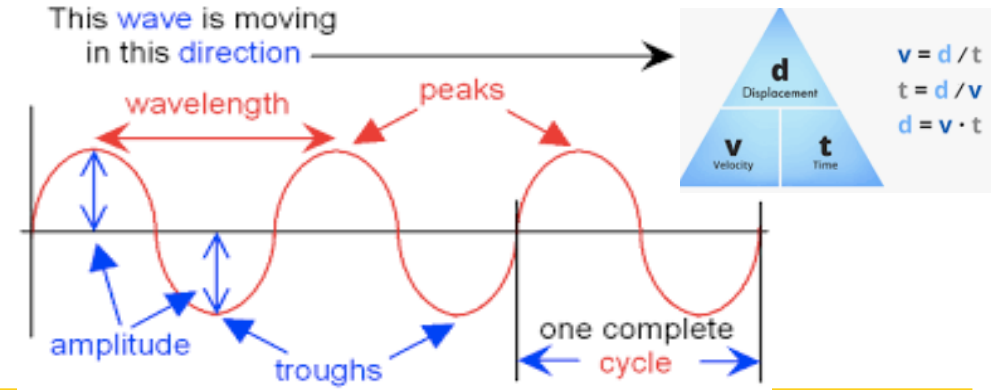
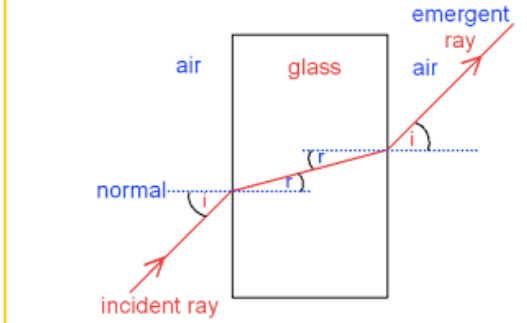
1	**Waves** transfer **energy**.
2	A **longitudinal** wave **oscillates** in the same direction that energy is transferred (**parallel**).
3	An example of a **longitudinal** wave is **sound.** Longitudinal waves need **particles** to travel.
4	A **transverse** wave **oscillates perpendicular** (at a 90° angle) to the direction of energy transfer.
5	An example of a **transverse wave** is **microwaves**. Transverse waves **do not need particles** to travel.
6	All waves in the **electromagnetic spectrum** are examples of **transverse** waves.
7	The **frequency** of a wave is the number of complete **waves** that pass a point **each second**.
8	The frequency of a wave is measured in **hertz (Hz).**
9	For sound waves, the frequency is related to the pitch. A **high frequency = high pitch sound.** A **low frequency = a low pitch sound.**
10	The **period** is the length of **time** it takes **one wave to pass** a given point.
11	The **wavelength** is the **distance** from one **peak** (or trough) to the very **next peak** (or trough) and is measured in metres (m)
12	The **amplitude** of a wave is the **maximum distance** of a point on the wave from it's **rest position** and is also measured in metres (m).
13	For **sound waves**, the **amplitude** is related to **volume**. Greater amplitude means a louder volume.
14	The **velocity of a wave** is **how fast** the wave is travelling in it's direction of energy transfer. Waves travel at different speeds in different materials.
15	**Speed = distance ÷ time**



$$v = f\lambda$$

v = velocity
f = frequency
λ = wavelength



16	Sound travels at 330 m/s in air
17	**Wave velocity (m/s) = frequency (Hz) x wavelength (m)** **V = f x λ**
18	Waves can **change direction** when they travel through a different medium with a different density. This is called **refraction**
19	When a wave '**bounces off' a surface** this is called **reflection**.
20	When a wave **passes through** a material and is not absorbed or reflected it is **transmitted**.
21	When a wave transfers all of its energy to an object or material it is absorbed.

1	When a sound wave reaches a solid object, some of the energy it is transferring is reflected and some is transmitted through the solid or absorbed by it. **(higher tier only)**
2	Sound waves cause the particles in a solid to vibrate and the vibrations can be passed on both as longitudinal and as transverse waves.
3	In human ears, vibrations caused by sound waves are passed on through parts of the ear until they are detected and and converted to electrical impulses that travel to the brain.
4	The eardrum is a thin membrane that can vibrate due to sound waves.
5	The cochlea is found inside the ear and is a coiled tube containing liquid.
6	A healthy cochlea can detect sounds from 20Hz to 20000Hz.
7	Ultrasound is sound made by waves with a frequency greater than 20000Hz
8	Ultrasound scans can be used to make images of things inside the body.
9	Other uses of ultrasound include sonar, cleaning and treatment of medical conditions such as kidney stones.
10	Infrasound is sound made by waves with a frequency less than 20Hz.
11	Infrasound waves travel further than higher frequency waves before they become to faint to detect.
12	Natural events such as volcanic eruptions and earthquakes create infrasound waves.
13	The energy released by an earthquake can travel through the Earth as a longitudinal P wave or as a transverse S wave.