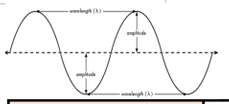
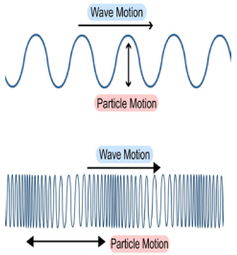
100% sheet

Waves



Wave speed	Wave speed = frequency X wavelength	V = f X λ
Wave period	Wave period = 1 ÷ frequency	T = 1 ÷ f
Speed	Speed = distance ÷ time	v = d ÷ 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

AQA Waves

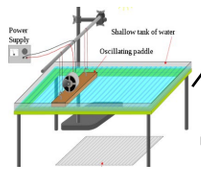
PHYSICS ONLY

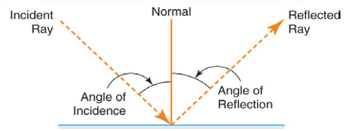
Properties

Measuring speed

In water, use a ripple tank.

In air, use echoes.

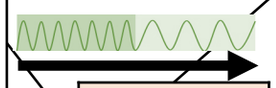




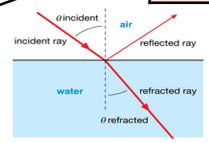
Angle of incidence = angle of reflection
(i) = (r)

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

Air Water



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

Electromagnetic waves

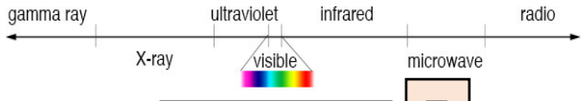
Black body radiation

PHYSICS ONLY

e.g. Gamma

Short wavelengths have high frequency and high energy.

Electromagnetic wave	***Continuous spectrum of transverse waves***



Absorbed light changes into thermal energy store.

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.

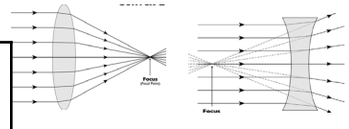
Black body radiation	***All objects absorb or reflect infrared radiation***	Hotter objects emit more infrared radiation.
Constant temperature	***Rate of absorption = rate of radiation***	Intensity and wavelength of energy affects temperature.

PHYSICS ONLY

Magnification = image size ÷ object size

	Units
Distance	***Metres (m)***
Wave speed	***Metres per second (m/s)***
Wavelength	***Metres (m)***
Frequency	***Hertz (Hz)***
Period	***Seconds (s)***

HIGHER: Lenses

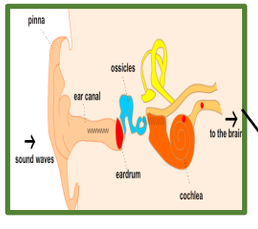


HIGHER: Properties

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.

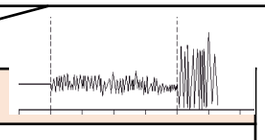
Specular	Flat surface reflection.
Diffuse	Rough surface reflection.



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.

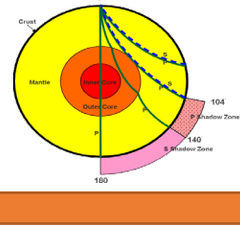
Seismic waves

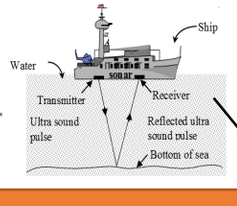


P wave	S wave	Seismograph
Longitudinal	***Transverse***	***Shows P and S waves arriving at different times.***
Fast	***Slow***	
Travel through solids and liquids	***Travels through solids***	By using the times the waves arrive at the monitoring centres, the epicentre of earthquake can be found. (v =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

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