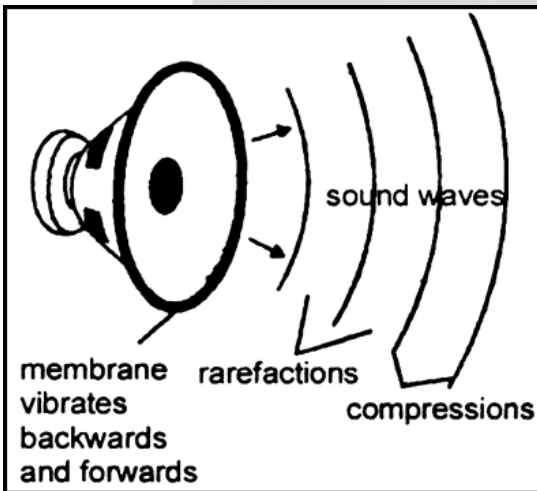


## Sound

- **How is sound produced?** Sound is produced by vibrating objects. When an object vibrates, it causes the air molecules around it to vibrate as well, creating sound waves.
- **Examples of vibrating objects that produce sound:**
  - School bell
  - Metal plate or pan
  - Musical instruments (veena, tabla, flute, etc.)
  - Jalrang (bowls filled with water at different levels)
  - Ektara (made from a coconut shell or earthen pot)



### Important Observations:

- **Feeling vibrations:** You can often feel the vibrations of an object producing sound by touching it.
- **Water waves:** When a vibrating object touches water, it creates waves, showing a connection between vibrations and sound.
- **Whole instrument vibrates:** When you play a musical instrument, the whole instrument vibrates, not just the part you directly touch (like the string or membrane).

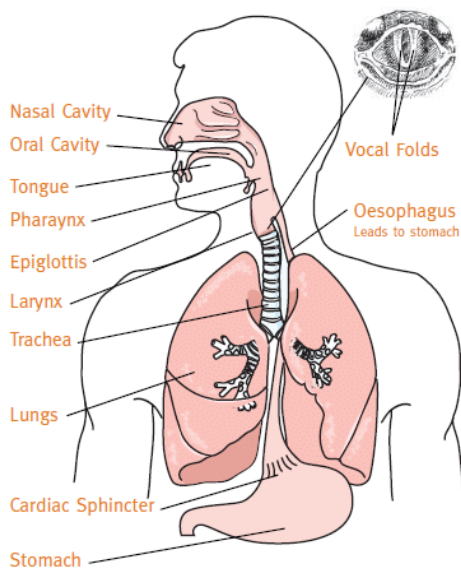
### Key Takeaways for Exams:

- **Vibration is essential for sound production:** No vibration, no sound.
- **Sound is a form of energy:** It travels in the form of waves.
- **Musical instruments produce sound through the vibration of different parts:** Strings, membranes, air columns, etc.

### Sound Produced by Humans

- **Voice box (larynx):** Responsible for producing sound in humans. Located at the upper end of the windpipe.

- **Vocal cords:** Two folds of tissue stretched across the voice box. Vibrate when air from the lungs passes through them, creating sound.



- **How vocal cords work:**
  - Muscles control the tightness and thickness of the vocal cords.
  - Tight and thin cords produce a different sound than loose and thick cords.
- **Voice differences:** Men, women, and children have different voice pitches due to the varying lengths of their vocal cords.

### Sound Needs a Medium for Propagation

- **Medium:** A substance (solid, liquid, or gas) that carries sound waves.
- **Sound cannot travel through a vacuum:** A vacuum is a space with no matter.
- **Examples:**
  - Sound travels through air when you talk to a friend.
  - Sound travels through water (whales and dolphins communicate underwater).
  - Sound travels through solids (scratching a metal scale).

