МИНИСТЕРСТВО ОБРАЗОВАНИЯ И НАУКИ РОССИЙСКОЙ ФЕДЕРАЦИИ
Нижегородский государственный университет им. Н.И. Лобачевского

ЖИВЫЕ СИСТЕМЫ

Сборник текстов и заданий по английскому языку

Практикум

Рекомендовано методической комиссией Института филологии и журналистики
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Практикум «Живые системы» предназначен для студентов-биологов третьего курса обучения. В нем приводятся тексты, в которых рассматриваются актуальные проблемы современной биологии. В практикуме используется нетрадиционный инновационный подход к предъявлению и закреплению нового лексического материала с помощью карт слов (word maps) и большого количества диаграмм. Диаграммы используются и для закрепления целых фраз и предложений, которые должны войти в активный вокабуляр обучающихся. Практикум включает большое количество кроссвордов, что также стимулирует познавательную деятельность учащихся. Цветные схемы, диаграммы и рисунки способствуют лучшему зрительному восприятию нового и закрепляемого материала. В практикуме представлен большой модуль по самопроверке. Выполняя упражнения модуля, студенты смогут проверить самостоятельно, насколько успешно они усвоили пройденный материал по каждому из представленных в практикуме разделов.

Ответственный за выпуск:
Зам. директора Института филологии и журналистики ННГУ по методической работе
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CONTENTS

UNIT 1

COORDINATION IN HUMANS

Practice the pronunciation of the words:

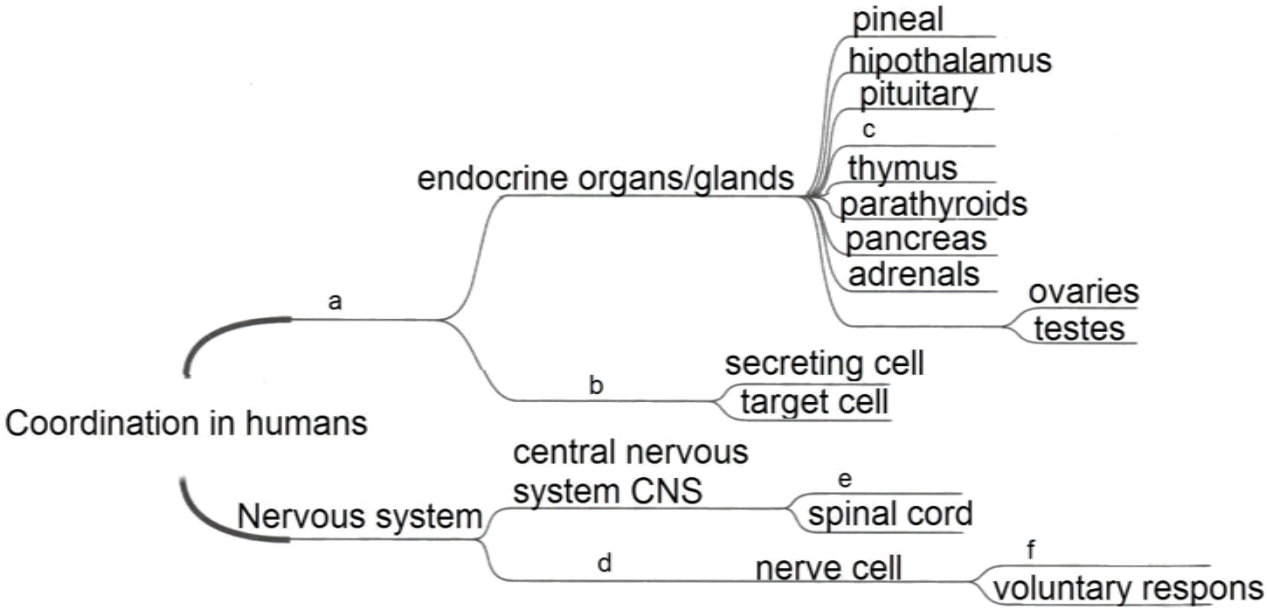
adrenaline [ə´drenəlɪn]
adrenal [ə´dri:n(ə)l]
cerebrum [sə´rɪ:brəm]
conscious [´kɔnʃəs]
endocrine [´endəukraɪn]
exocrine gland [´eksəukraɪn glænd]
homeostasis [ˌhəumɪəu´steɪsɪs]
hyperglycaemia [ˌhaɪpəuglaɪ´si:mɪə]
hypothalamus [ˌhaɪpəu´ θæləməs]
islet of Langerhans [´aɪlət əv´læŋgəhænz]
medulla oblongata [me´dʌlə˛ɔblɔŋ´gɑ:tə]
myelin sheath [ˌmaɪəlɪn´ʃi:θ]
oestrogen [´ɪ:strədʒ(ə)n]
pituitary gland [pɪ´tju:ɪt(ə)rɪ glænd]
reflex action [´ri:fleks ´ækʃ(ə)n]
synapse [´saɪnæps]
testosterone
[te´stɔstə˛rəun] thymus
[´θaɪməs] thyroid [´θaɪrɔɪd]
thyroxin [θaɪ´rɔksɪ:n]

Exercise 1 [1]. Read the text and place the words and phrases from the box in the correct place on the word map.

Coordination in the human body is controlled by two systems: *the nervous system* and *the endocrine system*. The endocrine system works together with the nervous system to regulate growth and development and to respond to changes both inside and outside of the body. The nervous system controls rapid and precise changes in the body by transmitting messages through the body along *nerve fibres*. The endocrine system deals with long-term changes in the body. It is also responsible for maintaining a constant internal environment in the body, which we call *homeostasis*. The messages of the endocrine system are transmitted by *hormones* that are released into the bloodstream from specific organs called glands. The blood transports the hormones to the target organs where they stimulate specific changes. This process of transferring messages around the body is much slower than of the nervous system, but is useful for long-term or widespread changes.

Coordination word map

brain endocrine system hormones involuntary responses peripheral nervous system (PNS) thyroid



Exercise 2. Read the text and answer the questions.

1. What parts constitute the central nervous system?
2. What constitutes the peripheral nervous system? What function does the peripheral nervous system perform?
3. What systems can the peripheral nervous system be subdivided into on the basis of function? What are they responsible for?
4. Do all the parts function as a single unit? Prove it.

The Nervous System

If you were to view the nervous system apart from the rest of the body, you would see a dense area of neural tissue in the head and a cord of neural tissue that extends down the middle of the back. These parts are the brain and spinal cord, and they constitute the *central nervous system (CNS)*, which integrates and coordinates all voluntary and involuntary nervous functions. Extending from the brain and spinal cord, are many communication 'cables'- the nerves that carry messages to and from the CNS. The nerves branch extensively, forming a vast network. There are also small clusters of nerve cell bodies, called *ganglia* (sing., ganglion). The nerves and ganglia are located outside of the CNS and make up the *peripheral nervous system (PNS)*. The PNS keeps the central nervous system in continuous contact with almost every part of the body.

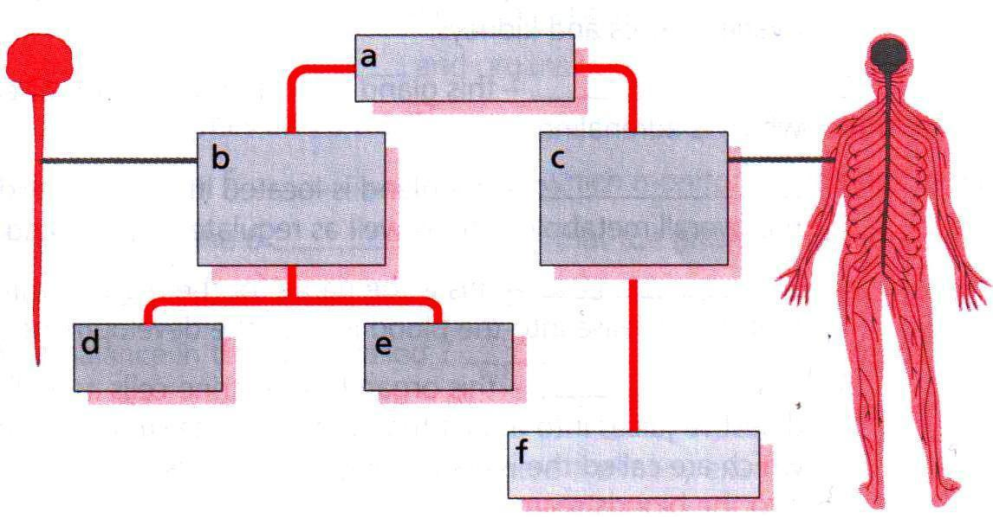
The peripheral nervous system can be further subdivided on the basis of function into somatic nervous system and the autonomic nervous system. The *somatic nervous system* consists of nerves that carry information to and from the CNS, resulting in sensations and voluntary movement. The *autonomic nervous system*, on the other hand, governs the involuntary, unconscious activities that maintain a relatively stable internal environment. The autonomic nervous system has two parts that generally cause opposite effects on the muscles or glands they control.

The *sympathetic nervous system* is in charge during stressful or emergency conditions. In contrast, the *parasympathetic nervous system* adjusts bodily function so that energy is conserved during nonstressful times.

Although we have referred to various parts of the nervous system, remember that the parts function as a single unit, as can be seen in the following scenario. Imagine for a moment that you are meditating in the park; your eyes are closed, and you are resting. While you are relaxing, the parasympathetic nervous system is ensuring that your life-sustaining bodily activities continue. Then someone grasps your hand. Sensory receptors in the skin (part of the somatic nervous system) respond to the pressure and warmth of the hand. They send messages over sensory nerves to the spinal cord. Neurons within the spinal cord relay the messages to the brain. The brain integrates incoming sensory information, 'deciding' on an appropriate response. The brain may then generate messages that cause your eyes to open. If the sight of the person holding your hand generates strong emotion, the sympathetic nervous system may cause your heart to beat faster and perhaps even your breathing rate to increase.

Exercise 3 [1]. Place these words and phrases in the correct place in the diagram:

brain central nervous system (CNS) nerve fibres nervous system peripheral nervous system (PNS) spinal cord



Exercise 4. Read the texts and retell them using the key phrases:

- to be subdivided;
- to carry sensory messages;
- to control movement;
- to maintain internal stability;
- to make appropriate adjustments;
- to gear the body;
- to conserve energy;

- to innervate an organ;
- to bring about antagonistic effects;
- to be connected through a chain of ganglia;
- to need a unified response;
- independently occurred effects.

The somatic nervous system controls conscious functions

The peripheral nervous system is subdivided into the somatic nervous system and the autonomic nervous system. The somatic nervous system carries sensory messages that tell us about the world around us and within us, and it controls movement. Sensory messages carried by somatic nerves result in sensations, including light, sound, and touch. The somatic nervous system also controls our voluntary movements, allowing us to smile, stomp a foot, sing a lullaby, or frown as we sign a cheque.

The autonomic nervous system controls internal organs

The autonomic nervous system automatically adjusts the functioning of our body organs so that an internal stability (homeostasis) is maintained and the body is able to meet the demands of the world around it. The somatic nervous system sends information about conditions within the body to the autonomic nervous system. Then the autonomic nervous system makes the appropriate adjustments. Its activities alter digestive activity, open or close blood vessels to shunt blood to areas that need it most, and alter heart rate and breathing rate.

Recall that the autonomic nervous system consists of two branches: the sympathetic and the parasympathetic nervous systems. The sympathetic nervous system gears the body to face an emergency or stressful situation, such as fear, rage, or vigorous exercise. Thus, the sympathetic nervous system prepares one for fight or flight. In contrast, the parasympathetic nervous system adjusts body function so that energy is conserved during relaxation.

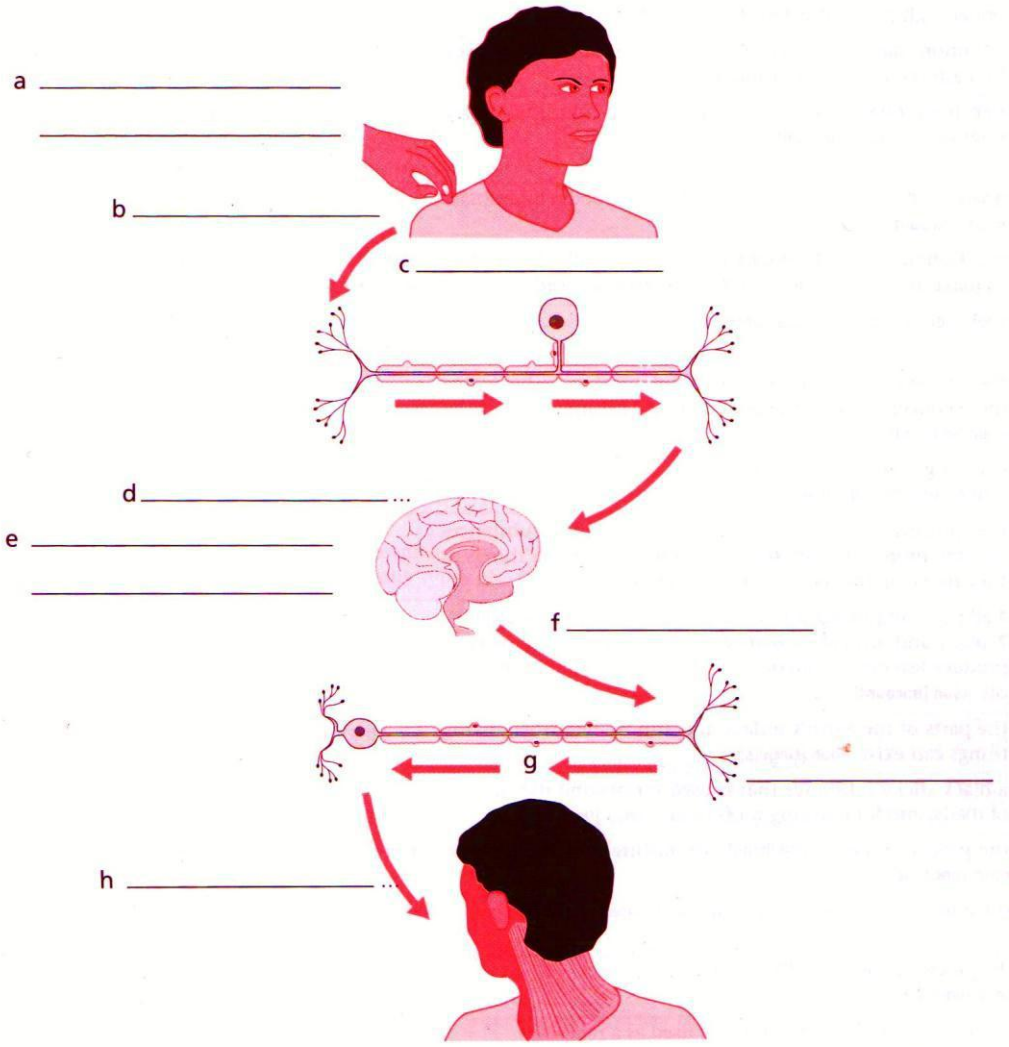
Both the parasympathetic and the sympathetic nervous systems send nerve fibers to innervate most, but not all, internal organs. When both systems innervate an organ, they have an opposite effects on its function. If one system stimulates, the other system inhibits. The antagonistic effects are brought about by different neurotransmitters. Whereas sympathetic neurons release mostly norepinephrine at their target organs, parasympathetic neurons secrete acetylcholine at their target organs.

The sympathetic nervous system acts as a whole, bringing about all its effects at once. This action is possible because its neurons are connected through a chain of ganglia. A unified response is exactly what is needed in an emergency. To meet the threat, the sympathetic nervous system increases breathing rate, heart rate, and blood pressure. It also orchestrates the responses needed to increase the amount of glucose and oxygen delivered to the cells. The adrenal glands are stimulated to release two hormones, epinephrine and norepinephrine, into the bloodstream. These hormones back up and prolong the effects of sympathetic stimulation. In a crisis, digesting the previous meal is hardly a priority, and digestive activity is inhibited.

The effects of the parasympathetic nervous system occur more independently of one another. After the emergency, organ systems return to a relaxed state at their own pace, based on the anatomy of the system. Organs can respond to the parasympathetic nervous system independently because the ganglia containing the parasympathetic neurons that stimulate organs are not connected in a chain, as they are in the sympathetic nervous system. Instead, the ganglia of the parasympathetic nervous system are located near the organs.

Exercise 5 [1]. Read the text and label the diagram with these sentences.

A decision can be made here about whether or not to turn.
If the decision is to turn and look, a response is sent to motor neurones.
Motor neurones transmit response message to the neck muscles, known as 'effectors'.
Neck muscles are activated causing the head to turn.
Receptors in the skin sense stimulus.
Sensory neurones transmit the stimulus message.
The message is interpreted in the brain.
The shoulder is tapped.



Voluntary actions

An example of a voluntary movement is where someone responds to a tap on the shoulder by turning their head in the direction where the touch was applied. When the shoulder is tapped, receptors in the skin respond to the touch stimulus by sending a message along a nerve to the spinal cord and brain. At this point a decision can be made about whether to turn and see what caused the stimulus or not to turn because there is something more important to look at. If the decision is to turn and look, an impulse is sent from the brain through a nerve to the muscles in the neck, which are effectors. This makes the muscles move to turn the head in the direction of the tap.

Exercise 6. Read and translate the text into Russian.

The cerebellum is an area of sensory-motor coordination

The cerebellum is the part of the brain responsible for sensory-motor coordination. It acts as an automatic pilot that produces smooth, well-timed voluntary movements and controls equilibrium and posture. The cerebellum receives sensory information regarding the position of joints and the degree of tension in muscles and tendons throughout the body. It integrates this information with input from the eyes and the equilibrium receptors in the ears. As a result, the cerebellum can determine the body's position, as well as where it is going, at any given instant.

The coordination of sensory input and motor output by the cerebellum involves two important processes: comparison and prediction. During every move you make, the cerebellum continuously compares the actual position of each part of the body with where it *ought* to be at that moment (with regard to the intended movement) and makes the necessary corrections. Try to touch the tips of your two index fingers together above your head. You probably missed on the first attempt. However, the cerebellum makes the necessary corrections, and you will likely succeed on the next attempt. At the same time, the cerebellum calculates future positions of a body part during a movement. Then, just before that part reaches the intended position, the cerebellum sends messages to stop the movement at a specific point. Therefore, when you scratch an itch on your cheek, the hand stops before slapping your face!

Exercise 7. Have a look at the endocrine glands. **The endocrine system**

The endocrine system is a collection of ductless glands. These glands secrete chemical messages or hormones into the bloodstream. Each hormone has a specific target organ. Here it reacts with receptor cells and stimulates the receptor organ to bring about changes. There are many endocrine glands in the human body.

Now match these names with their descriptions:
the adrenal gland the gonads the pancreas the pituitary gland the thyroid gland

1. _____- this gland is a pea-sized gland located at the base of the brain. It produces many hormones that control the functions of other endocrine glands and organs in the body, such as the ovaries, testes and kidneys.

2. _____ - this gland is located on the top of each kidney. They release several hormones, one of which is adrenaline.

3. _____ - this gland is located in the neck and secretes the hormone thyroxin. Thyroxin increases the overall metabolic rate as well as regulates growth and development of the individual.

4. _____ - this is the name for the organs which produce male and female sex cells. The hormones that they release into the blood lead to the development of secondary characteristics at puberty.

5. _____ - this organ has exocrine cells as well as endocrine cells. The exocrine cells secrete digestive juices into a duct that leads into the small intestine. The endocrine cells are found in small clusters which are called the islets of Langerhans. These produce the hormones insulin and glucagon that are secreted into bloodstream.

Exercise 8. Work in three groups.
Group A *read about the adrenal gland and complete the text with the words.*
Group B *read about the pituitary gland and complete the text with the words.*
Group C *read about the pancreas and complete the text with the words.*
Answer the questions.
1. Where is the gland located?
2. What hormones does the gland release?
3. What changes in the body do the hormones bring about?

