Chapter 11 Sense Organs.

Good Morning Students,
The following lesson is of Class 10 for the subject of Biology Topic - Structure and functioning of ear. which is covered in Chapter 11 titled Sense organs starting on Page No. 138 of your text book titled 'Concise Biology - Selina Publications and is being submitted to you on **14.10.2024**
This voice is of Nidhi Rana.
Students please open page No 145 of your text book as I am going to explain you the structure of Human ear.
Human ear is an organ concerned with two primary functions of hearing and body balance
Human ear has 3 main divisions as -

i **Outer ear or external ear.**
External ear consists of the projecting part the earlobe or pinna Pinna collects the sound waves and directs them to the ear canal or auditory canal The auditory canal terminates at the ear drum or tympanum Tympanum is a thin membrane that lies between the outer and middle ear Sound waves striking against it cause it to vibrate

ii **Middle ear** contains 3 tiny bones - malleus

(hammer-shaped), incus (anvil shaped) and stapes (stirrup shaped) The three bones are collectively called the ear ossicles Ear ossicles transmit vibrations to the internal ear. The cavity of the middle ear is connected to the throat through eustachian tube.

Positioning of ear ossicles - The handle of the malleus bone is attached to the inner surface of the eardrum. Its opposite end is connected to the incus which in turn is joined to the stapes The flat part of the stapes fits on the oval window, a membrane covered opening leading to the inner ear. Another opening the round window connects the middle and the inner ear. All students may please look at Pg No 146 Fig 11.9 B showing the close up view of middle ear and carefully see the positioning of the three bones, oval window & round window. Now let us talk about inner ear

iii. Inner ear or membranous labyrinth comprises the cochlea, semicircular canals and the vestibule

Cochlea is spiral shaped like a snail shell with two and half turns Its inner cavity is divided into 3 parallel canals separated by membranes. Please look at Fig 11.10 at Page 146 to understand the structure of inner ear.

The outer and inner canal of cochlea contains perilymph and the middle canal is filled with endolymph. The middle canal possesses sound receptors or sensory cells for hearing i.e. organ of Corti. Nerve fibres from these sensory cells join the auditory nerve Organ of Corti transform the sound vibrations into nerve impulses. and thus help us to hear

Semicircular canals The other part of the inner ear is a set of three semi circular canals which are fluid filled and arranged at right angles to each other in three different planes so that one is horizontal and two are vertical. One end of each canal enlarges into a swelling called the ampulla which contains sensory cells for dynamic balance i.e. maintenance of body position in response to movement or we can say when the body is in motion. Nerve fibres from these sensory cells join the auditory nerve.

Vestibule consists of utriculus and sacculus It is a short stem that joins the base of semicircular canals to cochlea Vestibule is concerned with static balance i.e. when the body is stationary as in standing position. Students may again carefully see Fig 11.10 on Page No 146 to clearly understand the positioning of all these parts of inner ear.

Before going further let us recapitulate the things we have done till now by means of a short test. Listen to the following questions and then pause the audio for 3 min to write their answers in your notebook Questions are as follows -

Q1 Name the tube that connects the cavity of middle ear with the throat

Q2 Name the sensory cells present in the cochlea that help us to hear.

Q3 Name the part of the ear that cantains -
(i) sensory cells for dynamic balance
(ii) sensory cells for static balance.

You may pause the audio for 3 mins now.
Break is over children. Listen to the correct answers first.

A1 Eustachian Tube connects ear with the throat

A2 Organ of corti are present in ear for hearing.

A3 Semicircular canals cantain sensory cells for dynamic balance and vestibule cantains the sensory cells for static balance

Now let us resume the topic with - Functions of the ear. The internal ear contains sensory cells that performs two functions i.e. hearing and body balance

(i) Hearing - Sound waves enter through the outer ear and after passing through the pinna & auditory canal they strike the tympanum

setting it into vibrations Eustachian tube equalises the air pressure on either side of the tympanum allowing it to vibrate freely. The vibrating ear drum / tympanum sets the 3 tiny bones ie. ear ossicles into vibrations. The vibration of the last ossicle ie. stapes is amplified due to lever-like action of the first two ossicles These enhanced vibrations of the stapes are transmitted to the membrane of the oval window which in turn sets the fluid contained in 3 cochlear canals also into vibration These vibrating movements of the fluid stimulate the hair like processes of the sensory cells of the cochlea ie. organ of corti Thus the sensory cells of hearing ie. organ of Corti of the ear receives the stimulus in form of vibrations Finally the organ of corti transform sound vibrations into nerve impulses which are transmitted to brain via auditory nerve. The different areas of the cochlear canal are suited to sounds of different pitches. We cannot pick up vibrations of all frequencies Our sensory endings can receive sounds at frequencies between 20 to 20,000 Hertz.

Now let us talk about the 2nd function of ear, that is, Body balance.

Body Balance - The 3 semicircular canals and the vestibule function as balancing organs These organs are filled with endolymph. Endolymph moves when we change our position for eg when we turn our head in different directions. The moving fluid in the canals pushes against sensory hair cells which sends the nerve impulses to the brain via auditory nerve. Children to refresh about the functioning - Semicircular canals are concerned with dynamic balance of the body.
Vestibule - ie. utriculus and sacculus is concerned with the static balance of the body This finishes with the chapter children Now I will give you some home assignment questions All students will write the answers to the home assignment questions in the notebooks

Home assignment questions are as follows -

Q1. Do the following 'Review questions' given at the end of chapter 11 Sense organs.

D Descriptive Type
Q No. 2, 3 and 4.

E Structured Type
Q No 4, 5 and 6

Q2 Draw a well labelled diagram of membranous labyrinth