KS3 Physics – Light – Learning Objectives

	Beginning	Developing	Secure	Embedding	Extending	Excelling
Travelling Light	Using examples, explain the difference between luminous and non-luminous objects, and define the terms 'transparent', 'translucent' and 'opaque'.	Recall that light always travels in straight lines (rectilinear propagation). Recognise appropriate symbols used to construct ray diagrams.	Explain, with the aid of a diagram, why we are able to see non-luminous objects. Explain the principle of operation of a (pinhole) camera.	Describe and explain how changing the position of a pinhole camera changes the image observed on the screen. Compare the similarities and differences between the camera and the eye.		-
Colour	Recall that white light is made of all colours of the spectrum, and that a prism may be used to separate the colours. Name the colours of the spectrum in order.	Explain that coloured surfaces reflect light of the same colour, but reflect all other colours. Explain that filters transmit light of the same colour but absorb all other colours.	Explain how combinations of the three primary colours of light can be used to make other colours of light. Describe and explain the appearance of an object when it is exposed to light of a different colour. Describe and explain the appearance of an object when light from a source passes through a coloured filter.		-	-
Reflection	Recall the Law Of Reflection. Demonstrate how to measure angles of incidence and reflection using the normal line.	Complete an experiment to prove the Law Of Reflection. Draw accurate ray diagrams to show a ray of light reflecting off plane mirrors in various contexts (such as the periscope). Describe the nature and properties of a mirror image. Demonstrate what happens when parallel light rays reflect off concave and convex mirrors. Describe some applications of concave and convex mirrors.			Accurately construct a ray diagram to show the position of a plane mirror's image. Explain the differences between real and virtual images.	Discuss various situations where real and virtual images are formed.
Refraction	Recall that light changes direction as it enters or leaves different substances.	Complete an experiment to compare the angles of incidence and refraction for a glass/Perspex block. Draw accurate ray diagrams to show what happens when light passes from one material to another. Describe some situations where refraction may be useful or a hindrance, including comparison of real and apparent depths.		Discuss refraction in terms of the speeds of light in different materials, and in terms of optical density. Explain the term 'refractive index'.		Determine refractive index from angles of incidence and refraction, using Snell's Law. Complete an experiment to determine the refractive index of a material.
Total Internal Reflection	-	Recall that light approaching a boundary at a large enough angle is reflected off the boundary within the material, and does not pass through the boundary.	Draw accurate ray diagrams to show TIR. Describe some devices that use TIR. Name some uses for optical fibres.	Explain that TIR only occurs when light tries to pass out from a material of greater optical density. Complete an experiment to determine the critical angle of a glass/Perspex block. Draw accurate ray diagrams to show light passing through an optical fibre, and discuss the applications of optical fibres.		Determine the critical angle of a substance by calculation, using refractive index. Describe and explain the composition of an optical fibre.
Lenses and The Eye	Recall that lenses work by refracting light; light rays are distributed in different directions since the surfaces of the lens are not parallel.	Recall that convex lenses cause convergence, and concave lenses cause divergence; represent these ideas using an appropriate diagram.	In simple terms, discuss how lens shape and power may be used to correct different types of eyesight.	Identify the focal point and focal length of a lens. Name the main parts of the eye and describe their functions; compare these parts to the parts of a camera.	Explain how the eye adjusts itself for bright and dim conditions, and to focus on near and far objects. Describe the causes and consequences of short- and long-sight, and explain how the eyesight may be corrected using lenses. Compare the various eyesight correction options (spectacles, contact lenses, laser surgery).	

** Objectives covering more than one grade are assessed based on the level of scientific detail and language used by the learner.*