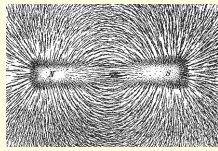
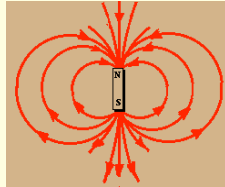
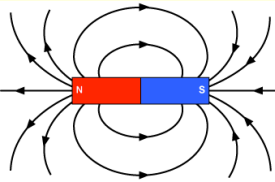


Magnetism

Magnetism: refers to the properties and interactions of magnets.

- A magnet is surrounded by a magnetic field.
- All magnets have a north and a south pole.
- Two magnets can either attract or repel each other.



Magnetic Domains

In iron, cobalt, nickel, and some other magnetic materials, the magnetic field created by each atom exerts a force on the other nearby atoms.

Because of these forces, large groups of atoms align their magnetic poles so that they are in the same direction. The groups of atoms with aligned magnetic poles are called **magnetic domains**.



Domains Before Magnetization



Domains After Magnetization

You can create a **temporary magnet** by rubbing a nail or paper clip with a magnet. This aligns the magnetic domains in the nail causing it to be magnetic temporarily before returning to the random arrangement.

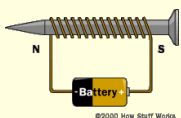
What is an electromagnet?

Electromagnet - a magnet made from a **current bearing coil** of wire wrapped around an **iron or steel core**.

Current is stronger flowing through a loop than a straight wire. A single wire wrapped into a cylindrical wire coil is called a **solenoid**.

Properties of Electromagnets

- * they are temporary
- * their strength can be increased with more coils
- * their properties can be changed by changing the current
- * they can be turned on and off

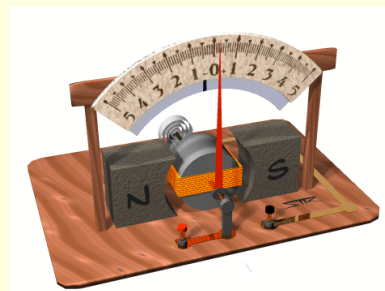


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What is a galvanometer?

A **galvanometer** is an electromagnet that interacts with a permanent magnet. The stronger the electric current passing through the electromagnet, the more it interacts with the permanent magnet.



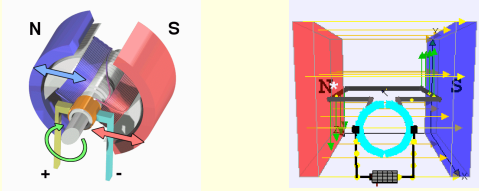
The galvanometer includes a permanent magnet, an electromagnet that rotates against a spring, and a scale that measures current.

Galvanometers are used as gauges in cars and many other applications.

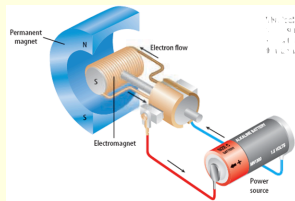
The greater the current passing through the wires, the stronger the galvanometer interacts with the permanent magnet.

What are electric motors?

An electric motor is a device which changes electrical energy into mechanical energy.



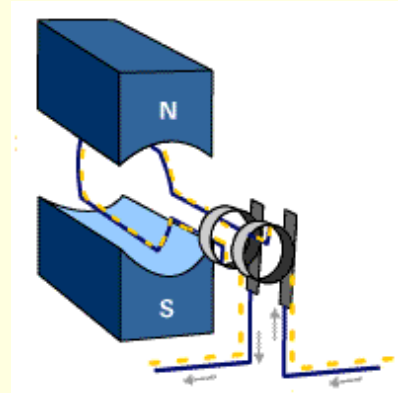
A basic electric motor has a power supply, a permanent magnet, and an electromagnet that can rotate.



Electromagnetic Induction

Moving a loop of wire through a magnetic field produces electric current. This is electromagnetic induction.

A Generator is used to convert mechanical energy into electrical energy by electromagnetic induction.



Direct current versus Alternating current

Direct current is electrical current which comes from a battery which supplies a constant flow of electricity in one direction.

Alternating current is electrical current which comes from a generator. As the electromagnet is rotated in the permanent magnet the direction of the current **alternates** once for every revolution.