Chapter 35

Nervous System

Section 35–1 Human Body Systems  (pages 891–896)
This section describes human organ systems and explains how the body maintains homeostasis.

Organization of the Body  (pages 891–894)
1. List the levels of organization in a multicellular organism, from smallest to largest.
   a. __________________________
   b. __________________________
   c. __________________________
   d. __________________________

Match the organ system with its function.

<table>
<thead>
<tr>
<th>Organ System</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Nervous system</td>
<td>a. Stores mineral reserves and provides a site for blood cell formation</td>
</tr>
<tr>
<td>3. Skeletal system</td>
<td>b. Provides oxygen and removes carbon dioxide</td>
</tr>
<tr>
<td>4. Integumentary system</td>
<td>c. Coordinates the body’s response to changes in its internal and external environments</td>
</tr>
<tr>
<td>5. Endocrine system</td>
<td>d. Helps produce voluntary movement, circulate blood, and move food</td>
</tr>
<tr>
<td>6. Lymphatic system</td>
<td>e. Controls growth, development, metabolism, and reproduction</td>
</tr>
<tr>
<td>7. Muscular system</td>
<td>f. Eliminates wastes and maintains homeostasis</td>
</tr>
<tr>
<td>8. Reproductive system</td>
<td>g. Serves as a barrier against infection and injury</td>
</tr>
<tr>
<td>9. Respiratory system</td>
<td>h. Converts food so it can be used by cells</td>
</tr>
<tr>
<td>10. Excretory system</td>
<td>i. Helps protect the body from disease</td>
</tr>
<tr>
<td>11. Circulatory system</td>
<td>j. Produces reproductive cells</td>
</tr>
<tr>
<td>12. Digestive system</td>
<td>k. Brings materials to cells, fights infection, and regulates body temperature</td>
</tr>
</tbody>
</table>

13. What are four types of tissues found in the human body? __________________________

14. The most abundant tissue in most animals is __________________________ tissue.

15. Circle the letter of the type of tissue that covers the surface of the body and lines internal organs.
   a. nervous          c. epithelial
   b. connective       d. muscle
16. What is a gland? ________________________________________________________________

17. Circle the letter of the type of tissue that connects bones to muscles.
   a. nervous  c. epithelial
   b. connective  d. integumentary

Maintaining Homeostasis (pages 895–896)

18. The process of maintaining a controlled, stable internal environment is called _________________.

19. The process by which the product of a system shuts down the system or limits its operation is referred to as _________________.

20. Fill in the missing labels in the diagram to show how a thermostat uses feedback inhibition to maintain a stable temperature in a house.

   Thermostat senses temperature change and switches off heating system

   [Diagram with labels to be filled in]

   Thermostat senses temperature change and switches on heating system

21. Is the following sentence true or false? The part of the brain that monitors and controls body temperature is the hypothalamus.

   ________________

22. What happens if nerve cells sense that the core body temperature has dropped below 37°C?

   ________________

23. What happens if the body temperature rises too far above 37°C?

   ________________
Section 35–2 The Nervous System  (pages 897–900)

This section describes the nervous system and explains how a nerve impulse is transmitted.

Introduction  (page 897)

1. What is the function of the nervous system?  

2. What are three types of neurons?
   a. 
   b. 
   c. 

Neurons  (pages 897–898)

3. Is the following sentence true or false? Sensory neurons carry impulses from the brain and the spinal cord to muscles and glands.

4. Label the following features in the drawing of a neuron: cell body, dendrites, and axon.

5. What is the function of the myelin sheath?  

The Nerve Impulse  (pages 898–899)

6. Is the following sentence true or false? There are more sodium ions in the cytoplasm than in the fluid outside the cell.

7. The difference in electrical charge across the cell membrane of a resting neuron is called its  

8. How does a nerve impulse begin?

9. Circle the letter of the choice that describes an action potential.
   a. Reversal of charges due to the flow of positive ions into a neuron
   b. Increase in negative ions in a neuron due to the flow of potassium out of the cell
   c. Change to a negative charge due to the flow of sodium ions out of a neuron
   d. Reversal of charges due to the flow of negative ions into a neuron

10. The minimum level of a stimulus that is required to activate a neuron is called the ________________.

11. How does a nerve impulse follow the all-or-nothing principle? ________________

12. Circle the letter of the term that refers to the location at which a neuron can transfer an impulse to another cell.
   a. axon       b. dendrite       c. synapse       d. node

13. What are neurotransmitters? ________________

14. Describe what happens when an action potential arrives at an axon terminal. ________________

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**Reading Skill Practice**

When you read about a complex process, representing the process with a diagram can help you understand it better. Make a diagram to show how a nerve impulse is transmitted from one cell to another. Do your work on a separate sheet of paper.
**Section 35–3 Divisions of the Nervous System** *(pages 901–905)*

This section describes the major divisions of the nervous system and explains their functions.

