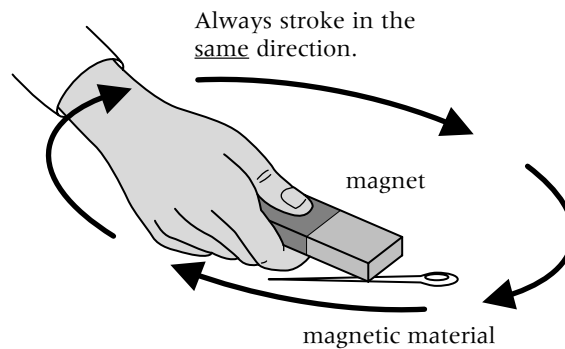


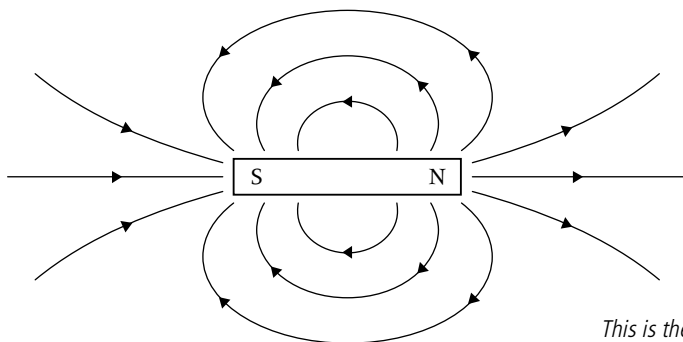
## Magnets and electromagnets

**Magnetism** is a non-contact force. Magnets attract magnetic materials. Iron, nickel and cobalt are **magnetic materials**. Mixtures, like steel, that include a magnetic material will also be attracted to a magnet. Other metals, like aluminium, are not magnetic and will not be attracted to a magnet. Iron oxide is a compound that is a magnetic material. It is used to make video and music cassettes and computer discs. Magnetic materials can also block magnetism.

You can make a magnet from a piece of iron or steel.



- The two ends of a bar magnet are called the **north seeking pole** and the **south seeking pole** or north pole and south pole for short.
- A north pole and a south pole **attract** each other.
- Two north poles or two south poles will **repel** each other.
- The space around a magnet where it has an effect is called its **magnetic field**.



*This is the shape of the magnetic field of a bar magnet.*

You can find the shape of the magnetic field using iron filings or using a plotting compass.

The Earth has a magnetic field. A **compass** is a small magnet that always points north. But magnetic materials placed near a compass can change the direction that it points.

Magnets can be used to sort iron and aluminium cans for recycling. Only the iron cans are attracted to the magnet. Magnets can also be used for holding fridge doors shut, and in compasses that sailors or walkers use.

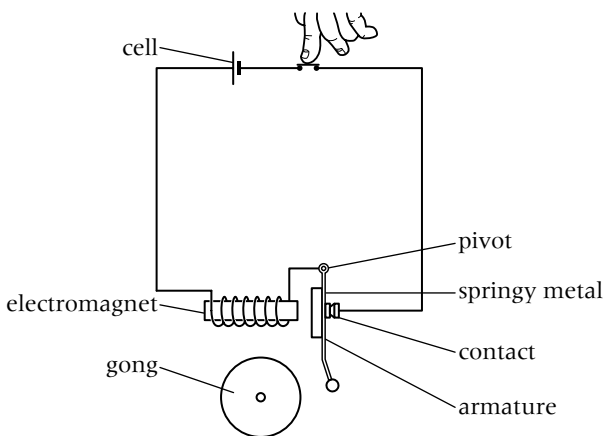
A wire with electricity flowing through it has a magnetic field around it. An **electromagnet** is a coil of wire with an electric current flowing through it.

You can make an electromagnet stronger by:

- increasing the number of coils of wire
- increasing the size of the current (by increasing the voltage)
- using an iron core.

Electromagnets can be used for lifting things. They are also used in electric bells, relays and in video and music recording.

Electromagnets are used to make bells work.



A **reed switch** has two thin pieces of iron inside it. If a magnet is held near the switch, the pieces of iron are magnetised and touch each other. A reed switch can also be switched on using an electromagnet. Any switch that is worked by electricity is called a **relay**.

Relays are used to make things safer. For example, the starter motor in a car uses a high current and needs thick wires for the current to flow through. A relay is used in a car so that the driver does not have to touch any part of the circuit that has a high current.

