



# Portfields Primary School Medium Term Plan



Year Group – 6





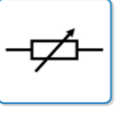


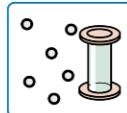

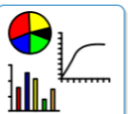

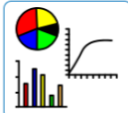
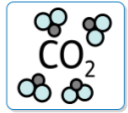
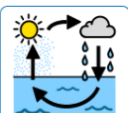
Subject - **Science**

Strand - **Light**

Term - **Summer 1**

National Curriculum	Key Questions	Substantive Knowledge	Key Vocabulary	Real-Life Links
<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> <li>recognise that light appears to travel in straight lines</li> <li>use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye</li> <li>explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes</li> <li>use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them.</li> </ul>	<ul style="list-style-type: none"> <li>Why do we see things clearer in the daytime?</li> <li>Is artificial light the same as natural light?</li> <li>What happens to light when it is shone through water?</li> <li>Put a pencil in a glass of water and it looks broken. Why?</li> <li>What happens when light travels through glass?</li> <li>Does light travel at only one speed?</li> <li>Why can I see a rainbow on a surface when the sun is shining through a window?</li> <li>If the colour spectrum is made up of 7 colours, why can I see more?</li> <li>Why do your clothes appear to change colour in a disco?</li> <li>Do coloured object look the same in different coloured light?</li> <li>Why is a polar bear white?</li> <li>How does the size of an object affect the size of a shadow?</li> <li>How does the distance between the light and the object change the size of a shadow?</li> <li>Do some surfaces scatter light more than others?</li> <li>Could I use light to help me see things that are hidden?</li> <li>How does the texture of a surface effect its ability to reflect light?</li> <li>How perfect are our mirrors?</li> </ul>	<ul style="list-style-type: none"> <li>Understand that light is a form of energy called electromagnetic radiation and it is made of particles called photons.</li> <li>Understand that light rays travel in straight lines.</li> <li>Recognise that light travels from its source to our eyes.</li> <li>We see objects because light rays reflect off of their surface into our eyes.</li> <li>Understand that light travels at different speeds through different mediums.</li> <li>Recognise that rainbows are visible when light refracts through raindrops.</li> <li>Understand that white light is made up of the colour spectrum. Each coloured light refracts at a slightly different speed.</li> <li>Know that light is made up of a spectrum of colours, as evidenced by Isaac Newton.</li> <li>Recognise that coloured objects reflect the light waves of the same colour.</li> <li>Explain why shadows have the same shape as the object that casts them.</li> <li>Shadows change size and shape when the angle/distance between the object and the light source changes.</li> <li>Understand the texture of a surface change the quality of the reflection: Smoother surface produce a clearer sharper reflection while a rough surface scatters the reflected light.</li> <li>Understand the different forms of reflection and related vocabulary: incident ray, reflected ray, mirror and diffused reflection.</li> </ul>	Shadow Light Filter Colour Beam Energy Rainbow	Rainbows Oil in water Light refracting through glass: glasses, Cameras, Telescopes, and Microscopes.
<b>Notes and guidance (non-statutory)</b>	<b>Technical Questions</b>	<b>Disciplinary Knowledge</b>	<b>Technical Vocabulary</b>	<b>Key Scientists</b>
<p>Pupils should build on the work on light in year 3, exploring the way that light behaves, including light sources, reflection and shadows. They should talk about what happens and make predictions.</p> <p>Pupils might work scientifically by: deciding where to place rear-view mirrors on cars; designing and making a periscope and using the idea that light appears to travel in straight lines to explain how it works. They might investigate the relationship between light sources, objects and shadows by using shadow puppets. They could extend their experience of light by looking a range of phenomena including rainbows, colours on soap bubbles, objects looking bent in water and coloured filters (they do not need to explain why these phenomena occur).</p>	<p><b>What is light?</b> Light is formed when atoms release energy as photons. We see this as light.</p> <p><b>Does light have a speed?</b> Light travels at approximately 186,282 miles per second!</p> <p><b>What is refraction?</b> Refraction happens when light changes direction, or bends, when it moves from one material to another. For example, light traveling through the air refracts when it hits water.</p> <p><b>Is refraction useful?</b> Refraction is used in many ways, including: lenses (glasses, telescopes and cameras), optical fibres (high-speed internet and communication) and magnification using microscopes.</p> <p><b>How does a prism allow us to see the colour spectrum?</b> A prism transmits light but slows it down. When light passes from air to the glass of the prism, the change in speed causes the light to change direction and bend. This produces the rainbow-effect of colours.</p> <p><b>How does a rainbow form?</b> Each colour travels at a different speed, so as the light beam refracts as they enter a raindrop, each of the colours bend at a slightly different angle.</p> <p><b>Why does the colour spectrum appear as white light?</b> The colour spectrum appears as white light because all the colours of the spectrum combined stimulate the colour receptors in our eyes in a way that our brain interprets as white.</p>	<p><b>How does light allow us to see colours?</b> Light allows us to see colours because different objects absorb and reflect different wavelengths of light. Our eyes detect these reflected wavelengths, and our brains interpret them as colours.</p> <p><b>What does a green object appear in a red light?</b> A green object in red light appears black or very dark because the green object absorbs the red light. As there is no other light to reflect into our eyes, the object appears black or very dark brown.</p> <p><b>How is a shadow formed?</b> A shadow is formed when an object blocks light, preventing the light rays from reaching a surface behind it.</p> <p><b>Does a translucent object cast a shadow?</b> A translucent object casts a shadow, although it may be a fainter, blurred, or less distinct shadow than that of an opaque object.</p> <p><b>What affects the size of a shadow?</b> A shadow will change size when:</p> <ul style="list-style-type: none"> <li>the object moves closer to, or further from, the light source;</li> <li>the light source moves closer to, or further from, the object.</li> </ul> <p><b>How is light reflected off a mirror?</b> Light is reflected off a mirror by bouncing off its smooth, reflective surface at an angle equal to the angle at which it hits the surface.</p> <p><b>Why do the reflections in circus mirrors look distorted?</b> Circus mirrors have curved surfaces that distort the reflected image by reflecting light at varying angles.</p>	Refract Spectrum Wavelength Transparent Opaque Incidence Photon Prism	<p style="text-align: center;"><b>Working Scientifically</b></p> <ul style="list-style-type: none"> <li>Use torches to demonstrate light travelling in straight lines.</li> <li>Make predictions and investigate refraction by moving an image behind a glass of water.</li> <li>Make predictions associated with refraction and the colour spectrum.</li> <li>Use a light box and assorted prisms to test predictions about the colour spectrum.</li> <li>Make predictions about the colour spectrum using colour filter paper.</li> <li>Make predictions about the behaviour of shadows in relation to objects of differing size.</li> </ul>

