Year 3 Physical Science: Forces and Magnets — Unit 4

Scientific Model (KS2):

Force Arrow Model

- Introduce the concept of force arrows when introducing each of the forces covered. The longer the arrow the greater the force.

Scientific Investigations:

- Looking for Naturally- Occurring Patterns and Relationships
- Identifying and Classifying Things
- Researching Using Secondary Sources
- Comparative and Fair Testing

Scientists:

- The first electromagnets were created in the 1820s. Several scientists contributed to the discovery of electromagnetism and developed its use. Other scientists have since refined and adapted the original electromagnets to make full use of their power.

Scientific Skills Taught:

ASK
- To ask relevant questions
- To decide when to use secondary sources to find answers
- To make simple predictions based on knowledge of science

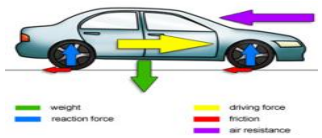
BREAKDOWN
- To set up simple tests
- To decide what equipment to use
- To learn how to use new equipment
- To make decisions about the type of enquiry
- To use different enquiry types to test questions

CAPTURE
- To observe carefully
- To measure accurately using standard units
- To gather data and record in different ways
- To make systematic observations
- To identify differences, similarities, and changes
- To group, sort and classify using different criteria

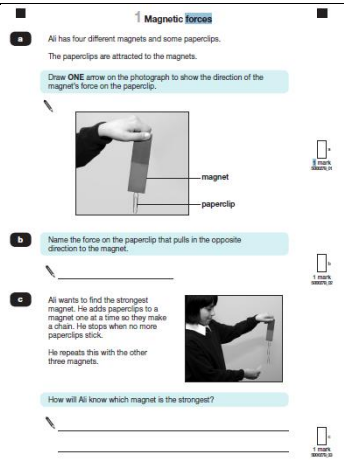
DESCRIBE
- To draw simple conclusions
- To present data in different ways
- To explain what they have found out using correct scientific language
- To record finding using correct language in varied ways
- To answer questions based on evidence orally and in writing
- To suggest improvements to tests

Prior Learning:

- 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)

Curriculum	Learning Intention	Knowledge and Key Vocabulary
Making links to learning and discuss the model (if needed) Force Arrow Model Model the key ideas that are needed to ensure children understand subsequent lessons. 	What is a force? Begin to use force arrow model to describe forces acting upon objects both moving and stationary	**Knowledge:** - To describe a force - Different surfaces create different amounts of friction. - The amount of friction created by an object moving over a surface depends on the roughness of the surface and the object, and the force between them.

		Vocabulary: Force, forces, friction surface, motion
Knowledge and skills through investigations Pupils should be taught to: - 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. Notes and guidance (non-statutory) - Pupils should observe that magnetic forces can act without direct contact, unlike most forces, where direct contact is necessary (for example, opening a door, pushing a swing). - They should explore the behaviour and everyday uses of different magnets (for example, bar, ring, button, and horseshoe). Pupils 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 that magnets behave in relation to each other and what might affect this, for example, the strength of the magnet or which pole faces another; identifying how these properties make magnets	Which forces act upon moving objects? (two lessons) • name different types of force • say when there is a push or a pull acting on an object • explain the force of friction • make a prediction about which surface creates the most friction for a toy car • take measurements and record results in a table • explain results using force arrow model Are all materials magnetic? • explain that magnets produce a force that attracts some materials • use a magnet to separate items that are magnetic and non-magnetic • name some magnetic materials and some non-magnetic materials Do all magnets have the same strength? • identify different types of magnet • investigate the strength of magnets • predict which magnet will be the strongest • test a prediction by adding paperclips to different magnets • record results in a table and present them in a bar chart • explain my results. How do magnets attract or repel each other? • identify the poles of a magnet • look at poles to say whether two magnets will attract or repel each other • explain that a compass always points north-south Who developed electromagnets? • describe how electromagnets are made	**Knowledge:** - Know a force is a push or pull - Explain that a force can change speed and direction of an object - Explain the impact of friction on an object - Know like poles repel and opposite poles attract - Know a magnetic field is invisible - Name 4 magnetic metals - Name 3 uses of electro-magnets in everyday life **Vocabulary:** - force; push; pull; friction; driving force, friction, surface, motion - magnet; magnetic; non-magnetic; magnetic field, North pole; South pole; repel; attract;

useful in everyday items and suggesting creative uses for different magnets.	• identify the scientists who developed the first electromagnets • investigate the strength of an electromagnet	
Application and Assessment Activity	 1 Magnetic forces a Ali has four different magnets and some paperclips. The paperclips are attracted to the magnets. Draw **ONE** arrow on the photograph to show the direction of the magnet's force on the paperclip. magnet paperclip b Name the force on the paperclip that pulls in the opposite direction to the magnet. c Ali wants to find the strongest magnet. He adds paperclips to a magnet one at a time so they make a chain. He stops when no more paperclips stick. He repeats this with the other three magnets. How will Ali know which magnet is the strongest?	

Thinking Deeper:

- Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object.

Links to other subjects:

- Subject Specific links –
  - Literacy in recording, explain idiom ‘Opposites attract’.
- Personal Development – apply knowledge of electro-magnets and the impact it has upon human lives
- SMSC – to develop collaborative work within a group
- Cultural Capital – appreciate the influence of a scientist and the impact they have upon modern day life
- Careers – Scrap metal dealer, industries where magnets are used.
- British Values – making decisions together within groups and sharing ideas

• Equality – equality within class/groupwork, everyone having opportunities to participate and share their findings