A9 · The ear: hearing and balance · Practice key

This is the worked key. Every practice question is worked step by step.

Worked examples

Read these first. There is one for each kind of question in this lesson.

Example 1 · Trace sound through the ear

List the parts that carry sound from the air to the brain, in order.

1. The pinna collects sound waves, and the auditory canal carries them in.
2. The tympanum vibrates.
3. The ossicles pass the vibrations to the cochlea.
4. Hair cells bend, and the auditory nerve carries action potentials to the brain.

Answer: Pinna, auditory canal, tympanum, ossicles, cochlea, auditory nerve.

Example 2 · Tell hearing from balance

A person hears normally but feels dizzy and unsteady. Which part of the inner ear is affected?

1. The cochlea is for hearing, and hearing is normal.
2. The semicircular canals are for balance.

Answer: The semicircular canals.

Practice

Questions 1 to 4 are easy. Questions 5 to 8 are medium. Questions 9 and 10 are harder.

EASY

1. Name the flap on the side of the head that collects sound waves.

1. It is part of the outer ear.
2. It is the pinna.

EASY

2. Name the three tiny bones of the middle ear.

1. They cross the middle ear in a chain.
2. They are the ossicles.

EASY

3. Name the coiled part of the inner ear.

1. It is shaped like a snail shell.
2. It is the cochlea.

EASY

4. Name the receptors for hearing.

1. They are in the organ of Corti.
2. They are hair cells.

MEDIUM

5. Explain why your ears "pop" when a plane climbs.

1. The air pressure outside changes.
2. The Eustachian tube opens and lets air out of the middle ear.
3. The pressure is equal again on both sides of the tympanum.

MEDIUM

6. State what fills the cochlea, and what moves in it when sound arrives.

1. The cochlea is filled with fluid.
2. The last ossicle pushes on it and makes waves in the fluid.

MEDIUM

7. Name where action potentials from the cochlea go. Name where those from the semicircular canals go.

1. From the cochlea: the temporal lobe.
2. From the semicircular canals: the cerebellum.

MEDIUM

8. Explain why there are three semicircular canals and not one.

1. The three canals lie at different angles.
2. So they detect movement of the head in any direction.

HARDER

9. Years of loud noise have destroyed many hair cells in a worker's cochlea. Use the six steps to explain the hearing loss.

1. Steps 1 to 4 still happen: vibrations reach the cochlea.
2. At step 5, there are few hair cells to bend.
3. Few action potentials start, so little reaches the brain.

HARDER

10. You spin on a chair and stop. For a moment the room seems to keep turning. Explain, using the fluid in the semicircular canals.

1. The fluid keeps moving after the head stops.
2. The hairs of the hair cells stay bent.
3. The brain is told the head is still turning.