

Year	5	SCIENCE	Forces <i>Why do objects fall from the sky?</i>
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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.

Prior Learning	Future Learning
<ul style="list-style-type: none"> <li>• <b>Compare how things move on different surfaces. (Y3)</b></li> <li>• <b>Notice that some forces need contact between two objects, but magnetic forces can act at a distance. (Y3)</b></li> <li>• <b>Observe how magnets attract or repel each other and attract some materials and not others. (Y3)</b></li> <li>• <b>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)</b></li> <li>• <b>Describe magnets as having two poles. (Y3)</b></li> <li>• <b>Predict whether two magnets will attract or repel each other, depending on which poles are facing. (Y3)</b></li> </ul>	<p>At KS3 pupils will learn:</p> <ul style="list-style-type: none"> <li>• Magnetic fields by plotting with compass, representation by field lines.</li> <li>• Earth’s magnetism, compass and navigation.</li> <li>• Forces as pushes or pulls, arising from the interaction between two objects.</li> <li>• Using force arrows in diagrams, adding forces in one dimension, balanced and unbalanced forces.</li> <li>• Moment as the turning effect of a force.</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.</li> <li>• Forces measured in Newtons, measurements of stretch or compression as force is changed</li> </ul>

**What Pupils Need To Know Or Do To Be Secure**

Key Substantive Knowledge	Key Disciplinary Skills/ Knowledge
<ul style="list-style-type: none"> <li>• A force causes an object to start moving, stop moving, speed up, slow down or change direction.</li> <li>• Gravity is a force that acts at a distance. Everything is pulled to the Earth by gravity. This causes unsupported objects to fall.</li> <li>• Mass is a measure of how much matter there is in an object, while weight is a measure of the size of the pull of gravity on the object.</li> <li>• 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.</li> <li>• Streamlined means an object that is shaped to travel through air or water with as little resistance as possible.</li> <li>• Buoyancy is a force on an object making that object rise or move upward.</li> <li>• 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.</li> <li>• Pulleys, levers and gears are all mechanisms, also known as simple machines.</li> <li>• <b>SCIENTIST:</b> Galileo Galilei (1564 - 1642) Galileo developed many mathematical theories about motion and mechanics. He suggested that all things fall to the ground at the same speed, even with different masses. He also noticed that when things fall they accelerate in a constant way. Galileo developed what we now know as ‘the scientific method’ of experimentation.</li> </ul>	<p><u>Working Scientifically:</u>  <b>Planning different types of scientific enquiries to answer questions, including recognising and controlling variables</b> - Given a wide range of resources the children decide for themselves how to gather evidence to answer a scientific question. They choose a type of enquiry to carry out and justify their choice.  <b>Taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate</b> – children select measuring equipment to give the most precise results and make decisions e.g. whether they need to: take repeat readings (fair testing); increase the sample size (pattern seeking)etc.  <b>Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary</b> – They carry out fair tests, recognising and controlling variables. They decide what observations or measurements to make over time and for how long. They look for patterns and relationships using a suitable sample.  <b>Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs</b> – Children present the same data in different ways in order to help with answering the question.  <b>Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms</b> - In their conclusions, children: identify causal relationships and patterns in the natural world from their evidence; identify results that do not fit the overall pattern; and explain their findings using their subject knowledge.</p>

Lesson Sequence	Curriculum Drivers	Common Misconceptions
<ol style="list-style-type: none"> <li>1. Why is Isaac Newton a significant scientist?</li> <li>2. What makes a parachute successful? Why is Galileo Galilei a significant scientist?</li> <li>3. What are the factors that affect an object's ability to resist water?</li> <li>4. What surface is the most affective to catch a villain in a high-speed car chase?</li> <li>5. How does levers, pulleys and gears allow a smaller force to have a greater effect?</li> <li>6. Why do objects fall from the sky?</li> <li>7. Assessment</li> </ol>	<p><b>Oracy-</b> Pupils will be given the opportunity to explore and use scientific vocabulary which is linked to their learning of forces. Children will be able to name the different forces and explain how they are acting upon an object..</p> <p><b>Diversity-</b> Pupils will have a developed understanding of how gravity and other forces impact our day to day lives.</p> <p><b>Social Intelligence-</b> Children will have the opportunity to work independently and in collaboratively when following a line of enquiry.</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>

Key Vocabulary			
friction	gear	gravity	lever
mass	pulley	resistance	streamlined