

# Year 3

## Light

For further curriculum activities, resources and alternative ideas see

Hamilton Trust <https://www.hamilton-trust.org.uk/browse/science/y3/year-3-autumn-2-light-light-and-shadows/116282>

STEM <https://www.stem.org.uk/resources/community/collection/12719/year-3-light>

### Background knowledge

This is the first topic on light in the National curriculum. It builds on the work on the sun and how seasons change completed in the seasonal changes topic in year 1.

The reflective investigation could be given a context to add meaning for the children e.g. a reflective strip to put on a book bag, reflective clothing for safety workers. The children could investigate shadows making a shadow puppet using opaque, translucent and transparent materials. If there isn't a sunny day during the topic, the children's university of Manchester has a website where you can investigate how shadows change during the course of the day virtually. The children can go on to make sunglasses using a range of materials investigating their effectiveness using UV beads.

We see objects because our eyes can sense light. We cannot see anything in complete darkness. Some objects for example the sun, light bulbs and candles are sources of light. The moon is not a light source. It reflects the light from the sun. Objects are easier to see if there is more light. Some surfaces reflect light. Objects are easier to see if there is less light if they are more reflective.

The light from the sun can damage our eyes and therefore we should not look directly at the sun and protect our eyes by using sunglasses or sun hats in bright light.

Shadows are formed on a surface when an opaque or translucent object is between a light source and the surface and blocks some light. The size of the shadow depends on the position of the source, object and surface.

#### Common misconceptions

See Explorify <https://explorify.uk/teaching-support/teaching-science/light-tackle-the-tricky-bits>

We can still see when there is an absence of light.

Our eyes "get used" to the dark.

The moon and reflective surfaces are light sources.

A transparent object is a light source.

Shadows contain details of an object e.g. facial features.

Shadows result from objects giving off darkness.

**What children should already know or can do (Review before starting topic)**

I can observe and comment on the changes in the seasons including day length.  
 I can name the seasons and suggest the type of weather in each season.  
 I know it is not safe to look directly at the sun. (year 1)

National curriculum objectives	Children's objectives
<ul style="list-style-type: none"> <li>• asking relevant questions and using different types of scientific enquiries to answer them</li> <li>• setting up simple practical enquiries, comparative and fair tests</li> <li>• making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers</li> <li>• gathering, recording, classifying and presenting data in a variety of ways to help in answering questions</li> <li>• recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables</li> <li>• reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions</li> <li>• using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions</li> <li>• identifying differences, similarities or changes related to simple scientific ideas and processes</li> <li>• using straightforward scientific evidence to answer questions or to support their findings.</li> </ul>	<p>I can describe dark is the absence of light.                      I can explain that light is needed in order to see.                      I can explain that light is reflected from a surface.                      I can explain and demonstrate how a shadow is formed.                      I can explore shadow size and explain how to change it.                      I can explain the dangers of direct sunlight and bright lights and describe how to keep protected,</p>
<p><b><u>Scientific enquiry.</u></b></p> <ul style="list-style-type: none"> <li>• making systematic and careful observations and, where appropriate, taking accurate measurements using standard units,</li> <li>• using a range of equipment, including thermometers and data loggers (where available).</li> <li>• recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables</li> </ul>	<p>I can make accurate observations.                      I can measure accurately using standard units.                      I can use equipment to make observations                      I can sort and classify objects according to their properties.</p>

- reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions

I can use different methods to represent my data including, labelled diagrams, tables and simple bar charts.  
 I can use and spell appropriate scientific language.  
 I can explain my findings both orally and in writing.  
 I can draw simple conclusions.

## Assessment

Can you name some light sources?

Why do we need light?

Can you reflect light onto the ceiling using a mirror? Explain what is happening.

Name some reflective materials. Why are they useful?

Sort the materials into transparent, translucent and opaque. Which material makes the best shadow?

How did you investigate how the size of a shadow changes?

What did your results show?

How would you make a shadow bigger?

What time of the day is your shadow at its shortest? Why?

How can you protect your eyes from the sun? Why do you need to do this?