Group A

The adrenal gland

adrenaline danger glucose heart rate kidney respond stimuli stress

The adrenal glands are located on the top of each 1 _____. They release several hormones, one of which is 2 _____. This is designed for coping with 3 _____ excitement and 4 _____; and causes changes in the body such as increased 5 _____; increased blood supply to the brain and muscles; decreased blood supply to the skin and gut; increased 6 _____ levels in the blood. Adrenaline is often referred to, as the fight or flight hormone, since it brings about changes that cause the body to 7 _____ suddenly and quickly to certain 8 _____.

Group B

The pituitary gland

endocrine glands feedback mechanism homeostasis hypothalamus master gland ovaries pea-sized target glands

The pituitary gland is a 1_____ gland located at the base of the brain. It produces many hormones that control the functions of other 2_____ and organs in the body, such as the 3 _____ testes and kidneys. This is why it is sometimes called the

4 _____. The levels of hormones secreted by the pituitary are partly controlled by the 5 _____, which monitors conditions in the body, and partly by the hormones that are made in the 6 _____ that the pituitary hormones stimulate. The hormones in the blood from the target glands inhibit the production of the hormone from the pituitary that stimulated them. This creates a balance in the body, called 7 _____, which keeps the internal environment of the body constant. This sort of interaction, where one action produces another action, which then inhibits the first action, is called a 8 _____. There are many examples of this in the endocrine system, such as the control of excretion of water by the kidney.

Group C

The pancreas

glucagon glucose target cells insulin endocrine exocrine glycogen islets of Langerhans

The pancreas has 1 _____ cells as well as 2_____ cells. The former secrete digestive juices into a duct that leads into the small intestine. The latter are found in small clusters in the pancreas which are called the 3 _____. These produce the hormones insulin and 4 _____ that are secreted into the bloodstream. These hormones regulate the amount of 5 _____ (sugar) in the blood. After eating a meal, the blood sugar level rises and 6 _____ is released into the blood. The insulin lowers the amount of glucose in the blood by causing 7 _____ in the liver and muscles to increase the rate at which they convert glucose to 8 _____, which is stored in the cells for use later on.

Find a partner from the other groups. Compare the adrenal gland, the pituitary gland and the pancreas, using your answers.

Exercise 9. Match the beginnings and endings of the sentences.

Beginnings	Endings
1. The nervous system and the endocrine system control	a) a synapse.
2. The endocrine system consists of	b) chemical neurotransmitters.
3. Hormones are chemical messages that affect	c) coordination in humans.
4. Some human endocrine glands are:	d) electrical impulses.
5. The islets of Langerhans in the pancreas produce	e) endocrine organs (or glands) and hormones.
6. The pituitary gland is often called the master gland because most of the hormones it produces control	f) involuntary movements.
	g) nerve cells.
	h) of the central nervous system (CNS) and the peripheral nervous system (PNS).
	i) pancreas, sex organs, adrenal glands,

7. The release of hormones by the pituitary is controlled partly by
8. The nervous system consists
9. The brain and spinal cord of the CNS and the nerves of the PNS are made up of
10. The brain is composed of three main parts:
11.The cerebrum controls
12. The medulla oblongata are responsible for
13. The tiny space between nerve cells is called
14. Messages travel through the neurons as
15. Messages pass across synapses

thyroid glands and pituitary gland.

j) the cerebrum, cerebellum and the medulla oblongata.

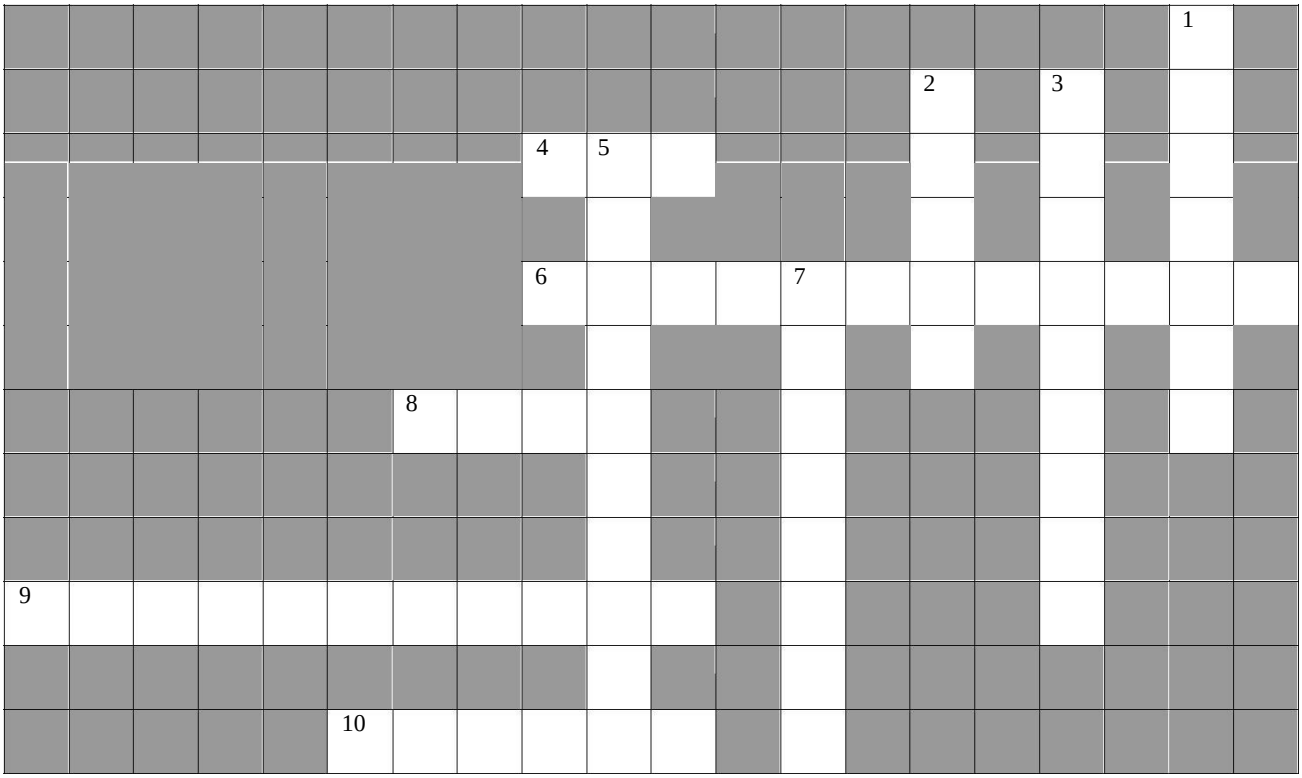
l) the function of the other endocrine glands.

m) the hormone insulin, which regulates blood sugar levels.

n) the level of the hormones that it stimulates to be released, in a feedback mechanism.

o) voluntary movement.

Exercise 10. Read the clues and complete the crossword.



ACROSS

4) to hit someone or something gently;

6) the process of sending electronic signals such as radio or television signals, or a signal that is sent in this way;

8) the long part of a neurone (=nerve cell) that carries the nerve impulses;

9) the process by which a living organism or cell keeps its own state steady and continuous, despite changes in the environment around it;

10) a very serious viral disease that affects the central nervous system. It is passed on in the saliva of an infected animal, and so it can be caught by being bitten.

DOWN

1) a gland in the neck that produces hormones;

2) a serious infectious disease caused by a virus that can destroy muscles and affect the ability to control movement;

3) done deliberately in a way that you can control;

4) a hormone that is produced in someone's body when they are frightened, excited, or angry;

7) something that produces a reaction in a living thing.

UNIT 2

EXCRETORY SYSTEM

Practice the pronunciation of the words:

aorta [eɪ´ɔ:tə]
Bowman's capsule [´bəumənz´kæpsju:l]
capillary [kə´pɪlərɪ]
convoluted tubule [ˌkɔnvə´lu:tɪd ´tju:bjul]
dialysis [daɪ´æləsɪs]
egestion [ɪ´ʤestʃ(ə)n]
excrete via [eks´kri:t ´vaɪə]
faeces [´fi:si:z]
follicle [´fɔlɪk(ə)l]
glomerulus [glɔ´meruləs]
loop of Henle [´lu:p əv ´henleɪ]
osmoregulation [ɔz´məuˌregju´leɪʃn]
renal artery [´ri:nəl ´ɑ:tərɪ]
sebaceous gland [sə´beɪʃəs glænd]
sweat pore [´swet ´pɔ:]
ultrafiltration [ˌʌltrəfɪl´treɪʃ(ə)n]
urea [ju´rɪ:ə]
urethra [ju´ri:θrə]
urine [´juərɪn]
vena cava [´vi:nə´keɪvə]

Exercise 1 [1]. Read the text and place the words and phrases from the box in the correct place on the word map.

The function of the excretory system is to remove waste and harmful by-products of normal metabolic processes from the body. If these waste products accumulate, they interfere with the delicate balance of oxygen, water, and nutrients needed for normal cell development. The main by-product of cell metabolism, carbon dioxide, is expelled by respiration, but cellular metabolism also produces a host of salts, fats, and excess chemicals, including carbon, hydrogen, oxygen, and nitrogen. The excretory system filters out those that are harmful and eliminates them so the body can maintain a state of *homeostasis*.

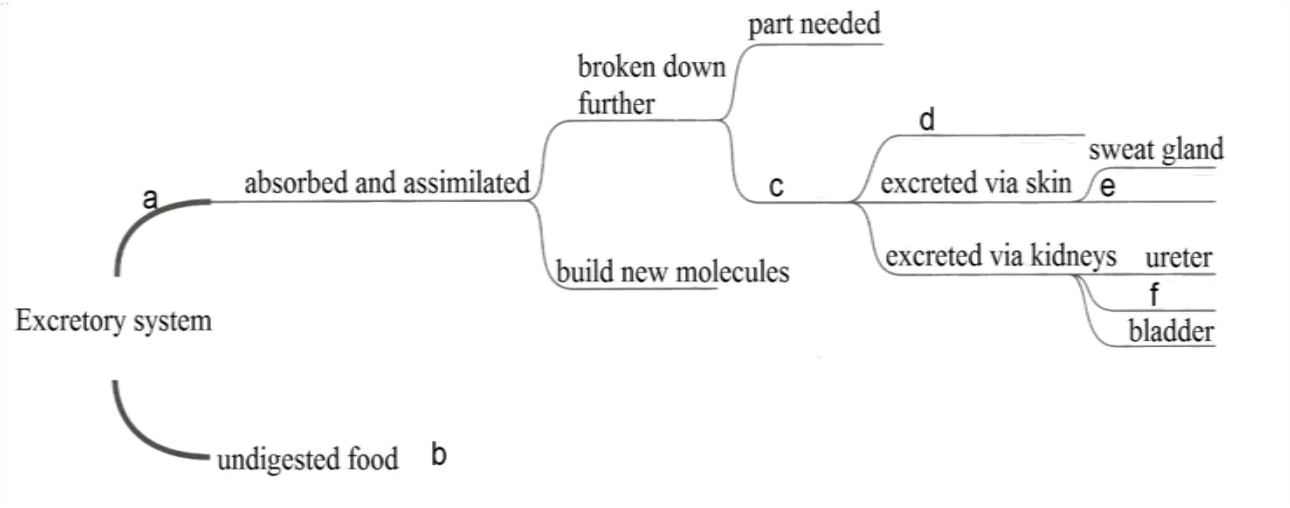
While the entire body is involved in the process of eliminating waste, the main organs of the excretory system are the *kidneys*. They are two bean-shaped organs located in the lower back that contain more than a million filtering units called nephrons. As blood passes through the kidneys, the nephrons filter out urea, a nitrogenous carbon compound produced by cell metabolism, and send it through tubes called ureters to the bladder where it is eliminated by urination. If the excretory system is functioning normal, the nephrons recycle beneficial substances, like glucose and proteins, back into the blood stream.

Elimination of waste from digestion is also a function of the excretory system, and the *liver* plays a role by decomposing worn out blood cells into bile pigments and passing them to the alimentary canal where they can be eliminated by defecation. The liver also produces urea and detoxifies the body by eliminating cholesterol and harmful toxins. The *skin* plays a role in maintaining a healthy internal balance by eliminating salts and other water soluble contaminants through perspiration. It is not considered part of the excretory system per se, because the process is more one of secretion than it is of active excretion.

per se [ˌpəːˊseɪ] *adv.formal* used to say that something is being considered alone, not with other connected things

Excretory system word map

digested food egestion excreted via lung part not required sweat pore urethra



Exercise 2. Match the beginnings and the endings of the sentences.

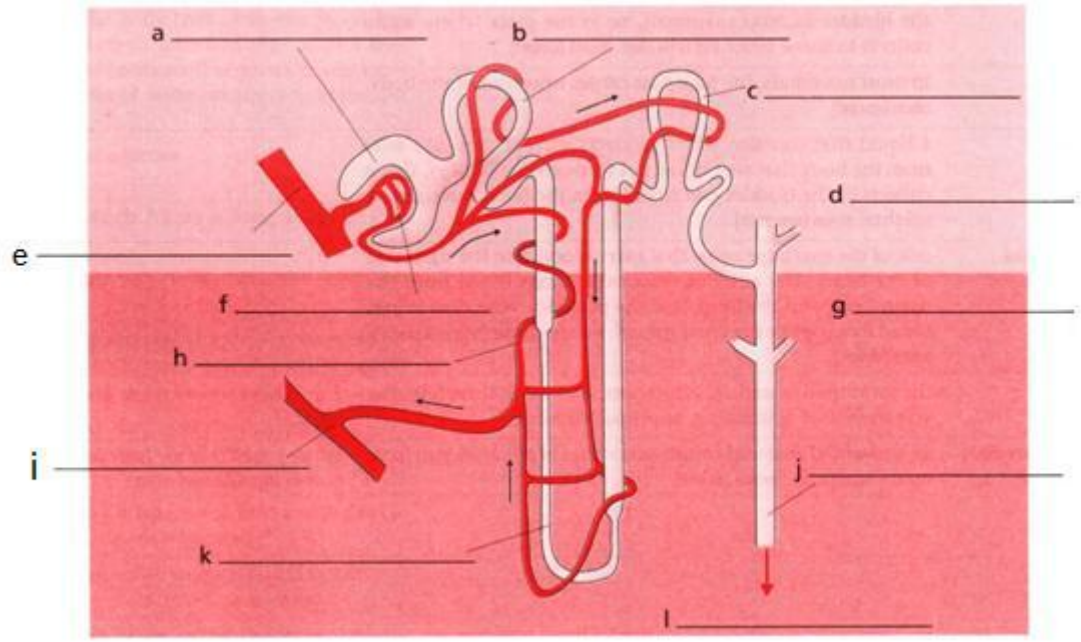
Excretion

Beginnings	Endings
1. Excretion is the process by which	a) by adjusting how much water is re-absorbed into the body.
2. Egestion is	b) lungs, excess water as sweat through the skin and urine.
3. The body excretes	c) expelled from the body via the urethra.
4. Carbon dioxide is excreted via the	d) waste via the lungs, skin and kidneys.
5. Deamination of amino acids	e) not a process of excretion.
6. The kidneys filter out waste from the blood	f) poisonous waste is eliminated from the body.
7. Urine is later	g) takes place in the liver.
8. The kidneys also assist with osmoregulation	h) to form urine which is stored in the bladder.

Exercise 3 [1]. Label the diagram with these words and phrases:

blood coming to kidney blood leaving kidney Bowman's capsule capillaries collecting duct cortex distal convoluted tubule glomerulus (knot of capillaries) loop of Henle medulla proximal convoluted tubule urine

The nephrons



Exercise 4. Read the text and say how a balance of water in the body is kept.

Osmoregulation

In addition to the removal of waste from the blood, the kidneys also play a very important role in maintaining a healthy balance of salts and water in the blood and cells of the body. This is called osmoregulation. We need to keep a balance of water in the body because many reactions involve substances that are dissolved in water. If the concentration of water in the cells is lowered due to loss of water from the body through evaporation (sweat) and urine, this can lead to complications. To return to a normal concentration of water in the cells, a hormone called anti-diuretic hormone (ADH) is released from the pituitary gland. This makes the kidneys reabsorb more water from the urine so that the body does not lose as much. If the cells in the body contain plenty of water, less ADH is released by the pituitary gland, so less water is reabsorbed in the kidneys and more is lost in the urine.

Exercise 5. Read the text and complete it with these words:
amino acids carbohydrates deamination digested excess kidneys respiration small intestine urea

The waste products of digestion

When proteins are 1 _____ they are broken down into amino acids which are absorbed in the 2 _____. The body uses the 3 _____ it needs to make its own protein for growth and repair of body cells. If we absorb more amino acids than the body needs, we cannot store the 4 _____. These are transferred to the liver where the amino group ($-NH_2$) is removed as ammonia. This is known as 5 _____. Ammonia is highly toxic to cells so it is converted to a less toxic compound called 6 _____. The rest of the amino acid is converted to 7 _____, which can be stored as glycogen and later used in respiration to provide energy. Urea is a waste product because it is not

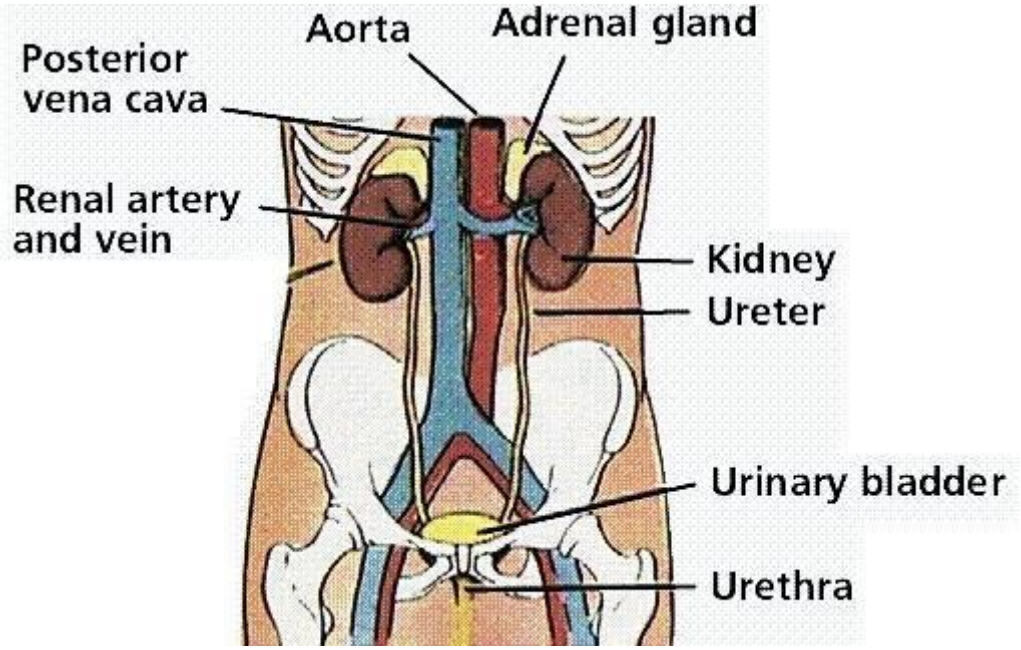
needed by the body. The carbohydrate is not a waste product because it is stored and then used by the body during 8 _____. The urea must be removed from the body because it can affect reactions in the cytoplasm, so it is transported by the blood to the 9 _____ where it is filtered and excreted from the body as urine.

Exercise 6. Read the text, divide it into logical parts and entitle each one. Sum up any of the parts.

