

# Light propagates faster than sound

Have you heard a loud thunder?

Why do we hear Thunder after seeing lightning?

As sound is slower than light, thunder is heard few seconds after lightning.

Lightning strikes at a distance

Speed of light =  $3 \times 10^8$  m/s

Speed of Sound = 330 m/s

Light propagates light million times faster than sound



# Characteristics of a Vibration

1

## Amplitude (A)

The maximum displacement of a body on either side of its mean position is called its amplitude.

2

## Time period (T)

The time taken for one complete oscillation is called as time period.

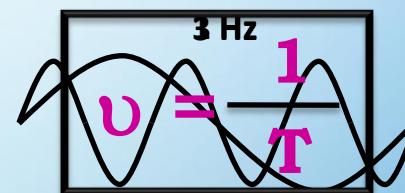
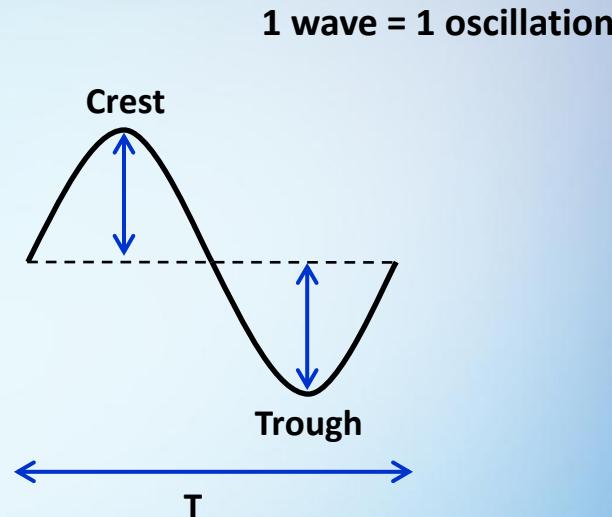
It is measured in seconds (s).

3

## Frequency ( $\nu$ )

The number of oscillations per second is called frequency of vibrations.

It is measured in hertz (Hz).

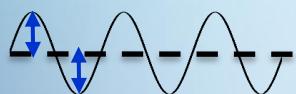


1 Hertz = A frequency of 1 Hz is one oscillation per second  
 $\frac{1}{1\text{ s}}$

# Characteristics of Sound

## Loudness

Loudness of sound depends on its amplitude



Amplitude is less, sound is soft.

Amplitude is more, sound is loud.

## Loudness

It is expressed in decibel (dB)

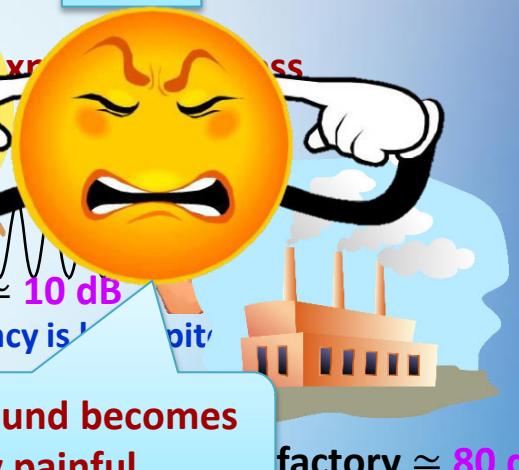


## Pitch

Generally girls sound is high pitch



Normal breathing  $\approx 10 \text{ dB}$   
Frequency is low, pitch is low



Above 80 dB sound becomes physically painful

factory  $\approx 80 \text{ dB}$



Aeroplane Frequency is low, pitch is low  
 $150 \text{ dB}$

Sound	Loud or Soft	High pitch or Low pitch
	<b>Loud</b>	<b>Low pitch</b>
	<b>Soft</b>	<b>High pitch</b>



Can we hear the  
sound of pendulum  
oscillating?



NO





## FREQUENCY OF SOUND



## TYPE OF SOUND

Less than 20 Hz



Infrasonic

Between 20 Hz & 20,000 Hz



Sonic

More than 20,000 Hz

Range of frequency which  
humans can hear

Ultrasonic

Greater than 200,000 Hz

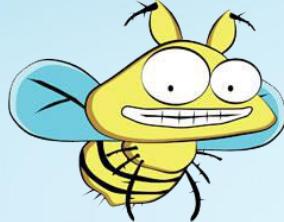
SoSonic &  
Infrasonic  
infUltrasonic  
Ultrasonic



