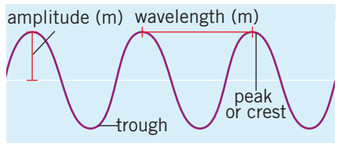
P1

Chapter 4: Waves
Knowledge organiser

Activate
Question • Progress • Succeed

Properties of waves

- A **wave** is an **oscillation** or **vibration** which transfers energy from one place to another
- **Amplitude** – the distance from the middle to the top of bottom of the wave
- **Wavelength** – the distance between a point on the wave to the same point on the next wave
- **Trough** – The bottom of the wave
- **Peak** – The top of the wave
- **Frequency** – How many waves pass a fixed point per second, measured in Hertz (Hz)



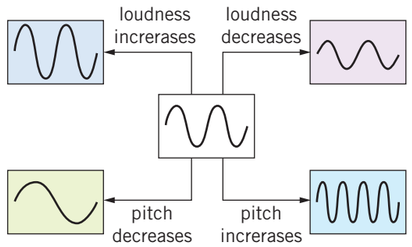
There are two main types of waves:

Transverse waves, e.g. light
- Travel at 90°direction of energy transfer
- Do not need a medium to travel through

Longitudinal waves, e.g. sound
- Travel in the direction of energy transfer
- Need a medium to travel through

Sound waves

- Sound waves are caused by the vibration of particles, sound travels quicker in a solid than a gas as the particles are closer together
- **Oscilloscopes** display sound waves on a screen
- Humans can hear between 20–20 000 **hertz** (Hz), but other animals have different ranges of hearing
- Sound waves above 20 000 Hz are known as **ultrasound**, thesesound waves are too high pitched for humans to hear

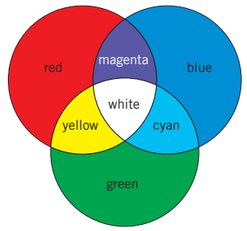


Hearing

- The **pinna** directs sound along the **auditory canal** to the **eardrum** which will vibrate
- The vibration from the ear drum moves onto the ossicles which amplifies the sound
- This passes the sound to the cochlea where tiny hairs detect the vibrations and passes this along to the **auditory nerve** as electrical signals for our brain

Colour

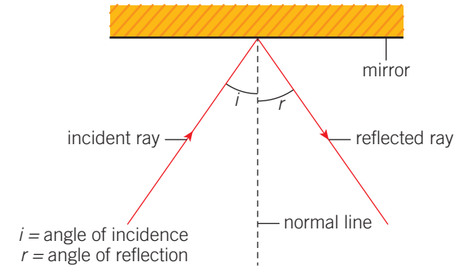
- Light can be split using a prism and is made up from different colours of light
- **Primary colours** can be mixed in order to form **secondary colours**



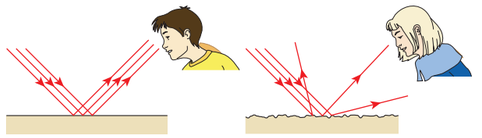
- Objects appear a certain colour as they absorb all other colours of light, but reflect the colour of light which they appear.

Reflection

- The **law of reflection** states that the **angle of incidence** will be equal to the **angle of reflection**

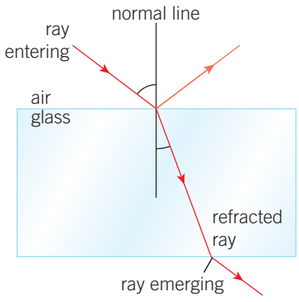


- For light reflecting off a smooth surface will form an image is called **specular reflection**
- Reflection off of a rough surface will not form an image and is know as **diffuse scattering**



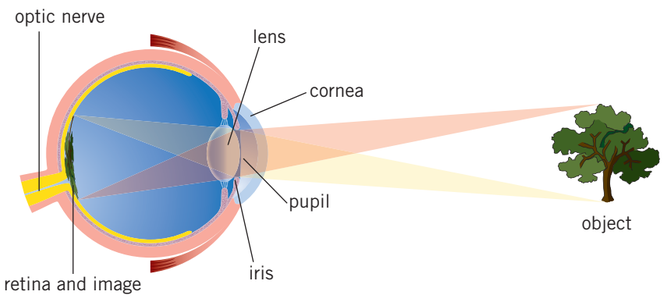
Refraction

- **Refraction** occurs when a wave passes between two different substances
- This happens as the wave will travel at different speeds in the different materials
- When the wave passes into a more dense material from a less dense material it will bend towards the **normal**, e.g. air into glass
- When the wave passes into a less dense material from a more dense material it bends away from the normal e.g. glass to air



Light and the eye

- Light entering your eye is refracted by the **lens**, focusing it on the retina and creating an inverted image
- **Photoreceptors** detect the light hitting your retina and send an electrical impulse to your brain
- If the light is not focussed on the retina or the eye, people cannot see properly



- Long sighted people have the light focus behind the eye, short sighted people have the light focus in front of the retina.
- Lenses can be used to refract the light in a way in which it will focus on the retina.

Key terms Make sure you can write definitions for these key terms.

amplitude angle of incidence angle of reflection auditory canal auditory nerve diffuse scattering eardrum frequency hertz law of reflection lens longitudinal normal oscillation oscilloscope peak photoreceptors primary colour refraction secondary colour specular reflection transverse trough ultrasound wave wavelength