

Assess Your Understanding

How the Nervous System Works

What Is the Role of the Nervous System?

got it?.....

- I get it! Now I know that the nervous system _____

- I need extra help with _____

What Is a Neuron?

- 1a. NAME What is another name for a nerve cell?

- b. CLASSIFY What kind of neuron senses a mosquito on your arm?

got it?.....

- I get it! Now I know that a neuron contains _____

- and the three kinds of neurons are _____
- I need extra help with _____

Assess Your Understanding

How the Nervous System Works

How Do Nerve Impulses Travel?

got it?

I get it! Now I know that a nerve impulse travels from one neuron to another structure by _____

I need extra help with _____

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Key Concept Summaries

How the Nervous System Works

What Is the Role of the Nervous System?

The nervous system is a communications network that includes the brain, spinal cord, and nerves that run throughout the body, as well as sense organs such as the eyes and ears. **The nervous system receives information about what is happening both inside and outside your body. It directs how your body responds to this information. In addition, your nervous system helps maintain**

homeostasis. Without your nervous system, you could not move, think, or sense the world around you. Your nervous system also checks conditions inside your body. Any change or signal in the environment that an organism can recognize and react to is called a **stimulus**. A **response** is a reaction to a stimulus.

What Is a Neuron?

Cells that carry information through your nervous system are called **neurons**, or nerve cells. **A neuron has a large cell body that contains the nucleus, threadlike extensions called dendrites, and an axon. The three kinds of neurons found in the body are sensory neurons, interneurons, and motor neurons.** The message that a neuron carries is called a **nerve impulse**. Nerve impulses begin in a **dendrite**, a branchlike structure that picks up the impulses. The impulses move through the neuron's cell

body to the tips of the **axon** at the end of the neuron. Axons and their tissue covering make up nerve fibers. A bundle of nerve fibers is called a **nerve**.

Of the three kinds of neurons, a **sensory neuron** picks up a stimulus and converts it into a nerve impulse. An **interneuron** carries a nerve impulse to another interneuron or to a motor neuron. A **motor neuron** sends an impulse to a muscle or gland, enabling it to respond.

How Do Nerve Impulses Travel?

Nerve impulses travel as electrical signals in neurons. When a nerve impulse reaches an axon tip, the message it carries can pass to another structure, such as another neuron or an organ. The place where a neuron transfers an impulse to another structure

is called a **synapse**. A synapse contains a gap between the axon tip of one neuron and the dendrite of another neuron. **At the axon tips, electrical signals change to a chemical form, allowing the message to cross the gap in the synapse.**

On a separate sheet of paper, describe the structure of a neuron and briefly explain how nerve impulses travel from one neuron to another.

Lesson Quiz

How the Nervous System Works

If the statement is true, write *true*. If the statement is false, change the underlined word or words to make the statement true.

- _____ The nervous system receives information about what is happening both inside and outside your body.
- _____ The nervous system helps maintain blood pressure.
- _____ A(n) motor neuron picks up a stimulus and converts it into a nerve impulse.
- _____ A(n) sensory neuron sends an impulse to a muscle or gland, enabling it to respond.
- _____ At the axon tips, electrical signals change to a(n) chemical form, allowing the message to cross the gap in the synapse.

Fill in the blank to complete each statement.

- A(n) _____ is any change or signal in the environment that an organism can recognize and react to.
- Cells that carry information through your nervous system are called nerve cells, or _____.
- An interneuron carries a nerve impulse to a motor neuron or to _____.
- A(n) _____ is the place where a neuron transfers an impulse to another structure.
- The message that a neuron carries is called a(n) _____.

Assess Your Understanding

Divisions of the Nervous System

What Is the Role of the Central Nervous System?

1a. **REVIEW** Which region of your brain helps you keep from falling when you walk? _____

b. **CHALLENGE** What symptoms might indicate that a person's cerebellum has been injured? _____

c. **DRAW CONCLUSIONS** Why is it helpful for the brain to be so well protected? _____

got it?

I get it! Now I know that the role of the central nervous system is _____

I need extra help with _____

Assess Your Understanding

Divisions of the Nervous System

What Is the Role of the Peripheral Nervous System?

- 2a. IDENTIFY The two groups of nerves in the peripheral nervous system are the _____
- b. COMPARE AND CONTRAST How do the two groups of peripheral nerves differ? _____

got it?

- I get it! Now I know that the role of the peripheral nervous system is _____

- I need extra help with _____

What Are Two Nervous System Injuries?

got it?

- I get it! Now I know that the nervous system can be injured by _____

- I need extra help with _____

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Key Concept Summaries

Divisions of the Nervous System

What is the Role of the Central Nervous System?