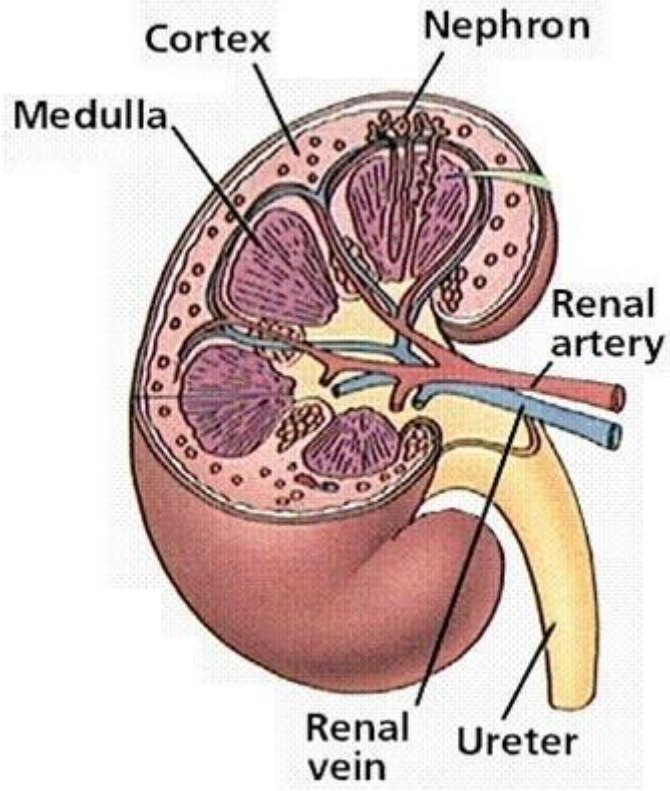
The *urinary system* consists of two kidneys, two ureters, one urinary bladder, and one urethra. The main function of this system is to regulate the volume, pressure, and composition of the blood. The *kidneys* are the organs of the urinary system that accomplish this task by regulating the amount of water and dissolved substances that are added to or removed from the blood. Wastes and excess materials removed from the blood form *urine*, the yellowish fluid produced by each kidney. Urine from the kidneys travels down tubelike organs called *ureters* to the urinary bladder. The *urinary bladder* is a muscular organ that temporarily stores urine until it is excreted from the body. Urine leaves the body through the *urethra*, a muscular tube that transports urine from the urinary bladder to the outside of the body through an external opening. The female urethra transports only urine. The male urethra, however, carries urine and reproductive fluids (but not simultaneously). Our kidneys are reddish in colour and shaped like kidney beans. Each kidney is about the size of a fist. The kidneys are located just above the waist between the back wall of the abdominal cavity and the parietal peritoneum (the membrane that lines the abdominal cavity). The slightly indented, or concave, border of each kidney faces the midline of the body. Perched on top of each kidney is an adrenal gland. The kidneys are covered and supported by several layers of connective tissue. The outermost layer anchors each kidney and its adrenal gland to the abdominal wall and surrounding tissues. Beneath this layer is a protective cushion of fat. Sometimes, in very thin people, one or the other of these layers is not substantial enough, and a kidney will slip from its normal position. This painful condition is known as floating kidney. The condition is dangerous because the ureter of the displaced kidney may kink, preventing normal flow of urine from the kidney down the ureter to the bladder. The backup of urine and increased pressure can damage the kidney. The innermost layer covering the kidneys is a transparent layer of fibrous connective tissue. This layer protects the kidneys from trauma and infection. The numerous protective barriers and cushions surrounding our kidneys highlight the importance of these organs to our daily existence. The ureter leaves the kidney at a notch in the concave border. This notch is also the area where blood vessels enter and exit the kidney. The renal arteries branch off the aorta and carry blood to the kidneys. The renal veins carry filtered blood away from the kidneys to the inferior vena cava, which transports the blood to the heart. Each kidney has three regions: an outer region, the *renal cortex*; the inner region, the *renal medulla*; and an inner chamber, the *renal pelvis*. The renal cortex begins at the outer border of the kidney, and portions of it, called renal columns, extend between cone-shaped structures of the renal medulla. These cone-shaped structures of the

medulla are called renal pyramids. The narrow end of each renal pyramid joins a cuplike extension of the renal pelvis. Urine produced by the kidneys eventually drains into the renal pelvis and out the ureter to the urinary bladder.

The human excretory system



Arrangements of the nephrons in the kidney



Exercise 7. The functions of the Urinary system have been mixed up. Read the sentences and sort them out into the correct section.

Transport urine from kidneys to urinary bladder.
Filter wastes and excess material from the blood.
Stores urine.
In males, transports semen to outside the body.
Help regulate blood pressure and pH.
Contracts and expels urine into urethra.
Release erythropoietin, which stimulates production of red blood cells.
Transports urine from urinary bladder to outside the body.
Transform vitamin D into its active form.
Maintain fluid balance by regulating the volume and composition of blood and urine.

Kidneys	Ureters	Urinary bladder	Urethra

Exercise 8 [1]. The text describes how sweat is excreted through the skin. The steps have been mixed up. Look at the diagram and place these sentences in the correct order on the picture.

How sweat is excreted through the skin

The sweat is transported to the surface of the skin via the sweat duct.

Blood carrying a lot of water flows along the capillaries and the waste diffuses from the blood into the sweat gland.

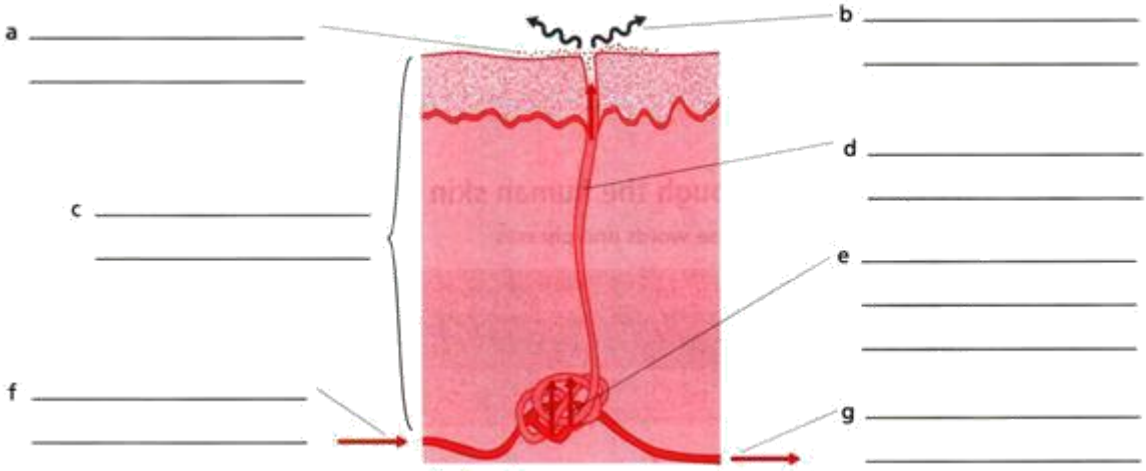
The base of the glands is near to blood capillaries which allows easy diffusion of waste products from the blood into the gland. The mixture of water, urea and salt, which is excreted from the sweat glands, forms a solution called sweat.

The blood continues along the capillary but contains less water.

The skin contains many sweat glands which are tubular structures that extend into the skin's surface.

The soluble substances, urea and salts, remain on the surface of the skin.

The water evaporates from the skin's surface.



Exercise 9. Match the beginnings and the endings of the sentences.

The lung as an organ

Beginnings	Endings
1. The lungs excrete the gaseous	a) capillaries over the alveoli, which is the point of gaseous exchange in the lungs.
2. The carbon dioxide that is formed in the cells during	b) from the lungs into the atmosphere when you exhale.
3. On reaching the lungs the blood flows through a network of	c) some water from the cells of the alveoli.
4. The carbon dioxide diffuses into the lungs along with	d) respiration diffuses into the blood stream, which transports it to the lungs.
5. Both the carbon dioxide and water (vapour) are excreted	e) waste product of respiration, carbon dioxide.

Exercise 10. Read the definition and say the word that is described.

1. The outer layer of the kidney that contains the nephrons.
2. The row of bones down or along the middle of the back of a vertebrate (=backbone, spinal column, vertebral column).
3. A nerve in a sense organ such as the skin or the nose that sends messages to the central nervous system.
4. One of many structures shaped like a cup inside the kidney, that contains the glomerulus.
5. To produce a liquid such as saliva.
6. The process by which the body gets rid of solid waste through the anus.
7. A hormone that controls the amount of water taken back in through the kidneys, in order to keep the concentration of water in the body's cells at a normal level.

8. The blood vessel which takes blood containing waste products to the kidney.

9. A small tube-shaped part in the nephrons of the kidney that has many twists and turns.

10. To become larger than normal, or to make something larger than normal.

11. A substance found in urine that is used for making fertilizers and for some types of medicine.

12. One of many small structures in the kidney consisting of a fine network of tiny blood capillaries that filter the blood.

13. The inner part of the kidney, which contains the loops of Henle.

14. One of the substances in the body that combine to make proteins.

15. The process of keeping the right balance of salts and water in the blood and cells of the body.

Exercise 11. Using the word map (ex.1) and the table below speak on the Excretory System.

Organ(s)	Function	Other organ system of which it is part
Lungs	Remove carbon dioxide	Respiratory system
Skin	Sweat glands remove water, salts, and other waste	Integumentary system
Large intestine	Removes solid waste and some water in the form of faeces	Digestive system
Kidneys	Remove urea, salts, and excess water from the blood	Urinary system

Exercise 12. Put the words and phrases in the correct order to make sentences.

Excretion of waste products in flowering plants

1) also / form / Plants / products. / waste

2) a complex excretory system / like humans / because/ can be re-used / do not require / in other processes. / most of their products / Plants

3) a waste product of photosynthesis, / can be considered / is a waste product of respiration. / Oxygen / while carbon dioxide

4) on the underside of the leaves. / oxygen and carbon dioxide, / Both gases, / via the stomata / will diffuse out of the leaves

5) and at night / During daylight / made in respiration / may be used in photosynthesis, / may be used in respiration. / much of the carbon dioxide / oxygen that was made during photosynthesis

6) by the plant / made during respiration / that is not needed / through transpiration through the stomata. / Water / will be lost

7) are / excretory organs / in plants. / The leaves / the main

8) after some time. / from other chemical reactions / in the plant / like the leaves and seeds, / may be stored in different parts, / Waste products / which are destined to drop off the plant

9) a large amount of waste / in the vacuoles / may store / of their leaves. / Some plants

10) and drops off. / and is lost / eventually crystallizes, / The accumulated waste / the leaf dies / when

UNIT 3

LOCOMOTION

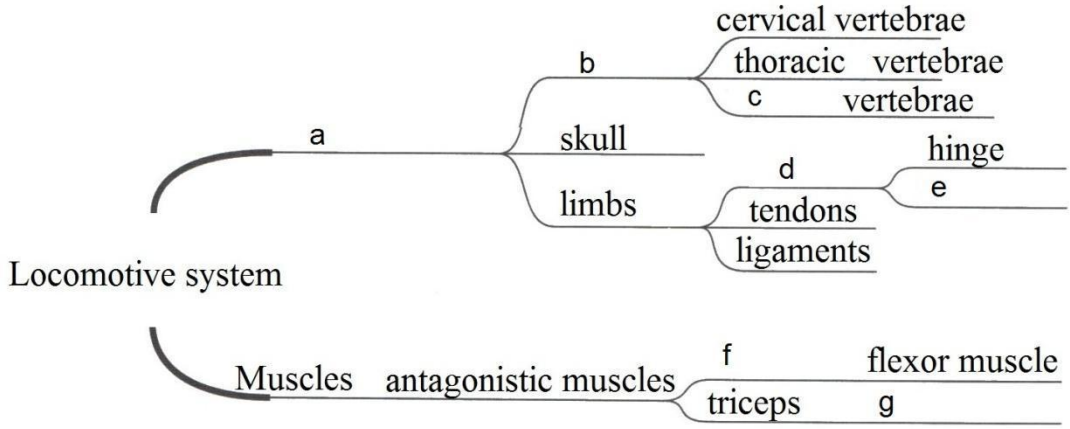
Practice the pronunciation of the words:

appendicular skeleton [ə´pendɪkuəl(ə)r´skelɪt(ə)n]
arthropod [´ɑ:θrə¸pɔd]
axial skeleton [´æksɪəl´skelɪt(ə)n]
cervical vertebra [sə:´vaɪk(ə)l ´və:təbrə] (pl.vertebrae [´və:təbrei])
coccyx [´kɔksɪks]
cranium [´kreɪnɪəm]
femur [´fi:mə]
fibula [´fɪbjulə]
hinge joint [´hɪnʤ¸ʤɔɪnt]
ligament [´lɪgəmənt]
metatarsal [¸metə´tɑ:s(ə)l]
sinew [´sɪnju:]
spongy [´spʌnʤɪ]
sternum [´stə:nəm] (breastbone [´brestbəun])
striated muscle [straɪ´eɪtɪd ´mʌs(ə)l]
synovial fluid [saɪ¸nəuvɪəl´flu:ɪd]
thoracic vertebra [θə´ræsɪk´və:təbrə]
tibia [´tɪbɪə]
triceps [´traɪ¸seps]
ulna [´ʌlnə]

Exercise 1 [1]. Fill in these words and phrases on the word map.

ball-and-socket biceps extensor muscle joints lumbar skeleton vertebral column

Locomotion word map



Exercise 2. Read the text. What functions does the skeleton in humans perform?

The skeleton is a framework of bones and cartilage that functions in movement and the protection of internal organs. Specifically, the skeleton has the following functions:

- Support. It provides a rigid framework that supports soft tissues.
- Movement. It provides places of attachment for muscles.
- Protection. It encloses internal organs, such as the heart and lungs, which are within the skull.
- Storage of minerals. The bones store minerals, particularly calcium and phosphorus, that can be released to the rest of the body when needed.
- Storage of fat. It stores energy-rich fat in yellow bone marrow (the soft tissue within some bones). The fat can be metabolized and the energy released when needed.
- Blood cell production. It produces blood cells in the red marrow of certain bones.

Exercise 3. Match the beginnings and the endings of the sentences about functions of the skeleton in humans.

Beginnings	Endings
1. The legs	a) is made up of bones joined together.
2. The ribs	b) protects the brain.
3. Muscles and tendons	c) protects the spinal cord.
4. The skeleton	d) protects the lungs, heart and much of the liver.
5. The blood cells	e) are separated by the width of the pelvis.
6. The vertebral column	f) can cause movement of a single bone.
7. The skull	g) manufactures red and white blood cells.
8. The skeleton	h) are made in the bone marrow.

Now read and listen to the text and check.

Protection of organs

The skull protects the brain. The vertebral column protects the spinal cord, and the ribs protect the lungs, heart and much of the liver. Bones surround these delicate organs forming cup-like structures or tube-like structures in which the organs are housed.

Support of the body

Humans are supported upright even more than most mammals and can stand on two feet. The skeleton acts like a frame supporting the soft body parts. The limbs are separated by the width of the pelvis and this helps keep the body stable.

Movement

The skeleton is made up of a number of bones joined together. Muscles and other tissues such as tendons can cause movement of a single bone. The coordinated movement of many bones results in walking, running and all the movements seen in a human.

Manufacture of red and white blood cells

Red and white blood cells are made in the bone marrow of the pelvis, ribs, sternum and leg bones.

Exercise 4. Read the text and complete it with these words:
pectoral appendicular calcified chitin endoskeleton fore exoskeleton axial Then listen and check.

The human skeleton is an 1_____, which means that it is inside the body. All vertebrates have the same arrangement of endoskeleton, with the bones inside and the muscles and other body tissues surrounding it. Some invertebrates also have an endoskeleton, such as squid and octopus, but many have an 2_____ where the hard part is on the outside. For example, insects have a jointed exoskeleton made of 3_____ , and many mollusks, like clams, have a hard 4_____ shell. Exoskeletons have an advantage in that they can protect the whole of the body, but they also limit the size to which the organism can grow. The human body is held upright by a skeleton which is made of bones. The skeleton can be divided into two parts: the 5_____ skeleton, which is the skull and vertebral column with the ribcage, and the 6_____ skeleton, which includes all the other bones, the 7 _____ and hind limbs, and the pelvic and 8_____girdles.

Exercise 5. Read the text. Work with a partner. Make incorrect sentences about the text. Give them to a partner to correct.

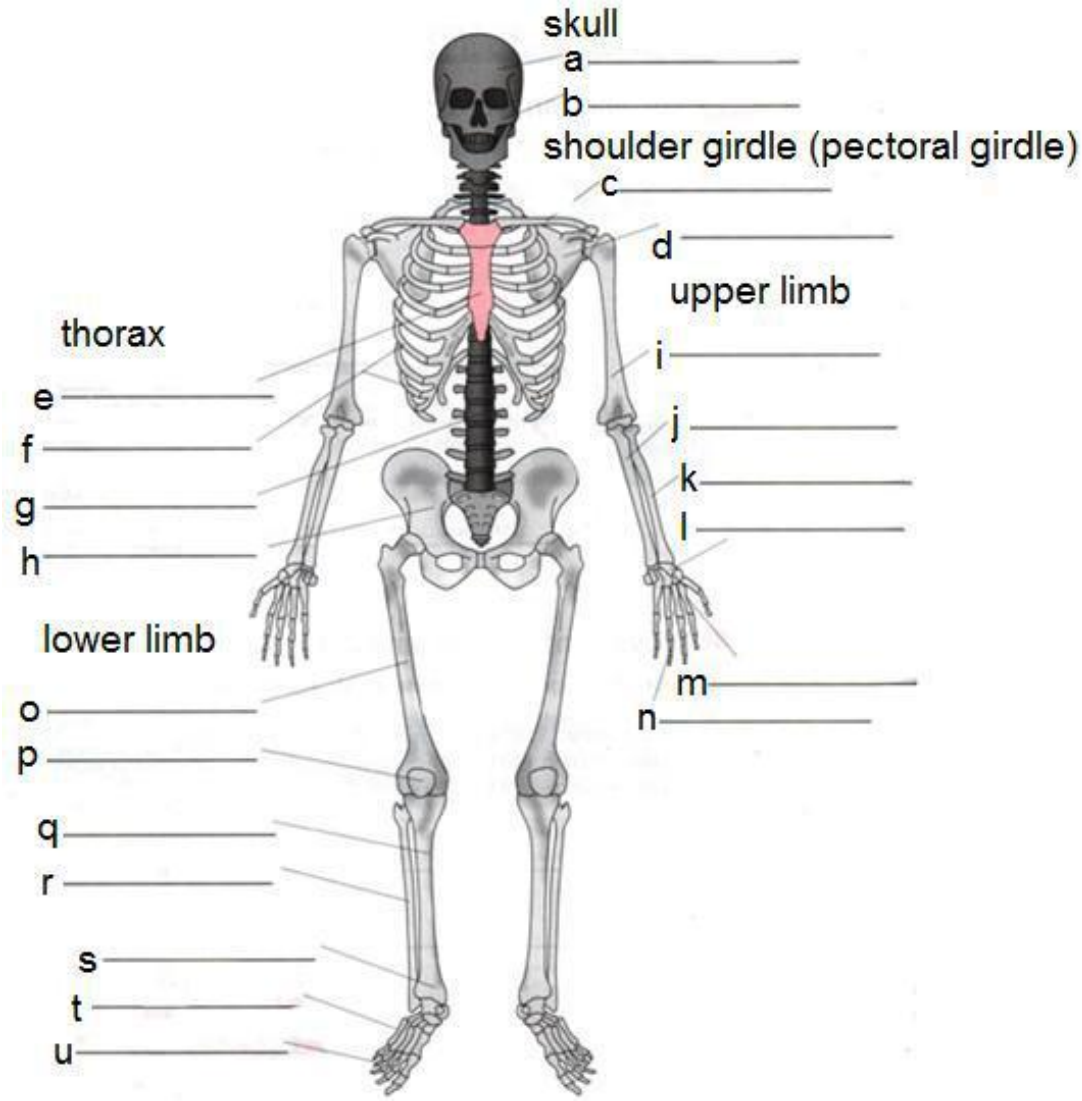
The 206 bones that form the internal scaffolding and girders of the human body come in a variety of shapes and sizes. They are generally classified on the basis of their shape – long, short, flat, or irregular. Bones usually contain some degree of both compact and spongy bone; the exact proportion depends on the shape and size of the bone.

