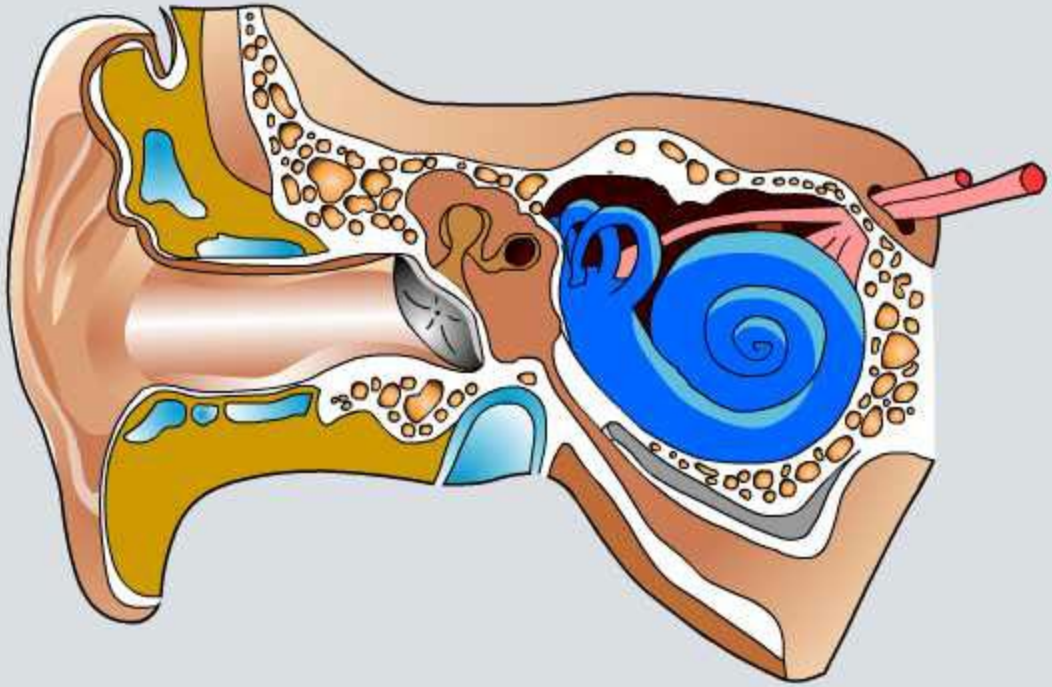
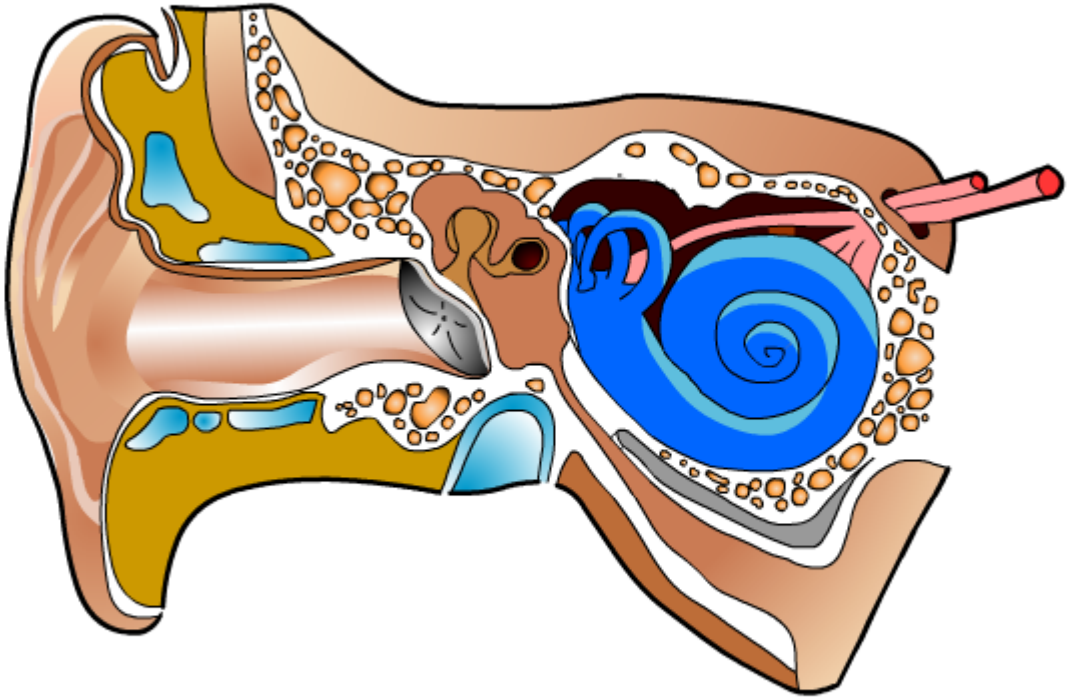
The Ear and Hearing



