**Notes on Electromagnets**

The magnetic field around a [straight wire](http://www.gcsescience.com/pme4.htm) is not very strong.
A strong field can be made by coiling the wire around a piece of soft iron.
This electromagnet is sometimes called a solenoid. The shape of the magnetic field is the same as a [bar magnet](http://www.gcsescience.com/pme1.htm).



The soft iron inside the coil makes the magnetic field stronger because it becomes a magnet itself when the current is flowing. Soft [iron](http://www.gcsescience.com/pme1.htm) is used because it loses its magnetism as soon as the current stops flowing.
Soft iron is said to form a temporary magnet. In this way, the electromagnet can be switched on and off by turning the electricity on and off.

[Steel](http://www.gcsescience.com/pme1.htm) forms a permanent magnet. If steel was used inside the coil, it would continue
as a magnet after the electricity was switched off. It would not be useful as an electromagnet. Permanent magnets are needed for
[electric motors](http://www.gcsescience.com/pme12.htm), [generators](http://www.gcsescience.com/pme17.htm), [loudspeakers](http://www.gcsescience.com/pme14.htm) and [microphones](http://www.gcsescience.com/pme22.htm).

The strength of the magnetic field around the coil can be increased by

1.  Using a soft iron core (core means middle bit).

2.  Using more turns of wire on the coil.

3.  Using a bigger current.

Reversing the direction of the current will reverse the magnetic field direction.  produces a constantly [changing magnetic field](http://www.gcsescience.com/pme15.htm).

An electromagnet is used in the [electric bell](http://www.gcsescience.com/pme6.htm), [relay](http://www.gcsescience.com/pme7.htm),
[circuit breaker](http://www.gcsescience.com/pme8.htm), [loudspeaker](http://www.gcsescience.com/pme14.htm) and [microphone](http://www.gcsescience.com/pme22.htm).