



## CP5 Light and the Electromagnetic waves

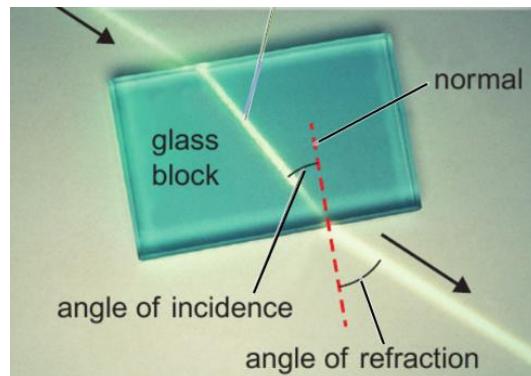
### 1. Electromagnetic waves

<b>Electromagnetic waves</b>	A group of waves that all travel at the same speed (speed of light) in a vacuum, and are all transverse.
<b>Speed of light</b>	300,000,000 m/s ( $3 \times 10^8$ m/s)
<b>Frequency</b>	The number of waves that pass a point every second. One hertz (Hz) is one wave per second.
<b>Wavelength</b>	The distance between a point on one wave and the same point on the next wave.
<b>EM waves</b>	All are transverse, all travel at the speed of light.
<b>Interface</b>	The boundary between two different materials.
<b>Refraction and wave speed</b>	Light travels at different speeds in different materials causing it to refract when hitting the interface at an angle.
<b>Prisms and the colour spectrum</b>	Different wavelengths slow down by different amounts when they hit glass causing each colour to refract differently.
<b>Infrared discovery</b>	Light split into a spectrum. Thermometer placed on every colour plus next to red. Red was hot, next to red was hottest.

### 2. Other notes

<b>EM spectrum mnemonic</b>	Rubbish <u>M</u> emories <u>I</u> nclude <u>V</u> isiting <u>U</u> r <u>X</u> <u>G</u> irlfriend
<b>EM Radiation and the atmosphere</b>	Some EM radiation (visible light, radio waves) passes through the atmosphere, most is absorbed.
<b>Space telescopes</b>	For types of radiation absorbed by the atmosphere (eg infra red), a telescope must be placed in space.
<b>Producing radio waves</b>	Oscillating electricity in a metal rod produces radio waves.
<b>Receiving radio waves</b>	Radio waves absorbed by a metal rod cause electrical oscillations.
<b>Fluorescence</b>	Absorbing ultraviolet and re-emitting it as visible light.

3. Core practical – refraction	
<b>Normal</b>	A line at right angles to the interface.
<b>Angle of incidence</b>	Angle between the incident ray and the normal.
<b>Angle of refraction</b>	Angle between the refracted ray and the normal.
<b>CP5 – Aim</b>	To explore how changing the angle of incidence changes the angle of refraction.
<b>CP5 - Variations</b>	Repeat 5 times, from 5 different angles, including head-on.
<b>CP5 - Results</b>	The greater the angle of incidence, the greater the angle of refraction.



4. EM radiation		
<b>Gamma rays</b>	Produced by radioactive sources, used for sterilising medical equipment, killing bacteria and cancerous cells	Mutation of DNA and other damage to cells leading to cancers.
<b>X-rays</b>	Seeing the internal structure of objects eg bones in the human body	Skin cancer
<b>Ultra violet (UV)</b>	Security marking, disinfecting water	
<b>Visible light</b>	Photography, illumination. The only type our eyes can detect.	
<b>Infra red (IR)</b>	All hot objects emit IR. Thermal imaging , cooking, TV remote.	Skin burns
<b>Microwave</b>	Cooking, communication (from satellites and mobile phones)	Internal heating of body cells
<b>Radio wave</b>	Produced by electrons oscillating in an aerial. Broadcasting TV and radio, satellite communications	

