Science – Forces - magnetism

Year: 3

Term: Spring

Prior knowledge

Explore how things work.

Explore and talk about different forces they can feel. (Nursery - Forces)

Talk about the differences between materials and changes they notice. (Nursery - Forces)

Explore the natural world around them. (Reception - Forces)

Describe what they see, hear and feel whilst outside. (Reception - Forces)

Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. (Y2 - Uses of everyday materials)

Key Knowledge

Forces are just pushes and pulls in a particular direction.
Forces are shown by arrows in diagrams. The direction of the arrow shows the direction in which the force is acting. The bigger the arrow, the bigger the force. They are measured in Newton.

Compare how things move on different surfaces
When an object moves on a surface, the texture of the surface and the object affect how it moves. It may help the object to move better or it may hinder its movement e.g. ice skater compared to walking on ice in normal shoes. There is no need for children to understand friction as this is taught in Year 5.

Magnetic forces
Some forces need contact between two objects but magnetic forces can act at a distance. When two magnets are close, they create pushing or pulling forces on one another. These forces are strongest at the ends of the magnets. The two ends of a magnet are known as the north pole and the south pole. Same poles repel**.** If you try to put two magnets together with the same poles pointing towards one another, the magnets will push away from each other. We say they repel each other. **Different poles attract** If you put two magnets together with different poles pointing towards one another, the magnets will pull towards each other. We say they attract each other. Some magnets are stronger than others, Strong magnets will create bigger pushing or pulling forces than weak magnets. Children should observe how magnets attract or repel each other. Children should use their understanding to predict where two magnets will attract or repel each other, depending on which poles are facing.

Magnetic metals
Magnetic materials are always made of metal, but not all metals are magnetic. Iron is magnetic, so any metal with iron in it will be attracted to a magnet. Steel contains iron, so a steel paperclip will be attracted to a magnet too. Most other metals, for example aluminium, copper and gold, are NOT magnetic. Two metals that aren't magnetic are gold and silver. They are often used for making jewellery, including crowns for instance.

Compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnets.

Key skills
a. I use my results to draw a conclusion and make predictions for answering a different question. b. I can identify some simple differences or similarities when making comparisons. c. I support my answers by pointing out the scientific evidence. d. I can report my conclusion from the results of my experiment. e. I can gather the data I need to answer a scientific question and then present them in a table, grid or graph. f. I can record my findings in simple labelled diagrams, keys, bar charts or tables. g. I can set up a simple fair test experiment to answer a scientific question. h. I can make observations and record measurements (for example in mm or g). i. I can ask relevant scientific questions.
Future Learning
Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object. (Y5 - Forces) Identify the effects of air resistance, water resistance and friction, that act between moving surfaces. (Y5 - Forces) Recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect. (Y5 - Forces) Magnetic fields by plotting with compass, representation by field lines. (KS3) Earth's magnetism, compass and navigation. (KS3)

Key Vocabulary	
Working scientifically key vocabulary – properties, observe, test, object, record, equipment, prediction, measurement, enquiry, dependent variable, independent variable, fair test, similar, theory, hypothesis	
Movement - an act of changing physical location or position or of having this changed.	**Poles** – One of the two ends of a magnet.
Surfaces – the outside part or uppermost layer of something (often used when describing its texture, form, or extent). road, ice, table, carpet	**Attract** - magnets will pull towards each other
Force - any interaction that, when unopposed, will change the motion of an object.	**Repel** - magnets will push away from each other.
Magnetic forces - possessing a power or ability to attract a magnetic personality.	**Contact force** – forces in which two or more objects or bodies touch or contact each other directly
Non-magnetic – not possessing a power or ability to attract or be attracted by a magnetic personality.	**Non-contact force –** when an object is able to push or pull another object without coming into contact with it
Additional vocabulary to discuss across the unit – contact, objects, strength, properties, predict, compare, contrast, opposite, energy, metal, material, rough, smooth, north, south.	
<u>Deepening and broadening the knowledge and understanding for GDS learners:</u> • explains the differences in distance or speed that an object travels over different surfaces, using the term friction • gives examples of how magnetic forces acting at a distance are used in everyday life, *e.g. the fastener on a mobile phone case*	**<u>Key Outcomes</u>** **Can you feel the force?** *Children investigate movements as push or pull forces and identify them in the real world recording their observations* **Do objects need the same force to move them across different surfaces?** *Children will design a fair test and use forcemeters and different surfaces to explore and answer the enquiry, recording their method and results through diagrams and tables.* **What are magnetic poles?** *Children will observe how magnets attract or repel each other and use secondary sources to explore the discovery of magnets and learn that they have a north and*

• explores how magnets, other than bar magnets, attract and repel each other • names a metal which is magnetic • names a metal which is not magnetic • names a metal which is magnetic • names a metal which is not magnetic • describes why the poles of a magnet are called north and south •	*south pole just like Earth. Children can tie a piece of thread around the middle of a bar magnet and hold it up by this thread. Discuss with them the fact that all magnets have two poles; a north and a south (probably shown in two colours on your bar magnets). Ask them to predict what they think will happen when you bring similar poles together. Now, what will happen when the poles are different?* **Is everything magnetic?** *Children will set up a simple fair test and predict whether magnets will attract each other depending on their poles and certain objects. They explore and observe how magnets attract some materials and not others and make simple conclusions from their results.* **Are all metals magnetic?** *Children will produce a 2 region Venn Diagram classifying objects as metal, magnetic or both and draw simple conclusions about what metals must be in certain materials based on whether the object is magnetic or not.* **Can I design a comparative investigation to test the strength of a magnet?** *Children plan and suggest own comparative scientific enquiry in order to test strength of magnetic fields making some decisions about choice of equipment and what they will measure.*