



# SCIENCE YEAR 5-6 Cycle B – Unit 9

## Light

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### RANGE

#### *How things work*

5. how light travels and how this can be used

### KEY VOCABULARY

beam  
travel  
reflect  
surface  
brighter  
dimmer  
opaque  
transparent  
translucent  
**diminish**  
**variables**  
**line graph**  
**reliability**  
**scale**

### Developing thinking

(Plan-Develop-Reflect  
integrated into activities)



### LNF - Main Numeracy Strands covered\*

Strand:  
*Developing numerical reasoning.*  
Element:  
*Identify processes and connections.*  
*Represent and communicate.*  
*Review.*

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Strand:  
*Using number skills.*  
Element:  
*Use number facts and relationships.*  
*Calculate using mental and written methods.*

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Strand:  
*Using measuring skills.*  
Element:  
*Length, weight/mass, capacity.*  
*Area and volume, angle and position.*

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Strand:  
*Using data skills.*  
Element:  
*Collect and record data, Present and analyse data, Interpret results.*

\*Refer to LNF Numeracy framework for details of specific skills within each element.

### LNF – Literacy (writing) opportunities

Element: Organising information and ideas  
Writing accurately

Writing to explain and inform

### Developing ICT



School to identify and provide opportunities for developing this skill within the scope of the unit.

### Curriculum Cymreig



School to identify and provide opportunities for developing this skill within the scope of the unit.

### Personal and social education



School to identify and provide opportunities for developing this skill within the scope of the unit.

## Science – Medium Term Planning (half term)

Year Group	<b>5-6</b>	Term	<b>Cycle B – Unit 9</b>	Unit Title	<b>Light</b>
<b>Range: <i>How things work</i></b> 5. how light travels and how this can be used					
<b>Cross Curricular Links:</b>					
Skills (Principal skills in bold italics)	Suggested activities	Resources and web links	Assessment Opportunities		
<b>PLAN</b> <i>Identify gaps in prior knowledge</i>  Ask relevant questions	<p><b>1. Big Question: What do you know about light?</b></p> <p>Introduce topic and elicit pupils' ideas about the nature of light, how it's generated and how it travels etc. Consider using :</p> <ul style="list-style-type: none"> <li>• true-false game, odd-one-out activity or online interactive activities</li> <li>• Concept Cartoon and/or video clip. Pupils raise questions or create their own true false cards. Or</li> <li>• Challenge pupils to draw and explain how light travels and how we see.</li> <li>• Begin to create a graffiti board of pupils' questions.</li> </ul> <p>Review children's understanding of light and shadows by asking them to draw and annotate a diagram to show how a shadow is formed. Suggest children use terms <i>e.g. light source, opaque, travel, block</i>. Discuss children's diagrams with them, drawing attention to the idea of light travelling.</p> <p>Begin to create a KWL grid. Challenge pupils to say <i>how</i> they intend to find things out. List sources of information that are available.</p> <p><b>To write to inform</b>  <b>Text type: annotated diagrams</b></p>	Concept Cartoons  <a href="http://resources.hwb.wales.gov.uk/VTC/2009-10/science/cripsat/e34-light/index.html">http://resources.hwb.wales.gov.uk/VTC/2009-10/science/cripsat/e34-light/index.html</a>  <a href="http://www.echalk.co.uk/">http://www.echalk.co.uk/</a>  <a href="http://www.woodlands-junior.kent.sch.uk/revision/Science/lightshadows.html">http://www.woodlands-junior.kent.sch.uk/revision/Science/lightshadows.html</a>	Use preferred diagnostic strategy/tool		