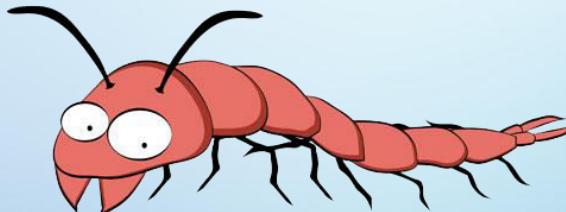
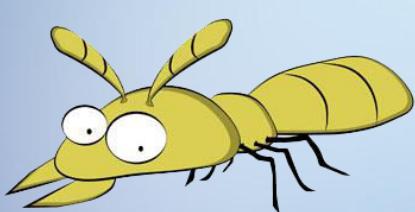
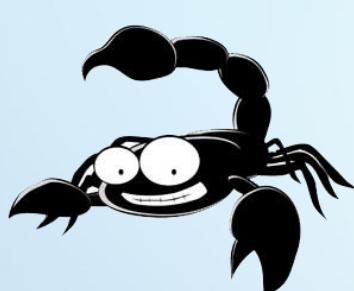
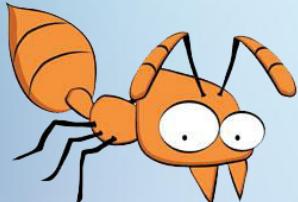
Dolphin  
Dog  
Elephant

22,000 Hz - 40,000Hz

## PESTS



Ultrasonic





# HUMAN EAR

We are able to hear with the help of extremely sensitive device called ear

Compression &  
rarefaction

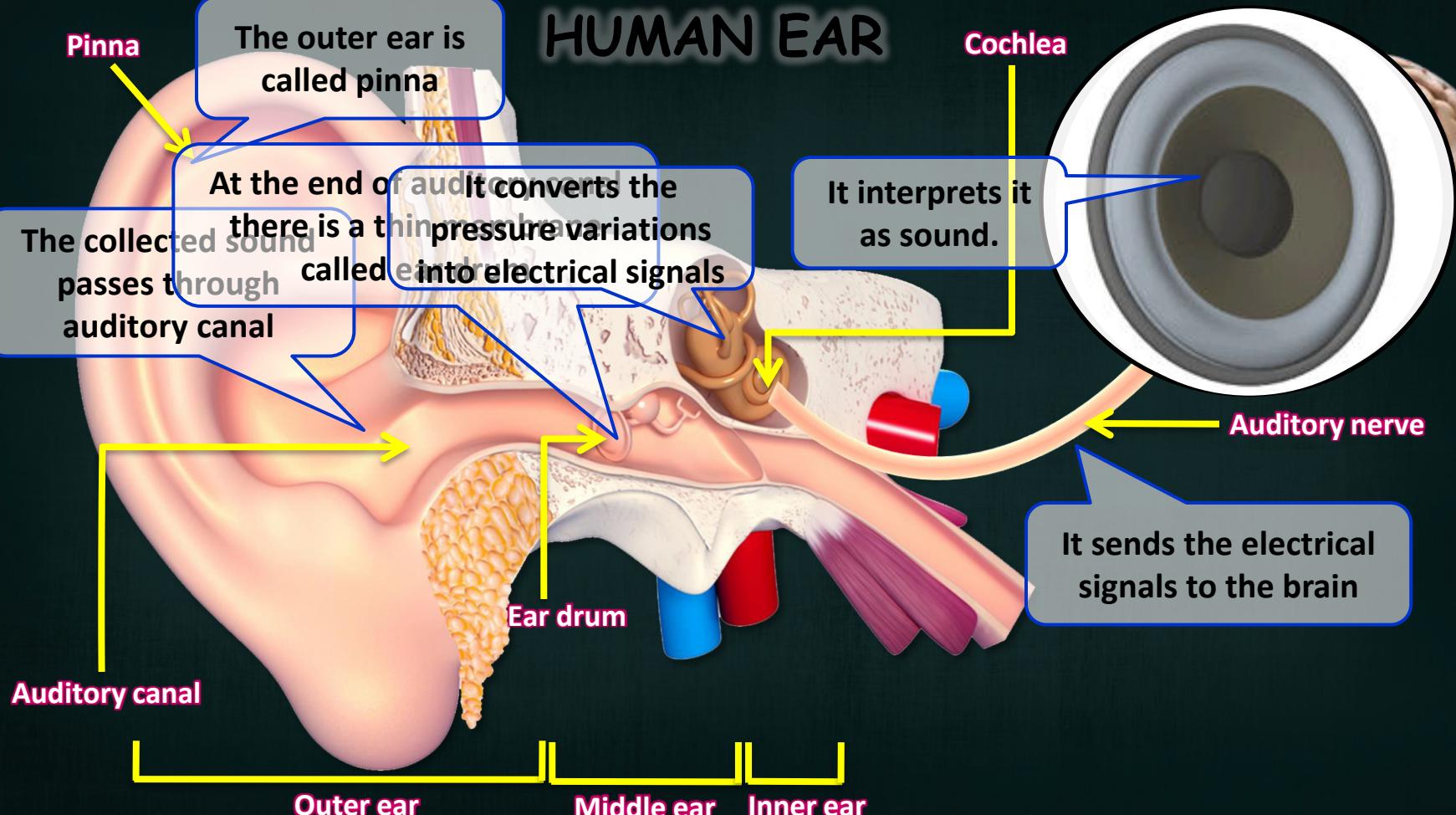
It allows to convert **pressure variation** in air with **Audible frequencies** into electric signals that travel through brain via auditory nerve