### Introduction *(page 901)*

1. What is the function of the central nervous system? ______________________________
   __________________________________________________________________________
   __________________________________________________________________________

### The Central Nervous System *(page 901)*

2. The central nervous system consists of the ______________ and the ______________.

3. Is the following sentence true or false? Three layers of connective tissue known as meninges protect the brain and spinal cord.
   __________________________________________________________________________

4. The brain and spinal cord are bathed and protected by ______________________________.

### The Brain *(pages 902–903)*

*Match the part of the brain with its function.*

<table>
<thead>
<tr>
<th>Part of Brain</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>5. Cerebrum</td>
<td>a. Coordinates and balances the actions of the muscles</td>
</tr>
<tr>
<td>6. Cerebellum</td>
<td>b. Regulates the flow of information between the brain and the rest of the body</td>
</tr>
<tr>
<td>7. Brain stem</td>
<td>c. Controls voluntary activities of the body</td>
</tr>
<tr>
<td>8. Thalamus</td>
<td>d. Controls hunger, thirst, fatigue, anger, and body temperature</td>
</tr>
<tr>
<td>9. Hypothalamus</td>
<td>e. Receives and relays messages from the sense organs</td>
</tr>
</tbody>
</table>

10. The two hemispheres of the brain are connected by a band of tissue called the ______________________________.

11. Identify the four lobes of the brain.
   a. ______________________________ c. ______________________________
   b. ______________________________ d. ______________________________

12. Is the following sentence true or false? The left hemisphere of the cerebrum controls the body’s left side. ______________

13. Is the following sentence true or false? The outer surface of the cerebrum is called the cerebral cortex. ______________

14. What is gray matter, and where is it found? ______________________________

15. The two regions of the brain stem are the ______________________________ and the ______________________________.
The Spinal Cord (page 903)

16. Name two examples of a reflex. 

17. What is the advantage of a reflex? 

The Peripheral Nervous System (pages 903–904)

18. Circle the letter of each choice that is part of the peripheral nervous system.
   a. cranial nerves
   b. spinal nerves
   c. ganglia
   d. spinal cord

19. Complete the concept map.

20. Circle the letter of each activity that is controlled by the somatic nervous system.
   a. Beating of the heart
   b. Lifting a finger
   c. Wiggling the toes
   d. Pulling foot away from tack

21. What does the autonomic nervous system regulate? 

22. Why is it important to have two systems that control the same organs?
Section 35–4 The Senses (pages 906–909)
This section explains how each of the five senses responds to stimuli from the environment.

Introduction (page 906)

1. What are sensory receptors? __________________________________________________________________________
   __________________________________________________________________________

2. List the five general categories of sensory receptors.
   a. __________________________________________________________________________
   b. __________________________________________________________________________
   c. __________________________________________________________________________
   d. __________________________________________________________________________
   e. __________________________________________________________________________

3. Which category of sensory receptors are sensitive to touch, sound, and motion?
   __________________________________________________________________________
   __________________________________________________________________________

Vision (pages 906–907)

4. Circle the letter of each sentence that is true about the structures of the eye.
   a. Light enters the eye through the cornea.
   b. The anterior chamber is filled with vitreous humor.
   c. The pupil changes in size to let more or less light enter the eye.
   d. The lens focuses light on the retina.

5. Is the following sentence true or false? The function of the iris is to adjust the size of the pupil. __________

6. Where are the photoreceptors located in the eye? __________________________________________________________________________

7. What do photoreceptors do? __________________________________________________________________________
   __________________________________________________________________________

8. Is the following sentence true or false? Cones are extremely sensitive to light, but they do not distinguish different colors. __________

9. How do impulses travel from the eyes to the brain? __________________________________________________________________________
   __________________________________________________________________________

Hearing and Balance (pages 908–909)

10. List the two sensory functions of the ear.
   a. __________________________________________________________________________
   b. __________________________________________________________________________
Chapter 35, Nervous System  (continued)

11. Label each of the following structures in the drawing of the ear: auditory canal, tympanum, semicircular canals, and cochlea.

12. Is the following sentence true or false? The tympanum sends nerve impulses to the brain. ________________

13. Complete the flowchart.

- Vibrations enter the ear through the ____________________________.

- The vibrations cause the ____________________________ to vibrate.

- These vibrations are picked up by three tiny bones, called the ____________________, ____________________, and ____________________.

- The last bone transmits the vibrations to the ____________________________, creating pressure waves in the ____________________.

- Tiny hair cells inside the ____________________ produce nerve impulses that are sent to the brain through the ____________________ nerve.
14. What is the role of hair cells in the cochlea? 

15. How do the semicircular canals help maintain balance? 

Smell and Taste (page 909)

16. Is the following sentence true or false? Your sense of smell is actually an ability to detect pressure. 

17. How does the body detect smell? 

18. Is the following sentence true or false? Much of what we commonly call the “taste” of food and drink is actually smell. 

19. The sense organs that detect taste are the . 

20. List the four different categories of tastes. 
   a. 
   b. 
   c. 
   d. 

Touch and Related Senses (page 909)

21. What is the largest sense organ? 

22. Is the following sentence true or false? The skin contains sensory receptors that respond to temperature, touch, and pain. 

