the stream. Erosion by the stream allows the channel to extend in two ways. Headward erosion at the source of the stream results from undercutting, usually at the base of the soil layer or a vegetation mat. Channel widening and deepening takes place primarily when the stream is in flood. Erosion of the channel sides causes the gradual migration of the channel and this together with work of the slope processes, contributes to the overall widening of the valley.

Transport of the eroded material is accomplished in three ways: the dissolved load consists of soluble materials carried uniformly throughout the water; the suspended load is composed of particles held in the water by the turbulent motion; and the bed load is made up of larger materials bounced, pushed and rolled along the channel floor. The relative contributions of each to the total load varies widely with the nature of the river and is dependent on the volume and velocity of the flow. The load carried by a stream increases with increased discharge and velocity. The term stream capacity denotes the largest amount of debries a stream can transport, and stream competence refers to the weight or size of the largest particles that can be moved. The lowest velocity at which grains of a given size can be picked up is said to be the critical erosion velocity.

Deposition occurs when the river is no longer competent to transport its load. This usually occurs because of a reduction in the gradient of the stream channel, but may also result from an increase in the calibre of the load, perhaps brought in by a tributary into the main stream, or by conditions of accelerated erosion upstream. The largest calibre material will be deposited first, succeeded downstream by finer material while the finest material may continue to be deposited even though the river energy has been reduced. This sequence of sedimentation is found in many of the depositional forms created by rivers.

Упражнение 2. Найдите русские соответствия следующих слов:

effect; erode; consolidate; action; corrosion; method; vegetation; primarily; migration; uniformly; total; term; to transport; calibre; to accelerate; suspension.

Упражнение 3. Выпишите приводимые ниже слова в их изначальной форме; определите значения этих слов по словарю.

Depends; flowing; achieved; eroding; consolidated; produced; allows; results from; contributes; accomplished; carried; composed; held; larger; bounced; denotes; refers (to); lowest; brought.

Упражнение 4. Выпишите из текста 4D все слова, которые используются для характеристики понятий «наносы», «материал».

Упражнение 5. (Парная работа). В правой колонке найдите русские эквиваленты следующих словосочетаний:

1. excess of energy	1. почвенный слой
2. source of a stream	2. механическое воздействие
3. soil layer	3. склоновая эрозия
4. mechanical impact	4. растворенные наносы
5. headward erosion	5. избыток энергии
6. dissolved load	6. транспортирующая способность потока
7. bed load	

8. stream competence	7. поток реки
9. channel floor	8. донные отложения
10. channel widening	9. дно русла
	10. расширение русла

Упражнение 6. (Парная работа). Разместите помещенные ниже слова и словосочетания по следующим тематическим группам:

Связующие элементы	Гидрологические термины	Общенаучная лексика

flowing water; which; upon; material; hydraulic action; principal method; corrasion; headward erosion; to result from; flood; to contribute; suspended load; total; velocity; stream capacity; that; critical erosion velocity; because of; while; sequence.

Упражнение 7. (Парная работа). Выберите один из абзацев текста 4D и придумайте 3—5 вопросов к нему. Попросите ответить на них другую пару студентов. Обменяйтесь вопросами.

Упражнение 8. (Парная работа). Поставьте плюс в соответствующей колонке приводимой ниже таблицы.

Yes	No	No evidence	
			1. Channel widening takes place primarily when the stream is in flood. 2. The principal method of erosion is by transport of the eroded material. 3. The term stream capacity denotes the largest amount of debris a stream can transport. 4. The degree of assortment of grains has a great effect on porosity. 5. Any rock formation containing interstices may be considered as an actual or potential ground water reservoir. 6. The load carried by a stream increases with increased discharge and velocity.

Упражнение 9. (Парная работа). Проведите классификацию следующих положений в соответствии со степенью их обобщения: от самых общих к наименее общим.

1. Erosion may also be achieved by solution.
2. Erosion takes place when the stream has an excess of energy.

3. Erosion is the weathering down of the land by running water, moving ice, the wind and waves.

1. The largest calibre material will be deposited first succeeded by finer material.

2. Deposition occurs when the river is no longer competent to transport its load.

3. Silt is a clastic sediment consisting mostly of fine particles having a diameter between 1/16 and 1/256 mm.

Упражнение 10. (Парная работа). Подготовьте краткие устные сообщения на одну из предлагаемых тем:

— Эрозия.
— Перенос наносов.
— Осаждение.

Упражнение 11. Письменно переведите последний абзац текста 4D. Контрольное время — 15 минут.

Упражнение 12. (Парная работа). Устно переведите текст на русский язык. Контрольное время — 5 минут.

Sediment Transport

Sediment transport is a term that generally refers to the movement of the solid debries load of streams. The amount of material transported varies from time to time and place to place along a river. The bed load is difficult to measure, but the suspended load can be measured. For large grains, stream velocity is critical for movement, regardless of depth or slope. The lowest velocity at which given grains will move is called the critical erosion velocity. This, along with the setting velocity of the particle and the turbulence of the water, determines the suspended load.

Упражнение 13. В приведенных ниже предложениях выберите подходящие по смыслу связующие элементы.

1. Erosion takes place (1. until 2. when 3. after) the stream has an excess of energy.

2. Erosion may also be achieved (1. at 2. but 3. by) corrosion.

3. (1. if 2. but 3.because of) the principal method of erosion is by corrasion.

4. The load carried by a stream increases (1. though 2. as 3. with) increased discharge and velocity.

5. The lowest velocity (1. on 2. at 3. in) which grains of a given size can be picked up is said to be the critical erosion velocity.

Упражнение 14. Переведите следующие предложения, обращая внимание на выделенные грамматические формы и словосочетания.

1. Much depends on the resistance of the bed over which the water is **flowing**.

2. Some erosion can be achieved by the force of the flowing water alone which exerts a **dragging** effect upon the bed **eroding** poorly consolidated materials.

3. Headward erosion at the source of the stream results from **undercutting**.

4. The principal method of erosion is by corrasion, the mechanical impact **produced** by the debries **carried** by the stream.

5. The load **carried** by a stream increases with increased discharge and velocity.

6. The term stream capacity denotes the **largest** amount of debries a stream can transport.

7. As the pieces of rock carried along by a river bump into each other **the finer** and **finer** they become.

8. The finest material may continue **to be deposited** even through the river energy has been reduced.

9. Many rivers in Southern England **appear to have** a relatively high percentage of dissolved load.

10. The lowest velocity at which grains of a given size can be picked up is said to be the critical erosion velocity.

LESSON 13

Упражнение 1. (Парная работа). Задание 1. Прочитайте заглавие текста. Обсудите между собой: a) о чем пойдет речь в тексте; b) что вы знаете по существу данного вопроса.

Задание 2. Выпишите 10—15 слов, которые с вашей точки зрения, должны встретиться в тексте с таким названием.

Задание 3. Прочитайте текст 4E и постарайтесь наиболее полно воспроизвести его содержание на русском языке. Контрольное время — 5 минут.

Text 4E. The Long Profile

In our earlier discussion in this chapter on water flow in channels, we noted that there was a tendency for channel gradients to become flatter downstream. The longitudinal profile of most rivers is therefore generally concave upwards. However, in detail the long profile or thalweg commonly shows many inflections called knickpoints. Many knickpoints have a structural or lithological origin; others may be the result of the steepening of the lower part of the profile by base level changes. Quite frequently, however, knickpoints are simply the result of variations in the load and discharge characteristics of the river, as will occur at the junction with a tributary.

In time, irregularities such as rapids and waterfalls will be eroded away. Observations show that irregularities in alluvial

channels disappear very rapidly. Rivers tend to obtain a condition of equilibrium with prevailing forces which is called grade. It is a condition of balance in which the slope, width, depth and other channel characteristics are adjusted to the prevailing volume of water and the load it is carrying. Minor fluctuations in erosion and deposition, say on a daily basis, tend to cancel each other out, such that over periods of time of several years a kind of oscillating balance or dynamic equilibrium is achieved in the river. This state is self-regulatory; the river reacts to any change in the controlling factors by adjusting itself to absorb the change and establish a new equilibrium. For example an increase in the volume of water supplied to a graded river would result in a change in channel characteristics whereby erosion would modify depth, width, and channel roughness to accomodate the new discharge. In summary then, the term 'graded' can be applied to rivers or parts of rivers which have reached a state of self-regulation and which maintain stable channel characteristics.

Упражнение 2. В правой колонке найдите русские эквиваленты следующих словосочетаний.

1. longitudinal profile	1. динамическое равновесие
2. alluvial channel	2. русловая шероховатость
3. condition of equilibrium	3. контролирующие факторы
4. prevailing forces	4. объем воды
5. dynamic equilibrium	5. продольный профиль
6. volume of water	6. базис эрозии
7. graded river	7. состояние равновесия
8. channel roughness	8. аллювиальное русло
9. controlling factors	9. преобладающие силы
10. base level	10. выровненный профиль реки

Упражнение 3. Найдите в словаре значения следующих слов:

downstream; concave; thalveg; inflection; knickpoint; junction; a rapid; waterfall; irregularity; grade; to adjust; to cancel; whereby; modify.

Упражнение 4. Заполните пропуски в предложениях подходящими по смыслу глаголами:

1. The longitudinal profile of most rivers (a. must b. has c. is) generally concave upwards.

2. The long profile commonly (a. shows b. reaches c. carries) many inflections.

3. Many knickpoints (a. are b. have c. do) a structural or lithological origin.

4. Observations show that irregularities in alluvial channels (a. disappear b. supply c. cancel) very rapidly.

5. The river (a. accomodates b. reacts c. results) to any change in the controlling factors.

Упражнение 5. В этом тексте выберите подходящие по смыслу связующие элементы.

Alluvial terraces are formed (a. between b. when c. which) a river erodes flood-plain sediments previously deposited by itself. The river cuts into these deposits (a. despite of b. in contrast to c. because of) some environmental change affecting the channel gradient. In many cases the cause is a climatic one, (a. but b. however c. thus) near river mouths, terraces may have been built and cut in response to sea-level changes. Terrace sediments and morphology are often used as evidence (a. since b. for c. as) interpreting the geomorphological history of a river valley, especially in relation to changes in the Quaternary period.

Упражнение 6. (Парная работа). Во втором абзаце текста 4E определите предложения, отражающие:
— основную идею;
— главные детали;
— второстепенные детали.

Упражнение 7. (Парная работа). Придумайте 3—5 вопросов к первому абзацу текста 4E. Попросите ответить на них другую пару студентов. Обменяйтесь вопросами.

Упражнение 8. (Парная работа). Определите, какие из приведенных ниже предложений наиболее полно отражают общее содержание текста 4E.

1. Minor fluctuations in erosion and deposition, say on a daily basis, tend to cancel each other out.
2. The term grade was first introduced by G. K. Gilbert, an American geologist.
3. An increase in the volume of water supplied to a graded river would result in a change in channel characteristics.
4. Rivers tend to obtain a condition of equilibrium with prevailing forces which is called grade.
5. There is a tendency for channel gradients to become flatter downstream.

Упражнение 9. Найдите в тексте 4E пример, иллюстрирующий какое-либо положение.

Упражнение 10. (Парная работа). Составьте резюме текста 4E.

Упражнение 11. Письменно переведите следующий текст. Контрольное время — 15 минут.

Knickpoint

Knickpoint is a break in the smooth concave profile of a river, denoted by rapids, cascades or a waterfall. The break may be

caused by a resistant layer of rock that the stream cannot erode. Knickpoints may also occur from anything that causes renewed downcutting of the channel. A lowering of base level, either locally or regionally, increases the stream gradient and enables the river to lower its channel, causing a knickpoint that moves upstream. All knickpoints tend to disappear with time as a result of their retreat upstream.

Упражнение 12. (Парная работа). В приводимом ниже тексте в каждой строчке найдите ту позицию, которую должно занимать слово из правой колонки.

Thalweg (or Talweg) a line joining the	is
deepest points a stream channel. As	along
the axis of a valley bottom, it may be	also
spoken of the valley thalweg. The	as
thalweg a stream is usually sinuous. In	of
meandering streams it moves the	toward
outside bank of each bend, crossing	over
near the point which the stream begins to	at
change direction of curvature.	its

Упражнение 13. Среди приведенных предложений выберите те, сказуемые которых выражены формами сослагательного наклонения. Переведите эти предложения на русский язык.

1. The rivers in impermeable ground rise with great rapidity at first and then move slowly.

2. An increase in the volume of water supplied to a graded river would result in a change in channel characteristics.

3. The material deposited by rivers is known as alluvium.

4. It is desirable that the mean velocity be reasonably uniform from bank to bank and the water move as near to stream lines as possible.

5. It may be assumed that some portion of the water of precipitation on all lands is derived from inland evaporation and transpiration.

5. It may be assumed that some portion of the water of precipi- because of the long projecting fingers of its distributaries.

7. Inundation may be an exceptional occurrence due to excessive rainfall or to some temporary obstruction of the river as might, for instance, be caused by ice formation.

8. The engineer should determine what precipitation and stream flow records are available in the general region of the project site.

9. The rate of melting of snow and the intensity of rainfall are probably the factors which affect the fluctuation of rivers most directly.

10. Runoff comprehends the flow of water on the surface of the Earth, through channels be they large or small.

Упражнение 14. Переведите следующие предложения, обращая внимание на выделенные формы.

1. It is often desirable that different meter sections **be** used at different stages.

2. It **should** be noted that porosity of clays may be higher — that is, the total pore space may be relatively greater.

3. To make a precise calculation of the rate of surface runoff from a given complex it is necessary to construct the infiltration rate curve that **would** prevail during the given rain.

4. Ordinarily such records are only obtainalbe for experimental areas, but in projects of importance the study **could** be prefaced by a period of record collection.

5. The hydrologic engineer **should** be interested in and have some knowledge of the tools and techniques used by the weather forecaster.

LESSON 14

Упражнение 1. (Парная работа по тексту 4F). Задание 1. Прочитайте заглавие текста и обсудите, о чем может идти речь в тексте с таким заглавием. Вспомните, что вы знаете о данном вопросе.

Задание 2. В этом тексте вы встретитесь с названиями некоторых законов, действующих в гидрологии. Ниже приводится их перечень.

Law of stream numbers — закон числа потоков.

Law of stream lengths — закон длины потоков.

Law of basin areas — закон водосборных площадей.

Laws of drainage composition — законы структуры водосборного бассейна.

Задание 3. Прочитайте текст и проверьте правильность своих предположений. Контрольное время — 5 минут.

Text 4F. Drainage Basin Geometry

In order to understand more fully the relationships between the various components of river systems, and to facilitate comparisons between basins, geomorphologists in recent years have placed considerable emphasis on the quantitative investigation of the geometric properties of rivers and their basins. This type of analysis is called fluvial morphometry.

For any drainage basin a hierarchy of stream orders can be applied. Although the idea was originally proposed by R. E. Horton, the amended systems of Shreve or Strahler are the ones generally used. Streams without tributaries at the head of river systems are designated first-order streams. Two first order streams join to make a third order stream, and so on. If a lower order unites with a higher order stream, the order of the latter remains unchanged. The basin order is named from the highest order stream in the basin.

The examination of a large number of systems has shown that if the number of streams is counted within each order, then that number decreases with increasing order in a regular manner. This is known as the law of stream numbers (Horton, 1945). Similar straight-line plots can be obtained if a stream order is plotted against the total stream lengths per order (law of stream lenghts) (Horton, 1945) and against the total area drained by each order (law of basin areas) (Schumm, 1956). The bifurcation ratio is an expression relating the number of streams in a given order to the number in the next order. These various geometric properties show that in many river basins downstream changes are regular and determinable. The laws described above are known collectively as the laws of drainage composition.

Other useful indices that can be derived from the analysis of drainage basins include an index of drainage density (Horton, 1932), expressed as the total channel length divided by the total area of the basin. In the United States, wide ranges of density value occur: the lowest, 2 to 2.5 km per square kilometre, are found on resistant rocks in the Appalachians; values in excess of 200 are reported from badlands. Stream frequency is the number of channels per unit area: like drainage density, it is a measure of the texture of the drainage net.

Упражнение 2. В правой колонке найдите русские эквиваленты следующих словосочетаний:

1. fluvial morphometry	1. порядок речного бассейна
2. stream frequency	2. бифуркационное отношение
3. bifurcation ratio	3. водосборный бассейн
4. drainage density	4. река первого порядка
5. geometric properties	5. частота потоков
6. drainage basin	6. густота речной сети
7. basin order	7. устойчивая порода
8. first order stream	8. исток реки
9. head of a river	9. геометрические свойства
10. resistant rock	10. речная морфометрия

Упражнение 3. Найдите в словаре и запомните значения следующих глаголов:

facilitate; apply; propose; designate; join; unite; remain; emerge; obtain; plot.

Упражнение 4. Заполните пропуски подходящими по смыслу связующими элементами.

1. The examination has shown that if the number of streams is counted (a. without b. within c. though) each order, then that number decreases with increasing order in a regular manner.

2. Streams (a. within b. without c. whereby) tributaries at the head of river systems are disignated first-order streams.

3. (a. Although b. If c. Thanks to) the idea of hierarchy of stream orders was originally proposed by R. E. Horton, the amended systems of Shreve or Strahler are the ones generally used.

4. Other useful indices (a then b. that c. if) can be derived from the analysis of drainage basins include an index of drainage density.

5. In order to understand the realationship (a. although b. among c. between) the various components of river systems geomorphologists have placed considerable emphasis on the quantitative investigation of geometric properties of rivers.

Упражнение 5. Выпишите из текста 4F 8—10 ключевых слов.

Упражнение 6. (Парная работа). Найдите в тексте 4F данные, с помощью которых можно было бы заполнить следующую таблицу.

Who	When	What

Упражнение 7. (Парная работа). Исходя из содержания прочитанного текста 4F, заполните пропуски в предложениях соответствующими вариантами слов и словосочетаний.

1. Geomorphologists in recent years have placed considerable emphasis on the (quantitative/qualitative) investigation of the geometric properties of rivers and their basins.

2. For any drainage basin a hierarchy of stream orders can be (applied/divided).

3. The idea of a hierarchy of stream orders was originally proposed by (Horton/Shreve/Strahler).

4. Streams without tributaries at the head of river systems are designated (first order/second order) streams.

5. The basin order is named from the (highest/lowest) order stream in the basin.

Упражнение 8. Письменно переведите текст. Контрольное время для перевода — 20 минут.

Drainage Density

Drainage density is a measure of dissection of a drainage basin (watershed). It describes the relative spacing of a stream network, expressed as the ratio of total length of streams in a watershed to area of the basin. Drainage density depends upon the climate, the geology and the physical characteristics of the drainage basin.

In general, a region underlain by sandstone has a lower drainage density than one underlain by shale. Low drainage densi-

ty denotes a region of coarse texture and is typical of watersheds underlain by resistant rock, such as in the Appalachian Plateau. Medium drainage density basins are found in the humid middle and eastern United States on many different rock types. High drainage density characterizes basins underlain by weak rock in semiarid regions.

Упражнение 9. (Парная работа). Запишите следующие выражения с помощью математических формул.

1. The product of 30 and the number *n*.
2. The ratio of the number *n* to 20.
3. The difference between the number *n* and 10.
4. Half *y* increased by the product of 50 and *x*.
5. Five times *b* decreased by one-forth of *a*.
6. The average of *x*, *y* and 60.
7. 100 diminished by one third the product of 20 and *x*.
8. Twice the sum of *s* and 10 diminished by 25.
9. One third the sum of *n* and seven-eights of *p*.
10. The product of *x* and *y* decreased by twice the difference between *a* and *b*.

Упражнение 10. Найдите в тексте 4F предложения, содержащие условные придаточные, и переведите их.

Упражнение 11. Переведите следующие предложения на русский язык:

1. If the relative humidity remains the same, the evaporation potential of the air decreases.
2. If an accumulation of snow melts rapidly the potentialities of a flood are present.
3. Relative humidity represents the ratio of the water vapour present in the air to the vapour which the same air could contain if saturated.
4. So enormous is the aggregate volume of ice that if it were all released by melting and returned to the oceans, the oceans would rise 130 to 190 feet above their present level.
5. At great depth it must become so hot that the rocks if they could would be molten.

Упражнение 12. Выберите правильный перевод выделенных слов.

1. The loss of soil is not a new problem, but it is **one** which is becoming rapidly more widespread and accute.
a. проблема b. одна
2. **One** of the basic functions in the life processes of vegetation is transpiration.
a. одна b. не переводится
3. **One** of the principal problems confronting hydrologist is resource management.
a. одна b. не переводится

4. Before **one** can study ground water flow under natural conditions, however, the geology of the flow medium should be first properly examined and understood.

a. один b. не переводится

5. The flood problem is **one** which affects many branches of engineering.

a. одна b. проблема

6. **In order** to understand the relationships between the various components of river systems geomorphologists have placed considerable emphasis on the quantitative investigation of the geometric properties of rivers and their basins.

a. в порядке b. для того, чтобы...

7. If a lower order unites with a higher order stream, **the order** of the latter remains unchanged.

a. для того, чтобы... b. порядок

8. The examination has shown **that**(1) if the number of streams is counted within each order, then **that**(2) number decreases with increasing order in a regular manner.

(1) a. который b. что

(2) a. это b. не переводится

9. Other useful indices **that** can be derived from the analysis of drainage basins include an index of drainage density.

a. что b. которые

LESSON 15

Упражнение 1. (Парная работа). Ниже приводятся три текста. Прочитайте их и сравните между собой. Контрольное время — 10 минут. После этого ответьте на вопросы:

a. Какая общая тема объединяет тексты?

b. В чем состоит различие текстов?

Text 4G

Flood is the overbank discharge of a stream. Most streams overflow their banks on an average of every 1.2 years. Although looked on as a disaster by man because he builds homes and industries on river floodplains, a flood is a natural event that often has beneficial results. The water carries sediment, which it deposits on the floodplain to renew and fertilize it; the water sinks into the soil to recharge the groundwater.

One way to minimize the disastrous effects of floods is to predict their magnitude and frequency. A flood frequency analysis is made by listing flood discharges according to magnitude.

From this data the time interval at which such discharges can be expected is calculated. It is called the recurrence interval. Each flood discharge is then plotted against its recurrence interval, and the points form the frequency curve. These curves are used by engineers in building bridges and roads.

Text 4H

A flood is a relatively high flow as measured by either gage height or discharge rate. Gage readings indicate levels of the water surface at measuring stations. Whenever the stream channel in an average section is overtaxed, causing overflow of adjacent land definitely outside the usual channel boundaries, the stream is said to have reached flood stage. Relative magnitudes of flood peaks may be expressed in various terms, including either height above low water, height above flood stage, or the corresponding rate of discharge.

Flood flows are normally the direct or indirect result of precipitation, even though the runoff may be delayed or modified by the processes of freezing and thawing, surface inequalities or indentations, interception on vegetal cover or through infiltration, underground flow, and temporary storage in or release from reservoirs through either natural or artificial means of detention and regulation.

Text 4I

Flash flood is a sudden, rapid increase of discharge in a river. A flash flood is marked by a precipitous rise in water level that forms a wall of water moving downstream. Flash floods are common in arid or in semiarid regions, where an intense local rainstorm often generates excessive runoff in an otherwise dry channel. Flash floods may occur in humid regions if conditions in the watershed are such as to suddenly concentrate the amount of runoff during an intense storm.

Упражнение 2. Проверьте, запомнили ли вы значения следующих слов и словосочетаний из текстов 4G — 4I, которые уже встречались вам ранее:

flow; stream channel; discharge; precipitation; interception; vegetal cover; temporary storage; underground flow; infiltration; sediments; to plot; runoff; watershed.

Упражнение 3. (Парная работа). Найдите в текстах слова, которые входят в словосочетания со словом flood (например, flood stage). Найдите значения этих словосочетаний в словаре.

Упражнение 4. (Парная работа). Прочитайте тексты еще раз и попробуйте максимально полно передать их содержание

на русском языке. Если какие-то части текстов показались вам непонятными, переведите их устно.

Упражнение 5. (Парная работа). Задание 1. Выпишите 5—10 ключевых слов из каждого текста.

Задание 2. Придумайте заглавие к каждому из текстов 4G—4I.

Упражнение 6. (Парная работа). На основе прочитанных трех текстов составьте свой собственный текст на английском языке, объем которого не должен превышать 120—150 слов.

Тесты к блоку 4

ТЛ

I. Укажите буквой русские эквиваленты следующих словосочетаний:

1. surface runoff	a. русловая шероховатость
2. discharge of a stream	b. густота речной сети
3. sluggish stream	c. медленное течение
4. bed load	d. почвенный слой
5. source of a stream	e. аллювиальное русло
6. soil layer	f. паводочный сток
7. alluvial channel	g. поверхностный сток
8. flood flow	h. донные наносы
9. channel roughness	i. исток реки
10. stream frequency	j. расход потока

II. Обозначьте буквой подходящий по смыслу вариант предлагаемых слов:

1. A stream or (a. flood, b. river, c. rainfall) is a body of water flowing in a defined channel.
2. (a. Braiding, b. Meandering, c. Discharge) occurs when a stream has not the capacity to transport its load in a single channel.
3. The long profile or (a. pool, b. thalweg, c. riffle) commonly shows many inflections called knickpoints.
4. Channel widening (a. accounts for, b. results in, c. takes place) primarily when the stream is in flood.
5. Turbulence is an important flow characteristic (a. according to, b. because, c. inspite of) it creates upward water motion which lifts and supports the finer sediments.

