

Nervous System Formative Check

Time: 25 min. 6 questions.

Instructions

Answer each question in the space provided. Show your reasoning for the numeric question, and use complete sentences for the short answer questions. This check is formative: it is designed to reveal what you already understand about neuron function, the central and peripheral nervous systems, sensory structures, and the coordination between the nervous and endocrine systems, so that you and your teacher can identify areas for review before the unit assessment.

Questions

1. Which structure of the brain is primarily responsible for coordinating voluntary muscle movement and maintaining balance?

A) Medulla oblongata
B) Cerebellum
C) Hypothalamus
D) Pons

([Outcome](#))

2. Using the patellar reflex as an example, describe the pathway of a reflex arc from the initial stimulus to the muscular response. Identify the role of the sensory neuron and the motor neuron in your description. ([Outcome](#))
3. True or false: Acetylcholine released at a synapse is broken down by cholinesterase in the synaptic cleft, which terminates its effect on the postsynaptic membrane. ([Outcome](#))
4. During the depolarization phase of an action potential, the membrane potential of a neuron rises from a resting value of -70 mV to a peak of $+30$ mV. Calculate the total change in membrane potential, in millivolts, during this phase. ([Outcome](#))
5. Which structure of the human ear contains the receptor cells that convert fluid vibrations into nerve impulses carried by the auditory nerve?

A) Tympanum
B) Ossicles
C) Organ of Corti
D) Eustachian tube

([Outcome](#))

6. Using stress and the adrenal gland as an example, explain how the nervous system and the endocrine system act together to maintain homeostasis. ([Outcome](#))

Curriculum Coverage

Question	Outcome Alias
1	Outcome
2	Outcome
3	Outcome

4	Outcome
5	Outcome
6	Outcome

Answer Key

1. **B) Cerebellum.** The cerebellum coordinates voluntary muscle movement and maintains balance and posture, distinct from the medulla oblongata, hypothalamus and pons ([Outcome](#)).
2. **Sample answer:** A tap to the patellar tendon stretches the muscle spindle, generating an impulse that travels along a sensory neuron to the spinal cord. There, the sensory neuron synapses directly with a motor neuron (a monosynaptic reflex), which carries the impulse to the quadriceps muscle, causing it to contract and extend the leg ([Outcome](#)).
3. **True.** Cholinesterase breaks down acetylcholine in the synaptic cleft, which stops continued stimulation of the postsynaptic membrane ([Outcome](#)).
4. **100 mV.** The change is calculated as $+30 \text{ mV} - (-70 \text{ mV}) = 100 \text{ mV}$ ([Outcome](#)).
5. **C) Organ of Corti.** The organ of Corti contains the hair cells that transduce fluid vibrations in the cochlea into nerve impulses transmitted by the auditory nerve ([Outcome](#)).
6. **Sample answer:** In a stress response, the nervous system triggers a rapid signal from the hypothalamus through the sympathetic nervous system to the adrenal medulla, which releases adrenaline for an immediate "fight or flight" response. The endocrine system sustains this response by releasing hormones such as cortisol into the bloodstream, producing slower, longer-lasting effects that help the body return to a stable internal state ([Outcome](#)).