Brain at Work

Trace how brain structures help a cyclist respond at a crossing.

PS.2.2 "Identify and describe the structure and function of major brain systems, including the major parts of the brainstem, limbic system and cerebral cortex."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline each named brain part or system, circle a phrase that describes its function, and label the three paragraphs B, L, and C for the major system each describes.

A Horn at the Crosswalk

1. At a crowded crosswalk, a cyclist hears a horn and slows down. Even before the cyclist decides what to do, the brainstem is helping keep the body running. The medulla, at the lower end of the brainstem, helps regulate breathing and heart rate. Above it, the pons helps coordinate breathing and supports sleep and alertness. The midbrain, farther up, helps orient the head and eyes toward sudden sights or sounds. These three connected parts link the brain with the spinal cord. Their functions keep essential processes going while other brain systems assess the horn.

2. The horn may also trigger a response in the limbic system, a group of connected structures involved in emotion, memory, and body responses. The amygdala helps detect possible threats and gives the horn emotional importance. The hippocampus helps form memories, so this close call may later be remembered as a reason to slow down at crossings. The hypothalamus helps regulate hunger, temperature, and stress responses. In this moment, it can help activate body changes related to stress. These structures do not act alone. They exchange information with the brainstem and cortex as the cyclist responds.

3. The cerebral cortex is the folded outer layer of the cerebrum. It helps the cyclist interpret the scene and choose an action. In the occipital lobe, visual information supports seeing the crossing signal. The temporal lobe helps process the sound of the horn. The parietal lobe helps locate the cyclist's body and nearby objects in space. The frontal lobe supports planning and voluntary movement, such as deciding to brake and guiding that action. No single lobe handles the entire event. The cortex works with limbic structures and the brainstem, combining perception, memory, emotion, and basic body control.

2 ANSWER WITH EVIDENCE

Use the passage

1. How do the medulla and midbrain support different functions as the cyclist hears the horn?

2. How might the amygdala and hippocampus each contribute to the cyclist's response to the horn?

3. Which cortex lobe helps the cyclist process the horn, and which helps the cyclist see the crossing signal? Describe each function.

4. How do the pons and hypothalamus support different body functions during the cyclist's trip?

3 YOUR TURN

Your own words

Imagine you are walking into a gym when a ball suddenly rolls toward your feet. In four or five sentences, explain how one named brainstem part, one named limbic structure, and one named cortex lobe could help you notice and respond to the ball; state a function of each.

Brain at Work

PART 1 · READ AND MARK

Underline each named brain part or system, circle a phrase that describes its function, and label the three paragraphs B, L, and C for the major system each describes. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	How do the medulla and midbrain support different functions as the cyclist hears the horn?	**The medulla helps regulate breathing and heart rate, while the midbrain helps orient the head and eyes toward a sudden sound.**
2	How might the amygdala and hippocampus each contribute to the cyclist's response to the horn?	**The amygdala helps detect a possible threat; the hippocampus helps form a memory of the close call.**
3	Which cortex lobe helps the cyclist process the horn, and which helps the cyclist see the crossing signal? Describe each function.	**The temporal lobe helps process the horn's sound. The occipital lobe processes visual information used to see the signal.**
4	How do the pons and hypothalamus support different body functions during the cyclist's trip?	**The pons helps coordinate breathing and supports alertness. The hypothalamus can help activate body changes related to stress.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

The medulla helps regulate my breathing while I react to the rolling ball. The amygdala helps me detect the ball as a possible threat. My parietal lobe helps locate my feet and the ball in space. My frontal lobe helps me plan and carry out a step to the side.

Accept any accurate connection between the gym event and a named part from each of the three major systems. Students may choose different parts if they describe each part's function correctly.