**How does the human  
ear work?**

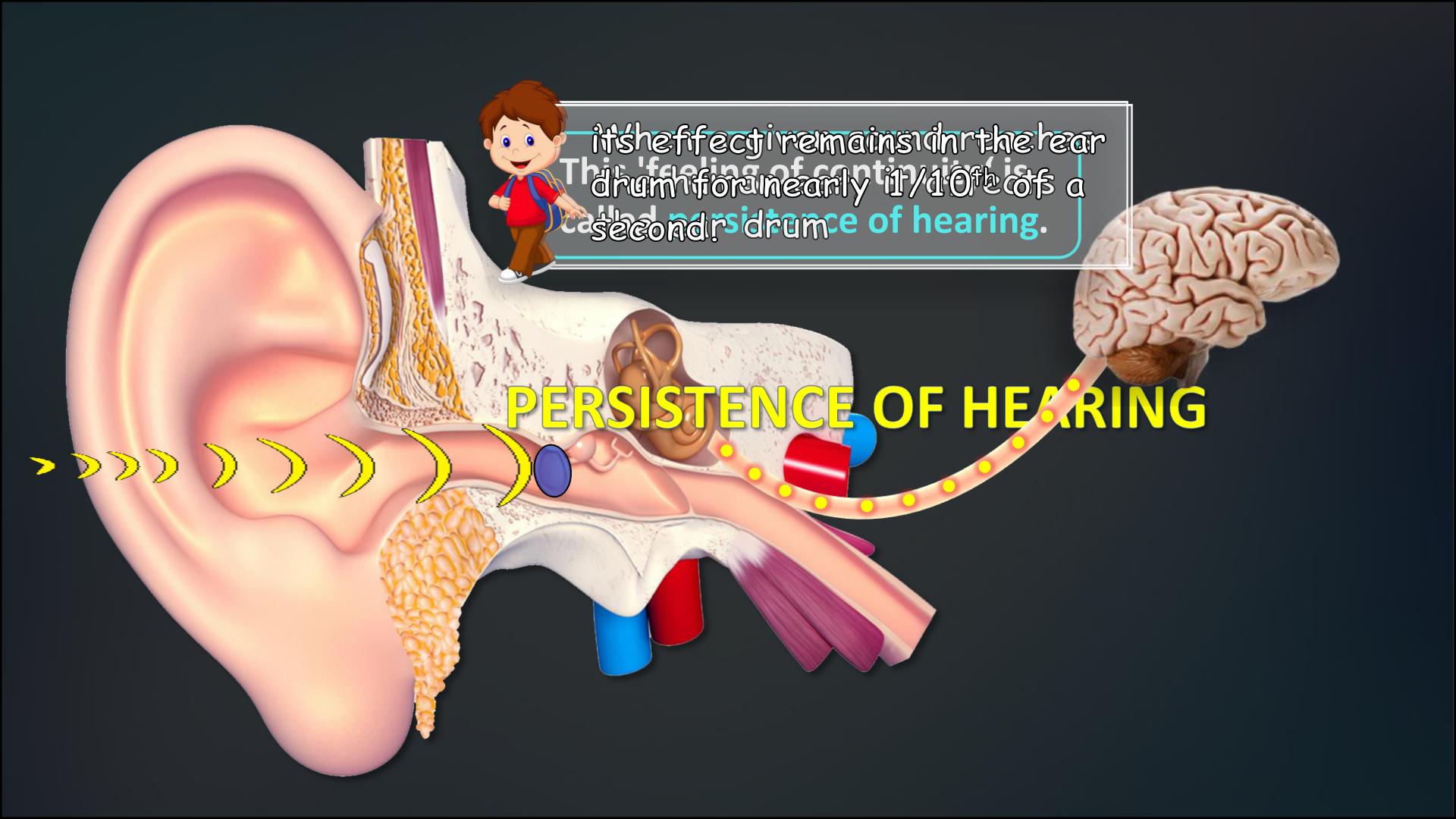
20 Hz to 20000 Hz

# HUMAN EAR



## Match the columns

Column 1	Column 2
Pinna	At the end of auditory canal there is a thin membrane.
Ear Drum	The outer ear is called pinna.
Auditory nerve	It converts the pressure variations into electrical signals.
Auditory canal	It sends the electrical signals to the brain.
Cochlea	The collected sound passes through auditory canal.



it's effect remains in the hear  
This 'feeling of continuity' is  
drum for nearly 1/10th of a  
second. Persistence of hearing.

## PERSISTENCE OF HEARING