### Key Takeaways for Exams:

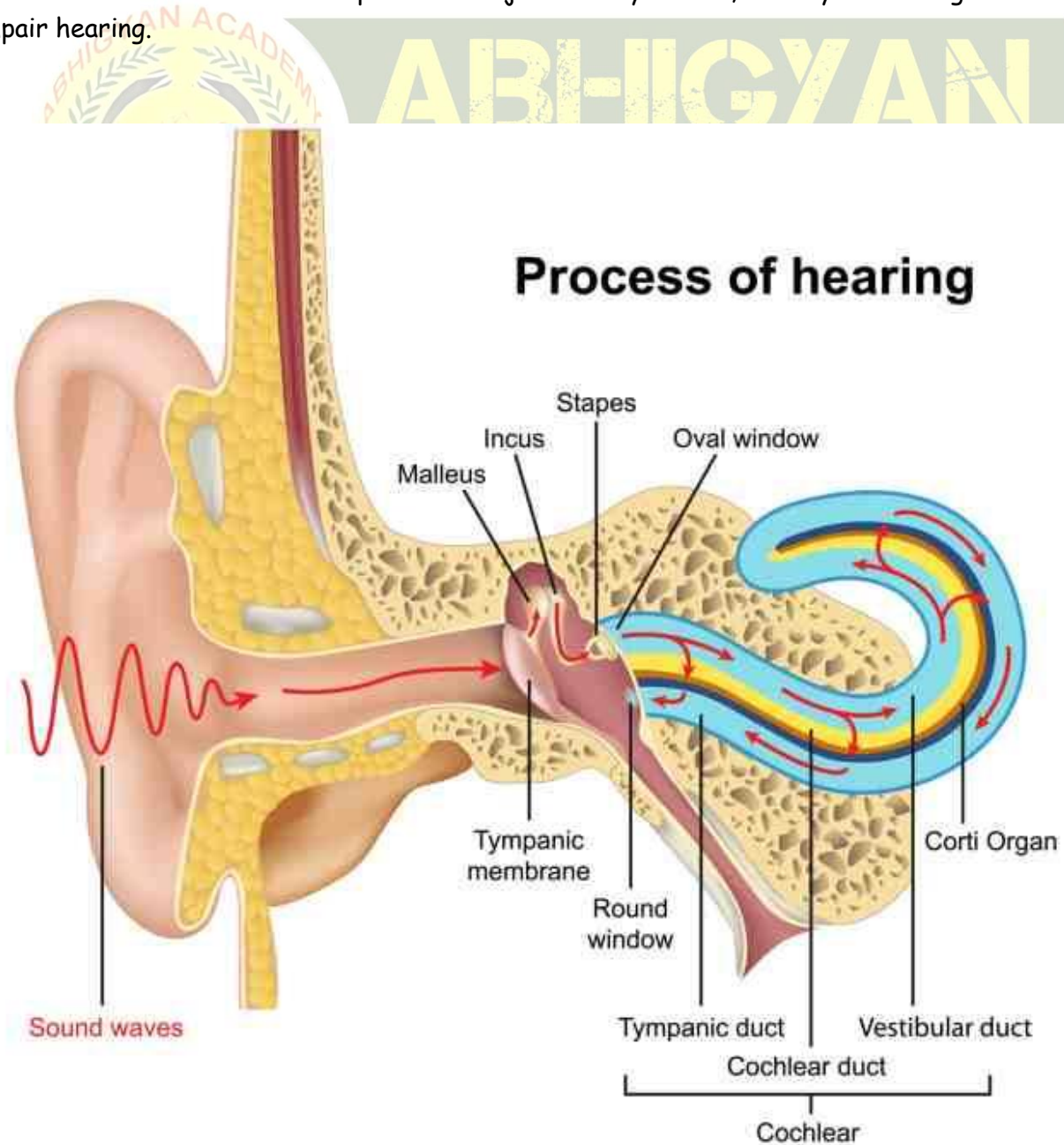
- Sound needs a medium to travel. It cannot travel in a vacuum.
- Sound travels through solids, liquids, and gases.
- The voice box and vocal cords are responsible for human sound production.

### We Hear Sound Through Our Ears

- **Outer ear:** Shaped like a funnel to collect sound waves.
- **Eardrum:** A thin membrane that vibrates when sound waves reach it.

- **Inner ear:** Receives vibrations from the eardrum and sends signals to the brain.

