

KS3 Physics – Waves: All about Light?

Subject curriculum intent:	<p>To develop in our students:</p> <ul style="list-style-type: none"> • An enjoyment of Science by providing relevant, interesting and challenging experiences and activities. • Observational skills, by looking for patterns and contrasts. • An inquiring mind and a logical approach to problem solving. • The ability to draw conclusions from simple experiments and, where appropriate, to devise suitable experiments for further investigations. • Communication skills in speaking and listening, written, diagrammatic and symbolic forms. • Co-operation and a respect for others by being able to work as part of a team – the development of appropriate social skills. • Confidence in their own abilities. • A respect for the environment and a careful use of resources. • An interest in the world about them and a greater understanding of it. 		
End of KS3 intent/outcome		End of KS4 intent/outcome	End of KS5 intent/outcome
Students will build on their knowledge of science through the different areas – biology chemistry and physics. Students will ‘work scientifically’ to achieve the goals of each topic area they encounter.		Students will continue to develop their scientific knowledge through the different areas – biology, chemistry and physics. Students will ‘work scientifically’ to achieve the goals of each topic area they encounter. Students will be able to relate their scientific experiences to everyday life and have an understanding that science is all around them.	N/A
Intent for this topic:	<p>Students will learn about light and how it travels. Students will learn about light sources and the difference between light and dark. Students will explore which objects are translucent, transparent and opaque and use this knowledge to investigate how shadows are formed. Students will learn about the electromagnetic spectrum and everyday examples of the electromagnetic spectrum in action. Students will learn about parts of the eye and how we see.</p> <p>Students will ‘work scientifically’ to achieve these goals, learning the key features of scientific enquiry; observing over time, pattern seeking, identifying, classifying, investigating (fair tests) and researching.</p>		
Core vocabulary needed for this subject/topic:	<p>Subject: Biology, Chemistry, Physics Observe, pattern, identifying, classifying, investigating, fair test, researching</p>		

	Topic: Light, light source, dark, reflection, refraction, ray, shadow, prism, wave Opaque, translucent, transparent Eye, pupil, retina			
Vocabulary pupils will have accessed in other topics or subject areas:	Measure, angles, reflect, light, dark, light source, shadow			
Key vocabulary taught within this topic:	Light, light source, dark, reflection, refraction, ray, shadow, prism Opaque, translucent, transparent Eye, pupil, retina			
Prior knowledge: what pupils may already have studied				
Key stage	Subject	Topic title	Term/year taught	Content/What might pupils already know?
KS3	Science	What is electricity?	Summer 2/Year 2	Students may have learnt about different light sources.
KS3	Maths	Measure & Shape	Every year	Students may have learnt about different angles and how to measure angles.
Links to other subjects: Maths				
Equality, Diversity, Inclusion: Thomas Edison – invented the lightbulb, phonograph & the motion-picture projector.				

	<u>OU P Steps 5-6</u>	<u>OU P Steps P7-8</u>	<u>OU Step 1</u>	<u>OU Step 2</u>	<u>OU Step 3</u>
<u>Subject specific knowledge</u>	Know that a light is a wave. Can identify light and dark. Can identify light sources. Understand that light travels in straight lines.	Know that light is a wave. Knows the difference between light and dark. Can identify several light sources. Understand that light travels in straight lines and that it reflects off surfaces.	Know that light is a wave. Can explain the difference between light and dark. Can explain what a light source is. Can explain that light travels in straight lines	Know that light is a wave. Can explain what a light source is with examples. Knows that light reflects off different surfaces. Know that light reflects off a mirror at the	Know that light is a wave. Knows that light reflects off different surfaces. Understand that light reflects off a mirror at the same angle it enters a mirror.