Compact bone is very dense bone with only a few internal spaces. Compact bone is what you see when you look at the outside of any bone. For instance, compact bone forms most of the shaft of long bones, such as those of the arms and legs. Compact bone is covered by a glovelike *periosteum*, the membrane covering that nourishes bone. The periosteum contains blood vessels and nerves as well as cells involved in bone growth and repair. When a bone is bruised or fractured, most of the pain results from injury to the periosteum.

Spongy bone is formed from a latticework of thin layers of bone with open areas between. These layers form internal struts that brace the bone from within. Spongy bone is largely found in small, flat bones, such as most of the bones of the skull, and in both the head (enlarged end) and near the ends of the shaft of long bones. In adults, the small spaces of some spongy bones (including the ribs, pelvis, backbone, skull, and long-bone ends) are filled with *red marrow*, where blood cells form. The cavity in the shaft of adult long bones is filled with *yellow marrow*, a fatty tissue for energy storage.

Exercise 6 [1]. Label the diagram with these words and phrases:

carpals clavicle cranium face femur fibula humerus metacarpals metatarsals patella pelvis phalanges (x2) radius ribs scapula sternum tarsals tibia ulna vertebral column



Exercise 7. Read the text. Formulate the main idea of the text.

Bone is a living tissue

Compact bone is highly organized living tissue. The structural unit of compact bone is microscopic and is called an *osteon*. Each osteon consists of mature bone cells, called *osteocytes* (*osteo*, bone; *cyte*, cell), which are arranged in concentric rings around a central canal. Each osteocyte lies within a tiny cavity (lacuna) in the hardened matrix. Tiny canals connect with nearby lacunae and eventually with the central canal. In this way, oxygen and nutrients can pass from the blood vessels of the central canal to the osteocytes, and wastes can be carried away.

Bone is, indeed, a living tissue, but its characteristics come from its nonliving component – the matrix. Secreted by the bone cells, the matrix makes bone both hard

and resilient. Bone's hardness and rigidity come from mineral salts, primarily calcium and phosphorus. Woven throughout the matrix are strands of the strong elastic protein collagen. Without the calcium and phosphorus salts, bone would be rubbery and flexible like a garden hose. Without collagen, bone would be brittle and would crumble like chalk. Sometimes bones do bend, causing bowlegs, in disorders such as rickets, in which the amount of calcium salts in the bones is greatly reduced.

Stop and think

Strontium-90 is a radioactive material that enters the atmosphere after atomic explosions. This material can end up in human bodies via milk from cows that grazed on contaminated grass. Strontium-90 can replace calcium in bone and then kill nearby cells or alter their genetic information. Explain why exposure to strontium-90 can lead not just to bone cancer but also to disruption of blood cell formation.

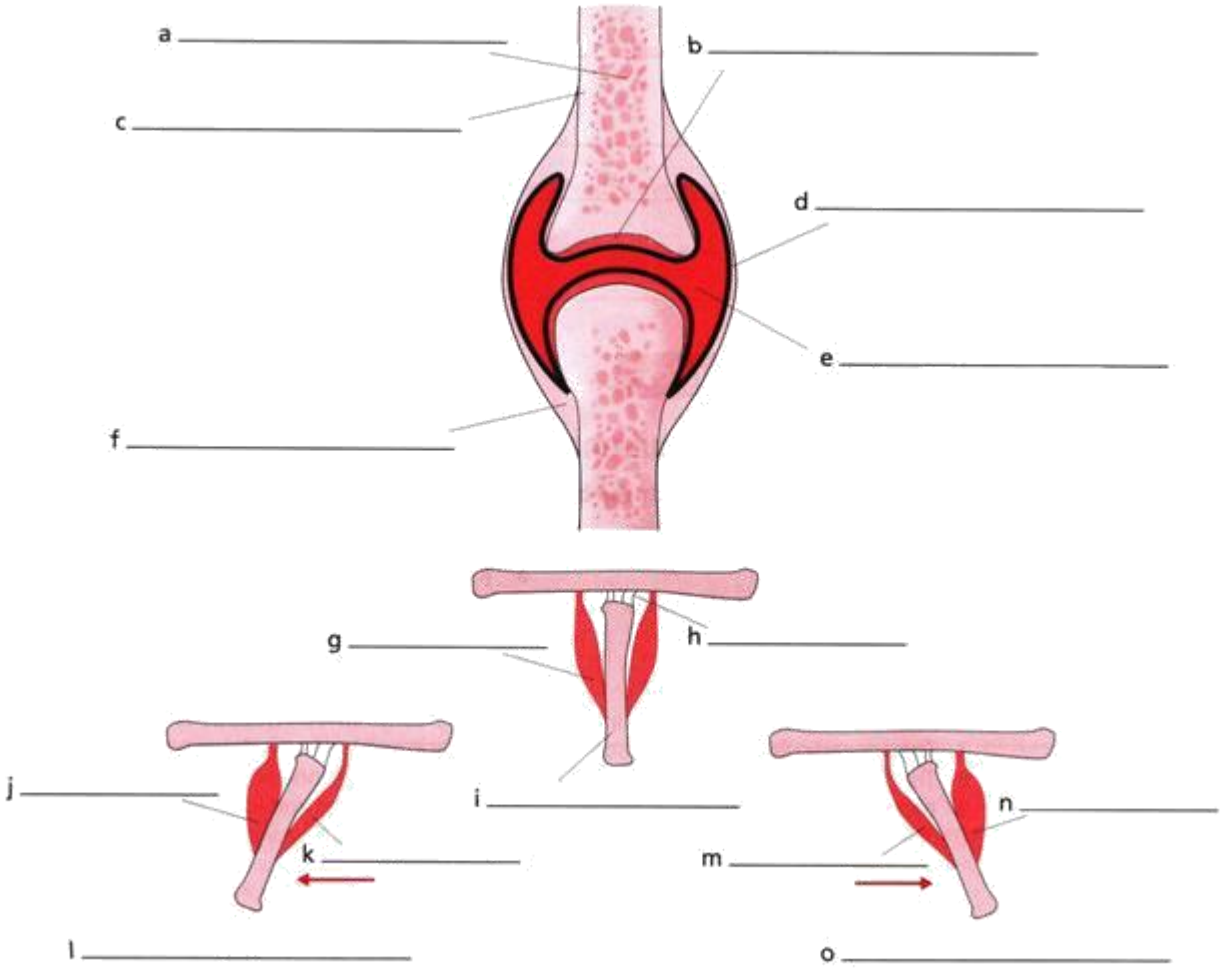
Exercise 8 [1]. Read the text and label the diagrams with the words or phrases.

1) *articular cartilage - functions as a shock absorber* 2) *bone moved to the left* 3) *bone moved to the right* 4) *compact bone* 5) *contracted muscle (x2)* 6) *muscle at rest* 7) *relaxed muscle (x2)*	8) *ligament (x2)* 9) *spongy bone* 10) *synovial fluid - lubricates joint reducing friction during movement* 11) *synovial membrane* 12) *bone*

Synovial joints permit flexibility

Most of the joints of the body are freely movable, *synovial joints*. Because of these joints, muscles can maneuver the body into thousands of positions. All synovial joints share certain common features. The surfaces of the joints that move past one another have a thin layer of hyaline cartilage. The cartilage reduces friction, allowing the bones to slide over one another without grating and grinding. Synovial joints are surrounded by a two-layered capsule. The inner layer of the capsule secretes viscous, clear fluid (synovial fluid) into the space between the two bones, called the synovial cavity. The synovial fluid lubricates and cushions the joint. The outer layer of the capsule is continuous with the covering membranes of the bones forming the joint. The entire synovial joint is reinforced with ligaments. *Ligaments* are strong straps of connective tissue that hold the bones together, support the joint, and direct the movement of the bones.

Although all synovial joints share these features, there are different types of synovial joints, each permitting a different type and range of motion. *Hinge joints*, such as the knee and elbow, are so named because, like a hinge on a door, they permit motion in only one plane. A *ball-and-socket joint* allows movement in all planes. The shoulder and hip are examples of ball-and-socket joints; the ball at the head of one bone fits into a socket on another bone. Notice that you can swing your arm around in a complete circle.



Exercise 9 [1]. Read the text and label the diagrams with these words or phrases:

arm bends or flexes arm extends biceps muscle (contracts)(flexor muscle) biceps muscle(relaxes) extending the arm flexing the arm radius radius(pulled) tendons, attach muscle to bone triceps muscle(contracts)(extensor muscle) triceps muscle(relaxes) ulna ulna(pulled)

Movement in the arms

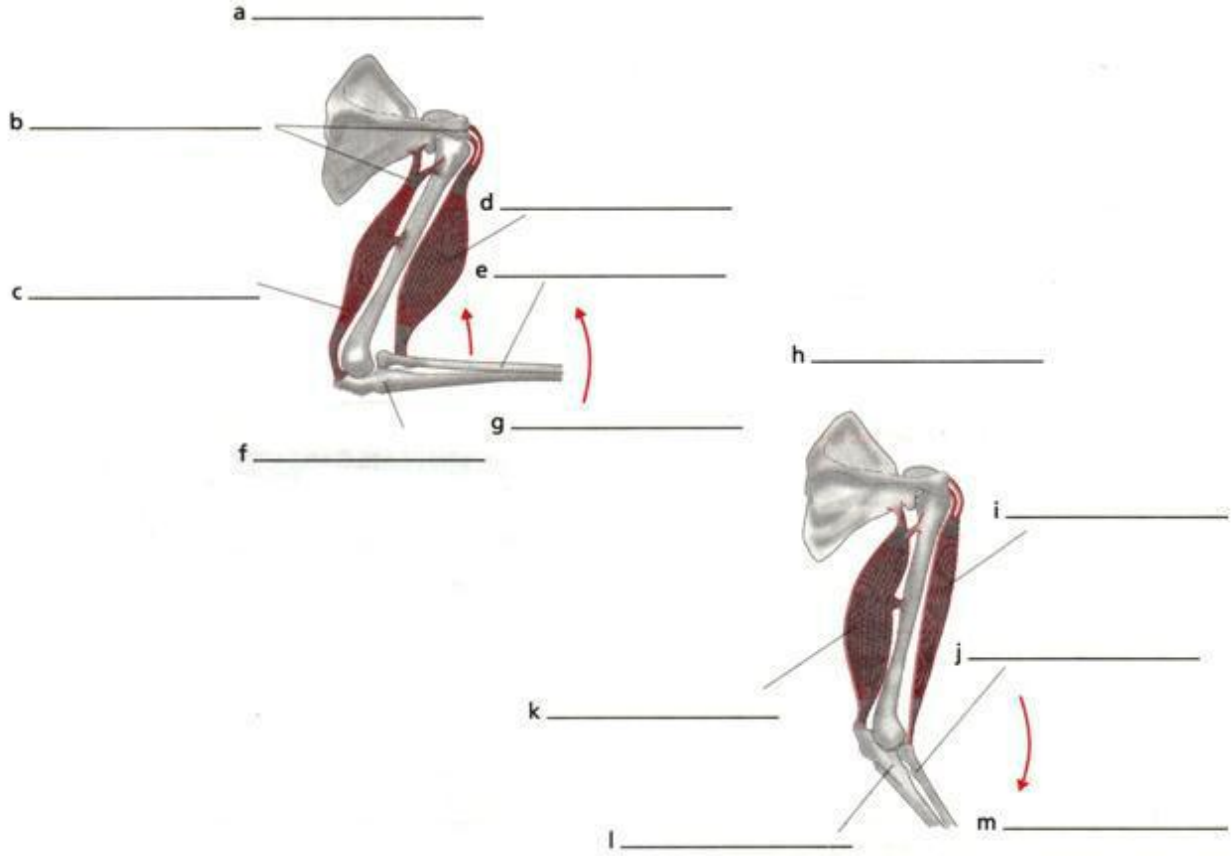
The muscles of the arm move the bones of the arm to flex or extend the arm in the same way. The bones are attached to each other by ligaments and attached to muscles by tendons. They have special names (triceps and biceps) and contract or relax to move the bones. All the bones of the body need muscles to help them move. Imagine the coordination of contraction and relaxation of muscles needed to cup the fingers around a bottle, then move the bottle to the lips to take a drink of water.

Movement is brought about the contraction and relaxation of antagonistic muscles.

Antagonistic muscles are pairs of muscles that always work together: when one is contracting the other is relaxing. They move many bones of the human skeleton. In the joint of the upper arm, the triceps and biceps are antagonistic muscles. They are

attached to the bones by tendons which are non-elastic. A muscle shortens when it contracts and lengthens when it relaxes. Movement of the bone is brought about when the muscles pull on the bones.

When the biceps muscle contracts (and triceps relax), it pulls the bones of the lower arm upwards so the arm bends or flexes. The biceps is called a flexor muscle. When the triceps muscle contracts (and biceps relax), it pulls the bones of the lower arm so that the arm straightens or extends. The triceps is called an extensor muscle.



Exercise 10. Read the text and give a short summary of it.

Damage to joints

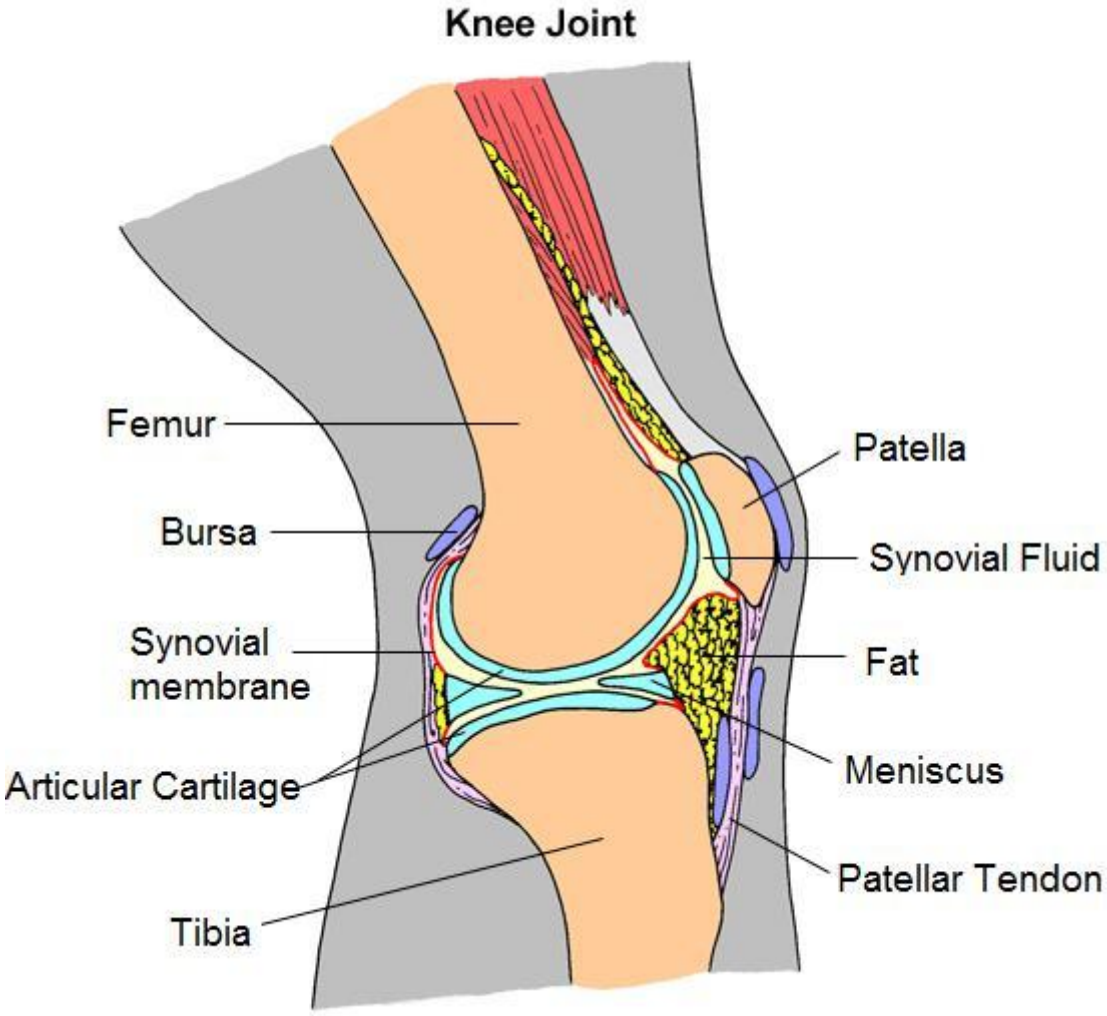
Damage to a ligament is called a *sprain*. Stretching a ligament may cause slight sprains, but a torn ligament results in swelling and enough pain to inhibit movement. Like tendons, ligaments have few blood vessels and heal slowly. They are covered with a concentration of pain receptors that are very sensitive to stretching and swelling. Thus, the injury may not be as severe as the pain would suggest. As with most musculoskeletal swelling, first treatment may involve reducing the swelling with ice.

A common knee injury among athletes, such as gymnasts and those in sports such football or soccer, is a tear in the *anterior cruciate ligament* (ACL). Why is this ligament so vulnerable? When the knee is bent, the ACL acts as a restraining wire that restricts front-shinbone (tibia). The ACL is stretched when there is an external

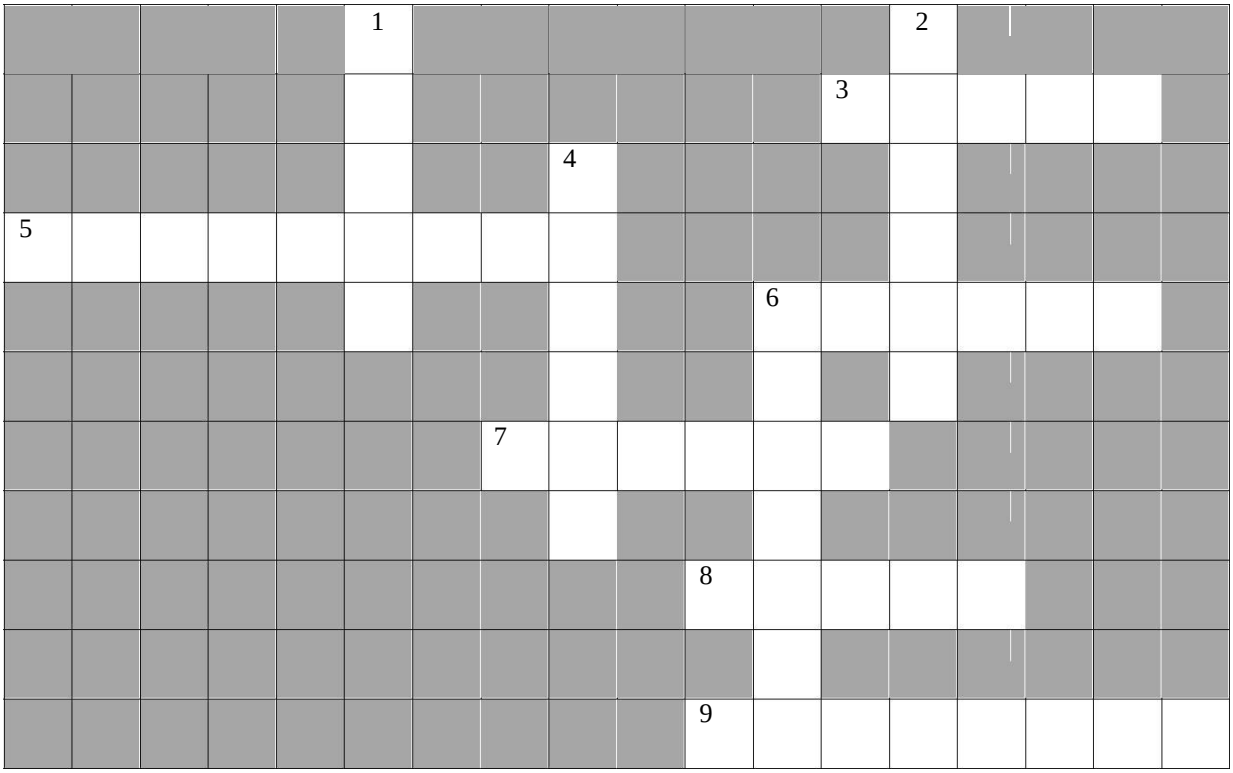
blow to the bent knee, as might occur during a tackle or when muscular force is applied to the knee by the athlete as might occur during landings in a tumbling run. If the force applied to the two bones is greater than the strength of the ligament, the ACL can tear.

