



**Science Autumn 1 Year 5 Physics -Forces**

**TAPS Assessment: Spinners**

**Key vocabulary: Force, gravity, Earth, air resistance, water resistance, friction, mechanisms, simple machines, levers, pulleys, gears**

National Curriculum	Week	NC - Coverage	Disciplinary Knowledge	Substantive Knowledge	Activity Outline
<p><b>The national curriculum for Science aims to ensure that all pupils:</b></p> <p><b><u>Working Scientifically Upper KS2</u></b></p> <p>Pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:</p> <ul style="list-style-type: none"> <li>♣ planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary</li> <li>♣ taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking</li> </ul>	1	<p>Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object</p>	<p>To identify scientific evidence that has been used to support or refute ideas or arguments.</p> <p>Research how the work of scientists such as Galileo Galilei to help develop the theory of gravitation.</p>	<p>To know that unsupported objects fall to Earth because of the force of gravity acting between the earth and the falling object</p>	<p>Show children a video clip with a range of forces in action including a spacecraft being launched, astronauts moving in space, sprinters on an athletics track, an elephant pulling a log, a bird landing, a car travelling over a rough surface, a stunt car and a boat being launched</p> <p><a href="http://www.bbc.co.uk/learningzone/clips/forces-in-action-no-narration/1601.html">http://www.bbc.co.uk/learningzone/clips/forces-in-action-no-narration/1601.html</a>.</p> <p>Use still images from the video and ask children to discuss how they were linked. Teacher to drop a ball and ask children to explain how the images are linked to this.</p>
	2	<p>Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object.</p>	<p>Identify scientific evidence that has been used to support or refute ideas or arguments.</p>	<p>To know that gravity on Earth pulls objects down to the ground.</p>	<p>Introduce gravity as a force acting between the Earth and an object pulling it down. Children to be shown a moonwalking clip to show the impact of reduced gravity and then asked to consider the idea of 'A world without gravity'. Children to identify positives and negative consequences.</p> <p>Show children a globe with some LEGO people stuck on and ask them to think about what would</p>




<p>repeat readings when appropriate</p> <ul style="list-style-type: none"> <li>♣ recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs</li> <li>♣ using test results to make predictions to set up further comparative and fair tests</li> <li>♣ reporting and presenting 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</li> <li>♣ identifying scientific evidence that has been used to support or</li> </ul>					<p>happen to a ball that each person threw. After discussion, children to draw and explain their ideas about this.</p>
	3	<p>Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object.</p>	<p>To take precise readings, choosing the most appropriate forcemeter depending on the size of the force.</p>	<p>To recognise that gravity acts as a pulling force between the Earth and the falling object.</p>	<p>To give children a set of forcemeters to look at and consider how they were the same and different. The teacher to demonstrate how to take a measurement by putting an object in a hole punched plastic wallet and hanging it on the hook. Highlight it needs to be kept steady and for it to be held at eye-level. The children to take measurements with a partner.</p>
	4	<p>Compare how things move on different surfaces. (Y3) • Identify the effects of air resistance, water resistance and friction, that act between moving surfaces.</p>	<p>To use appropriate subject knowledge to make a prediction.</p> <p>To identify a variable that</p>	<p>To know and can identify the effects of air resistance, water resistance and friction, that act between moving surfaces.</p>	<p>To show children the image and ask them to think about why the boy was finding it hard to pull the girl and the dog. The teacher to then introduce friction as a force acting when one solid moves over another solid. Children to make predictions testing the movement of a shoe/trainer on different surfaces.</p>



<p>refute ideas or arguments.</p> <p><b>Subject Content</b></p> <p>Pupils should be taught to:</p>			<p>should and could be controlled.</p>		
<ul style="list-style-type: none"> <li>♣ explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object</li> <li>♣ identify the effects of air resistance, water resistance and friction, that act between moving surfaces</li> <li>♣ recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect.</li> </ul>	<p>5</p>	<p>Identify the effects of air resistance, water resistance and friction, that act between moving surfaces.</p>	<p>To make predictions about the effects of air resistance in a range of contexts e.g. parachutes.</p>	<p>To know and can identify the effects of air resistance, water resistance and friction, that act between moving surfaces.</p>	<p>Teacher to hold up a parachute in the air and ask what would happen if it they let go. Drop two identical parachutes at the same time, one scrunched up and the other held open. Ask the children to make observations. Teacher to introduce air resistance as a force that slows an object down as it moves through air as air particles block the path of the object. Drop two parachutes with different sized canopies and ask the children to make observations. Ask children to describe a parachute jump including, if possible, the words 'gravity' and 'air resistance'.</p>
<p><b>School Context</b></p> <p>Levers in D&amp;T in Year 4 and Pulleys in Year 6</p>	<p>6</p>		<p>To report and present findings</p>		<p>Children to discuss the concept cartoon:</p>



<p><b>Common Misconceptions</b></p> <p>Some children may think:</p> <ul style="list-style-type: none"> <li>• the heavier the object the faster it falls, because it has more gravity acting on it</li> <li>• forces always act in pairs which are equal and opposite</li> <li>• smooth surfaces have no friction</li> <li>• objects always travel better on smooth surfaces</li> <li>• a moving object has a force which is pushing it forwards and it stops when the pushing force wears out</li> <li>• a non-moving object has no forces acting</li> </ul>	<p>Identify the effects of air resistance, water resistance and friction, that act between moving surfaces.</p>	<p>from enquiries, including conclusions.</p>	<p>To associate the shape of the object with the amount of air resistance and recognises that this can have an impact on how it falls.</p>	<p style="text-align: center;"><b>Paper Helicopter</b></p>  <p>Based on the spinner, ask the children to plan an investigation to answer their own question. Children to <b>record the results</b>, calculate an average and <b>comment on patterns in data</b> (use two lessons for this investigation).</p>
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**Science Autumn 2 Year 5 Physics - Light**

