

# Year 3 – Autumn 1 – ‘Forces and Magnets’

## Lower key stage 2 programme of study Working scientifically

During years 3 and 4, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:

- asking relevant questions and using different types of scientific enquiries to answer them
  - setting up simple practical enquiries, comparative and fair tests
- making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers
- gathering, recording, classifying and presenting data in a variety of ways to help in answering questions
- recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables
- reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions
- using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions
  - identifying differences, similarities or changes related to simple scientific ideas and processes
  - using straightforward scientific evidence to answer questions or to support their findings.

### Investigation/practical enquiry

- I can plan an investigation and predict the outcome.
- I can compare how things move on different surfaces.
- I can set up a practical enquiry.

Mr Newton was so grateful you agreed to help. Can you remember the theme for the fair this year? Recap what chn know from last session. Discuss friction and what it is. Relate to cyclists cycling over different surfaces. What happens when you cycle on the road compared to grass? Let's prove it! Try the car on the playground and the grass. What did you notice? Chn may know that you go slower over grass/mud. This is because of friction. Introduce the word *friction (the rubbing of two surfaces against each other when one or both are moving)*. Explain how friction can cause objects to stop or slow down. Discuss how friction is created. **POSE** question. How will a car move on different surfaces? How will the surfaces change the speed of the car? **PLAN** investigation. We will test friction using a toy car and materials. Plan the equipment and method. Discuss the variable and fair testing. Chn to record in books – What we are investigating. What equipment we need (bullet points). Paragraph on how we will carry out the test. How it will be a fair test and what the variable will be. **PREDICT** the outcome. Subheading predication. Children to predict which material they think the car will travel the

### Introduction

#### I can explore forces

**I can understand forces are pushes and pulls.** Chn receive an exciting and important letter from the British Scientific Society! Do we want to help Mr Newton? Yes! But we need to make a start at the task by getting to grips with our understanding of forces. **POSE** questions about forces and magnets? Does anybody know anything about forces/magnets? What is a force? Do we have to touch an object to apply a force? Darth Vader doesn't! What do we know about magnets? Are there any in class? IWB pen! Record chns ideas/suggestions. Forces are different ways that make things happen eg start/ stop moving, change direction, change shape, go faster/slow down. Explore this by playing a game called "Furious Forces." (SEE INSTRUCTIONS) Whole class discuss words stuck to the board – all these verbs describe a force acting on an object. Which forces can make things move? Kick, throw, shove, roll. Which forces can slow things down, stop them or change their direction? Catch, deflect, tap,

- I can pose a question and plan an investigation.
- I can set up a practical enquiry.

Recap different forces. What forces do you remember? What force did we use on the car? Look at variety of pictures of sport. What forces can you see here? Pose the question Does every force need to make contact? No. Gravity – pulls objects without touching. Is there anymore?

Chn to have paperclip and a piece of cardboard/paper. Chn to try move the paper clip without touching it. Let chn explore this. You could tip the paper- gravity would pull the paper clip. Chn may blow it – this is contact! You can't see the air but it is making contact. What about a magnet? Chn to explore using a magnet to move the paper clip. Feed back to class what they have discovered. Remind chn of Mr Newtons letter, he wants us to focus on magnetic forces. We need to explore magnets further. Chn to **POSE** a question about magnets. What do you want to find out about magnets? Gather all ideas. From this look at which questions we could investigate. In groups chn to have 1 question to investigate. In their groups, **PLAN** their investigation. Chn to record the question they are posing, how they will investigate (this could be written or drawn) and how it will be a fair test. Chn to also write a **PREDICTION**. Subheadings to be used for each section. Chn to carry out the investigation. **PRESENT** results. Chn to write what they found out and can they answer the question they posed. Each group to feed back to class on their investigation and findings.

Type

- I can predict an outcome and provide a conclusion.

I can classify materials based on whether they are attracted to a magnet.

- I can identify magnetic materials.

