Let's find out about...

And

Write your name here: _____

Write your class here: _____

Write the date here: _____

Prepared by Dr Diane Aston, IOM3

The Institute of Materials, Minerals and Mining

Materials and Magnets

Hello, are you ready to learn about materials?

Today you will be working on your science topic looking at materials and magnets.

You will be learning about:

- Different groups of materials and their properties
- Where materials are used around us
- Magnets and magnetic forces
- Materials that are attracted to magnets

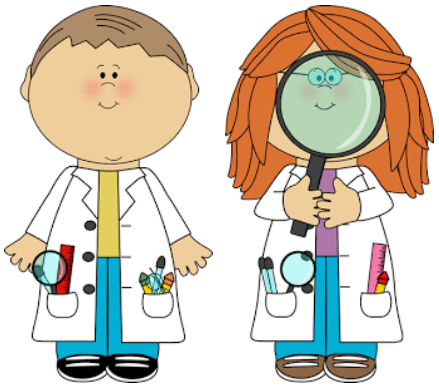
By the end of the afternoon you should be able to:

- Sort materials in to metals, plastics, ceramics and describe their simple properties
- Explain what happens when magnets are placed close to each other
- Carry out an experiment to show that not all magnets are the same
- Remember the types of materials that are attracted to magnets

You can use this workbook to write about what you have seen, record your results during the workshop and use it as a reference guide in lessons afterwards.

We will do some activities as a whole group and others in pairs but please follow these simple rules so that we can all have fun!

1. Please listen when an adult or one of your friends is talking.
2. Please walk around the classroom, there is no rush!
3. Please be careful with the samples of different materials.
4. Please put your hand up if you would like to ask a question.
5. Please be willing to get involved and have a go!



Materials

We use hundreds of different materials to make the things we use around us every day.

To make our lives a little easier we group similar materials together and within each group they have similar properties.

Can you think of three materials that might fall into each of these groups? You might be able to think of another group too.

Metals	Plastics	Ceramics
1	1	1
2	2	2
3	3	3

Wood	Fibres	
1	1	1
2	2	2
3	3	3

Properties of Materials

Properties describe the way that a material looks, feels or behaves.

Generally, the materials in each group have similar properties. For example, most metals have a high melting point and most plastics are poor conductors

Can you think of three properties for each group of materials?

Metals	Plastics	Ceramics
1	1	1
2	2	2
3	3	3

Wood	Fibres
1	1
2	2
3	3

Materials around us

Materials are used all around us and Materials Scientists and Engineers choose materials for particular applications on the basis of their properties.

Many different materials are used around the classroom, from your table to your clothes, the windows and the carpet!

Can you conduct a survey of the materials used in the classroom? You should write down the object you are looking at, the materials it is made from and the property that makes it useful for that application. The first one has been done for you as an example.

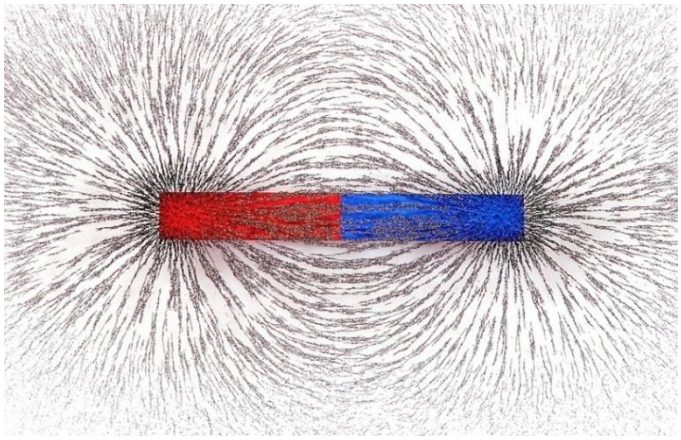
Object	Material	Property
Window	Glass	Transparent

Magnets

Magnets are special materials that produce an invisible force called a magnetic field.

We can see this field using a powder made from a material that is magnetic.

A magnetic material does not have to be touching a magnet to be attracted by the magnetic field. The further away from the magnet, the weaker the force becomes.



The parts of the magnet where the force lines are closest together and the magnetic field is the strongest are called a **poles**. We call the poles **north** and **south**.

What happens if you place like poles or opposite poles together? Can you work out what will happen in each of these cases?

Will this pair of magnets **ATTRACT** or **REPEL**

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Magnetic Strength

Out of all the materials that we know about only three metals are magnetic. They are iron, nickel and cobalt.

All magnets are based on one of these metals but by mixing them with other things we can produce magnets with different strengths. Different types of magnet are used for different things depending on how strong they need to be. Their cost also varies quite a lot!

Commonly used magnets include:

Name	Made from	Magnetic metal	Cost	Magnetic field strength
Super magnets	Neodymium iron and boron	Iron	Very expensive	Very, very strong
Rare earth magnets	Samarium cobalt	Cobalt	Expensive	Very strong
Alnico magnets	Aluminium, nickel and cobalt	Nickel and cobalt	Expensive	Strong
Ferrite magnets	Iron oxide	iron	Cheap	Weak
Bonded ferrite magnets	Iron oxide and plastic	Iron	Very cheap	Very weak

Can you work out which type of magnet would be best for these applications?

Application	Magnet type	Reason
Fridge door		
Fridge magnet		
Small motor		
Floating train		

Measuring the strength of magnets

We are going to do a simple experiment to see how strong different types of magnets are by measuring how much weight they can support.

Use the table to record our results. Don't forget to use the right units

Type of magnet	Amount of weight it could support
Super magnet	
Rare earth magnet	
Alnico magnet	
Ferrite magnet	

Use squared paper or graph paper to plot a bar chart of your results. Don't forget to label the axes. You can stick your finished graph in here.

Magnetic attraction

Not all materials are sensitive to magnetic fields.

Can you conduct a survey of objects used in the classroom using a magnetic wand? You should investigate 10 objects and record your results below.

Before you start can you predict what materials you think will stick to the magnet? Write you prediction in a sentence.

_____

_____

Object	Made from...	Stuck to magnet?

Was your prediction correct? _____

Which materials will stick to a magnet? _____

_____

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Have you finished already?

Use this space to create a poster to tell other children something about magnets. You could write about why they are useful, their properties or materials that are attracted to them.