	<p>Knows that light reflects off surfaces.</p> <p>Can identify a shadow.</p> <p>Identify the colours in the spectrum.</p> <p>Identify that we need light to see.</p> <p>Know that the eye has different parts.</p>	<p>Know that light reflects off smooth, shiny and flat surfaces best.</p> <p>Knows that an opaque object blocks light.</p> <p>Can identify when a shadow has been made.</p> <p>Knows that translucent objects let some light through.</p> <p>Knows that transparent objects let light through easily.</p> <p>Know that white light is made of 7 colours and name each one using a diagram.</p> <p>Can label and explain the purpose of the pupil in the retina in helping us see using a diagram and key symbols.</p>	<p>and that it reflects off surfaces.</p> <p>Knows that refraction is when light bends as it passes through one medium to another. E.g. light bends when it moves from air into water.</p> <p>Can explain what opaque means and link this to shadows.</p> <p>Can identify if a shadow is big or small.</p> <p>Knows that translucent objects let some of the light through but scatters the light so we can't see through properly.</p> <p>Knows that transparent objects let light through easily.</p> <p>Know that white light is made of 7 colours and name them in the correct order.</p> <p>Can label parts of the eye.</p>	<p>same angle it enters a mirror.</p> <p>Can explain what refraction is in their own words.</p> <p>Can explain how shadows are formed using key vocabulary e.g. opaque.</p> <p>Can explain the difference between translucent and transparent objects.</p> <p>Know that a shadow is larger when the object is closer to the light and a shadow is smaller when it is further from the light.</p> <p>Know that white light is made of 7 colours and recall them in order.</p> <p>Knows the names and can label parts of the eye.</p> <p>Explain how we see using key words to help.</p> <p>Understand that the electromagnetic spectrum is energy</p>	<p>Knows how to measure angles.</p> <p>Can explain what refraction is and give some examples.</p> <p>Can explain how shadows are formed and how we get larger and smaller shadows using scientific vocabulary.</p> <p>Can explain the difference between translucent and transparent objects and give some examples.</p> <p>Explain how we see using examples and names of parts of the eye.</p> <p>Knows that Isaac Newton shone the light through a prism, separating light into colours.</p> <p>Understand that the electromagnetic spectrum is a range of different waves each with a specific function.</p>
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			<p>Explain how we see using a diagram and key words.</p> <p>Understand that the electromagnetic spectrum is energy and we cannot see but it is present.</p>	<p>waves that we cannot see.</p>	
<p><u>Subject specific skills</u></p>	<p>Is able to classify objects into light source and not a light source.</p> <p>Is able to classify light and dark.</p> <p>Is able to use a torch to create shadows with some support.</p> <p>Is able to create a spectrum using a prism after staff demonstrations.</p> <p>Is able to shine light rays into a mirror and notice how it leaves the mirror.</p> <p>Is able to follow a set of demonstrations to make models.</p>	<p>Is able to classify pictures of light sources.</p> <p>Is able to use a torch to create shadows.</p> <p>Is able to use a torch to explore translucent, transparent and opaque objects.</p> <p>Is able to create a spectrum using a prism and visual instructions.</p> <p>Is able to identify that light is reflected from a mirror after an investigation.</p> <p>Is able to label diagrams using symbols.</p>	<p>Is able to use a torch to change the size of shadows.</p> <p>Is able to create a spectrum using a prism and written instructions.</p> <p>Is able to identify similarities in the angles of light into and out of a mirror after an investigation with verbal prompts.</p> <p>Is able to identify uses of the electromagnetic spectrum in medicine (xrays) and preventing forgery (UV light).</p> <p>Is able to label diagrams using a word bank.</p>	<p>Is able to use a torch to change the size of shadows.</p> <p>Is able to create a spectrum using a prism, and identify the main colour.</p> <p>Is able to identify similarities in the angles of light into and out of a mirror after an investigation.</p> <p>Is able to identify uses of the electromagnetic spectrum from examples.</p> <p>Is beginning to draw and label diagrams.</p> <p>Is able to make models following a written set of instructions.</p>	<p>Is able to explore what happens when light hits different surfaces.</p> <p>Is able to measure angles.</p> <p>Is able to name key scientists.</p> <p>Is able to create a spectrum using a prism, and identify each colour.</p> <p>Is able to measure angles of light into and out of a mirror using a protractor then identify similarities and differences in results.</p> <p>Is able to identify uses of each wave on the electromagnetic spectrum.</p>

