

Active Reading

Section: Sensory Systems

Read the passage below. Then answer the questions that follow.

Your ears convert the energy in sound waves to electrical signals that can be interpreted by your brain. Sound waves enter through the ear canal and strike the tympanic membrane, or eardrum, causing the tympanic membrane to vibrate. Behind the eardrum, three small bones of the middle ear—the hammer, anvil, and stirrup—transfer the vibrations to a fluid-filled chamber within the inner ear. This chamber, called the cochlea, is coiled like a snail's shell, and it contains mechanoreceptors called hair cells. Hair cells rest on a membrane that vibrates when waves enter the cochlea. Waves of different frequencies cause different parts of the membrane to vibrate and thus stimulate different hair cells. When hair cells are stimulated, they generate nerve impulses in the auditory nerve. The impulses travel to the brain stem through the auditory nerve. The thalamus then relays the information to the temporal lobe of the cerebral cortex, where the auditory information is processed.

The ears not only enable you to hear but also help you maintain equilibrium. The semicircular canals are fluid-filled chambers in the inner ear that contain hair cells. Clusters of these hair cells respond to changes in head position with respect to gravity. When your head moves, the hair cells are stimulated according to the magnitude and direction of the fluid's movement and send electrical signals to the brain. Signals generated by the hair cells enable the brain to determine the orientation and position of the head.

SKILL: READING EFFECTIVELY

Read each question, and write your answer in the space provided.

1. According to the passage, what are two functions of the ear?

2. How does energy change form in the ear?

Active Reading *continued*

3. What causes the tympanic membrane to vibrate?

4. What is the cochlea?

5. How do vibrations reach the cochlea?

6. What occurs when hair cells are stimulated?

7. What are semicircular canals?

8. How do the semicircular canals help you maintain balance?

In the space provided, write the letter of the term or phrase that best completes the statement.

9. The semicircular canals and cochlea are alike in that both
- a. are located in the inner ear.
 - b. are fluid-filled chambers.
 - c. convert sound energy to electrical signals.
 - d. Both (a) and (b)