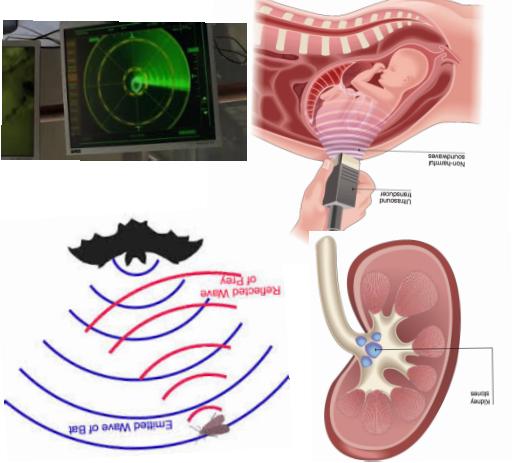


Waves, energy & speed



Ultrasound

Other waves may be able to travel as the waves travel. Electrical and magnetic fields vibrate. They can travel through empty space. Electromagnetic radiation are like this. microwaves and other types of waves have to. Visible light, infrared rays, through a medium, but they do not have the same frequency, so the sounds have the same pitch.

Sound waves and seismic waves are substance known as the medium. Some waves must travel through a medium, and it is the medium that like this. They must travel through a like this. The angle of incidence equals the angle of reflection.

HOW sound travels

Sounds 1 and 2: When an object or substance vibrates, it produces sound. louder the sound, the greater the amplitude.



Sound 3 has a greater frequency than sound 2 and 3, so sound 2 is louder. Sounds 1, so sound 2 has the same frequency, so the sounds have the same pitch.

Sound

Waves

Waves are **vibrations that transfer energy from place to place** without matter (solid, liquid or gas) being transferred.

Transverse Waves
eg light



Longitudinal waves
eg sound

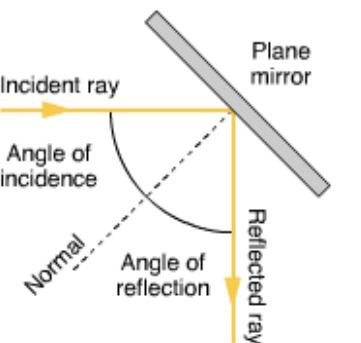


Reflection of light

Sound waves and light waves reflect from surfaces. When waves reflect, they obey the law of reflection:

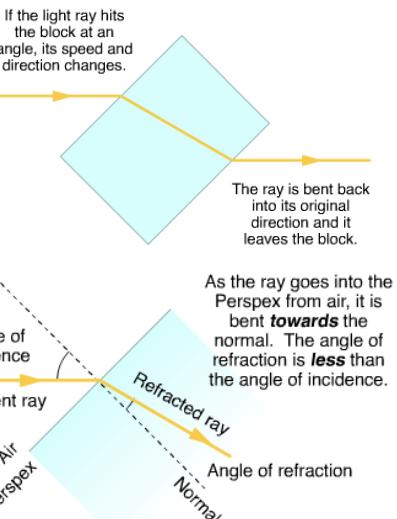
the angle of incidence equals the angle of reflection

The normal is a line drawn at right angles to the reflector
The angle of incidence is between the incident (incoming) ray and the normal
The angle of reflection is between the reflected ray and the normal.

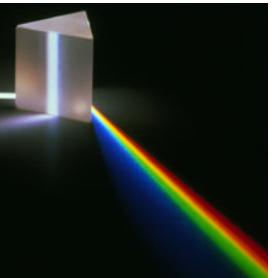


Refraction of light

Sound waves and light waves change speed when they pass across the boundary between two substances with different densities, such as air and glass. This causes them to change direction and this effect is called refraction.



Spectrum of light



White light can be split up using a **prism** to form a **spectrum**. The light waves are refracted as they enter and leave the prism. The shorter the wavelength of the light, the more it is refracted. As a result, red light is refracted the least and violet light is refracted the most, causing the coloured light to spread out to form a spectrum.