

Study Guide — HBS Unit 4: Patient Perspectives (Mid-Unit Test)

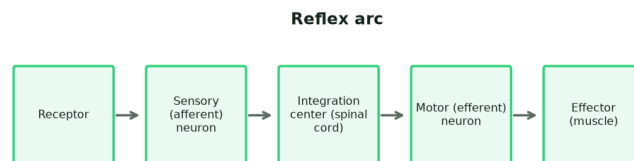
Human Body Systems · Unit 4 — Patient Perspectives · Modeled on the PLTW Guided Review format

Vocabulary to know cold

Term	Definition
Central nervous system (CNS)	The brain and spinal cord; the body's processing and integration center.
Peripheral nervous system (PNS)	Nerves outside the CNS that connect it to the rest of the body.
Neuron	Nerve cell with dendrites (receive), cell body, and axon (send).
Myelin sheath	Fatty insulating layer around an axon that speeds impulse conduction.
Synapse	The gap between two neurons where a neurotransmitter is released.
Neurotransmitter	Chemical messenger that crosses the synapse to signal the next cell.
Resting membrane potential	The neuron's stable charge (about -70 mV) when not firing.
Action potential	The rapid depolarization (nerve impulse) that travels down the axon.
Reflex arc	Receptor → sensory neuron → integration center → motor neuron → effector.
Sensory (afferent) neuron	Carries impulses from receptors TOWARD the CNS.
Motor (efferent) neuron	Carries impulses FROM the CNS to a muscle or gland (effector).
encephal/o	Combining form meaning brain; '-itis' adds inflammation (encephalitis).

Worked examples (follow the reasoning)

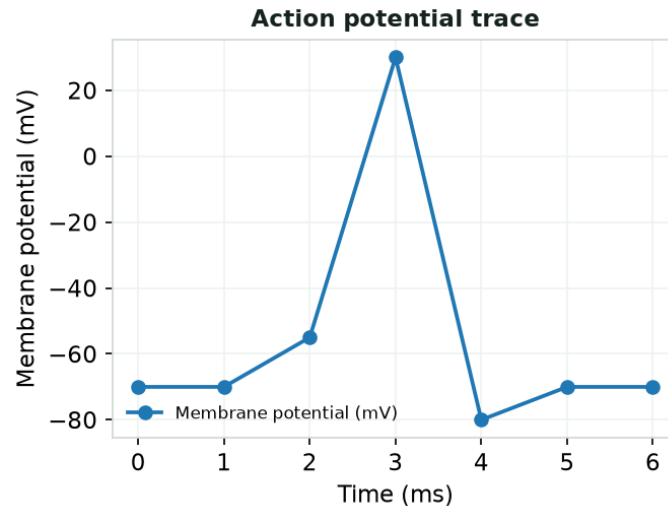
Example 1. Using the diagram, place the parts of a reflex arc in the correct order and describe what each does as you pull your hand off a hot pan.



- Receptor in the skin detects the heat (the stimulus).
- The sensory (afferent) neuron carries the signal toward the spinal cord.
- The integration center in the spinal cord processes the signal without waiting for the brain.
- The motor (efferent) neuron carries the command back out.
- The effector (muscle) contracts and pulls the hand away.

Answer: Receptor → sensory neuron → spinal cord → motor neuron → effector (muscle), giving a fast, automatic withdrawal.

Example 2. Read the action-potential trace and label what is happening at -70 mV and at the +30 mV peak.



- At about -70 mV with a flat line, the neuron is at its resting membrane potential.
- Near -55 mV the membrane reaches threshold and an impulse is triggered.
- The sharp rise to +30 mV is depolarization — the action potential firing.
- The dip below -70 mV afterward is hyperpolarization before returning to rest.

Answer: -70 mV = resting potential; +30 mV peak = depolarization (the action potential).

Practice questions (with reasoning)

1. Which structure speeds up impulse conduction along an axon?

- A. Synapse
- B. Myelin sheath
- C. Dendrite
- D. Nucleus

Answer: B. Myelin insulates the axon and speeds conduction.

2. A motor (efferent) neuron carries signals:

- A. From the CNS to a muscle or gland
- B. From a receptor to the CNS
- C. Only within the brain
- D. Through the bloodstream

Answer: A. Efferent/motor neurons carry commands from the CNS to effectors.

3. The term 'encephalitis' means:

- A. Inflammation of a nerve
- B. Inflammation of the brain
- C. Removal of the brain
- D. Pain in a gland

Answer: B. encephal/o (brain) + -itis (inflammation) = inflammation of the brain.

4. The gap where a neurotransmitter is released between neurons is the:

- A. Axon
- B. Synapse
- C. Myelin
- D. Soma

Answer: B. The synapse is the junction between neurons.

5. A reflex is faster than a voluntary movement because the signal:

- A.** Travels through the spinal cord without waiting for the brain
- B.** Goes to the brain first to decide
- C.** Uses hormones
- D.** Skips neurons entirely

Answer: A. Reflexes are integrated in the spinal cord, bypassing conscious processing.