Forces and magnets

How do magnets work?

Lesson 3: Which materials are magnetic?

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Scientific enquiry types and skills



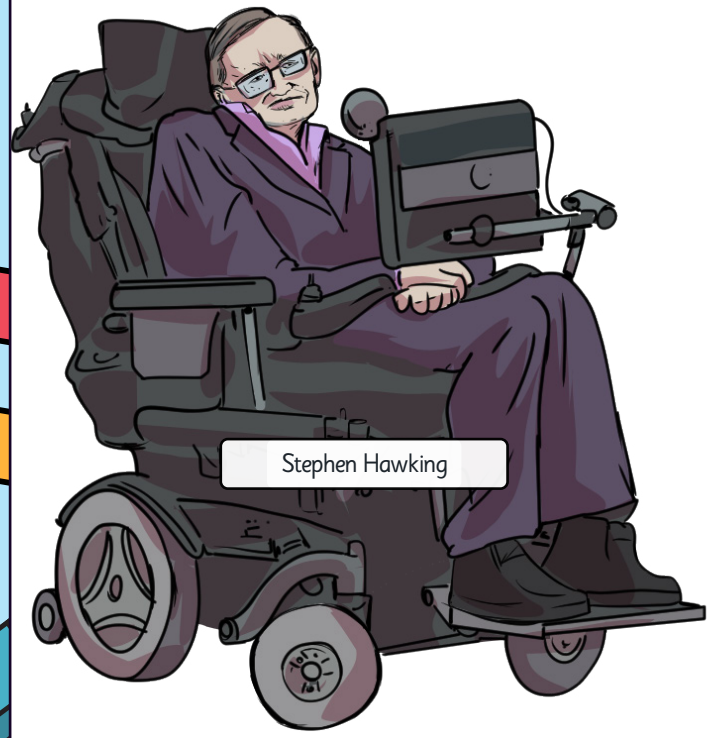
Scientific enquiry types

- Testing
- **Researching** ✓
- Observing
- Pattern seeking
- **Identifying & classifying** ✓
- Problem solving

Working scientifically skills

- Asking questions
- Making predictions
- Setting up tests
- **Observing & measuring** ✓
- **Recording data** ✓
- Interpreting & communicating results
- Evaluating

How do magnets work?



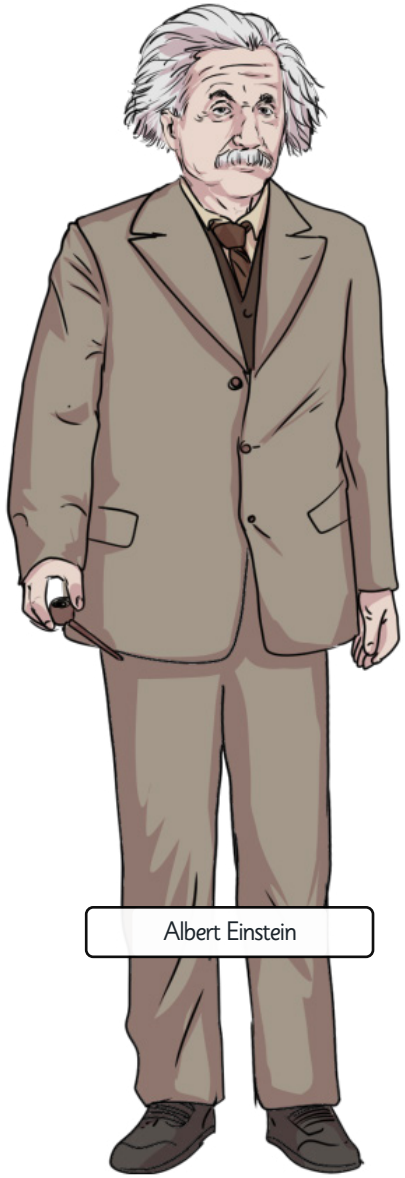
Lesson 1: What can forces do?

Lesson 2: How do surfaces affect movement?

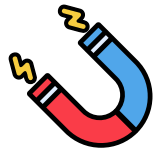
Lesson 3: Which materials are magnetic?

Lesson 4: How do magnetic forces work?

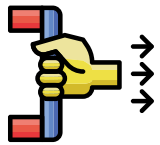
Lesson 5: Are all magnets the same?



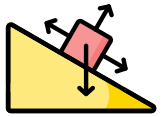
Key vocabulary for this lesson



attract – to make something move closer



pull – a force that brings an object closer



force – something that makes an object move, stop, change shape, speed or direction

Identifying and classifying



Hi, I'm Holly, a recycling coordinator!

My job is to help **sort materials**, so that we can recycle as much as possible.

I am great at **identifying and classifying** different objects to see what they are made from. I use **magnets** to help me find out which things are **magnetic**. This makes it easier to separate **magnetic items** from **non-magnetic** ones and helps us **look after our environment** by recycling the right way.