Lesson Breakdown					
Lesson 1	Lesson 2	Lesson 3	Lesson 4	Lesson 5	Lesson 6
<p><b>Learning Objective</b> To understand that light travels in straight lines and reflects off of objects around us.</p> <p><b>Success Criteria</b></p> <ul style="list-style-type: none"> <li>I can explain how light appears in <i>rays</i> or <i>beams</i>.</li> <li>I can demonstrate that light travels in a straight line.</li> <li>I can create a model to show how light travels from a light source to our eyes or to an object and then our eyes.</li> </ul> <p><b>Star Knowledge</b> Light is a form of electromagnetic energy. Light rays travel in straight lines and we see objects because light rays reflect from their surface into our eyes.</p>	<p><b>Learning Objective</b> To recognise that refraction changes the direction in which light travels.</p> <p><b>Success Criteria</b></p> <ul style="list-style-type: none"> <li>I understand how light is refracted.</li> <li>I can investigate the effects of refraction.</li> <li>I understand the way refraction alters the direction of light.</li> </ul> <p><b>Star Knowledge</b> Refraction is the bending of light (or other waves) as it passes from one medium to another and changes speed.</p>	<p><b>Learning Objective</b> To recognise that white light is made up of a spectrum of colours.</p> <p><b>Success Criteria</b></p> <ul style="list-style-type: none"> <li>I can demonstrate the refraction of light using a prism.</li> <li>I can create a colour wheel that, when spun using an electrical motor, will demonstrate how white light is created using a colour spectrum.</li> </ul> <p><b>Star Knowledge</b> The visible light spectrum is the range of colours of light that the human eye can see: Red, Orange, Yellow, Green, Blue, Indigo, and Violet.</p>	<p><b>Learning Objective</b> To understand how light enables us to see colours.</p> <p><b>Success Criteria</b></p> <ul style="list-style-type: none"> <li>I can investigate the effects of using coloured filters on the light spectrum.</li> <li>I can explain what Newton discovered about colour.</li> </ul> <p><b>Star Knowledge</b> When light hits an objects, some of the light is reflected, but the rest is absorbed. Our eyes see reflected light as colours. For example, red objects reflect red light, while absorbing the other colours.</p>	<p><b>Learning Objective</b> To understand the behaviour of shadows.</p> <p><b>Success Criteria</b></p> <ul style="list-style-type: none"> <li>I can explain why shadows have the same shape as the object that casts them.</li> <li>I can explain the relationship between the size of shadows and the distance between the objects and the light source.</li> </ul> <p><b>Star Knowledge</b> A shadow forms when an opaque or translucent object blocks light from reaching the surface on the other side. The size and shape of the shadow depends on the distance between the light and the object. The larger the distance, the smaller the shadow.</p>	<p><b>Learning Objective</b> To understand how mirrors reflect light and how they help us see objects.</p> <p><b>Success Criteria</b></p> <ul style="list-style-type: none"> <li>I can explain how light is reflected.</li> <li>I can measure the angles of incidence and reflection.</li> <li>I can use my understanding of reflection to create a working periscope.</li> <li>I can explain how the periscope allows me to see objects I would usually not be able to see.</li> </ul> <p><b>Star Knowledge</b> The angles of reflection are the angles at which light (or other waves) bounce off a surface, and they are always equal to the angles of incidence (the angles at which the light hits the surface).</p>

