

Exercise The Nervous System

True/False

Indicate whether the statement is true or false.

1. The elongated extension of a neuron that conducts nerve impulses is called an axon.
2. The cells of the nervous system that conduct electrical signals are called nerve cells, or neurons.
3. Many neurons have a layer of insulation called a myelin sheath that wraps around the axon.
4. Myelin sheaths slow down nerve impulses.
5. The potential of a resting neuron is positive.
6. When a neuron is not conducting a nerve impulse, the neuron is said to be at rest.
7. Neurons communicate with other cells by using neurotransmitters at synapses.
8. Neurotransmitters are chemical messengers that carry nerve impulses across the synaptic cleft.
9. A neurotransmitter may either excite or inhibit the cell it stimulates.
10. The spinal cord and the brain make up the peripheral nervous system.
11. Motor neurons that conduct impulses to skeletal muscles under our conscious control make up the limbic system.
12. Taste buds located in the tongue are stimulated when a chemical dissolved in saliva binds to taste cells in the taste buds.

Multiple Choice

Identify the choice that best completes the statement or answers the question.

1. "Antennae" that extend from a neuron and that receive information from other cells are called
 - a. axons.
 - b. cell bodies.
 - c. synapses.
 - d. dendrites.

2. Nodes of Ranvier
 - a. strengthen axons.
 - b. slow nerve impulses.
 - c. occur in malfunctioning axons.
 - d. are gaps in the myelin sheath.

3. The myelin sheath
 - a. transmits impulses from one neuron to another.
 - b. insulates synapses.
 - c. nourishes neurons.
 - d. insulates axons.

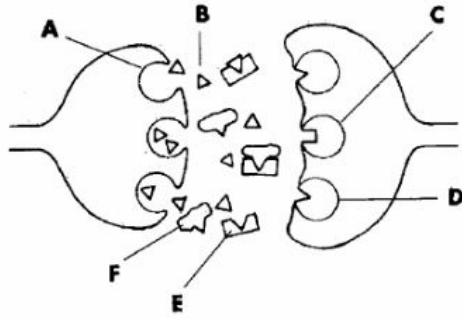
4. unmyelinated axon : slow nerve impulses ::
 - a. neuron : being composed of many axons
 - b. nerve impulse : not traveling through axons
 - c. myelinated axon : fast nerve impulses
 - d. dendrite : sending information

5. synapse : two neurons ::
 - a. neuron : two cell bodies
 - b. cell body : two axons
 - c. synapse : cell body and axon
 - d. axon : cell body and synapse

6. Which of the following statements about the resting potential of a neuron is true?
 - a. There are many times more sodium ions outside the neuron than inside.
 - b. Sodium ions are in balance inside and outside the neuron.
 - c. There are fewer potassium ions inside the neuron than outside.
 - d. There are equal amounts of potassium and sodium ions inside and outside the neuron.

7. After an action potential, the sodium-potassium pump helps
 - a. rebuild axon fibers.
 - b. restore the resting potential.
 - c. cause a stimulus.
 - d. All of the above

8. When a neuron is at rest,
 - a. sodium ions are most concentrated inside the cell.
 - b. potassium ions are most concentrated inside the cell.
 - c. the outside of the cell is negatively charged.
 - d. All of the above
9. A nerve impulse
 - a. moves from the inside to the outside of an axon.
 - b. moves from the outside to the inside of an axon.
 - c. is the movement of an action potential along an axon.
 - d. moves slowly.
10. When an impulse moves down the axon,
 - a. sodium ions first rush out of the cell.
 - b. a small part of the axon momentarily reverses its polarity.
 - c. the resting potential of the cell does not change.
 - d. potassium ions are pumped into the axon.
11. Neurotransmitters are
 - a. electrical impulses.
 - b. found only in neurons with myelin sheaths.
 - c. released at synapses.
 - d. produced by muscles.
12. When neurotransmitters cross a synapse and open ion channels in the membrane of a postsynaptic neuron, which of the following happens?
 - a. inhibition of impulses in the neuron
 - b. the death of the neuron
 - c. initiation of an impulse in the neuron
 - d. Both (a) and (c)
13. When a neurotransmitter is released from a presynaptic neuron, the neurotransmitter may
 - a. become an enzyme in the space between the neurons.
 - b. bind to membrane receptor proteins on the membrane of the postsynaptic neuron.
 - c. cover the membrane of the axon.
 - d. cause the cell body of the postsynaptic neuron to enlarge.



