

Physics

Strand: Forces & Magnets

Working Scientifically Drives All of the Knowledge & Understanding

NC Objectives	Key Scientific Knowledge	Key Vocabulary	Working Scientifically
Year 3			
To compare how things move on different surfaces	<p>To understand that some things move smoothly past each other and that others with more difficulty (friction)</p> <p>To observe (e.g. through hand rubbing together) that friction forces give off heat</p>	Move, force, movement, friction, heat, rubbing, push, pull	<p>Chn explore how things move past each other; they observe/ feel the difference in object moving past each other and suggest reasons why/ try to explain</p> <p>Chn explain verbally how they know that friction gives off heat e.g. my hands are getting hotter.</p>
To notice that some forces need contact between 2 objects, but magnetic forces can act at a distance	<p>To make observations about magnetic force (no contact needed)</p> <p>To feel the pull of magnetism and describe it as a 'force'</p> <p>To understand that magnetism can act at a distance, due to the 'magnetic field'</p> <p>To understand that magnet strength can vary</p> <p>To understand that the Earth acts like a giant magnet, causing the poles on the magnet to align with the Earth's North/ South pole.</p>	Push, pull, force, magnetism, magnetic field	<p>Children make observations about surfaces moving past each other/ the feel of magnets pulling or pushing away</p> <p>Children can make predictions about the strength of a magnet (is a bigger magnet always stronger?) Can a magnet pull another magnetic object from e.g. 1/2/3/4/5cm away?</p> <p>Support chn in raising questions to explore and test the 'magnetic field's' strength e.g. predict and test the strength of magnets pulling objects/ or changing the distance and seeing how far away specific magnets can still pull an object.</p>

			Discussions about geographical North/ South Pole vs True/ Magnetic North/ South Poles (look at on Google Maps)
To 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	<p>To understand that some materials are magnetic e.g. iron, steel</p> <p>To be able to test everyday materials using a magnet and group into magnetic/ non-magnetic (e.g. paper clip, rubber, spoon,)</p> <p>To observe that magnetic materials will pull other magnetic materials towards them</p> <p>To understand that magnetism is a useful force</p>	magnetism	<p>Children predict, test and group together magnetic/ non- magnetic materials and make suggestions about which other materials to test</p> <p>Support chn in raising further questions: are all metals magnetic?</p> <p>Chn to observe: iron fillings on paper/ magnetic force and how fillings behave. Teacher to ask question: how might this be useful? (Link to Yr 5 'Separating Materials')</p> <p>Research ways in which magnets are used in everyday life e.g. electromagnets at the dump; magnets on cupboard doors/ pencil cases; toys</p>
To describe magnets as having 2 poles	To understand that magnets have two poles: North/ South	Pole, North, South, magnetic field	<p>Draw diagrams and label poles N/ S</p> <p>Draw diagrams to show magnetic field</p>
To predict whether 2 magnets will attract or repel each other, depending on which poles are facing	To predict whether the poles will attract (N/S) or repel each other (N/ N or S/ S) dependent on which poles face each other	Attract, repel, attraction, repulsion, force, push, pull	Explore and make predictions about simple/ range of magnets (e.g. horse-shoe/ bar/ circular magnets) about whether they will feel attraction/ repulsion dependent on which ends of magnets face each other.
Year 5			
To explain that unsupported objects fall towards the Earth	<i>Revise Forces/ Magnets content and vocabulary from Yr 3. What do we know about forces?</i>	Gravity, gravitational pull, force, fall, object	

<p>because of the force of gravity acting between the Earth and the falling object</p>	<p>To name and describe 'gravity' as a force pulling objects towards the Earth's core (or towards any item with mass)</p> <p>To understand that gravity causes objects to fall towards the ground</p> <p>To understand the importance of gravity in its impact on how we live our lives e.g. we and the objects around us do not 'float' in the air</p>		<p>Explore, observe and test falling objects. raise questions: do all objects fall at the same speed? Explore gravity on different planets; what might life be like if we lived on e.g. Jupiter?</p> <p>Research the work of famous scientist: Newton</p> <p>Creative writing opportunity: I woke up and there was no gravity...</p> <p>Support chn in raising questions about life in space e.g. muscle deterioration: how do you go to the toilet in space: do you sleep 'floating' around? How might we find out the answers to these questions? How are spacecrafts/ objects designed to manage lack of gravity?</p>
<p>To identify the effects of air resistance, water resistance and friction, that act between moving surfaces</p>	<p>To understand that air and water resistance are friction forces</p> <p>To understand that friction forces give off heat and slow/ decelerate objects/ work against the direction of movement</p>	<p>Air resistance, friction, force, water resistance, energy, newton/ forcemeter</p>	<p>Skill: using equipment to make measurements with increasing accuracy (ensure that all chn know HOW to interpret the scale on the newtonmeters)</p> <p>Take repeat measurements & consider why this is important</p> <p>Predict, and test; use newtonmeters to measure friction of different surfaces (record and present data) How can we increase /minimise friction?</p> <p>Design a shoe to minimise friction (homework?)</p>

			<p>Chn write about CAUSAL relationships from their data. Chn will need explicit teaching of causal relationships (in a range of contexts e.g. rain & impermeable surface= puddles on ground; increased exercise= I get hot/ breath faster; water on ground in cold weather= freezes) and identify evidence that <u>supports/</u> (refutes) ideas.</p> <p>Support chn in raising further questions about how nature overcomes/ uses air resistance Look at designs in nature: how does nature (evolution) adapt designs of e.g. seeds to use air resistance e.g. sycamore seeds? Wind dispersal of dandelion seeds. Design a seed to use air resistance/ design a parachute/paper aeroplane to increase air resistance and slow a falling item.</p> <p>Collect data in table; plot on graph to present data (and articulate what graph shows orally).</p> <p>Research the usefulness and disadvantages of friction e.g. brakes/ sandpaper/ blisters on feet/ anti-slip bath mats: present findings orally.</p> <p>Chn observe: show chn video of items falling in vacuum-that without air resistance objects will accelerate and fall at same speed e.g. feather/ weight. Discuss how this is</p>
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			counterintuitive given how our lives are not lived in a vacuum!
To recognise that some mechanisms including levers, pulleys and gears allow a smaller force to have a greater effect	<p>To understand that levers, pulleys and gears are all machines, making a job 'easier'.</p> <p>To understand in simple terms how each mechanism reduces the effort required to move an object with mass</p> <p>To show in diagrams how e.g. pulley work and allow a smaller object to have a greater effect.</p>	Lever, gear, pulley, machine, mechanism, effort,	<p>Explore gears/ levers and pulleys; teacher to ask questions about how they might reduce effort required. (Link to Yr 3, 4 D&T)</p> <p>Draw diagrams to show understanding of each mechanism.</p> <p>Research/ explore diagrams e.g. levers; how are they used in everyday life?</p>