Mendell Primary School

Aspire Challenge Achieve

Medium Term Plan Science

Year Group: 3	Term: Autumn 2	Teacher: Jessica Hindley	Subject lead: Sarah Bride

Common Misconceptions:

Some children may think:

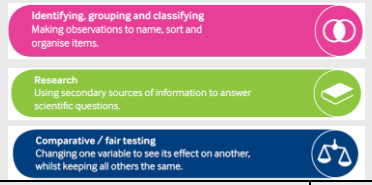
- the bigger the magnet the stronger it is
- all metals are magnetic

Unit key Vocabulary:

Force, push, pull, twist, contact force, non-contact force, magnetic force, magnet, strength, bar magnet, ring magnet, button magnet, horseshoe magnet, attract, repel, magnetic material, metal, iron, steel, poles, north pole, south pole

Overview: Magnets and Forces

- 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



Key End Points: By the end of this unit children will be able to:

Explore forces in the environment E.g. playing with toys, kicking/throwing balls, opening doors, climbing.
Make observations on how we use forces in everyday life.
Describe forces and their effect on things
Spot and talk about simple patterns in our observations E.g. the harder the kick the further the ball went.
Measure forces using a force meter and record data in a table.
Investigate how things move on different surfaces
Observe and describe magnetic forces

Links to other learning:

The Iron Man – Pathways Reading Spring 1

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)**

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)**

High Quality Text:

Curious Pearl Science Girl.
Magnetism Science Action

Scientists:

William Gilbert
John McAdam / Julie Brusaw

Risk Assessment:

Ensure magnets are not in close contact with electrical items.

Teacher CPD:

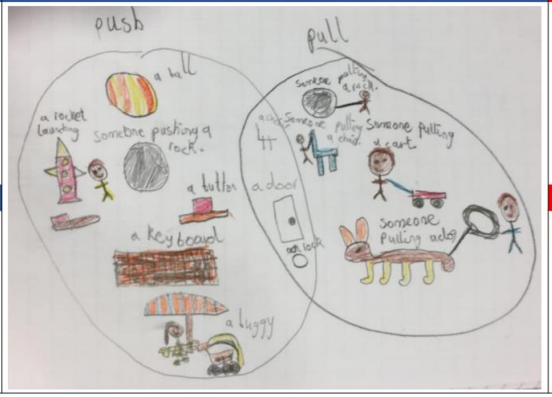
Examples of Work Nathan Magnets & Forces - Year 3

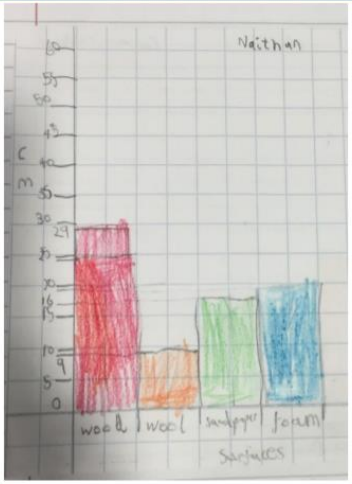
Reach Out CPD - https://www.reachoutcpd.com/ sign up for free.

