



# SCIENCE YEAR 5-6 Cycle B – Unit 8

## *Forces: gravity & air resistance*

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### RANGE

#### *How things work*

2. forces of different kinds – **gravity and air resistance**
3. the ways in which forces can affect movement and how they can be compared

### KEY VOCABULARY

gravity  
mass  
force  
weight  
friction  
air resistance  
newtons (N)  
**variables**  
**reliability**  
**table**  
**average**  
**bar chart**  
**line graph**  
**axes**  
**scale**

### Developing thinking

(Plan-Develop-Reflect  
integrated into activities)



### LNF - Main Numeracy Strands covered\*

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

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**Strand:**  
*Using measuring skills.*

### LNF – Literacy (writing) opportunities



**Element:** Organising information and ideas  
Writing accurately

Writing to inform and evaluate

### Curriculum Cymreig



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

<p><b>Elements:</b>  <i>Length, weight/mass, capacity.</i>  <i>Area and volume, angle and position.</i></p> <hr/> <p><b>Strand:</b>  <i>Using data skills.</i>  <b>Element:</b>  <i>Collect and record data</i>  <i>Present and analyse data</i>  <i>Interpret results.</i></p> <p><i>*Refer to LNF Numeracy framework for details of specific skills within each element.</i></p>	<p><b><u>Developing ICT</u></b></p>  <p><i>School to identify and provide opportunities for developing this skill within the scope of the unit.</i></p>	<p><b><u>Personal and social education</u></b></p>  <p><i>School to identify and provide opportunities for developing this skill within the scope of the unit.</i></p>
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### Science – Medium Term Planning (half term)

Year Group	<b>5/6</b>	Term	<b>Cycle B – unit 8</b>	Unit Title	<b><i>Forces – gravity &amp; air resistance</i></b>
<p><b>Range: <i>How things work</i></b>  2. forces of different kinds – <b>gravity and air resistance</b>  3. the ways in which forces can affect movement and how they can be compared</p>					
<b>Cross Curricular Links:</b>					
<b>Skills</b> (Principal skills in bold italics)	<b>Suggested activities</b>			<b>Resources and web links</b>	<b>Assessment Opportunities</b>

<p><b>COMMUNICATE</b> <i>Communicate clearly using drawings</i></p> <p><b>PLAN</b> Identify gaps in prior knowledge</p> <p><b>REFLECT</b> Suggest how the method could have been improved</p>	<p><b>1. Big Question: What do you know about forces?</b></p> <p>Record diagnostic assessment – mind map, KWL grid or ideas poster etc. Show video clips of different forces in action and/or Concept Cartoon. Discuss.</p> <p><b>Introduce the skill – Communicate findings. Using force arrows</b></p> <ul style="list-style-type: none"> <li>Play a true-false card game using statements</li> <li><i>Active Assessments: Pushes and Pulls.</i> (Page 141) activity.</li> </ul> <p><b>Practise the skill – Communicate findings. Using force arrows</b></p> <ul style="list-style-type: none"> <li>Show children forcemeters and point out the spring inside them. Review how they work. Help children to practise reading the forcemeter.</li> <li>Use a graphic organiser to consider the parts of a forcemeter and their function.</li> <li>Complete graphic organiser (whole-and-part relationships) using parts of a forcemeter.</li> <li>Recap on newtons (N).</li> <li>Start a forces glossary in pupils' books – to be completed over forthcoming tasks.</li> </ul>	<p><a href="http://resources.hwb.wales.gov.uk/VTC/2009-10/science/cripsat/e32-forces/index.html">http://resources.hwb.wales.gov.uk/VTC/2009-10/science/cripsat/e32-forces/index.html</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>Use preferred diagnostic strategy/tool</p> <p><i>Can pupils organise their findings using scientific language? (Level 4)</i></p>
<p><b>PLAN</b> Select the equipment for the enquiry</p> <p><b>DEVELOP</b> <i>Make careful observations</i></p> <p>Form considered opinions and make informed decisions</p> <p><b>REFLECT</b> Describe how they have learned</p>	<p><b>2. Big Question: Mass or weight? You tell me!</b></p> <p><b>Introduce the skill – Make careful observations and communicate ideas. OAM Unit 6: 'Feel the Force'</b></p> <ul style="list-style-type: none"> <li>Set the context for this activity by explaining the story of the apple falling on Sir Isaac Newton's head.</li> <li>Give the pupils a forcemeter (with a measuring range of 0-2.5N). Collect ideas with their thinking partners: what do they know about forcemeters? Ask them to look at the newton scale.</li> <li>Give every pair an apple and ask them to change the weight of the apple until it weighs exactly 1N. They can cut or bite the apple until they reach the weight, or add pieces of Blu@tack if the apple weighs less than 1N.</li> </ul> <p><b>Practise the skill – Make careful observations and communicate ideas.</b></p> <ul style="list-style-type: none"> <li>Now ask the pupils to look at the other scale on the force gauge which measures the mass of objects, in grams. What do they notice? (A small 100g apple = 1 Newton.)</li> <li>Recap on link between mass and weight. Discuss in relation to how the weight of a person will differ on different planets even though their mass is constant.</li> </ul>	<p><a href="http://resources.hwb.wales.gov.uk/VTC/2009-10/science/cripsat/e32-forces/index.html">http://resources.hwb.wales.gov.uk/VTC/2009-10/science/cripsat/e32-forces/index.html</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.schoolsobservatory.org.uk/">http://www.schoolsobservatory.org.uk/</a></p>	<p><i>Can pupils record using SI units? (Level 4)</i></p> <p>Can pupils explain using scientific knowledge, including simple models? (Level 5)</p>