The **central nervous system** includes the brain and spinal cord. The **peripheral nervous system** includes all the nerves outside the central nervous system. **The central nervous system controls the functions of the body. The brain is its control center. The spinal cord links the brain to the peripheral nervous system.** The **spinal cord** is a thick column of nervous tissue. Most impulses from peripheral nerves travel through the spinal cord to the brain, and the brain directs a response.

Three major regions of the brain are the brain stem, the cerebellum, and the cerebrum. The brain stem connects the brain and spinal cord, controls the flow of information between the brain and the body, and controls involuntary actions. The cerebellum coordinates muscle actions and helps you keep your balance. The cerebrum is divided into left and right halves. Different areas control movement, the senses, speech, and abstract thought. The spinal cord is surrounded and protected by the vertebrae.

What is the Role of the Peripheral Nervous System?

The peripheral nervous system is a network of nerves that branch out from the central nervous system and connect it to the rest of the body. The peripheral nervous system is involved in both involuntary and voluntary actions. The peripheral nervous system's 43 pairs of nerves begin either in the brain or the spinal cord. Each spinal nerve contains both sensory and motor neurons. Sensory

neurons carry impulses from the body to the central nervous system. Motor neurons carry impulses from the central nervous system to the body. The peripheral nervous system contains two groups of nerves. The **somatic nervous system** controls voluntary actions; the **autonomic nervous system** controls involuntary actions. A **reflex** is a rapid, automatic response that occurs without conscious control.

What Are Two Nervous System Injuries?

Concussions and spinal cord injuries are two ways in which the central nervous system can be damaged. A **concussion** occurs when the soft tissue of the brain bruises as it collides against the skull.

Serious concussions may cause loss of consciousness, confusion, or drowsiness. If the spinal cord is cut or crushed, the result is often paralysis.

On a separate sheet of paper, briefly compare and contrast the two divisions of the nervous system.

Lesson Quiz

Divisions of the Nervous System

Fill in the blank to complete each statement.

1. The _____ nervous system includes the brain and spinal cord.
2. A(n) _____ is an automatic response that occurs rapidly without conscious control.
3. The _____ nervous system includes all the nerves outside the central nervous system.
4. The _____ connects the brain and spinal cord, controls the flow of information between the brain and the body, and controls involuntary actions.
5. Different areas of the _____ control movement, the senses, speech, and abstract thought.

If the statement is true, write *true*. If the statement is false, change the underlined word or words to make the statement true.

6. _____ The peripheral nervous system controls the functions of the body.
7. _____ The spinal cord links the brain to the peripheral nervous system.
8. _____ Each spinal nerve contains axons of both sensory and motor neurons.
9. _____ The peripheral nervous system is involved in both involuntary and reflex actions.
10. _____ Spinal cord injuries rarely result in paralysis.

Assess Your Understanding

Sight and Hearing

How Do You See?

1a. NAME Which part of the eye focuses the image? _____

b. APPLY CONCEPTS If nearby objects look blurry, what kind of eyeglass lens would you need? _____

got it?

I get it! Now I know that I see when _____

I need extra help with _____

How Do Your Ears Work?

2a. LIST What are the three regions of the ear? _____

b. DESCRIBE Describe the eardrum's function. _____

got it?

I get it! Now I know that my ears _____

I need extra help with _____

Key Concept Summaries

Sight and Hearing

How Do You See?

Your eyes respond to the stimulus of light. They convert that stimulus into impulses that your brain interprets, enabling you to see. Rays of light pass through several structures in the eye. First, light strikes the **cornea**, the clear tissue that covers the front of the eye. Behind the cornea, the light passes through fluid to the **pupil**, the opening through which light enters the eye. The size of the pupil is adjusted by muscles in the **iris**, a circular structure that surrounds the pupil, regulates how much light enters the eye, and gives the eye its color. Light strikes the **lens**, a flexible structure that adjusts and focuses light. The focused light rays pass

through a jellylike fluid and strike the **retina**, which lines the back of the eye and contains 130 million light-sensitive receptor cells. Rods are the receptor cells that enable you to see black, white, and shades of gray; cones enable you to see colors. When light strikes the rods and cones, nerve impulses travel through the optic nerves to the brain. The brain combines the images from each eye to produce a single image. People with **nearsightedness** see nearby objects clearly but not distant objects. People with **farsightedness** see distant objects clearly but not nearby objects.

How Do Your Ears Work?

