Year 3 – Forces



|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| National Curriculum Outcomes: Knowledge   * 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 | | | | | | | | National Curriculum Outcomes: Working Scientifically   * Asking simple questions and recognising that they can be answered in different ways * Observing closely, using simple equipment * Performing simple tests * Identifying and classifying * Using their observations and ideas to suggest answers to questions * Gathering and recording data to help in answering questions | |
| Children might work scientifically by:  Comparing how different things move and grouping them. Raising questions and carrying out tests to find out how far things move on different surfaces and gathering and recording data to find answers to their questions. Exploring the strengths of different magnets and finding a fair way to compare them. Sorting materials into those that are magnetic and those that are not. Looking for patterns in the way they magnets behaving in relation to each other and what might affect this, for example, the strength of the magnet or which pols faces another. Identifying how these properties make magnets useful in everyday items and suggesting creative uses for different magnets. (*Taken from the National Curriculum)* | | | | | | | |
| Links to prior learning  **Year 1:** distinguish between an object and the material from which it is made. Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water and rock. Describe simple physical properties of a variety of everyday materials. Compare and group together a variety of everyday materials on the basis of their simple physical properties.  **Year 2:** identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses | | | | Links to future learning  **Year 5:** 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 | | | | | |
| Key Vocabulary  Push, pull, force, magnet, magnetic, surface, attract, repel, contact, poles | | | | Common Misconceptions   * Since the content on forces was removed from the KS1 National Curriculum in 2014, it is unlikely children will come to Year 3 with the understanding that **a force is a push or a pull**. This will need to be taught as part of this unit. * Children often say magnets ‘stick’ to each other or to metals. We should discourage this term, as magnets are not ‘sticky’ in the same way as glue is. Encourage them to use the terms ‘attract’ and ‘repel’. * Children with limited experiences of magnets may think all metals are magnetic, and so if a magnet isn’t attracted to a substance then it must not be metal | | | | | |
| Important Scientists  **Andre Marie Ampere** – French physicist and mathematician who worked on electro-magnetism  **The Wright Brothers** – American inventors who built and flew the first planes | | STEM Career Links  **Magnet Engineer** (design magnets or machines and devices that use magnets)  **MRI Technician** (uses magnetic resonance imaging to take detailed pictures of inside the human body)  **Physicist** (studies physics) | | | | Links to real life   * Where do we use magnets in our homes? (aside from the obvious fridges and toys, magnets are also used in computers, compasses, doorbells, alarm systems, microphones, speakers, motors and medical equipment) * Where can magnets help us when humans are not strong enough? | | | |
| Knowledge/facts that the children need to know  A force is a push or a pull.  Things move differently on different surfaces, depending on the object and the type of surface (note, children do not yet need to know about friction at this stage; they will learn about it in Year 5)  You can not see forces but you can feel and/or see the effects of them.  Some forces can only be created when objects come into contact with each other. Other forces (magnetism/gravity) can occur at a distance.  Magnets can attract and repel each other.  Magnets have a north pole and a south pole.  When opposite poles meet the magnets will attract (pull together), when the same poles meet they repel each other (push away).  There are different types of magnets e.g. horse shoe, bar magnet, button, ring.  In real life you will find magnets in: fridge magnets, fridge and freezers, debit cards, computers, television, mobile phones (any electrical device). | | | | | | | | | |
| Suggested Enquiry Activities | | | | | | | | | |
| Identifying and Classifying   * Are all metals magnetic? * Based on the children’s own criteria sort materials (leading towards metal/non-metal and magnetic/not magnetic) or sort toys (leading to what makes them move e.g. push/pull) | Comparative and Fair Testing   * How do different surfaces affect the distance a car travels? * Which is the best surface to spin a spinning top on? Which is the best to race toy cars on? * Which magnet is the strongest? * How does the material on a ramp affect how fast/far a car rolls down? * Which shoes are is best to stop you slipping on icy ground? | | Observation over Time   * If we magnetise a pin, how long does it stay magnetised for? | | | | Pattern Seeking   * Do magnets need to touch for them to work? * Which ends of the magnet attract/repel? * Does the size and shape of a magnet affect how strong it is? | | Research using Secondary Sources   * How are magnets used in everyday technology to make our lives easier? * How have our ideas about forces changed over time? * How does a compass work? |
| **National Curriculum Statements** | | | | | **Outdoor Learning Activities** | | | | |
| * Compare how things move on different surfaces. | | | | | Pupils explore moving objects across different surfaces in the playground. | | | | |

|  |  |  |
| --- | --- | --- |
| Wow Factor Experiences   * Create ‘magnet maze’ out of card, then use a magnet held underneath to guide a steel ball around the maze (see weblinks below) * Use magnets to create ‘magic’ floating paperclips (see weblinks below) * Make a compass then use this to navigate your way round the school grounds (or for a treasure hunt!) | | |
| Maths Links  Investigate how much weight different magnets are able to hold (*Note, children should be using standard measures in KS2, so if you carry out this investigation by seeing how many paperclips a magnet can hold, children must also weigh those paperclips (a non-standard measure) to find their weight in grams (a standard measure*). | Literacy Links  Write a set of instructions explaining how to make a magnet maze or magic paperclips. | Broader Curriculum Links  **Geography:** Investigate compasses and try orienteering!  **Design Technology:** Create magnetic toys for younger children (for example toy cars or a fishing game) |
| Story Links  Act Normal, Don’t Tell Anyone about the Rhinoceros Magnet – Christian Darkin | | |
| Helpful Weblinks  Assessment exemplification (could also be useful with planning ideas) – <https://www.ase.org.uk/resources/y3-forces-and-magnets-max>  BBC Class Clips (useful videos) – <https://www.bbc.co.uk/bitesize/topics/znmmn39>  Online CPD on this topic (free) – <https://www.reachoutcpd.com/courses/upper-primary/forces-and-magnets/>  STEM Learning’s online resource library for Forces & Magnets - <https://www.stem.org.uk/resources/community/collection/12391/year-3-forces-and-magnets>  Magic Floating Paperclips Activity - <https://www.science-sparks.com/how-to-defy-gravity/>  Magnet Maze Activity - <https://learning-resources.sciencemuseum.org.uk/resources/magnetic-maze/> | | |