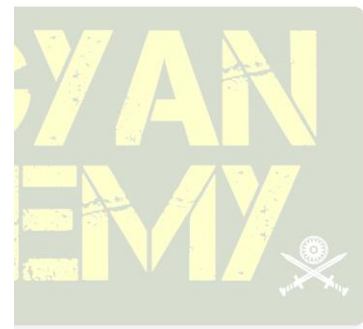
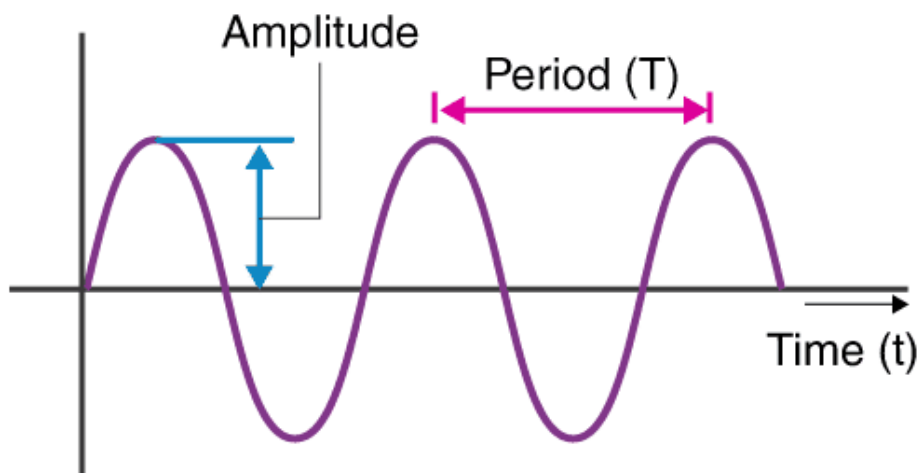
**Important Note:** Never insert sharp or hard objects into your ear, as they can damage the eardrum and impair hearing.



### Amplitude, Time Period, and Frequency

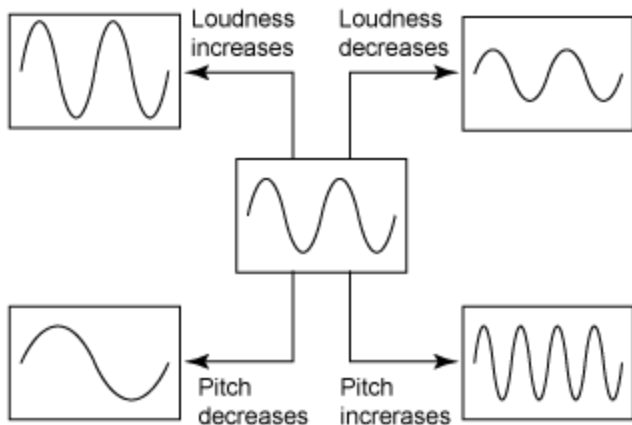
- **Vibration:** The back-and-forth movement of an object. Also called oscillatory motion.
- **Time period:** The time taken for one complete oscillation.
- **Frequency:** The number of oscillations per second. Measured in hertz (Hz).





### Loudness and Pitch

- **Loudness:** Determined by the amplitude of the vibration. Larger amplitude = louder sound. Measured in decibels (dB).
- **Pitch:** Determined by the frequency of the vibration. Higher frequency = higher pitch (shrill sound).