Working towards	Expected	Exceeding
I know we need light to be able to see and that darkness is the absence of light. I can name some light sources. I can observe how light is reflected off surfaces. I can sort materials into transparent, translucent and opaque and can investigate which material makes the best shadow. I can investigate with support how the size of a shadow changes in relation to its position to the light source. I can record my results in tables making simple measurements, and construct a bar chart with support saying what my results show. I know not to look directly at the sun.	I know we need light to be able to see and can explain that darkness is the absence of light. I can name several light sources. I can observe and explain how light is reflected off surfaces. I can sort materials into transparent, translucent and opaque and can determine which material makes the best shadow. I can investigate how the size of a shadow changes in relation to its position to the light source. I can record my results clearly in tables making simple measurements, and construct a bar chart saying what my results show. I know not to look directly at the sun explaining why.	I can explain we need light to be able to see and can explain that darkness is the absence of light. I can name a range of light sources. I can observe closely and explain clearly how light is reflected off surfaces. I can sort materials into transparent, translucent and opaque and can determine which material makes the best shadow explaining why this is the case. I can confidently investigate how the size of a shadow changes in relation to its position to the light source. I can record my results clearly in tables making accurate measurements, and construct a clear bar chart saying what my results show. I know not to look directly at the sun explaining why.

## Key Vocabulary

**Dark**- the absence of light.

**Light**- a brightness that lets you see things.

**Mirror**- a piece of flat glass or shiny plastic that reflects light.

**Opaque**- a material that doesn't let light through.

**Reflects**- sends light back from its surface.

**Shadow**- a dark shape on a surface that is made when light is blocked.

**Source**- where something comes from.

**Translucent**- a material that let some light through.

**Transparent**- a material that lets light through.

**Bar chart** - a way of displaying information  
**Classify**- sort into groups according to properties.

**Conclusion**: To look at our results and explain what we have found out.

**Investigation** - to find something out

**Measure** - to see find out the amount something is.

**Observe** - to look at something closely

**Pattern seeking**- To look for a pattern in your results.

**Predict** - to say what you think might happen

**Properties**- a way of describing an object

**Result** - to record what we have found out

**Table**- a way of recording results clearly.

## Character opportunities

Thomas Edison.

"There is no substitute for hard work"

"If we did all the things we were capable of, we would literally astound ourselves"

Curiosity - asking questions about the world around them.

## Possible STEM careers linked to unit

Astronomer (Studies Space)

Astrophysicist (Studies the physics of space and objects in space)

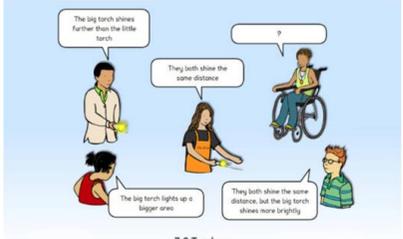
Optamologist (doctor specialising in vision and eye health)

Activities in italics are additional to the core activities and can be carried out time permitting

Also see Explorify <https://explorify.uk/teaching-support/teaching-science/light-explore-with-your-class>

Key vocabulary is given in **red**

Objectives	Working Scientifically	Lesson outcomes	Activities
<ul style="list-style-type: none"> <li>To observe and describe how day length changes</li> </ul>	<ul style="list-style-type: none"> <li>Asking relevant questions</li> </ul>	<p><b>Follow up from Y1</b></p> <ul style="list-style-type: none"> <li>Review understanding of apparent movement of the sun during the day</li> <li>To introduce the idea that light travels from a light source</li> <li>To know that the sun is a source of light</li> </ul>	<ul style="list-style-type: none"> <li>Concept mapping – ideas about the sun</li> <li>Track the sun as it appears to move across the sky</li> </ul>
<ul style="list-style-type: none"> <li>To recognise that they need <b>light</b> to see things and that <b>dark</b> is the absence of light</li> </ul>	<ul style="list-style-type: none"> <li>Using straightforward scientific evidence to support findings or answer questions</li> <li><b>Predict</b> what will happen</li> </ul>	<ul style="list-style-type: none"> <li>To identify <b>sources of light</b></li> <li>To be able to name a variety of light sources including natural and man made (artificial) sources</li> </ul>	<ul style="list-style-type: none"> <li>Using <b>mirrors</b> and torches, children <b>reflect</b> light – which are the light sources. Children identify other sources of light</li> <li>Look out for examples such as fire flies, glow sticks etc which are caused by a chemical reactions <ul style="list-style-type: none"> <li>BBC</li> <li><a href="http://www.bbc.co.uk/bitesize/ks2/science/physical_processes/light/read/1/">http://www.bbc.co.uk/bitesize/ks2/science/physical_processes/light/read/1/</a></li> </ul> </li> </ul>
			Investigate <b>the properties of transparent, translucent and opaque</b> materials. Which cause shadows?
<ul style="list-style-type: none"> <li>To recognise that they need <b>light</b> to see things and that <b>dark</b> is the absence of light</li> </ul>	<ul style="list-style-type: none"> <li>Identifying differences, similarities or changes related to simple scientific ideas and processes</li> </ul>	<ul style="list-style-type: none"> <li>To understand the need for light to be able to see things</li> <li>To understand that light travels in straight lines</li> </ul>	<ul style="list-style-type: none"> <li>Use dark boxes and light sources to demonstrate that we need light to see (or blackout tent with torch)</li> </ul>
<ul style="list-style-type: none"> <li>To notice that light is <b>reflected</b> from surfaces</li> </ul>	<ul style="list-style-type: none"> <li>Asking relevant questions</li> </ul>	<ul style="list-style-type: none"> <li>To understand that light is reflected from objects</li> <li>To know that shiny objects reflect better than dull objects</li> </ul>	<ul style="list-style-type: none"> <li>Experiment to find if shiny objects shine in the dark</li> <li>Which colours are easier to see in dim light</li> <li>Explore mirrors in the dark</li> <li><i>Explore reflective materials (eg safety sashes and plastic reflectors).</i></li> </ul>