III. Заполните пропуски соответствующими терминами:

The natural processes in the scenic system are:

a. . . . . the breaking up of rock where they lie by the direct effect of weather and plant and animal activity;

b. . . . . the wearing down of the land by running water, moving ice, the wind and waves;

c. . . . . the carrying away of weathered and eroded material;

d. ..... the laying down of transported material in a new place.

1. deposition; 2. erosion; 3. weathering; 4. transport.

ТГ

I. Укажите цифрой предложения, содержащие герундий.

1. A rapid reduction in stream velocity occurs when a river flows into standing water.

2. Deltas with curving shorelines are known as arcuate deltas.

3. Residual mass curves furnish another method of showing the extent of wet and dry periods.

4. For the large storms a relatively large error can be made in estimating depression storage without introducing any significant error in the calculated runoff.

5. A stream flowing over an alluvial fan may be entirely above the water table.

II. Укажите цифрой те предложения, в которых выделенные слова обозначают долженствование.

1. The gaging station **should** be located just above a place in the stream where the fall at all stages is greater than in the reaches just above and below.

2. Several methods have been developed for estimating the infiltration capacity that **would** exist at the start of any rain.

3. It **should** be understood that the variation in monthly values reflects not only the effect of season, but also that of antecedent moisture.

4. If there is a vegetative cover over the soil surface, then any precipitation **will** be caught and redistributed as throughfall, stemflow and evaporation from the vegetation.

5. The engineer **should** determine what precipitation and stream flow records are available in the general region of the project site.

III. Укажите цифрой те предложения, в которых выделенные глаголы-сказуемые выражены формами сослагательного наклонения.

1. If the surface is not confined, the difference in pressure **is the result** of surface slope.

2. With the available stream flow, it has been estimated that percolation through 2,500 acres of creek bottom lands in San Joaquin Basin in California **would increase** the underlying ground water tables by 84,000 acre-ft.

3. If the capillary fringe that lies just above the water table extends up to the ground surface, water will continuously **be drawn up** to the ground surface and evaporated therefrom.

4. The ideal gaging station **should offer** a conveniently located and secure sheltered spot for the gage.

5. To get representative data it is desirable that the mean velocity of the stream **be** reasonably **uniform** from bank to bank.

IV. Выберите правильный вариант перевода выделенных слов.

1. Cultivated crops such as corn **may** provide good protection at their period of maximum development.

a. могут b. должны

2. **One** of the most difficult problems confronting modern civilization is that of soil erosion.

a. одна b. проблема

3. The problem of flood estimation is a peculiarly difficult and complicated **one**.

a. одна b. проблема

4. Before **one** can study ground water flow under natural conditions, the geology of the flow medium should be first properly examined and understood.

a. одна b. не переводится

5. A temporary increase of temperature **results in** increased evaporation and also in increased precipitation.

a. результаты b. приводит к...

6. The **results** obtained have shown that the mean accumulated precipitation for a large group of stations is not significantly affected by change in individual stations.

a. результаты b. приводят к

7. In the case of soils the effect of even wide **changes** in temperature of applied water as related to changes in viscosity has generally escaped analysis.

a. результаты b. приводят к...

8. The number and dimensions of cracks that **form** in a soil may be used as an approximate basis for classifying it.

a. форма b. формируются

9. Precipitation in liquid **form** includes drizzle and rain.

a. форма b. формируются

TT

I. Расставьте предложения в их логической последовательности. (В своей работе укажите только последовательность номеров предложений.)

Deposition

1. It is usually only in times of high water or flood that a lot of this coarse material can be moved.

2. It is the laying down of part of the load when the river does not have enough energy to transport it.

3. Deposition happens throughout a river's course.

II. Заполните пропуски подходящими по смыслу словами. (В своей работе укажите только последовательность цифр, обозначающих соответствующие слова.)

Deltas

When a river at the end . . . . its course flows into a lake . . . . the sea, it slows down. As . . . . river slows, the fine particles of . . . . it has been carrying settle down . . . . to the bed of the lake or . . . . . The layers of alluvium can . . . . build up to form a new . . . . of land. These pieces of land . . . . called deltas.

1 2 3 4 5 6 7 8 9

piece; sea; are; of; rock; gradually; the; or; on.

III. Письменно переведите следующий текст. Контрольное время — 20 минут.

As part of the hydrological cycle, river energy is derived primarily from precipitation and gravity and lost by friction and work, namely erosion, transport and deposition. The efficiency of water flow is affected by channel characteristics such as shape and roughness. Natural channels are rarely straight, but commonly meander and braid. Erosion and deposition by rivers give rise to a range of alluvial landforms. A river or section of a river attains «grade» when its channel characteristics become stable in relation to the prevailing discharge and its load. Geometric analysis of rivers and their basins serves to demonstrate the equilibrium relationships between the component parts of the river system.

Блок 5. LAKES AND SWAMPS. WATER POLLUTION CONTROL

LESSON 16

Упражнение 1. (Парная работа). Просмотрите приводимый ниже текст и в каждом его абзаце найдите предложения, которые наиболее точно отражают общее содержание данного отрезка текста. Контрольное время — 7 минут.

Text 5A. Lakes

Lake is a sizeable inland body of standing water. The source of the water is precipitation that falls into the lake as rain or snow, or is fed into it by streams and springs. Lakes without outlets are usually found in arid regions and tend to be saline; some, such as Great Salt Lake and the Dead Sea, are more salty than an ocean. The salts in most saline lakes result from wea-

thering and volcanic activity; they were carried into the lakes by water and wind, usually when the lakes were larger. The concentration of salts is due to evaporation. Some saline lakes, like the Caspian and Aral seas, are landlocked arms of the ocean. Lakes can be permanent or ephemeral, and those in cold regions may be perennially frozen.

Lakes are formed in many ways. Faulting and gentle upwarping of the Earth's crust are responsible for some of the greatest lakes. Faulting produced those of the African Rift Valley and of south-western United States. Upwarping formed Lake Victoria in Africa, and the Caspian and Aral seas in Asia. Lakes are also formed by volcanic activity, they occupy craters and calderas (as in Crater Lake, Oregon) and occur where lava flows and volcanoes obstruct drainage. Landslides form lakes by damming up valleys, especially in mountainous regions. A lake 70 km long and over 200 m deep was formed in 1840 when a landslide blocked the Indus River, Kashmir.

Lakes of glacial origin are far more numerous than all other types put together. Some are dammed by ice, as in Greenland and in other regions now glaciated. Many are located in glacially-formed bedrock basins. Others result from the irregular deposition of till. Ponds and small lakes occur where kettle holes extend below the water table, as on Cape Cod, Mass. Rivers form lakes in many different ways, as, for example, the oxbow lakes that occupy abandoned channels on floodplains or the lakes found on deltas.

Lakes are short-lived geological features: their destruction commences as soon as they are formed. In humid regions the outlet stream lowers the barrier, and the deposition of detrital sediments and of organic matter helps fill the basin. In arid regions the deposition of chemical precipitates and sediments borne by wind and stremas help fill the basin, and evaporation reduces the size of the lake.

Упражнение 2. (Парная работа). В тексте 5А вам, вероятно, встретились незнакомые слова. Выпишите их, сравните с теми, которые выписал ваш сосед, и обсудите их предполагаемые значения. Правильность своих предположений проверьте по словарю.

Упражнение 3. (Парная работа). Определите в первом абзаце текста 5А слова, без которых вы все равно смогли бы понять его содержание.

Упражнение 4. (Парная работа). Придумайте 5—6 предложений, в которые входили бы следующие словосочетания из текста 5А:

water body; arid regions; to result from; responsible for; glacial origin; saline lakes; perennially frozen; deposition of till; deposition of sediments.

Упражнение 5. Заполните пропуски подходящими по смыслу связующими элементами.

Lakes and Landscape

Lakes are . . . . the most characteristic features of the landscape of glaciated regions. Finland is famous . . . . its innumerable lakes, 55,000 of . . . . have been mapped. Very appropriately, the Finns call their country Suomi — the Land of Lakes. Many parts of Ontario are riddled . . . . a comparable network of lakes and waterways. The extraordinary abundance . . . . the present time of lakes of glacial origin — they are far more numerous . . . . all other types put together — is a result of two circumstances:

a. immense numbers occupy hollows excavated . . . . the less resistant rocks by ice scouring, or irregular concavities in the drift surface left behind by the retreating ice; and

b. they originated so recently that only some of the shallower ones have since been silted up and replaced . . . . lacustrine flats.

by; than; amongst; for; at; which; in; with.

Упражнение 6. (Парная работа). Заполните следующую таблицу, исходя из содержания 2-го абзаца текста 5А:

1. Основная идея —
2. Второстепенные идеи —
3. Примеры —

Упражнение 7. Закончите следующие предложения, опираясь на содержание текста 5А.

1. The concentration of salts in lakes is due to . . . . .
2. Landslides form lakes by . . . . .
3. Lakes can be permanent or . . . . .
4. Ponds and small lakes occur where . . . . .
5. The salts in most saline lakes result from . . . . .

Упражнение 8. Письменно составьте план пересказа текста 5А.

Упражнение 9. Используя как можно большее количество выученных слов из текста 5А, напишите краткие сообщения на одну из следующих тем:

— Общая характеристика озер.
— Условия формирования озер.
— Озера ледникового происхождения.

Упражнение 10. Письменно переведите текст. Контрольное время — 30 минут.

Swamps

Swamps may be regarded as shallow lakes where the small depths of water and the slight range of fluctuation permits the growth of acquatic vegetation. Swamps occur mainly in areas of flat gradient and narrow stream channels. On steeper slopes vegetation may be sufficiently dense to retard runoff and prevent channel erosion, resulting in swamp conditions. Swamps tend to become filled from the growth of vegetation and from silting. Many swamps are old lakes in the later stages of filling.

Swamps are generally divided into inland or fresh-water swamps and coastal or sea-water swamps. The inland swamps include lake swamps resulting from the filling of lakes and growth of aquatic vegetation; river swamps along flood plains and deltas subject to frequent overflow; spring swamps formed by the discharge of springs; flatland swamps on poorly drained land and raised bogs on flat lands of small runoff where precipitation exceeds the evaporation. Coastal swamps are frequently formed between high and low tides.

Упражнение 11. Ответьте на следующие вопросы:

1. What is a swamp?
2. Where do swamps mainly occur?
3. What are the two main types of swamps?
4. What other types of swamps do you know?
5. How are coastal swamps formed?

Упражнение 12. Закончите следующие предложения в соответствии с содержанием текста 5А.

1. Swamps occur mainly...
2. Swamps tend to become filled from...
3. Swamps are generally divided into...
4. Coastal swamps are frequently formed...

Упражнение 13. Устно переведите приводимый ниже текст, выбирая правильные варианты выделенных слов.

Lakes and Rivers

The course of a river often contains a **number** of (номер/ряд) lakes. These are features of a youthful river and eventually disappear as **a result** (результат/приводит к) of deposition. Lakes **form** (форма/формируются) where the river bed contains a deep enough basin **to hold** (чтобы удерживать/который удерживает) the water.

A river system is composed of the main stream and the tributaries which flow into it. If the lake **is fed** (питается/питалось)

by enough tributaries, the water is fresh enough **to allow** (чтобы дать возможность/которая дает возможность) life to develop. However, if the area is too dry and **there is** (там есть/имеется) high evaporation in an inland basin, the lake becomes salty, e. g. the Caspian Sea. As the water evaporates, the salts which **are contained** (содержат/содержатся) in the water become more and more concentrated until the solution becomes saturated with sodium chloride, which is then presipitated to form salt flats, e. g. Lake Chad. If the lake **becomes** (становится/становилось) excessively salty life **cannot** (не может/не должно) develop.

LESSON 17

Упражнение 1. (Парная работа). Ниже приводятся три текста, объединенных одной темой. Прочитайте эти тексты и сравните их между собой. Контрольное время — 10 минут.

Дайте ответы на следующие вопросы:

1. Какой проблеме посвящены приведенные тексты?
2. Какие стороны этой проблемы рассматриваются в каждом тексте?
3. Какие способы решения рассматриваемой проблемы предлагаются авторами текстов?
4. Какие меры, с вашей точки зрения, могли бы способствовать решению поставленной проблемы?

Следующие слова и словосочетания помогут вам при чтении текстов 5B — 5D:

5B water pollution — загрязнение воды
to cause disease — вызывать заболевание
to remove — удалять
to screen — прикрывать, защищать
to reduce — уменьшать
toxic agents — токсичные вещества
to be available — иметься в распоряжении
sedimentation — осаждение, отстаивание
suspended — взвешенный
sewage — сточные воды, канализация

5C to bring about — вызывать, порождать
expenditure — затраты, расходы
treatment — обработка
disposal — *зд.* устранение, удаление
dilution — растворение
permissible — допустимый
magnitude — величина
augmentation — увеличение
investment — капиталовложение

5D Water Resource Act — Закон о водных ресурсах
to charge — поручать, вверять
to discharge — выпускать, выливать
responsibility — ответственность
pollutant — загрязняющее вещество
to dump — сбрасывать

Text 5B. Water Pollution Control

Almost all countries of the world have a water-pollution problem, which became very serious as a result of urbanization and industrialization.

There are many types of water pollution. It is convenient to divide them into classes, as follows: a) pollution by bacteria, viruses and other organisms that can cause disease; b) pollution by decomposable organic matter, which by absorbing the oxygen in the water kills fish; c) pollution by inorganic salts. They cannot be removed by any simple treatment process and may make water quite unsuitable for drinking, for irrigation and for many industries; d) pollution by plant nutrients; e) pollution by oily materials which may screen the river surface from the air thus reducing reoxygenation; f) pollution by specific toxic agents ranging from metal salts to complex synthetic chemicals.

Methods of reducing pollution are available and in wide use in many countries.

The simpliest way of treating domestic sewage is by sedimentation, which largely removes the suspended solids and reduce the general polluting effect up to 50 %.

Further treatment usually takes the form of biological oxidation, which causes natural purification, followed by further sedimentation.

Text 5C. Pollution Abatement

The growth and industrialization of cities has brought about many public health problems, not the least important of which is that of the pollution of streams. Many rivers downstream from cities have become open sewers ,dangerous to public health and destructive of fish, other wild life, and natural beauty. Pollution control is largely a sanitary engineering problem, to be solved by strict laws and enforcement and involving vast expenditures of public funds for sewage and industrial-waste treatment. However, the disposal of a certain amount of sewage by dilution is usually considered permissible, particularly in functioning through bacterial action and aeration. A complete stream pollution control study must include an investigation of stream flows. In some instances the augmentation of low flows, by means of reservoirs, has proved to be at least as important to the control of stream pollution as have investments in additional sewage-treatment plants.

Text 5D. Water Conservation in Great Britain

The Water Resources Act of 1963 set up a Water Resources Board, acting through 29 river authorities, charged with responsibility for the conservation and utilization of water. Standards are laid down, enforceable by law, governing the permitted levels of pollutants which may be discharged into rivers. Similar regulations are applied in other countries — although accidents can occasionally happen, as was the case in 1969 when the illegal dumping of chemicals caused the destruction of millions of fish along the entire length of the River Rhine.

Упражнение 2. (Парная работа). Найдите в прочитанных текстах 5B — 5D эквиваленты следующих словосочетаний:

непригодный для чего-либо; поглощать кислород; процесс обработки; вниз по течению; промышленные отходы; система очистки воды; меженный сток; сохранение и использование воды; допустимый уровень; устанавливать нормы.

Упражнение 3. (Парная работа). Выберите один из приведенных текстов и придумайте 3—5 вопросов к нему. Попросите ответить на них другую пару студентов. Обменяйтесь вопросами.

Упражнение 4. Поставьте плюс в соответствующей колонке приводимой ниже таблицы.

No evidence	Yes	Now	
			1. Almost all countries of the world have a water pollution problem. 2. There is no possibility to reduce water pollution. 3. Pollution of water may be caused by earthquakes. 4. Pollution control is largely a sanitary engineering problem. 5. Many rivers downstream from cities have become dangerous to public health.

Упражнение 5. Используя как можно большее количество выученных новых слов, напишите краткие сообщения на одну из следующих тем:

1. Причины загрязнения рек.
2. Виды загрязнения воды.
3. Меры, необходимые для защиты воды от загрязнения.

Упражнение 6. Письменно переведите текст 5D. Контрольное время — 10 минут.

Тесты к блоку 5

ТЛ

I. В каждом ряду обозначьте цифрой слово, которое по своему значению не соответствует данной тематической группе.

a. 1 pond, 2 lake, 3 swamp, 4 snow;

b. 1 saline, 2 brave, 3 permanent, 4 ephemeral;

c. 1 disposal, 2 damping, 3 discharge, 4 braiding;

d. 1 thus, 2 however, 3 surrounding, 4 although;

e. 1 remove; 2 discuss, 3 treat, 4 purify.

II. Укажите буквой русские эквиваленты приведенных слов.

1. stream	a. озеро b. болото c. поток
2. inland	a. внутренний b. внешний c. смежный
3. permanent	a. переменный b. постоянный c. прерывистый
4. deposition	a. осаждение b. отклонение c. просачивание
5. to retard	a. ускорять b. заполнять c. задерживать
6. coastal	a. горный b. прибрежный c. болотистый
7. purification	a. загрязнение b. осаждение c. очистка
8. to bring about	a. приносить b. порождать c. препятствовать
9. magnitude	a. величина b. магнитный c. широта
10. although	a. так как b. хотя c. поэтому

ТТ

I. Заполните пропуски подходящими по смыслу словами. (В своей работе укажите только последовательность цифр, обозначающих соответствующие слова.)

Kettle Hole

Kettle hole is a pit or basin formed by the melting of a block of ice partly or completely buried by glacial drift. Kettle holes are found on valley trains and on outwash plains. Many contains ponds, lakes or swamps. . . . . range from a few meters to several . . . . in diameter, and from about 1 m . . . . more than 30 m in depth. Small . . . . may be formed by the burial . . . . blocks of ice detached from glaciers . . . . transported away from them by melt-water . . . . . Large kettles, however, are formed . . . . the burial of extensive masses of . . . . glacial ice.

of; kilometers; to; and; kettles; they; stagnant; by; streams.

II. В данном тексте определите, где кончается одно и начинается другое предложение. В своих работах укажите лишь слова, **после** которых начинается новое предложение.

Water Pollution and Conservation

The world today has a great thirst for water in Britain they use many times more water now than it was fifty years ago the main users of water can be divided into two groups: industry and homes people in different countries use different amounts of water this depends on several things, such as the rainfall a country receives and how wealthy it is these factors influence whether a country can store, treat and distribute the water.

III. Письменно переведите следующий текст. Контрольное время — 15 минут.

Oxbow Lake

Oxbow lake is a lake formed in an abandoned meander loop, common on flood-plains. It forms when the meander of a channel is cut off; since the new channel is shorter and steeper than the old one, it is maintained by the river and the old channel is by-passed. The ends of the old channel are rapidly silted up and become separated from the stream, and the old channel becomes a crescent-shaped lake. An oxbow lake may eventually fill in and become a marsh.

ТГ

I. Укажите буквой правильный перевод выделенных форм и словосочетаний.

1. Canada is **richest** in lakes, South America poorest.

a. богата b. богаче c. самая богатая

2. **It** is generally understood that there are three paths by which water moves from the soil surface to the stream.

a. это b. не переводится c. именно

3. In some instances the augmentation of low flows, by means of reservoirs **has proved to be** at least as important to the control of pollution as have investments in additional sewage-treatment plants.

a. следует доказать b. оказалось c. было доказано

4. The gradual development of civilization **has meant** increased uses of water at every step forward.

a. должно было означать b. означало c. должно было бы означать

5. **There are** many types of water pollution.

a. существует b. там есть c. не переводится

6. **Several diseases have** long **been known to be associated** with polluted water.

a. было известно, что многие серьезные болезни связаны...

b. многие известные болезни связывались с...

7. **One of** the main purpose of water pollution control is the prevention of water-borne diseases.

a. не переводится b. одна из

8. **It should be noted** that the difference in the time of ice cover formation may be ascribed to...

a. следует отметить b. будет отмечено c. можно было бы отметить

9. **Increasing** lake areas may increase evaporation and in turn increase precipitation.

a. увеличивающиеся b. увеличение c. увеличивая

10. A comprehensive assessment of water resources **have to include** ground water.

a. включает b. должно включать c. включало

ОКЕАНОЛОГИЯ

Блок 1. THE WATER PLANET

LESSON 1

Упражнение 1. (Парная работа). Прочитайте заглавие приводимого ниже текста. Подумайте, о чем в нем может идти речь. Приведите 10—15 слов, которые, с вашей точки зрения, должны встретиться в этом тексте.

Прочитайте текст про себя (контрольное время — 5 минут) и определите, совпали ли ваши предположения с содержанием текста.

Text 1A. Earth — the Water Planet

Earth is the water planet. Since the crust solidified, water has been extracted from the Earth's interior to collect in depressions. Nearly 71 % of the Earth's surface is overlain by a blanket of water, averaging 3730 meters (12,200 feet) deep. At any instant only a small fraction ot the Earth's water is present in the atmosphere, retained on the land in lakes, or locked in glaciers and ice caps. Nearly all the water remains in the ocean.

Most people live within a few hundred kilometers of an ocean shore. For them the ocean serves as a recreational area, food source, waste receptor, and highway. Even to those living far from the ocean, its influence on daily life is great. Not only does the ocean supply water necessary for life, but it also stores and then releases much of the solar energy that powers Earth's atmospheric circulation, causing our weather. By contrasting the large daily temperature changes in a desert with the more even temperatures of coastal climates, we can see the role that the ocean plays as a climatic buffer.

In short, ours is a water-conditioned existence, and by studying the ocean, we learn about a controlling feature of our life. With better understanding we may someday be able to predict changes in the oceanic and atmospheric circulation. Equally important is the need to learn enough about the ocean to permit us to use it more fully for such functions as waste disposal, without destroying its use as a food source or recreational area.

Упражнение 2. Прочитайте следующие слова и определите их соответствия в русском языке:

planet; extract; meter; fraction; ocean; kilometer; recreation; receptor; energy; atmosphere; circulation; contrast; temperature; climate; role; buffer; condition; control; function.

Упражнение 3. (Парная работа). Определите значения выделенных слов, исходя из контекста.

1. Nearly 71 % of the Earth's surface is overlain by a **blanket** of water.
2. For most people the ocean **serves** as a recreational area, food source, waste receptor, and highway.
3. Even to those living far from the ocean, its **influence** on daily life is great.
4. By studying the ocean, we learn about a controlling **feature** of our life.
5. With better understanding we may someday be able to **predict** changes in the oceanic and atmospheric circulation.

Упражнение 4. (Парная работа). Выберите русские эквиваленты приведеных слов:

solar	a. земной
	b. лунный
	c. солнечный
depression	a. возвышенность
	b. равнина
	c. впадина
overlie	a. находиться над чем-либо
	b. находиться под чем-либо
	c. находиться рядом с чем-либо
solidify	a. размягчать
	b. затвердевать
	c. испарять
glacier	a. ледник
	b. озеро
	c. низменность
to collect	a. накапливать
	b. терять
	c. распределять

Упражнение 5. Определите, какие части речи обозначаются в словарях следующими сокращениями:

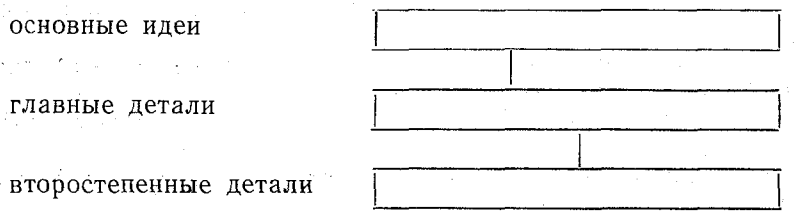
pron.; v.; num.; n.; a.; cj.; part.; prep.

Определите, к каким частям речи принадлежат следующие слова. Напишите соответствующие английские сокращения для каждого из них.

Nearly; collect; blanket; our; for; hundred; it; learn; causing; by; may; been; overlain; necessary; then; controlling; better.

Упражнение 6. Предварительно ознакомившись с приложением 3, прочитайте по-английски все цифры, которые встретились вам в тексте 1А.

Упражнение 7. Прочитайте приложение 1 («Структурно-смысловые особенности английских научно-технических текстов»). Найдите в тексте 1А основные идеи, главные и второстепенные детали. Заполните в своих тетрадях графы следующей таблицы:



Упражнение 8. (Парная работа). Из приведенных предложений и словосочетаний выберите те, которые можно использовать в качестве подзаголовков к каждому из трех абзацев текста 1А:

1. Nearly all the water remains in the ocean.
2. Ours is a water-conditioned existence.
3. Ocean and its role in human life.
4. Someday we may be able to predict changes in the oceanic and atmospheric circulation.
5. Earth is the water planet.
6. Most people live within a few hundred kilometers of an ocean shore.

Упражнение 9. Расскажите по-русски, используя информацию, содержащуюся в тексте 1А, о:

— соотношении суши и воды на Земле;
— роли океана в жизни человека;
— необходимости изучения океана.

Упражнение 10. Составьте план пересказа текста 1А.

Упражнение 11. Поставьте глаголы-сказуемые данных предложений в форму Present Indefinite.

1. Our present state of knowledge concerning the oceans still (to contain) many gaps which (to remain) to be filled in future years.
2. The knowledge that we have gained to this point (to be) an accumulation of advances that have been made in the various scientific disciplines.
3. The Pacific Ocean (to have) the greatest average depth 3940 m.
4. Sea ice (to cover) approximately 70 % of the Arctic Sea throughout the year.

