

## Definitions and Concepts for Edexcel Physics GCSE

### Topic 5: Light and the Electromagnetic Spectrum

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

*Definitions marked by '\*' are for separate sciences only*

**Critical Angle:** The angle of incidence beyond which a wave will undergo total internal reflection.

**Constant Temperature:** Bodies at a fixed temperature radiate the same average power that they absorb.

**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.

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

**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.

**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.

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

**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.

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

**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. The rays may converge or diverge away from this point.

**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.

**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 ( $3 \times 10^8$  m/s).

**Total Internal Reflection:** A process that occurs when a wave meets the boundary from a medium with a high refractive index to one with a lower refractive index, at an angle of incidence greater than the critical angle. All the wave is reflected at the boundary.

**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.

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

