The Backstage Crash

Trace how nervous system divisions shape a response.

P.2.5 "Identify the major divisions and subdivisions of the nervous system and describe how they function, and their effect on human behavior."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline each nervous system division and subdivision in the passage, then circle a nearby phrase that tells what it does. Number the signals that help Maya hear the crash, decide what to do, and move.

A Noise Behind the Curtain

1. During a school play, a sudden crash sounds backstage. Maya hears it and turns toward the noise before deciding whether to step forward. Her nervous system has two major divisions. The central nervous system, or CNS, includes the brain and spinal cord. The brain interprets information and helps plan a response. The spinal cord carries signals between the brain and body and can coordinate some rapid reflexes. The peripheral nervous system, or PNS, includes nerves outside the brain and spinal cord. It carries messages between the CNS and the rest of the body, making Maya's quick reaction possible.

2. The PNS has sensory and motor divisions, which carry signals in different directions. Sensory nerves carry information from receptors, such as those in Maya's ears, toward the CNS. After the CNS processes the sound, motor nerves carry commands from the CNS toward muscles and glands. One part of the motor division, the somatic nervous system, controls voluntary movements of skeletal muscles. Maya chooses to walk toward the fallen prop, and somatic motor signals help move her legs. A fast spinal reflex could also make her flinch before she consciously decides what to do. The reflex still uses sensory input and motor output.

3. Another part of the motor division, the autonomic nervous system, regulates functions such as heart rate and digestion without deliberate control. Its sympathetic subdivision prepares the body for action: Maya's heart beats faster when the crash startles her. This response may sharpen her attention to possible danger. After she sees that no one is hurt, the parasympathetic subdivision helps her heart rate slow and supports digestion. Both subdivisions can be active at the same time; their influence changes with the situation. Maya's choice to help and her changing body state show how nervous system divisions work together to shape behavior.

2 ANSWER WITH EVIDENCE

Use the passage

1. How do the CNS and PNS work together as Maya hears the crash and plans a response?

2. Compare the direction and job of sensory signals and motor signals in Maya's response.

3. Which motor subdivision helps Maya walk toward the prop? How is that choice different from her possible flinch?

4. How do the sympathetic and parasympathetic subdivisions affect Maya after the crash?

3 YOUR TURN

Your own words

Imagine you are about to take a penalty kick in soccer. In 4 to 5 sentences, explain how the CNS, the sensory and motor divisions of the PNS, and both autonomic subdivisions could affect your body and actions before and after the kick. Include one voluntary movement.

The Backstage Crash

PART 1 · READ AND MARK

Underline each nervous system division and subdivision in the passage, then circle a nearby phrase that tells what it does. Number the signals that help Maya hear the crash, decide what to do, and move. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	How do the CNS and PNS work together as Maya hears the crash and plans a response?	**The PNS carries sound information toward the CNS. The brain interprets it and helps plan a response, while the PNS carries signals between the CNS and Maya's body.**
2	Compare the direction and job of sensory signals and motor signals in Maya's response.	**Sensory signals carry information from receptors toward the CNS. Motor signals carry commands from the CNS toward muscles and glands.**
3	Which motor subdivision helps Maya walk toward the prop? How is that choice different from her possible flinch?	**The somatic nervous system helps move her leg muscles when she chooses to walk. A flinch could be a fast spinal reflex that occurs before she consciously decides what to do.**
4	How do the sympathetic and parasympathetic subdivisions affect Maya after the crash?	**Sympathetic activity helps prepare Maya for action and makes her heart beat faster. Parasympathetic activity helps her heart rate slow after she sees that no one is hurt.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

I see the goalie shift, and sensory signals in my PNS carry that information toward my CNS. My brain judges where to aim, and the somatic part of the motor PNS sends commands to my leg muscles as I kick. Before the kick, sympathetic activity raises my heart rate and helps prepare me to act. After the play, parasympathetic activity helps my heart rate slow. These changes in movement and body state affect how I respond on the field.

Accept other accurate examples of sensory input, voluntary movement, and changes in body state. Responses should distinguish signals traveling toward the CNS from motor commands traveling away from it.