### Examples:

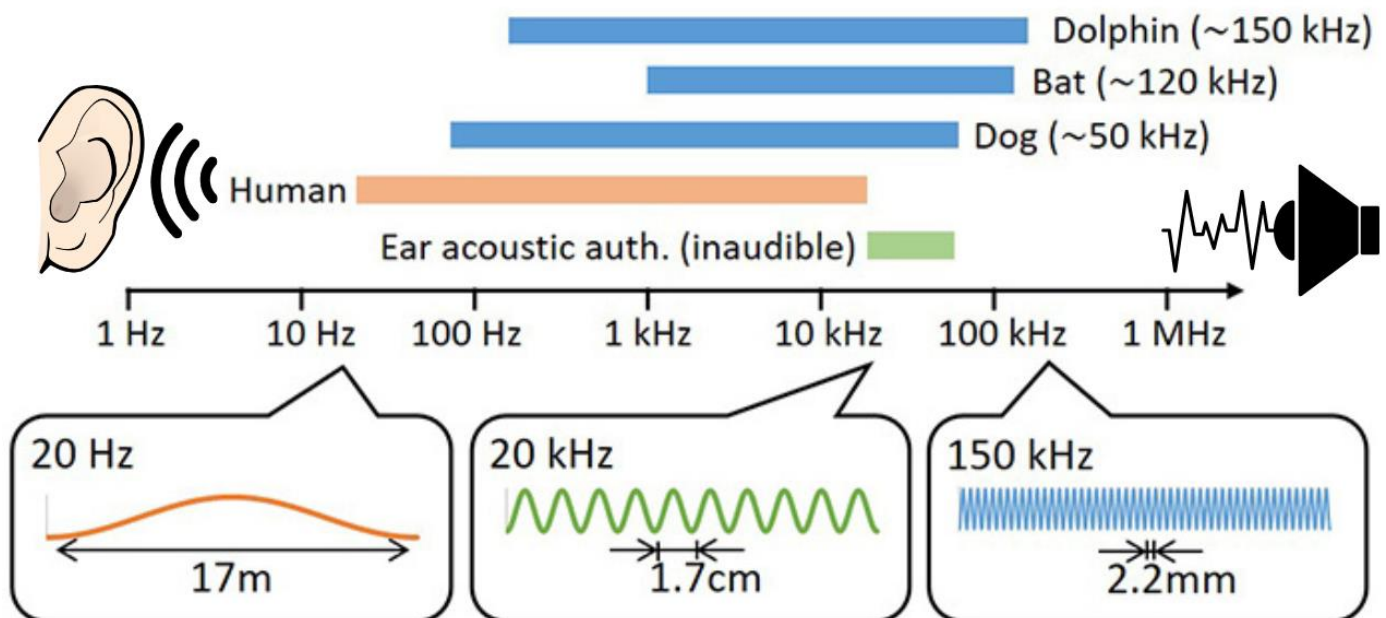
- A drum has a low frequency and produces a low-pitched sound.
- A whistle has a high frequency and produces a high-pitched sound.
- Children have higher-pitched voices than adults.

### Key Takeaways for Exams:

- Sound is heard when sound waves cause the eardrum to vibrate.
- Amplitude determines loudness.
- Frequency determines pitch.
- Sounds can be differentiated based on their loudness and pitch.

### Audible and Inaudible Sounds

- **Audible range for humans:** 20 Hz to 20,000 Hz
- **Inaudible sounds:** Frequencies below 20 Hz (infrasound) and above 20,000 Hz (ultrasound).
- **Animals and ultrasound:** Some animals, like dogs, can hear ultrasound. Ultrasound is used in medical equipment for diagnosis and treatment.



# Audible and Inaudible sounds

## Noise and Music

- **Noise:** Unpleasant sounds that cause discomfort. (Examples: construction sounds, traffic horns)
- **Music:** Pleasing sounds that are enjoyable. (Examples: musical instruments)
- **Loud music:** Even music can become noise if it's too loud.

## Noise Pollution

- **What is it?** Excessive or unwanted sounds in the environment.
- **Sources:** Vehicles, explosions, machines, loudspeakers, TV, kitchen appliances, etc.
- **Harmful effects:**
  - Health problems: lack of sleep, high blood pressure, anxiety, hearing impairment.
- **Measures to control noise pollution:**
  - Silencing devices in machines and appliances.
  - Locating noisy industries away from residential areas.

- Minimizing horn use.
- Lowering TV and music volume.
- Planting trees to absorb sound.

### Hearing Impairment

- **Types:** Total (rare, usually from birth) and partial (due to disease, injury, or age).
- **Sign language:** Helps people with hearing impairment communicate.
- **Technological devices:** Improve the quality of life for the hearing impaired.

### Key Takeaways for Exams:

- Understand the difference between audible and inaudible sounds.
- Know the causes and effects of noise pollution.
- Be aware of ways to reduce noise pollution.
- Show sensitivity towards people with hearing impairment.



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