<p><b>PLAN</b> <i>Search for relevant information</i></p> <p>Ask relevant questions</p> <p><b>DEVELOP</b> <i>Use prior knowledge to explain</i></p> <p><b>REFLECT</b> Decide whether the method was successful</p>	<p><b>2. Big Question: How do we see?</b></p> <p>Show pupils a selection of photos and/or video clips about light. Discuss a Concept Cartoon about how humans see. What do pupils think? Assess pupils' ideas about how we see – record as a class vote. Ask children to explain how they see the light from the torch. Prompt by showing small light sources in dark areas - <i>why we can see them more clearly when they are switched on?</i></p> <p><b>Introduce the skill – Finding information and explaining</b></p> <ul style="list-style-type: none"> <li>• Introduce question 'How do we see?' and ask pupils to suggest ways of finding out information about sight in humans.</li> <li>• What are their success criteria for carrying out scientific research?</li> <li>• Model some child-friendly websites or books and review key features of note-taking.</li> </ul> <p><b>Practise the skill – Finding information and explaining</b></p> <ul style="list-style-type: none"> <li>• Pupils find and record information and ideas.</li> <li>• What other facts have pupils discovered about sight? How do other animals see? Are insects able to see? Do all animals have two eyes?</li> <li>• Ask pupils to select their chosen method to communicate their findings (e.g. a letter to an alien visitor to Earth, a poem, a fact file card or an email etc).</li> </ul> <p><b>To write to inform</b> <b>Text type: letter, email or non-chronological report</b></p>	<p>Variety of books, websites etc</p> <p><a href="http://www.gosh.nhs.uk/children/general-health-advice/body-tour/">http://www.gosh.nhs.uk/children/general-health-advice/body-tour/</a></p> <p><a href="http://www.echalk.co.uk/">http://www.echalk.co.uk/</a></p> <p><a href="http://www.bbc.co.uk/education/subjects/z2pfb9g">http://www.bbc.co.uk/education/subjects/z2pfb9g</a></p> <p><a href="http://www.sciencekids.co.nz/sciencefacts/humanbody/eyes.html">http://www.sciencekids.co.nz/sciencefacts/humanbody/eyes.html</a></p>	<p><i>Can pupils find and use a variety of information and ideas? (Level 4)</i></p> <p><i>Can pupils find and use relevant information and ideas? (Level 5)</i></p>
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<p><b>PLAN</b> Plan the method to be used</p> <p><b>DEVELOP</b> <i>Make careful observations</i></p> <p><i>Check observations by repeating them to collect reliable data</i></p> <p>Form considered opinions</p> <p><b>REFLECT</b> Describe how they have learned</p>	<p><b>3. Big Question: Which is the brightest torch?</b></p> <p><b>Introduce the skill – Check observations by repeating them</b> Use Concept Cartoons to trigger discussion about light beams – do pupils think that beams of light travel to infinity or do they eventually diminish? What are their ideas and predictions?</p> <ul style="list-style-type: none"> <li>• Which torch is the brightest? How can we measure the brightness?</li> <li>• Recap the key features of the datalogger.</li> <li>• How will pupils test each torch? How will they ensure their findings are reliable?</li> <li>• Share ideas and plan whole-class method.</li> </ul> <p><b>Practise the skill – Check observations by repeating them</b></p> <ul style="list-style-type: none"> <li>• Carry out investigation and tabulate findings.</li> <li>• Select the most appropriate type of graph to use (bar graph: brightness versus type of torch).</li> <li>• Thinking partners to share what they have discovered with the rest of the class.</li> </ul> <p>NB. Draw analogy of the human eye with the datalogger: light entering the eye/datalogger. Recap how we see by light entering our eyes.</p> <p><b>To write to explain</b> <b>Text type: non-chronological report</b></p>	<p>Selection of torches</p> <p>Measuring tapes, rulers</p> <p>Dataloggers</p>	<p><i>Can pupils make qualitative observations and use standard equipment? (Level 4)</i></p> <p><i>Can pupils select the appropriate measuring equipment? (Level 5)</i></p> <p><i>Can pupils draw conclusions and form considered opinions? (Level 4)</i></p>
<p><b>PLAN</b> <i>Identify key variables</i></p> <p><i>Plan the method to be used</i></p> <p><b>DEVELOP</b> Make careful observations</p> <p>Form considered opinions</p> <p><b>REFLECT</b> Describe how they have learned</p>	<p><b>4. Big Question: How does the brightness of a torch beam change with distance?</b></p> <p><b>Introduce the skill – Identifying key variables and planning a method</b> Pupils may wish to investigate how the amount of light entering the logger changes as the logger moves away from the source.</p> <ul style="list-style-type: none"> <li>• Challenge groups to list all the variables and identify those to change, measure and keep the same (move torch away from logger at set intervals).</li> <li>• Remind pupils of the features of a systematic plan (using the interactive planning boards).</li> <li>• Record method and select equipment (datalogger).</li> </ul> <p><b>Practise the skill – Identifying key variables and planning a method</b></p> <ul style="list-style-type: none"> <li>• Carry out investigation and tabulate findings.</li> <li>• Select the most appropriate type of graph to use (line graph: light level versus distance).</li> <li>• Thinking partners to share what they have discovered with the rest of the class.</li> <li>• Can pupils describe the relationship between two continuous variables?</li> </ul> <p><b>To write to inform</b> <b>Text type: science write-up/report</b></p>	<p><a href="http://www.echalk.co.uk/">http://www.echalk.co.uk/</a></p> <p>Selection of torches</p> <p>Measuring tapes, rulers</p> <p>Dataloggers</p> <p>Interactive planning boards</p> <p>A3 group planning templates</p>	<p><i>Can pupils make qualitative observations and use standard equipment? (Level 4)</i></p> <p><i>Can pupils select the appropriate measuring equipment? (Level 5)</i></p> <p><i>Can pupils draw conclusions and form considered opinions? (Level 4)</i></p>