<ul style="list-style-type: none"> <li>To notice that light is <b>reflected</b> from surfaces</li> </ul>	<ul style="list-style-type: none"> <li>Recording findings using simple scientific language, drawings, labelled diagrams etc</li> </ul>	<ul style="list-style-type: none"> <li>To know that light travels in straight lines</li> </ul>	<ul style="list-style-type: none"> <li>Discuss how a mirror can be used to see behind you</li> <li>Use mirrors, torches and ray boxes (if available) to see how light travels in straight lines</li> <li>Experiment with putting objects in front of the light in order to make a <b>shadow</b>.</li> <li></li> </ul>
<ul style="list-style-type: none"> <li>To notice that light is reflected from surfaces but travels through others</li> </ul>	<ul style="list-style-type: none"> <li>Recording findings using simple scientific language, drawings, labelled diagrams etc</li> </ul>	<ul style="list-style-type: none"> <li>To know that light travels in straight lines</li> <li>To know that light can be broken into its coloured constituents and can also be bent</li> </ul>	<ul style="list-style-type: none"> <li>Using prisms to alter the beam of light (you need a very concentrated beam of bright light to do this really well stick a piece of black paper with a narrow slit in it over the end of a bright torch to provide a beam of light. It is best to do this in a darkened room, or to carry it out in a box lined with black paper) Try shining the light on different areas of the same prism</li> <li>Observe the order of the colours of the split light</li> <li></li> </ul>
<ul style="list-style-type: none"> <li>To recognise that shadows are formed when light from a source is blocked by a solid object</li> </ul>	<ul style="list-style-type: none"> <li>Using a table to record data/<b>results</b></li> <li>To identify and <b>seek patterns in data</b></li> <li>To carry out investigations to find the answer to a scientific question</li> <li>To draw <b>conclusions</b></li> </ul>	<ul style="list-style-type: none"> <li>To know that distance from light source affects the size of a shadow</li> </ul>  <p>7.9 Torches</p>	<ul style="list-style-type: none"> <li>Set up an <b>investigation</b> with torches and finger shadows, to get the sharpest images (should be single light source in a darkened room to eliminate extraneous light sources from interfering with each other)</li> <li>Investigate how the distance from a light source alters the size of a shadow. Look for patterns Record in a <b>table</b></li> <li>investigate using multiple light sources to achieve multiple shadows</li> </ul>
<ul style="list-style-type: none"> <li>To know that light passes through certain materials</li> </ul>	<ul style="list-style-type: none"> <li>Making careful observations</li> <li>setting up a fair test</li> </ul>	<ul style="list-style-type: none"> <li>To know the dangers of looking at the sun and bright lights and consider how to keep safe</li> </ul>	<ul style="list-style-type: none"> <li>Consider the dangers of looking at the sun</li> <li>Investigate different types of sunglasses eg polarised and non polarised. Use UV beads to test the effectiveness (available <a href="#">here</a> -</li> </ul>

