

# Your Ears – How Ears Hear

Our ears are wonderfully sophisticated organs that convert sound waves into electrical signals our brain can understand.

## AT A GLANCE

Ears catch sound waves, change them into nerve impulses, and send them to the brain for interpretation.

Three parts of the ear work together to help us hear.

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

But that's not all – ears keep us upright! They are our main organs of balance.

## HOW EARS WORK

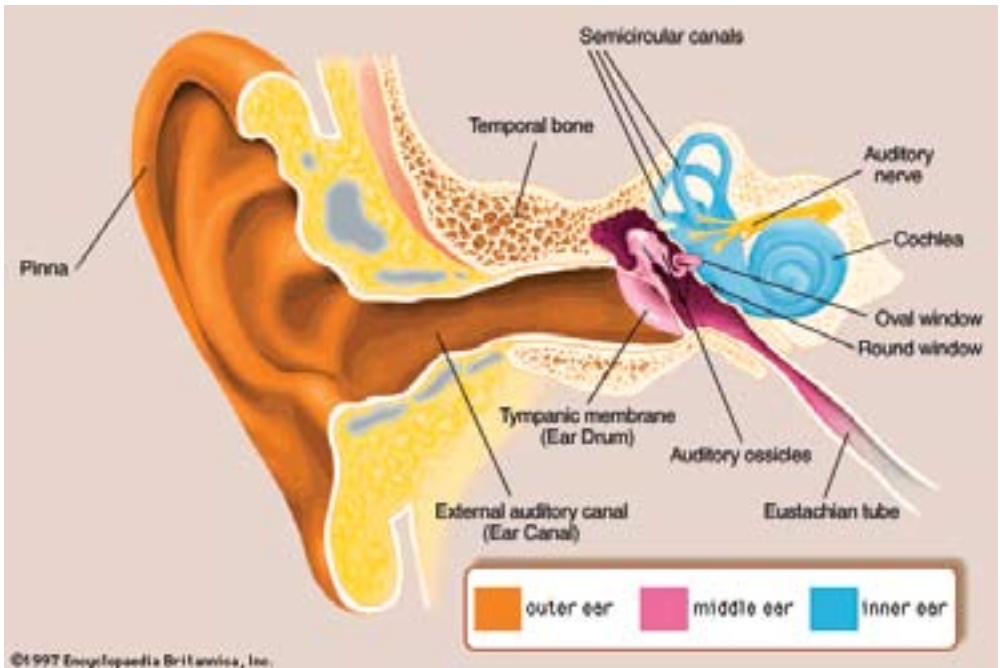
Ears pick up sound waves.

### Outer Ear

The sound waves first go into the outer ear. This is what we traditionally think of as our ears. It's the part of the ear we can see.

Sound waves are picked up by the pinna, and sent down the ear canal.

The ear canal makes some sounds stronger. The sound waves hit the ear drum and make it vibrate, transmitting this vibration into the middle ear.



## Middle Ear

The middle ear allows airborne sound to flow efficiently into the fluid-filled inner ear.

Once the sound waves get to the middle ear, three tiny bones – the hammer, then the anvil, then the stirrup – start working to amplify sound waves.

These are the smallest bones in our bodies and are also known as the ossicles. They sit like a tiny bridge between the ear drum and the inner ear. The entire structure is about the size of an M&M chocolate sweet – not much more than a centimetre across.

The middle ear then transmits the sound waves to the inner ear.

## Inner Ear

The inner ear is shaped in a spiral similar to a snail shell. It's called the cochlea, and contains mechanisms for hearing and balance. The entire cochlea is about the size of a pea.

The hearing part of the cochlea is lined with around 30,000 tiny hair cells and filled with fluid. It works like a sophisticated microphone, turning pressure waves into nerve impulses.

The sound waves enter the inner ear and pass as pressure waves through the fluid, stimulating the hair cells. The outer hair cells actively increase the strength of weak pressure waves to allow them to stimulate the inner hair cells, generating nerve impulses.

The nerve impulses are sent along the auditory nerve and the auditory processing centres in the brain.

The balance part of the inner ear consists of three fluid-filled loops which act like a gyroscope and tell us which way is up, and how we are moving.

## Auditory brain areas

The auditory brain areas interpret those electrical impulses into the sounds and noises we hear.

They help us to ignore some sounds and concentrate on sound that is important for us.

These areas let us know what direction sounds are coming from. There are important links between the brain's auditory areas and the brain's language and speech centres.

