

THE EAR

Explain the consequences for hearing if the structures labelled D are fused

Functions

- Transmits vibrations to the oval window
- Amplifies sounds

Adaptation: Made from bone... carry vibrations

D Ossicles

- The ossicles/structures will not be able to vibrate
- and hence no vibrations will be passed to the inner ear
- Cochlea will not be stimulated
- No amplification will occur

E Semi-circular (Cristae - balance)

F Sacculus and Utriculus (Maculae - balance)

Explain how part E and part F helps to maintain balance

1. The cristae in the semi-circular (E) canals are stimulated by changes in the direction and speed of movement
2. The maculae in the sacculus and utriculus (F) are stimulated by changes in the position of the head.

When stimulated, the cristae and maculae convert the stimuli received into nerve impulses. The nerve impulses are transported along the auditory nerve to the cerebellum to be interpreted. The cerebellum then sends impulses to the muscles to restore balance

G Auditory Nerve (Sensory neuron)

Transmit impulses from the cochlea to the cerebrum (hearing) and semi-circular canals to the cerebellum (balance)

H Cochlea

Contains the hearing receptors called Organ of Corti

Explain the consequences for hearing if part G is damaged

- Auditory nerve (G) won't be able to transmit impulses to the cerebrum
- Cerebrum won't be able to interpret the impulses
- The person won't be able to hear

Explain the consequences of a blockage in part I

- Blockage of the Eustachian tube which will not be able to equalise the pressure in the middle ear
- resulting in pressure on the tympanic membrane
- that may cause the tympanic membrane to burst - leading to hearing loss

Pinna A

Function: Directs sound waves to the tympanic membrane

Adaptations:

- Grooved-directs sound waves
- Situated on the outside to capture maximum sound waves

Ear canal B

Function: Directs sound waves to the tympanic membrane/tympanum (eardrum)

Oval window K

Function: Converts sound vibrations into pressure waves. Helps amplification

Round window

Function: Release/absorb pressure waves to prevent internal ear echo.

I Eustachian tube

(Connects the Mouth to the middle ear)

Functions

- Equalise pressure on either side of the tympanic membrane/eardrum
- Drains moisture from the middle ear

HEARING DEFECTS:

Hearing defect	Causes	Treatment	Describe how hearing occurs.
Middle ear infection	• Excess fluid in the middle ear caused by pathogen infection	• Antibiotics • Inserting grommets in the tympanic membranes	• Sound waves are directed into the auditory canal by the pinna. • The sound waves make the tympanic membrane vibrate and the vibrations are passed on to the ossicles in the middle ear.
Deafness	• Injury to parts of the ear, nerves or parts of brain responsible for hearing • Hardened wax • Hardening of ear tissues such as ossicles	• Hearing aids • Cochlear implants	• The ossicles make the oval window vibrate and this causes pressure waves to be set up in the inner ear. • These vibrations also cause the organ of Corti to be stimulated and it generates impulses which are sent to the cerebrum along the auditory nerve. • The cerebrum interprets the impulses as sound.