

Year 3 Science Planning – Forces and magnets

<p><u>Forces and magnets</u></p> <p>Pupils should be taught to:</p> <ul style="list-style-type: none"> ♣ compare how things move on different surfaces ♣ notice that some forces need contact between two objects, but magnetic forces can act at a distance ♣ observe how magnets attract or repel each other and attract some materials and not others ♣ 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 ♣ describe magnets as having two poles ♣ predict whether two magnets will attract or repel each other, depending on which poles are facing 		<p><u>Working scientifically</u></p> <ul style="list-style-type: none"> • asking relevant questions and using different types of scientific enquiries to answer them • setting up simple practical enquiries, comparative and fair tests • making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers • gathering, recording, classifying and presenting data in a variety of ways to help in answering questions • recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables • reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions • using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions • identifying differences, similarities or changes related to simple scientific ideas and processes • using straightforward scientific evidence to answer questions or to support their findings. 	
<p><u>Key words:</u></p> <p>attract, compass, contact, iron, magnet, magnetic, magnetic north, non contact, non magnetic, pole, prediction, repel</p>			
<p>Session Number</p>	<p>Focus and Success Criteria:</p>	<p>Lesson Plan</p>	<p>Resources</p>

Year 3 Science Planning – Forces and magnets

<p>1</p>	<p>Focus: To understand what a contact force is.</p> <p>Em. Children can say whether they used a push or a pull to make something move.</p> <p>Exp. Children can say that a push and a pull are contact forces.</p> <p>Exc. Children apply the idea of contact forces to explain how a range of objects are moved based on their personal experience.</p>	<p>Assess what children already know about forces and magnets using KWL grid.</p> <p>Take children into the school hall or outdoors for a P.E. lesson that focuses on moving small P.E. equipment and learning that to move something there needs to be a push or a pull and that pushes and pulls are forces. Set out the equipment for children to use to get from one end of the hall to the other, e.g. skipping ropes, balls, bats and balls, hoops, and tell them to use a push or a pull to move them. Demonstrate a push and a pull by getting children to work with a partner and then gently push and gently pull each other.</p> <p>Ask children to explain what forces they used with the P.E. equipment and what was needed to make it move. Did they use a push or a pull? For example, kicking a ball; was that a push or a pull? What force did they use when they threw a ball or hit a ball with a bat? Challenge them to work out what forces were used to make a hula hoop move; if children find this hard, ask them to watch what each other does to see if they can work this out. Focus on the fact that some forces need contact between two objects. Ask children to state what they are moving (e.g. a ball) and what force they used (e.g. a push). These are called contact forces; children will return to this idea later to reinforce the idea that magnets can act without direct contact.</p>	<p>P.E. Equipment. Hall or gym iPad to take pictures.</p>
<p>2</p>	<p>Focus: To Compare how things move on different surfaces.</p> <p>Em. Children are able to describe how something moves over a surface.</p> <p>Exp. Children can compare how things move over different surfaces.</p> <p>Exc. Children are able to suggest ideas as to why things move differently over a variety of surfaces.</p>	<p><u>Working scientifically</u> <i>Set up simple practical enquiries, comparative and fair tests. Make systematic and careful observations and, where appropriate, take accurate measurements using standard units, using a range of equipment including thermometers and data loggers. Record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts and tables. Use results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions.</i></p> <p>Em. Children carry out a comparative test between adjacent surfaces.</p> <p>Exp. Children carry out their fair test, graph their results and draw a conclusion about which surface the car travels furthest on and why, e.g. some are smoother, bumpier.</p> <p>Exc. Children test their predictions of which surface the car will travel furthest on and use their data to prove if their prediction was correct.</p> <p>Take children outdoors and ask them to work in pairs to find out how toy cars move over different surfaces. Before they begin, ask them to look around and see how many different surfaces there are in the school grounds; include grass, concrete, soil, tarmac and play surfaces around apparatus. Give them time to compare how the cars move on the different surfaces and, as they work, listen to and discuss their ideas with them.</p>	<p>Toy cars Tape measures Individual whiteboards and pens Chalk for each group</p>

