

What is a Reflex Arc?

Worksheet

A reflex arc is the pathway a nerve impulse follows for an automatic response: receptor sensory neuron relay neuron (spinal cord) motor neuron effector - all without waiting for the brain.

Questions

1. Which structure detects the stimulus in a reflex arc?
 - A) Effector
 - B) Receptor
 - C) Relay neuron
 - D) Motor neuron
2. Where is the relay neuron of most spinal reflexes located?
 - A) Brain cortex
 - B) Spinal cord
 - C) Muscle
 - D) Skin
3. What is the correct order of a reflex arc?
 - A) Effectorreceptormotor neuron
 - B) Receptorsensory neuronrelay neuronmotor neuroneffector
 - C) Motor neuronreceptoreffector
 - D) Relay neuronreceptorsensory neuronmotor neuron
4. Why don't reflexes involve conscious thought?
 - A) They do involve the brain first
 - B) The spinal cord processes the response without waiting for the brain
 - C) Effectors think for themselves
 - D) Receptors make the decision
5. Trace the pathway when you touch a hot stove and pull your hand back.
6. Explain the knee-jerk (patellar) reflex tested at a check-up.
7. What happens when an insect flies suddenly toward your eye?
8. Define: What is a reflex arc?
9. Define: What are the 5 parts of a reflex arc?
10. Define: Why are reflexes faster than voluntary actions?

Answer Key

1. B) Receptor - The receptor is the first structure to detect a stimulus and convert it into a nerve impulse.
2. B) Spinal cord - Most reflex arcs are processed in the spinal cord, allowing a very fast response.
3. B) Receptorsensory neuronrelay neuronmotor neuroneffector - Signals travel receptor sensory neuron relay neuron motor neuron effector.
4. B) The spinal cord processes the response without waiting for the brain - Reflex signals are processed at the spinal cord level, bypassing conscious brain processing for speed.
5. 1) Heat receptors in skin detect high temperature (stimulus) 2) Sensory neuron carries the impulse to the spinal cord 3) Relay neuron in the spinal cord connects to a motor neuron 4) Motor neuron signals the arm muscle 5) Muscle contracts and withdraws the hand (effector) - all in about 20-30 milliseconds, before pain is even consciously felt.
6. 1) Tendon hammer stretches the patellar tendon (stimulus) 2) Stretch receptors in the thigh muscle fire 3) Sensory neuron sends the signal directly to a motor neuron in the spinal cord (this reflex has no relay neuron - monosynaptic) 4) Motor neuron signals the quadriceps muscle 5) The leg kicks forward (effector response).
7. 1) Eye receptors detect the fast-moving object (stimulus) 2) Sensory neuron carries the signal to the brainstem 3) Relay neuron connects to the motor neuron controlling the eyelid 4) Motor neuron signals the orbicularis oculi muscle 5) Eyelid closes in about 100 milliseconds, protecting the eye before you consciously register danger.
8. The neural pathway for an automatic, involuntary response to a stimulus, from receptor to effector.
9. Receptor, sensory neuron, relay (connector) neuron, motor neuron, and effector.
10. The signal is processed in the spinal cord, not the brain, cutting out extra travel time and decision-making.

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