

Year Group: Year 6

Term: Autumn 2

Topic: Light

National Curriculum Links

Pupils in Key Stage Two should be taught to:

- recognise that light appears to travel in straight lines
- 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
- 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
- use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them

Working Scientifically

- plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary
- take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs
- use test results to make predictions to set up further comparative and fair tests
- report and present findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations
- identify scientific evidence that has been used to support or refute ideas or arguments.

Prior Learning

- Recognise that they need light in order to see things and that dark is the absence of light. **(Y3 - Light)**
- Notice that light is reflected from surfaces. **(Y3 - Light)**
- Recognise that light from the sun can be dangerous and that there are ways to protect their eyes. **(Y3 - Light)**
- Recognise that shadows are formed when the light from a light source is blocked by an opaque object. **(Y3 - Light)**
- Find patterns in the way that the size of shadows change. **(Y3 - Light)**
- Compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets. **(Y5 - Properties and changes of materials)**

Future Learning

- The similarities and differences between light waves and waves in matter. **(KS3)**
- Light waves travelling through a vacuum; speed of light. **(KS3)**
- The transmission of light through materials: absorption, diffuse scattering and specular reflection at a surface. **(KS3)**
- Use of ray model to explain imaging in mirrors, the pinhole camera, the refraction of light and action of convex lens in focusing (qualitative); the human eye. **(KS3)**
- Light transferring energy from source to absorber leading to chemical and electrical effects; photo-sensitive material in the retina and in cameras. **(KS3)**
- Colours and the different frequencies of light, white light and prisms (qualitative only); differential colour effects in absorption and diffuse

reflection. (KS3)

Common Misconceptions

Some children may think:

- we see objects because light travels from our eyes to the object.

Global Goals

This global goal would be perfect to fit with this unit of learning:

- Add your activities here



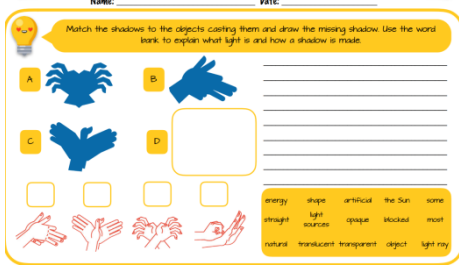
Catholic Social Teaching

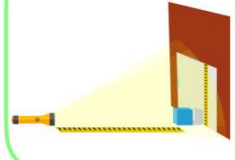

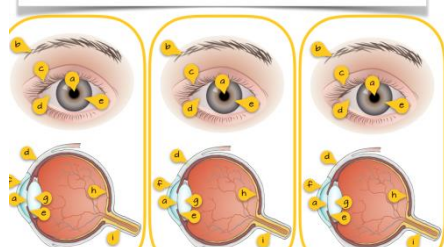
- Add your activities here

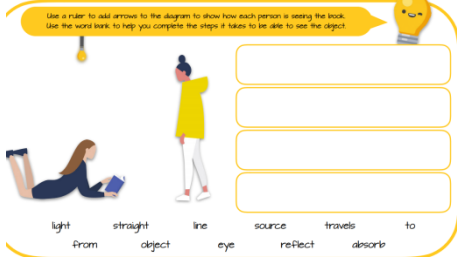
Knowledge and Skills Objectives

Activity

Differentiation

<p>Lesson 1 I can understand how shadows are formed.</p> <p>Add w/s here</p>	<p>Ask the children what a shadow is? How are they created? Are all shadows the same? Encourage the children to include some key words. Look more closely at light. What is it? Where does it come from? What kind of objects block light? Discuss how light comes from light sources and what kind of objects are light sources. Explore how light travels and ask the children why this is important to how shadows are made. Show the children a diagram of a shadow being made and make a special effort to look at the shape of the shadow. What do the children notice about the shape?</p> <p>Activity 1 - whole class Ask the children to pick the correct shadow from a selection to match the object casting it. How do they know? Why are the other options not correct?</p> <p>Children to understand how shadows are formed and that shadows are the same shape as the object.</p> <p>Children match the shadows to the objects that are casting them on worksheet. They draw the shadow for the final diagram using straight lines to show the light rays.</p> 	<p>SEN -</p> <p>LA -</p> <p>MA - Match them up.</p> <p>HA - Year 3 and 4 do this activity Draw the shadows that the object creates.</p> <p>All children must: Label the diagram to explain how the shadow is being made, using Word Bank 1A to help them.</p> <p>How are you challenging the HA?</p>
<p>Knowledge and Skills Objectives</p>	<p>Activity</p>	<p>Differentiation</p>
<p>Lesson Two I can investigate how we change shadows.</p>	<p>Year 3 and 4 do this activity. Check if LKS2 OR UKS2 Objective</p> <p>Ask the children how they would change the direction of a shadow. Can they explain why the direction changes? Ask how they could change the length of a shadow. Have them explain how/why the</p>	<p>SEN -</p> <p>LA - Children use card 1 for their activity</p> <p>MA - Children use card 2 for their activity</p>