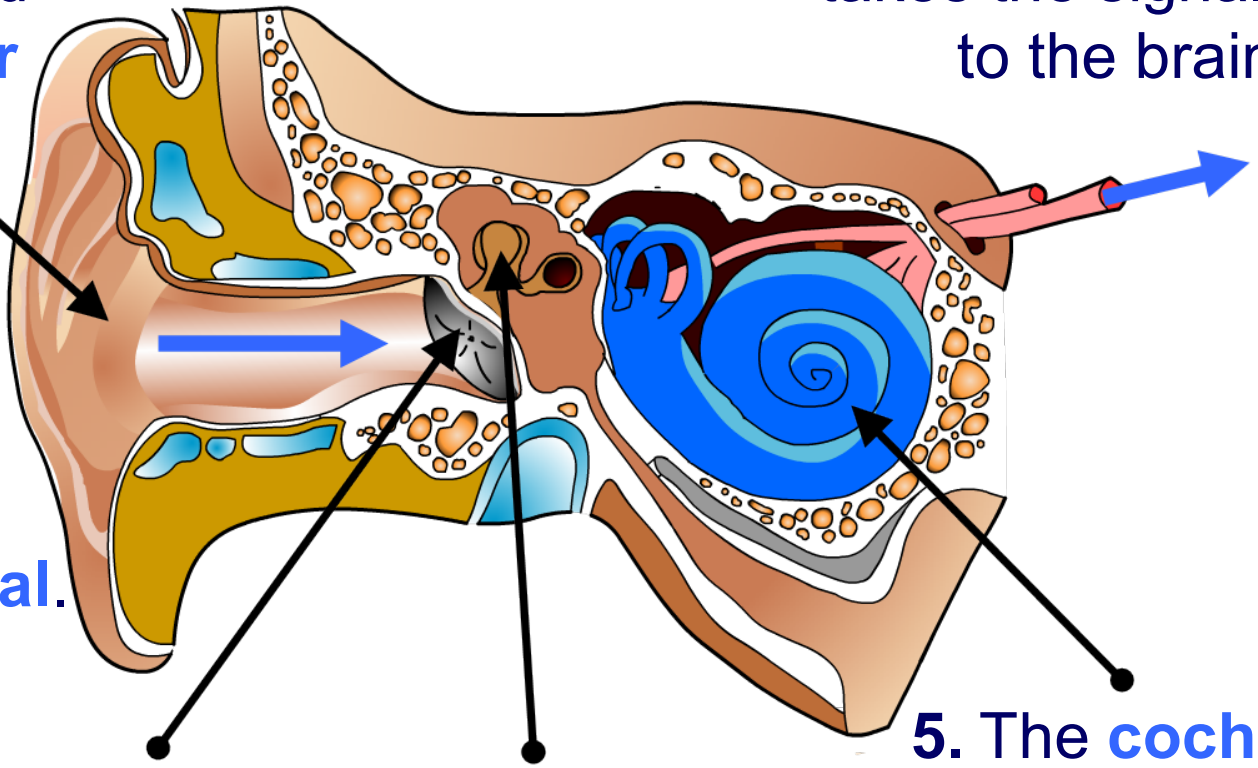
How does sound travel through the ear?