Year 3 Science Planning – Forces and magnets

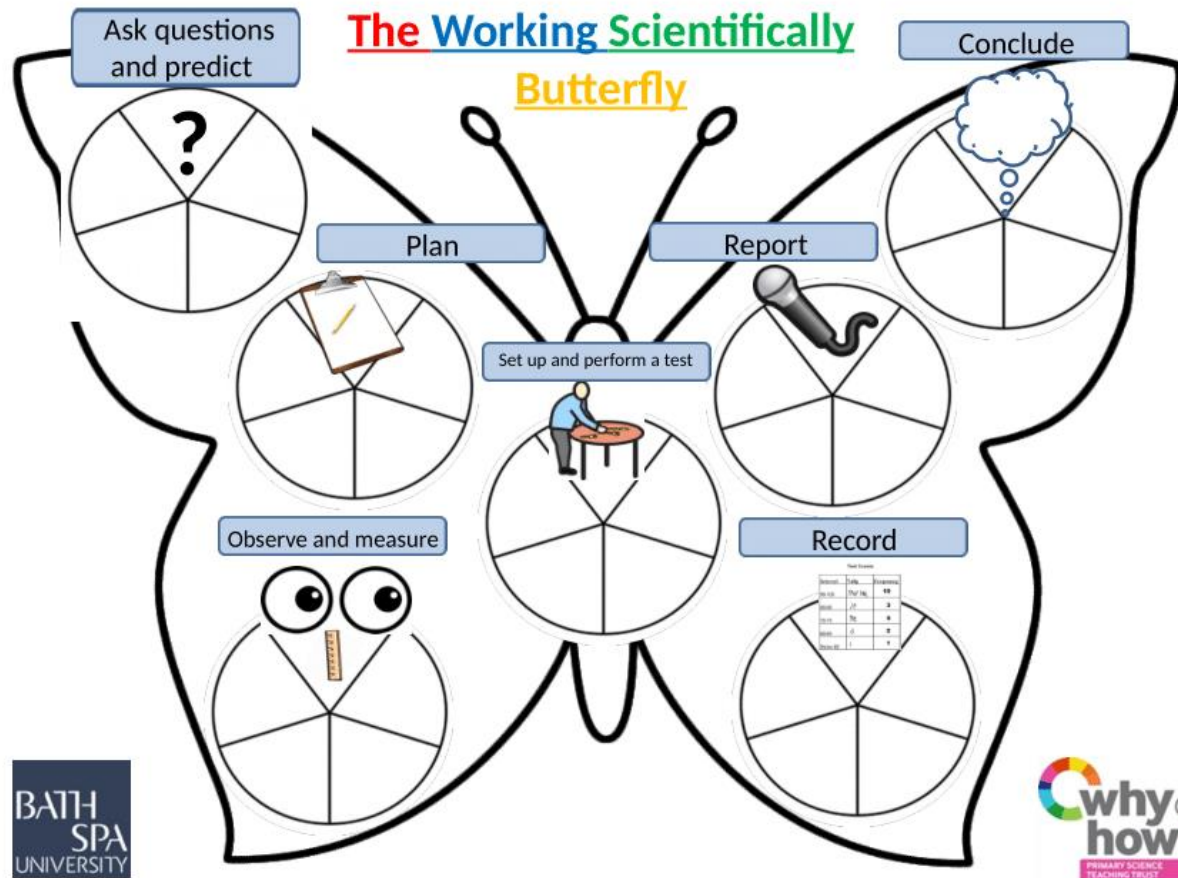
		<p>Bring children back together and ask them to work with another pair, telling each other what they have found out. Now ask them to think about how they could work like scientists and prove that the cars move differently on different surfaces. Ask them to set up a fair test to collect data (numbers) to show that the cars go further on some surfaces than others. Children should think about: which surfaces they are going to use what contact force they will use to move the car how they could make it fair what they will measure what kind of table they will draw on their whiteboard (this could be modelled on the playground).</p> <p>When they have completed their test, bring the class together to discuss their results and also model how to draw a bar graph on the playground, so that the groups can draw their own.</p>	
3	<p><u>Which magnet is the strongest?</u></p> <p>Focus: 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> <p>Em. Children know that magnets pick up some objects. Exp. Children know that magnets attract metals. Exc. Children know that magnets only attract objects made from some metals.</p>	<p><u>Working Scientifically</u> <i>Make systematic and careful observations and, where appropriate, take accurate measurements using standard units, using a range of equipment including thermometers and data loggers. Record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts and tables. Use straightforward scientific evidence to answer questions or to support their findings.</i></p> <p>Em. Children use non-standard measures, e.g. counting paperclips, and have support completing a table and graph. Exp. Children use standard measures, and record using a table and bar chart. Exc. Children use standard measures and draw their own table and graph.</p> <p>The important feature of children answering this question is to ensure that they carry out a fair test using standard measures. So, challenge children to think about how they can use, for example, a magnet to move something, e.g. a paper clip at a distance, measuring in cm. Alternatively, children could place masses (weights) in a metal lid and measure the mass that different magnets can move. Or they could count the number of paperclips each magnet can hold. Some children could use Activity Resource 5.1 to plan their investigation. They should record their results using a table and then transfer this data onto a bar chart. At this stage children may require support to create a graph. You could use PowerPoint Slides 5 and 6 to support this activity.</p>	<p>PowerPoint Slides 5 and 6 Different magnets to test strength Magnetic objects e.g. paper clips, and measuring equipment Activity Resource 5.1</p>
4	<p>Focus: Notice that some forces need contact between</p>	<p>Make sure that children understand what pushes and pulls are. Get children gently to push and pull an object; focus on the idea that, to be able to do this, they have to touch (have contact) with the object. Show</p>	<p>PowerPoint Slide 7 Objects to push</p>