Let's watch

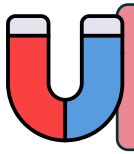


Let's watch this video and see how magnets are used in a recycling centre to sort materials.

Recycling Center - Sorting Aluminum and Steel

What do you already know about magnets?
Can you think of anything in your home or school that uses a magnet?

Discuss these questions with your **learning partner**.
Be ready to **share your ideas** with the class.



New word alert!
magnet - an object that can pull certain objects without touching them

Let's watch

answers



You might have said:

Magnets :

- stick to the fridge
- can pick up paper clips
- are used in toys
- are in my tablet/phone case to keep it closed
- are used to sort rubbish in recycling centres
- are used to hold things on the whiteboard at school

Let's watch



Now, let's watch these children using magnets in a game.

Magnetic game # easy to make# great ideas

What do you notice?

Think about how the object on the paper moves.

Are the children touching the metal disc?

Can you see how they are moving it?

Discuss these questions with your **learning partner**.
Be ready to **share your feedback** with the class.



Let's investigate



The children moved the metal disc **without touching it**. As it is moving, there must be a **force** acting on it. That force is coming from a magnet **underneath the paper**. It is **close** to the metal disc, but it **isn't touching it**.

Let's find out a little more about **how magnets work** by watching this clip and then trying it out!

Magnet & Paper clips - YouTube

You will each need a **magnet** and **metal paper clips**.

Instructions:

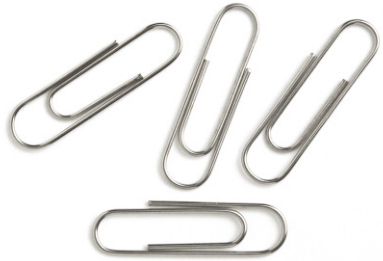
1. Place the paper clips on the desk.
2. Move the magnet slowly towards the paper clips.
3. Observe what happens.
4. Can you make the paper clips jump up in the air by holding the magnet above them?

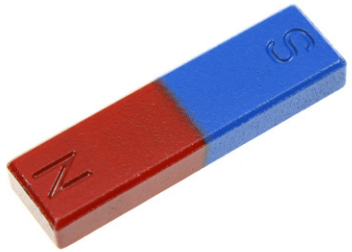
Let's investigate



Discuss these questions with your learning partner.

- What type of **force** did you notice? **Push** or **pull**?
- Did the magnet need to **touch** the paper clips **before they moved**?





Be ready to **share your ideas** with the class.

Use these sentence starters to help you:

"The paper clips moved _____ the magnet. This was a _____ force."

"The magnet _____ the paper clips when they moved."

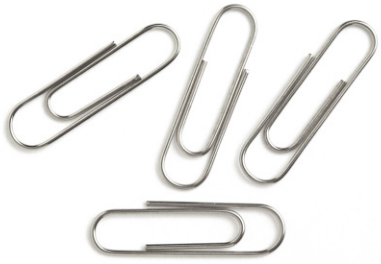
Let's investigate

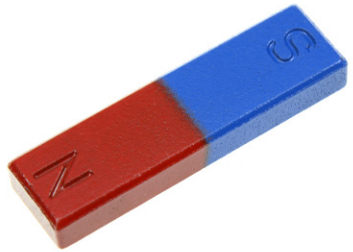
answers



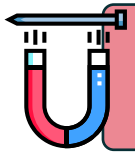
The paper clips moved **towards** the magnet. This was a **pulling force**.

The magnet **did not touch** the paper clips when they moved.





Magnets can **attract** some materials. This means there is a ***force*** which **pulls** the material or object towards the magnet. The magnet does not need to be touching the object. This is called a **non-contact *force***. Materials that are attracted to a magnet are **magnetic** materials.



New word alert!

magnetic - a material that is attracted to a magnet

Magnetic materials

Identifying & classifying



I wonder if all metals are magnetic?

I think objects that are **not metal** are **not magnetic**. How could I find out?

Which materials do you think are **magnetic**?

How could you **test** if materials are magnetic?
How could you **record** your results?

Discuss your ideas with your **learning partner**.
Be ready to ***feed back*** to the class.

Use these sentence starters to help you:

"We could test _____."

"If a material is magnetic, it will _____."

"We could record our results _____."

Magnetic materials

answers

Identifying & classifying



We could test different materials to see if they are attracted to a magnet.

If a material is magnetic, it will be attracted to the magnet.

We could record our results in a table or sort the objects into groups.

Before we test, we must make a **prediction**. This is what I think will happen:

I think the objects that are made from **metal** will be **attracted** to the **magnet** because the paper clips were attracted to the magnet. I think objects that are **not made from metal** will **not be attracted** to the magnet.

What do you predict will happen? Share your prediction with your learning partner.