<p><b>COMMUNICATE</b> <i>Use SI units</i></p> <p><b>PLAN</b> Plan the observations and measurements to take</p> <p><b>DEVELOP</b> <i>Make careful observations</i></p> <p><b>REFLECT</b> Describe how they have learned</p>	<p><b>3. Big Question: Can you estimate weight of everyday objects?</b></p> <p>Review pupils' knowledge of mass and weight. Gather pupils' predictions of the weight of everyday items. Tabulate and discuss.</p> <p><b>Introduce the skill – Use equipment and make careful measurements</b></p> <ul style="list-style-type: none"> <li>Review forcemeters and demonstrate use. Discuss scales.</li> </ul> <p><b>Practise the skill – Use equipment and make careful measurements</b></p> <ul style="list-style-type: none"> <li>Challenge pupils to select a range of everyday items and predict the weight of each item.</li> <li>Measure the weight of each item using a forcemeter.</li> <li>Tabulate findings.</li> <li>Consider transferring findings onto a bar chart.</li> <li>How does gravity vary between Earth and Moon? How does it vary across the planets?</li> <li>Can pupils find relevant information?</li> </ul>	<p><a href="http://www.bbc.co.uk/science/space/">http://www.bbc.co.uk/science/space/</a></p>	<p><i>Can pupils record using SI units? (Level 4)</i></p> <p><i>Can pupils select measuring equipment to make accurate measurements? (Level 5)</i></p>
<p><b>PLAN</b> <i>Identify the key variables to be controlled in a fair test</i></p> <p><b>DEVELOP</b> <i>Check observations by repeating them in order to collect reliable data</i></p> <p>Use apparatus and equipment correctly and safely</p> <p><b>REFLECT</b> Begin to evaluate outcomes against success criteria.</p>	<p><b>4. Big Question: What affects the movement of a conker?</b></p> <p><b>Introduce the skill – Identifying variables/reliability.</b></p> <ul style="list-style-type: none"> <li>Introduce the task via a concept cartoon and/or class predictions of what variables affect the speed of swing of a conker.</li> <li>Sort variables via diamond ranking activity, e.g. mass, length of string, type of string etc.</li> <li>List key variables.</li> <li>What makes a 'good' science plan? List success criteria for working scientifically.</li> <li>Groups to identify their chosen variable and plan accordingly.</li> </ul> <p><b>Practise the skill – Identifying variables/reliability.</b> Assign pupils roles in groups, e.g. measuring manager, recording manager etc.</p> <ul style="list-style-type: none"> <li>Discuss pupils understanding of reliability.</li> <li>Pupils undertake task and gather findings.</li> </ul> <p>Concentrate on creating a table in order to repeat the results to ensure accuracy /average (create tables with multiple columns and rows including the average).</p> <p><b>To write to inform</b> <b>Text type: tables and charts</b></p>	<p>'Conker' guidance notes on Moodle website</p> <p><a href="http://resources.hwb.wales.gov.uk/VTC/2009-10/science/cripsat/e32-forces/index.html">http://resources.hwb.wales.gov.uk/VTC/2009-10/science/cripsat/e32-forces/index.html</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/z2pfb9q">http://www.bbc.co.uk/education/subjects/z2pfb9q</a></p>	<p><i>Can pupils identify key variables? (Level 4)</i></p> <p><i>Can pupils take repeat readings to ensure reliability? (Level 5)</i></p> <p>Can pupils draw their own bar charts? (Level 4)</p> <p>Can pupils identify patterns and trends? (Level 4)</p>
<p><b>COMMUNICATE</b> <i>Use tables, bar charts and line graphs</i></p> <p><b>DEVELOP</b> <i>Form considered opinions and make informed decisions</i></p>	<p><b>5. Big Question: What affects the movement of a conker? ...cont.</b></p> <p><b>Introduce the skill – Line graph or bar graph?</b></p> <ul style="list-style-type: none"> <li>Review results from previous task.</li> <li>What type of graph does our data give us?</li> <li>Categoric data (e.g. type of string) gives a bar chart.</li> <li>Continuous data (e.g. length of string) produces a line graph.</li> <li>Give pupils the 'Which graph' planner.</li> </ul> <p><b>Practise the skill – Line graph or bar graph?</b></p> <ul style="list-style-type: none"> <li>Pupils to construct their own bar charts.</li> <li>Peer- or self-assess graphs.</li> <li>Can they identify patterns and trends?</li> </ul> <p><b>To write to explain</b> <b>Text type: non-chronological report</b></p>	<p>'Which graph?' template</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.co.uk/ambleweb/mentalmaths/grapher.html">http://www.amblesideprimary.co.uk/ambleweb/mentalmaths/grapher.html</a></p>	<p><i>Can pupils draw their own tables and bar charts? (Level 4)</i></p> <p><i>Do pupils understand reliability? (Level 5)</i></p> <p>Can pupils identify patterns and trends? (Level 4)</p>