Year 3 Science Planning – Forces and magnets

	<p>two objects, but magnetic forces can act at a distance.</p> <p>Em. Children know that objects can be moved using pushes and pulls. Exp. Children know that a force is needed to move an object and a magnet can move some things without touching.</p> <p>Exc. Children know the difference between contact and non-contact forces.</p>	<p>children the BBC video clip on pushes and pulls (see Useful website links on My Rising Stars). Ask children to make a list on their whiteboards of all the pushes and pulls they can see in the video. They can divide their whiteboard into two to do this. It might be best to play the video twice as the forces go by quite quickly. Finally, discuss what they have seen.</p> <p>Consolidate and review children’s understanding of pushes and pulls. Collect children’s suggestions of other pushes and pulls in objects that are in contact with each other, e.g. football and foot, tennis racket and ball. Use PowerPoint Slide 7 to support discussion. Finish by comparing the pushes and pulls in this activity with magnets. Do magnets have to touch an object to make them move? Tell children that they are going to think about the idea that magnetic forces can act at a distance. They do not have to touch objects to make them move. In future activities remind children of the idea that magnetism is a non-contact force.</p> <p><u>Working scientifically</u> <i>Set up simple practical enquiries, comparative and fair tests. Use straightforward scientific evidence</i></p> <p>Em. Children need an adult to model the activity first before they work more independently.</p> <p>Exp. Children plan and carry out their comparative tests and make a short video.</p> <p>Exc. Children use and record standard measures relating to the thickness of material that a magnet can work through.</p> <p>This is quite a straightforward question for children to answer; they use a magnet and magnetic object to see if they can use the magnet to move the object through, e.g. a desk, door, paper, book and anything that children choose to test. It is also a good opportunity to reinforce the idea that magnetic forces can act at a distance, i.e. through different materials. This kind of activity does not necessarily need children to record in a table (but they can use the table in Activity Resource 5.3 if desired). They could take some photographs, stick them into their book and annotate them with their conclusions. Give children access to plastic bottles with lids into which they can put metallic objects, e.g. screws, paper clips or nails, so that they can test whether magnets can work through water. Children could video a short clip, describe what they are doing and explain their conclusion. Make sure that children use the appropriate scientific language in their video clip.</p>	<p>and pull, e.g. with wheels or without BBC video clip to demonstrate pushes and pulls Individual whiteboards</p> <p>Magnets Magnetic objects Activity Resource 5.3 Camera / tablet Plastic bottles</p>
5	<p>Focus: Describe magnets as having two poles. Predict whether two magnets will attract or repel each other,</p>	<p>Some of the children’s questions might focus on why magnets repel each other and attract each other depending on which end of the magnets are together.</p>	<p>PowerPoint Slide 8 Collection of magnets Activity Resources 5.2 and 5.3</p>

Year 3 Science Planning – Forces and magnets

	<p>depending on which poles are facing.</p> <p>Em. Children know magnets have poles and can describe what happens when poles are put together.</p> <p>Exp. Children predict what will happen when poles are put together.</p> <p>Exc. Children apply knowledge about poles to explain magnetic marbles, floating magnets.</p>	<p>If you have magnets where one half is blue and the other red, then it is easy to call each end a pole: one is north, the other is south. Alnico magnets are red all over so they have a 'dimple' at one end to show it is a north or south pole.</p> <p>Children exploring the effect of two magnets being placed close together will feel when magnets are pushing against each other and when they pull each other. Ask them to find the rules about magnets, that is 'like poles repel and opposite poles attract.' So: north – north = repel south – south = repel north – south = attract south – north = attract</p> <p>Ask children to compare and record what happens when magnets are brought together, and to annotate their results using the terms attract and repel. Children can use Activity Resource 5.2 to record the findings and Activity Resource 5.3 to reinforce the idea of poles. Use PowerPoint Slide 8 to reinforce their learning. They could also make up a song or poem to remind themselves about the rules.</p>	
7			



Working scientifically butterfly.