14. Refer to the illustration above. If neurotransmitters could not be cleared out of a synapse after transmitting a message,
 - a. a postsynaptic neuron would continue to be stimulated for an indefinite period of time.
 - b. the presynaptic neuron could not pass on its impulse.
 - c. the postsynaptic neuron would not be stimulated.
 - d. None of the above

15. Refer to the illustration above. Label B indicates a
 - a. neurotransmitter molecule.
 - b. neuromodulator molecule.
 - c. receptor protein.
 - d. drug molecule.

16. Refer to the illustration above. Which labeled object in the diagram would be responsible for removing neurotransmitters from the synaptic cleft?
 - a. B
 - b. C
 - c. E
 - d. F

17. Refer to the illustration above. The effect of the neurotransmitter might be prolonged by the presence of molecule
 - a. B.
 - b. D.
 - c. E.
 - d. F.

18. Refer to the illustration above. When a drug blocks removal of a neurotransmitter from a synaptic cleft for a prolonged period,
 - a. the postsynaptic neuron is overstimulated.
 - b. the number of receptors on the postsynaptic neuron decreases.
 - c. the only way to maintain normal functioning of the nerve pathway is to continue taking the drug.
 - d. All of the above

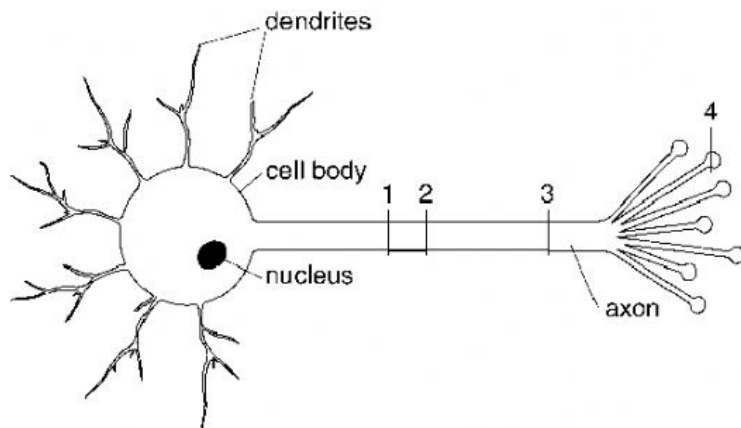
19. The central nervous system consists of
- the brain and spinal cord.
 - spinal nerves only.
 - the spinal cord only.
 - the brain only.
20. Information is carried from the central nervous system to a muscle or gland by
- sensory neurons.
 - sensory receptors.
 - motor neurons.
 - None of the above
21. Motor neurons transmit messages
- to the brain.
 - to the spinal cord.
 - from the spinal cord to the brain.
 - from the central nervous system to a muscle or gland.
22. Sensory neurons transmit messages
- from the central nervous system to a muscle or gland.
 - from the brain to the spinal cord.
 - to the spinal cord or brain.
 - All of the above
23. A reflex
- is a sudden, involuntary movement of
 - is not under conscious control.
 - is not learned.muscles in response to a stimulus.
 - All of the above

Completion

Complete each statement.

1. A(n) _____ is a cell that conducts electrical signals.
2. Cytoplasmic extensions called _____ allow a neuron to receive information simultaneously from many different sources.
3. Some axons are surrounded by an insulating structure called a(n) _____.
4. The electrical charge across the membrane of a neuron is caused primarily by different concentrations of _____ and _____ ions inside and outside the cell.
5. Messages are carried across synapses by signal molecules called _____.
6. The junction of a neuron with another cell is called a(n) _____.
7. The part of the nervous system that does not include the spinal cord and brain is known as the _____ nervous system.
8. A sudden, involuntary movement in response to a stimulus is called a(n) _____.
9. Specialized neurons that detect sensory stimuli are called _____ receptors.

Problem



1. Refer to the illustration above. At the locations labeled 1, 3, and 4, the inside of the neuron is negatively charged compared to the outside. At the location labeled 2, the inside of the neuron is positively charged.
 - a. Which numbered locations on the neuron are at the resting potential?
 - b. Which numbered location on the neuron is showing an action potential?
 - c. At which numbered location on the neuron is the cell membrane permeable to sodium ions?
 - d. At which numbered locations on the neuron are sodium-potassium pumps actively pumping these ions?
 - e. What happens when an action potential reaches location 4 on the neuron