In regions of the body where movements might cause friction between moving parts, such as might occur around synovial joints, the body has its own 'ball bearings' – fluid-filled sacs called *bursae* (sing.,*bursa* meaning pouch or purse). Bursae surround and cushion certain joints. They resemble synovial sacs in that they are lined with synovial membranes. However, bursae are found in places where skin rubs over bone as the joint moves and between tendons and bones, muscles and bones, and ligament and bones.

Repeated pressure on a bursa or injury to a nearby joint can cause the bursa to become inflamed and swell with excess fluid, a condition called bursitis (*itis* refers to an inflammation). Bursitis is characterized by intense pain that becomes worse when the joint is moved and cannot be relieved by resting in any position. Nonetheless, bursitis is not serious and usually subsides on its own within a week or two. In severe cases, a physician may drain some of the excess fluid to remove the pressure.



Exercise 11. Read the clues and complete the crossword.



ACROSS

3) the bone in the top part of the leg, above the knee;

5) a type of very strong tissue that is found, for example, at the end of bones and between the vertebrae;

6) light, soft, and full of small holes;

7) the muscle between the shoulder and elbow at the front of the arm;

8) a part of the body that can bend where two bones meet;

9) the type of muscle that you have in your arms or legs, made of long fibres.

DOWN

1) the bones of the head;

2) a band of strong tissue that connects a muscle to a bone;

4) the large circular bones that support the lower part of the back. They are connected to the bones of the legs.

6) to hold something such as a structure in place so that it does not move in the wrong way.

UNIT 4

ENERGY SOURCES AND POLLUTION

Practice the pronunciation of the words:

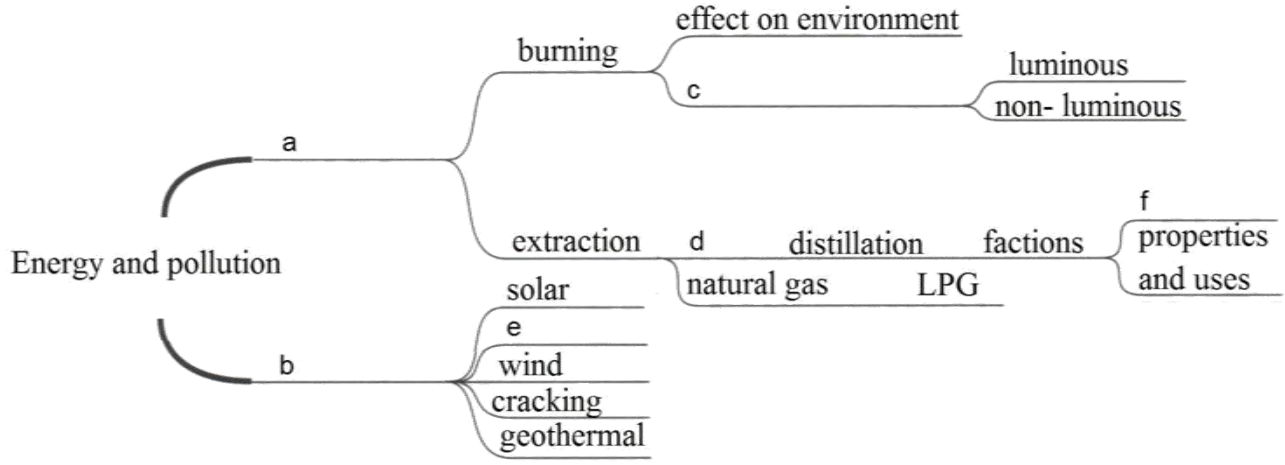
abundant supply [ə´bʌndənt sə´plaɪ]
aviation fuel [ˌeɪvɪ´eɪʃ(ə)n´fjuəl]
bioaccumulation[ˌbaɪəuəˌkju:mju´leɪʃ(ə)n]
catalyst [´kætəˌlɪst]
cylinder [´sɪlɪndə]
digester [daɪ´ʤestə]
enhanced [ɪn´hɑ:nst]
exhaust fumes [ɪg´zɔ:st´fju:mz]
extraction [ɪk´strækʃ(ə)n]
ferment [fə´ment]
finite [´faɪnaɪt]
geothermal energy
[ˌʤɪ:əuˌθə:m(ə)l´enəʤɪ]
halogen lamp [´hæləʤen læmp]
hydropower [ˌhaɪdrəu´pauə]
lubricate [´lu:brɪˌkeɪt]
ozone depletion [´əuzəun dɪ´pli:ʃ(ə)n]
pesticide [´pestɪˌsaɪd]
polystyrene [ˌpɔlɪs´taɪri:n]
toxicity [tɔk´sɪsətɪ]
ultraviolet radiation [ˌʌltrə´vaɪələt
ˌreɪdɪ´eɪʃ(ə)n]

Exercise 1 [1]. Read the text and place the words and phrases from the box in the correct place on the word map.

Ninety percent of the energy we use is obtained from the *fossil fuels* coal, oil and gas. There are only limited amounts of these. We say they are *finite* and *non-renewable*. This means that they cannot be replaced when they have been used. Not only is our main source of energy depleting, but we also damage the environment when we burn these fossil fuels. We need to find *alternative sources* of energy that are abundant, cheap to access, long lasting and environmentally friendly. Energy obtained in this way is called renewable energy because using it does not deplete the source from which it came. *Renewable sources* of energy include solar energy, water, wind, wave, geothermal energy and biomass.

Energy sources and pollution word map

alternative energy sources *biomass* *crude oil* *flames* *fossil fuels* *hydropower*



Exercise 2. Fill in the gaps in the sentences with these words:

biomass cylinders decay digester ethanol ferment fertilizer methane petrol wood

Energy from plants and animals

1. _____ energy comes from plant material and animal excreta.
2. Plant material, such as _____, has been burnt for thousands of years to obtain heat directly.
3. However, we know also _____ plant material to obtain alcohol which can be used to power vehicles.
4. In most cases the _____ that is made is mixed with petrol to form a mixture called gasohol.
5. This is used as an alternative to _____.
6. Biogas is a gas produced from the anaerobic ____ of organic matter, vegetable refuse or animal excreta.
7. Biogas mainly contains the hydrocarbon gas _____ or natural gas.
8. Like natural gas, biogas can be used directly or stored in _____ for later use.
9. After the biogas is formed the remains are removed from the tank, called the _____.
10. This is used as a _____ because it is rich in nitrogen, phosphorus and potassium, which are essential for proper plant growth.

Exercise 3. Underline the correct word in each sentence.

Energy from the ground

1. Heat (*runs/swims/flows*) outwards from the Earth's core.
2. It (*makes/turns/ forces*) rock deep below the Earth's surface hot.
3. This heat energy is called geothermal energy and can be (*collected/harnessed/burnt*) and used directly.
4. In colder countries pipes are (*hidden/used/buried*) about 15m underground, where the temperature is almost (*constant/continuous/irregular*).

5. Liquid circulating through the pipes becomes (*colder/warmer/boiling*).

6. It can be (*made/used/stored*) to heat the buildings above.

7. Below the surface of the Earth water can be (*established/found/lost*) at temperatures as high as 400^{O}C.

8. This hot water is usually (*flown/shipped/brought*) to the surface as steam, which is used to power turbines in order to (*deliver/generate/burn*) electricity. Hot springs are a result of geothermal energy.

Exercise 4. Read the paragraph and explain the words in bold. Then choose any three and make sentences.

Energy from the sun

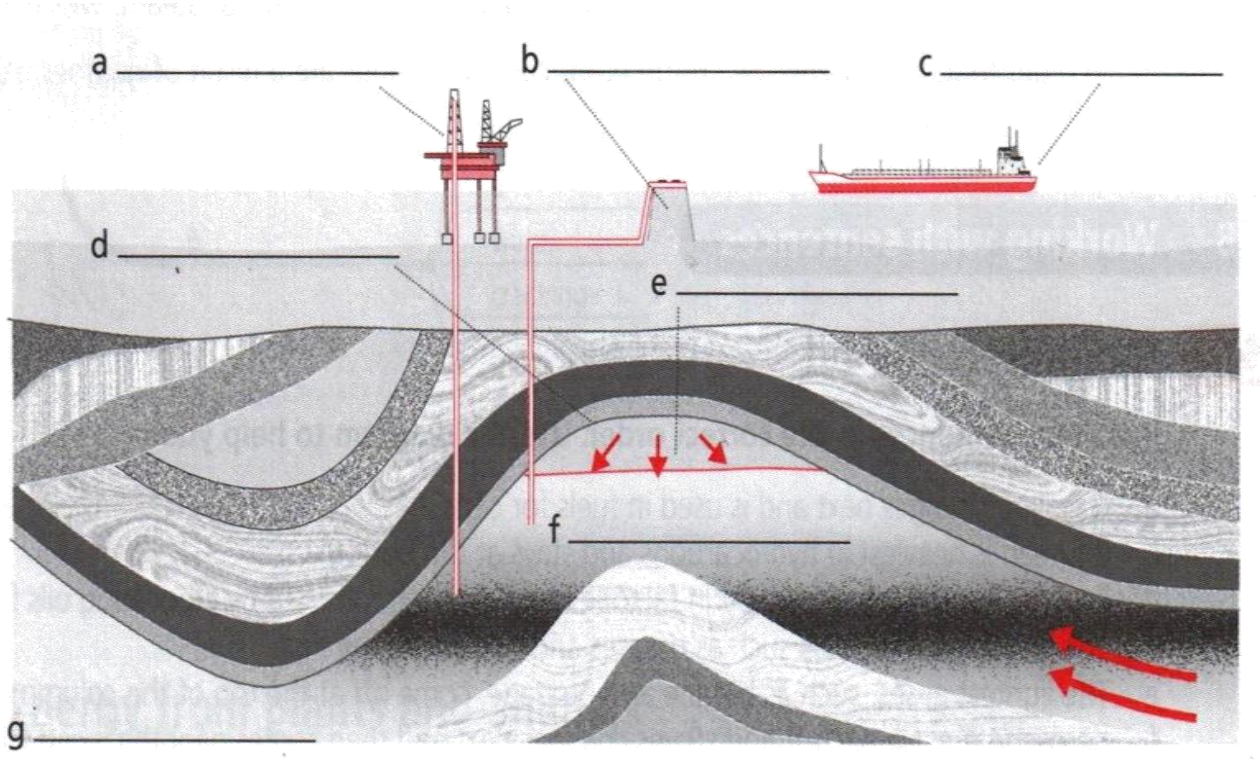
Solar energy is the most readily and easily **available** source of energy in some parts of the world. The radiation of the Sun can be captured and converted **directly** into electricity or heat. Solar cells are made of silicon and used to **capture** the light and turn it to energy. Only 10% of the Sun's energy is **converted** into electricity, so solar cells are best used where small amounts of energy are needed. **Solar panels**, however, **absorb** heat from the Sun. They can be used for cooking and heating water. Solar water heaters are **insulated** with glass and the inside panel and water pipes are coated black to absorb as much heat energy as possible. The outsides of the pipes are black and the insides shiny to **reflect** the energy inside. Convection currents **heat up** the water. Another way of **harnessing** solar energy **depends on** the fact that large amounts are absorbed as heat energy by the oceans and seas.

Is solar energy one of the most efficient sources of energy?

Exercise 5 [1]. Read the text and label the diagram.

The extraction of crude oil and natural gas

Crude oil needs to be extracted from deep below the ground by drilling wells and using an oil rig to pump it to the surface. The oil is not located everywhere under the Earth's surface. Usually geologists find it by using explosives underground where they suspect that oil may be present. This illustration shows an oil rig at sea. Geologists use measurements of reflected sound waves from explosions to help them discover whether oil is present or not. Then they do a test drill breaking through a cap of solid rock. The layer above the oil is a layer of soft rock (chalk or sandstone) and oil. The layer below is porous rock containing salt water. If oil is located, it is pumped to the surface. An oil storage buoy is placed above the location of the drill. If there is a lot of natural gas trapped in a pocket along with the crude oil, a 'gusher-type' well develops where the oil gushes to the surface requiring very little pumping. Natural gas is commonly used in houses all over the world. Oil tankers are used to transport the oil.



Exercise 6. Read and translate the text.

Noise pollution

It is difficult to escape the din of modern life – noise from airports, city streets, loud appliances, stereos. Noise pollution threatens your hearing and your health. Exposure to excessive noise is to blame for the hearing loss of one-third of all hearing-impaired people.

Loud noise damages the hairs on the hair cells of the inner ear. When the hairs are exposed to too much noise, they become worn down, loose ability to move, and can become fused together. Unfortunately, there is no way to undo the damage, you cannot get spare parts for your ears.

The loudness of noise is measured in decibels (dB). The decibel scale is logarithmic. An increase of 10dB generally makes a given sound twice as loud. The decibel ratings and effects of some familiar sounds are given in the table below the text. Most people judge sounds over 60dB to be intrusive, over 80dB to be annoying, and over 100dB to be extremely bothersome. The federal Occupational Safety and Health Administration (OSHA) has set 85dB as the sound safety limit for 8 hours of exposure. The threshold for physical pain is 140dB.

The louder a sound, the shorter the exposure time necessary to damage the ear. Even a single, explosively loud sound is capable of damaging hair cells. More commonly, however, hearing loss results from prolonged exposure to volumes over 55dB. Hearing can be damaged by exposure to noise loud enough to make it difficult to converse with someone. Some damage probably occurred if sounds seem muffled after you leave the noisy area. Your ears can endure sound at 90dB for about 8 hours. For every 5dB above that, it takes half as long for damage to begin. Thus, sound at

95dB will damage your ears in only 4 hours. At 11dB, the average rock concert or stereo headset at full blast can damage your ears in as little as 30 minutes.

Hearing loss is expected in the elderly, but a surprising number of young people also have impaired hearing. The culprit is most likely noise – probably in the form of music.

If you have ever walked away from a noisy area, such as a concert or a construction site, and your ears were ringing or everything sounded as if you were under water, you have experienced what is called a temporary threshold shift. It is a sign that some of the hair cells in the inner ear were damaged.

Noise has some other harmful effects. The stress responses to daytime noise can carry over into the night, causing sleep disturbances that can make you groggy, tense, and forgetful the next day. Noise triggers stress responses that may increase heart rate and blood pressure. Even common kitchen appliances such as blenders or mixers produce sound levels that cause pupils to dilate, the mouth to become dry, muscles to tense, and the digestive system to slow down. People become irritable when exposed to noise for prolonged periods, and their irritability may aggravate tension within a family. Many arguments have flared up when a person who has spent the day in a noisy workplace comes home to find the television or stereo blaring or children crying instead of the peace and quiet that was craved.

How can you protect yourself from bad vibes? Don't listen to loud music. Keep the tunes low enough that you can still hear other sounds. No one else should be able to hear the music you are listening to with earphones. When you cannot avoid loud noise, as when you are mowing the lawn, vacuuming, or attending a rock concert, wear earplugs to protect your hearing. You can find earplugs at most drugstores, sporting goods stores, and music stores.

Effects of noise pollution

Sound source	Loudness (dB)	Effect from prolonged exposure
Jet plane at takeoff	150	Eardrum rupture
Deck of aircraft carrier	140	Very painful, traumatic injury
Rock-and-roll band (at maximum volume)	130	Irreversible damage
Jet plane at 152m (500ft)	110	Loss of hearing
Subway, lawn mower	100	
Electric blender	90	Annoying
Washing machine, freight train at 15m (50ft)	80	

Traffic noise	70	Intrusive
Normal conversation	65	
Chirping bird	60	
Quiet neighborhood (daytime)	50	
Soft background music	40	Quiet
Library	30	
Whisper	20	Very quiet
Breathing, rustling leaves	10	
	0	Threshold of hearing

Answer the questions on the text.

1. What is one of the culprits responsible for impaired hearing?
2. What does loud noise effect?
3. Are there any ways to treat damaged hair cells in the inner ear?
4. What loudness of sound can human ears endure?
5. What is the threshold for physical pain?
6. The decibel scale is logarithmic, isn't it?
7. When do people experience a temporary threshold shift?
8. Are there any other harmful effects of noise?
9. Do people become irritable when using common kitchen appliances?
10. What would you advise young people to protect hearing?

Give Russian equivalents of: the din of modern life, excessive noise, become worn down, to undo the damage, to get spare parts, a decibel rating, the sound safety limit, prolonged exposure, impaired hearing, a temporary threshold shift, groggy, to flare up an argument, to crave, bad vibes.

Group the derivatives: pollution, response, noise, effect, protect, threaten, loud, pollutant, protection, effective, noisy, responsive, threat, loudness, protective, pollute, noisily, effectiveness, respondent, threatening, loudly, polluter, respond, ineffectively, protectiveness, aloud, unresponsive, threateningly, noiseless.

Exercise 7. Read the text and answer the questions.

1. What is photochemical smog? What effect does it cause on the respiratory system?
2. How does UV radiation affect terrestrial forms of life?
3. Is ozone a dense gas?
4. What causes the destruction of the ozone layer?
5. What happens in the stratosphere when CFCs reach it?
6. Is usage of substitutes for CFCs paying off?
7. Do scientists predict that the ozone hole will shrink in 50 years?

Human activities cause pollution
The destruction of the ozone layer

Ozone, composed of three atoms of oxygen (O_3), can be a good thing or a bad thing. If ozone is close to the earth, say anywhere in the first few miles above the surface, it is generally a bad thing. In fact, ozone is the primary component of photochemical smog, the noxious gas produced largely by sunlight interacting with air pollutants. Ozone irritates the eyes, skin, lungs, nose, and throat. Ozone can also damage forests and crops and dissolve rubber.

However, naturally produced ozone is an essential part of the stratosphere, a layer of the lower atmosphere that encircles the earth about 10 to 45 kilometers above its surface. Without this layer of ozone, most terrestrial forms of life could not exist on the earth. The ozone layer acts as a shield against ultraviolet (UV) radiation from the sun. Ultraviolet radiation causes cataracts, aging of the skin, sunburn, and snow blindness, and it is the primary cause of skin cancer. In addition, UV radiation inhibits the immune system and can interfere with plant growth.

The ozone in the atmosphere reaches levels of only about 1 molecule in 100,000. If all the ozone were compressed into one layer, its depth would be equal to only the diameter of a pencil lead. Still, ozone is able to shield the earth from excessive UV radiation.

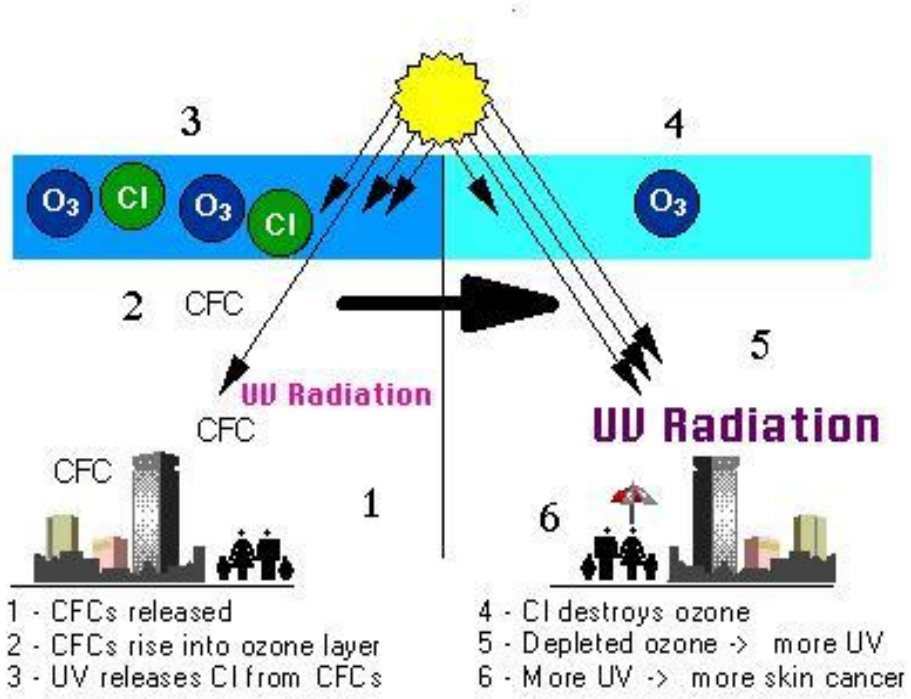
In 1985, British scientists reported a sharp drop in the concentration of ozone over the Antarctic. This ‘hole’ appears on a yearly cycle - at the beginning of the Antarctic spring (early September through mid-October).

