



How Magnets Attract and Repel Each Other

KS4 PHYSICS

Ages 11-15 ⌚ 3 min read

What Makes a Magnet Work?

A **magnet** is an object that creates an invisible force around itself. This force can push or pull other magnetic objects without even touching them. This might seem like magic, but it's actually **physics**—and there's a clear reason it happens.

Inside every **atom** are tiny particles called **electrons**. These electrons are always moving, and as they move, they create something special: a **magnetic field**. In most materials, these magnetic fields point in random directions and cancel each other out. But in **magnetic materials** like **iron**, **nickel**, and **cobalt**, something different happens—the electrons' movements all line up in the same direction, creating one powerful combined field.

Think of it like a classroom where everyone whispers in different directions—you hear nothing. But when everyone faces the same way and speaks together, the noise becomes loud and clear.

North Poles and South Poles

Every magnet has two ends called **poles**. One is the **North Pole** and one is the **South Pole**. These names come from the fact that Earth itself is a giant magnet.

Here's the golden rule: **opposite poles attract**, and **like poles repel**. A North Pole will pull toward a South Pole, but two North Poles will push away from each other. The same happens with two South Poles.

Think of it like friends—best friends (opposite poles) want to sit together, but rivals (like poles) stay far apart and push each other away.

The Magnetic Field in Action

The space around a magnet where you can feel its force is called a **magnetic field**. This field is invisible, but you can see its pattern using **iron filings**—tiny bits of iron

that line up along the field's invisible lines. The field is strongest at the poles and grows weaker the farther you move away.

This is why **electromagnets**—magnets powered by **electricity**—are so useful. They work by running electrical current through a coil of wire, which creates a magnetic field. The stronger the electricity, the stronger the magnet. This is how **MRI machines** in hospitals work, and how **electric motors** in toys, cars, and machines function.

Think of it like turning up the volume on a speaker—more electricity means a stronger magnetic push or pull.

Why Does This Matter?

Understanding magnets helps us use them in thousands of ways. From **speakers** and **hard drives** to **power plants** and **transportation systems**, magnets are hidden heroes of modern life. By understanding how they attract and repel, scientists can design better technology and solve bigger problems.