





Subject: Science		Year Group: 3			Unit: Magnets and forces - Stone Age to Iron Age (T2)	
First- hand experience:						
NC Objectives to be addressed:				Prior Learning required:		
<p style="text-align: center;">Forces and Magnets</p> <ul style="list-style-type: none"> • 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. 				<ul style="list-style-type: none"> • 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) 		
Biology		Chemistry		Physics		
Working scientifically				Where next?		
Comparative and fair testing	Pattern seeking	Observing over time	Secondary sources	Classifying and grouping		
Key Vocabulary:						
force	A force is a push or pull that acts upon an object			Ring magnet		
push	to press against with force in order to drive away from you			Button magnet		
pull	a pull is the force of bringing an object towards you			Horseshoe magnet		

twist	to bend or turn (something)	Attract	a force on (an object) that is directed towards the source of the force
contact force	A contact force is any force that requires contact to occur.	Repel	to act with a force that drives or keeps away something
Non-contact force	A non-contact force is any force that doesn't require contact to occur.		
Magnetic force	attraction or repulsion that arises between two magnetic	Iron	A magnetic metal
Magnet	A magnet is a material or object that produces a magnetic field	Steel	A metal alloy made up of iron
Strength	How strong something is – e.g. a magnet	Poles	The northern and southern ends of a magnet and indeed the Earth
Bar magnet		North Pole	The northern end of a magnet (generally the red end)
metal	a solid material which is typically hard and shiny	South Pole	The southern end of a magnet (generally the blue end)

Sequence of learning:

Assessment: [Forces and Magnets Assessment](#)

Lesson 1

Forces are pushes and pulls. They cause objects to speed up or slow down

Pupils will know how a ploughshare is used for farming

There are 2 types of forces, contact and non contact

For example friction is a contact force

Friction is a force between two surfaces when they slide across each other

Friction works in the opposite direction and slows the object down

Different surfaces produce different levels of friction

Smoother surfaces produce less friction

Friction is a useful force. The friction between our shoes and the floor stop us from slipping

Lesson 2

Magnets supply a non-contact force to magnetic materials (as opposed to friction being a contact force)

Gravity is also a non-contact force

Magnetism is an invisible force. A magnet can either attract or repel other magnets

Magnets have a north pole (N) and a south pole (S)

Opposite poles of a magnet will attract each other (pull together)

Similar poles of a magnet will repel each other (push away)

Lesson 3

Objects can be sorted by whether they are attracted to a magnet or not

Only iron (Nickel and Cobalt) are magnetic, all other materials, including all other metals, are not.

A hypothesis is a statement which you can test to see if it is true.

Lesson 4 and 5

Magnets come in lots of different shapes and sizes.

The Earth is like a giant magnet with a magnetic north and south pole.

A compass points towards the north pole because of the Earth's magnetic field

Some magnets will be stronger than others and create bigger pushing or pulling forces

In a scientific test, all variables need controlling apart from the ones you are testing or measuring

Children will know how to record results in a results table, and draw suitable conclusions

Children will know how to suggest improvements to an investigation

Resources and teacher subject knowledge:

A force is a push or a pull. 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.

A magnet attracts magnetic material. Iron and nickel and other materials containing these, e.g. stainless steel, are magnetic. The strongest parts of a magnet are the poles. Magnets have two poles – a north pole and a south pole. If two like poles, e.g. two north poles, are brought together they will push away from each other – repel. If two unlike poles, e.g. a north and south, are brought together they will pull together – attract.

For some forces to act, there must be contact e.g. a hand opening a door, the wind pushing the trees. Some forces can act at a distance e.g. magnetism. The magnet does not need to touch the object that it attracts.

Possible misconceptions:

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

Possible lesson ideas

Lesson 1 – Investigate how objects move on different surfaces.