<p><b>COMMUNICATION</b>  <i>Communicate clearly using tables, bar charts and line graphs</i></p> <p><b>DEVELOP</b>          Make comparisons and identify trends or patterns</p> <p><b>REFLECT</b>          Link learning to similar situations within and outside school.</p>	<p><b>5. Big Question: How do we present our findings and what do they tell us?</b></p> <p>Review findings from the previous two investigations.</p> <p><b>Practise the skill – Using bar charts and line graphs</b></p> <ul style="list-style-type: none"> <li>Recap on types of graph and how we decide which type is appropriate.</li> <li>Use interactive planning boards to model examples.</li> </ul> <p><b>Practise the skill – Using bar charts and line graphs</b></p> <ul style="list-style-type: none"> <li>Challenge pupils to select a set of results from their recent work and construct a graph to communicate the data.</li> <li>Swap graphs and peer assess.</li> <li>Ask pupils to create their own information leaflet - 'a rough guide to graphs'.</li> </ul> <p><b>To write to inform</b>  <b>Text type: fact file/leaflet</b></p>	<p><a href="http://www.mrnussbaum.com/coo/graphing.htm">http://www.mrnussbaum.com/coo/graphing.htm</a></p> <p><a href="http://www.amblesideprimary.com/ambleweb//mentalmaths/grapher.html">http://www.amblesideprimary.com/ambleweb//mentalmaths/grapher.html</a></p> <p>'Which graph?' pupil sheet</p>	<p><i>Can pupils make qualitative observations and use standard equipment to measure using SI units? (Level 4)</i></p> <p><i>Can pupils select the measuring instruments that allow them to make accurate measurements? (Level 5)</i></p> <p><i>Can pupils identify patterns and trends? (Level 4)</i></p>
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<p><b>PLAN</b> Outline the plan/method</p> <p>Select equipment and techniques required</p> <p><b>DEVELOP</b> <i>Form considered opinions and make informed decisions</i></p> <p><i>Describe amendments</i></p> <p><b>REFLECT</b> Suggest how the method could have been improved</p>	<p><b>6. Big Question: Which brand of battery is the 'best'?</b></p> <p>Discuss ideas/opinions about brands of batteries. Are there any favourites? Which brands are the 'best'? Take a class vote. How could pupils devise a test to find out which brand of battery is the 'best'? What does 'best' mean?</p> <p><b>Introduce the skill – Form considered opinions and evaluate outcomes</b></p> <ul style="list-style-type: none"> <li>• Discuss method and identify key variables.</li> <li>• What equipment will be required?</li> <li>• Decide on some basic success criteria for effective science work – pupils will need to reflect on these criteria at the end of the task.</li> </ul> <p><b>Practise the skill – Form considered opinions and evaluate outcomes</b></p> <ul style="list-style-type: none"> <li>• Give pupils roles in groups, e.g. thinking manager, equipment manager etc.</li> <li>• Pupils carry out investigation and tabulate findings.</li> <li>• Can pupils identify patterns and trends?</li> <li>• How well did they manage to meet their initial success criteria?</li> <li>• Thinking manager to report back to class, including a description of findings. Equipment manager to discuss ways of improving the method.</li> </ul> <p><b>To write to explain</b> <b>Text type: non-chronological report</b></p>	<p>Dataloggers</p> <p>Selection of devices and/or mobile phones</p> <p>Measuring tapes, rulers</p> <p><a href="http://www.echalk.co.uk/">http://www.echalk.co.uk/</a></p> <p><a href="http://www.bbc.co.uk/education/subjects/z2pfb9q">http://www.bbc.co.uk/education/subjects/z2pfb9q</a></p>	<p><i>Can pupils select the measuring instruments that allow them to make accurate measurements? (Level 5)</i></p> <p><i>Do pupils consider reliability? (Level 5)</i></p>
<p><b>COMMUNICATION</b> <i>Communicate clearly using writing, tables and graphs.</i></p> <p><b>REFLECT</b> Suggest how the method could have been improved</p>	<p><b>7. Big Question: Can you write a science report?</b></p> <p>Tell pupils they have been asked to write a short report for Which? Magazine. The article must outline the pupils' findings and give recommendations.</p> <p><b>Introduce the skill – Communicate using writing, tables and charts</b></p> <ul style="list-style-type: none"> <li>• Recap on language style in science reports. Share examples and ask pupils to mark key aspects with coloured pencils.</li> </ul> <p><b>Practise the skill – Communicate using writing, tables and charts</b></p> <ul style="list-style-type: none"> <li>• Ask pupils to determine some success criteria for their science report.</li> <li>• Plan the report and identify evidence they will include (e.g. tables and graphs)</li> <li>• Produce report and present to class.</li> <li>• Share feedback and gauge whether the success criteria have been met.</li> </ul> <p><b>To write to inform</b> <b>Text type: consumer report/non-chronological report</b></p>	<p>Copies of product review articles and/or Which? Magazine</p>	<p><i>Can pupils select the appropriate type of graph to use? (Level 5)</i></p> <p><i>Can pupils use line graphs to describe the relationship between two continuous variables? (Level 5)</i></p>