Summer 1 – Light – Flashback Four											
Lesson 1		Lesson 2		Lesson 3		Lesson 4		Lesson 5		Lesson 6	
	<p><b>Last Topic</b> Y6 Electricity L1</p> <p>What does Electrical current flow through?</p> <p><b>Through wires or conductors.</b></p>	<p><b>Last Lesson</b> Y6 Light L1</p> <p>How does light allow us to see objects?</p>  <p><b>Light rays reflect from the object's surface into our eyes.</b></p>	<p><b>Last Topic</b> Y6 Electricity L2</p> <p>When more bulbs are added to a circuit, what happens to the electrical current?</p> <p><b>The electrical current is reduced.</b></p>	<p><b>Last Lesson</b> Y6 Light L2</p> <p>What is the name given to the bending of light as it passes from one medium to another?</p> <p><b>Refraction</b></p>	<p><b>Last Topic</b> Y6 Electricity L3</p> <p>What happens when a push switch is pressed?</p>  <p><b>The electrical switch is closed which completes the circuit.</b></p>	<p><b>Last Lesson</b> Y6 Light L3</p> <p>What are the colours of the visible light spectrum?</p>  <p><b>Red, Orange, Yellow, Green, Blue, Indigo, and Violet.</b></p>	<p><b>Last Topic</b> Y6 Electricity L4</p> <p><i>Whose name was used for describe the strength of an electric current?</i></p>  <p><b>Alessandro Volta</b></p>	<p><b>Last Lesson</b> Y6 Light L4</p> <p>If a red light is shone onto a red object, which coloured wavelength will be reflected?</p> <p><b>The red light will be reflected while all the others will be absorbed.</b></p>	<p><b>Last Topic</b> Y6 Electricity L5</p> <p><i>What does a variable resistor allow you to do to an electric circuit?</i></p>  <p><b>A variable resistor allows you to change the amount of resistance in an electric circuit.</b></p>	<p><b>Last Lesson</b> Y6 Light L5</p> <p>When does a shadow get bigger?</p>  <p><b>When the object creating the shadow gets closer to the light source.</b></p>	<p><b>Last Topic</b> Y6 Electricity L6</p> <p>What's a common example of a push switch in everyday use?</p> <p>a) a dimmer switch b) a pull cord c) a button in a lift.</p> <p><b>A button in a lift.</b></p>
<p><b>Last Year</b> Y5 SE L1</p> <p>Why would you not measure rainfall per hour using Litres?</p>  <p><b>The units of measurement is not suitable. It is too big.</b></p>	<p><b>Previous Key Stage</b> Y4 States L1</p> <p>In what state does matter fill its container?</p> <p><b>Gas</b></p> 	<p><b>Last Year</b> Y5 SE L2</p> <p>If anomalies are spotted, results are more likely to be:</p> <p>a) Ignored completely. b) More accurate and reliable. c) Less accurate and reliable.</p> <p><b>More accurate and reliable</b></p>	<p><b>Previous Key Stage</b> Y4 States L2</p> <p><u>True or False.</u> Only a increase in temperature can cause matter to change state?</p>  <p><b>False</b></p>	<p><b>Last Year</b> Y5 SE L3</p> <p>Which type of chart is used to show proportions of whole?</p>  <p><b>Pie chart</b></p>	<p><b>Previous Key Stage</b> Y4 States L3</p> <p>In which states can water be found in?</p> <p><b>Solid – Ice Liquid – Water Gas – Water Vapour</b></p>	<p><b>Last Year</b> Y5 SE L4</p> <p>What type of test must be completed in order for the data to be reliable?</p> <p><b>Fair Test</b></p>	<p><b>Previous Key Stage</b> Y4 States L4</p> <p>What is name of the process that sees water turn into water vapour when heated?</p>  <p><b>Evaporation</b></p>	<p><b>Last Year</b> Y5 SE L3</p> <p>Which type of chart is used to examine the relationship between two or more things?</p>  <p><b>Scatter Graph</b></p>	<p><b>Previous Key Stage</b> Y4 States L5</p> <p>As well as fizzy drinks, what other product is carbon dioxide used in?</p>  <p><b>Fire Extinguishers</b></p>	<p><b>Last Year</b> Y5 SE L4</p> <p>True or False. Completing a fair test and controlling the variables makes the data more unreliable.</p> <p><b>False</b></p>	<p><b>Previous Key Stage</b> Y4 States L6</p> <p>In which cycle can water be found as liquid (water), gas (vapour), or solid (ice)?</p>  <p><b>The water cycle</b></p>