- First introduce what forces are, the fact we can't see forces, but can see the effect of forces.
- Ask children to discuss forces they may know and create a bank on the board.
- First discuss pushes and pulls. What they are and how they work. Explain that for some forces to act, there must be contact e.g. wind pushing tree, pulling a door open.
- Discuss how pushing and pulling has been used throughout history to create historic building, for farming, etc.
- Look at the Iron Age tool, the Ploughshare, and discuss why it would be useful in farming, why its shape is the way it is, and the push or pull forces the people would have used to enable it to work.
- Complete a brief investigation about how an object – like a ploughshare – moves on different surfaces.
- Use a weight as a ploughshare, and drag or push it on different surfaces – wood, grass, playground, carpet etc.
- Record information about which surfaces were easier to move the object on, which were harder, and encourage children to speculate why.

Lesson 2 –Identify how magnets are attracted to each other.

- Recap work on forces yesterday, and ask children to share what they learned.
- Continue to today's lesson about magnets and magnetic force.
- Ask children to identify where they see magnets in their lives – fridges, whiteboards potentially, screwdrivers, bank cards etc.
- Ask children to discuss as a pair, and come up with a definition for a magnet.
- Share actual definition for a magnet - A magnet is a rock or a piece of metal that can pull certain types of metal toward itself.
- Next, simply lay out a variety of magnets, and allow children to play with them, seeing what they notice
- Work the room, asking questions about what they have noticed – the north and south poles attracting, magnets attracting at a distance, objects the magnets are attracted to.
- Discuss their findings as a class.
- Task – create a poster to show how magnets attract or repel each other, based on which poles are facing.
- Poster needs to include pictures and information about the south and north pole being attracted to each other, and what happens when the south and south meet and when the north and north meet.
- Ensure they are using the term poles

Lesson 3 –Identify materials that are magnetic

ENTRANCE TICKET

Prediction activity – Will they attract?

Think back to the previous lesson and see if you think the images of magnets will attract or repel each other.

- Carry out an investigation as to which household objects are magnetic and which aren't.
- Gather a number of objects from around the school and see whether they are attracted to a magnet or not.
- Complete the table below

Object	Hypothesis	Magnetic?
Magnetic or not?	Yes	No

Allow children to gather some of their own items from around the classroom to test.

- Following the investigation, discuss what we have found as a class, and began grouping the objects based on their properties.
- Use sorting hoops to determine similarities, and differences. E.g. metals, irons, steels, plastic?
- Begin to develop some findings from the investigations

Lesson 4 – Report findings of an investigation

- Refer back to the previous lesson's investigation, what did we find out?
- This lesson will be learning how to construct a good Results section of a scientific experiment.
- As a class identify the key vocabulary and phrases that children will have to use in order to create this piece of writing.
- What features will they have to include?
- Make sure children keep referring back to their results tables, and the sorting activity. Perhaps have an image of how the materials were sorted present to refer back to.
- Share examples, and ask peers to suggest improvements.

Lesson 5 – Devise an investigation into magnet strength.

- Ask children to recall their observations about magnets so far.
- Lead that into the fact the magnetic force can act at a distance, and they will have noticed as such.
- Allow a brief play into magnets working at a distance – in water, either side of a table or door, attracting a paper clip from a distance away.
- Ask children to think about how the strength of a magnet effects the distance at which it can work, and ask them which magnet in the room they feel is the 'strongest' and providing a reason and evidence why.
- Refer back to fair test work in previous term, and ask children in small groups or pairs to devise their own fair test to test the strength of magnets.
- Post-it planning will be a useful tool for this <https://www.pstt-cpd.org.uk/ext/cpd/dips/resources/pdfs/Sc1-Planning-Posters.pdf>
- Once they have a few ideas, discuss as a class and support making their investigations a fair one.
- Discuss a method section of an investigation, and ask children to write what they are going to do, including why it is a fair test. Explain they need to be extremely specific, meaning anyone could pick it up and run the investigation, following their instructions.

Lesson 6 – Carry out an investigation

Carry out the investigation they had planned, and record results.