Subject: Science (Trilogy)	Topic: Waves	Year Group: 11

Wave equations

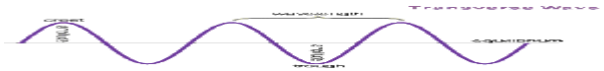
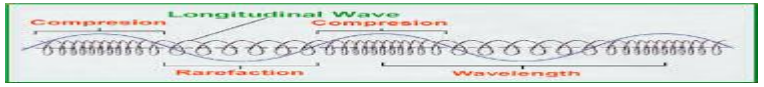
1	v = f λ	wave speed = frequency ×wavelength. wave speed, v, in metres per second, m/s frequency, f, in hertz, Hz wavelength, λ, in metres, m
2	T = 1/ f	period = 1/ frequency period, T, in seconds, s frequency, f, in hertz, Hz

Required Practical's –

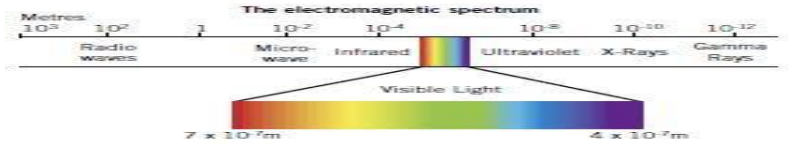
RP 20 – Waves – ripple tank

RP 21 – Infra-red radiation and absorption

Transverse and Longitudinal waves

1	Transverse wave	
2	Longitudinal wave	. 
3	Reflection	When waves are reflected the angle of is the same as the angle of reflection. The angle of incidence is the angle between the incoming wave and the normal. The angle of reflection is the angle between the reflected wave and the normal. The normal is usually show by a dotted line.
4	Wave behaviour	The behaviour of a wave depends on the wavelength of the wave and the properties of the materials involved.

Electromagnetic waves and refraction and light

1	Electromagnetic spectrum	
2	Refraction	When a wave crosses a boundary between materials at an angle it changes direction –it's refracted. Refraction depends on speed of the wave and density of the material.
3	Ray diagrams	A ray diagram shows how light travels, including what happens when it reaches a surface. In a ray diagram, you draw each ray as: a straight line; with an arrowhead pointing in the direction that the light travels.
4	Using EM waves	Satellites, Microwaves, Temperature monitoring, Data transmission, sun tanning, Medicine. EM radiation can be harmful to people. Radiation dose is measured in sieverts.

Key Vocabulary

1	Wave	Any disturbance that transmits energy through matter or space.
2	Medium	A solid, liquid or gas that is vibrated
3	Transverse Wave	The oscillations are perpendicular to the direction of energy transfer.
4	Longitudinal Wave	The oscillations are parallel to the direction of energy transfer.
5	Wavelength	The distance between any adjacent crests or compressions in a series of waves.
6	Frequency	The number of waves produced in a given amount of time.
7	Wave Speed	wave speed (metre per second) = frequency (hertz) × wavelength (metre)

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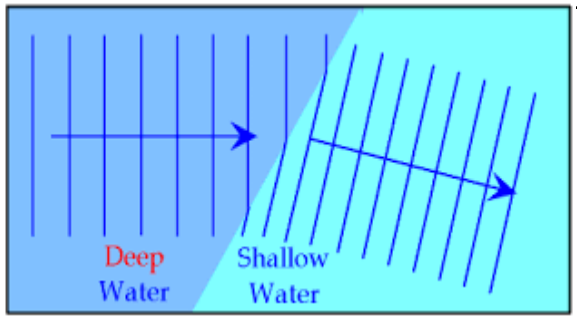
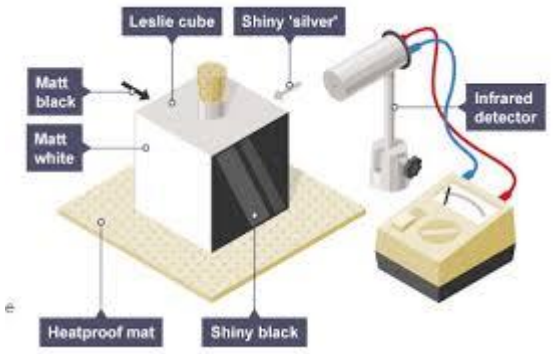
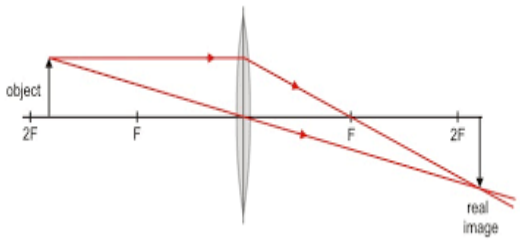
Key diagrams







Electromagnetic waves and refraction and light

1	Radio waves	Radio waves are a type of electromagnetic radiation with wavelengths in the electromagnetic spectrum longer than infrared light. Radio waves are made by oscillating charges Radio waves are extensively used for communication.
2	Microwaves	Microwaves are used by satellites eg satellite TV and phones. Microwave ovens use a slightly different wavelength.
3	Fibre optics and UV	Fibre optics are thin glass or plastic fibres that can carry data. They work on reflection. Visible light is used in fibre optics. UV radiation can give you a tan. Security pens also show up in UV light.
4	X-Rays and gamma rays	Radiographers in hospitals take X-ray photographs to see if they have any broken bones.
5	Radiation	Every object absorbs and emits infra-red radiation. A Leslie cube can be used to investigate IR emission. IR can be used to increase or monitor temperature.

Dangers of Electromagnetic Waves

1	EM radiation and harm	EM radiation can pass through living tissue. Depending up on the type of EM radiation will dictate as to what and how much herm will come to you.
2	Measuring risk	EM radiation does have it's uses but there are associated risk to go with them. We measure risk of harm (radiation dose) in sieverts often expressed in millisieverts. 1Sv = 1000mSv.
3	Risk variation	Risks can be different for different parts of the body as different amounts of radiation are given to different parts of the body eg Head 2.0 mSv and the Chest 8.0 mSv

Key Vocabulary

1	Diffraction	The bending of waves around a barrier or through an opening.
2	Reflection	The angle of incidence equals the angle of reflection. The normal is a line drawn at right angles
3	Refraction	Waves pass through a different medium and change direction
4	Decibel (dB)	The most common unit used to express loudness.
5	Frequency	Number of oscillations per second (Hz)
6	Time Period	one complete cycle of vibration to pass a given point
7	Oscillation	A motion that repeats itself – IE vibrations