5. Radiation entering the sea surface (may) come directly from the Sun or it (may) come from the clouds and the atmosphere.

Упражнение 12. Перепишите следующие предложения. Подчеркните в них подлежащее и поставьте в скобки те глаголы-сказуемые, которые не согласуются с ними.

Пример: The ocean (play)/plays an important role in our life.
The ocean (play)/plays an important role in our life.

1. Oceanography is/are the branch of science concerned with the oceans and the phenomena occuring therein.

2. As resources of land are used up we is/are rapidly turning to the ocean to obtain oil and gas from the ocean bottom.

3. Oceanography provide/provides an opportunity to learn more about the Earth's most distinctive feature — the World Ocean.

4. We has/have good geological evidence that the oceans have existed on the Earth's surface for well over three billion years.

5. The solidification of the Earth's crust mark/marks the beginning of geologic history.

Упражнение 13. В левом столбце приводятся некоторые глагольные формы, в правом — личные местоимения. Выберите соответствующие друг другу элементы из правого и левого столбцов.

a. is	1. we	2. he	3. they	4. you	5. I
b. are	1. I	2. he	3. it	4. you	5. they
c. were	1. we.	2. you	3. they	4. I	5. they
d. am	1. we	2. he	3. she	4. I	5. we
e. shall be	1. I	2. he	3. it	4. they	5. you

Упражнение 14. Найдите в предложениях 1-го абзаца текста 1А подлежащие и сказуемые. Объясните, какими частями речи они выражены.

Упражнение 15. Письменно переведите третий абзац текста 1А. Контрольное время — 15 минут.

LESSON 2

Упражнение 1. (Парная работа). Постарайтесь вспомнить, что вам известно о распределении суши и воды на Земле. А теперь прочитайте текст 1В и найдите в нем ответы на следующие вопросы:

— Каково внутреннее строение Земли?

— Как соотносятся суша и вода на поверхности Земли?

— Каким образом распределяются на Земле океанические бассейны и континенты?

— В каком полушарии располагается большая часть Мирового океана?

Контрольное время — 5 минут.

shell —	оболочка
composition —	состав, композиция
core —	ядро
mantle —	мантия
rock —	горная порода
film —	пленка
smooth —	гладкий, ровный
average —	средний
insignificant —	незначительный
to compare —	сравнивать
exclude —	исключать
sedimentary rocks —	осадочные породы
unevenly —	неравномерно
to distribute —	распределять
latitude —	широта
impede —	препятствовать

Text 1B. Distribution of Land and Water

The Earth consists of concentric shells, each having a distinctive chemical and physical composition. The interior of the Earth, consisting of a metallic core and the rocks of the mantle, constitutes 99,6 % of the Earth's mass. The remaining 0,4 % is comprised of the rocks of the continents and ocean basins, the ocean waters, and the atmosphere, of which the ocean and atmosphere are only a very small fraction. In short, the ocean is a thin film of water on a nearly smooth sphere.

Of the Earth's surface (510 million square kilometers, or 197 million square miles), the ocean covers 361 million square kilometers (139 million square miles), or 70.8 %. Although the average depth of the ocean is 3.73 km (2.32 statute miles), it is insignificant (1/1700) compared to the Earth's radius. Excluding the water retained in the pores of sedimentary rocks, the ocean contains 97 % of our planet's free water. An immense but unknown quantity of water remains in mantle rocks, tightly bound in silicate materials. Each of the great continental blocks tends to have an oceanic area opposite to it on the other side of the Earth. Most land (67 %) lies in the Northern Hemisphere. If we consider the Northern Hemisphere to be the land hemisphere, the Southern Hemisphere is mainly water. Not only does ocean cover 81 % of the Earth's surface between latitudes 40° and 65 °S, but there is also almost no land to impede the atmospheric or oceanic circulation.

Table. Mass and Distribution of the Hydrosphere

	Mass (10^{15} tons)	Relative Abundance (%)
Seawater	1410	86.5
Lakes, rivers	0.5	0.03
Continental ice	22	1.3
Water vapour in atmosphere	0.013	0.001
Water in sediments and sedimentary rocks	200	12.2
Totals	1632	100

Упражнение 2. В приводимой ниже таблице поставьте плюс в соответствующей колонке, предварительно определив, правильным или неправильным является то или иное утверждение.

Right	Wrong	
		1. Each concentric shell of the Earth has a distinctive chemical and physical composition. 2. The Northern Hemisphere is mainly water. 3. Ocean basins and continents are evenly distributed over the Earth's surface. 4. Oceans cover 19 % of the Earth's surface. 5. Including the water retained in the pores of sedimentary rocks, the ocean contains 97 % of our planet's free water.

Упражнение 3. (Парная работа). Выпишите из текста 1В 8—10 основных, с точки зрения смысловой нагрузки, слов (ключевые слова).

Упражнение 4. Прочитайте по-английски все цифры, которые встретились вам в тексте 1В в таблице «Mass and Distribution of the Hydrosphere».

Упражнение 5. Письменно переведите текст. Контрольное время — 20 минут.

Ocean

Ocean is a large body of marine water that separates two or more continents and covers a broad expance of the Earth's crust. In general an ocean must be very large and have features that set it apart from adjacent bodies of water. These features may include currents, water masses, submarine topographic features and de-

finable land boundaries. These criteria are fulfilled by only three of the very large water bodies: the Atlantic, Pacific, and Indian oceans. The Arctic and Mediterranean seas are well-defined but quite small in comparison with those menitoned above. The Antarctic is not considered as ocean because it surrounds a continent and lacks definable physical boundaries.

LESSON 3

Упражнение 1. (Парная работа). Задание 1. По приведенным ниже словам постарайтесь определить, о чем пойдет речь в тексте 1С.

origin; timing; ocean basins; Earth's history; ancient rocks; volcanic action; bodies of water; seawater composition; geologists.

Задание 2. Придумайте заглавие к тексту 1С.

Text 1C

The ocean is an ancient feature of the Earth's surface. Through time the records of its origin have been obscured, but it appears that both ocean basins and continents originated as a consequence of the same processes. The timing of these events and the rate at which the ocean and continents formed are still hotly disputed.

Due to a gradual release of water at the Earth's surface through volcanic action, water originally bound in interior rocks was released to accumulate at the Earth's surface. The amount of water released through Earth's history can account for the water now in the ocean.

Some of the most ancient rocks known — approximately 3 billion years old — contain pebbles and other features which suggest that the sediments from which they formed were deposited in large bodies of water. Since the Earth is about 4.5 billion years old, these data suggest that large bodies of water have been present on its surface throughout more than half its history. Some rocks, approximately 2 billion years old, contain the remains of bacterialike organisms, now visible only with electron microscopes. Photosynthesis of such primitive acquatic plants released oxygen, vital to the later development of animal life on Earth.

We know little about changes in seawater composition through time. Reasoning from apparent similarities between living organisms and the abundant fossils in rocks as old as 600 million years, geologists have concluded that the composition of seawater has changed little in this period. Oxygen has probably become more abundant in the atmosphere, and consequently in the ocean, due to photosynthesis.

Упражнение 2. (Парная работа). Прочитайте следующие слова и определите их соответствия в русском языке:

origin; basin; continent; n. process; v. form; v. dispute; volcanic; action; interior; accumulate; history; approximately; billion;

contain; bacteria; organism; visible; electron; microscape; photosynthesis; primitive; aquatic; vital; geologist; period; atmosphere.

Упражнение 3. (Парная работа). В правой колонке найдите русские эквиваленты следующих словосочетаний:

1. Earth's surface	1. очевидные сходства
2. volcanic action	2. водный объект
3. body of water	3. вулканическая деятельность
4. remains of organisms	4. состав морской воды
5. aquatic plants	5. водные растения
6. seawater composition	6. дальнейшее развитие
7. later development	7. земная поверхность
8. apparent similarities	8. останки организмов

Упражнение 4. Заполните таблицу словами из текста 1С по следующему образцу, принимая во внимание значение соответствующих суффиксов:

Глаголы	Существительные	Прилагательные	Причастия	Наречия
act	action	active	forming formed	originally

Упражнение 5. Абстрактные существительные, чаще всего обозначающие в научно-технической литературе процессы, качества и явления, характеризуются следующими типичными для них суффиксами:

disposal, sedimentation, distance, consistency, drainage, movement, knowledge, variability, etc.

Образуйте абстрактные существительные от следующих прилагательных и глаголов:

appear;	approximate;	develop;
form;	suggest;	conclude;
act;	present;	similar;
accumulate;	visible;	abundant.

Упражнение 6. (Парная работа). Прочитайте приложение 2, в котором говорится о связующих элементах, и определите, к каким разновидностям принадлежат те связующие элементы, которые встретились вам в прочитанном тексте 1С. Выпишите эти слова и словосочетания, запомните их значения.

Упражнение 7. Прочитайте текст 1С, подлинное название которого «Age and Origin of the Ocean», еще раз и расскажите по-русски:

— о процессах, лежащих в основе образования Мирового океана;

— об изменениях, которые претерпел состав морской воды;

— о возрасте Земли.

Упражнение 8. (Парная работа). Определите основную идею в каждом абзаце текста 1С.

Упражнение 9. (Парная работа). Озаглавьте каждый абзац текста 1С.

Упражнение 10. В приводимом ниже отрывке текста имеются два предложения, по своему смыслу не соответствующие его общему содержанию. Определите эти предложения.

1. Most of the early studies of the oceans were made by biologists interested in the abundant and diverse life of the marine realm. 2. These studies were accompanied and followed by investigations of ocean currents and water chemistry. 3. Because of the great amount of travel by sail in former times a knowledge of currents and weather was of great importance. 4. It became common practice for ships' logs to include valuable information on these matters. 5. Oil shale is a very fine-grained sedimentary rock containing sufficient organic matter to yield oil. 6. Most of oil shale is dark.

Упражнение 11. Определите исходные формы следующих слов:

continents; originated; formed; bound; released; known; bodies; becoming; larger; years; containing.

Упражнение 12. Письменно переведите текст. Контрольное время — 15 минут.

Oceanographic Research

In comparison to what we know of the continents, we know very little about the 70 % of the Earth that is covered by marine waters. Because of the ever-increasing need for new sources of food and natural resources as well as the continuing importance of the seas for transportation and defense, the ocean environment is receiving more and more attention from scientists. Most of this intensive investigation began after World War II. At present the bulk of all oceanographic research is carried out in Canada, Great Britain, Germany, Japan, Monaco, USA and Russia.

Упражнение 13. В тексте, приводимом ниже, поставьте глаголы-сказуемые в форму Past Indefinite.

Oceanography. Early History

If human beings (to evolve) in Africa some two million years ago, it is obvious that the vast extent of the ocean (to be) no barrier to their movement from this early home to all parts of the habitable world. When the European (to set) out at the end of the 15th century to see what lay beyond the horizon, they (to discover) that cultures unknown to them had preceded them to many of these far-off places. Explorers (to find) that not only the newly discovered continents of the world were inhabited, but also the small islands in the Pacific Ocean separated from the mainlands by perhaps thousands of miles of ocean expase. We know little of how the inhabitants (to reach) these islands but the fact is that they (to do) arrive on the islands by some means.

The inhabitants of the Pacific islands obviously (to have) a complete knowledge of the distribution of islands within their immediate environment, and they (to have) an oral tradition that (to explain) how their ancestors had arrived from distant points of origin. This type of knowledge (to be) typical of that existing among inhabitants of the entire world prior to voyages of discovery that were initiated near the end to the 15th century.

Упражнение 14. Прочитайте текст упражнения 13 еще раз и передайте его содержание по-русски не более чем в 3—5 предложениях.

Упражнение 15. В приводимом ниже тексте поставьте глаголы-сказуемые в форму Future Indefinite.

Weather General Outlook

General situation: The area of low pressure over the North Sea (to move) slowly east.

Eastern England (to be)rather cloudy, with more persistent cloud and showery rain becoming confined to the North Sea coastal areas. Elsewhere over England brighter periods (to develop) giving some sunny intervals, especially in the South and West. Scattered showers in these areas (to die) out later.

The strong northerly winds, which (to keep) North Sea coasts on the cool side (to moderate) during the day.

LESSON 4

Упражнение 1. Ниже приводятся первые предложения каждого из трех абзацев текста 1D. Этого должно быть достаточно для того, чтобы вы смогли сделать выводы о содержании текста и его заглавии.

— The ocean basins are interconnected, so processes acting in the most remote basin eventually affect all the ocean.

— We assume that the world ocean is changing very slowly, if at all, with time.

— Because of the Ocean's great age and slow rate of change, seawater is generally well mixed.

Парная работа. Обсудите, какое название лучше всего подходит для текста 1D.

Выпишите 10—15 слов, которые, с вашей точки зрения, могут встретиться в этом тексте.

А теперь прочитайте текст и проверьте, правильность своих предположений. Контрольное время — 4 минуты.

Text 1D

The ocean basins are interconnected, so processes acting in the most remote basin eventually affect all the ocean. For example, the warm, arid climate around the Mediterranean Sea causes its surface waters to evaporate at a greater rate than do most Atlantic waters, and hence makes them somewhat saltier. Warm salty water from the Mediterranean enters the Atlantic Ocean along the bottom of the Strait of Gibralter and can be detected below the surface over a large part of the Atlantic before losing its identity by mixing with waters above and below.

We assume that the world ocean is changing very slowly, if at all, with time. This so-called steady state assumption permits oceanographers to use data taken as much as a hundred years ago to study open-ocean processes. The significance of this assumption is evident when considering the enormous area of the ocean and the difficulty of getting nearly simultaneous data.

Because of the ocean's great age and slow rate of change, seawater is generally well mixed. Bottom water in the deep ocean returns to the surface in 1000 to 2000 years, and the oceans have probably existed for 3 billion years. Thus we estimate that the ocean waters have been mixed more than a million times, and we should not be surprised to find that sea salts are nearly identical, regardless of where the seawater samples are collected. The apparently uniform chemical composition of the ocean may arise from its long history and from our restricted vantage point, covering about 1000 years for a feature that has existed at least 20 million times as long.

Упражнение 2. (Парная работа). Прочитайте следующие слова и определите, какие слова в русском языке могут помочь понять их значение:

basin; process; climate; salt; detect; identity; mixing; surprise; collect; uniform; chemical; history.

Упражнение 3. (Парная работа). Определите значения выделенных слов по контексту.

1. The ocean basins are **interconnected.**
2. Processes acting in the most remote basin eventually **affect** all the ocean.
3. Warm, **arid**, climate around the Mediterranean Sea causes its surface waters to evaporte.
4. **Bottom** water in the deep ocean returns to the surface in 1000 to 2000 years.
5. We estimate that the ocean waters have been mixed more than a million **times.**

Упражнение 4. В правой колонке найдите русские эквиваленты следующих словосочетаний.

1. ocean basin	1. придонные воды
2. salty water	2. пробы морской воды
3. World Ocean	3. океанический бассейн
4. steady state consumption	4. химический состав
5. open-ocean processes	5. соли морской воды
6. enormous area	6. процессы в открытом океане
7. bottom water	7. Мировой океан
8. sea salts	8. теория стационарного состояния (Вселенной)
9. chemical composition	9. огромная площадь
10. seawater samples	10. соленая вода

Упражнение 5. Подлинное название текста 1D — «Features of the Ocean». Прочитайте текст еще раз и выпишите все термины, относящиеся к понятиям «океан» и «морская вода».

Упражнение 6. Найдите в тексте 1D доказательства справедливости следующих утверждений:

1. Processes acting in the most remote basin eventually affect all the ocean.
2. Seawater is generally well mixed.

Упражнение 7. Дайте ответы на следующие вопросы.

1. What does steady state assumption mean?
2. How long have the oceans probably existed?
3. Why is seawater generally well mixed?

Упражнение 8. Выберите из текста 1D 8—10 ключевых слов.

Упражнение 9. Во 2-м и 3-м абзацах текста 1D найдите:
— основную идею;
— главные детали;
— второстепенные детали.

Упражнение 10. Найдите в тексте пример, который иллюстрирует какую-либо идею. Определите, какие слова используются для описания такого рода иллюстраций.

Упражнение 11. (Парная работа). Какие из данных предложений, с вашей точки зрения, наиболее полно отражают основные идеи текста 1D.

1. Warm salty water from the Mediterranean enters the Atlantic Ocean along the bottom of the Strait of Gibraltar.

2. Seawater is generally well mixed.

3. The apparently uniform chemical composition of the ocean may arise from its long history.

4. The world ocean is changing very slowly with time.

5. The ocean basins are interconnected and the process acting in the most remote basin eventually affects all the ocean.

6. Warm, arid climate around the Mediterranean Sea causes its suface waters to evaporate.

7. The oceans have probably existed for 3 billion years.

8. The ocean waters have been mixed more than a million times.

Теперь выберите 5 наиболее важных положений и расположите их в порядке следования в тексте. Если это задание выполнено вами правильно, то выделенные предложения должны представлять собой основу резюме анализируемого текста.

Упражнение 12. (Парная работа). Прочитайте текст 1D еще раз и устно переведите те его части, которые представляют для вас какие-либо сложности. Обсудите перевод наиболее сложных отрывков текста между собой.

Упражнение 13. Поставьте глаголы-сказуемые следующих предложений в необходимую форму Continuous:

1. While the planets rotate around the sun, the entire system (to move) at about 280 km/s as it revolves around the centre of the Milky Way. (Present Continuous).

2. By observing light energy that radiates distant galaxies, astronomers have been able to determine that most (to move) away from us. (Present Continuous).

3. The heavier constituents of the planet Earth (to migrate) toward the centre to form the heavy core surrounded by lighter materials. (Past Continuous).

4. Throughout the geologic time during which the oceans and continents (to increase) their volumes, the ocean basins (to get) deeper to accomodate the increasing volume of water (Past Continuous).

Упражнение 14. Заполните следующую таблицу прилагательными и наречиями, встретившимися вам в текстах 1A, 1B, 1C, по следующему образцу:

Положительная степень	Сравнительная степень	Превосходная степень
large	better	most ancient

Упражнение 15. Определите функцию глагола have в приводимых ниже предложениях:

a) самостоятельный глагол со значением «иметь», «обладать»;

b) вспомогательный глагол, используемый для образования времен группы Perfect.

1. Although the ocean itself is very old, shorelines have probably changed location many times.

2. Helium has an atomic number of 2.

3. Because Columbus had greatly underestimated the distance to the East Indies via the Atlantic Ocean, he was convinced that he had arrived at these islands.

4. The inhabitants of the Pacific islands obviously had a complete knowledge of the distribution of islands within their immediate environment.

5. The Earth has recently experienced an Ice Age.

Упражнение 16. Выберите правильный перевод выделенных форм и сочетаний.

1. The Atlantic Ocean is separated from the Pacific Ocean by a line along the **shortest** distance from Cape Horn to the South Shetland Islands.

a. более короткое b. кратчайшее c. короткое

2. Oceanographic research resulted in a deeper understanding of the structure and dynamics of the oceans.

a. глубокое b. более глубокое c. самое глубокое

3. **The longer** waves are absorbed in the immediate neighbourhood of the sea surface; the shorter waves penetrate to some little distance.

a. более длинные волны b. чем длиннее волны c. самые длинные волны

4. **The larger the continent**, the more pronounced is the continental character of the climate of its interior.

a. больший континент b. континент большой c. чем больше континент

5. **The more rapidly** ice forms, the more brine that will be captured and the higher the salinity.

a. чем быстрее b. быстро c. быстрее всего

Тесты к блоку 1

ТЛ

I. Заполните пропуски в предложениях, выбрав соответствующий вариант предлагаемых слов:

1. The Earth consists of concentric shells, each having a distinctive chemical and physical . . . . .
   a. depression, b. composition
2. The ocean basins are . . . . .
   a. interchanged, b. interconnected
3. . . . . water in the deep ocean returns to the surface in 1000 to 2000 years.
   a. bottom, b. surface
4. Sea salts are nearly identical . . . . where the seawater samples are collected.
   a. due to, b. regardless of
5. Nearly 71 % of the earth's surface is overlain by a . . . . of water.
   a. fraction, b. blanket

II. Укажите цифрами слова, которые по своему значению не соответствуют данной тематической группе:

1 basin, 2 ocean, 3 process, 4 congratulation, 5 meditation, 6 seawater, 7 atmosphere, 8 disappointment, 9 depth, 10 distribution.

III. В левом столбце определите слово, **после** которого должно следовать слово из правого столбца. В своей работе укажите букву, соответствующую той или иной строчке, и цифру, обозначающую искомое слово, например, a-1, c-1 и т. д.

a. Under the oceans the crust is covered 6	by
b. about a kilometer sediment and 4	of
c. sedimentary rock. The thickness sedimentary 5	of
d. material the oceanic crust reaches several 6	over
e. kilometers the continental margins where most 6	along
f. of the sediment carried the land is accumulated 4	from

ТГ

I. По выделенным словообразовательным элементам определите, к какой части речи принадлежат следующие слова:

1. acting (a. прилагательное, b. причастие, c. глагол)

2. greater (a. существительное, b. прилагательное, c. наречие)

3. concluded (a. наречие, b. глагол, c. местоимение)

4. evaporation (a. прилагательное, b. существительное, c. наречие)

5. evenly (a. причастие, b. наречие, c. местоимение)

II. Выберите правильный перевод выделенных форм:

1. If the bergs **are drifting** in shallow waters they very slowly disintegrate.

a. плавают, b. плавали, c. будут плавать

2. The essential point to bear in mind is that the currents which **will have** the most importance in navigation are the tempopary currents.

a. будут иметь, b. имели, c. должны иметь

3. An immense quantity of water **remains** in mantle rocks.

a. оставаться, b. останется, c. остается

4. Among the remarkable men who **have contributed** to oceanography, the Norwegian Fridtjof Nansen deserves special mention.

a. вносят вклад, b. имеют вклад, c. внесли вклад

5. The extent of ice in the Barents Sea produces a greater or lasser obstruction to the surface flow of the warm water.

a. маленькое, b. меньшее, c. наименьшее

6. **The higher** the temperature of the air the lower the pressure.

a. высокая, b. чем выше, c. самая высокая

7. The Pacific Ocean is **largest** among the ocean basins.

a. большой, b. самый большой, c. больше

8. Two of the earliest successful sounders of deep oceans **were** Englishmen, Sir John Ross and Sir James Clark Ross.

a. были, b. будут, c. не переводится

9. Helium **has** an atomic number of 2.

a. имеет, b. будет иметь, c. имел

10. The results ot new investigations **have led** to a new concept of the Earth's crust.

a. приводят, b. привели, c. приведут

III. В левом столбце приводятся формы глагола to be, в правом — личные местоимения. Пользуясь цифрами и буквами, укажите соответствующие друг другу элементы из правого и левого столбцов.

a. am	1. we	2. I	3. you
b. is	1. you	2. they	3. he
c. was	1. we	2. she	3. they
d. are	1. you	2. I	3. it
e. shall be	1. it	2. they	3. we

I. Расставьте предложения в их логической последовательности. В своей работе укажите только последовательность **номеров** предложений.

Study of the Ocean

1. Later the English navigator Captain James established outlines for much of the Pacific Ocean and showed that an ice-covered continent (Antarctica) was located at the South Pole. 2. It began with some of the earliest explorations of the earth's surface. 3. The Portuguese nobleman Ferdinando Magellan explored the Pacific Ocean and circumnavigated the earth. 4. Oceanography derives its name from the study of ocean geography, the mapping of ocean boundaries and the delineation of ocean currents. 5. Of the exploring expeditions which began in the 15th century, two were especially important for mapping the oceans.

II. В приводимом ниже тексте два предложения не соответствуют его общему содержанию. Определите номера этих предложений.

1. As our knowledge of the ocean basins has improved, emphasis in oceanography has shifted from mapping and charting to studies of basic processes. 2. As this trend continues, oceanographers find themselves increasingly involved in climatological investigations. 3. Estuaries are semienclosed tidal basins containing water with measurable amounts of sea salts. 4. Large salinity variations are a characteristic feature of coastal surface waters. 5. It appears that the deep-ocean circulation may play an important role in determining world climate over periods of decades or even centuries. 6. Some answers to questions of vital concern in a world of food shortages may involve a more detailed picture of basic ocean processes than we now have. 7. With the oceans playing an important role in expanding world trade many important processes remain to be studied and described in sufficient detail to permit a more efficient and wise use of ocean resources.

III. Заполните пропуски подходящими по смыслу словами и словосочетаниями, обозначив их соответствующими буквами.

1. . . . . is the study of volcanic phenomena and their causes.
a. marine geology, b. volcanology, c. geology
2. . . . . is the study of the Earth's atmosphere.
a. climatology, b. geophysics, c. meteorology.
3. . . . . is the study of the chemical, biological, physical and geological features of the oceans and seas.
a. oceanography, b. geomorphology, c. mineralogy.

IV. Письменно переведите текст. Контрольное время — 15 минут.

History of Oceanography

Oceanography is perhaps one of the most composite of sciences, involving the many branches of knowledge that pertain to a study of the life and conditions of the environment in the oceans and seas. The study of the ocean currents, the tides, the temperatures, and the saltness and other chemical properties, is approached through pure physics and chemistry. The charting of the ocean margins and the mapping of the relief of the ocean beds are matters for physical geographers. Intimately bound up with the great ocean currents and the tides are meteorological and astronomical phenomena. The above studies constitute hydrography.

Блок 2. SEAWATER

LESSON 5

Задание 1. (Парная работа). Подумайте, о чем может идти речь в этом блоке текстов; попробуйте определить, из каких разделов он будет состоять. Быстро просмотрите тексты блока и проверьте правильность своих предположений.