	<p>Is able to follow a set of demonstrations to carry out a simple investigation.</p>	<p>Is able to make models following a picture method.</p> <p>Is able to make a prediction from a choice of 3 using symbols.</p> <p>Is able to follow a picture method to carry out a simple investigation.</p> <p>Is able to identify one thing that has changed when completing a fair test.</p> <p>Identifies the correct result in a table.</p>	<p>Is able to make models following a word and picture method.</p> <p>Is able to link their model to a concept.</p> <p>Is able to select an appropriate prediction from a given choice.</p> <p>Is able to follow a word and picture method to carry out a simple investigation.</p> <p>Is able to suggest what to change when completing a fair test.</p> <p>Is able to record results in a simple table.</p> <p>Analyses results in the form of tables, simple bar graphs and a brief descriptions using key words or sentence blanks.</p>	<p>Is able to use their model to explain a concept.</p> <p>Is able to make a prediction linked to their investigation.</p> <p>Is able to follow a written set of instructions to carry out a simple investigation.</p> <p>Is able to explain why their investigation included a fair test.</p> <p>Is able to record results in a suitable table.</p> <p>Is able to record results in the form of a simple bar graph.</p> <p>Analyses results in the form of tables, simple bar graphs and a brief description.</p>	<p>Is able to draw and labels diagrams.</p> <p>Is able to make models following a written set of instructions.</p> <p>Is able to suggest improvements to their model.</p> <p>Is able to use their model to explain a concept.</p> <p>Is able to make predictions.</p> <p>Is able to follow a written set of instructions to carry out a simple investigation.</p> <p>Is able to design an experiment to include a fair test.</p> <p>Is able to record results in a suitable table.</p> <p>Analyses results in the form of tables, simple bar graphs and a brief description.</p>
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					Is able to draw conclusions from their results.
<u>Suggested Activities</u>	<ul style="list-style-type: none"> • Look at different light sources. • Explore light and dark. • Look at how light reflects. • Look at how light refracts. • Learn about how light travels. • Look at light rays. • Look at objects that are opaque, transparent and translucent. • Make shadows. • Label parts of the eye. • Explain how we see things. • Look at the colour spectrum and the name of different colours. • Make a rainbow in a glass • Electromagnetic spectrum circus of activities • Making a spectrum using a prism. • Measuring angle of incidence and reflection. • Shining light rays into a mirror. 				
<u>Possible Investigations/ Working Scientifically</u>	<ul style="list-style-type: none"> • Investigate which objects are opaque, transparent and translucent. • Investigate how to make shadows bigger or smaller. • Investigate light rays – see resources folder on shard area. 				
<u>Personal development</u>	<p><u>Problem solving</u> Investigations and matching exercises</p> <p><u>Communication skills</u> Working as pairs in investigations, asking and answering questions</p> <p><u>Self-belief</u> Learning new skills, practising them and demonstrating them.</p> <p><u>Self-management</u> Working with new equipment</p> <p><u>Teamwork</u> Working as groups to solve problems or find out new information</p>				
<u>Resources</u>	<p>Twinkl Youtube</p>				

Resource folder on the shared area.
CLEAPPS for risk assessments.

Evidencing Work

All work / evidence sheets need to be printed off (where appropriate levelled in accordance with the rubric), students need to self-assess and work needs to be put in student folders.

RRS Articles:

This unit of work is linked to Articles of the UN Convention on the Rights of the Child.

Article 13 (freedom of expression)

Article 24 (health and health services)

Article 29 (goals of education)