

Definitions and Concepts for OCR (B) Physics GCSE

Topic 1: Matter

*Definitions in **bold** are for higher tier only*

Definitions marked by '' are for separate sciences only*

Amplitude: The maximum displacement of a wave from its undisturbed (equilibrium) position.

***Colour:** The colour of an object is determined by which wavelengths of light reflect from it. All other wavelengths are absorbed.

Concave Lens: A lens that is thicker at the edges than in the centre. Parallel rays diverge when passing through.

Convex Lens: A lens that is thicker in the centre than at the edges. Parallel rays converge when passing through.

Diffuse Reflection: The reflection of a wave from a rough surface that results in the wave being scattered.

Electromagnetic Spectrum: A group of transverse waves that cover a large range of frequencies and wavelengths. The highest frequency waves in the spectrum are gamma-rays and the lowest are radio waves.

Electromagnetic Waves: Transverse waves that transfer energy from the source of the waves, to an absorber. They form a continuous spectrum of different frequencies and all travel at the same speed in a vacuum.

Energy Levels: The stable states in which electrons are found in around a nucleus. Electrons can transition to a higher energy level through the absorption of electromagnetic radiation and can transition to a lower energy level through the emission of electromagnetic radiation.

Focal Length: The distance between the centre of a lens and its principal focus.

Foetal Scanning: A method of producing an image of a foetus in a womb through the emission, reflection and detection of ultrasound waves.

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Frequency: The number of waves passing a given point in a second. It is the inverse of the wave's time period.

Gamma Rays: High energy radiation rays used for detecting and treating cancers, and sterilising food and medical implements. They can cause cell damage and mutations.

Hertz (Hz): The unit of frequency.

Infrared Radiation: A type of radiation that all objects emit and absorb. The hotter an object is, the greater the infrared radiation it emits in a given time.

Infrared: Used for cooking food, thermal imaging and short range communications. It can cause skin burns.

Ionisation: The process of an atom gaining or losing electrons, resulting in it becoming a charged ion. High energy radiation can cause ionisation.

Law of Reflection: The angle of incidence must always equal the angle of reflection when a wave reflects.

Lens: An object that forms an image through the refraction of light.

Longitudinal Waves: Waves with oscillations that are parallel to the direction of travel/energy transfer.

Microwaves: Used for satellite communications and for cooking food. They can cause internal heating of body cells.

Ozone: A gas produced when oxygen absorbs ultraviolet radiation. It has three oxygen atoms in each molecule. Ozone also absorbs ultraviolet radiation.

Power of a Lens: Equal to the reciprocal of the focal length of a lens. Concave lenses have negative powers whereas convex lenses have positive powers.

Principal Focus: The point before or after a lens where light rays appear to meet.

Radio Waves: Used for television and radio signals. **They can be produced by oscillations in electrical circuits, or can induce these oscillations themselves.**

***Ray Diagram:** A visual representation of the path of a wave, usually around the point where it meets a boundary. Rays are usually drawn as straight lines with an arrow pointing in their direction of travel.

Real Image: An image produced by light-rays physically converging. Real images are ones that can be projected onto a screen.



***Reflection:** The bouncing back of a wave at a boundary.

***Refraction:** The changing of speed, and consequently the direction, of a wave as it changes medium. The wavelength of the wave will also change but the frequency remains constant.

Seismic Waves: Waves that are produced by earthquakes.

***SONAR:** A form of imaging involving the emission, reflection and detection of ultrasound waves to take distance measurements and form images deep underwater.

Specular Reflection: The reflection of a wave from a smooth surface.

Speed of EM Waves: All electromagnetic waves travel at the same speed in a vacuum (3×10^8 m/s).

Temperature: An object's temperature depends on the balance of the amount of radiation it absorbs in comparison to the amount of radiation it emits.

Time Period: The time it takes for one complete wave to pass a given point. It is the inverse of frequency.

Transverse Waves: Waves with oscillations that are perpendicular to the direction of travel/energy transfer.

***Ultrasound Waves:** Waves that have a frequency higher than the upper limit of human hearing (20kHz).

***Ultrasound Imaging:** A form of medical imaging that involves the emission, reflection and detection of ultrasound waves to form an image of within a patient's body.

Ultraviolet: Used in energy efficient lamps, disinfecting water, and for sun tanning. It can cause cell and eye damage that can result in skin cancer and eye conditions.

Virtual Image: An image produced by the apparent, but not actual, divergence of light-rays. Virtual images cannot be projected onto a screen.

Visible Light: The only type of electromagnetic radiation that our eyes can detect. It is used for fibre optic communications and photography.

Wave Velocity: The velocity at which energy is transferred through the medium. It is equal to the product of the wave's wavelength and frequency.



Wave: A process of energy transfer through oscillations, without medium being transferred with it.

Wavefront: An imaginary surface representing points of a wave that are at the same point in their cycle.

Wavelength: The distance from a point on one wave to the same point on the adjacent wave (ie. peak to peak or trough to trough).

X-Rays: Used for medical imaging and security scanners. They can cause cell damage and mutations.

