

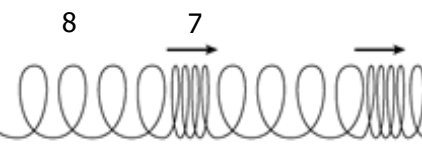
Physics 6: Waves

Section 1: Describing Waves

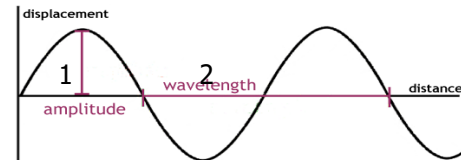
1 Amplitude	The maximum displacement of a point on a wave away from its undisturbed position .
2 Wavelength	The distance from a point on one wave to the equivalent point on the next wave .
3 Frequency	The number of waves passing a point each second .
4 Longitudinal	Oscillations are along the same direction as the direction of travel e.g. sound waves.
5 Transverse	Oscillations are at right angles to the direction of travel e.g. water waves, all electromagnetic waves.
6 Period	The time needed for one wave to pass a given point .
7 Compression	Region in a longitudinal wave where the particles are closest together .
8 Rarefaction	Region in a longitudinal wave where the particles are furthest apart .
9 Absorb	When the energy of an EM wave is taken up by an object .
10 Transmit	When a wave is able to pass through a material.
11 Reflect	The wave bounces off a surface ; the angle of incidence is equal to the angle of reflection .
12 Refract	The wave changes direction when it enters a medium of different density where it has a different speed .

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4 Longitudinal Wave

5 Transverse Wave

Section 2: Measuring the Speed of Sound

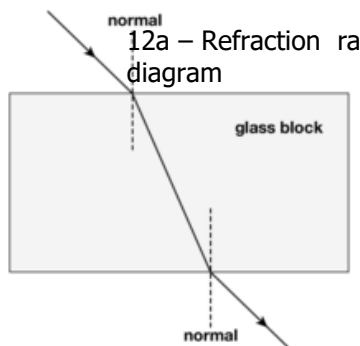
13	Measure the distance to a building .
14	Fire a starting pistol and start a timer .
15	Stop the timer when the echo is heard.
16	Half your value for time .
17	Work out the speed using distance divided by time .

Section 3: Equations to learn

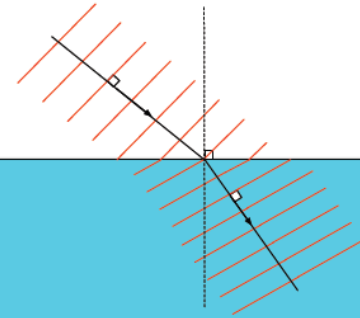
Calculation	Equation	Symbol equation	Units
18 Wave speed	Wave speed = frequency x wavelength	$v = f \lambda$	Wave speed - metres per second (m/s) Frequency - hertz (Hz) Wavelength - metres (m)

Section 4: Refraction Diagrams

12a – Refraction ray diagram



12b – Refraction wave front diagram



Section 5: The Electromagnetic Spectrum

19 Electromagnetic Spectrum	The collective name for all types of EM radiation . They are all transverse waves that travel at 300,000,000 m/s .
20 Ionising	High energy radiation which can remove electrons leaving ions . If this happens in DNA it can cause a mutation that could lead to cancer .
21 Production	Gamma rays are produced from the decay of an unstable nucleus . Radio waves are produced by oscillations in electrical circuits .
22	Long wavelength —————> Short wavelength

Radio waves	Microwaves	Infrared	Visible light	Ultraviolet	X-rays	Gamma rays
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Low frequency —————> High frequency

Section 6: Properties of EM Waves and Sound Waves

Property	EM Wave	Sound Wave
23 Speed	300,000,000 m/s	Much slower (around 330 m/s)
24 Medium it can travel through	Can travel through anything, even a vacuum (space).	Solids, liquids, gases
25 Type of wave	Transverse	Longitudinal
26 Wavelength	Very short	Longer

Section 3: Uses and Risks of EM Radiation

EM Wave	Use	Why it's suitable (HT)	Risks
27 Radio Waves	Television and radio	Reflected by ionosphere so can broadcast over long distances.	
28 Microwaves	Satellite communications, cooking food	Able to pass through the atmosphere to satellites. Has a heating effect.	
29 Infrared	Electrical heaters, cooking food, infrared cameras	Has a heating effect. Emitted by objects so can be detected.	
30 Visible Light	Fibre optic communications	Able to pass along a cable by total internal reflection.	
31 Ultraviolet	Energy efficient lamps, sun tanning	Increases amount of melanin (brown pigment) in skin.	Premature skin ageing, increase risk of skin cancer (some can ionize)
32 X-Rays	Medical imaging and treatments	Absorbed by bone but transmitted through soft tissue.	Ionizing – can cause mutation of genes and cancer
33 Gamma Rays	Medical imaging and treatments	Able to pass out of body and be detected by gamma cameras. Can kill cancerous cells.	Ionizing – can cause mutation of genes and cancer