The Human Nervous System

Use this key to check answers and read the explanations.

1. Which two structures make up the central nervous system?
   - A. Brain and spinal cord
   - B. Brain and the nerves in an arm
   - C. Spinal cord and the nerves in a leg
   - D. Nerves in the arms and legs

   Correct answer: A. Brain and spinal cord
   The brain and spinal cord form the central nervous system. Nerves extending into the limbs belong to the peripheral nervous system.

2. The nerves that extend from the central nervous system into the hand belong to which division?
   - A. Skeletal system
   - B. Central nervous system
   - C. Peripheral nervous system
   - D. Circulatory system

   Correct answer: C. Peripheral nervous system
   The peripheral nervous system connects the brain and spinal cord with other parts of the body.

3. Which part of a neuron contains its nucleus?
   - A. Axon
   - B. Cell body
   - C. Dendrite
   - D. Axon terminal

   Correct answer: B. Cell body
   The cell body, also called the soma, contains the nucleus and supports the cell's basic activities.

4. A typical neuron has several short branches extending from its cell body. Which label fits branches that receive messages from other neurons?
   - A. Nuclei
   - B. Axon terminals
   - C. Cell bodies
   - D. Dendrites

   Correct answer: D. Dendrites
   Dendrites often branch near the cell body. They receive input from other cells.

5. In a typical neuron, which part carries a message away from the cell body toward the terminals?

A. Dendrite
B. Axon
C. Nucleus
D. Cell body

Correct answer: B. Axon
A message can travel along the axon from the cell body toward the axon's terminals.

6. A student hears a chime and points toward the speaker. Which event is the sensory input?

A. Receptors in the ear detect the sound.
B. Arm muscles lift the student's hand.
C. Finger muscles move into a pointing position.
D. Neurons send a command to the arm muscles.

Correct answer: A. Receptors in the ear detect the sound.
Sensory input begins when receptors detect a change. Detecting the chime is input, and pointing is a movement that follows it.

7. A student decides to pick up a notebook. Which part of the body receives the motor messages that produce the lift?

A. Touch receptors in the notebook-holding hand
B. Light receptors in the eyes
C. Hearing receptors in the ear
D. Skeletal muscles in the arm and hand

Correct answer: D. Skeletal muscles in the arm and hand
Motor neurons carry messages to skeletal muscles. Those muscles move the arm and hand to lift the notebook.

8. In a simple model of a typical neuron, a message arrives at the dendrites and leaves through the terminals. Which sequence follows that path?

A. Terminals → axon → cell body → dendrites
B. Dendrites → axon → cell body → terminals
C. Dendrites → cell body → axon → terminals
D. Cell body → terminals → dendrites → axon

Correct answer: C. Dendrites → cell body → axon → terminals
In this model, input travels from the dendrites toward the cell body. Output then travels along the axon toward its terminals.

9. A classroom diagram marks the junction where one neuron communicates with another. Which label names the junction?

A. Synapse
B. Nucleus
C. Cell body
D. Dendrite

Correct answer: A. Synapse
A synapse is a junction where a neuron communicates with another cell.

10. A spinal cord model shows a sensory neuron sending a message to a second neuron, which passes it to a motor neuron. What is the role of that middle neuron?

A. Sensory receptor
B. Sensory neuron
C. Motor neuron
D. Interneuron

Correct answer: D. Interneuron
An interneuron connects neurons within the central nervous system. Some spinal circuits use one or more interneurons between sensory and motor neurons.

11. Two animations show the same arm movement. In A, a stimulus triggers movement through a spinal circuit before any choice to move. In B, the person chooses to move. Which labels fit?

A. Both animations show a spinal reflex.
B. A is a voluntary movement, and B is a spinal reflex.
C. A is a spinal reflex, and B is a voluntary movement.
D. Both animations show a voluntary movement.

Correct answer: C. A is a spinal reflex, and B is a voluntary movement.
A spinal reflex is an automatic response to a stimulus. A voluntary movement follows a decision to move.

12. Arrow A goes from a fingertip touch receptor toward the spinal cord. Arrow B goes from the central nervous system toward a finger muscle. Which labels match?

A. A is motor output, and B is sensory input.
B. A is sensory input, and B is motor output.
C. Both arrows show sensory input.
D. Both arrows show motor output.

Correct answer: B. A is sensory input, and B is motor output.
Sensory input travels toward the central nervous system. In this example, motor output travels away from it toward a muscle.

13. A drawing shows one neuron passing a message to a second. The second neuron receives that message on a dendrite. Which pair labels the two ends at the junction in the direction of the message?

A. First neuron's dendrite → second neuron's dendrite
B. First neuron's dendrite → second neuron's axon terminal
C. First neuron's cell body → second neuron's nucleus
D. First neuron's axon terminal → second neuron's dendrite

Correct answer: D. First neuron's axon terminal → second neuron's dendrite
The first neuron's axon terminal is the outgoing end in this drawing. The second neuron's dendrite is the receiving end.

14. A fictional reflex animation shows a touch message reaching the spinal cord. The arrow from the motor neuron toward the muscle is missing, and the muscle icon stays still. What does the animation show?

A. The sensory message reaches the cord, but the modeled motor path is incomplete.
B. The sensory message misses the cord, but the modeled motor path is complete.
C. The modeled motor message reaches the muscle before the touch signal reaches the cord.
D. Every arrow from the receptor to the muscle is present.

Correct answer: A. The sensory message reaches the cord, but the modeled motor path is incomplete.
The model shows input reaching the cord. The missing arrow is on the output side, between the motor neuron and the muscle.

15. A fictional classroom model logs a sensory marker at tick 2 and movement at tick 6 in run A. In run B, it logs those markers at ticks 3 and 10. Which comparison fits the log?

A. Run A's sensory-to-movement interval is 4 ticks shorter.
B. Run B's sensory-to-movement interval is 3 ticks shorter.
C. Run A's sensory-to-movement interval is 3 ticks shorter.
D. The sensory-to-movement intervals are equal.

Correct answer: C. Run A's sensory-to-movement interval is 3 ticks shorter.
From input to movement, run A takes $6 - 2 = 4$ ticks, and run B takes $10 - 3 = 7$ ticks. The interval is 3 model ticks shorter in A.