Investigation

Identifying & classifying

Observing & measuring

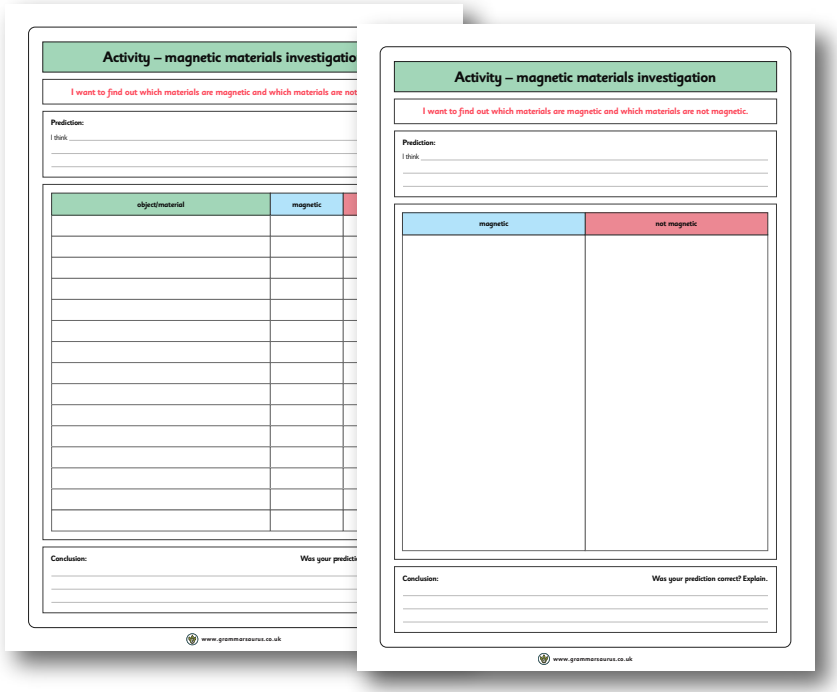
Recording data

You are going to investigate which materials are **magnetic** and which are **not**. Your teacher may give you some objects or materials to test. You could also test objects around your classroom.

First you need to **make a prediction** about what you think will happen on **your activity worksheet**.

Then you can begin **testing** and **recording** your results.





Results



Identifying & classifying

Now I have completed my investigation, I can look back at my prediction.
I can see that my prediction was **partly correct**. I have some metal objects that are **magnetic**, but I also have some metal objects that are not magnetic.

What did your results show?

magnetic	not magnetic
	

Discuss your results with your learning partner or table group.
Be ready to ***feed back*** to the class.

