

CHOONG HAN JUN (COPYRIGHTED) ©

INTERACTIONS: Sound

CHAPTER ANALYSIS

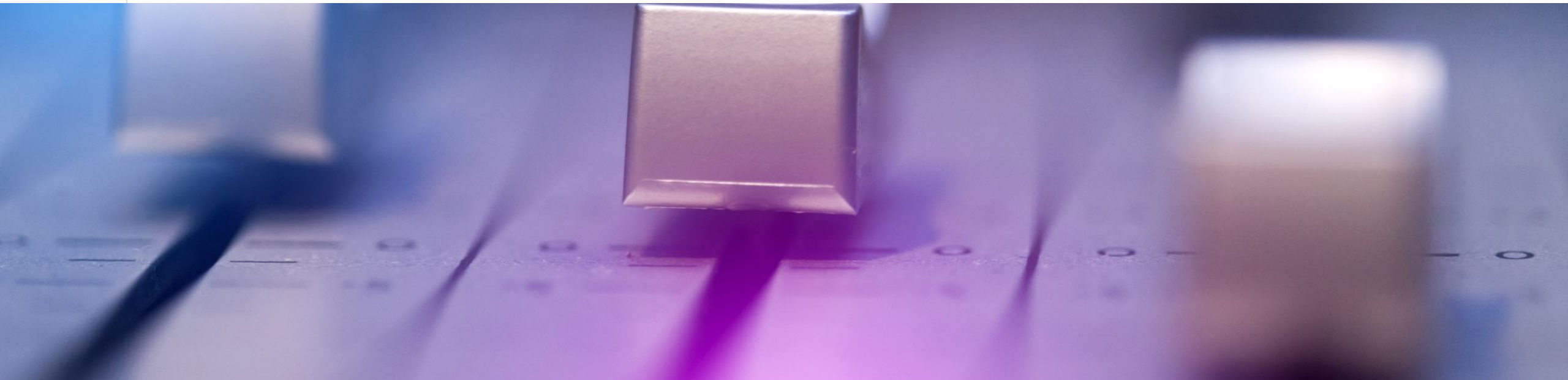


6 KEY CONCEPTS

- Explain that sounds are produced due to interactions between molecules of a medium caused by a vibrating source
- Recognise that sound transfers energy and that it takes different lengths of time to travel from one point to another through different media
- Outline how the ear detects sounds in terms of the vibration of the eardrum and ear bones, and the subsequent interpretation of sound by the brain
- Identify sounds of different pitch and relate the pitch to their frequencies
- Infer that the pitch can be changed by changed the frequency
- Infer that the loudness of sounds can be changed by changing the size of vibrations

KEY CONCEPT

SOUNDS





SOUNDS

SOUND

Sounds are produced by **vibrations**, and the number of vibrations in one second is called **frequency**.

Measurement of frequency: hertz (Hz)

Sound can travel through:

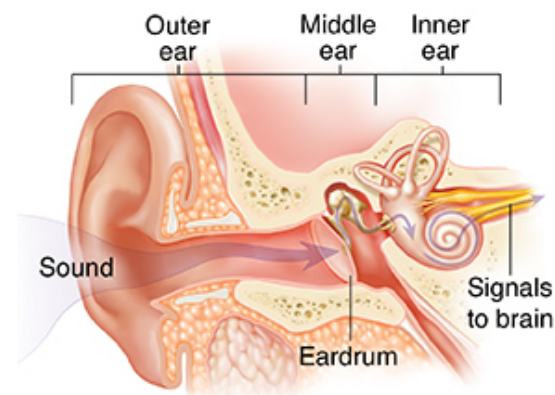
- Solids
- Liquids

Sound cannot travel through:

- Vacuum

Sound travels in the form of **waves**. The waves are formed from vibrating air molecules, which collide with neighbouring molecules and cause them to vibrate (and so on).

Detection of sound



- **Outer ear:** collects sound waves and directs them to the eardrum
- **Middle ear:** contains three small bones which magnify the vibrations and pass them on to the inner ear
- **Inner ear:** nerve cells in the inner ear detect the vibrations and change them into electrical signals. The nerves carry these signals to the brain

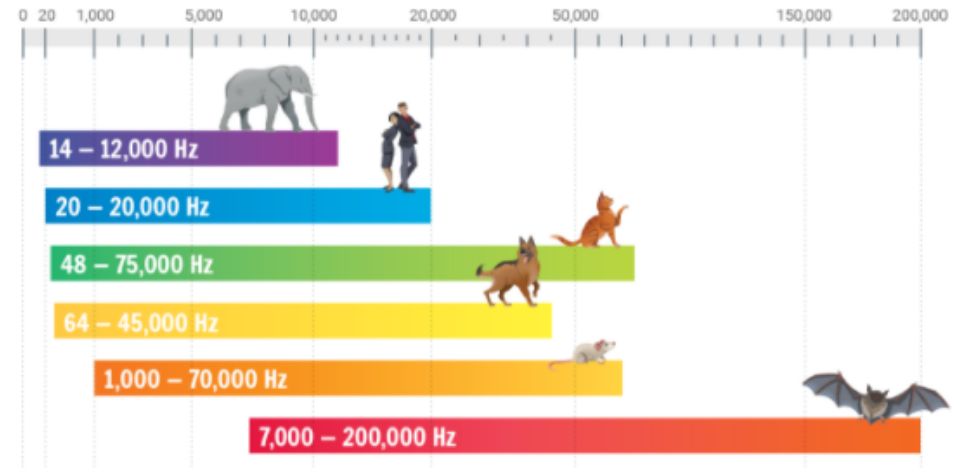
RANGE OF HEARING

Range of hearing

The human ear can only detect sounds from **20Hz to 20 000 Hz**.

This is defined as our *range of hearing*.

THE HEARING RANGE OF DIFFERENT MAMMALS



Relation between frequency and pitch

- Notes with a **low pitch** have a **low frequency**.
- Notes with a **high pitch** have a **high frequency**.

Loud & Soft sounds

Loudness depends on the **size of the vibrations**. The larger the vibrations, the louder the sounds.

KEY CONCEPT

IMPORTANCE & EFFECTS



A close-up, shallow depth-of-field photograph of a guitar's headstock and tuning pegs. The strings are in sharp focus, stretching from the bottom left towards the top right. The tuning pegs are metallic and have a hexagonal shape. The background is blurred, showing the body of the guitar.

IMPORTANCE & EFFECTS

IMPORTANCE OF SOUND IN SOCIETY

Communication

- A baby crying to get the attention of his/her parents

Warning signals

- The siren of an ambulance, fire engine or police vehicle tells other drivers to give way to them on the road

Pleasure

- Music gives people pleasure and relax

Healthcare

- Ultrasound is often used in medicine to look at a fetus and detect abnormalities in our bodies

EFFECTS OF NOISE

The loudness of a sound is measured in **decibels (dB)** using a decibel meter.

Noise pollution

Main sources: traffic noise and noise from construction sites

Effects

- Affects human health: noise pollution can cause problems such as indigestion or heart disease
- Decrease work performance: loud noises make it more difficult to concentrate while working or studying

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