

SP5: Light and the Electromagnetic Spectrum (Paper 1)

Lesson	Objectives Tracker Sheet	Date covered	I know this well	I need to do more work on this
SP5a Ray diagrams	SP5.1P Explain, with the aid of ray diagrams, reflection, refraction and total internal reflection (TIR), including the law of reflection and critical angle.			
SP5a Investigating refraction – Core Practical	SP5.9 Investigate refraction in rectangular glass blocks in terms of the interaction of electromagnetic waves with matter.			
SP5b Colour	SP5.2P Explain the difference between specular and diffuse reflection.			
	SP5.3P Explain how colour of light is related to: a differential absorption at surfaces b transmission of light through filters.			
SP5c Lenses	SP5.4P Relate the power of a lens to its focal length and shape.			
	SP5.5P Use ray diagrams to show the similarities and differences in the refraction of light by converging and diverging lenses.			
	SP5.6P Explain the effects of different types of lens in producing real and virtual images.			
SP5d Electromagnetic waves	P5.7 Recall that all electromagnetic waves are transverse, that they travel at the same speed in a vacuum			
	P5.8 Explain, with examples, that all electromagnetic waves transfer energy from source to observer.			
	P5.9 Investigate refraction in rectangular glass blocks in terms of the interaction of electromagnetic waves with matter.			
	P5.12 Recall that our eyes can only detect a limited range of frequencies of electromagnetic radiation.			
	P5.14 H Explain the effects of differences in the velocities of electromagnetic waves in different substances.			
SP5e The electromagnetic spectrum	P5.10 Recall the main groupings of the continuous electromagnetic spectrum including (in order) radio waves, microwaves, infrared, visible (including the colours of the visible spectrum), ultraviolet, X-rays and gamma rays.			

	P5.11 Describe the electromagnetic spectrum as continuous from radio waves to gamma rays and that the radiations within it can be grouped in order of decreasing wavelength and increasing frequency.			
	P5.13 H Recall that different substances may absorb, transmit, refract, or reflect electromagnetic waves in ways that vary with wavelength.			
SP5f Using the long wavelengths	P5.13 H Recall that different substances may absorb, transmit, refract, or reflect electromagnetic waves in ways that vary with wavelength.			
	P5.14 H Explain the effects of differences in the velocities of electromagnetic waves in different substances			
	P5.22 Describe some uses of electromagnetic radiation: (a) radio waves: including broadcasting, communications and satellite transmissions (b) microwaves: including cooking, communications and satellite transmissions (c) infrared: including cooking, thermal imaging, short range communications, optical fibres, television remote controls and security systems (d) visible light: including vision, photography and illumination.			
	P5.23 H Recall that radio waves can be produced by, or can themselves induce, oscillations in electrical circuits.			
SP5g Radiation and temperature	SP5.15P Explain that all bodies emit radiation, that the intensity and wavelength distribution of any emission depends on their temperature			
	SP5.16P H Explain that for a body to be at a constant temperature it needs to radiate the same average power that it absorbs			
	SP5.17P H Explain what happens to a body if the average power it radiates is less or more than the average power that it absorbs.			
	SP5.18P H Explain how the temperature of the Earth is affected by factors controlling the balance between incoming radiation and radiation emitted.			

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<p align="center">SP5g Investigating radiation – Core Practical</p>	<p>SP5.19P Investigate how the nature of a surface affects the amount of thermal energy radiated or absorbed.</p>			
<p align="center">SP5h Using the short wavelengths</p>	<p>P5.13 H Recall that different substances may absorb, transmit, refract or reflect electromagnetic waves in ways that vary with wavelength.</p>			
	<p>P5.14 H Explain the effects of differences in the velocities of electromagnetic waves in different substances.</p>			
	<p>P5.22 Describe some uses of electromagnetic radiation: (e) ultraviolet: including security marking, fluorescent lamps, detecting forged bank notes and disinfecting water (f) X-rays: including observing the internal structure of objects, airport security scanners and medical X-rays (g) gamma rays: including sterilising food and medical equipment, and the detection of cancer and its treatment.</p>			
<p align="center">SP5i EM radiation dangers</p>	<p>P5.20 Recall that the potential danger associated with an electromagnetic wave increases with increasing frequency</p>			
	<p>P5.21 Describe the harmful effects on people of excessive exposure to electromagnetic radiation, including: (a) microwaves: internal heating of body cells (b) infrared: skin burns (c) ultraviolet: damage to surface cells and eyes, leading to skin cancer and eye conditions (d) X-rays and gamma rays: mutation or damage to cells in the body</p>			
	<p>P5.24 Recall that changes in atoms and nuclei can: (a) generate radiations over a wide frequency range (b) be caused by absorption of a range of radiations.</p>			