Chlorofluorocarbons (CFCs) – once important in cooling systems, as an aerosol propellant and as solvents in the electronic industry – are the primary culprit responsible for the destruction of the ozone layer. The CFCs drift up to the stratosphere, where UV radiation causes them to break down to chlorine, fluorine, and carbon. Then, under the conditions found in the stratosphere, chlorine can react with ozone, converting it to oxygen. Because chlorine is not altered in this reaction, a single chlorine molecule can destroy thousands of ozone molecules.

A number of laws are now in place to prevent the production or release of CFCs. In 1990 and 1992, industrialized countries signed agreements to reduce the production of CFCs. These countries have now phased out CFC production. Substitutes for CFCs have been found for aerosol cans, refrigerators, and air conditioners. There is evidence that the reduction in CFC production is paying off. In 1996, two years after CFC use peaked, chlorine levels in the lower atmosphere were

slightly lower than before. By 1999, chlorine levels in the stratosphere were reduced. The ozone hole did shrink during 2001 and 2002, causing some scientists to suggest that the ozone hole may be eliminated by 2050 if international goals are met. However, it is still too soon to determine whether their prediction will be correct, because the ozone hole expanded nearly to its record size in 2003. In September of 2003, the ozone hole was 10.8 million square miles - an area three times the size of the United States, excluding Alaska.

Give English equivalents of: ядовитый газ, загрязнители воздуха, причинять вред посевам, растворять каучук, составляющая часть, наземные формы жизни, подавлять иммунную систему, вредить росту растений, заслонять, чрезмерное УФ излучение, аэрозольные пропелленты, растворители, главный виновник, превращать, изменяться, заменитель, окупаться, устранять, достижение целей.



Exercise 8. Read the text and ask different types of questions on it.

Human activities deplete the earth's resources

An intact ecosystem usually retains soil and remains fertile. However, overuse and misuse of land can destroy its fertility.

Soil erosion

As the population grows, land is cultivated, grazed, and stripped of vegetation faster than it can cover. Wind and rain then carry away the topsoil, and the productivity of farmland declines. In this way, overfarming and overgrazing transform marginal farmlands to deserts, a process called *desertification.*

Deforestation

You often do not know what you have until it is gone. This may be true for forests. Some of us live in areas where trees are so common that we take them for granted. However, trees especially when they are grouped together to form forests, are an essential part of the global ecosystem. Forests play an important role in water, carbon, and nitrogen cycles. Tree roots also reduce erosion by holding soil in place. If trees are cut down, rainwater runs off the land, carrying away soil and causing floods. In addition, trees are part of local ecosystems that include an incredible variety of life. They also influence local and global climate, including temperature and rainfall. And, in hot weather, their shade is pleasant.

Why, then, are forests disappearing? The cause is simple: the human population is expanding. People need space in which to live. Wood is needed for homes and furniture. Livestock cannot graze in forests. So trees are cut. Most are not replanted.

Deforestation is the removal of trees from an area without replacement. Deforestation is taking place in many regions of the world.

Nonetheless, tropical forests are falling the fastest. Why? The first and most important reason that land is cleared is so that native families can feed themselves. A second reason is commercial logging. The third reason is cattle ranching. Cattle can graze on the land for about 6 to 10 years after trees have been cleared from a tropical forest before shrubs take over and make the area unsuitable for rangeland. Foreign companies own most of these cattle ranches, and the beef is often exported to fast-food restaurant chains.

Fill in the correct word(s) from the list below: incredible, pleasant, fast-food, commercial, marginal, unsuitable, expanding, global.

1. …….variety	5. …….restaurant chains
2. …….shade	6. …….area
3. ……climate	7. …….human population
4. ……logging	8. …….farmlands

Use the phrases to make sentences.

Exercise 9. Read the clues and complete the crossword.

ACROSS

1) the part of the Earth’s surface and atmosphere where living things can exist;

5) a substance that is added to soil in order to help plants to grow;

6) polluted air that forms a cloud close to the ground;

7) waste from people’s bodies that is removed from houses and other buildings by a system of large underground pipes;

9) able to decay naturally in a way that is not harmful to the environment.

DOWN

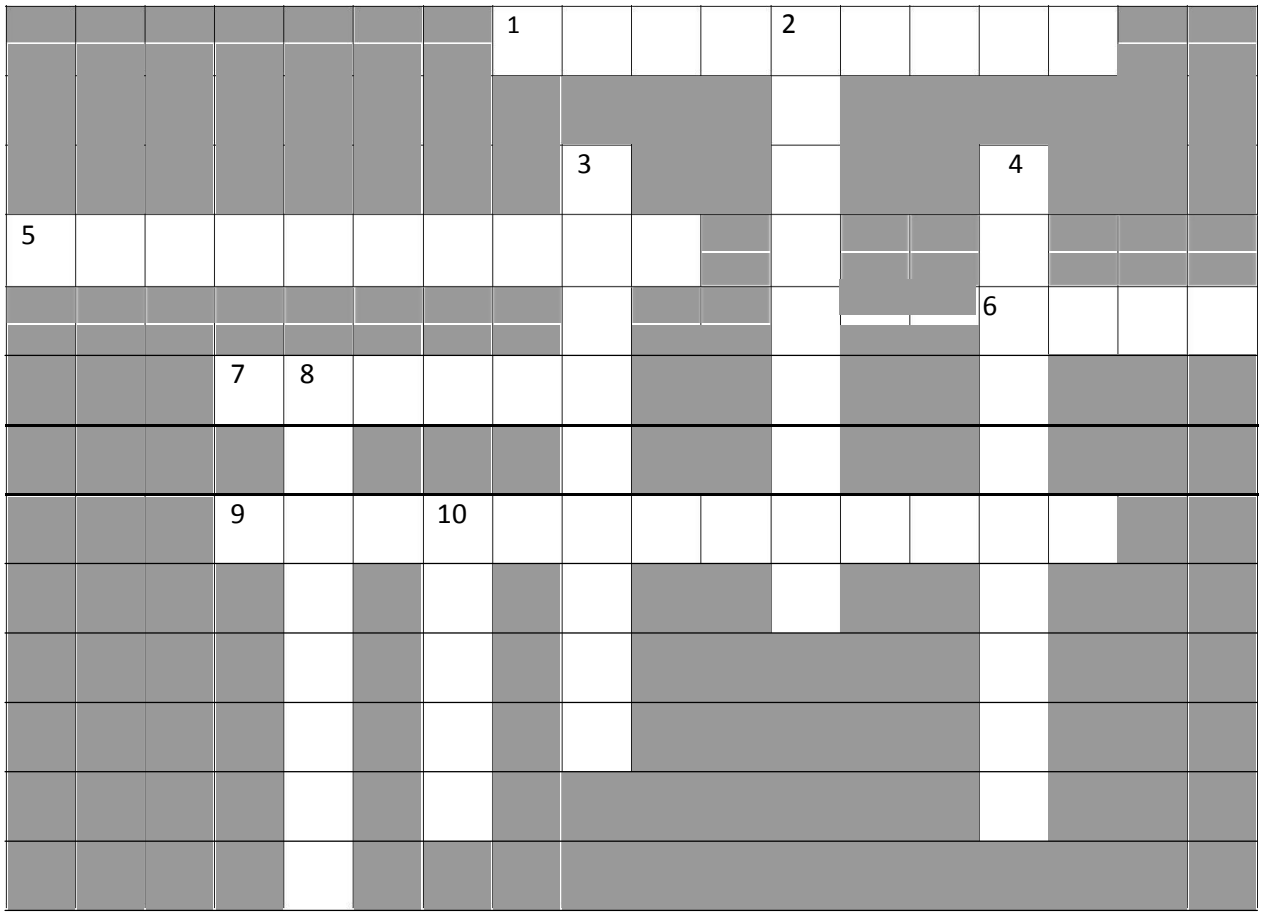
2) a chemical used for killing insects that damage crops;

3) a liquid or powder that is used for washing clothes or dishes;

4) a fuel such as coal, oil, or natural gas made from decayed material from organisms that lived many millions of years ago;

8) a substance, especially a gas, that is released into the air;

10) to be gradually broken down by bacteria or fungi.



UNIT 5

AQUATIC AND TERRESTRIAL ENVIRONMENTS

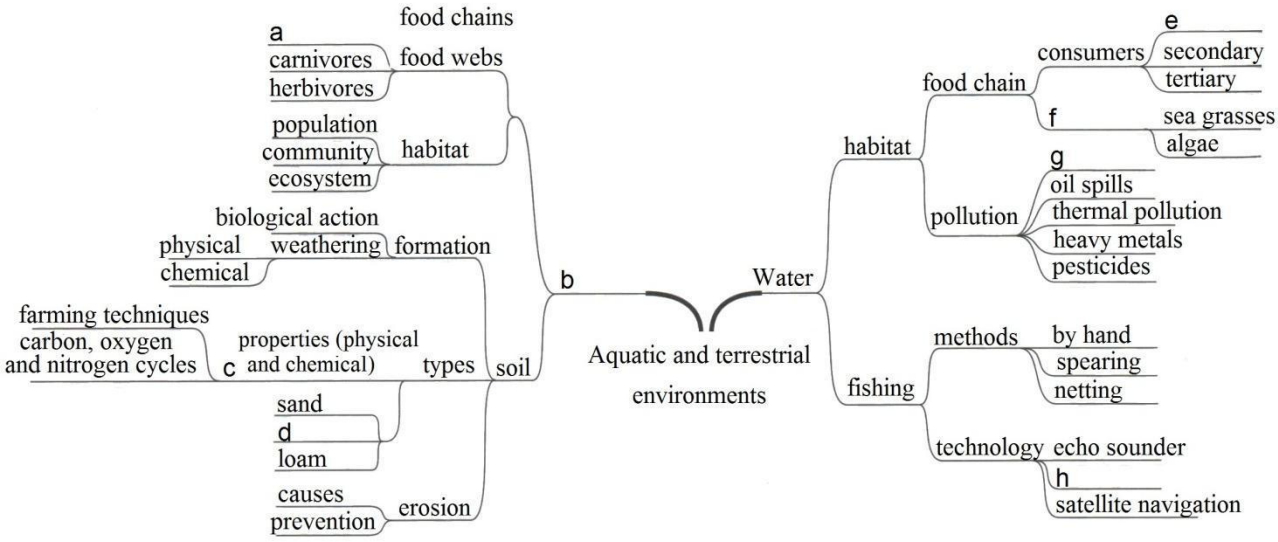
Practice the pronunciation of the words:

acidity [ə´sɪdɪtɪ]
algae [´ældʒi:]
alkali [´ælkə¸laɪ]
aquatic [ə´kwætɪk]
contour ploughing [´kɔntuə ´plauɪŋ]
denitrifying bacteria [dɪ´naɪtrɪfaɪɪŋ bæk´tɪərɪə]
depletion [dɪ´pli:ʃən]
drainage [´dreɪnɪdʒ]
eutrophication [¸ju:trəufɪ´keɪʃ(ə)n]
fossilization [¸fɔsɪlaɪ´zeɪʃ(ə)n]
herbivore [´hə:bɪ¸vɔ:]
humus [´hju:məs]
leaching [´lɪ:tʃɪŋ]
nitrate [´naɪ¸treɪt]
nitrite [´naɪ¸traɪt]
oxidation [¸ɔksɪ´deɪʃən]
phytoplankton [´faɪtəu¸plæktən]
sewage [´sju:ɪdʒ]
trawling [´trɔ:lɪŋ]
zooplankton [´zu:¸plæktən]

Exercise 1 [1]. Fill in these words and phrases on the word map.

clay eutrophication fertility omnivores primary producers radar terrestrial

Terrestrial and aquatic environments word map



Exercise 2. Match the beginnings and the endings of the sentences.

Terrestrial environment

Beginnings	Endings
1. The main components of soil are	a) all the animals and plants living in an

2. Soil formation results from

3. During a sedimentation test

4. Humus improves the crumb structure of

5. The three main types of soil are

6. Soil fertility depends on

7. Soil erosion is a process in which

8. Terracing, contour ploughing, reforestation, strip planting and use of organic fertilizers

9. Terrestrial food webs and food chains start with

10. Ecosystems contain
11. A community is
12. A population is
13. Oxygen, carbon and nitrogen

ecosystem.
b) all the members of a species in an ecosystem which are close enough to interbreed.
c) chemical and physical weathering of rocks, along with biological action.
d) cycle through the living and non-living parts of ecosystems.
e) humus (from decaying plant and animal material) and fragments of rocks.
f) many different habitats.
g) particle size, mineral content, organic matter and soil pH.
h) producers that are eaten by consumers.
i) sand, clay and loam.
j) soil, allowing for proper aeration and water retention without becoming waterlogged.
k) the particles of soil settle out according to particle size, with the larger and heavier particles settling out first (to the bottom of the container).
l) topsoil is removed either by wind or water.
m) will assist in soil conservation.

Exercise 3. Read the paragraph and select the correct word to complete the sentences.

Food chain

A *food cycle/energy chain/food chain* is the transfer of food and energy from one organism to the next within a habitat.

Plants are called *producers/contributors/consumers* because they make their own food.

Animals depend on plants for food whether directly or indirectly, so they are called *contributors/consumers/producers.*

Carnivores/omnivores/herbivores are animals that feed on plants only.

Eutrophication occurs when nutrients are added to water, causing *regal/global/algal* blooming and damaging the aquatic environment.

Pollution in aquatic environments can damage the organisms living there and those which live in surrounding *aquatic/polluted/terrestrial* environments.

Deep-sea commercial fishing uses a method called *trawling/traps/rod and line*.

Modern fishing techniques include the *hifi/echo/boom* sounder which uses sound to find fish.

Exercise 4. Read the text and complete it with these words:

carnivores consumers herbivores omnivores photosynthesise phytoplankton producers respiration seaweeds substrate

Getting food in the aquatic environment

Aquatic organisms need to eat food to obtain energy during 1_____, to move around, to repair cells and to carry out bodily functions. Aquatic plants, like terrestrial plants, 2_____ and make their own food using energy from sunlight. Therefore they are called 3_____.

Two main groups of aquatic plants are sea grasses and algae:

Sea grasses resemble land plants. However they are rooted or anchored in the 4_____ at the bottom of the water and are completely submerged in the water.

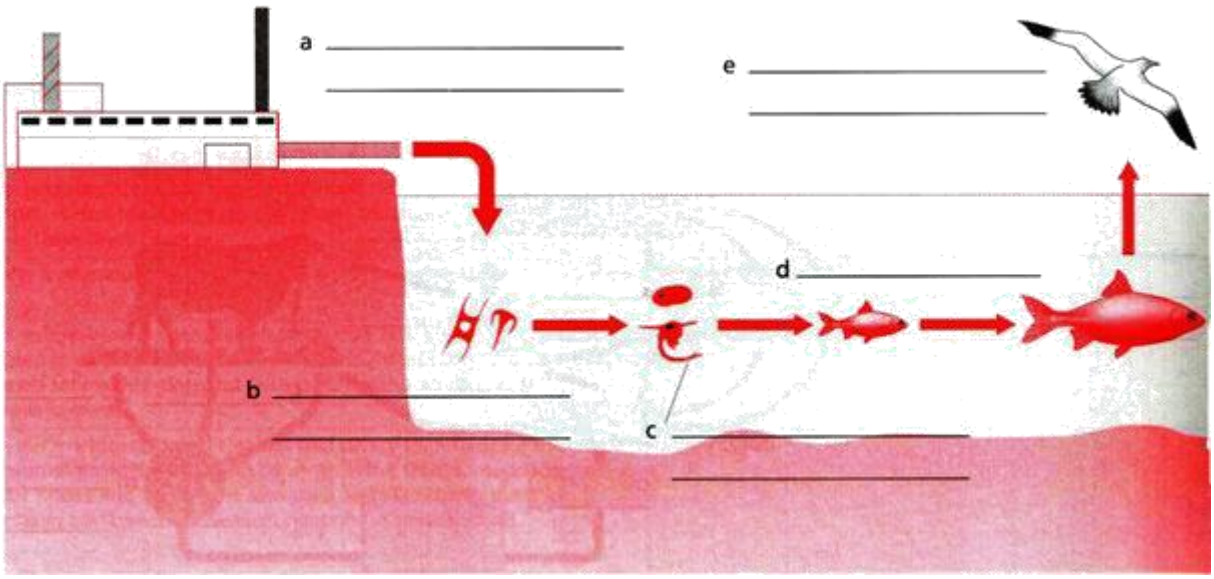
Algae are plants which do not have roots, leaves or stems, though they vary greatly in shape, structure and colour (red, green and brown). Some are microscopic and are called 5_____. They float in the water, mostly near the surface. Some algae are very large and are called 6_____.

Animals do not make their own food. Therefore they depend on plants for food, whether by directly eating the plant or by eating other organisms that feed on plants. Animals are therefore called 7 _____. Animals that eat only plants are called 8_____. Animals that only feed on other animals are called 9_____. Those that feed on both plants and animals are called 10_____.

Exercise 5 [1]. Look at the diagram and label it with these sentences.

Pollutants in the food chain

1. Pollutants are absorbed by the phytoplankton by diffusion and enter the food chain.
2. Primary consumers are eaten by secondary consumers who eat many of them and absorb a large concentration of pollutant.
3. Pollutants increase in each level of the food chain. This can be dangerous for animals at the end of the food chain e.g. sea birds and humans, as they can build up toxic levels of pollutant which are damaging or even fatal.
4. Factories release harmful pollutants into aquatic environments.
5. Small crustaceans (primary consumers) eat microscopic plants and store pollutants in their bodies.



Exercise 6. Read the text and explain the words in bold. Then choose any three and make sentences.

Chemicals cycle through ecosystems

Resources on the earth are limited. Life on the earth is demanding. Many of the earth's reserves would be quickly depleted if it were not for nature's cycling. Materials move through a series of transfers, from living to nonliving systems and back again. Let's look at some of the more important of these *biogeochemical cycles*, the recurring pathways of materials between living and nonliving systems.