<p><b>PLAN</b>  <i>Make predictions using prior knowledge</i></p> <p><i>Identify the key variables to be controlled in a fair test</i></p> <p><b>DEVELOP</b>          Use apparatus and equipment correctly and safely</p>	<p><b>6. Big Question: Why do feathers fall slowly?</b></p> <p><b>Introduce the skill – Making predictions and fair testing</b></p> <ul style="list-style-type: none"> <li>Ask children to investigate pieces of paper falling to ground. How can you make the paper fall quicker or slower? Draw analogies to parachutes. Show video clip of parachutes <i>eg do different materials affect how long a parachute takes to fall?</i></li> <li>Pupils make predictions using scientific vocabulary.</li> <li>Ask them what they plan to measure in order to answer the question. Encourage pupils to focus on continuous variables, e.g. length, area.</li> <li>Pupils make simple parachutes out of everyday materials, bluetack and string. Less able pupils may choose to test different material canopies (categorical variable).</li> </ul> <p><b>Practise the skill – Making predictions and fair testing</b></p> <ul style="list-style-type: none"> <li>Pupils produce group planning sheets.</li> <li>Tabulate findings.</li> <li>Discuss results and search for patterns in findings. Help children to relate this to an understanding of air resistance.</li> </ul> <p><b>To write to inform</b>  <b>Text type: science write-up/plan</b></p>	<p><a href="http://resources.hwb.wales.gov.uk/VTC/2009-10/science/cripsat/e32-forces/index.html">http://resources.hwb.wales.gov.uk/VTC/2009-10/science/cripsat/e32-forces/index.html</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/z2pfb9q">http://www.bbc.co.uk/education/subjects/z2pfb9q</a></p>	<p><i>Can pupils make predictions using scientific ideas? (Level 4)</i></p> <p><i>Can pupils list all independent and dependent variables? (Level 5)</i></p>
<p><b>PLAN</b>  <i>Make predictions using prior knowledge</i></p> <p><i>Identify the key variables to be controlled in a fair test</i></p> <p><b>DEVELOP</b>          Check observations by repeating them in order to collect reliable data</p> <p>Use apparatus and equipment correctly and safely</p> <p><b>REFLECT</b>          Begin to evaluate outcomes against success criteria.</p>	<p><b>7. Big Question: What affects how quickly a paper spinner falls to Earth?</b></p> <p><b>Introduce the skill – Making predictions and fair testing</b></p> <ul style="list-style-type: none"> <li>Show pupils paper spinner template. List all variables that may affect flight. Sort variables into relative importance, e.g. mass, length, paper colour etc.</li> <li>Pupils make predictions using scientific vocabulary.</li> <li>Ask them what they plan to measure in order to answer the question. Encourage pupils to focus on continuous variables, e.g. length, area, mass etc</li> <li>Identify key variables and re-cap on aspects of fair testing, reliability etc.</li> </ul> <p><b>Practise the skill – Making predictions and fair testing</b></p> <ul style="list-style-type: none"> <li>Pupils produce group planning sheets.</li> <li>Tabulate findings.</li> <li>Discuss results and search for patterns in findings. Help children to relate this to an understanding of air resistance.</li> <li>Consider drawing a line graph (length of wing versus time taken to fall).</li> </ul> <p><b>To write to inform</b>  <b>Text type: science write-up/plan</b></p>	<p><a href="http://resources.hwb.wales.gov.uk/VTC/2009-10/science/cripsat/e32-forces/index.html">http://resources.hwb.wales.gov.uk/VTC/2009-10/science/cripsat/e32-forces/index.html</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/z2pfb9q">http://www.bbc.co.uk/education/subjects/z2pfb9q</a></p> <p>Card sort variables</p>	<p><i>Can pupils make predictions using scientific ideas? (Level 4)</i></p> <p><i>Can pupils list all independent and dependent variables? (Level 5)</i></p>