**TAPS Assessment: Plan Solar System**

**Key vocabulary: Earth, Sun, Moon, (Mercury, Jupiter, Saturn, Venus, Mars, Uranus, Neptune), spherical, solar system, rotates, star, orbit, planet**

National Curriculum	Week	NC - Coverage	Disciplinary Knowledge	Substantive Knowledge	Activity Outline
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<p><b>The national curriculum for Science aims to ensure that all pupils:</b></p> <p><b>Working Scientifically Upper KS2</b> pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:</p> <p>§ planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary</p> <p>§ taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate</p> <p>§ recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs</p>	1	Describe the movement of the Earth, and other planets, relative to the Sun	To identify scientific evidence that has been used to support or refute ideas or arguments.	Knows some ideas about the movement of the Earth, and other planets, relative to the Sun.	KWL grid: Use following as an introduction to the topic and for AfL. Ask children to sort a series of statements about the solar system into 'true', 'false' or 'not sure'. Provides the teacher with information about the children's starting points and misconceptions.
	2	Describe the movement of the Earth, and other planets, relative to the Sun	Use secondary sources to help create a model e.g. role play to show the movement of the Earth around the Sun.	The Sun is a star. It is at the centre of our solar system. There are 8 planets (can choose to name them, but not essential). These travel around the Sun in fixed orbits.	Through role play, show children the movement of the planets around the Sun using the key vocabulary orbit to describe the movement. Following the role play, ask children to explain/write what they have learnt.
	3	Describe the movement of the Earth, and other planets, relative to the Sun	Use secondary sources to create a model to understand the movement of the Earth.	Earth takes 365½ days to complete its orbit around the Sun.	During this lesson, children to return to their role play model and use their understanding of the movement of the Earth to explain how many days there are in a year and how leap years occur. Children to then draw a model to describe the movement of planets using arrows.



<p>§ using test results to make predictions to set up further comparative and fair tests</p> <p>§ reporting and presenting 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</p> <p>§ identifying scientific evidence that has been used to support or refute ideas or arguments.</p>	<p>4</p>	<p>Use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky</p>	<p>Make first-hand observations of how shadows caused by the Sun change through the day.</p>	<p>As Earth rotates half faces the Sun (here it is day) and half is facing away from the Sun (night).</p>	<p>Children to make observations of shadows outside at different times of day. Children to then demonstrate their understanding using diagrams. Provide children with a series of questions about shadows caused by the Sun and how these can be used to tell the time.</p> <div data-bbox="1509 379 1962 753" style="border: 1px solid black; padding: 5px;"> <ol style="list-style-type: none"> <li>1. At what time of the day are shadows at their shortest?</li> <li>2. In what ways do shadows change throughout the day?</li> <li>3. Why do shadows change their length?</li> <li>4. If we measured the length of shadows throughout the day what would eventually happen to the shadows?</li> <li>5. Why?</li> <li>6. Where in the playground can you use a shadow clock?</li> <li>7. Would it work in a shady place?</li> <li>8. Why?</li> <li>9. Does it matter which way around you place it?</li> <li>10. How can you check that your clock faces the correct direction?</li> <li>11. How accurately can you tell the time with the shadow clock?</li> <li>12. Is it accurate to the hour, half hour, quarter hour for example?</li> </ol> </div>
<p><b>Subject Content</b></p> <p>Describe the movement of the Earth, and other planets, relative to the Sun</p> <p>Describe the movement of the Moon relative to the Earth</p> <p>Describe the Sun, Earth and Moon as approximately spherical bodies</p> <p>Use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky</p>	<p>5</p>	<p>Use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky</p>	<p>Use secondary sources to create a model to show why day and night occur.</p>	<p>The Earth rotates (spins) on its axis every 24 hours. As Earth rotates half faces the Sun (here it is day) and half is facing away from the Sun (night). As the Earth rotates the Sun appears to move across the sky</p>	<p>Ask children to use a globe, a LEGO person and a torch to demonstrate how the rotation of the Earth causes day and night, the apparent movement of the Sun across the sky, and changes in shadows. Capture evidence verbally.</p>
	<p>6</p>	<p>Describe the movement of the Moon relative to the Earth</p> <p>Describe the movement of the</p>	<p>Use secondary sources to create a model to show why day and night occur.</p>	<p>The Moon orbits the Earth. It takes about 28 days to complete its orbit.</p>	<p>Use role play to demonstrate the movement of the Moon around the Earth. Capture understanding verbally.</p>



<p><b><u>School Context</u></b></p> <p>Use playground to create role play of the solar system</p> <p><b><u>Common Misconceptions</u></b></p> <p>Some children may think:</p> <ul style="list-style-type: none"> <li>• the Earth is flat</li> <li>• the Sun is a planet</li> <li>• the Sun rotates around the Earth</li> <li>• the Sun moves across the sky during the day</li> <li>• the Sun rises in the morning and sets in the evening</li> <li>• the Moon appears only at night</li> <li>• night is caused by the Moon getting in the way of the Sun or the Sun moving further away from the Earth</li> </ul>		<p>Earth, and other planets, relative to the Sun</p>	<p>Consider the views of scientists in the past and how evidence was used to deduce the shapes and movements of the Earth, Moon and planets before space travel.</p>	<p>The Sun, Earth and Moon are approximately spherical.</p>	<p>Extension: Children to plan and research their own information texts with the title 'Earth, Space and Beyond' by drawing on what they have learnt in the sequence of lessons. Children to conduct additional research into areas of interest to themselves. Children to create an information booklet for children of a similar age.</p>
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