

# Science

## Year 5 – Summer 1-Forces

### National Curriculum / End Point statement

#### Forces

- explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object
- identify the effects of air resistance, water resistance and friction, that act between moving surfaces
- recognise that some mechanisms including levers, pulleys and gears allow a smaller force to have a greater effect

#### Working Scientifically

- planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary
- taking 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
- using test results to make predictions to set up further comparative and fair tests
- 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
- identifying scientific evidence that has been used to support or refute ideas or arguments.

Step 1	Step 2	Step 3	Step 4	Step 5	Step 6
Reactivate learning: Year 3 learning (Forces), Year 4 states of matter, Yr 5 Earth and Space WALT describe the effect of gravity on unsupported objects	WALT identify the effects of air resistance	WALT identify the effects of water resistance	WALT identify the effects of friction on slowing or stopping objects	WALT recognise the effect of pulleys and levers on a force	WALT recognise the effect of gears on a force
In Focus - <a href="https://explorify.wellcome.ac.uk/en/activities/whats-going-on/bounce-and-turn">https://explorify.wellcome.ac.uk/en/activities/whats-going-on/bounce-and-turn</a>	In Focus - <a href="https://explorify.wellcome.ac.uk/en/activities/odd-one-out/shoot-the-breeze">https://explorify.wellcome.ac.uk/en/activities/odd-one-out/shoot-the-breeze</a>	In Focus - <a href="https://explorify.wellcome.ac.uk/en/activities/whats-going-on/sturdy-pads">https://explorify.wellcome.ac.uk/en/activities/whats-going-on/sturdy-pads</a>	In Focus - <a href="https://explorify.wellcome.ac.uk/en/activities/whats-going-on/floating-bottle">https://explorify.wellcome.ac.uk/en/activities/whats-going-on/floating-bottle</a>	In Focus - <a href="https://explorify.wellcome.ac.uk/en/activities/whats-going-on/pole-position">https://explorify.wellcome.ac.uk/en/activities/whats-going-on/pole-position</a>	In Focus - <a href="https://explorify.wellcome.ac.uk/en/activities/odd-one-out/cogs-in-the-kitchen">https://explorify.wellcome.ac.uk/en/activities/odd-one-out/cogs-in-the-kitchen</a>

#### Success Criteria

I can explain why an object falls I can link my learning to what I know about Earth and Space I know why we don't float into the sky	I can explain what air resistance is I can identify how a test can be fair	I can explain what water resistance is. I can recognise and control variables	I can explain what friction is I can take measurements and record data I can present findings from an enquiry	I know what a lever is. I know what a pulley is. I can explain how levers and pulleys can help us	I know what a gear is. I can explain how gears can help us I can explain how gears work using my knowledge of forces
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	I can report and present findings, including conclusions.			I can explain how a lever and pulley work using my knowledge of forces	
<b>Suggested Outcome</b>					
<p>Children could explore a range of practical activities to support their learning. Teacher drop 2 pieces of paper ( 1 flat and 1 scrunched) as an example to lead into following lesson on air resistance. Which takes longer to fall? Why?</p> <ul style="list-style-type: none"> <li>Put a splodge of paint at the top of a piece of paper stuck on the wall. What happens when you turn the paper upside down?</li> <li>What happens to your hair when you cartwheel?</li> <li>Challenge children to jump up in the air for as long as possible without holding on to anything. Can you stay in the air for longer than 2 seconds? Why/why not?</li> <li>Throw a ball up in the air. What always happens to the ball? Why?</li> </ul>	<p>Children can be challenged to make sure that an object is undamaged after being dropped from 2m. Children design and make a variety of parachutes to determine which is the most effective design.</p>	<p>Children make and test boats of different shapes from plasticine and see which shape is the most effective/ least effective.</p>	<p>Use a bike wheel to show the effects of the break. Children make observations and name other examples.</p>	<p>Children will understand that working with gravity (pulling down) is much easier than working against gravity. Children could try to lift a heavy object (large milk carton filled with sand) to an agreed height. Repeat the same action with a pulley (cotton reel with dowel through the middle or skipping rope thrown over a rolling pin) Linked to how longships were built/moved Also investigate levers by changing the position of the fulcrum and measuring the effort made using a forcemeter.</p>	<p>Children could create a simple gear system by making their own gears out of card and lolly sticks Children explain how gears have an effect on the force – real life example of bikes</p>
<b>Vocabulary</b>			<b>NC links</b>		
Force, <i>gravity</i> , Earth, <i>air resistance</i> , <i>water resistance</i> , <i>friction</i> , mechanisms, simple machines, <i>levers</i> , <i>pulleys</i> , <i>gears</i>			DT Science – materials, Earth and Space, States of Matter		
<b>Key Learning</b>					
A force causes an object to start moving, stop moving, speed up, slow down or change direction. Gravity is a force that acts at a distance. Everything is pulled to the Earth by gravity. This causes unsupported objects to fall.					

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Air resistance, water resistance and friction are contact forces that act between moving surfaces. The object may be moving through the air or water or the air and water may be moving over a stationary object. A mechanism is a device that allows a small force to be increased to a larger force. The pay back is that it requires a greater movement. The small force moves a long distance and the resulting large force moves a small distance e.g. a crowbar or a bottle opener. Pulleys, levers and gears are all mechanisms also known as simple machines.

Possible Evidence	Common Misconceptions
<ul style="list-style-type: none"> <li>• Can demonstrate the effect of gravity acting on an unsupported object</li> <li>• Can give examples of friction, water resistance and air resistance</li> <li>• Can give examples of when it is beneficial to have high or low friction, water resistance and air resistance</li> <li>• Can explain the results of their investigations in terms of the force, showing a good understanding that as the object tries to move through the water or air or across the surface the particles in the air, water or on the surface slow it down.</li> <li>• Can demonstrate how pulleys, levers and gears work.</li> <li>• Can clearly demonstrate the effects of using levers, pulleys and gears.</li> </ul>	<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 upon 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 on it</li> <li>• Heavy objects sink and light objects float</li> </ul>