Упражнение 1. (Парная работа). Определите, какие из приведенных ниже слов и словосочетаний могут, на ваш взгляд, встретиться в тексте 2А. Если среди этих слов вам встретятся незнакомые, найдите их значения в словаре:

mixture; tides; estuary; elements; sulfur; storm; tsunamis; components; proportions; waves; climate; salinity; ion; ridge; circulation; kilogram; analysis.

А теперь прочитайте текст и проверьте правильность своих предположений. Контрольное время — 5 минут.

Text 2A. Sea Salts

Seawater is a solution of salts of nearly constant composition, dissolved in variable amounts of water. While water, the most abundant constituent, determines most of the physical properties of seawater, sea salts cannot be ignored. Their role is especially important in controlling seawater density. We now consider the composition of the salts dissolved in sea water, especially changes in water properties resulting from the addition of sea salts.

It is easy to evaporate seawater, leaving behind sea salts, a mixture containing at least traces of most elements. Despite the variety of elements dissolved in seawater, only six elements comprise more than 99 % of sea salts: chlorine; sodium; magnesium; calcium; potassium and sulfur.

Ocean waters are well mixed. Consequently, the relative abundance of the major components in seasalt is essentially constant, regardless of where the ocean is sampled. Only the water content of the mixture varies, within rather restricted limits. These nearly constant proportions of the major salt components provide the oceanographer with a method of determining the salinity of seawater.

Oceanographers have traditionally used chlorinity — the amount (in grams) of chloride ion (plus bromine and iodine) present in one kilogram of water — to determine the salt content of seawater. Since chloride ion constitutes 55 % of sea salt, we can calculate salinity, the total amount of dissolved salts in a kilogram of seawater.

Electrical conductivity — the ability of seawater to transmit an electrical current — is frequently used to determine salinity because of the speed and precision with which the analyses can be made. Higher salinity increases electrical conductivity of seawater: decreased salinity inhibits electrical conductivity.

Упражнение 2. (Парная работа). Прочитайте по-английски следующие слова и определите их соответствия в русском языке:

salt; ignore; constant; variable; gases; especially; result; mixture; contain; element; calcium; potassium; component; limit; proportion; method; determine; traditionally; ion; total; transmit; analysis.

Упражнение 3. (Парная работа). Найдите в тексте 2А эквиваленты следующих слов и словосочетаний:

разнообразие; соли морской воды; основные компоненты; постоянные пропорции; метод определения; соленость морской воды; хлорность; общее количество; растворенные соли; электропроводность; электрический ток.

Упражнение 4. Пользуясь приложением 3 («Цифры в английской научно-технической литературе»), прочитайте по-английски следующие формулы, а также данные, содержащиеся в приводимой ниже таблице.

$$(1) \quad S(‰) = 1.8\mathrm{Cl}(‰) + 0.03$$

where Cl, the chlorinity, is the amount (in grams) of chloride plus bromine and iodine per kilogram of seawater; and S — is the salinity, in parts per thousand.

$$(2) \quad S(‰) = 1.80655 \times \text{chlorinity } (‰)$$

$$(3) \quad \text{Average salinity } 34.7\,‰ = 1.80655 \times \text{Average chlorinity of the oceans } 19.2\,‰$$

Ocean Salinity, Major Constituents (over 100 parts per million)

Ion	Percentage
Clorine	55.04
Sodium	30.61
Sulfate	7.68
Magnesium	3.69
Calcium	1.16
Potassium	1.10
	99.28

Упражнение 5. Прочитайте текст 2А еще раз и найдите в нем определения:

— морской воды;
— хлорности;
— солености;
— электропроводности.

Упражнение 6. Заполните графы приводимой ниже таблицы словами, относящимися к следующим понятиям:

Salts	Water

Упражнение 7. (Парная работа). В правой колонке найдите отрезок предложения, который больше всего подходит по смыслу к отрезку предложения, расположенного в левой колонке. Обратите внимание на значение связующих элементов (см. приложение 2).

1. **Despite** the variety of elements dissolved in seawater.
2. **Since** chloride ion constitutes 55 % of sea salt.
3. **While** water determines most of the physical properties of seawater.

a. we can calculate salinity, the total amount of dissolved salts in a kilogram of seawater.
b. only six elements comprise more than 99 % of sea salts.
c. sea salts cannot be ignored.

Упражнение 8. В прочитанном тексте 2А найдите предложение, несущее основную смысловую нагрузку.

Упражнение 9. (Парная работа). Выберите один из абзацев текста 2А, придумайте к нему 3—5 вопросов. Попросите ответить на них другую пару студентов. Обменяйтесь вопросами.

Упражнение 10. В приводимой ниже таблице поставьте плюс в соответствующей колонке, предварительно определив, правильным или неправильным является то или иное утверждение:

Right	Wrong	
		1. Ocean water is a complex solution of salts in water. 2. Salinity is the amount of chloride ion present in one kilogram of water. 3. Salinity is the total amount of solid material dissolved in a kilogram of sea water. 4. Sea salts are aspecially important in controlling seawater density. 5. Electrical conductivity is the ability of seawater to transmit an electrical current.

Упражнение 11. Переведите текст письменно. Контрольное время — 25 минут.

Salinity of Ocean Water

Ocean water is a complex solution of salts in water. The major component ions are distributed in ocean water in relatively constant proportions to one another, but the proportion of water to dissolved salts may vary from place to place within the ocean. Water makes up, on the average, 96,5 % of the ocean's mass, so this substance determines most of the physical properties that we observe in ocean water.

The term used to describe the condition of solid substances being dissolved in the ocean is salinity. Salinity is defined as the total amount of solid material dissolved in a kilogram of seawater when all the carbonate has been converted to oxide, all bromine and iodine replaced by chlorine, and all organic matter completely oxidized.

Упражнение 12. В тексте 2А найдите формы Participle I и II; переведите предложения, содержащие эти формы на русский язык.

Упражнение 13. Выберите подходящую по смыслу форму причастия.

1. Seawater does not freeze completely at a (giving/given) temperature as does pure water.
2. In other words, seawater has no fixed (freezing/frozen) point.
3. Seawater contains small amounts of (dissolving/dissolved) gases.
4. Seawater has a structure of icelike clusters (surrounding/surrounded) by unbounded water molecules.

5. Abundant rainfall releases heat in the atmosphere (preventing/prevented) the much lower winter temperatures (finding/found) in the continental regions away from the oceans.

LESSON 6

Упражнение 1. Прочитайте приводимый ниже текст (контрольное время — 8 минут). Постарайтесь понять его содержание. Среди приведенных после текста предложений укажите те, которые, на ваш взгляд, соответствуют его содержанию.

Text 2B. Some Physical Properties of Seawater

Physical properties of salt water are changed by increased salt concentrations. Changing the salinity of water from 0 ‰ to 40 ‰ causes the viscosity — the internal resistance of a liquid to flowing — to increase about 5 %. Adding sea salts in water also changes the temperature of maximum density and the temperature of initial freezing. Since sea salts do not fit into the ice crystal structure, the presence of salt inhibits ice formation. Adding more sea salt causes the salt mixture to freeze at temperatures below 0 °C.

Seawater does not freeze completely at a given temperature as does pure water — in other words, seawater has no fixed freezing point. The reason is easily understood. As seawater freeze, salts are excluded from the ice structure. Consequently, the remaining seawater becomes more saline and freezes at a lower temperature. Unless cooled to very low temperatures, a small amount of highly concentrated brine remains unfrozen.

The processes that cause the depression of the initial freezing point also depress the temperature of maximum density. Sea salts apparently inhibit development of the clusters that cause volume expansion of pure liquid water near the freezing point. Adding sea salt to water causes the temperature of maximum density to become progressively lower. At a salinity of 24,7 ‰, the temperature of maximum density and the initial freezing temperature coincide at —1,33 °C.

Changes in certain properties of water, due to the presence of sea salt, can be measured and used as an indicator of salinity. An example is the refractive index, an indication of the relative speed of light rays passing through seawater. The refractive index of seawater can easily be measured with simple devices, this index providing useful information where the seawater exhibits salinity changes, for example, in coastal regions.

1. Изменение некоторых свойств воды может использоваться в качестве индикатора солености.

2. Движение жидкости можно разделить на два вида — ламинарное и турбулентное.

3. Внешним выражением движения молекул в твердых телах, жидкостях и газах является температура.

4. Морская вода не имеет постоянной точки замерзания.

5. Присутствие солей препятствует образованию льда.

6. Размеры и время жизни вихрей зависит от температуры и солености водных масс.

Упражнение 2. (Парная работа). Прочитайте следующие слова и найдите их соответствия в русском языке.

concentration; resistance; initial; crystal; structure; formation; mixture; pure; fix; temperature; process; expansion; normal; measure; indicator; refractive index; information; region.

Упражнение 3. (Парная работа). Найдите в тексте 2В эквиваленты следующих словосочетаний:

физические свойства; концентрация солей; соленость воды; внутреннее сопротивление; максимальная плотность; кристаллическая структура; образование льда; чистая вода; точка замерзания; низкие температуры; расширение объема; показатель преломления; полезная информация; прибрежные районы.

Упражнение 4. (Парная работа). В тексте 2В, вероятно, остались слова, значения которых вы не знаете. Выпишите их, сравните с теми, которые выписал ваш сосед, и обсудите их предполагаемые значения. Правильность своих предположений проверьте по словарю.

Упражнение 5. Разместите приводимые ниже слова и словосочетания по соответствующим тематическим группам:

Термины	Общенаучная лексика	Связующие элементы

property; concentration; salinity; resistance; temperature of maximum density; since; below; temperature of initial freezing; as; refractive index; low temperature; due to; information.

Упражнение 6. (Парная работа). В каждом предложении первого и второго абзацев текста 2В найдите подлежащее и сказуемое.

Упражнение 7. Устно переведите 1-й и 2-й абзацы текста 2В. Контрольное время — 10 минут.

Упражнение 8. Прочитайте по-английски:

5; 15; 50; 55; 100; 500; 5000; 1,000; 10,000; 100,000; 246; 703; 924; 1.046; 7.222; 10.101; 6.725; 1/2; 1/5; 8/9; 0.1; 0.002; 0.0003; 4.89; 27.46; 239.789; 521.632; 71 %; 25 ‰; 1-й; 2-й; 3-й; 10-й; 70-й; 225-й; 1000-й.

Упражнение 9. Переведите следующие предложения, содержащие причастные конструкции, на русский язык.

1. The oceans, covering nearly three fourths of the Earth's surface, have a most direct and important influence on the heating of the air.
2. This current, flowing to the east in summer, is called the Monsoon Current.
3. Some of the molten material having cooled, the solid crust of the Earth formed.
4. A storm having passed over, winds are west or north-west.
5. The refraction index of seawater can easily be measured with simple devices, this index providing useful information where the seawater exhibits salinity changes.
6. In this region the Gulf Stream reaches the ocean bottom, its flow being directly influenced by the topography of the continental slope.
7. The sea surface rises toward the right-hand side of the Florida Current, this rise amounting to about 45 cm.
8. The surface of the sea behaves much like a mirror, reflecting from 40 to 50 per cent of the insolation.
9. The water is very warm, the surface temperature being 82 °F in most of the ocean north of the equator.
10. In summer the Equatorial Current is driven forward by the south-west monsoon, its speed frequently attaining 4 knots near the equator.

LESSON 7

Упражнение 1. Прочитайте предлагаемый текст 2С (контрольное время — 10 минут) и определите, на какие из данных вопросов можно найти в нем ответы.

1. В какой зависимости находятся между собой частота планетарных волн и их длина?
2. Почему атмосферные газы обычно растворяются в поверхностных водах?
3. Чем определяется количество газа, которое растворяется в поверхностных водах?
4. Откуда берется энергия в океане?
5. Какова роль вихрей в формировании динамики океана?
6. Какие факторы вызывают уменьшение количества газов, которое может растворить морская вода?

Text 2C

Seawater also contains small amounts of dissolved gases. Because of the constant stirring of the sea surface by winds and waves, atmospheric gases usually dissolve in surface waters. Wa-

ter of a given temperature and salinity is said to be saturated with gas when the amount of gas entering the water equals the amount leaving during the same period of time. Surface seawater is normally saturated with atmospheric gases, particularly oxygen and nitrogen.

The amount of gas which can be dissolved in surface seawater is determined by water temperature and salinity. Increasing the temperature or salinity reduces the amount of gas that seawater can dissolve. Of the two factors, temperature is the more important. Like water temperature and salinity, the dissolved gas content of a bit of seawater is controlled by conditions existing in the area where that water parcel was last at the surface.

Once a mass of water sinks beneath the surface, dissolved gases can no longer exchange with atmospheric gases. There may be two occurrences. First, the amount of gas in a bit of water may remain unchanged except by movement (diffusion) of gas molecules through the water — a slow process — or by mixing with other water masses containing different amounts of dissolved gas. In general, nitrogen and rare gases, argon, helium, neon, and krypton, behave in this manner; we say that their concentrations are conservative properties. Seawater is nearly saturated at all depths with nitrogen and rare gases.

Second, in addition to mixing and diffusion, some gases are involved in biological and inorganic processes which change their concentrations. They are examples of nonconservative properties. Specifically, oxygen and carbon dioxide may be generated or depleted at varying rates in the ocean. Variations in the dissolved oxygen concentration can be used to trace subsurface water movements.

Упражнение 2. (Парная работа). Выберите наиболее подходящий, на ваш взгляд, заголовок для текста 2С.

1. Heat Balance of the Earth.
2. Surface Circulation.
3. Salinity of Ocean Water.
4. Dissolved Gases.
5. Continental Slopes.

Упражнение 3. В правой колонке найдите английские эквиваленты следующих слов и словосочетаний:

1. растворенные газы	1. small amount
2. небольшое количество	2. water parcel
3. содержание растворенных газов	3. carbon dioxide
	4. in general
4. объем воды	5. dissolved gases
5. диоксид углерода	6. dissolved-gas content
6. важный фактор	7. conservative properties
7. в целом	8. nearly saturated

8. консервативные свойства
9. почти насыщенный
10. изменения концентрации

9. variations in concentration
10. important factor

Упражнение 4. Выпишите из текста 2С все слова, которые имеют отношение к понятию «газы». Если вы не знаете значения какого-либо слова, найдите его в словаре.

Упражнение 5. Используя две колонки слов, составьте как можно большее количество словосочетаний:

surface	gas
different	water
conservative	amounts
oxygen	properties
small	concentration
important	movement

Упражнение 6. Дайте ответы, там, где это возможно, на вопросы, содержащиеся в упражнении 1.

Упражнение 7. (Парная работа). Из приведенных ниже предложений выберите те, которые наиболее полно отражают содержание текста 2С.

1. Oxygen and carbon dioxide may be generated or depleted at varying rates in the ocean.
2. The amount of gas which can be dissolved in surface seawater is determined by water temperature and salinity.
3. Once a mass of water sinks beneath the surface, dissolved gases can no longer exchange with atmospheric gases.
4. Seawater contains small amounts of dissolved water.
5. Seawater is nearly saturated at all depths with nitrogen and rare gases.

Упражнение 8. (Парная работа). В приведенном отрывке текста содержатся две смысловые ошибки. Не заглядывая в текст 2С, попытайтесь найти их; приведите правильные варианты.

The abundance and distribution of dissolved oxygen is affected by metabolic processes of plants and animals. Free oxygen is released during photosynthesis, the process by which carbon and water are combined by chlorophyll in the absence of sunlight, to form carbohydrates. Large floating plants called phytoplankton, are responsible for most photosynthesis in the ocean.

Упражнение 9. (Парная работа). Данный отрывок текста приводится без деления на предложения. Прочитайте его и обсудите, где кончается одно и начинается другое предложение.

Photosynthesis requires energy from sunlight, so food and oxygen are produced only in the sunlit, near-surface ocean waters, called the photic or photosynthetic zone the shade-loving phytoplankton are usually most abundant a few meters or tens of meters below the sea surface there, intense photosynthetic activity releases

oxygen, which is dissolved but which cannot readily escape to the atmosphere through the sea surface such near-surface waters are frequently supersaturated with dissolved oxygen.

Упражнение 10. (Парная работа). Прочитайте текст 2С, подлинное название которого «Dissolved Gases», еще раз и переведите те его предложения, которые показались вам непонятными. Обсудите перевод этих предложений между собой.

Упражнение 11. Заполните, там, где это возможно, соответствующие графы приводимой ниже таблицы. При необходимости проверьте себя по словарю.

Verb	Noun	Adjective	Adverb
equal	equality	equal constant normal	equally
	salinity		usually particularly
exist increase			
change	occurrence		

Упражнение 12. Найдите в тексте 2С глагольные формы, оканчивающиеся на -ed; определите, к какой части речи они относятся.

Упражнение 13. Перепишите следующие предложения, поставив их глаголы-сказуемые в форму страдательного залога соответствующего времени.

1. Nearly 50 years ago the word «plankton» (to use — Past Indefinite) by a German professor to embrace all acquatic organisms that float and drift in the ocean.
2. A great variety of phytoplankton and zooplankton (to locate — Present Indefinite) in the photic zone, that is, where light penetrates.
3. In England study of marine phenomena (to encourage — Past Indefinite) by wealthy, learned members of scientific societies.
4. Many contributions from a number of nations (to make — Present Perfect) to the understanding of the oceans.
5. When considering the chemical reactions in which atoms (to involve — Present Indefinite), we (to concern — Future Indefinite) primarily with the distribution of electrons in the outer shell.

Упражнение 14. Выберите правильный вариант перевода выделенных форм и словосочетаний.

1. It the 15th century **there were** important advances in navigational instrumentation.

a. там были, b. там имеются, c. были

2. **There is** a significant relationship between the formation of the continental masses and the surrounding ocean basins.

a. там есть, b. существует, c. там существует

3. Although a water parcel may sink far below the surface, animals living **there** can continue to eat food produced at the surface.

a. имеется, b. там, c. есть

4. Within the ocean itself **there must be** a continual passage of heat from lower to higher latitudes.

a. там должно быть, b. должно быть, c. там имеется

5. In general **there exists** a gradual slope from the continental shore out to the 100-fathom depth limit.

a. там существует, b. существует, c. существовал

LESSON 8

Упражнение 1. (Парная работа). Прочитайте заглавие текста 2D. Подумайте, какие вопросы будут затронуты в этом тексте.

Теперь напишите 10—15 английских слов, которые, на ваш взгляд, должны встретиться в тексте с таким заглавием. После того, как вы прочитаете текст, проверьте правильность своих предположений. Контрольное время для чтения — 5 минут.

Text 2D. Seawater Density

The density of water in its various states and at different temperatures is of great importance in considering the movement of water in the ocean. Anything that is more dense than water will sink into it, and a substance that is less dense will float on the surface. We define density as mass per unit of volume, usually grams per cubic centimeter (g/cm^3).

Seawater density is controlled by three factors: temperature, salinity, and pressure. Temperature and salinity are the most important. In the open ocean, seawater density varies only between relatively narrow limits. Consequently, the oceanographer must determine seawater density with great precision and must work with very slight differences. Density distributions are closely related to current patterns in the deep ocean.

Normally seawater density is calculated from precise measurements of temperature (accurate to $\pm 0.02\,^{\circ}C$) and salinity (accurate to $\pm 0.02\,‰$) of water samples. From these measurements density is calculated to a precision of one part in 50,000.

Density is affected by temperature and with most substances we observe that a decreased temperature produces an increase in

the density of the substance. The increase in density is the result of the same number of molecules occupying less space as they lose energy. This condition is also found in water. As the temperature of water is lowered from 4° to 0 °C, we observe that its density decreases.

Упражнение 2. (Парная работа). Найдите соответствия следующих слов и словосочетаний в русском языке:

various; substance; mass; cubic centimeter; control; factor; limit; precision; normally; calculate; accurate; observe; occupy; energy.

Упражнение 3. Найдите в тексте 2D эквиваленты следующих словосочетаний:

плотность морской воды; плавать на поверхности; плотность веществ; с большой точностью; масса на единицу объема; точные измерения; модели течения; открытый океан; движение воды; различные состояния; незначительные различия; терять энергию.

Упражнение 4. Укажите английские эквиваленты приведенных глаголов.

оказывать влияние	a. consider
	b. calculate
	c. affect
измерять	a. sink
	b. measure
	c. float
увеличивать	a. decrease
	b. increase
	c. descend
определять	a. affect
	b. determine
	c. vary
плавать	a. sink
	b. float
	c. define
соотносить	a. occupy
	b. relate
	c. observe

Упражнение 5. (Парная работа). Из правой колонки подберите антонимы к следующим словам:

1. increase	1. wide
2. sink	2. shallow
3. narrow	3. slight
4. surface	4. closed
5. deep	5. decrease
6. great	6. bottom
7. open	7. float

Упражнение 6. Прочитайте текст 2D еще раз и выпишите из него 8—10 ключевых слов.

Упражнение 7. В приведенной ниже таблице поставьте плюс в соответствующей колонке, предварительно определив, правильными или неправильными являются следующие утверждения:

Right	Wrong	
		1. Density is defined as a mass per unit of volume. 2. Seawater density is controlled by temperature, salinity and velocity of water. 3. Normally, seawater density is calculated from precise measurements of temperature. 4. The temperature of maximum density for fresh water is 4 °C. 5. Density controls vertical movements of water.

Упражнение 8. Найдите в тексте 2D доказательства справедливости следующих утверждений:

1. The density of water is of great importance in considering the movement of water in the ocean.
2. Density is affected by temperature.

Упражнение 9. (Парная работа). Напишите, не более чем в трех предложениях, резюме текста 2D.

Упражнение 10. (Парная работа). Заполните пропуски в тексте приводимыми ниже словами.

Density

Density is the degree of compactness of a substance: the mass per unit volume; it is usually measured in grams per cubic centimeter or in pounds per cubic foot. The density of all substances is . . . . to the density of pure water . . . . 4 °C, which equals 1 gram per . . . . centimeter. The density of a mineral . . . . determined by its atomic structure and . . . . chemical composition, and is affected by . . . . and pressure. A rise in temperature . . . . density while an increase in pressure . . . . density.

increase; its; at; decrease; compared; is; temperature; cubic.

Упражнение 11. Переведите следующий текст письменно. Контрольное время — 20 минут.

Distribution of Density

Since the density of sea water depends on its temperature and salinity, all processes that alter the temperature or the salinity

influence the density. At the surface the density is decreased by heating, addition of precipitation, melt-water from ice, or runoff from land, and is increased from cooling, evaporation, or formation of ice. If the density of the surface water is increased beyond that of the underlying strata, vertical convection currents arise that lead to the formation of a layer of homogeneous water. Where intensive cooling, evaporation or freezing takes place, the vertical convection currents penetrate to greater and greater depth until the density has attained a uniform value from the surface to the bottom.

Упражнение 12. Прочитайте по-английски все цифровые данные, которые содержатся в тексте 2D.

Упражнение 13. Прочитайте по-английски:

$$16 - 9 = 7;\ 6 \times 5 = 30;\ 12 : 4 = 3;\ x^2 + y^2 = z;\ x_3 = 2y;$$

$$6.248 + 0.002 = 6.250;\ 64;\ x^3 + y^3 = c;\ x = 2.37$$

Упражнение 14. Пользуясь географической картой и приложением 3, расскажите о географическом положении Ирландии, Новой Зеландии, Фолклендских островов.

Упражнение 15. Определите, к каким частям речи принадлежат выделенные формы:

1. The island north of Australia **form** a natural boundary between the Pacific and Indian oceans.

a. существительное, b. глагол

2. The Arctic Mediterranean also receives a considerable amount of fresh water in the **form** of runoff from the great Siberian and Canadian rivers.

a. существительное, b. глагол

3. The increase in density is the **result** of the same number of molecules occupying less space as they loose energy.

a. существительное, b. глагол

4. A temporary increase of temperature **results** in increase of evaporation.

a. существительное, b. глагол

5. An increased temperature produces a **decrease** in the density of the substance.

a. существительное, b. глагол

6. As the temperature of water is lowered from 4 °C to 0 °C, we observe that its density **decreases**.

a. существительное, b. глагол

Упражнение 16. Переведите следующие предложения на русский язык, обращая внимание на выделенные формы и словосочетания.

1. When this state **has been established**, continued increase of the density of the surface water leads to an accumulation of the **densest** water near the bottom.

2. Density **is affected** by temperature, salinity and pressure.

3. The width of the continental shelf extending seaward from the continent may vary considerably, **depending** on the topographic expression.

4. The interface between the lithosphere and the hydrosphere is a sea bottom; across it **there is** a density change from approximately 2.5 to 1.06 g/cm³. ,

5. On the left hand side of the Atlantic water are found water masses which **have been formed** by mixing between the Atlantic and the Arctic waters.

6. The uniform bottom water fills all the basins of the Norwegian Sea at depth below 600 m, **the temperatures above 1500 m being somewhat higher.**

7. One of the **most striking features** of the Atlantic bottom topography is the Mid-Atlantic Ridge.

Упражнение 17. Просмотрите еще раз тексты 2A, 2B, 2C, 2D и определите в каждом из них ключевые предложения; составьте резюме к блоку 2 «Seawater».

Тесты к блоку 2

ТЛ

I. В каждом ряду укажите цифрой слово, не соответствующее по своему значению данной тематической группе:

a. chlorine (1), sodium (2), calcium (3), property (4);

b. salinity (1), generosity (2), density (3), viscosity (4);

c. dissolve (1), saturate (2), diffuse (3), satisfy (4);

d. fresh (1), salty (2), pure (3), relative (4);

e. during (1), by (2), along (3), amount (4).