How does the ear work?

1. Sound waves are collected by the **outer ear** (or pinna).

2. The waves travel along the **ear canal**.



3. The waves reach the **eardrum** and make it vibrate.

4. The small bones (**ossicles**) amplify the vibrations.

5. The **cochlea** turns these into electrical signals.

6. The **auditory nerve** takes the signals to the brain.

The ear and hearing summary

Complete these sentences about sound and hearing

1a. Sound waves enter the outer ear and travel along the ear canal to the _____.

1b. The eardrum vibrates, which makes the three _____ (ossicles) in the middle ear move.

1c. This movement amplifies the eardrum's vibration and causes liquid and tiny hairs in the _____ to move.

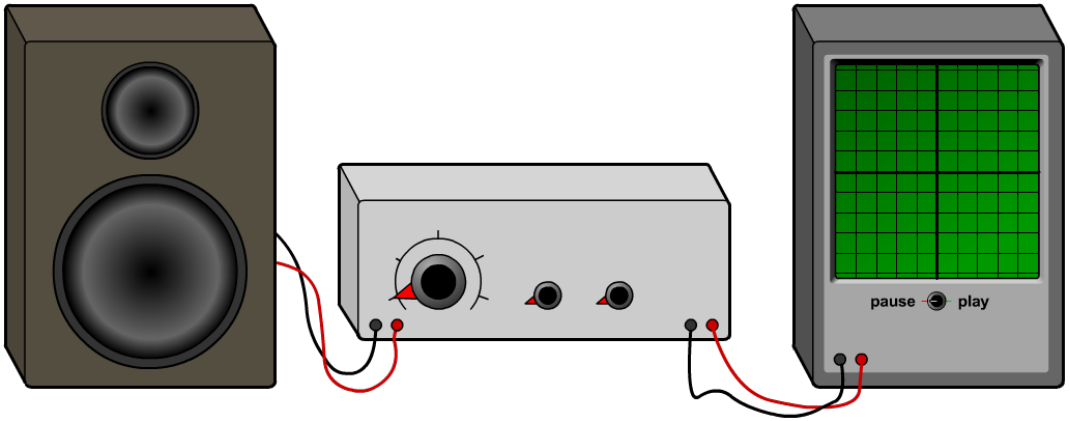
delicate	small bones	repair	tiny hair cells
eardrum	cochlea	auditory	loud

hide solve

What range of frequencies can you hear?

Humans can only hear sounds of certain frequencies. The range of frequencies a person can hear is called their **hearing range**.

Hearing range can be tested using a **pitch sweep**, in which the frequency of a sound wave is gradually increased. This can be created using a signal generator and loudspeaker.



What is the hearing range of a healthy young person?

20 Hz to 20,000 Hz

Hearing ranges and hearing loss

Does everyone have the same hearing range?

We all have slightly different hearing ranges.

People lose the ability to hear sounds of high frequency as they get older.

Almost 1 in 5 people suffer some sort of hearing loss.

- **Temporary** hearing loss may be caused by ear infections and colds, after which hearing recovers.
- **Permanent** hearing loss and deafness can be present at birth or occur if the ear is damaged or diseased.

Animals' hearing ranges

What is the order of hearing ranges, from biggest to smallest?

1	dolphin:	70 Hz to 150,000 Hz
2	cat:	100 Hz to 60,000 Hz
3	mouse:	1000 Hz to 100,000 Hz
4	elephant:	1 Hz to 20,000 Hz
5	human:	20 Hz to 20,000 Hz
6	dog:	40 Hz to 45,000 Hz
7	bat:	1000 Hz to 150,000 Hz

?

C solve

Ordering volumes

What is the order of these sounds from loudest to quietest?

- pin dropping
- combine harvester
- vacuum in space
- airplane overhead
- personal stereo
- motorcycle
- quiet countryside

solve

Reducing noise