STRUCTURE OF THE NERVOUS SYSTEM

1. Read and learn the words:

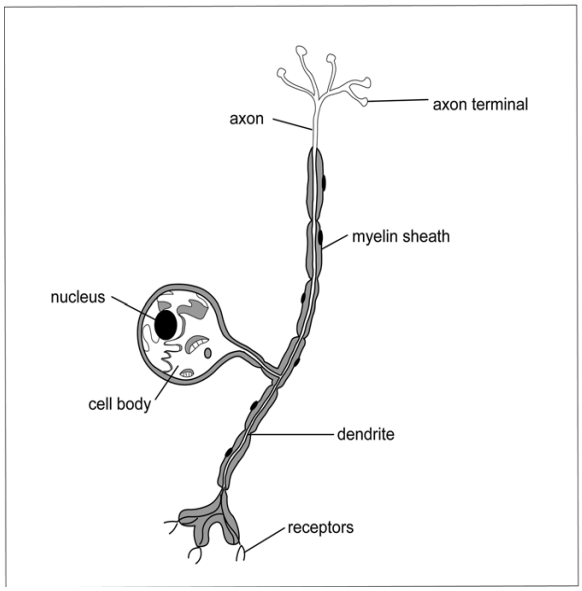
arachnoid membrane	[ə'ræknɔɪd]	павутинна мозкова оболонка
axon	[ˈaksɒn]	аксон
brain	[brein]	головний мозок
cerebral cortex	[ˊko:teks]	кора головного мозку
cerebrospinal fluid	[ˌsɛrɪbrəʊ'spaɪn(ə)l]	спинномозкова рідина
cerebrum	[sə'ri:brəm]	головний мозок
cytoplasm	['saɪtəplæz(ə)m]	цитоплазма
dendrite	[ˊdendrait]	дендрит
dura mater	[ˌdjuərə'meɪtə]	тверда мозкова оболонка
glia	[ˈglʌɪə, ˈgli:ə]	нейроглія
interneuron	[ˌɪntəˈnjʊərɒn]	проміжний, вставний нейрон
meninges	[mɪˈnɪndʒi:z]	мозкові оболонки
mitochondrion	[ˌmʌɪtə(ʊ)ˈkɒndrɪən]	мітохондрія
myelin sheath	['maɪɪlɪn ʃi:θ]	мієлінова оболонка
nerve tract	[nɜ:v trækt]	нервовий пучок
neuron	['njuərɔn]	нейрон
neurotransmitter	[ˌnjʊərəʊtrænz'mɪtə]	нейротрансмітер, нейромедіатор
pia mater	[ˌpaɪə'meɪtə]	м’яка мозкова оболонка
scalp	[skælp]	волосяниста частина голови
spinal cord	[ˊspainl ko:d]	спинний мозок
synapse	[siˊnæps]	синапс
to emit	[ɪ'mɪt]	виділяти, випускати
ventricle	[ˊventrikl]	шлуночок

2. Read and translate the text:

The human body’s nervous system is divided into two parts: the central nervous system (CNS) and the peripheral nervous system (PNS). The central nervous system

consists of the brain and the spinal cord. The peripheral nervous system consists of the cranial nerves (the brain's 12 pairs of nerves) and the spinal nerves (31 pairs of nerves associated with the spinal cord). The peripheral nervous system also includes the autonomic nervous system (ANS), which controls the involuntary movements of the body's smooth muscles, cardiac muscles, and glands. The two divisions of the autonomic nervous system are the parasympathetic division, which dominates and controls the body during nonstressful situations, and the sympathetic division, which dominates and controls the body during stressful situations.

A nerve is defined as a group of nerve fibers located outside the CNS. Bundles of nerve fibers located within the CNS are called nerve tracts. Nerve fibers make up nerve cells, also known as neurons, which are the building blocks of the entire nervous system. Although neurons vary in size, shape, and functions, they all consist of the following four distinct parts:



1. Cell body. This is the main mass of the cell and contains the nucleus and other organelles. The cell body also contains cytoplasm, and an abundance of mitochondria, which are responsible for energy production in the cell.

2. Dendrites. This group of branching nerve fibers carries impulses to the cell body.

3. Axon. This single nerve fiber carries impulses away from the cell body and the dendrites. In humans, some axons can be around one meter long. Some axons are covered with myelin sheath. Composed of fatty material, the myelin sheath insulates neurons from one another. A nerve fiber is the neuron including the axon and the surrounding cells.

4. Transmitting region. The axon carries the impulses to the transmitting region, and from there it leaves the cell body and travels to the CNS.

Neurons are classified into three groups: sensory, motor, and interneurons. In the CNS, neurons communicate with each other when the axon of one neuron comes into contact with the cell body or dendrite of another neuron. The space between the axon and dendrite of these two neurons is known as a synapse. Chemical substances are emitted through nerve endings to help transmit messages. These chemicals are called neurotransmitters. In the human body, there are about 80 different neurotransmitters.

The central nervous system is made up of two major organs: the brain and the spinal cord. It detects a stimulus and facilitates the response in the organ or muscle. The spinal cord connects the brain to the peripheral nervous system. Protected by a bony canal, it extends down to the end of a column, which is made up of bones called vertebrae. The functions of the spinal cord are: to conduct sensory impulses, to conduct motor impulses, to carry out direct reflexes which do not involve the brain.