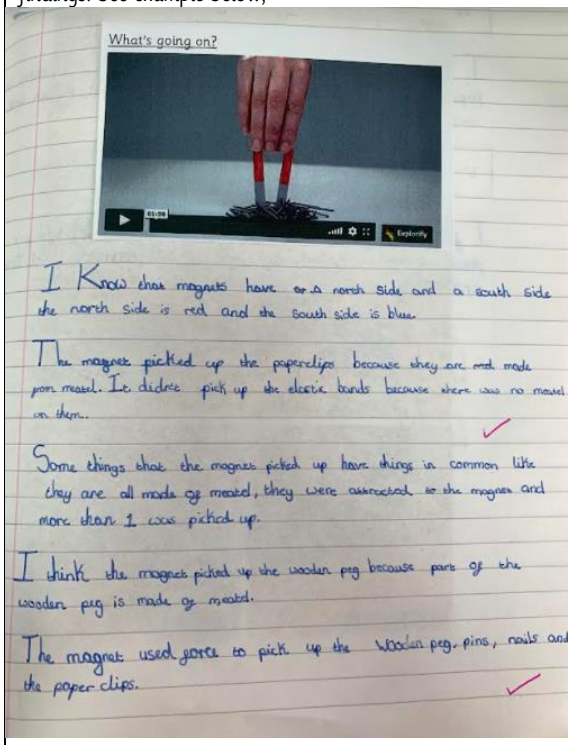
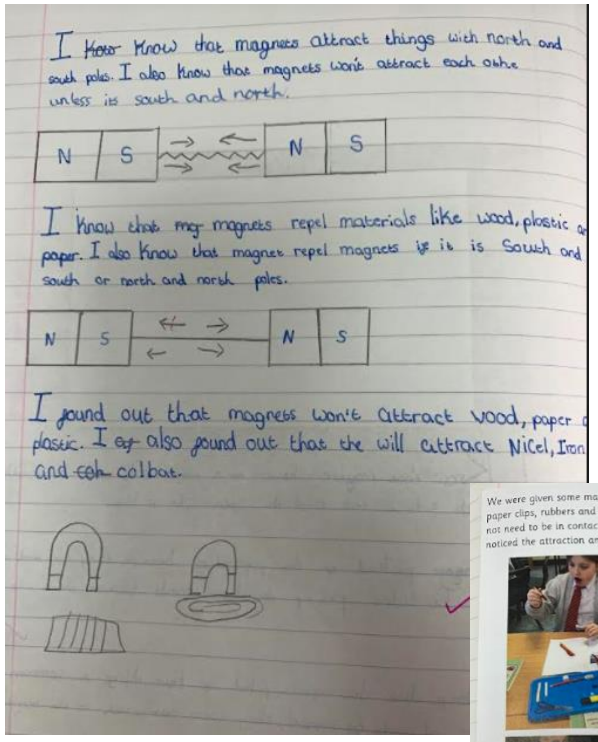
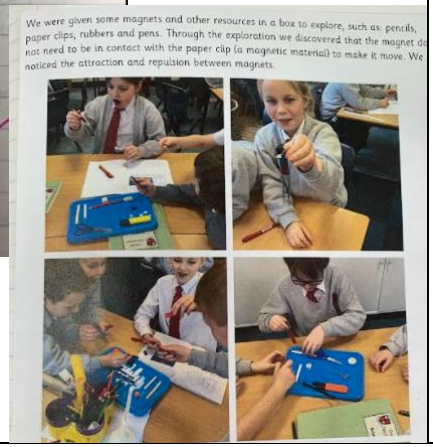
Sign up to Explorify - https://explorify.uk/en/activities

	Learning Intention	Lesson Outline (Key Questions in colour)	Resources	Vocabulary	Lowest 20% Adaptations
1	L.I. I can explore how different objects move and understand the word force.	**This is a Science lesson. In Science, we study nature and the behaviour of natural things. The skill we will be using this lesson is asking questions and making observations.** **Big Question: What is a force?** **Word of the week: Force -** *Forces are the things that allow the movement of all objects around us.* **What is a force?** **Can you name any forces? –** At this stage children may only refer to Y2 vocabulary of bending, twisting, squashing and stretching. Watch: https://www.bbc.co.uk/bitesize/topics/zvpp34j/articles/zywcrdm Word of the week: In books, ask the children to write a definition, find synonyms and use the word force in context.	Range of toys and games for children to explore. Vocabulary list.	**squashing, bending, twisting and stretching**	

		Ask children to complete a thought shower of what they already know about forces and magnets. Children will continue to add to this thought shower as the unit progresses to show their learning (children to add to it in green pen to show the difference from initial ideas) Provide the children with the following prompt questions if needed: **How do things move?** **What makes thing speed up or slow down?** **Which materials are magnetic?** **What are magnets used for?** **What different forces are there?** **What are some different types of magnets?** Provide the children with a range of toys to explore similar to the example below. Encourage high quality talk and use of Y2 vocabulary – bending, squashing, twisting and stretching. Encourage the children to ask questions linked to their observations e.g. why does the pom pom move when I blow throw the straw? On the tables provide post it notes (these can be stuck in books with a photo of the carousel) for children to record responses e.g. the fish stick to the magnet; you push the buttons to make it work etc… See example below:  Share the unit vocabulary with the children and allow time for them to assess their understanding following the colour code – Green: I know what this word means and I can provide a definition, orange – I have heard this word but unsure of what it means, red – I have no experience of this word. Stretch children to write definitions for the words they have identified as green.			
2.	L.I. I can identify different forces and sort them into push or pull..	**This is a Science lesson. In Science, we study nature and the behaviour of natural things. The skill we will be using this lesson is making observations** **Big Question: How can we sort forces?** Let's explore all the different ways that forces can make things happen by playing a game called "Furious Forces." Use the instructions – *How to play Furious Forces*. At the end of the game, praise all the children for their great exploration skills and clap the winning team.	A bag of mixed items for each group - a range of everyday objects, e.g. toy vehicles, balls of	**Push, pull, force, contact, non contact.**	

