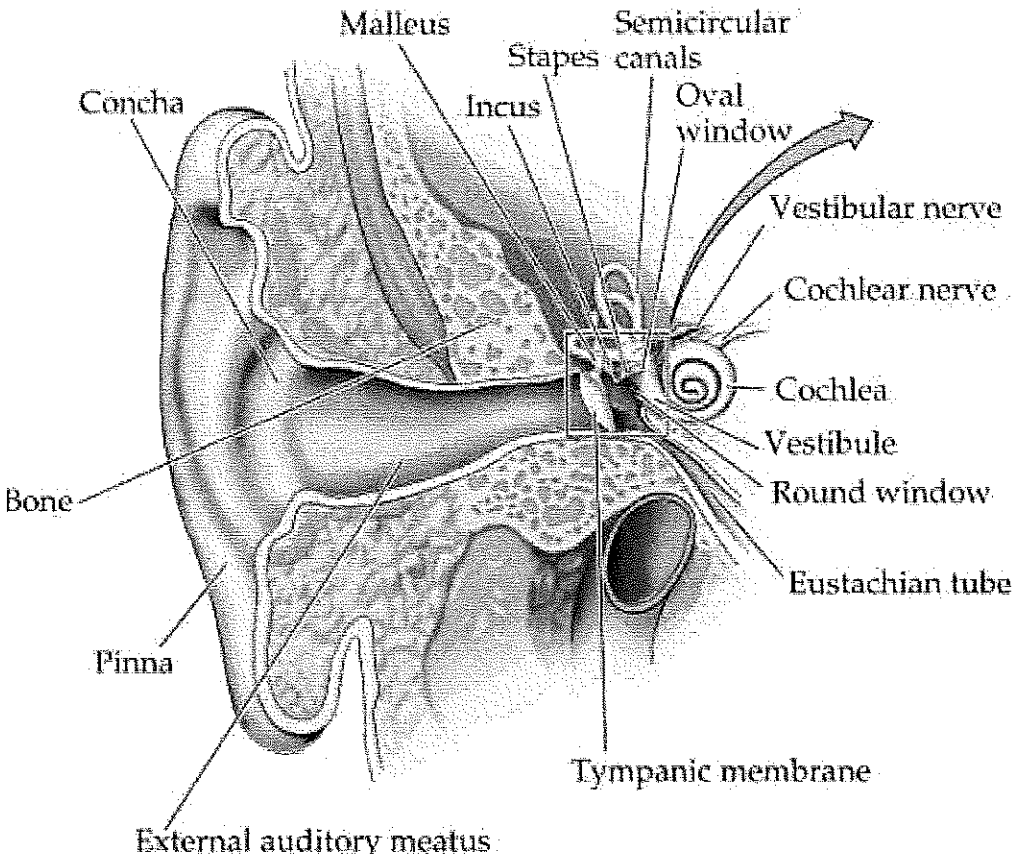
MODULE 20 HEARING

AUDITION

- Hearing is highly adaptive.
- **AMPLITUDE** of sound waves determines loudness. The length of the sound wave, or **FREQUENCY**, determines the **PITCH** we experience. We measure sound in decibels, with zero decibels representing the absolute threshold.

THE EAR

- The **MIDDLE EAR** consists of three tiny bones (hammer, anvil, and stirrup) pick up the vibrations and transmit them to the **COCHLEA**, a snail-shaped tube in the **INNER EAR**.
- Hair cell movements triggers impulses in the adjacent nerve cells which travels down the auditory nerve and sends the neural message to the auditory cortex in the brain's temporal lobe.



- **SENSORINEURAL HEARING LOSS (nerve deafness)** is hearing loss caused by damage to the cochlea's receptor cells or to the auditory nerves; also called nerve deafness.

- **CONDUCTION HEARING LOSS** is hearing loss caused by damage to the mechanical system that conducts sound waves to the cochlea.
- The only way to restore hearing for people with nerve deafness is a sort of bionic ear – a **COCHLEAR IMPLANT**. This is a device for converting sounds into electrical signals and stimulating the auditory nerve through electrodes threaded into the cochlea.
- Hermann von Helmholtz's **PLACE THEORY** presumes that we hear different pitches because different sound waves trigger activity at different places among the cochlea's basilar membrane. Explains how we hear high pitch sounds but not low-pitched sounds.
- **FREQUENCY THEORY** in hearing, the theory that the rate of nerve impulses traveling up the auditory nerve matches the frequency of a tone, thus enabling us to sense its pitch. Waves = amount of neural impulses. Explains high pitches.
- Might be a mixture of the two theories.

BE ABLE TO ANSWER: What are the basic steps in transforming sound waves into perceived sound?

PRACTICE FRQ: Describe two parts of the ear that transmit sound waves before they reach the hair cells.