* The ear has two main functions:

1. Hearing
2. Equilibrium

* The ear can be divided into three sections:

1. The outer ear
2. The middle ear
3. The inner ear

The Outer Ear

* Outer ear is made up of 2 structures:
* **Pinna** – outer part of the ear that acts as a funnel, taking sound from a large area and channelling it into a small canal.
* **Auditory canal** – carries sound waves to the eardrum.

Middle Ear

* Middle ear is made up of 3 structures:
* **Tympanic membrane** (eardrum) – thin layer of tissue that receives sound vibrations.
* **Eustachian tube** – air filled tube that equalizes pressure between the external and internal ear.
* **Ossicles** – tiny bones that amplify and carry sound in the middle ear.
  + 3 bones:
  + Malleus (the hammer)
  + Incus (the anvil)
  + Stapes (the stirrup)

Inner Ear

* Inner ear is made of 3 structures:
* **Vestibule** – chamber found at the base of the semicircular canals that provides information about static equilibrium.
  + **Static equilibrium** – sense that interprets head position.
* **Semicircular canals** – fluid filled structures that provide information about dynamic equilibrium.
  + **Dynamic equilibrium** – sense that interprets balance.
* **Cochlea** – coiled structure that responds to various sound waves and converts them to nerve impulses.

Sequence of Hearing

* The **pinna** collects the sound waves from environment and channels them into the **auditory canal**.
* The auditory canal is lined with specialized sweat glands that produce ear wax, that traps foreign particles and prevents them from entering the ear.
* The sound waves reach the **tympanic membrane** (eardrum) and cause it to vibrate.
* The vibrations are passed on to the three **ossicles**: first the **malleus**, then the **incus** and finally the **stapes**.
* The bones amplify the vibrations.
* The **oval window**, a oval shaped hole in the vestibule, receives the vibrations next.
* The oval window is pushed inward, and the **round window** (below oval window) moves outward.
* This triggers waves of fluid within the inner ear.
* The **cochlea** receives these fluid waves and converts them to electrical nerve impulses, which we interpret as sound.
* The hearing apparatus within the cochlea is known as the **organ of Corti** and is made of rows of specialized hair cells.
* The **basilar membrane** anchors the hair cells in the organ of Corti.
* The hair cells respond to vibrations and begin to move.
* The movement of the hair cells stimulates sensory nerves in the basilar membrane and the nerve impulse is sent to the temporal lobe of the cerebrum by way of the **auditory nerve**.

Pitch and Loudness

* Basilar membrane is narrow and stiff near the oval window.
* Further along in the cochlea the basilar membrane is wide and flexible.
* High frequency sounds activate the narrowest area.
* Low frequency sounds activate the wider area.
* This allows us to hear different pitches.