II. Укажите буквой русский эквивалент приведенных слов:

1. conductivity	a. преломление b. проводимость c. преобразование
2. measurement	a. ограничение b. изменение c. измерение
3. pressure	a. давление b. плотность c. вязкость

4. property	a. свойство b. обмен c. распределение
5. dissolve	a. таять b. растворять c. замерзать
6. sink	a. плавать b. опускаться c. всплывать
7. saturate	a. растворять b. сохранять c. насыщать
8. frequently	a. редко b. часто c. регулярно
9. increase	a. увеличивать b. уменьшать c. сохранять
10. also	a. хотя b. также c. несмотря на

III. Заполните пропуски в предложениях, выбрав соответствующий вариант предлагаемых слов:

1. . . . . is the total amount of dissolved salts in a kilogram of seawater.

a. chlorinity, b. salinity, c. conductivity

2. . . . . is the amount of chloride ion present in one kilogram of water.

a. chlorinity, b. density, c. viscosity

3. . . . . is an indication of the relative speed of light rays passing through seawater.

a. electrical conductivity, b. refractive index, c. photic zone

ТГ

I. Укажите буквой подходящую по смыслу форму причастия.

1. Water flows readily, maintaining only a fixed volume at a . . . . temperature.

a. giving, b. given

2. Evaporation from the sea surface occurs well below the . . . . point.

a. boiling, b. boiled

3. Abundant rainfall releases heat in the atmosphere, ... the much lower winter temperatures found in the continental regions.

a. preventing, b. prevented

II. Выберите правильный вариант перевода выделенных форм и словосочетаний.

1. Considerable experience **has been accumulated** in determining the pattern of the temperature conditions of the water surface.

a. накоплен, b. будет накоплен, c. накапливается

2. In the Norwegian Sea Atlantic water **is being** somewhat **diluted** by the excess precipitation.

a. разбавлялось, b. разбавляется, c. будет разбавляться

3. Baffin Bay in Canada **was explored** by Sir John Ross in 1817 and 1818.

a. был исследован, b. исследуется, c. исследованный

4. After **having passed** the meridian of Cape Farewell the icebergs drift into the Davis Strait.

a. проходящие, b. после прохождения, c. проходя

5. When **navigating** in this sea several factors should be taken into account.

a. плавающий, b. проплыв, c. плавая

6. From the geographical point of view **there is** a general and regional oceanography.

a. существует, b. там существует, c. существовала

7. The annual variation of sea surface temperature **changes** considerably from region to region.

a. изменяются, b. изменения, c. изменяющийся

8. The Arctic Sea **forms** a nearly isolated northern extension of the Atlantic Ocean.

a. формы, b. формирует, c. формирующее

TT

I. В данном тексте два предложения не соответствуют его общему содержанию. Определите номера этих предложений.

1. Salinity is the total amount of dissolved solids in one kilogram of seawater. 2. Although sodium and chlorine comprise the bulk of these dissolved solids, there are more than 60 other elements in seawater most of them in very small quantities. 3. The Atlantic coast of the United States has numerous salt marsh areas. 4. Many of these marshes have been made into wildlife refuges or similarly protected areas. 5. In 1884 a Scottish chemist William Dittmar found that regardless of the total amount of dissolved material, the constituents invariably occurred in the some proportion. 6. Salinity can therefore be determined from the concentration of only one element, commonly chlorine.

II. Выберите и укажите цифрой правильные ответы на следующие вопросы:

1. What three factors control seawater density?

a. Conductivity, viscosity, pressure;

b. Salinity, permeability, concentration;
c. Temperature, salinity, pressure.
2. What is chlorinity?
a. The amount of chloride ion in one kilogram of water.
b. The total amount of dissolved salts in a kilogram of seawater.
c. The ability of seawater to transmit an electrical current.
3. What are the two main gases dissolved in seawater?
a. hydrogen, carbon dioxide;
b. nitrogen, oxygen;
c. argon, helium.
4. What are the two main factors determining the amount of gases dissolved in seawater?
a. density, viscosity;
b. temperature, salinity;
c. conductivity, chlorinity.

III. Письменно переведите следующий текст. Контрольное время — 15 минут.

Density of Seawater

Seawater density is the mass per unit of volume, which depends on salinity (the amount of dissolved substances in the water), temperature, and pressure. The latter depends in turn on the depth of water. Fresh water has a density of essentially 1.00000 gram per cubic centimeter, whereas seawater density commonly ranges between 1.02400 and 1.03000 grams per cubic centimeter. Although this range may seem insignificant differences of only a few tenthousandths of a gram per cubic centimeter can be important in deep currents and water masses.

Блок 3. THE OPEN OCEAN

LESSON 9

Упражнение 1. Прочитайте заглавие блока 3. Подумайте, о чем может идти речь в этом блоке текстов; приведите 10—15 слов, которые, с вашей точки зрения, должны встретиться в нем. Попробуйте также определить, из каких разделов может состоять данный текст. Быстро просмотрите тексты, входящие в блок 3, и проверьте правильность своих предположений.

Упражнение 2. Не более чем за 7 минут прочитайте текст 3А, а затем постарайтесь максимально полно воспроизвести его содержание на русском языке.

Text 3A. Layered Stucture of the Ocean

Light, temperature, and salinity are the most important variables in the marine environment. Their distribution results from absorption of incoming solar radiation (insolation) in the surface ocean and transport of heat and water vapor over the earth's surface. Part of this energy from the sun heats the ocean surface to evaporate water, the source of rain for the continents.

Absorption of insolation at the ocean surface causes a three-layered structure of the open ocean, the surface, pycnocline and deep zones. The surface zone undergoes major changes because of seasonal variations in heating, cooling, evaporation, and precipitation. In the polar and subpolar oceans, freezing of surface seawater to form sea ice is an important process. These processes control the temperature, salinity, and therefore the density of surface waters.

The surface zone contains less-dense water, usually as a result of higher temperatures caused by warming of surface waters by the sun. Thickness of the surface zone is controlled by the depth of mixing, caused primarily by winds. In certain areas vertical water movements (convective movements) are caused by density changes resulting from changes in temperature and salinity. Mixing of the water within the surface zone results in its nearly neutral stability, so water particles can easily move vertically. Surface waters have ample opportunity to adjust to local climatic conditions and to dissolve atmospheric oxygen.

Before the surface zone is the pycnocline, where water density changes with depth. Because of those large changes in density with depth, water in the pycnocline zone has great stability. The pycnocline acts as an effective, though slightly leaky, barrier to vertical water movements, serving as a floor to the surface circulation with its seasonal temperature and salinity changes.

Furthermore, the pycnocline zone acts as a ceiling for the deep zone and prevents deep-ocean waters from readily mixing with surface waters. In high latitudes and polar areas the pycnocline is usually absent, so deep-ocean waters exchange gases with the atmosphere, giving up excess carbon dioxide and taking up dissolved oxygen.

Упражнение 3. Определите русские соответствия следующих слов и словосочетаний, встретившихся вам в тексте 3А:

absorption; isolation; structure, seasonal variations; polar; subpolar; process; energy; control; mixing; vertical; convective; neutral stability; vertically; local; climatic conditions; pycnocline zone; barrier; circulation.

Упражнение 4. Найдите в правой колонке английские эквиваленты следующих словосочетаний:

1. диоксид углерода	1. transport of heat
2. солнечная радиация	2. water vapor
3. перенос тепла	3. to undergo changes
4. водяной пар	4. depth of mixing
5. в свою очередь	5. solar radiation
6. претерпевать изменения	6. high latitudes
7. глубина перемешивания	7. to dissolve oxygen
8. изменения плотности	8. carbon dioxide
9. высокие широты	9. in turn
10. растворять кислород	10. density changes

Упражнение 5. Заполните пропуски в предложениях подходящими по смыслу словами.

1. The surface zone undergoes major changes . . . . seasonal variations in heating, cooling, evaporation and transpiration.
2. These processes control the temperature, salinity and . . . . the density of surface waters.
3. The pycnocline acts as an effective . . . . slightly leaky, barrier to vertical water movements.
4. The pycnocline zone acts . . . . a ceiling for the deep zone.
5. Part of the energy from the sun heats the ocean which . . . . supplies energy to drive the atmospheric circulation.

in turn; though; as; because of; therefore.

Упражнение 6. Найдите по словарю, если в этом есть необходимость, значения приведенных ниже наречий; определите, от каких слов они образованы.

Usually; primarily; nearly; particularly; slightly; readily; easily; vertically.

Упражнение 7. (Парная работа). Прочитайте текст 3А еще раз и выпишите из него те слова, значения которых остались для вас неизвестными. Сравните их со словами, выписанными вашим товарищем; обсудите предполагаемое значение выписанных слов между собой. В случае необходимости используйте словарь.

Упражнение 8. Найдите в тексте 3А ответы на следующие вопросы.

1. Какие факторы являются определяющими для процессов, происходящих в открытом океане?
2. Из каких элементов формируется слоистая структура открытого океана?
3. Что обусловливает меньшую плотность воды в поверхностной зоне океана?
4. Чем объясняется большая устойчивость воды в пикноклине?

Упражнение 9. Закончите следующие предложения.

1. Below the surface zone is . . . . .

2. The pycnocline zone acts as a ceiling for the . . . . . .

3. Absorption of insolation at the ocean surface causes a three-layered structure of the open ocean which includes the . . . . . and . . . . zones.

4. Thickness of the surface zone is controlled by the . . . . .

Упражнение 10. (Парная работа по тексту 3А). Задание 1. Придумайте подзаголовки к каждому абзацу текста.

Задание 2. Если бы перед вами стояла задача выбрать одно предложение в качестве ключевого к тексту, какое предложение вы бы выбрали?

Задание 3. Найдите ключевые предложения в каждом абзаце текста.

Задание 4. Какие положения второго абзаца текста находят развитие в последних трех абзацах?

Упражнение 11. Заполните пропуски подходящими по смыслу словами.

Movements and behavior of ocean water . . . . studied by oceanographer much as air . . . . are studied by meteorologists. Large volumes . . . . seawater move through the ocean basins . . . . discrete water masses, identifiable by their . . . . temperatures and salinities. A water mass . . . . at the surface: then, if denser . . . . the waters below, it sinks to . . . . appropriate level in the ocean. It . . . . moved laterally by currents, often for . . . . thousands of miles, before becoming indistinguishably . . . . with other waters.

is; are; forms; than; as; mixed; masses; many; its; of; characteristic.

Упражнение 12. Переведите текст письменно. Контрольное время — 20 минут.

The Deep Zone

The deep zone contains 80 % of the oceans's water. Over most of the ocean, these deep waters are isolated from the surface by the pycnocline zone. There is no opportunity for heating or cooling these waters at the surface or for exchanging dissolved gases, except in the high latitudes. Thus it is understandable that deep-ocean waters are cold. Because light is absent in the deep zone, there is no photosynthesis and most of the food consumed there is «imported» from the surface zone. Some food for bottom-dwelling organisms is carried by turbidity currents from the continental shelf.

Упражнение 13. Среди приведенных ниже форм укажите формы инфинитива:

resulting; is used; to drive; evaporated; to have changed; has been done; are caused; can move; to be flowing; frozen; having passed; must be done.

Упражнение 14. Найдите в тексте 3А предложения, содержащие формы инфинитива. Переведите их на русский язык.

Упражнение 15. Выберите из данных предложений те, в которых инфинитив выступает в функциях определения и обстоятельства цели. Переведите эти предложения на русский язык.

1. The specific heat of a substance is the heat required to raise one gram of it one degree centigrade.
2. According to Daly the maximum lowering of sea level was of the order of 100 cm but Shepard in order to account for the origin of the submarine canyons, has advanced arguments in favour of a lowering of the order of 1000 m.
3. The terms applied to features of submarine topography are classified according to the origin of the features.
4. Deposition in the sea tends to fill in the depressions and thus to level out the minor irregularities of the bottom.
5. The term «Gulf Stream System» is used to include the whole northward and eastward flow beginning at the Straits of Florida.
6. Systematic order in the collection of ships observations and the increased accuracy to be obtained by the use of instruments came only after the beginning of the 19th century.
7. The task of deep-sea expeditions is first and foremost to determine the shape of the sea bottom.
8. It is also desirable to know something about the circulation of water masses.

LESSON 10

Упражнение 1. Ниже приводятся два предложения из первого и второго абзацев текста 3В. Исходя из содержания этих предложений, постарайтесь определить, о чем пойдет речь в тексте 3В.

a. The color of ocean water ranges from a deep indigo in tropical and equatorial regions to a yellow green in the coastal waters of high latitude areas.

b. The reason we see things in color is because objects reflect wavelengths of light which correspond to the colors of the visible spectrum.

Упражнение 2. Теперь не более чем за 3 минуты найдите в тексте 3В ответы на следующие вопросы:

а. Почему предметы в океане имеют голубовато-зеленый цвет?

б. Чем объясняется голубой цвет морской воды в тропиках?

Text 3B

The color of ocean water ranges from a deep indigo blue in tropical and equatorial regions where there is little biological productivity to a yellow green in the coastal waters of high latitude areas where biological productivity is carried on seasonally at a very high rate. The blue of the tropical waters where there is little particulate matter is due to the molecular scattering of solar radiation. Higher concentrations of particulate matter, especially, when phytoplankton is abundant, results in a greater amount of scattering and absorption and decreased transmission of solar radiation. This produces the greenish color characteristic of these waters.

The reason we see things in color is because objects reflect wavelengths of light which correspond to the colors of the visible spectrum. If those wavelengths of light are not present in the light that falls upon an object, colors cannot be seen. In the ocean the absorption of visible light is known to be greater for the long wavelength colors, thus the short wavelength portion of the visible spectrum is transmitted to greater depths. As a result of this condition, we see the red wavelenghts absorbed within the upper 15—20 m, the yellow will disappear before a depth of 100 m has been reached, and green light can still be perceived down to 250 m. Only the blue and some green wavelengths extend beyond these depths and their intensity becomes low. It is because of this pattern of absorption that objects in the ocean usually appear to be blue green. It is only in the very shallow surface waters that the true colors of the objects can be observed in natural light, since it is only in the surface waters that all of the wavelengths of the visible spectrum can be found.

Упражнение 3. Прочитайте текст 3B еще раз и подберите 2—3 варианта заглавия к нему. Выпишите 10—15 слов, которые наиболее полно отражают его содержание.

Упражнение 4. Проверьте, насколько хорошо вы помните слова и словосочетания, которые встретились вам в предыдущих текстах. Приведите эквиваленты следующих слов и словосочетаний в русском языке:

density; carbon dioxide; increase; v. sink; bottom water; v. measure; water content; salinity; due to; refractive index; dissolved salts; aquatic plants; solar; water parcel.

Упражнение 5. Расставьте приводимые ниже слова в алфавитном порядке в их изначальной форме; найдите, если это необходимо, значения приводимых слов в словаре.

Carried; higher; greater; decreased; produces; scattering; wavelengths; falls; seen; transmitted; reached; perceived; colors.

Упражнение 6. Не заглядывая в текст 3В, подлинное название которого «Light», заполните пропуски в данных предложениях подходящими по смыслу глоголами.

1. Higher concentrations of particulate matter . . . . a greater amount of scattering and absorption.

a. result in, b. result from, c. corresponds

2. The color of ocean water . . . . from a deep indigo blue to yellow green.

a. becomes, b. carries, c. ranges

3. Objects . . . . wavelengths of light which correspond to the colors of the visible spectrum.

a. attract, b. reflect, c. transmit

4. Only the blue and some green wavelengths . . . . beyond depths of 100—250 m.

a. correspond, b. expand, c. absorb

5. The true colors of the object . . . . be observed in natural light.

a. can, b. is, c. fall

Упражнение 7. В правой колонке найдите английские эквиваленты следующих предложений.

1. Цвет океанической воды колеблется от темно-синего до желтого.
2. В тропических районах биологическая продуктивность незначительна.
3. Мы видим вещи в цвете.
4. Предметы в океане обычно имеют голубовато-зеленый цвет.
5. Подлинные цвета предметов можно наблюдать при естественном освещении.

1. We see things in color.
2. Objects in the ocean usually appear to be blue green.
3. True colors of the objects can be observed in natural light.
4. The color of ocean water ranges from deep blue to yellow.
5. There is little biological productivity in equatorial regions.

Упражнение 8. (Парная работа). В каждой строчке приводимого ниже текста найдите позицию, которую должен занимать соответствующий связующий элемент.

A striking feature many open-ocean areas is	of
the intense blue color the water. The blue color	of
marks those surface waters are devoid of particles	which
The blue water color is caused scattering	by
absorption of light; pure water scatters bluish	and
colors more readily reddish colors. In addition	than
water is more transparent blue than to red.	to

Упражнение 9. (Парная работа). Выберите один из абзацев текста 3В, придумайте 2—3 вопроса к нему. Попросите ответить на них другую пару студентов. Обменяйтесь вопросами.

Упражнение 10. Составьте краткий план пересказа текста 3В; используйте его основные положения для того, чтобы составить резюме текста, состоящее из 3—5 предложений.

Упражнение 11. Письменно переведите следующий текст на русский язык. Контрольное время — 20 минут.

Light and Seawater Color

An abundance of particles in water changes its scattering properties, frequently causing a more greenish color. Also, colored particles, or dissolved materials may themselves give seawater a variety of hues. Coastal waters may be brownish, greenish, or even reddish depending on the type of particles or organisms in the water. For example, a great abundance of red organisms causes the red tide sometimes seen in coastal waters. Suspended and dissolved material also limit the depth of light penetration. In turbid seawater at 10-m depth, light levels may be comparable to those at 100 m in nonturbid seawater, and the light remaining is more yellow green.

Упражнение 12. Среди приведенных предложений выберите те, которые содержат инфинитивные конструкции — «сложное подлежащее» и «сложное дополнение». Переведите эти предложения письменно.

1. Warm, arid climate around the Mediterranean Sea causes its surface water to evaporate at a great rate.
2. Two forms of ice are encountered in the Atlantic Ocean.
3. As the state is supposed to be stationary, the ocean must lose as much heat as it gains.
4. In the development of oceanographic research during the last one hundred years, three eras seem to stand out.
5. The term «submarine canyon» has been used widely to include broadfloored troughs with steep walls on continental shelf.
6. In higher latitudes, the European side of the North Atlantic has proved to be much warmer than the American side.
7. In physical oceanography it is necessary to know the density of sea water to an accuracy of at least five decimal places.
8. The ocean covering nearly three-forths of the earth's surface has a most direct influence on the heating of the air.
9. There has been much discussion as to the processes that have led to the formation of the continental shelf.
10. Surface waters have ample opportunity to adjust to local climatic conditions and to dissolve atmospheric oxygen.

Упражнение 13. Переведите следующие предложения, обращая внимание на выделенные формы и словосочетания.

1. No prefrontal cloud systems **appear** with cold fronts.
2. Some ancient rocks **appear to have been formed** by primitive one-celled plants.

3. When sea water reaches the freezing point and continues to cool, water crystals of neelde-like form **appear**.

4. In winter the current **appears to reach** Australia and in part to continue towards the Pacific along the Australian south coast.

5. Investigations show that **it is** the base of the continental slope **that** marks the boundary of the continents.

6. **It was** not until the 1950s **that** geologists of the Northern Hemisphere began to give serious attention to continental drift.

7. Although we are dealing with only one ocean, for convenience we divide **it** into three parts: the Atlantic, the Indian, and the Pacific oceans.

8. **It is** found **that** the tide-producing forces of both sun and moon group themselves into 3 classes: semidiurnal, diurnal and longperiod forces.

9. **It** is well known **that** marine climates are very moderate.

10. Water warms slowly during periods of insolation. However, is cools equally slowly through radiation at night.

11. The Pacific Ocean is nearly as large as the Indian and Atlantic oceans combined, and **it** contains slightly more than half the water in the world ocean.

12. Each of the great continental blocks tends to have an oceanic area opposite to **it** on the other side of the earth.

LESSON 11

Упражнение 1. (Парная работа). Данные слова вы встретите в предлагаемом ниже тексте. Прежде, чем прочитать его, ознакомьтесь с этими словами и словосочетаниями; обсудите вместе с другими студентами предполагаемое содержание этого текста. Постарайтесь найти для него заглавие. Изложите свои предположения о содержании текста по-английски в письменном виде.

Solar energy; heating; absorb; insolation; radiating energy; layered structure; thermocline; temperature changes; isotherms; transfer of heat.

Теперь прочитайте текст и проверьте правильность своих предположений. Контрольное время — 7 минут.

Text 3C

The ocean is an efficient absorber of incoming solar energy. Heating of the ocean surface occurs only during daylight hours, and surface waters are warmest in late afternoon. The amount of energy absorbed by the ocean depends of local cloud cover and the sun's altitude. The sun's altitude depends in turn on latitude and time of year. More solar energy is absorbed when the sun is high in the sky and less when the sun is near the horizon. In the tropics and subtropics the sun is well above the horizon at all

seasons. Near the poles the sun is never far above the horizon so polar and subpolar regions receive much less insolation there. Consequently, the earth is heated in the tropics and subtropics and cooled by radiating energy, primarily from the polar and subpolar regions.

One effect of heating the ocean's surface is to cause the layered structure. Vertical transfer of heat in the surface zone creates a nearly isothermal (iso-equal; thermal-heat) mixed surface zone. Separating the sunwarmed surface zone and the cold, deep zone is the thermocline (thermo — heat; cline — slope), where temperature changes rather abruptly with depth. Below the thermocline, temperatures change little with increasing depth. Changes in temperature cause density changes, so in most ocean areas the thermocline coincides with the pycnocline.

Unequal heating of the earth causes large differences in surface water temperatures between tropic and polar regions. The ocean is warmest (25° to 30 °C) in the tropical and subtropical regions, and coldest (down to —1.7 °C) near the poles. In general, belts of equal surface-water temperature trend east-west.

Surface isotherms — lines connecting points of equal ocean temperature — deviate from their east-west trends near the continents, especially in the western North Atlantic and western North Pacific oceans. These deviations are a consequence of continental climatic conditions and ocean boundary currents which tend to flow parallel to the continents. Some boundary currents, such as the Gulf Stream, transport warm water toward the poles. Other transport cool water toward the equator; the Labrador Current is an example.

Упражнение 2. Не более чем за 3 минуты найдите в тексте 3С ответы на следующие вопросы.

1. В каком направлении осуществляется перенос холодной воды Лабрадорским течением?
2. Почему в большинстве океанов термоклин совпадает с пикноклином?
3. Какие факторы влияют на количество энергии, поглощаемой океаном?

Упражнение 3. (Парная работа). В тексте 3С, вероятно, есть слова, значения которых вы не знаете. Выпишите их, сравните с теми, которые выписал ваш сосед, и обсудите их предполагаемые значения. Проверьте правильность своих предположений по словарю.

Упражнение 4. (Парная работа). Выберите из данных предложений те, которые наиболее полно отражают содержание текста 3С.

1. Surface waters are warmest in late afternoon.
2. The ocean is an efficient absorber of incoming solar energy.
3. Some currents transport cool water toward the equator.

4. Rapid vertical transfer of heat in the surface zone creates a nearly isothermal mixed surface zone.

5. The amount of energy absorbed by the ocean depends on local cloud cover and the Sun's altitude.

6. Near the poles the sun is never far above the horizon.

7. The Earth is heated in the tropics and subtropics and cooled by radiating energy, primarily from the polar and subpolar regions.

Упражнение 5. Укажите, в каких предложениях текста 3С содержится новая для вас информация.

Упражнение 6. Заполните пропуски в следующих предложениях подходящими по смыслу терминами.

1. A thin zone of great temperature and density change, about 1000—200 m below the ocean surface is called . . . . .

2. . . . . is a hypothetical line connecting points of equal temperature within the Earth.

3. . . . . is the zone where water density changes with depth.

4. Radiation from the sun received by the Earth's surface is called . . . . .

Упражнение 7. Ниже приводится несколько положений, не соответствующих действительности. Внимательно прочитайте текст 3С, подлинное название которого «Temperature — Heating and Cooling» и сравните его с данными положениями; исправьте их и объясните, почему они неверны.

1. The Earth is cooled primarily in the tropics.

2. Changes in density cause changes in temperature.

3. Separating the sunwarmed surface zone and the cold, deep zone is the pycnocline, where temperature changes rather abruptly with depth.

4. The Gulf Stream transports cold water toward the poles.

5. The amount of energy absorbed by the ocean does not depend on latitude and time of year.

Упражнение 8. В следующих предложениях заполните пропуски подходящими по смыслу словами.

1. Rapid vertical transfer of heat in the surface zone creates a . . . . isothermal mixed surface zone.

a. such as, b. nearly, c. which

2. . . . . belts of equal surface-water temperature trend east-west.

a. in general, b. rather, c. nearly

3. Some boundary currents . . . . the Gulf Stream, transport warm water toward the poles.

a. consequently, b. nearly, c. such as

4. The Sun's altitude depends . . . . on latitude and time of year.

a. in turn, b. nearly, c. such as

5. Surface isotherms deviate from their east-west trends near the continents . . . . in the western North Atlantic.

a. nearly, b. especially, c. rather

Упражнение 9. Составьте краткий план пересказа текста 3C.

Упражнение 10. Переведите следующий текст письменно. Контрольное время для перевода — 15 минут.

Thermocline

Thermocline is a thin zone of great temperature and density change about 100—200 m below the ocean surface. Because salinity in the open ocean is nearly constant and pressure has only a slight effect on density, temperature is by far the most important factor in seawater density. Surface water is warm and therefore has a low density in comparison to the cold water at lower depths. The rapid temperature and density change in the thermocline makes it a significant boundary for organisms and also for circulation.

