

## What are forces?

Forces are **pushes** and **pulls**.

These **forces** change the **motion** of an object. They will make it start to move or speed up, slow it down or even make it stop.

*For example, when a cyclist **pushes** down on the pedals of a bike, it begins to move. The harder the cyclist pedals, the faster the bike moves. When the cyclist **pulls** the brakes, the bike slows down and eventually stops.*

## How do different surfaces affect the motion of an object?

Forces act in opposite directions to each other. When an object moves across a surface, friction acts as an opposite force.

Friction is a force that holds back the motion of an object.

Some surfaces create more friction than others which means that objects move across them slower.

On a ramp, the force that causes the object to move downwards is gravity.

Objects move differently depending on the surface of the object itself and the surface of the ramp



## How can forces be measured?

We measure forces in **Newtons** (N) using a Newton meter. A Newton meter is sometimes called a Force meter.



Newton Meters



## Gravity

The force that pulls things to the ground on Earth (and other planets) is called **gravity**.

Gravity also holds Earth and the other planets in their orbits around the Sun.

The force of gravity also exists on the Moon but it is not as strong as it is on Earth. This is because the Moon is much smaller than our planet.



Astronaut dealing with a lack of gravity

## Key Vocab

<b>Force</b>	The scientific word for the pulling and pushing effect
<b>Friction</b>	The force that makes it difficult for things to move when they touch each other.
<b>Motion</b>	Moving from one place to another
<b>Accelerate</b>	Speeding up
<b>Decelerate</b>	Slowing down
<b>Balanced force</b>	When two forces are equal and there is no motion
<b>Magnet</b>	A piece of iron or other material which attracts some metals towards it
<b>magnetic</b>	Something that acts like a magnet
<b>Pole</b>	North and South ends of a magnet
<b>Attract</b>	The force of one object pulling another object towards it
<b>Repel</b>	The force of one object pushing another object away from it
<b>Magnetic field</b>	The area around a magnet where the magnetic forces work

## Magnetic forces

Magnets produce an area of force around them called a **magnetic field**.



When objects enter this **magnetic field**, they will be **attracted** to or **repelled** from the magnet if they are magnetic.

**When two magnets are close, they create pushing or pulling forces on one another.**

These forces are strongest at the ends of the magnets. The two ends of a magnet are known as the north pole and the south pole.

**Same poles repel**

If you try to put two magnets together with the same poles pointing towards one another, the magnets will push away from each other. We say they **repel** each other.

**Different poles attract**

If you put two magnets together with different poles pointing towards one another, the magnets will pull towards each other. We say they **attract** each other.



## Magnets



All magnets are made of a group of metals called the ferromagnetic metals. These are metals such as **nickel** and **iron**.

## Earth's Magnetic Field

Earth's **magnetic field** acts like an invisible shield around Earth that protects it from dangerous things, like radiation from the sun.

You might say it's Earth's super power. It's also called a magnetosphere, the most remote part of a planet's atmosphere. Earth's magnetic field's power begins at Earth's core.



## Magnetic Materials

Magnetic materials are always made of metal, but not all metals are magnetic.

Magnetic	Non-Magnetic
Iron Steel Nickel	Aluminium Copper Gold Silver
	These are the only metals that are not magnetic

All magnets have two poles - a South pole and a North pole. You can see them marked on these pictures.