## SP5a Ray diagrams

| Word | Pronunciation | Meaning |
|---|---|---|
| **angle of incidence** | | The angle between an incoming light ray and the normal. |
| **angle of reflection** | | The angle between the normal and a ray of light that has been reflected. |
| **angle of refraction** | | The angle between the normal and a ray of light that has been refracted. |
| **critical angle** | | The angle of incidence above which total internal reflection occurs inside a material such as glass or water. |
| **incident ray** | | A ray of light going towards an interface or object. |
| **interface** | | The boundary between two materials. |
| **law of reflection** | | The law that says the angle of incidence and the angle of reflection are equal. |
| **normal** | | An imaginary line drawn at right angles to the surface of a mirror or lens where a ray of light hits it. |
| **ray diagram** | | A diagram that represents the path of light using arrows. |
| **reflection** | | When a wave bounces off a surface instead of passing through it or being absorbed. |
| **reflected ray** | | A ray of light that has been reflected from a surface. |
| **refracted ray** | | A ray of light that has changed direction because it has passed from one substance into another. |
| **refraction** | | The change in direction when a wave goes from one medium to another. |
| **total internal reflection** | | The reflection of a ray of light inside a medium such as glass or water when it reaches an interface. Total internal reflection only happens when the angle of incidence inside the material is greater than the critical angle. |

## SP5b Colour

| Word | Pronunciation | Meaning |
|---|---|---|
| **absorb** | | To soak up or take in – for waves, it is when the wave disappears as the energy it is carrying is transferred to a material. |
| **diffuse reflection** | | Reflection from a rough surface, where the reflected light is scattered in all directions. |
| **filter** | | Something that only transmits certain colours and absorbs the rest. |
| **luminous** | | Giving off light. The Sun and light bulbs are luminous objects. |
| **specular reflection** | | When light is reflected evenly, so that all reflected light goes off in the same direction. Mirrors produce specular reflection. |

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|---|---|---|
| **transmit** | | For waves, when the wave passes through something and is not absorbed or reflected. |
| **visible spectrum** | | The seven colours that make up white light. |
| **white light** | | Normal daylight, or the light from light bulbs, is white light. |

## SP5c Lenses

| Word | Pronunciation | Meaning |
|---|---|---|
| **converging lens** | | A lens that brings together (converges) light rays. |
| **diverging lens** | | A lens that spreads out (diverges) light rays. |
| **focal length** | | The distance from a lens to the focal point |
| **focal point** | | The point at which parallel light rays converge after passing through a converging lens, or appear to come from after passing through a diverging lens. |
| **object** | | The thing looked at through a lens or other optical instrument. |
| **power (lenses)** | | A measure of how much the lens bends light rays passing through it. A more powerful lens bends rays more and has a shorter focal length. |
| **real image** | | An image through which light rays pass, so that it can be seen on a screen placed at that point. |
| **virtual image** | | An image that light rays do not pass through; they only appear to come from the image. |

## SP5d Electromagnetic waves

| Word | Pronunciation | Meaning |
|---|---|---|
| electromagnetic waves | | A group of waves that all travel at the same speed in a vacuum, and are all transverse. |
| frequency | ***free****-kwen-see* | The number of vibrations (or the number of waves) per second. One hertz (Hz) is one wave per second. |
| infrared (IR) | | Electromagnetic radiation that has a longer wavelength than visible light but shorter than microwaves. We can feel infrared radiation as warmth. |
| transverse wave | | A wave in which the vibrations are at right angles to the direction the wave is travelling. |
| ultraviolet (UV) | | Electromagnetic radiation that has a shorter wavelength than visible light but a longer wavelength than X-rays. |
| vacuum | ***vak****-yoom* | A place where there is no matter at all. |
| visible light | | Electromagnetic waves that can be detected by the human eye. |

## SP5e The electromagnetic spectrum

| Word | Pronunciation | Meaning |
|---|---|---|
| electromagnetic spectrum | | The entire frequency range of electromagnetic waves. |
| gamma rays | | Electromagnetic radiation with the shortest wavelengths and highest frequencies. |
| microwaves | | Electromagnetic radiation with a longer wavelength than infrared radiation but a shorter wavelength than radio waves. |
| radio waves | | Electromagnetic radiation with the longest wavelengths and lowest frequencies. |
| X-rays | | Electromagnetic radiation that has a shorter wavelength than ultraviolet radiation but a longer wavelength than gamma rays. |

## SP5f Using the long wavelengths

| Word | Pronunciation | Meaning |
|---|---|---|
| oscillations | | Movements back and forth. In radio aerials, oscillations are repeated changes in voltage and current. |

## SP5g Radiation and temperature

| Word | Pronunciation | Meaning |
|---|---|---|
| **greenhouse effect** | | The warming effect on the Earth's surface caused by greenhouse gases absorbing energy emitted from the warm surface of the Earth and reemitting it back to the surface. |
| **greenhouse gas** | | A gas, such as carbon dioxide, water vapour or methane, in the Earth's atmosphere, which absorbs energy emitted from the Earth's surface and then reemits it back to the surface. |
| **power (energy transfers)** | | The amount of energy (in joules, J) transferred every second. It is measured in watts (W). |
| **watts (W)** | | The unit for measuring power. 1 watt = 1 joule of energy transferred every second. |

## SP5h Using the short wavelengths

| Word | Pronunciation | Meaning |
|---|---|---|
| fluorescence | | Absorbing radiation of one wavelength and re-emitting the energy at a different wavelength (usually so that it becomes visible). |
| radiotherapy | | Cancer treatment in which a patient is given gamma radiation to kill the cancer cells. |

## SP5i EM radiation dangers

| Word | Pronunciation | Meaning |
|---|---|---|
| DNA | | Deoxyribonucleic acid. Chemical that makes up genes and chromosomes. It contains the instructions for a cell's growth and activity. |
| mutation | | A change in the DNA instructions in a cell. |
| skin cancer | | A cancer or cancerous tumour on the skin. |