		Together look at all the words you have stuck to the whiteboard. All these verbs describe a force acting on an object. Which forces can make things move? *Kick, throw, shove, roll* are good examples. Which forces can slow things down stop them or change their direction? *Catch, deflect, tap and stop,* are examples. Which can change the shape of something? *Squash, stretch, press and squidge* are examples. Almost all these forces can be divided into either a **push** or a **pull**. You push something away from you *(demonstrate with a hand action)* and you pull something towards you *(use a hand action once again).* Is a throw a push or a pull? – get the children to mime the action. Yes it is a push away from you. What about a catch? Mime the action. Yes it is a pull towards you. Let's sort all our words into pushes and pulls. Take down the words and give a pile to each team together with a pair of push/pull labels (see session resource). Encourage the group to discuss which are pushes and which are pulls and sort them into 2 groups. Hopefully through discussion the children will discover that some of their words can be both, e.g. *roll.* You can roll something away from you –a push, or you can roll it towards you – a pull. Another example is a twist or a turn that involves pushing on one side and pulling on the other. Ask the groups to share their examples of pushes and pulls and those actions that can be both. Let's take a look at some other examples of pushes and pulls – show the compilation film clip and briefly discuss the different ways they saw forces (pushes and pulls) at work. https://www.bbc.co.uk/bitesize/clips/zkw8q6f **Recording**; Children are to draw and write different examples of Push/pull forces using a Venn diagram see example below. PLAN Planning for assessment • Notice that some forces need contact between two objects, but magnetic forces can act at a distance. Description of activity The teacher showed the children the activities they had carried out in the previous carousel activity and asked them how they made things move. The children started to use the words 'push' and 'pull'. The teacher demonstrated a push and a pull and asked children to think of things that they could move by pushing, pulling or both. She then asked them to record this in a way of their choosing. EVIDENCE OF LEARNING / ASSESSMENT Oral evidence / Examples of work / Knowledge  Teacher observations The children chose how to record their ideas. Naithan chose to use an intersecting Venn diagram. Other children used a table or simply labelled each individual object. Working scientifically Naithan records his ideas using an intersecting Venn diagram. **Exit pass:** https://explorify.uk/en/activities/whats-going-on/fantastic-gymnastics can the children identify the forces at work in the video?	different sizes and materials (e.g. ping pong, foam, tennis, beach, football), pull along toys, rubber bands, bulldog clips, beanbags, pencil case with zip, spectacle case, rulers, rubbers, scissors, calculators, screw top pots or bottles, coins. A sheet of paper and pen per group.		
3.	L.I. I can explore how friction from different surfaces affect the movement of a toy car.	**This is a Science lesson. In Science, we study nature and the behaviour of natural things. The skill we will be using this lesson is setting up a test, making predictions, observing and measuring and recording data.** **Big Question: How do different surfaces affect the distance of a toy car?** Introduce the children to the work of John McAdam / Julie Brusaw using the PowerPoint. Working in groups the children will test a range of materials to act as different road surfaces for the toy car to travel on in order to find the answer to the big question. Provide the children with a range of resources and allow them to select the equipment they feel will best support them in their data gathering.	Standing on the shoulders of giants John McAdam PowerPoint. Squared paper for graphs, toy cars, wooden ramps,	**Force, friction, surface, push, pull.**	

		Ask the children before they begin their investigation: **what forces will be acting upon the car? Are there pushes or pulls? Any other forces?** – gravity, friction. **Word of the week: Friction** Discuss friction further with the children: https://www.bbc.co.uk/bitesize/topics/zsxxsbk/articles/zxqrdxs Show the children the 'Lets cause some friction information text' to support their understanding of friction. Before they begin, spend time discussing their predictions. **What does the work of John McAdam tell us? How might this help our predictions today?** Explain to the children that we will be testing each material three times to ensure we get an accurate reading. Ask the children to display their data in a bar chart. Once the children have gathered their data allow them time to consider what it tells them. **What patterns can they see? Can they answer the big question? Which surface slowed the car down the most? Why?** PLAN Planning for assessment **Focus of assessment (National Curriculum statements)** • Compare how things move on different surfaces. **Description of activity** The children then presented their results in a bar chart and the teacher asked them to talk to each other about their graph. **EVIDENCE OF LEARNING** / **ASSESSMENT** Oral evidence: Naithan: "The car went 29cm on the wood. This was the furthest. It only went 9cm on the wool. It actually went about the same distance on the sandpaper and foam." Teacher: "Why do you think it went different distances on the surfaces?" Naithan: "The wool was fluffy and slowed the car down. The wood was smooth and didn't slow it down. The sandpaper and foam feel quite similar." Examples of work:  Knowledge: Naithan is now showing an awareness that it is the texture of the surface that affects the movement. Teacher observations Working scientifically: Naithan correctly draws the axes and the bars on his graph. Exit pass or homework task: research the work of Julie Brusaw in greater detail.	different materials to test – sandpaper, wood, paper, carpet.		
4.	L.I I can use secondary sources and observations to explore magnets and observe how poles attract and repel each other.	**This is a Science lesson. In Science, we study nature and the behaviour of natural things. The skill we will be using this lesson is research, making observations and interpreting and communicating.** Explorify – Magnets – What is going on? https://explorify.uk/en/activities/whats-going-on/magnets Allow children time to use secondary sources to find out how magnets are used in everyday life – what examples did they think of in their thought shower in lesson 1? – use non-fiction books and the internet for research. **Big Question: Is magnetism a contact or noncontact force?**	Explorify video link in planning, Books for research/iPads. Range of magnetic and non magnetic objects be sure to include mixed material e.g. wooden	**force, invisible, attract, repel, contact, non contact.**	

