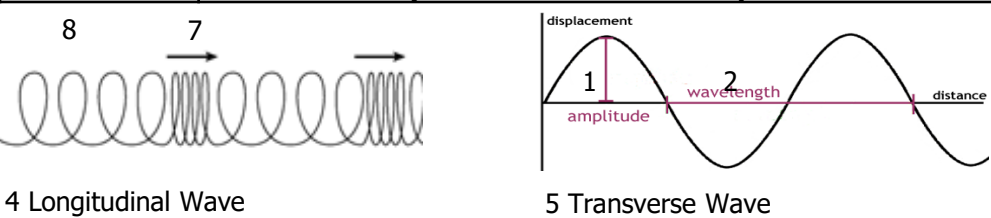


# Physics 6: Waves

## Section 1: Describing Waves

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



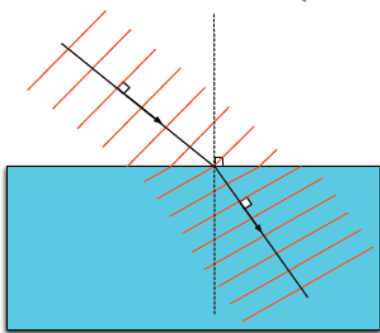
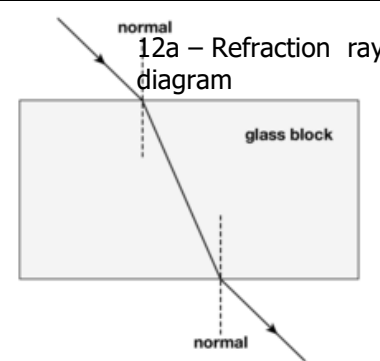
## Section 2: Measuring the Speed of Sound

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

## 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)

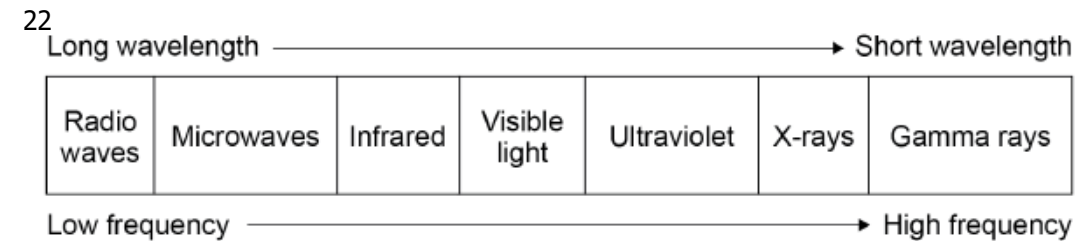
## Section 4: Refraction Diagrams



12b - Refraction wave front diagram

## Section 5: The Electromagnetic Spectrum

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



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