Ears are the sense organs that respond to the stimulus of sound. An ear converts sound into nerve impulses that your brain interprets. Also, structures in your inner ear help to control your balance. Most sounds are caused by vibrations, rapid back-and-forth movements, of air particles. Vibrations move outward from the source of the sound like waves from a stone dropped in water. Sound waves can pass through gases, liquids, and solids. The funnel-shaped outer ear gathers sound waves, which

pass through the ear canal to reach the **eardrum**, a membrane that vibrates when sound waves strike it. A series of structures in the middle ear transfer those vibrations to the **cochlea**, a snail-shaped tube lined with sound receptor cells. Sensory neurons then send nerve impulses to the brain, where they are interpreted as sounds. **Semicircular canals** in the inner ear help your central nervous system maintain your balance.

On a separate sheet of paper, compare the processes by which we hear a sound and see an image.

Place the outside corner, the corner away from the dotted line, in the corner of your copy machine to copy onto letter-size paper.

Lesson Quiz

Sight and Hearing

If the statement is true, write *true*. If the statement is false, change the underlined word or words to make the statement true.

1. _____ Your eyes convert the stimulus of light into impulses that your brain interprets, enabling you to see.
2. _____ The first structure of the eye that light strikes is the cornea.
3. _____ People with farsightedness see distant objects clearly but not nearby objects.
4. _____ Semicircular canals are the sense organs that respond to the stimulus of sound.
5. _____ Structures in your inner eye help to control your balance.

Fill in the blank to complete each statement.

6. The _____ is a circular structure that surrounds the pupil and regulates how much light enters the eye.
7. The _____ is a membrane inside the ear that vibrates when sound waves strike it.
8. The _____ is a flexible structure that focuses light.
9. People with _____ see nearby objects clearly but not distant objects.
10. The _____ lines the back of the eye and contains light-sensitive cells.

Assess Your Understanding

Smell, Taste, and Touch

How Do Smell and Taste Work Together?


got it?.....

- I get it! Now I know that my senses of smell and taste _____

- I need extra help with _____

How Do You Sense Touch?

1a. REVIEW What kinds of touch receptors are found in the skin? _____

b. ANSWER  How does your body sense and react to your surroundings? _____

got it?.....

- I get it! Now I know that my skin _____

- I need extra help with _____

Key Concept Summaries

Smell, Taste, and Touch

How Do Smell and Taste Work Together?

Receptors in the nose react to chemicals in the air during the process of smelling. **Taste buds**, which are sensory receptors on your tongue, respond to chemicals from the food that dissolved in your saliva. **The senses of smell and taste work together. Both depend on chemicals in food or in the air. The chemicals trigger responses in receptors in the nose and mouth.** Nerve impulses then travel

to the brain and are interpreted as smells or tastes. The nose can distinguish at least 50 basic odors. In contrast, there are only five main taste sensations—sweet, sour, salty, bitter, and a meatlike taste called *umami*. However, when you eat, you experience a wider variety of flavors since both smell and taste affect the flavor of food.

How Do You Sense Touch?

Your skin has different kinds of touch receptors that respond to different stimuli. Some receptors respond to delicate or light touch. These receptors are located in the upper part of the dermis, and they also let you feel a variety of textures. Receptors deep in the dermis pick up the feeling of heavy pressure. The

dermis also contains receptors that respond to pain and temperature change. Pain can be one of the most important sensations, because it alerts you to possible danger. Unlike the other four senses, the sense of touch is not found in one place. It is present in all areas of your skin.

On a separate sheet of paper, explain some similarities between smell and taste, and identify four types of touch that you can experience because of different receptors in your skin.

This is a preview of the content on the page. To see the full content, please visit the full page.

Lesson Quiz

Smell, Taste, and Touch

Fill in the blank to complete each statement.

1. The senses of _____ and taste work together.
2. _____ respond to chemicals from food that has dissolved in your saliva.
3. There are five main taste sensations—sweet, sour, salty, umami, and _____.
4. Receptors located in the upper part of the dermis let you feel _____ touch.
5. Receptors deep in the dermis pick up the feeling of _____ pressure.

If the statement is true, write *true*. If the statement is false, change the underlined word or words to make the statement true.

6. _____ Receptors in the nose react to vibrations in the air during the process of smelling.
7. _____ Nerve impulses travel to the brain and are interpreted as smells or tastes.
8. _____ The nose can distinguish at least 20 basic odors.
9. _____ Temperature can be one of your most important touch sensations because it alerts you to possible danger.
10. _____ Of the five senses, only the sense of touch is not found in one place.

Assess Your Understanding

Alcohol and Other Drugs

How Does Drug Abuse Affect the Body?

1a. **DEFINE** What is drug abuse? _____

b. **EXPLAIN** How can the repeated use of drugs lead to addiction? _____

got it?.....