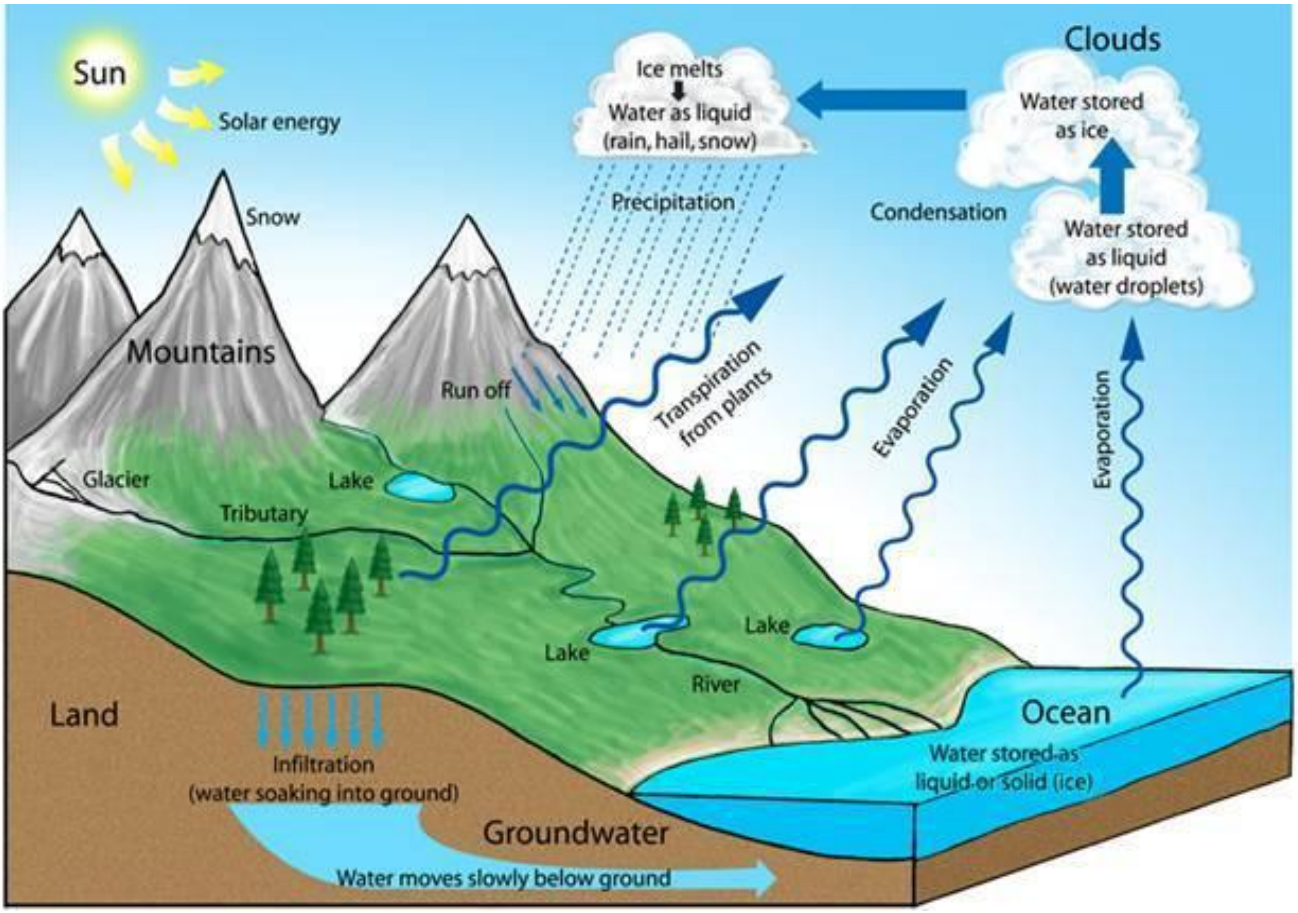
Water cycles between the atmosphere and land

Each drop of rain teaches us something about water recycling. In it water, in the form of rain, snow, sleet, or hail, continuously cycles from the atmosphere to the land, where it collects in ponds, lakes, or oceans and moves back into the atmosphere as it **evaporates**. Most of the rain or snow that falls to the earth returns to the sea at some point. This cycle provides us with a **renewable source** of drinking water. Because water is so **critical** to life, large amounts temporarily pause in the bodies of living things. In living cells, water helps regulate temperature and acts as **solvent** for many biological reactions. The very oxygen we breathe is produced from water through the reactions of photosynthesis. Water also cycles back to the environment from living things as plants return 99% of the water they **absorb** to the atmosphere in the process of transpiration (the evaporation of water from the leaves and stems of plants).

The steps of the water cycle have been mixed up. Look at the diagram and put these sentences in the correct order.

A __ B__ C __ D__ E __ F __

1. The clouds are blown by the wind until they reach higher ground.
2. Water vapour is released from the soil and from plants.
3. Water droplets fall back to Earth as rain, hail or snow.
4. As water vapour rises into the atmosphere, it cools and condenses into clouds.
5. After the rain has fallen on land, it either evaporates back into the air or is absorbed by soils and plants. Some of it runs into rivers and lakes and eventually reaches the sea.
6. Heat from the Sun causes water from seas, rivers and lakes to evaporate.



Complete this description of the water cycle with the linkers from the box. Some can go in more than one gap.

first of all	*next*	*then*	*finally*	*after that*

1 _____the sun heats the sea. 2 _____ the water in the sea evaporates and it goes into the air. 3 _____ the water vapour forms clouds. 4 _____ the clouds move over the land and they move above the mountains. In the cold air, the water vapour changes into rain. 5 _____ this rain falls to the ground and it goes into rivers. 6 _____the rivers carry the water to the sea and the cycle begins again.

GAME. Chain story. Continue the story as in the example. If you fail to continue the story, you are out of the game.

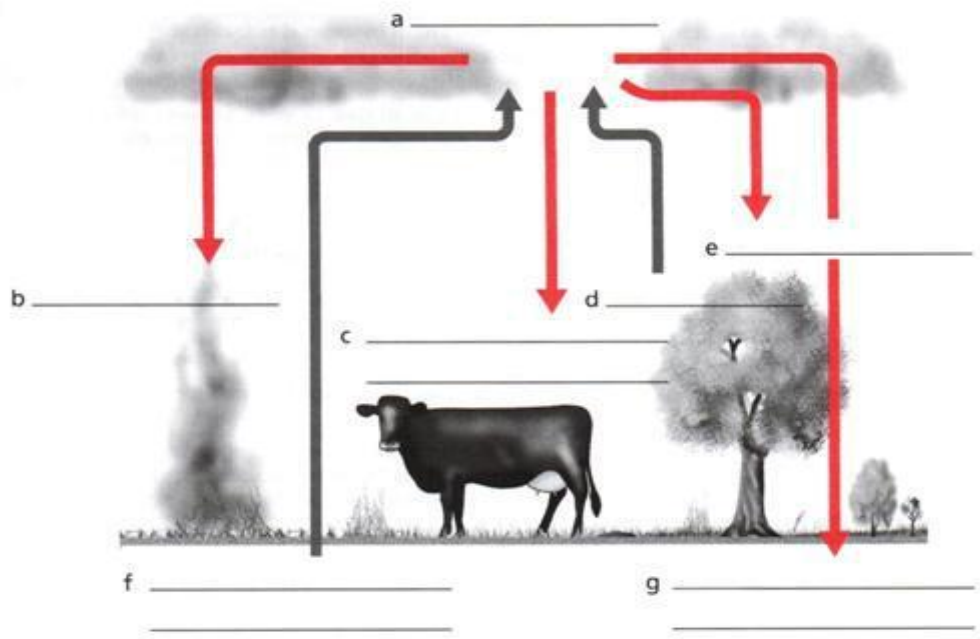
S1: This is a description of the water cycle.

S2: First of all, the sun heats the sea. etc

Exercise 7 [1]. Label the diagram with the given below phrases. Write a description of the oxygen cycle using sequencing phrases (from ex.6).

Oxygen cycle

1) animals use oxygen for respiration *2) atmospheric oxygen* *3) combustion uses oxygen* *4) oxygen from plant photosynthesis*	*5) oxygen from soil organisms that photosynthesise* *6) plants use oxygen for respiration* *7) soil organisms use oxygen for respiration*



Exercise 8. Work in three groups.

***Group A** read about the carbon cycle.*

***Group B** read about the nitrogen cycle.*

***Group C** read about the phosphorus cycle.*

***Group A** read the text and explain the words in bold. Then choose any three and make sentences.*

Carbon cycles between the environment and living bodies

Put simply, in the carbon cycle, carbon moves from the environment, into the bodies of living things, and back to the environment. Life and the carbon cycle are intimately related. Carbon is essential to organisms because it is a part of molecules

such as proteins, carbohydrates, fats, and nucleic acids. Also, certain processes of living organisms – **photosynthesis** and respiration – are critical to carbon cycling.

Carbon moves from the environment primarily during photosynthesis, as plants, algae, and cyanobacteria use carbon dioxide (CO_2) to produce sugars and other organic molecules. When the **photosynthesizers** are eaten by **herbivores**, the organic molecules serve as a carbon source for the herbivores. The herbivores, in turn, use the carbon to produce their own organic molecules, which then serve as a carbon source for **carnivores**. When these organisms die, the organic molecules in their bodies will serve as a carbon source for **decomposers**. However, while alive, all organisms cycle carbon back to the environment through the reactions of cellular respiration, which breaks down organic molecules to CO_2.

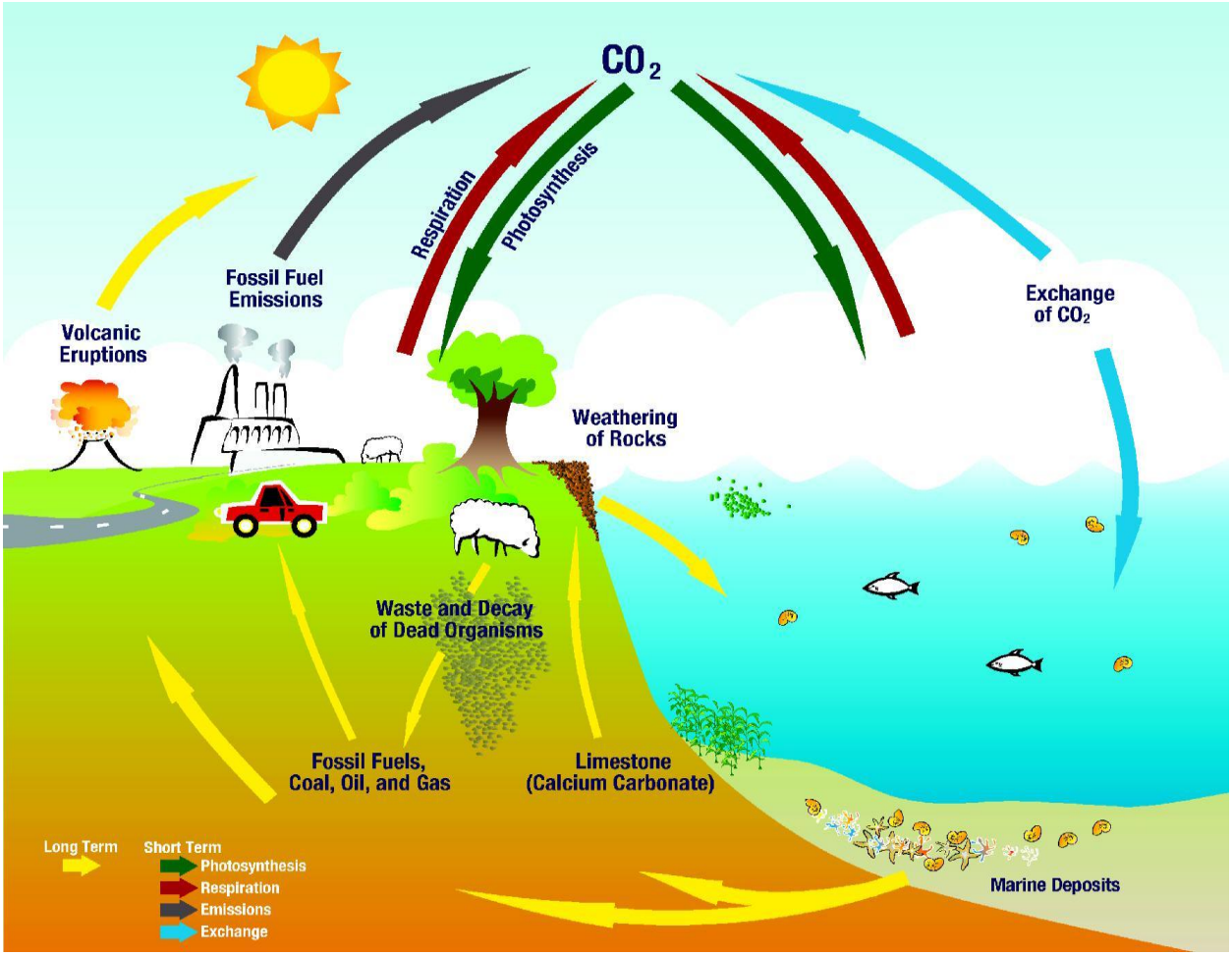
In some cases, there may be a significant delay before carbon cycles back into the environment. For example, carbon may remain tied up in the wood of some trees for hundreds of years. Most of the carbon that has left the carbon cycle is thought to be in **limestone**, a type of sedimentary rock that formed from the shells of marine organisms that sank to the bottom of the ocean floor and were covered by **sediments**. Also **fossil fuels**, so named because they formed from the remains of organisms that lived millions of years ago, are the vast stores of products of photosynthesis.

Three processes are involved in returning carbon from long-term storage to the environment: respiration, **erosion**, and **combustion**. The trees will eventually die, and the natural process of **decomposition** will make the carbon available for new organisms, which will respire and release CO_2 to the atmosphere. The carbon in limestone is recycled through erosion. Millions of years after it forms, sedimentary rock containing limestone can be lifted to the earth's surface, where it is eroded by **chemical** and **physical weathering**. Carbon is returned to the environment and is available to cycle through the **food web** once again. Combustion, or burning, returns the carbon in fossil fuels to the environment. Today, fossil fuels such as coal, oil, and natural gas are being burned, and the carbon they contain is being returned to the atmosphere as CO_2.

Answer the questions.

1. Why is carbon essential to organisms?
2. How is carbon transformed into organic compounds?
3. Are the carbon atoms already present in organic compounds passed along food chains by feeding and digestion?
4. How does carbon cycle back to the environment?
5. Where may carbon remain tied up?

6. What processes are involved in realizing carbon from long-term storage to the atmosphere?



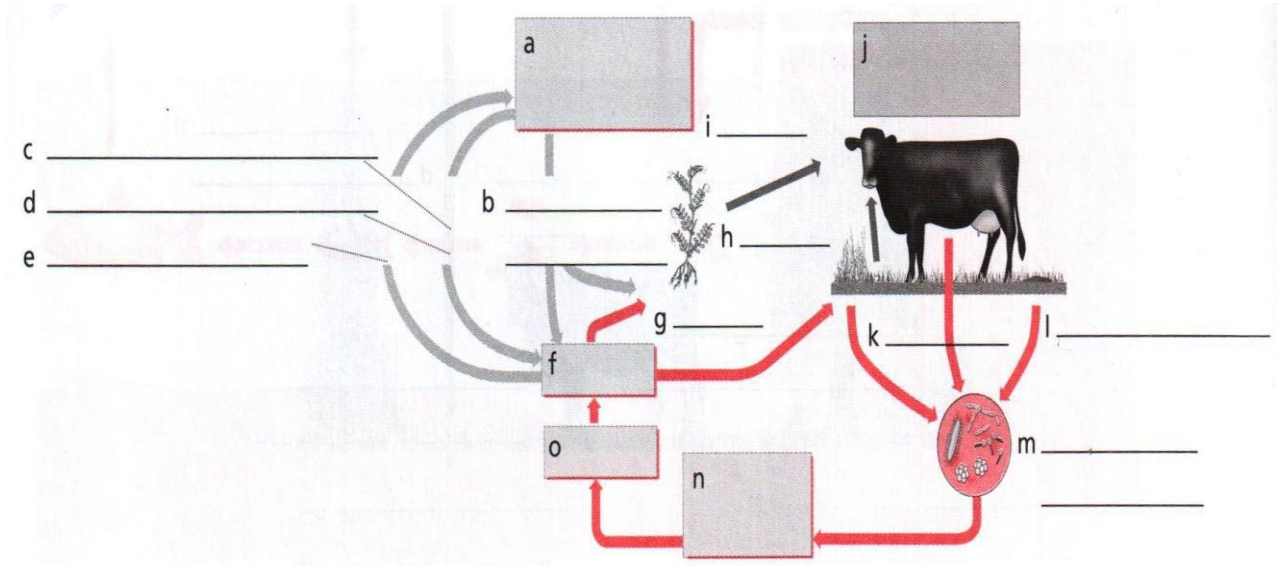
Find partners from the other two groups. Tell your partners about the carbon cycle, using the diagram.

***Group B** read the text and label the diagram with these words or phrases.* **The nitrogen cycle**

The atmosphere contains about 79% nitrogen but very few organisms can use the gas because it is very unreactive. However plants need nitrogen in the form of nitrates for healthy growth. Some bacteria can convert atmospheric nitrogen directly into nitrites or nitrates by a process called nitrogen fixation. These are known as nitrogen-fixing bacteria. Some of these bacteria are found in the soil and others live in the roots of leguminous plants. Nitrates made by bacteria can then be absorbed by the plants. Most of the nitrogen used by plants is in the form of nitrates are released when dead plants and animals, and waste products such as urine and faeces, are decayed by decomposers. Nitrates can also be formed during thunderstorms where the lightning provides enough energy for oxygen and nitrogen in the air to combine and nitrogen fixation occurs. In water-logged soil, which doesn't contain enough oxygen, there are bacteria that change nitrates back to nitrogen. These bacteria are

called denitrifying bacteria. So it is important to keep the soil well aerated where crops are growing, so that the nitrates are not lost.

1) absorbed 2) ammonium compounds in soil 3) death and decay 4) decay bacteria 5) denitrifying bacteria 6) eaten 7) nitrates in soil 8) nitrites in soil	9) nitrogen in the air 10) nitrogen-fixing bacteria 11) protein in animals 12) root nodule 13) urine and faeces 14) lightning 15) nitrogen fixation



Match the words 1-6 with the definitions a-f.

1. Nitrate 2. Nitrite 3. Denitrifying bacteria 4. Nitrogen-fixing bacteria 5.Water-logged soil 6. Legume	a) an area of land flooded with water and cannot be used. b) a plant such as a bean plant that has seeds in a pod(=a long thin case). c) a salt formed from nitric acid (NO_2). d) a salt formed from nitric acid that is used for improving the quality of soil (NO_3). e) bacteria that change nitrogen from the atmosphere into compounds in the soil that plants and other organisms can use. f) bacteria in soil that break down nitrates in the soil and produce some of the nitrogen that exists in the air.

Find partners from the other two groups. Tell your partners about the nitrogen cycle, using the diagram.

Group C *read the text and say whether the sentences below are true or false.*

- Phosphorus is an essential material.
- Phosphorus cycles from the atmosphere.
- The reservoir for phosphorus is sedimentary rock.
- The phosphates cycle through marine food webs.

