

# Summary – Sound and Light

## Sound and Vibrations

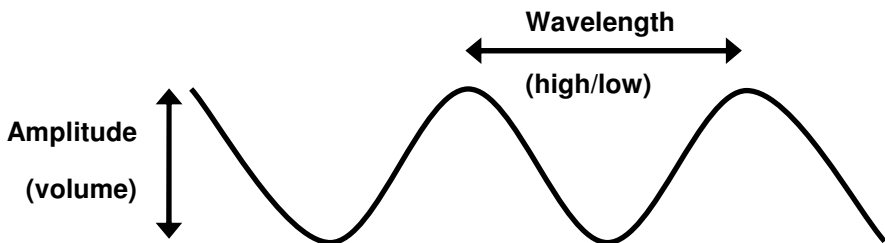
Sound is a **form of energy**. Sound is created by a **vibration**; *e.g.* a violin string being plucked or your voice box vibrating when you are speaking. Sound can **travel** through air at a **fast** speed. (Around 330 metres per second or 3 football pitches a second). If there is a **vacuum** then **sound cannot travel**. Sound can travel very well through **solids, liquids and gases**. Sound travels **better through solids and liquids** than it does through gases.

## Pitch and Volume

**Pitch** is a measure of how **high** or low a sound is. **Volume** is a measure of how **loud** a sound is.

You can change the **pitch** by changing the **frequency** of the wave. Frequency is the **number of waves per second** and is measured in **Hertz (Hz)**.

You can change the **volume** of the sound wave by changing the **amplitude** (height of the wave). Amplitude is measure in **decibels (dB)**.



**Frequency = no. of waves produced in a second**

The **normal range of human hearing** for a young, healthy person is from **20 Hertz to 20000 Hertz**. Some animals *e.g.* dogs can hear higher sounds than we can.

## Input-process-output

All **electronic systems** are made up of an **input** part, a **process** part and an **output** part. For example, a **PA** (Public Address) system has a **microphone** (input), an **amplifier** (process) and **speakers** (output). Only the **process** part **needs power** from a battery or mains electricity, as it is the only part that requires increasing the size of the electrical signal.

## Parts of the Ear

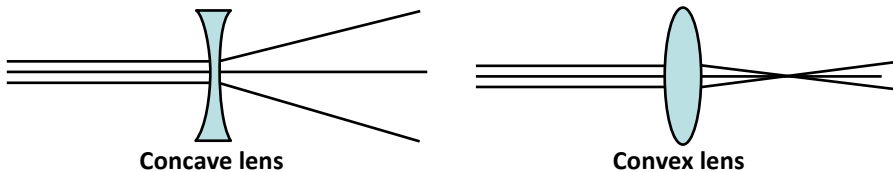
- **Cochlea** –converts the sound vibrations into an electrical signal.
- **Eardrum** - a thin membrane that **vibrates when sound waves reach it**.
- **Eustachian tube** - it **equalizes the pressure** between the middle ear and the air outside.
- **Hammer, anvil and stirrup** – the bones that **bang together** when you hear..
- **Pinna** - **collects sound** and directs it into the outer ear canal
- **Semicircular canals** - help us maintain our sense of **balance**.

## Light

**White light** is made up of **many colours**. We can **split the light** into these colours using a **prism**. Light travels in **straight lines** at 300 000 000 metres per second. We can **block** certain colours using a **filter**. For example, you can **block green and red** light with a **blue filter**.

When **light can travel through** an object, it is said to be **transparent**. When **light cannot travel through** an object, it is said to be **opaque**. When light shines on an **opaque object** it creates a **shadow**.

When light **bends and slows down** in an object, this is called **refraction**. When light **bounces off** an object, this is called **reflection**. Different objects refract light in different ways.



## Mixing Colours

You can make **any colour of light** by mixing **red, green and blue (RGB) light**. You can make **any colour of ink** by mixing **cyan, yellow, magenta and black (CYMK) ink**. The colours on a **TV screen or monitor** are made up of **red, green and blue spots**.

## Parts of the Eye

**Lens** – focuses the light.

**Retina** – converts the light into an electrical signal.

**Cornea** – protects the eye.

**Pupil** – The hole where the light comes in.

**Optic nerve** – Carries the electrical signal from the eye to the brain.