

Solenoids – physics coursework

[Science](#), [Physics](#)



Solenoids

Permanent Magnet- Magnetic Field.

<http://www.diracdelta.co.uk/science/source/m/a/magnetic%20field/source.html> Magnets have two poles called North and South.

Similar (like) magnetic poles repel. Unlike magnetic poles attract. A magnet attracts a piece of iron. The most important of the two properties of attraction and repulsion is repulsion. The only way to tell if an object is magnetised is to see if it repels another magnetised object. The strength and direction of a magnetic field is represented by magnetic field lines. Field lines by convention go from North to South. A magnetic field is three-dimensional, although this is not often seen on a drawing of magnetic field lines.

Electromagnets

A magnetic field exists around all wires carrying a current. When there is no current the compass needles in the diagram shown line up with the Earth's magnetic field. A current through the wire produces a circular magnetic field. See what happens when there is a current in the wire. The magnetic field for a coil of wire is shown below. The magnetic fields from each of the turns in the coil add together, so the total magnetic field is much stronger. This produces a field which is similar to that of a bar magnet. A coil of wire like this is often called a solenoid.

http://www.bbc.co.uk/bitesize/standard/physics/using_electricity/movement_from_electricity/revision/1/slideshow-1/2/

<https://assignbuster.com/solenoids-physics-coursework/>

An electromagnet consists of a coil of wire, through which a current can be passed, wrapped around a soft iron core. This core of magnetic material increases the strength of the field due to the coil. 'Soft' iron is easily magnetised, and easy to demagnetise- it does not retain its magnetism after the current is switched off. Steel, on the other hand, is hard to magnetise and demagnetise, and so it retains its magnetism. It is used for permanent magnets. The strength of an electromagnet depends on:

The size of the current flowing through the coil

The number of turns in the coil

The material inside of the coil

Heinmann physics

Domains - <http://hyperphysics.phy-astr.gsu.edu/hbase/solids/ferro.html#c4>

Ferromagnetic materials exhibit a long-range ordering phenomenon at the atomic level which causes the unpaired electron spins to line up parallel with each other in a region called a domain. Within the domain, the magnetic field is intense, but in a bulk sample the material will usually be unmagnetized because the many domains will themselves be randomly oriented with respect to one another. The main implication of the domains is that there is already a high degree of magnetization in ferromagnetic materials within individual domains, but that in the absence of external magnetic fields those domains are randomly oriented. A modest applied magnetic field can cause a larger degree of alignment of the magnetic moments with the external field, giving a large multiplication of the applied field.

Ferromagnetism

<https://assignbuster.com/solenoids-physics-coursework/>

Iron, nickel, cobalt and some of the rare earths (gadolinium, dysprosium) exhibit a unique magnetic behavior which is called ferromagnetism because iron (ferrum in Latin) is the most common and most dramatic example.