LESSON 12

Упражнение 1. Найдите в тексте 3D ответы на следующие вопросы. Контрольное время — 5 минут.

1. В каких районах океана пикноклин часто совпадает с галоклином?
2. В каких пределах колеблется соленость воды в океане?
3. Какие факторы влияют на испарение с поверхности океана?

Text 3D. Salinity — Evaporation and Precipitation

Salinity in the open ocean varies much less than temperature. Changes in salinity are caused primarily by evaporation (removal of fresh water as water vapor), by precipitation (adding fresh water as rain or snow), and by river discharge.

Near the poles, sea ice formation plays an important role because nearly fresh water is incorporated in the ice, leaving behing the salts. These processes act on the ocean surface, just as the heating and cooling processes do. Large changes of salinity with depth form the halocline (halo — salt; cline — slope).

Salinity changes have a pronounced effect on seawater density. A change in salinity of 1‰ causes a greater density change than does a temperature change of 1 °C. Hence in those parts of the ocean where surface waters are greatly diluted by excess precipitation, the main pycnocline frequently coincides with the halocline. However, despite important local effects of reduced surface salinity, over most of the ocean the pycnocline is controlled by the development of the thermocline. This is primarily a result of the re-

latively large temperature range (—1.7 to 30 °C) of seawater. In contrast, the salinity range for most of the ocean is relatively small (33 ‰ to 37 ‰).

Water evaporated from the ocean surface each year is equivalent to a layer about 1 m thick. Approximately 90 % of this water returns to the ocean surface as rain. The remainder falls as rain (or snow) on the continents. Eventually, this water also returns to the coastal ocean, carried by rivers where it causes lower salinities.

Evaporation from the ocean surface is controlled by (1) local insolation, (2) wind speed, and (3) relative humidity of the overlying air. Because of abundant insolation, the tropics and subtropics experience large amounts of evaporation. Conversely, there is less evaporation in polar regions.

Упражнение 2. Вспомните значения следующих слов, встретившихся вам в тексте предыдущего урока:

amount; altitude; latitude; receive; surface; coincide; unequal; heating; deviate; consequence; boundary.

Упражнение 3. Прочитайте следующие слова из текста 3D и определите, какие слова в русском языке помогают понять их значение:

primarily; role; formation; halocline; effect; local; control; range; equivalent; approximately; continent; insolation; tropics; region.

Упражнение 4. Найдите значения приводимых слов в словаре.

to cause; evaporation; precipitation; to add; removal; to dilute; despite of; remainder; range.

Упражнение 5. В правой колонке найдите русские эквиваленты следующих словосочетаний:

1. ice formation	1. речной сток
2. to play a role	2. пресная вода
3. ocean surface	3. формирование льда
4. salinity changes	4. играть роль
5. river discharge	5. водяной пар
6. excess precipitation	6. поверхность океана
7. cooling process	7. изменение солености
8. fresh water	8. ярко выраженное воздействие
9. water vapour	9. избыточные осадки
10. pronounced effect	10. процесс выхолаживания

Упражнение 6. Выпишите из текста 3D все слова, которые используются для описания понятия «соленость».

Упражнение 7. Разместите приводимые ниже слова и словосочетания по следующим тематическим группам:

Термины	Общенаучная лексика	Связующие элементы

salinity; changes; to cause; evaporation; precipitation; river discharge; pole; salts; process; halocline; effect; than; hence; to dilute; pycnocline; however; despite of; to reduce; to control.

Упражнение 8. (Парная работа по тексту 3D). Задание 1. Придумайте подзаголовки для второго и третьего абзацев текста.

Задание 2. Выберите из текста 10—15 ключевых слов.

Задание 3. Найдите ключевые предложения в каждом абзаце текста.

Задание 4. Если бы перед вами стояла задача выбрать одно предложение в качестве ключевого к тексту, какое предложение вы бы выбрали?

Упражнение 9. Составьте предложения, в которых говорилось бы:

— о факторах, влияющих на соленость воды в океане;
— о влиянии солености на плотность морской воды;
— о влиянии осадков на соленость воды в океане;
— о диапазоне изменений солености в океане;
— об испарении с поверхности морской воды.

Упражнение 10. Письменно переведите следующий текст. Контрольное время — 20 минут.

Density and Salinity

Another variable that affects the density of surface water is salinity. It appears that salinity has a very minimal effect on the movement of water masses in the lower latitudes, and density changes resulting from salinity changes are only of importance in the very high latitudes where water temperature remains relatively constant. For example, the highest salinity of water in the open ocean is found in the subtropical regions, but there is no sinking of water in these areas due to the fact that water temperatures are high enough to maintain a low density for the surface water mass and prevent it from sinking. In such areas, a strong halocline may develop with a relatively thin surface layer of water having salinities in excess of 37 ‰.

Упражнение 11. (Парная работа). Устно переведите следующий текст на русский язык. Контрольное время — 7 минут.

Evaporation and Precipitation

Maximum amounts of evaporation occur in subtropical regions where the persistent trade winds blow throughout the year. Also, the subtropics are areas of clear skies and relatively dry air. Relatively high surface salinities near 30 °N and 30 °S demonstrate that these are areas of excess evaporation. Diminished evaporation in equatorial regions is due in part to the light and variable winds, regional cloudiness also contributes by diminishing insolation.

Упражнение 12. Выберите правильный вариант перевода выделенных форм и словосочетаний:

1. This Antarctic water does not **appear** to pass through the Pacific Equatorial Water Mass into the North Pacific.
   a. оказывается, что... b. появляется
2. The Equatorial Water Mass has relatively high salinity **ranging** from 35 ‰ at a depth of 100 m to down to 34.6 ‰ at 800 m.
   a. изменяющуюся b. изменения
3. No deep water **is known** to form in the Pacific Ocean.
   a. известно, что... b. было известно
4. **It was** not until the 19th century **that** a more or less complete understanding of what caused waves developed.
   a. это..., который b. лишь
5. The Circumpolar Current meets its greatest restriction as **it** passes through the 1000 km Drake Passage.
   a. это b. оно
6. The main circulation **to be observed** in Antarctic waters is the Circumpolar Current.
   a. должно наблюдаться b. которое наблюдается
7. **It** is the absorbed radiation **that** increases temperature.
   a. это..., которое b. именно

Тесты к блоку 3

ТЛ

I. Укажите буквой английские эквиваленты следующих словосочетаний:

1. глубина перемешивания	a. high latitudes
2. изменения плотности	b. river discharge
3. высокие широты	c. fresh water
4. перенос тепла	d. density changes
5. речной сток	e. bottom water
6. избыточные осадки	f. water content
7. пресная вода	g. dissolved salts
8. донная вода	h. transfer of heat
9. растворенные соли	i. depth of mixing
10. содержание воды	j. excess precipitation

II. В правой колонке найдите и обозначьте буквой слова, обратные по значению словам, расположенным в левой колонке:

1. vertical	a. shallow
2. deep	b. (v.) cool
3. surface	c. low
4. scattering	d. horizontal
5. v. heat	e. concenrtation
6. salty	f. bottom
7. high	g. fresh
8. increase	h. above
9. below	i. warm
10. cold	j. decrease

III. Заполните пропуски в предложениях подходящими по смыслу терминами.

1. Below the surface zone is the . . . . where water density changes with depth.

2. Absorption of . . . . at the ocean surface causes a three-layered structure of the open ocean.

3. The blue of the tropical waters is due to the molecular . . . . of solar radiation.

4. Separating the sun-warmed surface zone and the cold, deep zone is the . . . ., where temperature changes rather abruptly with depth.

5. Surface . . . . — lines connecting points of equal ocean temperature — deviate from their east-west trends near the continents.

a. scattering; b. pycnocline; c. thernocline; d. insolation; e. isotherms.

ТГ

I. Обозначьте соответствующими буквами предложения, содержащие инфинитивные конструкции.

a. Higher rates of convergence cause one plate to break free and move past the other.

b. This anomalous behavior is thought to be a consequence of the structure of liquid water.

c. As the oxygen disappears, hydrogen sulfide concentrations appear and increase with depth.

d. If you put a drop of colored salty water into a beaker of fresh water at the same temperature, the salty water sinks to the bottom.

e. Using changes in dissolved-oxygen concentrations, oceanographers trace deep ocean water masses from their point of origin until they reappear at the surface.

II. Укажите буквой предложения, перевод которых следует начинать со слова «чтобы».

1. To understand the significance of water density we can conduct the following experiment.

2. Fog is said to form mainly with western winds.

3. To a very large extent the flow of water within the main part of this area is very variable.

4. In order to understand the movement of the wave form within the basin we need to return our consideration to tidal forces.

5. To test the above statement is not difficult.

III. Выберите правильный вариант перевода выделенных форм.

1. Salinities **are known** to range from 2‰ to over 100‰ due to high rates ot runoff.

a. знали, что, b. известно, что..., c. стало известно, что...

2. On the front end of a group the waves seem constantly disappearing, whereas new waves **appear** at the rear.

a. кажется, что..., b. появляются, c. оказывается, что...

3. Attempts **to determine** the causes of the change in relative level of the ocean and the continent have not met with great success.

a. определить, b. которые определяют, c. оказывается, что...

4. No significant density discontinuity layer is present **to act** as a boundary layer that keeps surface variations restricted to the top layer.

a. действовать, b. который действует, c. должен действовать

5. **It** was the wave produced by this disturbance in the Aleutian Trench **that** was recorded throughout the coastal regions of the Pacific Ocean on seismograph.

a. это..., которая, b. именно, c. не переводится

6. **It** may be **that** the bootom water masses throughout the world ocean originate in the Atlantic Ocean.

a. именно, b. это, c. не переводится

7. As the Antarctic Bottom Water moves northward along the bottom **it** is carried to the east by the Circumpolar Current.

a. это, b. она, c. не переводится

8. The water at the surface develops a density great enough **to allow** it to sink and move off to the south as North Atlantic Deep Water during winter.

a. чтобы дать возможность, b. которая позволяет, c. должна позволить

TT

I. Расставьте предложения в их логической последовательности. (В своей работе укажите только последовательность **номеров** предложений.)

1. In the Northern Hemisphere, however, the ocean surface is slightly warmer than in the Southern. 2. This has been explained as a consequence of greater abundance of land in the Northern Hemisphere. 3. Comparison of ocean surface temperatures in the Northern and Southern hemispheres shows that temperature changes with latitude are generally similar.

II. В данном тексте определите, где кончается одно предложение и начинается другое. В своих работах укажите лишь слова, **после** которых начинается новое предложение.

Density Current

Density current is a circulation which is caused by a density gradient or difference from one location to another water masses are typically characterized by a particular density which is susceptible to significant changes as a result of variations in temperature, salinity, or suspended sediment when two water masses converge, gravity induces currents because it causes the denser water to sink under the less dense mass an excellent example of a density current is the tongue of salty, heavy Mediterranean Sea water that flows through the Straits of Gibraltar, sinks, and spreads several hundred kilometers into the less salty, lighter water of the Atlantic Ocean.

III. Переведите следующий текст письменно. Контрольное время — 20 минут.

Stratification of Ocean Waters

As early as 1814, Alexander von Humboldt's observations indicated that cold water lay deep under the warm surface waters of the tropics. Further series of measurements of the properties of sea water over the years at various locations has allowed classification of large bodies of water in the oceans. Humboldt explained the cold deep water in the tropics as a consequence of the inflow of cold waters that have sunk from the surface in polar regions. The later measurements have also been interpreted largely in relation to the climatological influence on the sea surface at all latitudes.

Блок 4. OCEAN CIRCULATION

Упражнение 1. (Парная работа). Прочитайте приводимое ниже предисловие к блоку текстов, объединенных названием «Ocean Circulation». Постарайтесь определить тематическую структуру этого блока. Приведите 10—15 слов, которые, с вашей точки зрения, должны встретиться в текстах блока.

Currents, or water masses in motion, are driven ultimately by energy derived from the sun. These masses can be categorized as either being wind driven or thermohaline. The wind-driven currents are set in motion by the moving air masses, and this motion is confined primarily to horizontal movement in the upper waters of the World Ocean. The thermohaline circulation has a significant vertical component and accounts for the thorough mixing of the deep masses of ocean water. Thermohaline circulation is initiated at the ocean surface by temperature and salinity conditions which produce a high density mass which sinks slowly beneath the surface waters.

The upper water mass of the World Ocean includes the well-mixed surface layers of the ocean and the thermocline. The base of the thermocline will usually be encountered above a depth of 1000 m. The deep water includes the rest of the water column below the thermocline to the bottom of the ocean where the temperatures are relatively low throughout.

Быстро просмотрите тексты блока 4 и проверьте правильность своих предположений.

LESSON 13

Unit 4.1. Horizontal Circulation

Упражнение 1. (Парная работа). Задание 1. Исходя из названия раздела 4.1 («Horizontal Circulation») постарайтесь определить, о чем пойдет речь в этом разделе; что вы знаете по существу данного вопроса.

Задание 2. Выпишите 10—15 слов, которые, с вашей точки зрения, должны встретиться в разделе 4.1.

Text 4.1.A. Wind-Driven Circulation

Упражнение 1. Прочитайте приводимый ниже текст, а затем постарайтесь наиболее полно воспроизвести его содержание по-русски. Контрольное время — 5 минут. Следующие слова помогут вам понять содержание текста:

wind-driven circulation — ветровая циркуляция
stress — напряжение
interface — поверхность раздела
trade-winds — пассаты
backbone — основа
to set in motion — приводить в движение
to deflect — отклонять
clockwise — по часовой стрелке
counterclockwise — против часовой стрелки
gyre — вращение по кругу, спираль

margin — граница
respective — соответствующий
to push on — толкать, ускорять
to complete — завершать

Wind-driven horizontal circulation in the surface waters develops as a result of stress at the interface between the ocean and the moving air masses of the atmosphere. The trade winds blowing out of the southeast in the Southern Hemisphere and northeast in the Northern Hemisphere may be thought of as providing the backbone of the system of ocean surface currents. Setting the water masses between the tropics into motion the trade winds develop the equatorial currents that can be found in all of the world's oceans. Due to the Coriolis effect, these currents move in a direction parallel to the equator, and they are deflected into clockwise gyres in the Northern Hemisphere and counterclockwise gyres in the Southern Hemisphere. As these deflected masses move along the western margin of their respective ocean basins, the westerly wind systems blowing out of the northwest in the Southern Hemisphere and the southwest in the Northern Hemisphere add more energy and push the circulating masses in an easterly direction. Deflection toward the equator along the eastern margin of their respective basins complete the path of circulation.

Упражнение 2. Переведите прочитанный текст устно. Контрольное время — 10 минут.

Text 4.1.B. Ekman Spiral

Упражнение 1. В приводимом ниже тексте упоминаются имена известных ученых Ф. Нансена и В. Экмана. Прочитайте текст и найдите в нем объяснение той роли, которую сыграли эти ученые в создании теории ветровой циркуляции. Контрольное время — 3 минуты.

To explain the reasons for the water masses moving as they do relative to the wind direction, we will recall the observation made by Fridtjof Nansen during the voyage of the Fram. Nansen described his observations to V. Walfrid Ekman, a physicist who developed the mathematical relationships associated with the observation.

Ekman developed what has been called the Ekman spiral which assumes a homogeneous water column that is being set in motion by wind blowing across its surface. The surface current moves in direction 45° to the right of the wind in the Northern Hemisphere, and this surface mass of water moving as a thin lamina sets a thin layer beneath it in motion. The energy of the wind is passed through the water column from the surface down with each successive layer of water being set in motion with a lower velocity than and in a direction to the right of the one that set it in mo-

tion. At some depth the momentum imparted by the wind to the moving water laminae will be lost and there will be no motion as a result of wind stress at the surface. This is thought to occur at a depth of possibly 100 m, where the water at that depth is actually moving in a direction opposite to the direction of the wind that set the water in motion.

Упражнение 2. В правой колонке найдите русские эквиваленты следующих английских словосочетаний:

1. to develop a theory
2. to set in motion
3. water lamina
4. wind stress
5. wind direction
6. mathematical relationship
7. to explain reasons
8. surface current

1. объяснять причины
2. направление ветра
3. создать теорию
4. приводить в движение
5. поверхностное течение
6. небольшой объем воды
7. математическая зависимость
8. напряжение ветра

Упражнение 3. Проверьте, помните ли вы три основные формы приводимых ниже глаголов. В случае необходимости посмотрите значения слов в словаре.

Move; recall; explain; describe; assume; blow; pass; impart; lose; occur; set.

Упражнение 4. Прочитайте текст «Ekman Spiral» еще раз и устно переведите его второй абзац на русский язык.

Упражнение 5. Ниже приводятся еще два текста, близкие по своей тематике тексту «Ekman Spiral». Прочитайте их и постарайтесь ответить на следующие вопросы:

— Какая информация отличает три текста друг от друга?

— В чем состоит сходство этих текстов?

Контрольное время — 10 минут.

Text 4.1.C. Laminar Flow in the Ocean

Wind blowing steadily across the ocean sets the water in motion by dragging on the water surface. Wind ripples or waves seem to cause the surface roughness necessary for the wind to «grab» surface waters and set them in motion. A steady wind blowing for 12 hours with an average speed of 100 cm/sec (about 2.2 mi/hr) over deep water causes ocean surface currents of approximately 2 cm/sec. In other words, the resulting ocean current has a speed which is about 2 % of the speed of the wind that set the water in motion. Winds cause the surface water to move, but the resulting currents commonly involve water movements extending at least 100 m below the surface. This is because slowly moving fluids may flow as thin sheets sliding over each other, the so-called laminar

flow. Because of viscosity (internal friction), each moving fluid layer drags on adjacent layers. At these slow speeds, momentum is transmitted from one layer to another by collisions of individual particles. Momentum is transferred from rapidly moving layers to more slowly moving layers and is steadily lost in overcoming the molecular viscosity within each layer (lamina). Hence momentum imparted to the surface layer by wind cannot be transmited to infinite depths in the ocean.

The effect of a steady wind blowing across an infinite, homogenous ocean with uniform eddy viscosity can be treated theoretically. In the Northern Hemisphere of an idealized ocean, surface water layers move at an angle of 45° to the right of the wind (45° to the left in the Southern Hemisphere). Each moving layer of water sets the layer below in motion. As each deeper layer is set in motion, it is also deflected by the Coriolis effect, causing it to move to the right of the overlying layer. Deeper layers move slowly because momentum is lost in each transfer between layers. This idealized water movement is called the Ekman spiral, after the physicist V. W. Ekman who first explained the phenomenon in 1905.

Text 4.1.D. Ekman Layer

Ekman layer is the topmost layer of the ocean (also the layer above the earth's surface in the atmosphere) in which the large-scale motion of the sea is theoretically represented by a balance between frictional forces and the Coriolis effect.

As friction between the wind and the atmosphere sets the sea surface in motion, the Coriolis effect causes the water to drift to the right of the wind direction (in the Northern Hemisphere). The effect of friction, which extends downward to a depth of roughly 100 m, was first computed by the Swedish oceanographer Vagn Walfrid Ekman. According to Ekman's theory, the sea surface water flows at an angle of 45° to the wind direction (45° to its right in the Northern Hemisphere; 45° to its left in the Sourthern Hemisphere). The 45° angle is theoretical; observations indicate that the angle is probably considerably smaller. With increasing depth and decreasing speed the water drifts farther and farther to the right (or left) of the wind direction, its movement describing a spiral known as the Ekman spiral. Finally, at the bottom of the layer, the flow is opposite to the wind direction but quite small. The average flow of water is to the right of wind direction in the Northern Hemisphere, to the left in the Southern Hemisphere.

The theory was first applied to atmospheric motion by F. A. Akerblom in 1908. In the atmosphere the Ekman layer extends from about 10 m above the surface to the base of the free atmosphere. The wind speed in the Ekman layer is most retarted at the bottom of the layer because the wind there blows at an angle across the isobars and causes surface friction. At the top of the

layer there is minimum friction because the isobars are parallel to the geostrophic wind.

Упражнение 6. Переведите следующие предложения, обращая внимание на выделенные формы и словосочетания.

1. **To explain** the reasons for the water masses moving **as** they do relative to the wind direction, we will recall the observation **made** by Fridtjof Nansen.

2. The energy of the wind **is passed** through the water column from the surface down with each successive layer of water **being set** in motion with a lower velocity than and **in** a direction to the right of the **one** that set it in motion.

3. Wind ripples or waves **seem to cause** the surface roughness necessary for the wind **to «grab»** surface waters and set them in motion.

4. Wind **cause the surface water to move.**

5. At these slow speeds, momentum **is** transmitted from **one** layer to another by collisions of individual particles.

6. With increasing depth and decreasing speed the water drifts farther and farther to the right (or **left**) of the wind direction, **its movement describing a spiral** known **as** the Ekman spiral.

Упражнение 7. Выберите правильный перевод выделенных слов.

1. Normally, the lithosphere, the hydrosphere and the atmosphere are arranged **one** above the other.

a. одна, b. атмосфера, c. не переводится

2. In the Baltic, **as** in the Black Sea, precipitation and runoff greatly exceed evaporation.

a. по мере того, как, b. так же как и, c. в качестве

3. On this **basis one** finds a total excess of precipitation of about 0.09 million m^3/sec.

a. один, b. избыток, c. не переводится

4. The distribution of land and water is asymmetrical, **since** land areas are concentrated mainly in the Northern Hemisphere.

a. с тех пор, b. так как

5. In this area a general increase of surface salinity **since** 1900 seems to be established.

a. с, b. так как

6. The most common method is an indirect **one** which calculates the density of a sea water sample from the known salinity, temperature, and pressure.

a. один, b. метод

7. Mean sea level may be defined as the surface the sea would assume if undisturbed by the rise and fall of the tide.

a. когда, b. как, c. так как

Упражнение 1. Переведите текст письменно. Контрольное время для перевода — 25 минут.

If we consider a closed gyre in the Northern Hemisphere, for example, in the North Atlantic Ocean, and remember the effect of the Ekman spiral, it can be seen that a clockwise rotation in the Northern Hemisphere tends to produce a piling up of water in the center of that gyre. We find within all such ocean gyres hills of water that rise as much as 2 m above the water level at the margins of the gyres. The water piles up on these hills until the gravitational force acting on individual particles of water balances the Coriolis force, and the particles begin to slide down the slopes of the hill. As the Coriolis effect acts on the particles moving down the hill they are deflected to the right and make very slow progress down the slope, with most of the motion in a direction parallel to the side of the hill. The gravitational force pulling the water off the hill and the Coriolis effect deflecting it around the hill produce geostrophic currents.

LESSON 14

Unit 4.2. Vertical Circulation

Упражнение 1. (Парная работа). Задание 1. Исходя из названия раздела 4.2 («Vertical Circulation») постарайтесь определить, о чем пойдет в нем речь; что вы знаете по существу данного вопроса.

Задание 2. Выпишите 10—15 слов, которые, с вашей точки зрения, должны встретиться в текстах раздела 4.2.

Упражнение 2. (Парная работа). Прочитайте приводимый ниже текст, который должен помочь вам проверить правильность своих предположений.

Lateral movement of water masses may bring about vertical circulation within the upper water mass. We will refer to this shallow vertical circulation system as wind-induced. Of greater oceanwide importance in producing the thorough mixing that exists within the ocean is the vertical circulation that is the result of density changes at the ocean surface which cause the sinking of water masses. Since the changes that increase the density are normally changes in temperature and salinity, this circulation is referred to as thermohaline.

Упражнение 3. Переведите заглавие текста 4.2.А и постарайтесь определить, какие из приведенных ниже слов и словосочетаний вы встретите в нем. Проверьте правильность своих предположений по тексту. Контрольное время — 7 минут.

Upwelling; surface currents; zenith; surfacing of water; divergence; lunar day; estuary; to veer; equator; diflection; ocean current system; rotational movement; solar radiation; convection cell; lagoon.

Text 4.2.A. Wind-Induced Circulation

There are regions throughout the world ocean where water moves vertically to the surface and away from the surface as a result of wind-driven surface currents carrying water away from or toward these regions. Upwelling **occurs** in areas where the surface flow of water is away from the area. If volume is to be conserved and no surface flows **bring** water into the area, water must come from beneath the surface to **replace** that which has been displaced. This condition may occur in the open ocean or along the margins of continents.

The surfacing of water in the equatorial region as a result of the divergence of the north equatorial and south equatorial water masses is common. As the North Equatorial and the South Equatorial currents **flow** in a westerly direction on either side of the equator, the water on the north side of the equator will tend to **veer** to the right, moving to a higher latitude, while that in the Southern Hemisphere will veer to the left to a higher latitude. The net effect is a water deficiency at the surface between the two currents. Water from deeper layers within the upper water mass comes to the surface to **fill** the void that **results from** the deflection of equatorial water to the north and south.

Near the center of the rotating gyres of the major ocean current systems the winds are relatively weak, and the rotational movement of the water occurs at a very low rate. The winds that do **blow** in these regions may be steady in direction and are known to set up convection cells in the upper water mass. This phenomenon was first observed by Irving Langmuir while crossing the Sargasso Sea in 1938. He observed straight rows of seaweed parallel to the direction of the wind and **concluded** that the plants were being **trapped** in zones of convergence between cells. Not only macroscopic plant material is concentrated in these regions. Microscopic plants and dissolved organic material are also concentrated here. In the regions of divergence where water is surfacing as a result of convection, the concentrations of organic material are relatively low.