<p><b>PLAN</b> <i>Identify key variables in a fair test, including independent, dependent and control</i></p> <p><b>DEVELOP</b> <i>Use equipment correctly</i></p> <p><b>REFLECT</b> Describe how they have learned</p>	<p><b>8. Big Question: How do you make a periscope?</b></p> <p>Allow pupils to explore periscopes and/or study pictures/diagrams of different types of periscope.</p> <p><b>Introduce the skill – Use apparatus and equipment correctly and safely</b></p> <ul style="list-style-type: none"> <li>• Ask children to explore what they can see with a mirror by posing questions. (<i>Can you see behind you? Can you make a beam of light move round the classroom?</i>)</li> <li>• Ask children to think of other questions to explore and to record and explain their observations in drawing and writing.</li> <li>• Help children to represent the direction of a light beam using straight lines with arrows.</li> <li>• Present children with a collection of shiny and dull surfaces. Ask children to find out which ones they can see themselves in and which ones reflect a torch beam. Ask children to use their own knowledge and secondary sources to identify everyday uses of mirrors.</li> </ul> <p><b>Practise the skill – Use apparatus and equipment correctly and safely</b></p> <ul style="list-style-type: none"> <li>• Pupils to design and construct a simple periscope. What will be the success criteria for a periscope?</li> </ul> <p><b>To write to instruct</b> <b>Text type: instructions</b></p>	<p>Selection of small plastic mirrors</p> <p>Adhesive and/or sticky Velcro pads</p> <p>Cardboard tubes and boxes</p> <p><a href="http://www.planet-science.com/categories/under-11s/our-world/2012/06/make-a-periscope.aspx">http://www.planet-science.com/categories/under-11s/our-world/2012/06/make-a-periscope.aspx</a></p>	<p><i>Can pupils identify all key variables, including independent, dependent and control? (Level 5)</i></p> <p><i>Can pupils select the measuring instruments that allow them to make accurate measurements? (Level 5)</i></p>
<p><b>COMMUNICATION</b> <i>Communicate using tables, bar and line graphs</i></p> <p><b>REFLECT</b> Suggest how the method could have been improved</p>	<p><b>9. Big Question: Can you solve this ‘thought experiment’?!</b></p> <p>Introduce pupils to a ‘thought experiment’ – an experiment that it is not possible to carry out in the classroom but requires careful consideration, reasoning and explanation only. Einstein was fond of thought experiments.</p> <p>Thought experiment: can you <i>capture</i> light?</p> <p><b>Practise the skill – Use prior knowledge to explain</b></p> <ul style="list-style-type: none"> <li>• Discuss Concept Cartoon: box of mirrors.</li> <li>• Assemble mirrors at 45 degree angles inside the corners of a shoe box.</li> <li>• Is it possible to shine a torch beam into the box and quickly close the lid to ‘capture’ the light inside?</li> <li>• Will the light be reflected around the inside of the shoe box and keep travelling?</li> <li>• Consider using the datalogger to measure the light in the box.</li> </ul> <p>Ask pupils to create a science postcard or letter to Albert Einstein to explain their ideas/findings.</p> <p><b>To write to inform and explain</b> <b>Text type: postcard/non-chronological report</b></p>	<p><a href="http://www.sciencekids.co.nz/sciencefacts/scientists.html">http://www.sciencekids.co.nz/sciencefacts/scientists.html</a></p>	<p><i>Can pupils explain using scientific vocabulary? (Level 4)</i></p> <p><i>Can pupils explain using scientific vocabulary and use simple models? (Level 5)</i></p>
<p><b>REFLECT</b> <i>Describe how they have learned, and identify the ways that worked the best.</i></p> <p>Link the learning to similar situations, within and outside school.</p>	<p>Revisit initial diagnostic assessment. Can pupils demonstrate understanding at end of topic and discuss new skills learned and/or practised?</p>	<p>Use preferred AfL strategy</p>	<p><i>Can pupils describe how they have learned and identify the ways that worked the best? (Level 4)</i></p> <p><i>Can pupils identify the thinking/learning strategy they used? (Level 5)</i></p>

Evaluation