23. Circle the letter of each choice that is true about the sense of touch. 
   a. Unlike the other senses, the sense of touch is not found in one particular place. 
   b. All parts of the body are equally sensitive to touch. 
   c. The greatest density of touch receptors is found on the arms and legs. 
   d. Touch is detected by mechanoreceptors. 

24. Where is the greatest density of touch receptors found on the body?
**Section 35–5 Drugs and the Nervous System** (pages 910–914)

This section describes how different types of drugs affect the nervous system.

**Introduction** (page 910)

1. Is the following sentence true or false? A drug is any illegal substance that changes the structure or function of the body.

   ~~~~~~~~~~~~~~~~~~

2. Is the following sentence true or false? Among the most powerful drugs are the ones that cause changes in the nervous system, especially to the brain and the synapses between neurons.

   ~~~~~~~~~~~~~~~~~~

3. How can drugs disrupt the functioning of the nervous system? ~~~~~~~~~~~~~~~~~~

   ~~~~~~~~~~~~~~~~~~

**Drugs That Affect the Synapse** (pages 910–914)

Match the drug or type of drug with one way that it can affect the body.

<table>
<thead>
<tr>
<th>Drug or Type of Drug</th>
<th>Effect on the Body</th>
</tr>
</thead>
<tbody>
<tr>
<td>5. Depressant</td>
<td>b. Destroys liver cells</td>
</tr>
<tr>
<td>6. Cocaine</td>
<td>c. Reduces pain</td>
</tr>
<tr>
<td>7. Opiate</td>
<td>d. Decreases heart rate</td>
</tr>
<tr>
<td>8. Marijuana</td>
<td>e. Increases blood pressure</td>
</tr>
<tr>
<td>9. Alcohol</td>
<td>f. Causes lung damage</td>
</tr>
</tbody>
</table>

10. Circle the letter of each choice that is a stimulant drug.
    a. nicotine    b. cocaine    c. amphetamine    d. codeine

11. Circle the letter of each choice that is a depressant drug.
    a. alcohol    c. tranquilizer
    b. morphine    d. barbiturate

12. An uncontrollable craving for more of a drug is known as ~~~~~~~~~~~~~~~~~~.

13. Cocaine causes the sudden release in the brain of a neurotransmitter called ~~~~~~~~~~~~~~~~~~.

14. How does drug use increase the transmission of HIV, the virus that causes AIDS? ~~~~~~~~~~~~~~~~~~

   ~~~~~~~~~~~~~~~~~~
15. Complete the Venn diagram.

Cocaine

Opiate

Affects neurotransmitters

16. Is the following sentence true or false? The most widely abused illegal drug is marijuana. ____________

17. Circle the letter of each choice that is a result of long-term use of marijuana.
   a. Loss of memory
   b. Inability to concentrate
   c. Increase in testosterone
   d. Cirrhosis of the liver

18. Is the following sentence true or false? Alcohol is the drug most commonly abused by teenagers. ____________

19. What is fetal alcohol syndrome, or FAS? ________________________________

20. People who have become addicted to alcohol suffer from a disease called ______________.

21. How does long-term alcohol use affect the body? ________________________________

22. Using any drug in a way that most doctors could not approve is referred to as ________________.

23. What is psychological dependence on a drug? ________________________________

24. When does physical dependence on a drug occur? ________________________________
WordWise

Solve the clues to determine which vocabulary terms from Chapter 35 are hidden in the puzzle. Then find and circle the terms in the puzzle. The terms may occur vertically, horizontally, or diagonally.

<table>
<thead>
<tr>
<th>Clues</th>
<th>Hidden Words</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of cell that carries messages throughout the nervous system</td>
<td>_____________</td>
</tr>
<tr>
<td>Part of a neuron that carries impulses toward the cell body</td>
<td>_____________</td>
</tr>
<tr>
<td>Part of a neuron that carries impulses away from the cell body</td>
<td>_____________</td>
</tr>
<tr>
<td>Minimum level of a stimulus required to activate a neuron</td>
<td>_____________</td>
</tr>
<tr>
<td>Three layers of tissue in which the brain and spinal cord are wrapped</td>
<td>_____________</td>
</tr>
<tr>
<td>Area of the brain responsible for voluntary activities of the body</td>
<td>_____________</td>
</tr>
<tr>
<td>Area of the brain that coordinates body movements</td>
<td>_____________</td>
</tr>
<tr>
<td>Brain structure that receives messages from the sense organs</td>
<td>_____________</td>
</tr>
<tr>
<td>Quick automatic response to a stimulus</td>
<td>_____________</td>
</tr>
<tr>
<td>Part of the eye that focuses light on the retina</td>
<td>_____________</td>
</tr>
<tr>
<td>Small opening in the iris of the eye</td>
<td>_____________</td>
</tr>
<tr>
<td>Lining inside the eye that contains photoreceptors</td>
<td>_____________</td>
</tr>
</tbody>
</table>