Упражнение 4. Укажите английские синонимы приведенных русских слов:

район	1. region
	2. volume
	3. zone
	4. margin

течение	1. current 2. flow 3. movement 4. locality
иметь место	1. take place 2. develop 3. occur 4. cause
недостаток	1. insufficiency 2. deflection 3. deficiency 4. convergence
отклоняться	1. veer 2. carry 3. bring 4. deflect
основной	1. main 2. weak 3. major 4. low
наблюдать	1. observe 2. drive 3. fill 4. see
концентрировать	1. combine 2. concentrate 3. set up 4. surface

Упражнение 5. Разместите приведенные ниже слова и словосочетания по следующим тематическим группам:

Термины	Общенаучная лексика	Связующие элементы

upwelling; movement; toward; masses; surface current; deflection; direction; beneath; surface; convective cell; concentration; dissolve; within; devergence; along.

Упражнение 6. Определите русские эквиваленты соответствующих английских глаголов. В правильности выбора вам может помочь текст 4.2.A, в котором приводимые ниже глаголы выделены.

occur — иметь место
перемещаться
подниматься

bring —	передавать
	удерживать
	приносить
replace —	извлекать
	перемещать
	замещать
flow —	проникать
	течь
	опускаться
veer —	оказывать влияние
	менять направление
	приходить в равновесие
fill —	заполнять
	просачиваться
	падать
result from —	быть причиной
	влиять
	приводить к
blow —	течь
	дуть
	наполнять
conclude —	заключать
	предполагать
	наблюдать
trap —	пропускать
	извлекать
	задерживать

Упражнение 7. Заполните пропуски подходящими по смыслу словами из правой колонки.

1. Horizontal water movements in the ocean are called	wind effects
2. Upward or downward water movements can be caused by	currents
3. In an idealized frictionless ocean gravity would be balanced by the Coriolis effect, resulting in a	Ekman layer
4. . . . . is nearly vertical movement that carries cold water to the surface of the oceans.	geostrophic currents
5. . . . . is the topmost layer of the ocean in which the largescale motion of the sea is theoretically represented by a balance between frictional forces and the Coriolis effect.	upwelling

Упражнение 8. Составьте 5—7 предложений, которые содержали бы следующие словосочетания:

regions throughout the ocean; wind-driven surface currents; surfacing of water; divergence of water masses; deflection of water; rotating gyres; major ocean current systems; concentrations of organic material.

Упражнение 9. Найдите в тексте 4.2.A данные, с помощью которых можно было бы заполнить следующую таблицу:

Who	What	When

Упражнение 10. (Парная работа). В данном отрывке текста определите, где кончается одно предложение и начинается другое.

Coastal upwelling is common where prevailing winds tend to blow parallel to the coast winds cause surface waters to move in the direction which depends on the hemisphere and the wind direction the presence of the continent and shallow bottom restrict the resulting water movement when the net wind-induced water movement is directed off-shore, subsurface water flows to the surface near the coast this slow, upward flow, from 100 to 200 m deep, replaces surface waters blown seaward.

Упражнение 11. (Парная работа). Устно переведите приводимый ниже текст. Контрольное время — 5 минут.

Upwelling

Extensive upwelling occurs along the equator in the open ocean. This wind-induced upwelling is caused by change in direction of the Coriolis effect at the equator. Westward-flowing, wind-driven surface currents near the equator are deflected northward on the north side of the equator and southward on the south side. Surface water moving away from the equator is replaced by the upwelling of deeper water from beneath the equatorial region.

Упражнение 12. Переведите предложения на русский язык, обращая внимание на выделенные формы.

1. The temperature of sea water **may be raised** by the absorption of radiation entering the sea-surface.
2. Warm, salt water from the Mediterranean **can be detected** below the surface over the large part of the Atlantic.
3. As climatic changes **must be linked** to variations in heat balance of the sea-land-air system as a whole, there **can be** little doubt that fluctuations in the atmosphere **must be associated** with fluctuations in the oceans.

4. In addition to the three space dimensions, a fourth dimension, the time factor, **had to be introduced** in the exploration of the world ocean.

5. **It is to be borne in mind** that the so-called «long period tides» introduce a variation in sea level from day to day.

Упражнение 13. Среди приведенных ниже предложений выберите те, в которых выделенные формы и словосочетания следует переводить с помощью слов «необходимо», «нужно».

1. The energy striking the sea penetrates to greater depth and thus **has** a relatively small influence on the temperature of a greater thickness of water.

2. To some degree, runoff of river water, ice melting, and freezing **have to be considered** locally.

3. The tendency **is to separate** the sensing oceanographical instrument for recording or telemetring completely from the ship by the use of anchored or drifting buoys.

4. **It is to be noted** that the wind-driven Antarctic Circumpolar Current is a deep current in contrast to the currents of the warm water sphere.

5. In the Pacific and Atlantic Oceans seasonal variations of the character of western boundary currents **are to be expected**.

6. Submergence of the shorelines **must have been caused** by a subsidence of the continent, a rise in sea level, or a combination of the two.

7. In order to understand the movement of the wave we **need** to return our consideration to tidal forces.

LESSON 15

Упражнение 1. (Парная работа). Приводимый ниже текст называется «Thermohaline Circulation». Прежде, чем прочитать его, постарайтесь вспомнить, что вы знаете по существу данного вопроса. А теперь найдите в тексте ответы на следующие вопросы:

1. Какие факторы определяют различия в плотности у различных водных масс в океане?

2. Какие факторы являются основной причиной возникновения термохалинной циркуляции?

3. В каких районах интенсивность солнечной радиации является наибольшей?

Контрольное время — 7 минут.

Text 4.2.B. Thermohaline Circulation

Below the pycnocline, waters move erratically in sluggish currents. This deep circulation, almost completely separated by

the pycnocline from the wind-driven surface circulation, is driven primarily by differences in seawater density, which in turn is controlled primarily by temperature and salinity variations. Hence the deep-ocean circulation is frequently called a thermohaline (thermo — heat; haline — salt) circulation.

Vertical mixing of ocean water is achieved primarily through the sinking and rising of water masses in high latitude. It is only in the high latitude areas that the water column has a stability that is sufficiently neutral to allow vertical movements to the extent that surface masses may sink to the ocean bottom and deep water masses may rise to the surface. The relatively strong density stratification throughout the lower latitude regions serves as a very effective barrier to such movements.

Since the intensity of solar radiation is greater in the equatorial region, we might expect that heating of surface water here may cause it to expand and move away from the equatorial region toward the poles, spreading over the colder, more dense, high latitude waters. We may further expect that at some depth a return flow from the high latitudes toward the equator would be set in motion to replace the surface water moving away from the equatorial region. This does not seem to occur in the oceans, although it is theoretically proper to assume that such a pattern might develop. The energy imparted to the surface waters by winds, is greatly in excess of the energy that is developed as a result of density changes due to temperature differences. Thus the effect of the wind overcomes any tendency that may exist for development of such a pattern of circulation.

Another variable that affects the density of surface water is salinity. It appears that salinity has a very minimal effect on the movement of water masses in the lower latitudes, and density changes resulting from salinity changes are only of importance in the very high latitudes where water temperature remains relatively constant.

Упражнение 2. Проверьте, помните ли вы значения следующих слов и словосочетаний из текста 4.2.B, которые уже встречались вам в предыдущих текстах:

wind-driven circulation; surface circulation; seawater density; sinking; latitude; sufficiently; bottom; deep water masses; throughout; heating; to set in motion; to replace.

Упражнение 3. Найдите в словаре и запомните значение следующих английских глаголов:

achieve; spread; expect; expand; move; assume; develop; impart; overcome; exist.

Упражнение 4. В правой колонке найдите русские эквиваленты следующих слов и словосочетаний:

1. erratically	1. часто
2. completely	2. сравнительно

3. frequently	3. главным образом
4. primarily	4. следовательно
5. sufficiently	5. таким образом
6. relatively	6. беспорядочно
7. in turn	7. полностью
8. due to	8. благодаря
9. thus	9. в свою очередь
10. hence	10. достаточно

Упражнение 5. (Парная работа). Прочитайте текст 4.2.B еще раз и устно переведите те его части, которые остались для вас непонятными.

Упражнение 6. В приводимой ниже таблице поставьте плюс в соответствующей колонке, предварительно определив, правильными или неправильными являются следующие утверждения:

Right	Wrong	
		1. The deep-ocean circulation is driven primarily by differences in seawater density. 2. Differences in sea water density are controlled primarily by the Coriolis effect. 3. Vertical mixing of ocean water is achieved primarily through the sinking and rising of water masses in high latitude. 4. The intensity of solar energy in lowest in the equatorial region. 5. Salinity has a minimum effect on the movement of water masses in the lower latitudes.

Упражнение 7. В тексте 4.2.B найдите пример, который иллюстрирует какое-либо положение, предложенное автором.

Упражнение 8. В приводимом ниже отрывке текста содержатся два предложения, которые не соответствуют его общему содержанию. Определите эти предложения.

1. Deep-ocean currents move generally north-south. 2. The world's fish production comes primarily from coastal ocean waters. 3. Like surface currents, bottom currents tend to be strongest on the western side of an ocean basin. 4. In contrast to surface currents, bottom currents cross the equator in the Atlantic and Pacific oceans. 5. Deep-ocean circulation in the Atlantic connects the Northern and Southern polar regions. 6. In 1971 the total live weight of world fish production was 69 million metric tons.

Упражнение 9. Письменно переведите третий абзац текста 4.2.B. Контрольное время — 20 минут.

Упражнение 10. Из приведенных ниже предложений выберите и переведите на русский язык те, в которых глаголы-сказуемые выражены формой сослагательного наклонения.

1. As we have seen, water movement occurs on all scales in the ocean.

2. It is important that the relative shallowness of the oceans be considered when one studies vertical oceanographic sections showing the distribution of certain properties of ocean water.

3. It might have been expected that the frequency distribution of areas showing the elevations of the land above sea level and the ocean depths below sea level would be random.

4. If a water parcel is small and far from energy sources, molecular motions transfer heat, salt, or other properties.

5. Other irregularities of water might be pointed out that affect life on the Earth.

6. Bottom water movements are strongly influenced by topography.

7. No treatment of the conditions of the atmosphere from a marine viewpoint would be complete without at least a brief examination of the physical properties of the sea.

8. Seawater has viscosity, and energy must be expended to keep water flowing.

Упражнение 11. Выберите правильный вариант перевода выделенных форм и словосочетаний.

1. In a stable situation, the water below **will be denser** than any given water parcel.

a. была бы более плотной, b. будет более плотной, c. должна быть более плотной

2. In using this visual method, attention **should be paid** to the fact that ship must lie entirely on a flat keel in the wave trough.

a. обращалось, b. было бы обращено, c. должно обращаться

3. If the water temperature **drops** to freezing point, ice is formed.

a. падает, b. падала бы, c. упала

4. If ice were to sink, the polar waters **would** gradually be **frozen** solid.

a. замерзнут, b. замерзли бы, c. замерзают

5. The general distribution of density is closely related to the character of the currents **but for** the present purpose it is sufficient to emphasize the point that in every ocean region water of a certain density tends to sink to and spread at depth where that density is found.

a. но для..., b. если бы не...

6. **But for** meteorites we could obtain a water content from which we can estimate a water content for the mantle.

a. но для..., b. если бы не...

7. If this abnormality did not exist, ice **would sink** to the bottom instead of flowing at the surface.

a. опустился, b. опускается, c. опустился бы

8. During the summer seasons ships laden with goods for trade **would leave** the Arabian ports and sail eastward across the Indian Ocean.

a. покидают, b. покидали, c. покинут

Тесты к блоку 4

ТЛ

I. В каждом ряду обозначьте цифрой слова, которые по своему значению не соответствуют данной тематической группе:

a. upwelling^{1}, sinking^{2}, rising^{3}, conclusion^{4};

b. to veer^{1}; to deflect^{2}; to converge^{3}; to educate^{4};

c. maritime^{1}; sufficient^{2}; oceanic^{3}; continental^{4};

d. excessive^{1}; equatorial^{3}; polar^{3}; tropical^{4};

e. but for^{1}; due to^{2}; unless^{3}; may^{4}.

II. Укажите буквой русские эквиваленты приведенных слов:

1. stress	a. погружение b. ветер c. напряжение
2. gyre	a. отклонение b. спираль c. граница
3. bring	a. передавать b. удерживать c. приносить
4. fill	a. заполнять b. просачиваться c. падать
5. primarily	a. главным образом b. полностью c. часто
6. exist	a. существовать b. допускать c. достигать
7. bottom	a. поверхность

	b. дно
	c. плотность
8. thus	a. затем
	b. таким образом
	c. поскольку
9. include	a. включать
	b. исключать
	c. проникать
10. deflection	a. протяженность
	b. направление
	c. отклонение

III. В левом столбце определите слово, **после** которого должно стоять слово из правого столбца. В своей работе укажите буквой соответствующую строчку, а цифрой — искомое слово.

a.	1 2 3 4 5 6 Bottom water movements are strongly influenced	by
b.	1 2 3 4 5 6 7 topography. Gaps the Mid-Atlantic Ridge control the	in
c.	1 2 3 4 5 6 7 8 9 10 flow of bottom water the deep basins of the western	from
d.	1 2 3 4 5 6 7 8 Atlantic the eastern Atlantic basins. A ridge separating	into
e.	1 2 3 4 5 6 7 8 9 the Arctic Sea the Atlantic Ocean prevents the escape	from
f.	1 2 3 4 5 6 7 8 9 10 into the Atlantic of dense water masses formed the Arctic	in
g.	1 2 3 4 5 6 7 8 Sea. Only those water masses formed Greenland can	near
h.	1 2 3 4 5 flow the deep Atlantic basins.	into

TT

I. Заполните пропуски подходящими по смыслу словами. (В своей работе укажите только последовательность цифр, обозначающих соответствующие слова.)

Ocean Currents

The water of the oceans is . . . . a state of continual movements, not . . . . at the surface but at all . . . . . Ocean current circulation, in its widest . . . ., takes place in three dimensions, but . . . . stronger currents occur in an upper . . . . which is

shallow compared with the . . . . depth. A current at any depth . . . . flow horizontally, obliquely or vertically, although . . . . surface one only flows horizontally.

1 2 3 4 5 6 7 8 9
Layer; in; may; sense; the; a; depths; only; ocean.

II. В этом тексте определите, где заканчивается одно и начинается другое предложение. В своих работах укажите лишь слова, **после** которых начинается новое предложение.

Outstanding features of the surface circulation in all oceans are currents that flow in a nearly zonal direction near continental coasts, the currents are forced to follow the coastlines, forming eastern and western boundary currents the dominant trend of the general circulation in the upper layers of the oceans is in the form of anticyclonic and cyclonic gyres in the North Atlantic and North Pacific Oceans the circulation around the anticyclonic gyres is in a clockwise direction.

III. Письменно переведите текст. Контрольное время — 20 минут.

Thermohaline Current

Thermohaline current is a deep, slow movement of water, generated by differences in density resulting from variations in water temperature and/or salinity from place to place. Below a depth of about 100 m, little circulation is caused by surface winds, but water temperature and salinity vary just enough to result in differences in water density. This creates a density gradient, which in turn causes a current. Such currents move so slowly (of the order of kilometers per year) that they can be detected only by special techniques involving the plotting of temperature, salinity, and oxygen content of water masses at various depths.

ТГ

I. Укажите буквой правильный перевод выделенных форм и словосочетаний.

1. The temperature of the sea water **may be** raised by the absorption of radiation entering the sea-surface.
a. может быть, b. должна быть, c. могла бы быть

2. This deep water **cannot be** formed anywhere in the Polar Sea.
a. не могла бы, b. не может, c. не должна

3. **It is to be expected** that the net horizontal water transport of the Antarctic Circumpolar Current is subjected to considerable periodic and aperiodic fluctuations.
a. следует ожидать, b. ожидается, c. это ожидалось

4. The deep water of the Polar Sea **has** a uniform salinity and uniform temperature.

a. имеет, b. должна иметь, c. может иметь

5. Water bodies with salinities greater than 24,7‰ **have to be cooled** to lower temperatures from top to bottom until freezing starts at the surface.

a. охлаждаются, b. должны охлаждаться, c. охлаждались

6. It is beyond doubt that changes in ice conditions in the Arctic **should have effect** on atmospheric processes.

a. влияют, b. должны влиять, c. повлияют

7. If the rock layer were freed from all its characteristic irregularities it **would be** in the geodetic sense «flat».

a. будет, b. должно быть, c. был бы

8. If the Earth **were covered** entirely by a homogeneous ocean unaffected by atmospheric phenomena then there would be only a single force acting on the sea: gravity.

a. была покрыта, b. была бы покрыта, c. покрыта

Блок 5. WAVES AND TIDES

LESSON 16

Задание 1. Прочитайте приводимое ниже предисловие к текстам блока и, исходя из его содержания, постарайтесь определить основные вопросы, которые будут в нем рассмотрены.

The ocean surface is rarely still. Any disturbance from a pebble dropped into the water to a submarine landslide, generates waves. Wind, earthquakes, and the gravitational attraction of the moon and sun are the three most important wave generators.

Winds cause waves which range in size from ripples less than a centimeter high to giant, storm-generated waves more than 30 m (100 ft) high. Tides also behave like waves but are so large that their wave-like characteristics are easily overlooked. Spectacular seismic sea waves, caused by earthquakes, often result in catastrophic property damage and loss of life, especially in lands bordering the Pacific Ocean.

Быстро просмотрите тексты блока 5 и проверьте правильность своих предположений.

Unit 1. Waves

Ниже приводятся короткие тексты, в которых говорится о различных характеристиках волн, их разновидностях, условиях образования и т. д. Прочитайте эти тексты и выполните соответствующие упражнения к каждому из них.

Упражнение 1. Найдите в тексте 5В ответы на следующие вопросы:

— Что называют элементами волн?
— Что такое период волны?
— Как определить крутизну волны?
— Что обозначает формула в приведенном ниже тексте?

Контрольное время — 5 минут.

Text 5B. Ideal Progressive Waves

We will start with a group of simple waves called a wave train, to study the parts of a wave. Watching a series of such progressive waves pass a fixed point we see a regular succession of crests — the highest part of a wave — and troughs — the lowest part of a wave. The wave height (H) is the vertical distance from a crest to a trough. Successive crests (or troughs) are separated by one wave length (L). The time required for successive crests (or troughs) to pass the fixed point is the wave period (T), commonly expressed in seconds. Wave period is easily measured and is frequently used to classify waves.

Wave speed (V) can be calculated by $V=L/T$. This simple formula says that wave speed, wave length, and wave period are related; so knowing any two factors, we can calculate the third. The wave height is not related to the other three factors and must be determined by observation. Wave steepness is the ratio of wave height to wave length and may be expressed as H/L.

Упражнение 2. Выпишите из текста 5В все термины, используемые автором для описания различных параметров волн, и запомните их значения. В случае необходимости воспользуйтесь словарем.

Упражнение 3. Не заглядывая в текст 5В, заполните пропуски в предложениях подходящими по смыслу терминами.

1. The time required for successive crests or troughs to pass a fixed point is the . . . . .
2. The highest point of wave is . . . . and the lowest is . . . . .
3. Successive crests or troughs are separated by one . . . . .
4. The . . . . is the vertical distance from a crest to a trough.
5. A group of simple waves is called . . . . .

Упражнение 4. Прочитайте текст 5С и найдите в нем предложения, в которых говорилось бы:

— о различиях между цунами и приливными волнами;
— о катастрофических последствиях цунами;
— о причинах возникновения цунами.

Контрольное время — 3 минуты.

Text 5C. Seismic Sea Waves (Tsunamis)

Large waves are generated by sudden movements of the ocean bottom, caused by earthquakes or slumping of sediment. These seismic sea waves, or tsunamis have wave lenghts up to 200 km (125 mi), periods of 10 to 20 min, and wave heights up to 0.5 m (1.5 ft) in the deep ocean. Sometimes erroneously called tidal waves, they are unrelated to tidal phenomena.

Unnoticed by ships on the open sea where seismic sea waves are small, huge breakers form when they encounter the proper bottom configuration in shallow water. Large loss of life and extensive property damage has resulted from tsunamis as the aftermath of a distant earthquake. Japan, Hawaii, and Alaska are especially prone to these catastrophic waves; over the past 150 years the Hawaiian Islands have experienced on the average one seismic sea wave every four years.

Упражнение 5. (Парная работа). Определите значения выделенных слов, исходя из контекста:

1. Large waves are **generated** by sudden movements of the ocean bottom.
2. Sometimes **erroneously** called tidal waves, tsunamis are unrelated to tidal phenomena.
3. Over the past 150 years the Hawaiian Islands have **experienced** on the average one seismic sea wave every four years.
4. Large loss of life and extensive property damage has resulted from tsunamis as the **aftermath** of a distant earthquake.
5. Japan, Hawaii and Alaska are especially **prone to these** catastrophic waves.

Упражнение 6. (Парная работа). Вероятно, в прочитанном тексте 5С остались слова, значения которых вы не знаете. Выпишите их, сравните с теми, которые выписал ваш сосед. Обсудите предполагаемые значения этих слов. В случае необходимости проверьте себя по словарю.

Упражнение 7. Найдите в тексте 5С доказательства правильности или ошибочности следующих утверждений.

1. Japan, Hawaii and Alaska are especially prone to tsunamis.
2. The Hawaiian Islands have never experienced any seismic sea wave.
3. Sometimes tsunamis are correctly called tidal waves.

Упражнение 8. Заполните пропуски подходящими по смыслу словами.

Tsunami

Tsunami is a Japanese word for . . . . waves or sea waves of great . . . ., caused by submarine earthquakes. The waves . . . .

across the open sea at a . . . . speed and can cause heavy damage . . . . coastlines thousands of kilometers from . . . . source. Tsunamis generally occur in the . . . . Ocean because its perimeter is much . . . . by earthquake activity.

high; tidal; Pacific; to; affected; their; length; travel.

Упражнение 9. (Парная работа). Прочитайте заглавие к тексту 5D. Обсудите между собой основные положения, которые, на ваш взгляд, будут в нем рассматриваться; выпишите 10—15 слов, которые должны встретиться в тексте с таким названием.

А теперь прочитайте текст и проверьте правильность своих предположений. Контрольное время — 4 минуты.

Text 5D. Wind Waves

When winds blow across a still water surface, small wavelets or ripples are formed, usually less than 1 cm high with rounded crests and V-shaped troughs. Because of the small size of ripples, surface tension — resulting from the mutual attractions of water molecules — influence their shape. Ripples, also called capillary waves, move with the wind and last only a short time, but they provide much of the wind's «grip» on the water. They cause both wave formation and wind-induced currents.

As wind strength increases, small waves called gravity waves form which also travel with the wind. The size of the waves formed depends on the wind speed, the length of time it blows in one direction, and the distance the wind has blown across the water. This distance is commonly known as the fetch. In short, wave size depends on the amount of energy imparted to water by the wind.

In a storm or a strong wind, a complicated mix of superimposed waves and ripples, known as a sea, develops. Waves continue to grow until they are as large as a wind of that speed can generate. After the wind dies, the waves continue to travel away from the generating area. But after leaving the generating area, the waves change, becoming more regular. These long, regular waves outside the generating area are known as swell. Much of the energy in ocean waves is transmitted by sea and swell.

Упражнение 10. Запомните значения следующих слов и словосочетаний, встретившихся вам в тексте:

wavelets — небольшие волны
ripples — рябь
capillary waves — капиллярные волны
gravity waves — гравитационные волны
fetch — разгон
generating area — область зарождения волнения
swell — зыбь

Упражнение 11. В правой колонке найдите русские эквиваленты следующих словосочетаний.

1. wind waves	1. поверхностное натяжение
2. rounded crests	2. сила ветра
3. surface tension	3. ветровые волны
4. mutual attraction	4. дрейфовые течения
5. wind-induced currents	5. количество энергии
6. energy amount	6. округлые гребни
7. wind strength	7. взаимное притяжение

Упражнение 12. Прочитайте текст 5D еще раз. После этого, не заглядывая в него, поставьте в приводимой ниже таблице плюс в соответствующей колонке, предварительно определив, правильным или неправильным является то или иное утверждение.

	Right	Wrong
1. Surface tension influence the shape of ripples.		
2. Ripples are also called gravity waves.		
3. Wave size depends on the amount of energy imparted to water by the wind.		
4. Long, regular waves outside the generating area are known as swell.		
5. Fetch results from the mutual attraction of water molecules.		

Упражнение 13. Приведите или составьте собственные предложения, в которых даются определения: зыби, нагона, гравитационных волн.

Упражнение 14. Найдите в приводимом ниже тексте объяснение различия между стоячей и прогрессивной волной.

Контрольное время — 2 минуты.

Text 5E. Ideal Stationary Waves

In addition to progressive waves, there is another type of wave — the stationary wave, also known as a standing wave or seiche (pronounced saysh) when it occurs in a bay or a lake. Viewed from the side, the water surface can be seen to tilt to one side, then to the other. This type of wave is distinctly different from the progressive wave previously discussed, because the wave form does not move along the water surface.

During each oscillation the water surface remains at the same level at certain locations. These are called nodes. The stationary waves generated in a small basin usually have a single nodal line where the water level does not change. It is possible, however,

to have several nodal lines or nodal points about which the water surface tilts.

At the antinodes, or crests, vertical movement of the water surface is greatest. It is possible to have many antinodes or crests, but they always occur at the ends of the basin.