The brain is the other major organ that makes up the central nervous system. Weighing approximately a little over 1 kilogram, in an average adult, the brain consists of over 100 billion neurons and trillions of glia. The brain is covered by fluid, membranes, and bones. Housed in the skull, the brain is enclosed by a total of 14 bones. Because the brain is such an important organ, it needs a lot of protection. The initial layer of protection is the scalp, or skin layer, which contains the hair follicles. Right beneath the scalp is the skull, which is followed by three layers of connective tissues call meninges. The outermost layer of the meninges is made up of thick fibrous tissue called the dura mater, which lines the skull. Because of its thickness, the dura mater keeps the brain from moving too much in the skull. The next layer is the arachnoid membrane made up of web-like strands of connective tissue. Finally, the innermost layer is called the pia mater, which is closest to the brain and spinal cord. The brain contains four ventricles, or cavities - the two lateral ventricles, and a third and fourth ventricle. Within each ventricle there is a capillary network that forms cerebrospinal fluid using blood plasma. This tissue fluid circulates in and around the brain and spinal cord. The largest part of the brain is divided into two halves called hemispheres. The outer layer of the cerebrum is called cerebral cortex, which is a folded sheet of gray matter tissue.

3. Answer the questions.

1. What does the central nervous system consist of?
2. What does the peripheral nervous system consist of?
3. What is the difference between the parasympathetic division and the sympathetic one?
4. What is a nerve?
5. What groups of neurons are there?
6. What are the parts of a neuron?
7. What is the brain covered by?
8. What are meninges?
9. How many ventricles are there in the brain?
10. What is the function of neurotransmitter?

4. Define if the statements are true or false. Correct them if they are false.

1. There are 10 pairs of cranial nerves.
2. The first layer of the brain's protection is the skull.
3. Axon carries impulses away from the cell body.
4. The autonomic nervous system controls voluntary body movements.
5. Neurons are building blocks of the entire nervous system.
6. The outermost layer of the meninges is called the pia mater.
7. Bundles of nerve fibers located within the CNS are called nerve tracts.
8. Parasympathetic division dominates and controls body during stressful situations.
9. The dura mater is made up of web-like strands of connective tissue.
10. Dendrites carry impulses to the cell body.

5. Fill in the gaps.

1. A nerve _____ is the neuron including the axon and the surrounding cells.
2. Cerebral cortex is a sheet of _____ _____ tissue.

3. Capillary networks in the ventricles form _____ _____ using blood plasma.
4. The main mass of a neuron is _____ _____.
5. Dendrites are _____ nerve fibers.
6. The layers of _____ _____ covering the brain are called meninges.
7. Neurotransmitter is a _____ _____ which helps to transmit messages.
8. Two halves of the cerebrum are called _____.
9. An axon carries _____ away from the cell body.
10. The meninges are called the _____ mater, the _____ mater and _____ membrane.

6. Match the following terms with their definitions:

ventricle, synapse, brain, axon, spinal cord, neuron, cerebral cortex, dendrite, cerebrospinal fluid, meninges.

1. The folded outer layer of the cerebrum, making up some 40% of the brain by weight. This is the part of the brain most directly responsible for consciousness.
2. The long threadlike part of a nerve cell along which impulses are conducted from the cell body to other cells.
3. The clear watery fluid that surrounds the brain and spinal cord.
4. A junction between two nerve cells, consisting of a minute gap across which impulses pass by diffusion of a neurotransmitter.
5. The soft convoluted mass of nervous tissue within the skull that is the controlling and coordinating centre of the nervous system and responsible for thought, memory, and emotion.
6. A specialized cell transmitting nerve impulses; a nerve cell.
7. Any one of the four main cavities of the brain, which contain cerebrospinal fluid.
8. The three connective tissue membranes that line the skull and vertebral canal and enclose the brain and spinal cord.

9. One of the shorter branching processes of the cell body of a neurons, which makes contact with other neurons at synapses and carries nerve impulses from them into the cell body.
10. The thick cord of nerve tissue within the spinal canal, which in man gives rise to 31 pairs of spinal nerves, and together with the brain forms the central nervous system.

7. Make up word combinations.

1. gray	a. mater
2. nerve	b. cord
3. myelin	c. division
4. dura	d. fiber
5. spinal	e. impulse
6. cerebral	f. muscle
7. sympathetic	g. matter
8. sensory	h. membrane
9. smooth	i. sheath
10. arachnoid	j. cortex

8. Choose Present Simple Active or Passive. Use the verbs from the frame.

to conduct, to divide, to compose, to cover, to contain, to protect, to make, to connect, to insulate, to circulate

1. The spinal cord _____ the brain to the peripheral nervous system.
2. Some axons _____ with myelin sheath.
3. Cerebrospinal fluid _____ in and around the brain and spinal cord.
4. The cerebrum _____ into two hemispheres.
5. Myelin sheath _____ neurons from one another.
6. The spinal cord _____ by a bony canal.

7. The central nervous system _____ up of two major organs.
8. Myelin sheath _____ of fatty material.
9. The spinal cord _____ sensory and motor impulses.
10. The scalp _____ hair follicles.

Keys

5. 1. fiber; 2. gray matter; 3. cerebrospinal fluid; 4. cell body; 5. branching; 6. connective tissue; 7. chemical substances; 8. hemispheres; 9. impulses; 10. pia, dura, arachnoid.

6. 1. cerebral cortex, 2. axon, 3. cerebrospinal fluid, 4. synapse, 5. brain, 6. neuron, 7. ventricle, 8. meninges, 9. dendrite, 10. spinal cord.