

## KS2: MEDIUM TERM PLANNER

### Forces Y5

Pupils should be taught to:

- 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.

The principal focus of science teaching in upper key stage 2 is to enable pupils to develop a deeper understanding of a wide range of scientific ideas. They should do this through exploring and talking about their ideas; asking their own questions about scientific phenomena; and analysing functions, relationships, and interactions more systematically. At upper key stage 2, they should encounter more abstract ideas and begin to recognise how these ideas help them to understand and predict how the world operates. They should also begin to recognise that scientific ideas change and develop over time. They should select the most appropriate ways to answer science questions using different types of scientific enquiry, including observing changes over different periods of time, noticing patterns, grouping and classifying things, carrying out comparative and fair tests and finding things out using a wide range of secondary sources of information. Pupils should draw conclusions based on their data and observations, use evidence to justify their ideas, and use their scientific knowledge and understanding to explain their findings.




'Working and thinking scientifically' is described separately at the beginning of the programme of study but must always be taught through and clearly related to substantive science content in the programme of study. Throughout the notes and guidance, examples show how scientific methods and skills might be linked to specific elements of the content.

Pupils should read, spell, and pronounce scientific vocabulary correctly.

During years 5 and 6, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:

- 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 a 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


<p><b>Prior Learning:</b></p> <ul style="list-style-type: none"> <li>• Compare how things move on different surfaces. (Y3 - Forces and magnets)</li> <li>• Notice that some forces need contact between two objects, but magnetic forces can act at a distance. (Y3 - Forces and magnets)</li> <li>• Observe how magnets attract or repel each other and attract some materials and not others. (Y3 - Forces and magnets)</li> <li>• Compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet and identify some magnetic materials. (Y3 - Forces and magnets)</li> <li>• Describe magnets as having two poles. (Y3 - Forces and magnets)</li> <li>• Predict whether two magnets will attract or repel each other, depending on which poles are facing. (Y3 - Forces and magnets)</li> </ul>	<p><b>Future Learning:</b></p> <ul style="list-style-type: none"> <li>• Forces as pushes or pulls, arising from the interaction between two objects. (KS3)</li> <li>• Using force arrows in diagrams, adding forces in one dimension, balanced and unbalanced forces. (KS3)</li> <li>• Moment as the turning effect of a force. (KS3)</li> <li>• Forces: associated with deforming objects; stretching and squashing – springs; with rubbing and friction between surfaces, with pushing things out of the way; resistance to motion of air and water. (KS3)</li> <li>• Forces measured in Newtons, measurements of stretch or compression as force is changed. (KS3)</li> </ul>		
<p><b>Key Questions</b> (<i>show how content and concepts link</i>)  <b>Differentiated Learning Objectives</b></p>	<p><b>Teaching and learning activities</b> (<i>linked directly to objectives</i>)</p>	<p><b>Resources</b> (<i>to help pupils reach the learning objectives</i>)</p>	<p><b>Written and non -written outcomes</b> (<i>assessment including homework's</i>)</p>
<p>1) <b>What forces are acting on an object?</b>  2) <b>Who was Isaac Newton and why is he significant?</b></p> <p><b>SCIENCE CAPITAL:</b> <i>How does this lesson connect with children in my class? What force do you use on the objects around the house?</i></p> <p><b>Science Working scientifically Skills:</b></p>  <p><b>Science Enquiry Type</b>  <b>Classify</b></p>	<p><b>Science reasoning task: explorify: What's going on?</b> <a href="#">Fantastic gymnastics - Explorify</a></p> <p><b>Activity 1:</b> PowerPoint go through and discuss the force and where it is placed on each object.</p> <p><b>Activity 2:</b> PowerPoint- go through key facts about Issac newton.</p> <p><b>Activity 3:</b> Read secondary resources and discuss key facts about Isaac Newton discoveries.</p>	<p><b>Activity 1:</b> PowerPoint</p> <p><b>Activity 2:</b> PowerPoint</p> <p><b>Activity 3-</b> Reading comprehension</p>	<p><b>Homework:</b> Researching and creating fact files about different Isaac Newton.</p>


*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. 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 bottle top remover. Pulleys, levers and gears are all mechanisms, also known as simple machines.*


**Misconceptions:**

Some children may think:

- the heavier the object the faster it falls, because it has more gravity acting on it
- forces always act in pairs which are equal and opposite
- smooth surfaces have no friction
- objects always travel better on smooth surfaces
- a moving object has a force which is pushing it forwards and it stops when the pushing force wears out
- a non-moving object has no forces acting on it
- heavy objects sink and light objects float

<p><b>3) What is the difference between weight and mass?</b></p> <p><b>SCIENCE CAPITAL:</b> <i>How does this lesson connect with children in my class? What does an apple weigh? Would it weigh the same in space?</i></p> <p>Science Working scientifically Skills:</p>  <p><b>Science Enquiry Type</b> <b>Pattern seeking</b></p> <p><i>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. 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</i></p>	<p><b>Science reasoning task: explorify: Zoom in and out <a href="#">Weight a minute!</a> - Explorify</b></p> <p><b>Activity 1:</b> PowerPoint to go through and recap Isaac Newton and what gravity is. Discuss the difference between weight and mass.</p> <p><b>Activity 2:</b> Plan and carry out experiment to identify if there is a link between weight and mass of an object. Discuss concept cartoon of various ideas of links between mass and weight.</p> <p><b>Misconceptions:</b> 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 on it</li> <li>• heavy objects sink and light objects float</li> </ul>	<p><b>Activity 1:</b> PowerPoint</p> <p><b>Activity 2:</b> Concept Cartoon</p> <p><b>Activity 3:</b> Post it note planning sheets, different objects to measure and newton meter.</p>	<p><b>Assessment: Are pupils able to plan and apply working scientifically skills.</b></p>
---	--	---	--