Упражнение 15. Запомните значения следующих терминов, встретившихся вам в тексте 5Е:

stationary wave, standing wave — стоячая волна
progressive wave — прогрессивная волна
seiche — сейша
node — узел стоячей волны
nodal line — узловая (нодальная) линия
nodal point — узловая (амфидромическая) точка
antinode — пучность

Упражнение 16. (Парная работа). Выпишите из текста 5Е те слова, значения которых вы не знаете. Сравните их со словами, которые выписал ваш сосед, обсудите их предполагаемые значения; в случае необходимости воспользуйтесь словарем.

Упражнение 17. (Парная работа). Прочитайте текст 5Е еще раз и переведите те его части, которые остались для вас непонятными.

Упражнение 18. Найдите в каждой строчке текста позицию для соответствующего связующего элемента.

Swell

As waves generated in a sea area move — toward
the margins the generating area, they eventually are — of
moving a velocity greater than that of the wind. — with
When this occurs, the steepness of the waves decreases, — and
they become long-crested waves longer periods called — with
swell. The swell moves little loss of energy — with
large stretches of the ocean's surface, transmitting — over
energy away the imput area of the sea to where most — from
of it will eventually be released the margins of the — along
continents.

Упражнение 19. Задание 1. Сравните прочитанные тексты (5В — 5Е) и определите:

— в чем заключается сходство и различие этих текстов;

— что нового содержится в каждом из текстов по сравнению с предыдущим?

Задание 2. Выпишите из каждого текста 5—10 ключевых слов.

Задание 3. Составьте краткий план пересказа каждого из прочитанных текстов.

Задание 4. Передайте содержание каждого из текстов не более чем в 1—2 предложениях.

Задание 5. Составьте один небольшой текст, который представлял бы собой резюме всех прочитанных текстов.

LESSON 17

Unit 2. Tides

Упражнение 1. Найдите в предлагаемом ниже тексте ответы на следующие вопросы:

а. Что такое «суточный прилив»?

б. Какие факторы обусловливают возникновение астрономических приливов?

в. Какой из приливов — сизигийный или квадратурный — имеет наибольшую величину?

г. Можно ли наблюдать астрономические приливы на небольших, по сравнению с океаном, водоемах?

д. Какова периодичность возникновения сизигийных приливов?

Контрольное время — 10 минут.

Упражнение 2. Следующие слова и словосочетания встретятся вам в тексте 5F. Запомните их значения.

astronomical tide — астрономический прилив
body of water — водная масса, масса воды бассейна
lunar cycle — лунный цикл
tidal range — величина прилива
bulge of water body — деформация водной оболочки в виде приливного выступа
a high (water) — полная вода
a low (water) — малая вода
onshore wind — нагонный ветер
storm tide — штормовой нагон воды
at a right angle — под прямым углом
magnitude — величина
to pile up — производить нагон

Text 5F. Tides. Characteristics and Types

Tide is the gradual rise and fall of the sea along a coast. A tide may be periodic and predictable, such as astronomical tides, or aperiodic, such as those caused by weather phenomena. The astronomical kind is due to the attractive forces of the Earth, Moon and Sun coupled with the Earth's rotation. In accordanse with Newton's Law of Universal Gravitation, the attraction between these three celestial bodies causes bulges in bodies of water. Theoretically these bulges move from place to place as the Earth rotates, producing daily changes in water level, the type and amount depending on the location and lunar cycle.

A diurnal tide is one in which there is one high and one low stage each day. A semidiurnal tide has two highs and two lows, whereas a mixed tide is a combination of the two types during one lunar month. Spring tides are tides of maximum range that occur every two weeks, when the Earth, Moon and Sun are aligned and there is consequently a full or new moon. Neap tides are of minimum range and occur when the line connecting the Sun and the Earth is at a right angle to the line connecting the Moon and the Earth, resulting in a first and third-quater moon. Although astronomical tides are most evident in the oceans, they also occur in small bodies of water but their magnitude in the latter is so slight that they go unnoticed. The Great Lakes of North America, for example, have tides of only 2 to 6 cm. When winds blow onshore they tend to cause water to pile up along the coast. Under normal conditions of prevailing winds, this increase is slight and is masked by astronomical tides. During storms, however, and particularly hurricanes or typhoons, these storm tides or wind tides may rise a few meters above normal water level, and they have resulted in devastating coastal flooding.

Упражнение 3. В правой колонке найдите русские эквиваленты следующих словосочетаний:

1. water level	1. штормовой нагон
2. under condition (of)	2. вращение земли
3. storm tide (surge)*	3. явления погоды
4. wind tide (surge)*	4. суточный прилив
5. weather phenomena	5. уровень воды
6. earth's rotation	6. полусуточный прилив
7. diurnal tide	7. полная луна
8. semidiurnal tide	8. преобладающие ветра
9. full moon	9. при условии
10. prevailing winds	10. ветровой нагон

Упражнение 4. Поставьте плюс в соответствующей колонке приводимой ниже таблицы.

No evidence	Yes	No	
			1. Tides are caused by the physics of the solar system, in particular the Sun-Earth-Moon system. 2. The moon passes over any given location on the earth once ovory 24 hours 50 minutes. 3. Spring tides are tides of maximum range. 4. The Sea of Okhotsk produces the highest tides in Russia.

* В настоящее время чаще используются термины storm surge и wind surge.

No evidence	Yes	No	
			5. Astronomical tides never occur in small bodies of water. 6. A diurnal tide is one in which there is one high and one low stage each day. 7. A semidiurnal tide has two lows and two highs.

Упражнение 5. (Парная работа). Выберите один из абзацев текста 5F и придумайте 3—5 вопросов к нему. Попросите ответить на них другую пару студентов. Обменяйтесь вопросами.

Упражнение 6. Определите логическую последовательность приводимых ниже предложений.

1. These are the spring tides, when the daily tidal range is largest.

2. At certain times during the Moon's travel around the Earth, the direction of its gravitational pull is aligned with the Sun's.

3. Then the tidal bulges, or crests, are highest and the water level between them in the tidal troughs is lowest.

4. At these times — near the time of new and full moons — the two tide-producing bodies act together.

Упражнение 7. В левой колонке найдите позицию, которую должен занимать связующий элемент предложения, расположенный в правой колонке.

The tide is caused slight variations in gravitational attraction the Earth and the Moon at different locations the Earth's surface. On the side of the Earth nearest the Moon, ocean water is drawn the Moon the distance between the two is slightly less than at the Earth's center.	by between on toward because

Упражнение 8. Письменно переведите следующий текст. Контрольное время — 25 минут.

Types of Tides

Despite the complexity of ocean basin responses to the tide-generating force, three types of tides can be identified. Diurnal tides — one high water and one low water per tidal day — are the simplest. This type of tide is common in parts of the northern Gulf of Mexico and Southwest Asea. Semidiurnal tides — two high waters and two low waters per tidal day — are common on the Atlantic coasts of the United States and Europe. Note that

successive high water and low water levels are approximately equal, just as predicted by Newton's simple equilibrium model of the tides. Along the Pacific coasts of the United States mixed tides are most common. Successive high-water and low-water stands differ appreciably. Here we have higher high water and lower high water, as well as higher low water and lower low water.

Упражнение 9. Переведите следующие предложения на русский язык, обращая внимание на выделенные формы и словосочетания.

1. Large loss of life and extensive property damage **has resulted from** tsunamis as the aftermath of a distant earthquake.
2. The size of the waves **formed** depends on the wind speed, the length of time it blows in one direction and the distance the wind has blown across the water.
3. **After leaving** the generating area, the waves change, becoming more regular.
4. In addition to progressive waves, **there is** another type of wave — the stationary wave.
5. A tide may be periodic, such as astronomical tides, or aperiodic, such as **those** caused by weather phenomena.
6. Bulges in bodies of water move from place to place as the earth rotates, producing daily changes in water level, **the type and amount depending on the location and lunar cycle**.
7. A diurnal type is **one** in which there is **one** high and **one** low stage each day.
8. Although astronomical tides are most evident in the oceans, they also occur in small bodies of water, but their magnitude in **the latter** is so slight that they go unnoticed.

Тесты к блоку 5

ТЛ

I. Укажите буквой русские эквиваленты приведенных слов и словосочетаний:

1. ripples
   a. прибой
   b. рябь
   c. нагон
2. earthquake
   a. оползень
   b. сейша
   c. землетрясение
3. swell
   a. зыбь
   b. прилив
   c. водоем
4. fetch
   a. уровень
   b. нагон
   c. величина
5. surface tension
   a. взаимное притяжение
   b. сила ветра
   c. поверхностное натяжение
6. nodal point
   a. уровень воды
   b. амфидромическая точка
   c. пучность

7. neap tide	a. квадратурный прилив
	b. сизигийный прилив
	c. астрономический прилив
8. standing wave	a. сейсмическая волна
	b. гравитационная волна
	c. стоячая волна

II. Заполните пропуски подходящими по смыслу терминами:

1. Periodic rise and fall of the surface of the ocean resulting from the gravitational attraction of the Moon and Sun is called . . . . .

2. . . . . is the elapsed time between the passage of two successive wave crests past a fixed point.

3. . . . . is one of a series of regular, long-period waves that travels out of a wave-generating area.

4. A tide with one high water and one low water during a tidal day is called . . . . .

5. . . . . is a zone of maximum vertical particle movement in standing waves where crest and trough formation alternate.

6. Tides of minimal range occurring when the moon is in quadrature, first and third quaters are called . . . . .

7. . . . . is a long-period gravity wave generated by a submarine earthquake or volcanic event.

a. swell; b. diurnal tide; c. tide; d. antinode; e. wave period; f. neap tides; g. tsunami.

TT

I. В приводимом ниже тексте два предложения не соответствуют его общему содержанию. Укажите цифрами эти предложения.

1. The current that accompanies the slowly turning tide crest in a basin will turn in a counterclockwise direction, producing a rotary current in the open portion of the basin. 2. In the swell we see what may be referred to as a free wave which is moving with the momentum and energy imparted to it in the sea area but is not experiencing a maintaining force that keeps it in motion. 3. In the wave-generating area, free and forced waves are present. 4. Near shore the rotary current is changed to an alternating or reversing current that moves in and out rather than along the coast as would a rotary current. 5. A forced wave is one that is maintained by force that has a periodicity that coincides with the period of the wave. 6. This force would be the wind, and due to the variability of the wind, many wave systems in the sea area alternate between being forced waves and free waves.

II. В приведенном ниже тексте определите, где кончается одно и начинается другое предложение. В своей работе укажите только слова, **после** которых начинается новое предложение.

The mixed tide may have characteristics of both diurnal and semidiurnal tides the diurnal inequality is a characteristic of this tide, as successive high tides and/or low tides will have significantly different heights mixed tides commonly have a tidal period of 12 h 25 min, which is a semidiurnal characteristic, but may also possess diurnal periods this is the tide that is most common throughout the world and the type that is found along the Pacific Coast of the United States diurnal inequalities are greatest when the moon is at its maximum declination, and such tides are called tropical tides because the moon is over one of the tropic regions.

III. Письменно переведите следующий текст. Контрольное время — 20 минут.

Waves

Apart from those very occasionally started by earth-quakes (tsunamis), all other waves are produced by wind. The wind exerts a drag on the surface water particles and sets up small orbital motions in the water. There is some small lateral displacement of the water, but the wave itself moves much faster through the sea, growing as it travels. Three factors govern the size of the wave: the wind speed, the duration of the wind, and the distance or «fetch» over which the wave travels. The largest waves will be produced by prolonged galeforce winds blowing over ocean surfaces.

ТГ

Укажите буквой правильный перевод выделенных форм и словосочетаний.

1. **The greater the mass** of the objects and the closer they are together, the greater will be the gravitational attraction.

a. бóльшая масса, b. чем больше масса, c. самая большая масса

2. We previously stated that the tides **were** an extreme example of shallow-water waves whose velocity is proportional to the square root of the water depth.

a. являлись, b. являются, c. являлись бы

3. In order for the tidal wave to travel at 1600 km/h, the depth of our idealized ocean **would have to be** 22 km.

a. должна быть, b. должна была бы быть, c. была бы

4. **It is** possible that a free standing wave initiated by strong winds at the surface or some seismic disturbance may be set up in the basin.

a. это, b. именно, c. не переводится

5. Free oscillations of the type **described** above are common on large lakes and were given the name seiche.

a. описывались, b. описанного, c. описываются

6. **In order to understand** the movement of the wave form within the basin we need to return our consideration to tidal forces as they are distributed over the earth's surface.

a. в порядке понимания, b. для того, чтобы, c. следует понять

7. Tidal observation in the open oceans of the world are insufficient **to give** a detailed picture of the total tide.

a. давать, b. чтобы дать, c. которое дает

8. Constructive interference would result if the two identical wave trains came together in phase.

a. результатом было бы, b. результатом будет, c. результатом должно быть

9. A forced wave is **one** that is maintained by force that has a periodicity that coincides with the period of the wave.

a. одна, b. волна, c. не переводится

10. Internal waves **are known to have** periods related to tidal forces.

a. было известно, что..., b. известно, что..., c. должно быть известно, что...

Структурно-смысловые особенности английских научно-технических текстов

Важнейшей задачей при изучении иностранного языка является овладение навыками извлечения информации из текста. В зависимости от поставленной задачи чтение может быть ориентировано на определение основного содержания текста, на поиск каких-либо конкретных фактов, данных и т. д. или на извлечение полной информации текста. В любом из указанных случаев следует знать структурно-смысловые особенности английских текстов научно-технического характера. Остановимся на некоторых из них.

Одним из внешних признаков, характерных для структурной организации английского научно-технического текста, является порядок изложения информации, в котором прослеживается достаточно четкая последовательность: текст имеет **вводную часть**, где приводится основное содержание данного сообщения, **основную часть**, в которой происходит раскрытие этого содержания, и **заключение.**

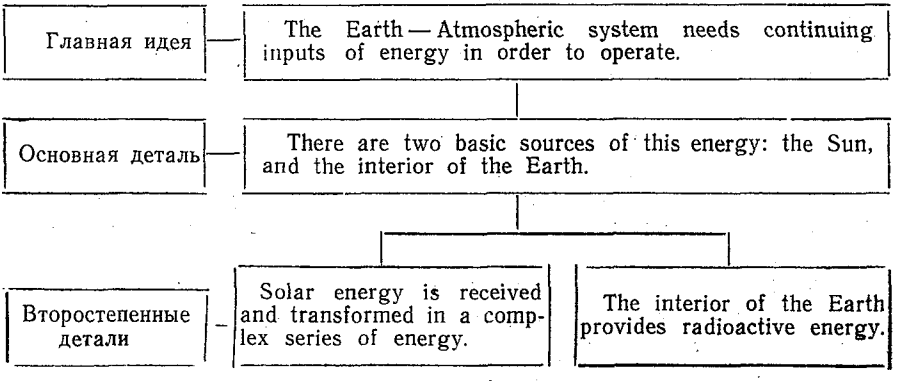
При работе над научно-техническим текстом особое внимание следует обратить на его заголовок. В смысловой структуре текста заголовку принадлежит важнейшая роль, поскольку он в сжатой форме передает его основное содержание. Таким образом заголовок является первым смысловым ориентиром при работе над текстом.

Важной структурной единицей текста является абзац — группа связанных между собой предложений, развивающих какую-либо идею. Почти всегда в каждом абзаце одна идея является более важной, чем другие. В ней содержится основная идея данного отрывка текста. Такая идея называется **основной идеей** абзаца, обычно она содержится в его начале.

В качестве примера проанализируем первый абзац текста «Energy Sources and Transfers».

1. The Earth — Atmosphere system needs continuing inputs of energy in order to operate, since without energy the world would have no motion or life. 2. There are two basic sources of this energy: the sun, and the interior of the Earth. 3. Solar energy is received and transformed in a complex series of energy transfers, especially in the atmosphere. 4. The interior of the Earth provides radioactive energy, derived from the time of the formation of the planet.

Основная идея приведенного абзаца содержится в первом предложении, в котором говорится о необходимости источников энергии для функционирования системы «Земля — атмосфера». Далее в тексте раскрывается содержание этой основной идеи, примером чего может послужить 2-е предложение, сообщающее о том, что существует два основных источника энергии, одним из которых является Солнце, а другой находится в недрах Земли. В предложениях 3 и 4 в свою очередь происходит дальнейшая детализация этой информации: в них содержится указание источников энергии. Такие уровни детализации можно обозначить как соответственно **главные** (предложение 2) и **второстепенные** (предложения 3, 4) **детали**. Таким образом, иерархическая структура приведенного абзаца может быть представлена следующим образом:



Связующие элементы предложения и текста*

В любом тексте важное значение имеют слова и словосочетания, служащие для выражения связей и отношений, существующих как между отдельными элементами предложения, так и между самими предложениями. К этим словам и словосочетаниям, которые в дальнейшем будут называться «связующими элементами», можно, например, отнести следующие: then — затем; firstly — во-первых, in conclusion — в заключение; moreover — более того; yet — тем не менее; in front of — перед чем-либо и т. д. Связующие элементы могут быть использованы в предложении для выполнения различных логико-семантических функций, главными из которых являются следующие:

— выражение временных, пространственных, причинно-следственных, условных отношений, например: since — с, так как; during — в течение; on — на; behind — позади; so — таким образом; hence — следовательно; for this reason — по этой причине; on account of — из-за; because — потому что; as a result — в результате; to this end — с этой целью; unless — если не;

— выражение уточнения, например: namely — а именно; that is to say — так сказать;

— выражение соотнесенности чего-либо с чем-либо, например: in this respect — в этом отношении; in that connection — в этой связи; apart from — помимо чего-либо;

— обозначение сравнения, например: likewise — схожим образом; similarly — подобно чему-либо;

— обозначение дополнительной информации, например: and — и; moreover — более того; furthermore — кроме того;

— выражение противоположности, например: yet — тем не менее; though — хотя; however — однако; nevertheless — тем не менее; instead — вместо; on the contrary — напротив; on the other hand — с другой стороны;

— выражение подведения итогов, например: in short — вкратце; in conlusion — в заключение; to sum up — подводя итоги;

— обозначение иллюстрации какого-либо положения, факта и т. д., например: thus — таким образом; for example — например.

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* Следует особо подчеркнуть, что данная группа слов и словосочетаний выделяется исключительно для практических целей.

Цифры и знаки в английской научно-технической литературе

Числительные в английском языке, так же как и в русском, можно разделить на количественные и порядковые.

Количественные и порядковые числительные

Количественные (Cardinal)	Порядковые (Ordinal)
1 one	1st first
2 two	2nd second
3 three	3rd third
4 four	4th fourth
5 five	5th fifth
6 six	6th sixth
7 seven	7th seventh
8 eight	8th eighth
9 nine	9th nineth
10 ten	10th tenth
11 eleven	11th eleventh
12 twelve	12th twelfth
13 thirteen	13th thirteenth
14 fourteen	14th fourteenth
...	...
20 twenty	20th twentieth
30 thirty	30th thirtieth
...	...
100 one hundred	100th one hundredth
1000 one thousand	1000th one thousandth
10 000 ten thousand	10 000th ten thousandth
100 000 one hundred thousand	100 000th one hundred thousandth
1 000 000 one million	1 000 000th one millionth

При цифровом обозначении количественных и порядковых числительных каждые три разряда справа налево в английском языке отделяются запятой, а не точкой, как в русском языке (следует, однако, помнить, что эти запятые часто опускаются), например: 4,357,804; 5,341; 278,426,614.

При словесном обозначении, а также при чтении в составных числительных в пределах каждых трех разрядов перед десятками, а если их нет, то перед единицами ставится союз and:

101 — one hundred **and** one
152 — one hundred **and** fifty two
1001 — one thousand **and** one
2325 — two thousand, three hundred **and** twenty five
15 972 — fifteen thousand, nine hundred **and** seventy two
234 753 — two hundred **and** thirty four thousand, seven hundred **and** fifty three

Дробные числительные

В простых дробях (vulgar fractions) числитель выражается количественным числительным, а знаменатель — порядковым числительным, например 1/8 — one eighth, 1/4 — one quarter (или: a quarter), 1/2 — one half.

В десятичных дробях (decimal fractions) целое число отделяется от дроби точкой, а не запятой, как в русском языке. Каждая цифра читается отдельно. Точка, отделяющая целое число от дроби, читается как point. Нуль читается как nought или zero или не читается вообще. Например, 0.125 читается как (nought) point one two five; 0.25 — (nought) point two five; 0.5 — (nought) point five.

Примечание. 0 — «нуль» может иметь несколько прочтений в английском языке:

0=nought, zero — в десятичных дробях, причем zero — характерно для американского варианта английского языка;

0=[ou] в датах. Например, 1706 — seventeen [ou] six;

0=nil в результатах спортивных соревнований; например, The result of the game was 3 : 0 (three-nil).

Обратите внимание на то, как читается 0 в следующих числительных:

108 — one hundred **and** eight;
4,006 — four thousand **and** six;
4,105 — four thousand, one hundred and five;
0.6 — *nought* point six;
0.07 — nought point nought seven;
1.008 — one point nought nought eight.

Хронологические даты

Годы обозначаются количественными числительными следующим образом:

1900 — nineteen hundred
2000 — two thousand
1905 — nineteen o[ou]five
1988 — nineteen eighty eight

Слово «year» (год) после обозначения года не употребляется, однако возможен вариант In the year (of) 1988.

Даты обозначаются порядковыми числительными:

13th July — the thirteenth of July.

May, 20, 1988 — the twentieth of May, nineteen eighty eight.

Математические символы и выражения

В этом разделе приводятся некоторые наиболее распространенные символы и выражения, используемые в математике, геометрии и статистике.

$+$ plus/and
$-$ minus/take away
$\pm$ plus or minus
$\times$ (is) multiplied by/times
$\div$ (is) divided by
$=$ is equal to/equals
$\neq$ is not equal to/does not equal
$\simeq$ is approximately equal to
$>$ is more than
$\geqslant$ is more than or equal to
% per cent
$\log_e$ natural logarithm or logarithm to the base e
$\sqrt{}$ (square) root; $\sqrt{9}$ the square root of nine
$\sqrt[3]{}$ cube root; $\sqrt[3]{8}$ the cube root of eight; $\sqrt[5]{x}$ the fifth root of x
x^2 — x squared; 3^2 three squared or the second power of three
x^3 — x cubed; 5^3 five cubed or the third power of five
5^4 five to the power of four
$\angle$ angle
$\llcorner$ right angle
$\triangle$ triangle
$\parallel$ is parallel to
$\perp$ is perpendicular to
° degree
′ minute (of an arc)
″ second (of an arc)

Расстояние, высота, глубина

Традиционно меры длины в Великобритании и США выражались в дюймах, футах, ярдах и т. д., однако теперь все большее распространение получает метрическая система. Ниже приводятся наиболее распространенные единицы измерения обеих систем.

in — inch — дюйм
ft — foot — фут

yd — yard — ярд
mi — mile — миля
mm — millimetre — миллиметр
cm — centimetre — сантиметр
km — kilometre — километр
m — metre — метр
sq in — square inch — квадратный дюйм
sq ft — square foot — квадратный фут
sq yd — square yard — квадратный ярд
cu in — cubic inch — кубический дюйм
cu ft — cubic foot — кубический фут
cu yd — cubic yard — кубический ярд.

Температура

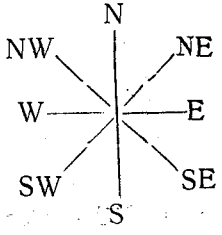
В Великобритании для измерения температуры используются как стоградусная шкала, так и шкала Фаренгейта. Примеры:

Fahrenheit	Centigrade
Water freezes at thirty two degrees Fahrenheit (32 °F).	Water freezes at nought degrees Centigrade (0 °C).
Last night we had nine degrees of frost (23 °F).	Last night the temperature was five degrees below zero (—5 °C).
It was ninety five in the shade this morning (95 °F).	It was thirty five in the shade this morning (35 °C).

Перевод значений из одной шкалы в другую осуществляется по следующим формулам:

$$°C = (°F - 32) \cdot 5/9$$
$$°F = 5/9\,°C + 32$$

Расположение в пространстве



Стороны света	Compass points...	Adjectives
	north (N)	northern
	north-east (NE)	north-eastern
	east (E)	eastern
	south-east (SE)	south-eastern
	south (S)	southern
	south-west (SW)	south-western
	west (W)	western
	north-west (NW)	north-western

Примеры:

X is $\frac{\text{to}}{\text{in}}$ the $\begin{matrix}\text{north}\\ \text{east}\\ \text{south}\\ \text{west}\end{matrix}$ of the $\frac{\text{capital}}{\text{country}}$

X is to the east of the capital — *X* находится к востоку от столицы.

X is in the south of the country — *X* находится на юге страны.

Пространство

to / on the right — направо / left — слева

on / in the right hand side — на правой стороне / left hand column — в левой колонке

in the top / bottom left-hand / right-hand corner — в верхнем левом углу / в верхнем правом углу

at the top — вверху / bottom — внизу

in the middle — в середине / centre — в центре / corner — в углу

Размеры

Nouns	Ajectives
длина — length;	long;
ширина — widht;	wide;
глубина — depth;	high;
высота — height;	deep;
толщина — thickness;	thick.
емкость, вместимость — capacity;	
площадь — area;	
объем — volume;	
окружность — curcumference;	
диаметр — diameter;	
радиус — radius.	

Химические формулы

При чтении химических элементов и формул необходимо помнить следующее:

— каждая буква и цифра читается отдельно, например:

NaCl (en ei si el);

— знаки, используемые в химических формулах читаются следующим образом:

\+ plus, and, together with, added to, combined with

= give, form, are equal to

→ forms, is formed from

← give, pass over to, lead to.

СОДЕРЖАНИЕ

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