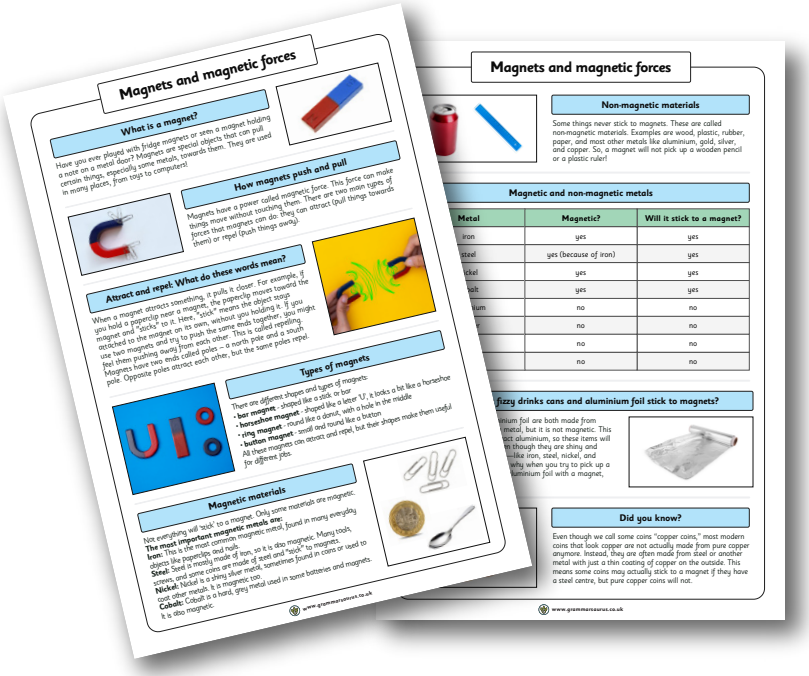
Researching

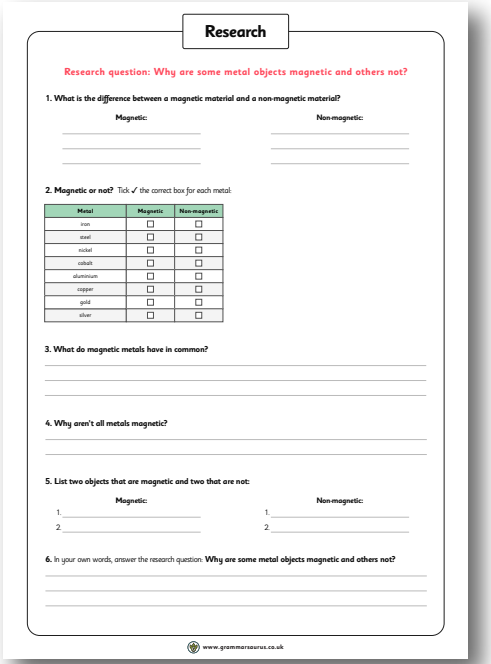


Why are some metal objects magnetic and others are not?

Use the **research worksheet** to help you find the answer to the question.

You could use the **internet** or **books** to research this question, or you can find the answer on the **magnets information sheet**.





Researching

answers



Magnets help me in the recycling centre to sort the magnetic materials.

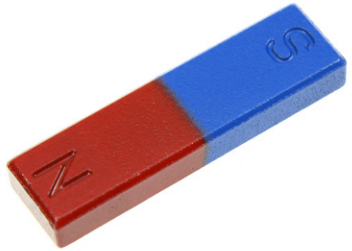
Today, we found out that **magnetic** materials are **always metals**, but **only a few metals are magnetic**!

Iron is magnetic, so any metal with iron in it will be **attracted to a magnet**. **Steel contains iron**, so a **steel paper clip**, for example, will be **attracted to a magnet**.

Most other metals such as **aluminium**, **copper** and **gold**, are **NOT magnetic** which is why the aluminium drinks can **WAS NOT** attracted to the magnet.











Challenge

Discuss the following question with your learning partner.

You are at the beach. You lose your ring and some money in the sand.
You have a magnet with you.
Do you think using the magnet will help you find your lost items?
Why or why not? Explain your answer.



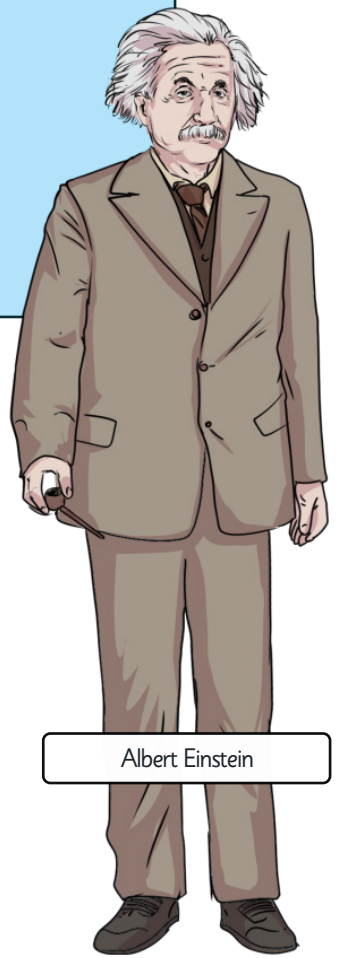
Be ready to **share your ideas** with the class.

Use these sentence starters to help you:

"I think the magnet will/won't help because…"

"The ring/money is made of… so…"

"Magnets only attract certain materials, so…"



Challenge answers

Some possible answers:

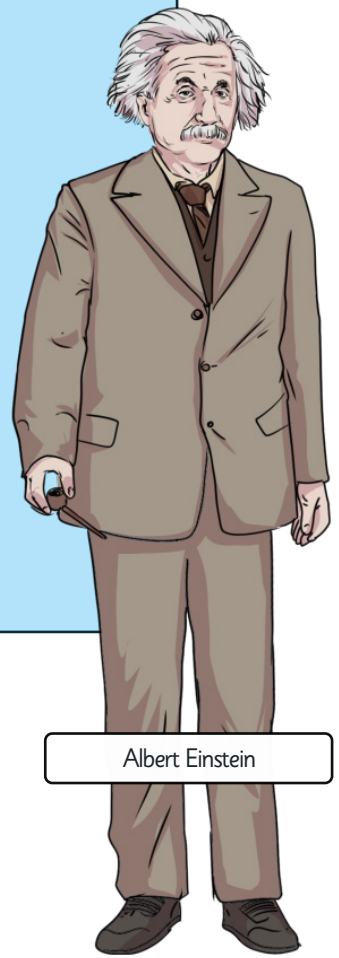
I think the magnet will help because most coins are made from metals that are attracted to a magnet.

The ring may be made of metal, but I know that magnets only attract certain metals like iron or steel. So, if the ring is made from gold, silver or copper, the magnet won't pick it up.

Magnets only attract certain materials, so if my ring and money are made from magnetic metals, the magnet will help me find them.



Stephen Hawking



Albert Einstein