Forces – Magnetism

Name_____ **Class**_____

What you will need for this lesson: baking paper, needle or pin of some sort, a bowl, a magnet (you can use any magnet that's on your fridge. You will be able to put it back afterwards), a scissors and some water.
You will also need a pen, a pencil and if you have it, access to a computer, tablet or iPad.

LESSON STARTER

Magnetic or not?
Which of these objects do you think is magnetic? Draw a circle around those you think are magnetic.

 table	 key	 spoon	 cup	 lego
 chair	 ball	 pencil	 crayon	 book
 fork	 plate	 shirt	 scissors	 shoes
 can	 lunch box	 sock	 knife	 nail
 jumper	 bottle	 coin	 note	 door
 screwdriver	 tin	 box	 drawer	 trousers
 zip	 bricks	ruler	 pencil case	 coat
 CD	 saucer	paper clip	screw	 scarf

Do you notice anything about the ones you have circled?

_____

_____

_____

Try and explain what made you pick these items.

_____

_____

_____

_____

_____

When you've finished, watch the video to see how many you got right.

What have we learned so far?
We have learned that magnets are a force. We also know that they act over a distance. In other words they don't need to touch an object to make it move. We also know that magnets can attract and also repel an object depending on what it is!

The Investigation

We use magnetic force to help us in many ways. One way we use the natural magnetic force of the Earth is in a compass. A compass will tell us which direction we are pointing.

Today we are going to make our own compass using magnets!

Be very careful as you use the needle!

What did you notice when you were doing your experiments? Try and think of at least 5 things!

1. _____

2. _____

3. _____

4. _____

5. _____

WORKING SCIENTIFICALLY

Our next focus is about working scientifically. All scientists apply these principles whenever they are investigating anything and we've divided them into different skill units.

Find the section your teacher has asked you to focus on and answer the questions in the relevant section.

A. Planning or

B. Presenting and analysing data or

C. Evaluation

A. Planning

Every scientist wants to solve a problem and so takes the following steps

1. **Decides on a question that needs answering.** e.g. Does the number of times I rub the needle with the magnet affect its strength
2. **Decides what the independent variable (the thing that is changed) might be in order to work out the answer to the question** e.g. I will change the number of times I rub the magnet on the needle.
3. **Decides what the dependent variable might be (how to measure the differences in each different example**) e.g. I will observe the strength of the needle's movement.
4. **Last of all decide what elements have to stay the same in order to make it a fair test** e.g. I will use the same items in each investigation

Now using this knowledge, see if you can answer the questions below!

Year 3, 4, 5, and 6 pupils -What might be the independent variable you would use in your investigation, in other words what would be the things that you would change to investigate your question?

_____

Year 3, 4, 5 and 6 pupils - What would be your dependent variable, in other words what would you measure to record the difference?

_____

Year 4, 5 & 6 pupils -What was your control variable, in other words what did you keep the same to make sure that it was a fair test?

_____

Year 5 & 6, Now design your own question you might want to explore. Make sure you Say what your independent and dependent variables might be.

My question is _____

My dependent variable would be_____

My independent variable would be_____

B. PRESENTING & ANALYSING DATA

When scientists carry out investigations, it is really important that they capture data to make sure they can then answer the questions that they have set themselves.
The scientist on the video has asked you to complete the following:

Year 3 & 4 pupils – You are carrying out experiments to answer the following question:

Does the number of times I stroke the needle with a magnet affect the strength of the magnetised needle?

What kind of data would you capture to show what happens and why?

_____

_____

_____

_____

Year 5 & 6 pupils – You are carrying out experiments to answer the following question:

Does the type of metal used for my needle affect the accuracy of my compass?

What kind of data table would you use to show your results? Then fill the table in with your results. A page has been left blank at the end of the working scientifically section for you to use.

_____

_____

_____

_____

_____

C. EVALUATION

Evaluating how an investigation went as well as the data that comes from a science experiment is a really important part of science. It may be that you feel your experiment could have been done better or more thoroughly and it is important to understand this.

Answer the question below and then explain why you came to this answer:

Year 3, 4, 5 & 6 pupils: Did your experiment work?

Year 3,4, 5 & 6 pupils: Why? Try and explain how you know it worked or didn't work. You can draw some diagrams to help you!

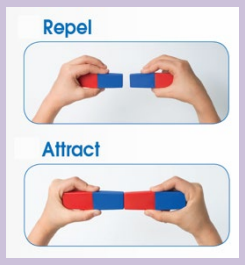
Year 5 & 6 pupils: Record the data from your investigation. Can you see any anomalies (strange results)? How did you spot them? A page has been left blank for you to use to record your data

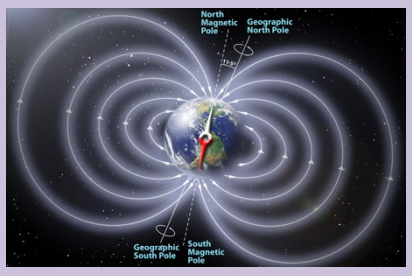
Use this page to record your data!

The science behind the investigation

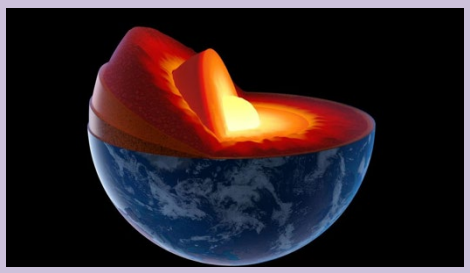
Magnetism is an invisible force. It pulls some materials that are magnetic towards it. It is also a non-contact force and as such when you move away from it, it becomes weaker.

