Electricity & Magnetism

Magnetic Train

Background

A current-carrying conductor experiences a force in a magnetic field.

You will need...

- ✓ 22 gauge bare copper wire,
- ✓ 15 mm × 4 mm neodymium magnets,
- ✓ 1.5V AA battery.

Follow these steps

1. Wind the copper wire around a metal pipe or plastic tube so that the diameter of the coil is only slightly bigger than the diameter of the battery.
2. Attach a neodymium magnet to each end of the battery so that the same poles are facing each other.
3. Place the battery with magnets inside the copper wire and let go.

So what happened?

When the battery is placed inside the copper coil it completes a circuit and current flows through a section of the coil. A magnetic field is produced in that section of the coil which interacts with the magnetic field of the neodymium magnets This creates a force which causes the battery to move through the copper wire.

If your battery does not move turn it the other way around.

The direction of the current flowing through the coil will create a north pole (anti-clockwise current) or a south pole (clockwise current) hence the battery needs to be facing the correct direction.

Note: In this demonstration a large current is drawn from the battery.

What next?

1. Try with south and north pole facing each other.
2. Try with south and south pole facing each other.
3. Join the ends of the bare copper coil together to form a circle and watch your ‘train’ continue to move in a circle.