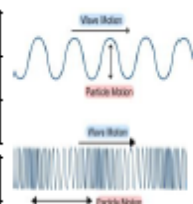


Wave speed	Wave speed = frequency X wavelength	$V = f \times \lambda$
Wave period	Wave period = $1 \div \text{frequency}$	$T = 1 \div f$
Speed	Speed = distance $\div$ time	$v = d \div t$



Transverse wave	Vibration causing the wave is at right angles to the direction of energy transfer	Energy is carried outwards by the wave.	Water and light waves, S waves.
Longitudinal wave	Vibration causing the wave is parallel to the direction of energy transfer	Energy is carried along the wave.	Sound waves, P waves.

Wavelength	Distance from one point on a wave to the same point of the next wave
Amplitude	The maximum disturbance from its rest position
Frequency	Number of waves per second
Period	Time taken to produce 1 complete wave

Transverse and Longitudinal waves

Waves in air, fluids and solids

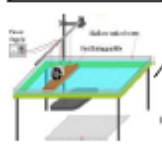
Black body radiation

PHYSICS ONLY

Earth and Global warming

Ultraviolet, visible light, infra-red radiation penetrate atmosphere and heat up Earth's surface.
Longer wavelengths are radiated back, trapped by atmosphere.

Energy lost is not at the same rate as energy being absorbed so Earth heats up.



In water, use a ripple tank.
In air, use echoes.

Measuring speed

Sound waves travelling through different mediums, the frequency stay constant.

Properties

Air Water

PHYSICS ONLY

AQA Waves

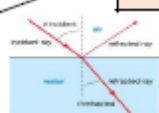
e.g. Gamma

Electromagnetic waves

Short wavelengths have high frequency and high energy.

Angle of incidence = angle of reflection (i) = (r)

Reflection	Wave bounces off the surface.
Refraction	Waves changes direction at boundary.
Transmitted	Passes through the object.
Absorbed	Passes into but not out of, transfers energy and heats up the object.



Light refracts as it slows down in a denser substance

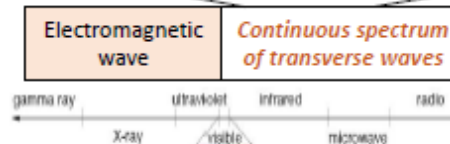


PHYSICS HIGHER ONLY

Hearing Frequencies between 20 - 20,000 Hz

Longitudinal waves cause ear drum to vibrate, amplified by three ossicles which creates pressure in the cochlea.

Absorbed light changes into thermal energy store.



Magnification = image size $\div$ object size

HIGHER: Lenses



HIGHER: Properties

Convex	Real or virtual images.
Concave	Only virtual images.

2F	Image same size, upside down, real.
2F - F	Image larger, upside down, real.
< F	Image bigger, right way, virtual.

Specular	Flat surface reflection.
Diffuse	Rough surface reflection.

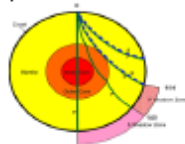
Seismic waves

P wave	S wave	Seismograph
Longitudinal	Transverse	Shows P and S waves arriving at different times.
Fast	Slow	
Travel through solids and liquids	Travels through solids	
Produced by earthquakes.		By using the times the waves arrive at the monitoring centres, the epicentre of earthquake can be found. ($v = x \div t$).

Black surfaces	Good emitters, good absorbers
White surfaces	Poor emitters, poor absorbers
Shiny surfaces	Good reflectors



EM waves refract



Ultra sound	Partially reflected off boundary	Used for medical and foetal scans.
Sonar	Reflected off objects	Used to determine depth of objects under the sea.

EM wave	Danger	Use
Radio	Safe.	Communications, TV, radio.
Microwave	Burning if concentrated.	Mobile phones, cooking, satellites.
Infrared		Heating, remote controls, cooking.
Visible	Damage to eyes.	Illumination, photography, fibre optics.
Ultra violet	Sunburn, cancer.	Security marking, disinfecting water.
X-ray	Cell destruction, mutation, cancer.	Broken bones, airport security.
Gamma		Sterilising, detecting and killing cancer.

Low frequency, long wavelength.	
White	Wave lengths reflected
Black	Wave lengths absorbed
High frequency, short wavelength	