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| Year 3 - Forces and Magnets |
| **National Curriculum Objectives:**\* Compare how things move on different surfaces.\* Notice that some forces ned contact between two objects, but magnetic force can act at a distance.\* Observe how magnets attract and repel each other and attract some materials but 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. |
| **Prior Learning:**  | **Working Scientifically (NC) Links:** | **Opportunities for working Scientifically:** | **Story / Book Opportunities:** | **Maths Opportunities:** | **Vocabulary:** |
| **In Year 2: Materials:**\* Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. | \* Compare how different things move and group them.\* Raise questions and carry out different tests to find out how far things move on different surfaces; gather and record data to answer these questions.\* Explore the strength of magnets and find a fair way to compare them.\* Sort materials into those that are magnetic and those that are not.\* Look for patterns in the way that magnets behave in relation to each other and what might affect this (e.g. its strength or which poles face each other). \*Identify how these properties make magnets useful in everyday items and suggest creative uses for different magnets. | \* How do different surface affect how far a car travels?\* How does the mass of an object affect how much force is needed to make it move?\* Which magnet is strongest?\* 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?\* Are all materials magnetic?\* Are magnets the same all the way through?\* If we magnetise a pin, how long will it remain magnetised? | The Iron Man – Ted HughesSwim Little Wombat Swim – Charles FugeMrs Armitage: Queen of the Road(Quentin Blake)Mr Archimedes’ Bath(Pamela Allen) | Bar graphsDisplaying data in chart / table | force, push, pull twist, bar, ring, horseshoe, contact force, non-contact force, magnetic, magnetism, attract, repel, magnetic material, poles, metal, iron, steel, north pole, south pole |
| **Types of scientific Enquiry:**Fair & Comparative testingResearch using secondary sourcesIdentifying, classifying & groupingPattern seekingObserving over time | **Famous Scientists:****William Gilbert**(Theories on Magnetism)**Andre Marie Ampere**(Founder of Electro-Magnetism) |
|   **In 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, which act between moving surfaces.\* Recognise that some mechanisms, including levers, pulling and gears, allow a smaller force to have a greater effect.  |







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| Year 5 - Forces |
| **National Curriculum Objectives:**\* 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, which act between moving surfaces.\* Recognise that some mechanisms, including levers, pulling and gears, allow a smaller force to have a greater effect.  |
| **Prior Learning:**  | **Working Scientifically (NC) Links:** | **Opportunities for working Scientifically:** | **Story / Book Opportunities:** | **Maths Opportunities:** | **Vocabulary:** |
| In Year 3:\* Compare how things move on different surfaces.\* Notice that some forces need contact between two objects, but magnetic force can act at a distance.\* Observe how magnets attract and repel each other and attract some materials but 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. | \* Explore falling paper cones or cup-cake cases.\*Make parachutes and carry out fair to tests to determine which designs are the most effective.\* Water resistance – make and explore different shaped boats.\* Design and make products which use pulleys, levers, gears and / or springs and explore their effects. | \* How does the size of an object affect the rate that it falls?\* What size wing makes the best sycamore paper helicopter?\* What is the best material to make a parachute out of?\* Does the length of a lever affect the size of a force produced? (Shaduf / trebuchet?)\* How does the surface area of an object affect how long it takes to sink?\* Where do you find gears in the real world?\* Can you label all the forces acting on the object shown?\* How do submarines sink if they are full of air? | **The Enormous Turnip**(Katie Daynes)**Leonardo's Dream**(Hans de Beer)**The Aerodynamics of Biscuits**(Clare Helen Welsh)**The Tin Snail**(Cameron McCallister) | Drawing graphs / chartsMeasuring distance, time, force | Force, gravity, Earth, air resistance, water resistance, friction, mechanisms, simple machines, levers, pulleys, gears, cog |
| **Types of scientific Enquiry:**Fair & Comparative testingResearch using secondary sourcesIdentifying, classifying & groupingPattern seekingObserving over time | **Famous Scientists:****Galileo Galilei** (Gravity and Acceleration)**Isaac Newton**(Gravitation)**Archimedes of Syracuse**(Levers) |
| **In KS3:**\* Forces as pushes or pulls, arising from the interaction between 2 objects.\* Using force arrows in diagrams, adding forces in one direction, balanced and unbalanced.\* Movement as the turning effect of a force.\* 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.\* Forces measured in Newtons, measurements of stretch or compression as force is changed. |