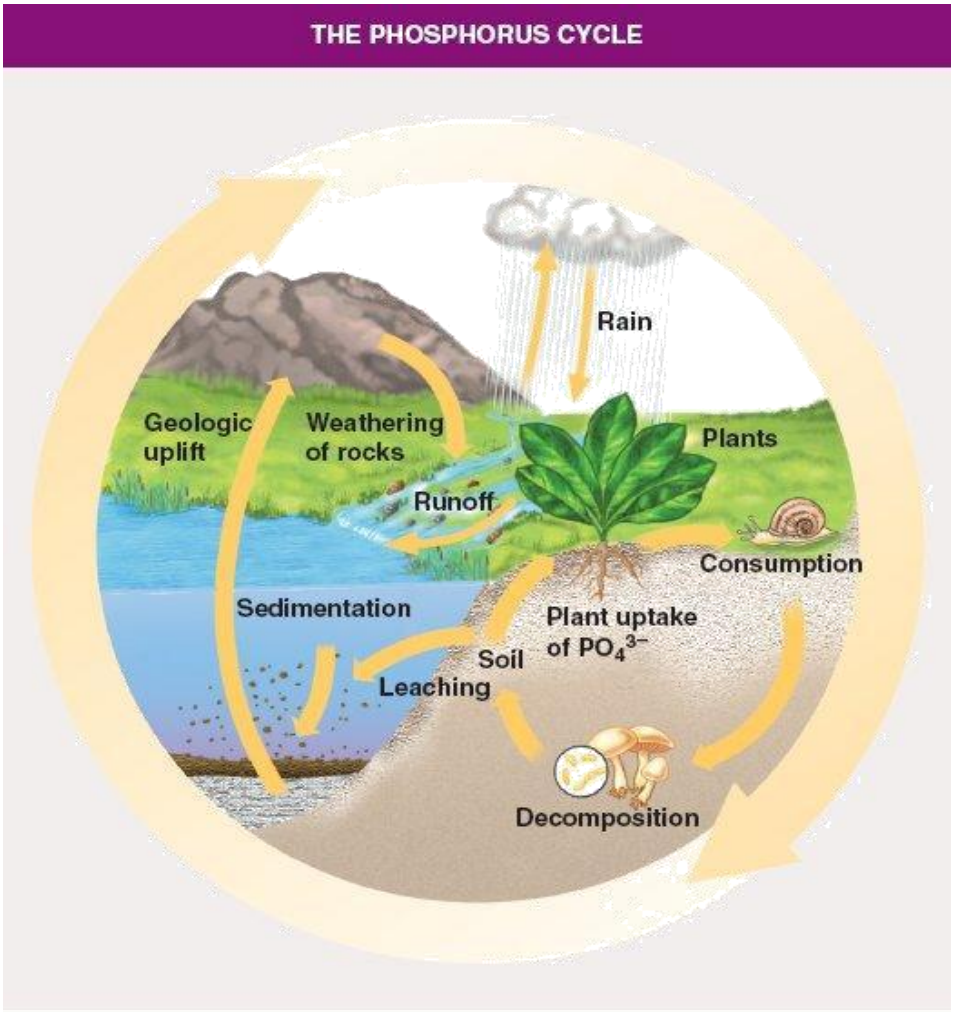
Phosphorus cycles between rocks and living organisms

Phosphorus is an important component of many biological molecules, including the genetic material DNA, energy transfer molecules such as ATP, and phospholipids found in membranes. Phosphorus is also essential in vertebrate bones and teeth.

Unlike the water, carbon, and nitrogen cycles, the phosphorus cycle does not have an atmospheric component. Instead, the reservoir for phosphorus is sedimentary rock, where it is found in the form of phosphate. The cycle begins when erosion caused by rainfall or runoff from streams dissolves the phosphates in the rocks. The dissolved phosphate is readily absorbed by producers and incorporated into their biological molecules. When animals eat the plants, the phosphates are passed through food webs. Decomposers return the phosphates to the soil or water, where they become available to plants and animals once again. Much of the phosphate is lost to the sea. Although some of this phosphate may cycle through marine food webs, most of it becomes bound to sediment. The phosphates in sediment become unavailable unless geological forces bring the sediment to the surface.

Complete the table.

Noun	*Verb*	*Adjective*
absorption		
		insoluble
	compose	
transference		
		cyclical
production		
	decompose	



Find partners from the other two groups. Tell your partners about the phosphorus cycle, using the diagram.

Exercise 9. Read the clues and complete the crossword.

ACROSS

2) living on land rather than in water;

3) a hard substance that grows in the sea;

5) living in or near water;

7) all the plants, animals and other organisms in a particular area, considered in relation to the environment that they live in and the way they all depend on each other;

8) with a lot of very small holes that air and water can pass through;

9) a system that uses radio signals in order to find the position of something as an aircraft or ship.

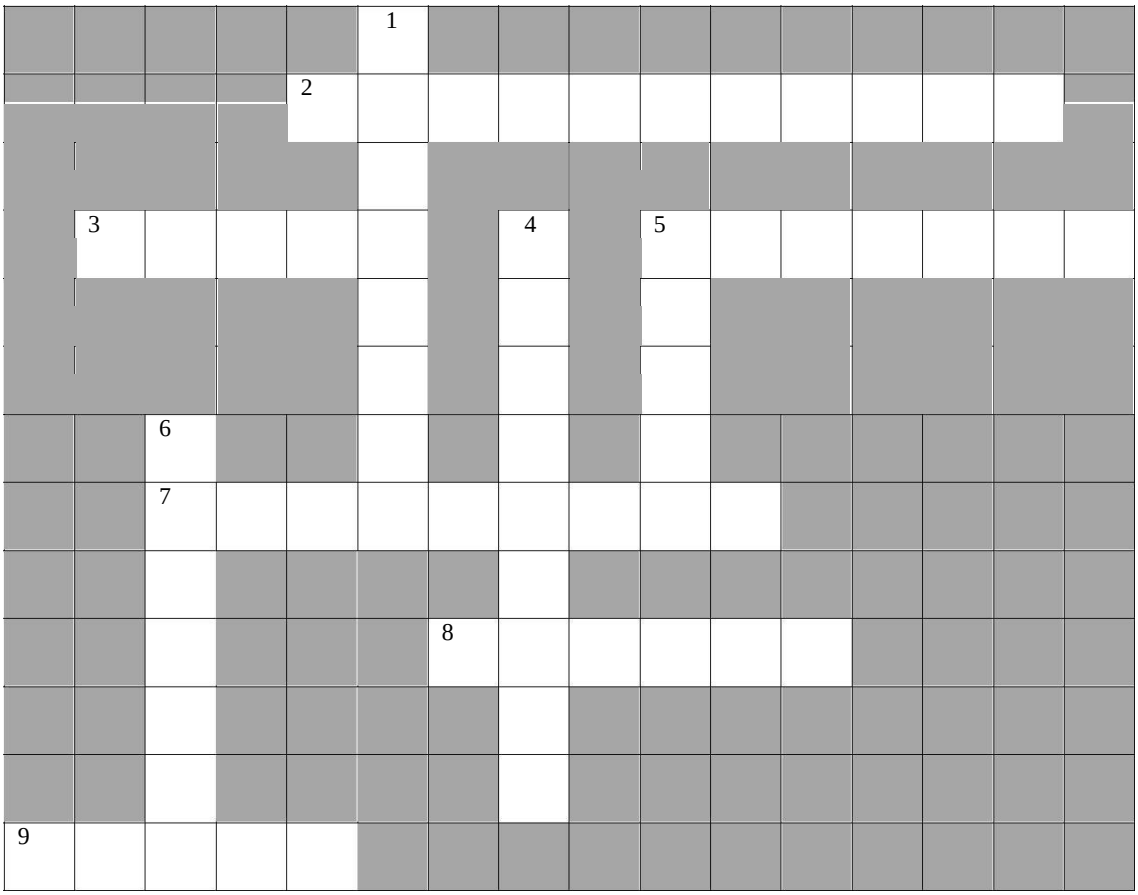
DOWN

1) low land that is often covered with water from the lake, river, or sea next to it;

4) a type of white or grey stone that consists mainly of calcium carbonate and is formed from the skeletons and shells of sea animals;

5) simple plants that have no roots, stems or leaves and that usually grow in water;

6) a simple green, red or brown plant that grows in the sea.



Exercise 10. Describe the complexity of living systems using the picture on p.64.

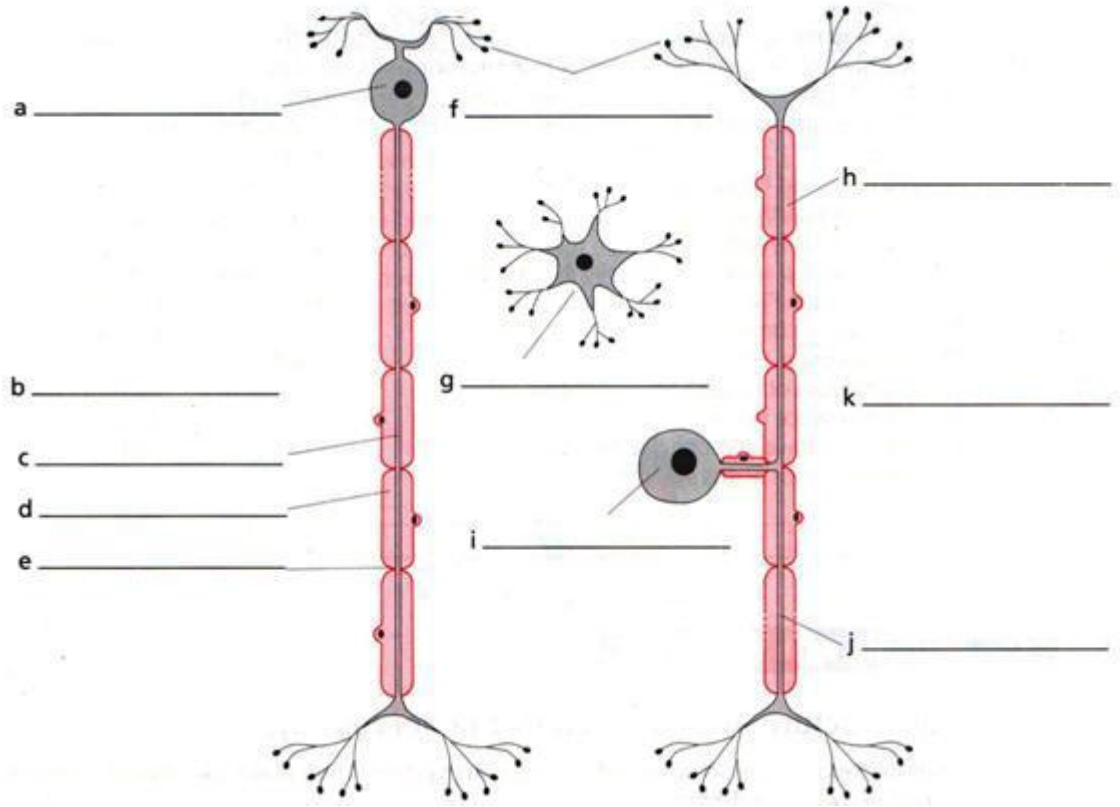
SELF-CHECK MODULE

UNIT 1

Exercise 1 [1]. Label the diagram with these words:

axon (x2) cell body (x2) dendrite dendron motor neurone myelin sheath node of Ranvier intermediate or relay neurone sensory neurone

Neurone structures



Exercise 2. Read the definition and guess the word that is described.

1. To produce a liquid such as saliva (estecer).
2. A nerve message that comes from a receptor (pesynorsisulem).
3. Illness caused by a blocked or broken blood vessel that can make someone suddenly unable to speak or move (esrokt).
4. An organ in the body on which a particular hormone acts (gotrenratag).
5. The fact of no longer working in the right way (angmutconinilf).
6. The fact that a part of your body is unable to do something fully (timirapenm).
7. The process of making something bigger or of growing bigger (telegarenmn).
8. A small group of things that are very close to each other (tculers).
9. Physical harm (gamead).

10. An action that is not controlled consciously by the mind but automatically by the brain (ninovulynatocirat).

UNIT 2

Exercise 1. Read the texts about the lungs and the kidneys. The information has been mixed up. Sort the texts into the two columns. Then put the sentences in the correct order to form two paragraphs.

Excretory organs of the human body

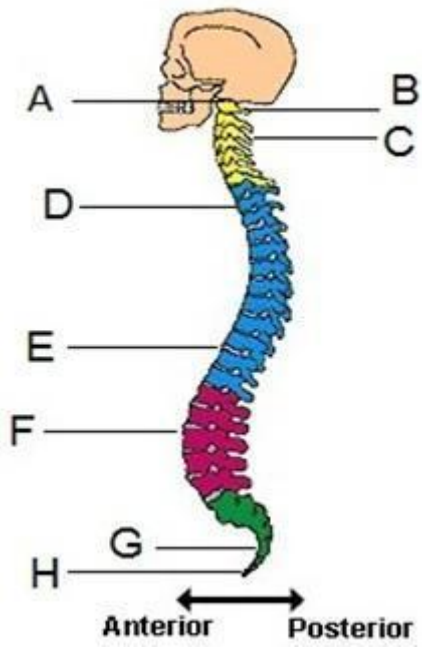
1. Both the carbon dioxide and water vapour are excreted from the lungs into the atmosphere when you exhale.
2. Each kidney is about 12.5 cm long and 7.5 cm wide.
3. On reaching the lungs the blood flows through a network of capillaries over the alveoli, which is the point of gaseous exchange in the lung.
4. The carbon dioxide diffuses into the lung along with some water from the cells of the alveoli.
5. This carbon dioxide which is formed in the cells during respiration diffuses into the bloodstream, which transports it to the lung.
6. The kidneys are the main excretory organs in the human body.
7. The lungs excrete the gaseous waste product of respiration, carbon dioxide.
8. The main function of the kidneys is to remove excess water and nitrogenous waste from the blood.
9. This waste is urea, which was formed from the breakdown of amino acids in the liver.
10. We have two of them, which are located to the back of the body just above the waist on either side of the spine.

The lung as an excretory organ	The kidney as an excretory organ

UNIT 3

Exercise 1 [1]. Label the diagram with these words:

sacral vertebrae thoracic vertebrae axis coccyx neck lumbar vertebrae cervical vertebrae atlas



Read the text and check.

The vertebral column in humans extends from the neck to the tailbone or coccyx. It is made up of 33 bones called vertebrae. All vertebrae have the same basic structure. The first two bones of the vertebral column are the atlas and axis. These are the first two bones of the neck and the cervical vertebrae. They are followed by 12 thoracic vertebrae, then 5 lumbar vertebrae. The sacrum is made up of several vertebrae fused together. It follows the lumbar vertebrae. Finally, there are the tail vertebrae which are also fused to form the coccyx.

Exercise 2. Read the definition and guess the word that is described.

1. One of the long curved bones in the chest (ibr).
2. The ways in which the different parts of a structure or system are connected (irulitnaocat).
3. The backbone or spinal column (nvteblrmuareloc).
4. Liquid within the joints of the body that allows the bones to move smoothly (dsyivlaulifon).
5. A strong substance that surrounds the joints of animals (irtslge).
6. Difficult to break or damage (hutgo).
7. An arm or leg (bmil).
8. One of the two flat bones at the top of the back (esolhuerdadbl).
9. One of the bones of a finger or toe (xplahan).
10. The mandible (ejbnowa).

UNIT 4

Exercise 1. Read the text and complete it with these words:

distillation thermo-cracking catalyst catalytic hydrocarbon evaporate denser cracking viscous

The more carbons present in a 1_____chain, the larger and heavier it will be. Large hydrocarbons will also have the following characteristics. They have a higher boiling point and so condense at a higher temperature. They are more 2____, so are stickier and take longer to flow. They do not 3_____ as easily. They are less flammable than smaller hydrocarbons. Vapours that are easily released from the smaller hydrocarbons are 4_____ than air and can result in fires at ground level. It is for this reason that sources of heat (such as smoking) are not allowed at petrol stations. The amount of each fraction that is obtained during 5_____ of crude oil varies. Larger hydrocarbons are less useful than the smaller ones. If more larger hydrocarbons are obtained than is needed, they can be broken down into smaller, more useful ones. This process is called cracking. Cracking is done in two ways. 6_____ is where the large molecules are heated at high temperature in the absence of air to break them. 7_____ is where the large hydrocarbons are broken at lower temperatures in the presence of a 8_____.

Exercise 2. Match the beginnings and the endings of the sentences.

Beginnings	Endings
1. Fuels are substances which store	a) alternative sources of energy.
2. Coal, crude oil and natural gas are	b) chemical energy.
3. The main constituent of natural gas is methane,	c) which break up large hydrocarbons into smaller ones.
4. Hydrocarbons are organic compounds which contain	d) when there is a limited supply of oxygen.
5. Fractional distillation is a process which separates	e) but also contains the gases butane and propane.
6. Thermo-cracking or catalytic cracking are processes	f) fossil fuels.
7. A luminous flame occurs	g) carbon and hydrogen only.
8. Solar energy, water, wind, geothermal and biomass are	h) the different hydrocarbon fractions in crude oil.

UNIT 5

Exercise 1. Read the text and complete it with these words:
decomposers herbivores chalk weathering photosynthesis decayed organic compounds fossil fuels

The carbon cycle

Carbon passes as carbon dioxide from the air into plants in the process of 1_____ and some is returned by the process of respiration. The rest is changed into 2_____ in the plants. These pass to the 3_____ that eat the plants, and get passed along the food chain. In each animal in the chain some carbon is lost as carbon dioxide in respiration, or as organic compounds in faeces and urine. 4_____ release the carbon as carbon dioxide when they decay dead plants, animals, faeces and urine. Some dead organic material may not get 5_____ before it is buried. This eventually forms the 6_____ such as coal, oil and natural gas. The carbon is released as carbon dioxide back into the air when the fuels are burnt. Carbon can also be locked away in rocks in the form of carbonates, such as in limestone, coral and 7_____. It is released into the atmosphere again when the rock undergoes chemical 8_____.

Exercise 2. Choose the correct answers.

1. An omnivore is an animal
a) that eats only plants.
b) that eats both plants and other animals.
c) that eats only other animals.
2. Trawling is
a) the process of removing something.
b) a method of deep-sea fishing.
c) waste from people's bodies.
3. Algae are
a) tropical sea animals.
b) organisms that cause decay.
c) simple plants that grow in water.
4. Coral is
a) a type of worm.
b) a hard substance that grows in the sea.
c) an aquatic plant.
5. Silt is
a) small rock particles.
b) a grain of sand.
c) a grain of salt.
6. Terrestrial means
a) living in water.
b) living on land.
c) being able to live both on land and in water.

ANSWER KEY

UNIT 1, ex.10

ACROSS	DOWN
4 - tap	1 - thyroid
6 - transmission	2 - polio
8 - axon	3 - conscious
9 - homeostasis	5 - adrenaline
10 - rabies	7 - stimulus

UNIT 3, ex.11

ACROSS	DOWN
3 - femur	1 - skull
5 - cartilage	2 - tendon
6 - spongy	4 - pelvis
7 - biceps	6 - support
9 - strained	

UNIT 4, ex.9

ACROSS	DOWN
1 - biosphere	2 - pesticide
5 - fertilizer	3 - detergent
6 - smog	4- fossilfuel
7 - sewage	8 - emission
9 - biodegradable	10 - decay

UNIT 5, ex.9

ACROSS	DOWN
2 - terrestrial	1 - wetlands
3 - coral	4 - limestone
5 - aquatic	5 - algae
7 - ecosystem	6 - seaweeds
8 - porous	
9 - radar	

ANSWERS TO ASSIGNMENTS IN SELF-CHECK MODULE

UNIT 1

Exercise 1.

a) cell body b) motor neurone c) axon d) myelin sheath e) node of Ranvier f) dendrite	g) intermediate or relay neurone h) dendron i) cell body j) axon k) sensory neurone

Exercise 2.

1) secrete 2) sensory impulse 3) stroke 4) target organ 5) malfunctioning	6) impairment 7) enlargement 8) cluster 9) damage 10) involuntary action

UNIT 2

Exercise 1.

The lung as an excretory organ	The kidney as an excretory organ
7 5 3 4 1	6 10 2 8 9

UNIT 3

Exercise 1.

a) neck b) atlas c) axis d) cervical vertebrae	f) thoracic vertebrae e) lumbar vertebrae g) sacral vertebrae h) coccyx

Exercise 2.

1) rib 2) articulation 3) vertebral column 4) synovial fluid 5) gristle	6) tough 7) limb 8) shoulderblade 9) phalanx 10) jawbone

UNIT 4

Exercise 1.

1) hydrocarbon 2) viscous 3) evaporate	5) distillation 6) thermo-cracking 7) catalytic cracking

4) denser	8) catalyst

Exercise 2.

1	2	3	4	5	6	7	8
b	f	e	g	h	c	d	a

UNIT 5

Exercise 1.

1) photosynthesis	5) decayed
2) organic compounds	6) fossil fuels
3) herbivores	7) chalk
4) decomposers	8) weathering

Exercise 2.

1	2	3	4	5	6
b	b	c	b	a	b

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APPENDIX

The sources of the pictures and schemes used

p. 18 www.emc.maricopa.edu
p. 30 www.practical-wellness-guide.com
p. 39 www.epa.gov
p. 46 www.wsfcs.k12.nc.us
p. 49 www.nas-sites.org
p. 52 www.bio1903.nicerweb.com
p. 64 www.wahs-biology.wikispaces.com

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