Signals at Lunch

Compare how receptors detect changes inside and outside the body.

HS-AP6-1 "Compare and contrast the somatic, visceral, and special senses, the prominent sensory receptor types of each, and their functional operation."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline one receptor type, its stimulus, and its location for each sense category. Circle each mention of mechanoreceptors to trace a receptor type shared by the categories.

A Cup, a Meal, and a Bell

1. At a food truck, you pick up a cold paper cup and feel its rim press against your fingers. These are somatic sensations: their receptors lie in skin, skeletal muscles, and joints, and they report conditions at the body surface or the position of body parts. Skin mechanoreceptors respond to pressure at the rim, while thermoreceptors respond to its low temperature. Nociceptors can signal potentially damaging heat or injury, rather than ordinary touch. Signals from these receptors reach the central nervous system, where you can often identify which finger touched the cup. Muscle and joint receptors also help you hold it steady.

2. After you drink, the stomach wall expands. Stretch-sensitive mechanoreceptors in that wall send visceral signals about an internal organ; this expansion can contribute to your conscious feeling of fullness. Other visceral receptors include chemoreceptors that monitor conditions such as oxygen levels in blood vessels and nociceptors that respond to potentially harmful conditions in organs. Visceral signals can also help regulate automatic responses, such as changes in breathing or digestion. Unlike a touch on one finger, a visceral sensation may be hard to pinpoint. Both somatic and visceral receptors convert a physical or chemical change into electrical signals carried toward the central nervous system.

3. While you wait, you smell grilled onions and hear a bicycle bell. Smell and hearing are special senses, along with taste, vision, and balance. Their receptors are concentrated in specialized structures, such as the nose and inner ear, rather than spread through the skin or many organs. Smell uses chemoreceptors that respond to airborne molecules. Hearing uses mechanoreceptors called hair cells that respond to vibrations in the inner ear; vision uses photoreceptors that respond to light. A receptor type is not exclusive to one category: both skin pressure and hearing involve mechanoreceptors, but they detect different changes in different places.

2 ANSWER WITH EVIDENCE

Use the passage

1. Compare how you sense the cup's coldness and your stomach's fullness. Name each receptor type, where it is, and what change it detects.

2. Smell and monitoring blood oxygen both involve chemoreceptors. How do the locations and detected substances differ?

3. The cup's rim and the bicycle bell both activate mechanoreceptors. Compare what these receptors detect and where they are.

4. What basic step do receptors in all three sense categories perform? Compare where somatic, visceral, and special-sense receptors are found.

3 YOUR TURN

Your own words

Invent a brief scene somewhere other than a food truck. In four or five sentences, describe a somatic, a visceral, and a special sense; name a receptor type and what it detects for each, then compare two of the signals.

ANSWER KEY

Signals at Lunch

HIGH SCHOOL · HS-AP6-1

PART 1 · READ AND MARK

Underline one receptor type, its stimulus, and its location for each sense category. Circle each mention of mechanoreceptors to trace a receptor type shared by the categories. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	Compare how you sense the cup's coldness and your stomach's fullness. Name each receptor type, where it is, and what change it detects.	**Somatic thermoreceptors in the skin detect the cup's low temperature. Visceral mechanoreceptors in the stomach wall detect its expansion, which can contribute to fullness.**
2	Smell and monitoring blood oxygen both involve chemoreceptors. How do the locations and detected substances differ?	**Smell chemoreceptors in the nose detect airborne molecules. Visceral chemoreceptors in blood vessels monitor conditions such as oxygen levels.**
3	The cup's rim and the bicycle bell both activate mechanoreceptors. Compare what these receptors detect and where they are.	**Somatic mechanoreceptors in finger skin detect pressure from the rim. Special-sense hair cells in the inner ear detect vibrations from the bell.**
4	What basic step do receptors in all three sense categories perform? Compare where somatic, visceral, and special-sense receptors are found.	**All convert detected changes into electrical signals carried toward the central nervous system. Somatic receptors occur in skin, muscles, and joints; visceral receptors occur in internal organs and blood vessels; special-sense receptors are concentrated in specialized structures such as the nose and inner ear.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

As I climb a hill, mechanoreceptors in the skin of my foot detect pressure from my boot, a somatic sensation. Each deep breath stretches my lungs, activating visceral mechanoreceptors that help regulate breathing. A bird calls nearby, and mechanoreceptors in my inner ear detect sound vibrations as a special sense. My foot and lungs both use mechanoreceptors, but one signal comes from the body surface and the other comes from an internal organ. The bird's call also activates mechanoreceptors, but these are specialized cells in my ear.

Accept other accurate receptor examples from the passage. For the open task, check that each sense category has a valid receptor, stimulus, and location, and that the comparison identifies a meaningful similarity or difference.