		Ask the children to discuss what was happening in the video – encourage them to discuss each object shown. **What do you know about magnets? Why did the magnet pick up some items and not others? – do these items have anything in common? How did the magnet pick up some of the objects? –** record observations in books. Introduce the children to the following vocabulary; **Word of the week: attract and repel. Can they use these words in context now to explain what was happening in the video?** – Record in books. Provide each group with a range of objects to explore and some magnets. Allow children time to observe what happens when using the magnet on the objects. Remind children of the vocabulary attract and repel when joining in their discussions. To prompt the children ask this question halfway through explorations: **Does the magnet have to be in contact to make an object move?** Prompt children to consider how magnets act in close contact to each other **– what do they notice? –** show https://www.bbc.co.uk/bitesize/topics/z4qtvcw/articles/zhs7xyc Share with the children the work of William Gilbert and his discoveries about magnetic poles using the fact card resource. Take feedback from the children about what they have discovered from their explorations. In books, ask the children to use diagrams and sentences to explain their findings. See example below;    **Exit pass: Can the children write a definition for the force magnetism?** For pupils who need support provide a word bank including: force, invisible, attract, non contact.	peg with metal clip. William Gilbert fact card.		

5.	L.I. I can investigate which materials are attracted to a magnet and sort a range of materials into magnetic and non magnetic.	**This is a Science lesson. In Science, we study nature and the behaviour of natural things. The skill we will be using this lesson is asking questions and making predictions.** **Big question: Are all metals magnetic?** Explorify Odd One Out – Pull together - https://explorify.uk/en/activities/odd-one-out/pull-together Encourage the children to write down what is similar about the three images as well as identifying an odd one out with a reason. Provide each table with a range of materials and ask them to sort the materials into magnetic and non-magnetic (at this stage only use magnetic metals) – for any the children are unsure of provide a magnet to test - discuss as a class.  Ask the children to look closely at their sorting and ask them **what do they notice about the magnetic materials? What is similar about them?** Allow the children time to pose a scientific question which they could find the answer to using an investigation. E.g **are all metals magnetic?** Ask the children to write a prediction. Provide the groups with a range of metal disc and coins. Allow them time to sort the metals into magnetic and non magnetic. Children to write up their findings. Also take photographic evidence. **Exit pass:** what would happen if all metals were magnetic?	A range of materials for sorting and magnets. Metal disc and coins.	**Magnetic, non magnetic, attract, non contact, invisible, metal, material.**	
6.	L.I. I can investigate the strength of magnets.	**This is a Science lesson. In Science, we study nature and the behaviour of natural things. The skill we will be using this lesson is asking questions, setting up tests and recording data.** Explorify – what's going on – Mighty Magnets https://explorify.uk/en/activities/whats-going-on/mighty-magnets Pose the question to the children : **which magnet is the strongest?** In groups allow the children to discuss how they could find the answer. Provide the children with a group planning frame and using post it notes ask the children to devise an investigation to complete. Provide the children with a range of different magnets including: bar, horse shoe, wand and ball. Allow the children to gether their data using whatever method they have decided e.g how many paperclips can each magnet hold? Ensure the children identify how they have kept the investigation fair e.g. only changing the magnet type. Children can record their data in a table and then a graph. Encourage the children to discuss their results and explain how they know which magnet was the strongest. Allow the children time to return to their original thought shower from lesson one and add in what they have found out during the unit. Also repeat the vocabulary colour coding and definitions. Complete CGP assessment at the end of the unit.	Group planning frame, post it notes, a range of magnets and magnetic materials for investigation. Vocabulary list.	**Force, strongest, strength, magnet**	