Recap last session- what questions did we pose? How did we answer them? What were the answers? Expln today we will investigate another question -What materials/objects are attracted to magnets? Chn to have a range of everyday objects on their tables. Allow chn to explore these. **PREDICT** which ones will be magnetic and which won't. Chn to have a table with object, column for prediction and column for attracted to magnet? Chn write the objects in. Put a tick or a cross to show if they predict it will be magnetic or non-magnetic. Under the table, write a sentence on why they think certain objects will be magnetic. Hand out the magnets. Take turns to test the objects. If an object is magnetic, children to tick or cross in the next column to say if it is magnetic or not. Once all objects have been tested, discuss findings. What do you notice about the objects that were magnetic? They were a type of metal. Children to **PROVIDE** a conclusion. Write a short paragraph about what they found out and whether their predictions were right or wrong.

- I can explore magnetic poles.

- I can predict an outcome.

I can show results using a labelled diagram.

Recap on learning so far by playing 3 strikes and you're out (SEE INSTRUCTIONS).

Let's look at these magnets more closely. (Show the magnets with red&blue) What do you notice? The colours. Why do you think they are red one side and blue the other? Gather ideas. Show video clip

<http://www.bbc.co.uk/education/clips/zk9rkqt>

and discuss again. What do you think now?

Explain that the whole world is one big magnet.

We have magnetic poles, North and South.

Discuss the vocabulary attract and repel. So far you've only had 1 magnet but what happens if I give you 2 magnets? Show four different scenarios of magnets facing each other. North-North, South-South, North-South and South-North. In books chn to write a **PREDICTION** for each scenario. Hand out magnets. Chn to have time to explore putting the different poles together. What happens? Why is this happening?

Children to **PRESENT** their results using diagrams. Draw and colour the diagrams representing the 2 magnets. Label the poles.

Under each diagram, chn to write whether the two poles attract or repel.

Type

- I can pose a question.
- I can set up a practical enquiry.
- I can show an understanding of forces and magnets.

Remind chn about the letter from M Newton. He wants us to come up with activities for the science fair. First, let's see what we have learnt. Mini quiz on forces using multiple choice questions. Can be answered on whiteboards or paper.

We have investigated lots of things to do with magnetic forces. Which ones do you think will be good at the science fair? Make a note of the different investigations. I have got all of the resources we have used over the last few weeks.

We are going to set up the investigations and take photos to show Mr Newton. A really good way to get the visitors thinking is to ask them why they think something is happening. Let's think about the sort of questions you could ask.

Chn **POSE** questions around each of the investigations. In groups chn to have different investigations and write their questions and answers on folded card. Draft them on paper first and then copy them onto card. Make them bright and colourful. Chn then gather the equipment needed and set up their activity so it can be photographed (for Mr Newton).

Chn to rotate around each other's activities exploring the questions and the investigations.

Type

## Year 3 Forces and magnets

- compare how things move on different surfaces
- notice that some forces need contact between 2 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 2 poles
- predict whether 2 magnets will attract or repel each other, depending on which poles are facing



# Year 3 – Autumn 1 – 'Forces and Magnets'

stop, hit, blow. Which can change the shape of something? Squash, stretch, press and squidge. Almost all these forces can be divided into either a push or a pull. You push something away from you & you pull something towards you. Ask chn if a throw is a push or a pull? – (get chn to mime the action) it's a push away from you. Ask chn if a catch is a push/pull? – (get chn to mime the action) it's a pull towards you. Give selection of words off board to each group with a pair of push/pull labels. Chn to discuss in groups which are pushes and which are pulls and sort them into 2 groups. Through discussion chn will discover some of their words can be both, e.g. roll. Roll something away – a push/Roll it towards you – a pull. Another e.g. twist or a turn, involves pushing on one side and pulling on the other. Ask groups to share egs of pushes & pulls and those actions that can be both.

Look at other pushes and pulls on video (Link – <http://www.bbc.co.uk/education/clips/zkw8q6f>).

Do you think forces can be measured? What could they be measured in? Forces are measured using a forcemeter and is measured in Newtons. Plenary- Plenary dice.

furthest/shortest on and why. Making sure to use 'friction' in their explanation. Carry out the investigation. Ask questions. Which force is making the toy car run down the ramp? Is the force a push or a pull? Gravity is pulling it down.

After each material, note down the measurement of how far the car travelled. **PRESENT** results. Chn to have a table of results. Write each material and how far the car travelled. **PROVIDE** conclusion. Chn to write what they found out, which material made the car travel furthest/shortest distance. Explain if their prediction was right/wrong and why.

Type