<p><b>COMMUNICATION</b> <i>Communicate using scientific vocabulary, inc. tables bar and line graphs</i></p> <p><b>PLAN</b> Find relevant information and ideas</p> <p><b>REFLECT</b> Suggest how the method/process could have been improved</p>	<p><b>8. Big Question: Can you produce a science report?</b></p> <p>Discuss pupils' results from the paper spinner activity and review patterns.</p> <p><b>Introduce the skill – Communicating using science ideas</b></p> <ul style="list-style-type: none"> <li>Show pupils a selection of science conclusions from the science guidance.</li> <li>What makes a 'good' conclusion? Discuss.</li> <li>Pupils annotate a paper copy of a conclusion and highlight aspects that make it 'good'.</li> <li>Model conclusions using interactive planning templates.</li> </ul> <p><b>Practise the skill – Communicating using science ideas</b></p> <ul style="list-style-type: none"> <li>Challenge pupils to produce several versions of a 'conclusion'. Share and rank order the conclusions by quality according to agreed success criteria.</li> <li>Pupils identify the best version.</li> </ul> <p><b>To write to explain and evaluate</b> <b>Text type: science write-up/report</b></p>		<p><i>Can pupils communicate ideas integrating text, images and data? (Level 5)</i></p> <p>Can pupils find and use a variety of information and ideas? (Level 4)</p> <p>Can pupils find and use relevant information and ideas? (Level 5)</p>
<p><b>COMMUNICATION</b> <i>Search for and access relevant scientific information</i></p> <p><b>REFLECT</b> Suggest how the method could have been improved</p>	<p><b>9. Big Question: Issac Newton – what <i>did</i> happen to his apple?!</b></p> <p><b>Introduce the skill – Find evidence and information</b></p> <ul style="list-style-type: none"> <li>Recap on research skills and the nature of non-fiction text.</li> <li>Review the use of the web to gather information and discuss fact, belief and opinion. Begin to address bias in some news sources.</li> </ul> <p><b>Practise the skill – Find evidence and information</b></p> <ul style="list-style-type: none"> <li>Use the web to search for information about the life of Isaac Newton.</li> <li>Consider modelling biography genre</li> </ul> <p><u>Or</u></p> <ul style="list-style-type: none"> <li>Research on the internet to discover how gravity varies from planet to planet.</li> <li>Present what they have discovered to the rest of the class</li> <li>Create a true/false game and/or produce a Millionaire Earth and Space quiz.</li> </ul> <p><b>To write to inform</b> <b>Text type: biography</b></p>	<p><a href="http://www.sciencekids.co.nz/sciencefacts/scientists.html">http://www.sciencekids.co.nz/sciencefacts/scientists.html</a></p> <p><a href="http://www.bbc.co.uk/science">http://www.bbc.co.uk/science</a></p> <p>Millionaire Powerpoint quiz template</p>	<p><i>Can pupils find relevant scientific ideas? (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>
<p>Evaluation</p>			