I get it! Now I know that drug abuse has _____

I need extra help with _____

What Are Some Commonly Abused Drugs?

2a. **LIST** Name two abused stimulants. _____

b. **CHALLENGE** Why might a person's risk of heart attack increase with the use of stimulants? _____

got it?.....

I get it! Now I know that some commonly abused drugs are _____

I need extra help with _____

Assess Your Understanding

Alcohol and Other Drugs

How Does Alcohol Abuse Harm the Body?

3a. **DESCRIBE** Why is alcohol a depressant? _____

b. **MAKE JUDGMENTS** Is it fair that drivers can be arrested for having a BAC above a certain level? Explain your answer. _____

got it?

I get it! Now I know that alcohol abuse can _____

I need extra help with _____

Place the outside corner, the corner away from the dotted line, in the corner of your copy machine to copy onto letter-size paper.

Key Concept Summaries

Alcohol and Other Drugs

How Does Drug Abuse Affect the Body?

A **drug** is any chemical taken into the body that causes changes in a person's body or behavior. Medicines to treat sickness are drugs, as are alcohol and marijuana. The deliberate use of a drug for nonmedical purpose or the use of an illegal drug is **drug abuse**. **Drug abuse is dangerous because of its immediate effects on the brain and other parts of the nervous system. In addition, long-term drug abuse can lead to addiction and other health and social problems.** Most abused drugs can change a person's mood and feelings and affect the way the brain interprets information

from the senses. People taking a drug regularly may develop a tolerance for it. **Tolerance** is a state in which a drug user needs more of a drug to produce the same effect. Tolerance can cause a person to take a large amount of a drug, called an overdose. Repeated drug use can result in **addiction**, in which the body becomes physically dependent on a drug. Some drugs also cause emotional dependence, so the person strongly desires to continue using them. **Withdrawal** is an adjustment period that occurs when a person stops taking a drug on which the body is dependent.

What Are Some Commonly Abused Drugs?

Some commonly abused drugs are marijuana, depressants, stimulants, inhalants, hallucinogens, and steroids. **Depressants** slow down the activity of the central nervous system. **Stimulants** speed up body processes. Inhalants alter

mood, and hallucinogens can make people see and hear things that are not really there. **Anabolic steroids** are synthetic chemicals similar to some hormones naturally produced in the body.

How Does Alcohol Abuse Harm the Body?

A powerful depressant, alcohol is quickly absorbed from the digestive system, often causing blurred vision and changes in heart rate and blood pressure. The more alcohol in the blood, the more serious the effects. Many adults drink moderately without health problems. However, heavy drinking can cause

significant health troubles. **Alcohol abuse can cause the destruction of brain cells and liver cells. It can also lead to addiction and emotional dependence.** It can result in **alcoholism**, a disease in which a person is physically addicted to and emotionally dependent on alcohol.

On a separate sheet of paper, explain several ways in which drug and alcohol abuse affect the body in negative ways.

Lesson Quiz

Alcohol and Other Drugs

If the statement is true, write *true*. If the statement is false, change the underlined word or words to make the statement true.

1. _____ Drug abuse is dangerous because of its eventual effects on the brain and other parts of the nervous system.
2. _____ Few abused drugs can change a person's mood and feelings and affect the way the brain interprets information from the senses.
3. _____ Repeated drug use can result in addiction, in which the body becomes physically dependent on a drug.
4. _____ Some drugs cause emotional dependence, so that a person strongly desires to continue using them.
5. _____ Alcohol is a powerful stimulant.

Fill in the blank to complete each statement.

6. _____ include medicines used to treat illnesses as well as alcohol and marijuana.
7. The deliberate use of a drug for nonmedical purpose or the use of an illegal drug is _____.
8. Long-term drug abuse can lead to _____ and other health and social problems.
9. Alcoholism is a(n) _____ in which a person is physically addicted to and emotionally dependent on alcohol.
10. Alcohol abuse can cause the destruction of brain cells and _____ cells and lead to addiction and emotional dependence.

1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 17. 18. 19. 20. 21. 22. 23. 24. 25. 26. 27. 28. 29. 30. 31. 32. 33. 34. 35. 36. 37. 38. 39. 40. 41. 42. 43. 44. 45. 46. 47. 48. 49. 50. 51. 52. 53. 54. 55. 56. 57. 58. 59. 60. 61. 62. 63. 64. 65. 66. 67. 68. 69. 70. 71. 72. 73. 74. 75. 76. 77. 78. 79. 80. 81. 82. 83. 84. 85. 86. 87. 88. 89. 90. 91. 92. 93. 94. 95. 96. 97. 98. 99. 100.