	<p>length changes. Ask the children if they can change the size of the shadow. Can they make the shadow bigger? How/why does this happen?</p> <p>Explain that the children will be conducting their own investigation into the relationship between the size of the shadow being cast and the position of the light source and object casting the shadow.</p> <p>Give groups/pairs of children a light source (e.g. torch), a simple object that can easily be measured (as well as its shadow) and a perpendicular, flat surface for the shadow to be cast on (e.g. a space on a wall, preferably with paper on so children can make marks to help with their measuring).</p> <div data-bbox="965 432 1391 651"> <p><u>Shadow Size Experiment</u></p>  <ul style="list-style-type: none"> Set up your experiment as follows: A light source e.g. a torch pointing at a wall. Optional attach some paper to the wall where the light hits it. Place a ruler alongside the light source. Place the object at the other end of the ruler. Turn the light source on and measure the shadow. Move the light source closer to the object by a set amount e.g. 5 cm. Measure the shadow again. </div> <div data-bbox="965 667 1391 837"> <p><u>Shadow Size Experiment</u></p>  <ul style="list-style-type: none"> Set up your experiment as follows: A light source e.g. a torch pointing at a wall. Optional attach some paper to the wall where the light hits it. Place a ruler alongside the light source. Place the object at the other end of the ruler. Turn the light source on and measure the shadow. Move the light source closer to the </div>	<p>HA - Children use card 3 for their activity</p>
<p>Knowledge and Skills Objectives</p>	<p>Activity</p>	<p>Differentiation</p>
<p>Lesson Three</p> <p>I can understand how eyes allow us to see.</p> <p>Add w/s here</p>	<p>Explain to children that light enters our eyes through our pupils and that when we are in a dark room we cannot see another as there is no light around.</p> <p>Activity - have a dark corner or table for children to sit in to experience dark area.</p> <p>Point out the sclera and the iris and what they do. Describe how the iris changes the size of the pupil depending on how much light there is. Have</p> <div data-bbox="987 1150 1429 1398">  </div>	<p>SEN -</p> <p>LA - Match the names to the specific part of the eye.</p> <p>MA - Children use Eye Diagram 3A to match the labels to the right letters on worksheet 3B.</p> <p>HA - They then use Word Bank 3A to finish the descriptions of each part of the eye.</p> <p>Where are the 3A cards? What resource?</p>

	<p>the children face the window and then away from it to see if their partners can spot the pupils changing size.</p> <p>Children should be able to label and know the names of the parts of the eye.</p>	
Knowledge and Skills Objectives	Activity	Differentiation
<p>Lesson Four</p> <p>I know how we see objects.</p> <p>Add w/s here</p>	<p>Explain to children that we see objects in different ways and that light reacts to different objects in different ways.</p> <p>For example, some materials absorb light, some reflect and objects like mirrors are highly reflective.</p> <p>Use the diagrams on the slides to describe how light travels from a light source, reflects off of an object and travels to our eye, which is how we see it.</p> <p>Show the children the picture of the person looking at an object again. Can the children draw some arrows to show how light travels? Be explicit in noting which direction the light is travelling from and where the light source is. Task in books</p> 	<p>SEN -</p> <p>LA - ?</p> <p>MA - Children write explanation for seeing an object on worksheet, using the word bank to help them. They then complete the diagram to show the light rays' direction and route clearly.</p> <p>HA - Children write the steps to describe how someone sees themselves in a mirror on worksheet 4C. They will complete the diagram to show how the light ray has travelled.</p>
Knowledge and Skills Objectives	Activity	Differentiation
<p>Lesson Five</p> <p>I can investigate reflection.</p> <p>Add w/s here</p>	<p>Use the power point to explain how both objects will reflect the light in different amounts. The jumper will absorb most of the light and reflect a small amount, which will be scattered in lots of different directions because of its rougher/bumpier surface. The mirror is better at reflecting as it is smooth and shiny. The light reflecting off this object will travel in a specific direction.</p>	<p>SEN -</p> <p>LA -</p> <p>MA - As a pair, give children Light Maze, Light Angles Poster, protractors and some mirrors. Children need to draw the path of a light ray around</p>