<p>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 bottle top remover. Pulleys, levers and gears are all mechanisms, also known as simple machines.</p>			
<p><b>3)What is air resistance?</b>  <b>SCIENCE CAPITAL:</b> <i>How does this lesson connect with children in my class? What is special about aeroplanes and birds in their design?</i>  <b>Science Working scientifically Skills:</b>    <b>Science Enquiry Type</b>  <b>Comparative</b>  <i>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. Air resistance, water</i></p>	<p><b>Science reasoning task: explorify: Listen what can you hear?</b>  <a href="#">Thin ice - Explorify</a></p> <p><b>Activity 1:</b> PowerPoint go through and discuss what air resistance is and scientist such as Galileo's discoveries.</p> <p><b>Activity 2:</b> Discuss the concept cartoon about the variables – such as shape, colour, size and material of the parachute.</p> <p><b>Activity 3:</b> Post-it is planning of different enquiry question- pupil led.</p> <p><b>Misconceptions:</b>  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 on it</li> <li>• heavy objects sink and light objects float</li> </ul>	<p><b>Activity 1:</b> PowerPoint</p> <p><b>Activity 2:</b> Concept cartoon with differing opinion.</p> <p><b>Activity 3:</b> post it planning sheets.</p>	<p><b>Assessment:</b> can pupils show different working scientifically skills.</p>

<p>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 bottle top remover. Pulleys, levers, and gears are all mechanisms, also known as simple machines</p>			
<p><b>4)Which material is best for brake pad?</b>  <b>SCIENCE CAPITAL:</b> <i>How does this lesson connect with children in my class? Which materials are objects made out of around us? Why?</i>  <b>Science Working scientifically Skills:</b>  </p>	<p><u>Science reasoning task: explorify: Odd one out <a href="#">Defying gravity?</a> - Explorify</u></p> <p><b>Activity 1:</b> PowerPoint go through and discuss friction and materials and their properties.</p> <p><b>Activity 2:</b> Model planning experiment</p> <p><b>Activity 3:</b> Conclude and discuss findings.</p> <p><b>Misconceptions:</b> Some children may think:</p>	<p><b>Activity 1:</b> PowerPoint go through.</p> <p><b>Activity 2:</b> children to work in small groups to plan an experiment- post it note</p> <p><b>Activity 3:</b> Carry out experiment.</p>	<p><b>Assessment:</b> Able to explain which material is most suitable for brake pad.</p>


**Science Enquiry Type**  
**Comparative**

*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. 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 bottle top remover. Pulleys, levers, and gears are all mechanisms, also known as simple machines*

- the heavier the object the faster it falls, because it has more gravity acting on it
- forces always act in pairs which are equal and opposite
- smooth surfaces have no friction
- objects always travel better on smooth surfaces
- a moving object has a force which is pushing it forwards and it stops when the pushing force wears out
- a non-moving object has no forces acting on it
- heavy objects sink and light objects float

<p>5) <b>What is water resistance?</b></p> <p><b>SCIENCE CAPITAL:</b> <i>How does this lesson connect with children in my class? What do you notice about the moon during the day? Night? Different days within a month?</i></p> <p><b>Science Working scientifically Skills:</b></p>  <p><b>Science Enquiry Type</b></p> <p><b>Research/ observation over time</b></p> <p><i>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. 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</i></p>	<p><b>Science reasoning task: explorify:</b> <a href="#">Tour de force - Explorify</a></p> <p><b>Activity 1:</b> PowerPoint go through and discuss what water resistance is and how can this force be useful or hinderance.</p> <p><b>Activity 2:</b> Discuss the designs of different objects and discuss the meaning of streamlined.</p> <p><b>Activity 3:</b> Discuss concept cartoon about which boat shape will be the best. Use post it note planning to plan an experiment.</p> <p><b>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 on it</li> <li>• heavy objects sink and light objects float</li> </ul>	<p><b>Activity 1:</b> PowerPoint</p> <p><b>Activity 2:</b> various objects real or pictures.</p> <p><b>Activity 3:</b> Post it note planning template / concept cartoon.</p>	<p><b>Assessment:</b> Using working scientifically skills.</p> <p><b>Homework:</b> spotting other objects around them that are streamlined.</p>
--	---	--	---



<p>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 bottle top remover. Pulleys, levers, and gears are all mechanisms, also known as simple machines</p>			
<p><b>6) How does this mechanism work using force?</b>  <b>SCIENCE CAPITAL:</b> <i>How does this lesson connect with children in my class? Which of these objects do you use at home? (tin opener/ swing)</i>  <b>Science Working scientifically Skills:</b>    <b>Science Enquiry Type Research</b>  <i>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</i></p>	<p>Science reasoning task: explorify: Odd one out? <a href="#">Sleek designs - Explorify</a></p> <p><b>Activity 1:</b> PowerPoint go through and discuss the different mechanisms.</p> <p><b>Activity 2:</b> Design your own mechanism and see how it works.</p> <p><b>Misconceptions:</b>  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 on it</li> <li>• heavy objects sink and light objects float</li> </ul>	<p><b>Activity 1:</b> PowerPoint</p> <p><b>Activity 2:</b> Design sheet</p>	<p><b>Homework:</b> Mechanism hunt – can they find different examples of different mechanisms.</p>

*gravity. This causes unsupported objects to fall. 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 bottle top remover. Pulleys, levers, and gears are all mechanisms, also known as simple machines*