A magnetic field is the area around the magnet where the force of the magnet can be felt. This area is in all directions and we need to think of it as a 3D shape not a flat shape. At its centre is the magnet and its force is greatest here.
We also know that a magnet has 2 poles. One of these is a north pole and the other is a south pole. If we put a north
and south pole near each other they will attract each other. If we put two north poles or two south poles together they will repel (push away) from each other. When we made out compass the magnetised south pole of out needle was attracted to the magnetic north pole.





Some metals are magnetic but not all of them. Some magnetic metals are Iron, cobalt, nickel, stainless steel. The Earth itself has a magnetic field around it. This is because the core is partly made of molten nickel and iron.

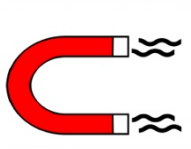


Your challenge!

Your challenge is to go and find items in your house or school that are magnetic and those that are not magnetic. Use the fridge magnet from our investigation to test each item.

In the table below write the names of the items that are magnetic in the left hand column and those that are not magnetic in the right hand column.

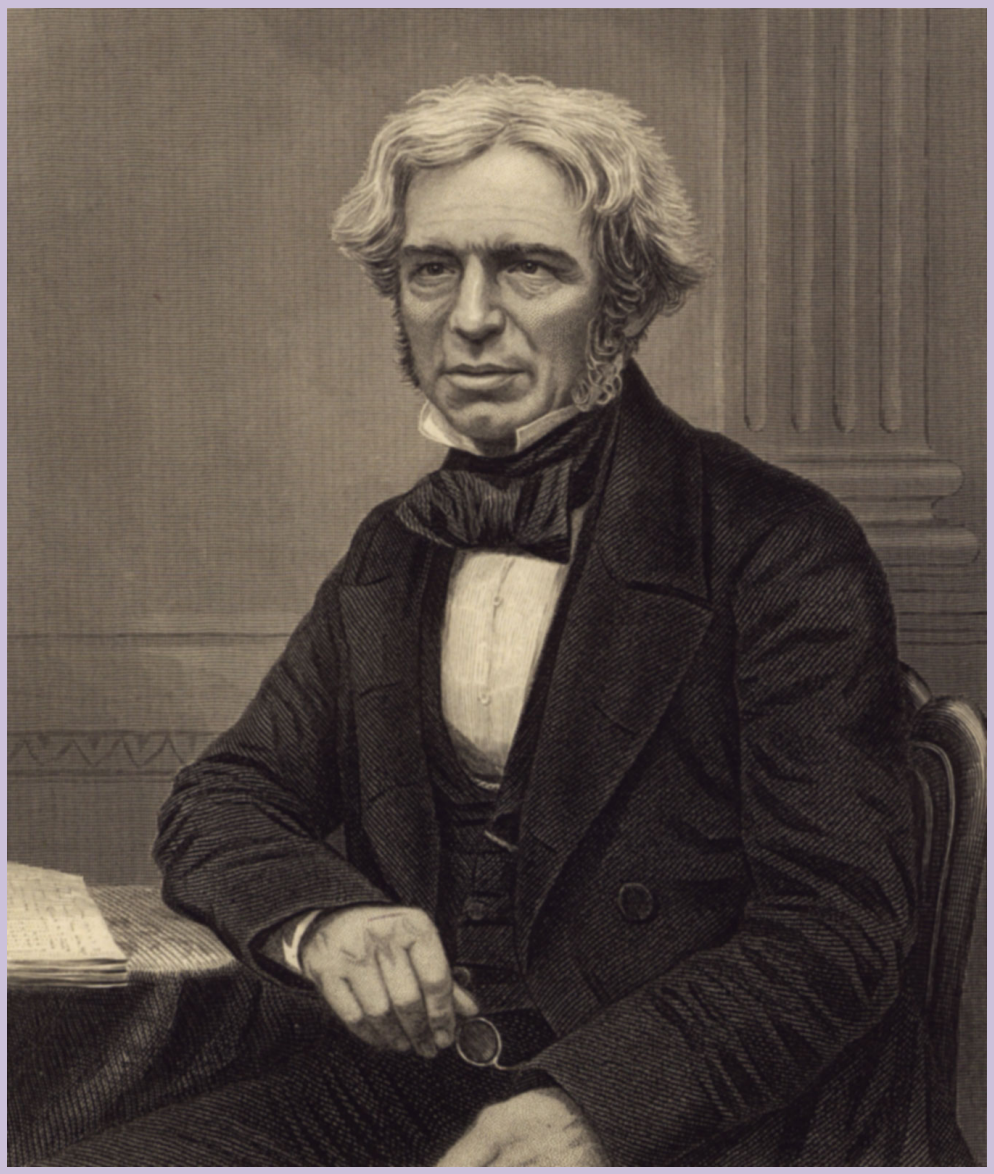
Magnetic or not!



Research opportunity

Find out whatever you can about Michael Faraday and create a fact file about him.

Where was he born?
When was he born?
Where did he study?
What important scientific knowledge did he find out and how?
What else was he famous for?



What was your score?