	<p>Show them another beam of light with a different angle of reflection. What do they notice about this reflection? Compare the two reflections.</p> <p>Explain and label the incident ray, reflected ray, the normal, angle of incidence and angle of reflection.</p> <p>Describe and define the angles of incidence and the angle of reflection and how they are equal.</p> <p>Use the following slides to explain how both objects will reflect the light in different amounts. The jumper will absorb most of the light and reflect a small amount, which will be scattered in lots of different directions because of its rougher/bumpier surface. The mirror is better at reflecting as it is smooth and shiny. The light reflecting off this object will travel in a specific direction.</p> <p>Children will design their own maze using light reflections.</p>	<p>the maze using the mirrors. They need to calculate the angle of incidence and reflection from where they place the mirrors and add these measurements to the light's path on the sheet.</p> <p>Children to make periscopes which they can take home with them.</p> <p>These are to be done during lesson instead of maze.</p> <p>HA - How do you challenge your HA?</p>
<p>Knowledge and Skills Objectives</p>	<p>Activity</p>	<p>Differentiation</p>
<p><u>Lesson Six</u> I can understand what is meant by refraction.</p> <p>ADD W/S HERE</p>	<p>Refraction happens when a light ray travels between different mediums, e.g. from air to glass, air to water etc.</p> <p>Travelling through a transparent medium at an angle, the new medium can change the speed of the light ray, which also changes its direction, 'bending' the path of the ray.</p>	<p><u>SEN -</u></p> <p><u>LA - ?</u></p> <p><u>MA</u> - Children sort the Sorting Cards based on if the facts are referring to, or if the objects will (mainly) refract or reflect light, they write on worksheets.</p> <p><u>HA</u> - Difference between refraction and reflection on worksheet 6B using the word bank to help them.</p>



Plan the route of a light ray through the maze by drawing and predicting the reflection of the light ray off mirrors.

Calculate the angle of reflection using the Light Angles Poster to help you. Test your predictions using the mirrors and a light source.



	<p>Travelling through a transparent medium at an angle, the new medium can change the speed of the light ray, which also changes its direction, 'bending' the path of the ray. Show this using an image (or practically if you have the resources) of a cuboid prism, highlighting where the light ray has slowed down and sped up.</p> <p>Show the children convex and concave lenses and show what happens to the light as it travels through them.</p>	
<p>Knowledge and Skills Objectives</p>	<p>Activity</p>	<p>Differentiation</p>
<p>Lesson Seven I can investigate colours in white light.</p> <p>ADD W/S</p>	<p>Introduce Newton and his discovery that white light is a mixture of seven different colours and can be split into these colours. Do the children know what these colours could be?</p> <p>Explain that the colours are the colours of the rainbow. Show the colours in a spectrum and briefly explain the visible section and ultraviolet and infrared sections at either end.</p>	<p><u>SEN</u> -</p> <p><u>LA</u> -</p> <p><u>MA</u> -</p> <p><u>HA</u> -</p> <p>ADD DIFFERENTIATION</p>

	Children to create their own colour wheel.	
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Applied Write Opportunities

ADD THESE

Assessment Opportunities

- Can explain how evidence from enquiries shows that light travels in straight lines
- Can predict and explain, with diagrams or models as appropriate, how the path of light rays can be directed by reflection to be seen, e.g. the reflection in car rear view mirrors or in a periscope
- Can predict and explain, with diagrams or models as appropriate, how the shape of shadows can be varied

Key Vocabulary

Tier 2: light, source, ray or beam, vacuum, reflection, absorb, refraction, focal point, transparent, opaque, cast, spectrum, prism, wavelength

Tier 3: incidence, periscope