**Year 8 Physics Revision: Magnetism**

The first section of this topic is about magnetism and magnetic fields. We explain how magnetism results from the arrangement of groups of atoms in magnetic materials. We describe how an electromagnet can be formed, and how it can be used. Amongst the most important uses of electromagnetism are electric motors and generators.

The second section of the topic looks at electric power generation, comparing the advantages and disadvantages of the most important methods.

**Magnetism and magnetic fields (pages 102 - 105 & 108 - 109)**

Some \_ materials \_, such as iron, nickel and cobalt are \_ magnetic \_ materials. When they are placed close to a magnet they are \_attracted\_ to it. When two magnets are placed close together they will either \_attract\_ or \_\_repel\_\_ each other.

The space around a magnet in which it has an effect is called its magnetic \_ field \_. The effect of a magnet surrounds a magnet in all directions, but it becomes \_ weaker \_ as you move further away. The places where the effect of the magnet is strongest are called the \_poles\_.

The \_\_shape\_\_ of a magnetic field can be found by covering the magnet with a piece of paper and sprinkling with \_iron\_\_ \_\_filings\_\_.

The \_ direction \_ of a magnetic field can be found using a \_ plotting \_ \_\_ compass \_, which will always point away from the \_south\_ and \_towards\_ the \_\_north\_ pole.

Magnets which keep their magnetism for a long period are called \_permanent\_ magnets. They are often made from \_ hard \_ magnetic materials like steel, which is hard to magnetise but it keeps its magnetism for longer.

\_\_Iron\_\_ is a soft magnetic material. It is easier to magnetise as its domains are more easily aligned but also loses its magnetism more easily.

In the spaces below, list 3 ways of making a permanent magnet: (these all ***align*** the magnetic domains)

1.\_\_stroke a magnetic material with a permanent magnet in the ***same*** direction\_\_

2.\_\_ place a magnetic material in the magnetic field of a permanent magnet\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

3.\_\_\_ place a magnetic material in a coil of wire (solenoid) with a direct current (DC) in it\_\_\_\_

4. \_\_ place a steel bar in a magnetic field, heat it and hammer it as it cools \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Now list 3 ways in which magnetism can be removed: (these all ***disrupt*** the magnetic domains)

1.\_\_drop or hammer it\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2.\_\_heat it strongly\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

3.\_\_stroking it with another magnet in a ***random*** direction \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Carefully read the section on ‘Explaining magnetism’ (pages 108 – 109 in your textbook) and make sure that you can answer questions 3 – 5, to explain about magnetic domains.

**The Earth’s magnetic field (pages 106 – 107)**

The Earth’s magnetic field is important to life on Earth because it protects us from \_\_cosmic \_\_ rays and \_the solar\_ wind.

The Earth behaves like a giant permanent magnet. We can show that the ***geographic*** North pole behaves as a ***magnetic*** south pole because:

\_\_\_\_it attracts the north (seeking) pole of a compass needle \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Electromagnetism, motors and generators (pages 110 -116)**

Passing an electric current through a wire creates a magnetic field around it. The field can be made stronger by:

1.\_\_coiling up the wire \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2.\_\_increasing the current \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

3.\_\_increasing the number of coils of wire \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

4. \_ add an iron core to the centre of the wire \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Electromagnets have many important uses because, unlike permanent magnets, their effects can be switched on and off when necessary. Read pages 112 and 113 to make sure that you understand the workings of lifting magnets, electric bells, relays and circuit breakers.

The motor effect and the generator effect are described on pages 114 – 115. Read this section and fill in the following:

The motor effect can be increased by:

1.\_\_coiling up the straight wire \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2.\_\_increasing the current \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

3.\_\_increasing the number of coils of wire \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

4.\_\_increasing the strength of the magnetic field (using a stronger magnet) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

The generator effect can be increased by:

1.\_\_\_moving the magnet faster\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2.\_\_\_ increasing the number of coils of wire \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

3.\_\_\_ increasing the strength of the magnetic field (using a stronger magnet) \_\_\_\_\_\_\_\_\_\_\_\_

**Important methods of electrical power generation (pages 118 – 125)**

Most of the electrical energy we use is generated in power stations which burn fossil fuels. However using this method has many disadvantages:

1.\_\_it release carbon dioxide which is a ‘greenhouse gas’ and contributes to global warming\_\_

2.\_\_it release sulphur dioxide which causes acid rain \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

3.\_\_it is not very efficient and transporting all the fuel required cause pollution \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

4.\_it releases a lot of heat energy so large quantities of water are used in cooling \_\_\_\_\_\_\_\_\_\_\_\_

5.\_\_burning coal releases large quantities of ash (‘fly ash’)\_\_\_\_\_\_\_\_\_\_

Nuclear power is used to generate about 5% of the world’s electricity supply. Complete the table below:

|  |  |
| --- | --- |
| **Advantages of nuclear power** | **Disadvantages of nuclear power** |
| Small amounts of nuclear fuel, such as \_\_uranium\_ generate large amounts of energy | It is non-renewable as uranium must be mined |
| It lasts a long time | \_nuclear\_\_ \_radiation\_\_ can cause cancer and death |
| It produces electricity very efficiently | The technology required is expensive |
| It does not contribute to global warming or release polluting gases when functioning properly | \_De-commissioning\_ is an expensive and dangerous process |

To make our fossil fuels last longer and to reduce pollution we need to find other ways to produce the energy that we need. Renewable energy resources are energy resources which will not run out. Renewable resources which are widely used are:

1.\_water (hydro-electric power / HEP)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2.\_wave power \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

3.\_wind power \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

4.\_tidal energy\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

5.\_solar energy \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

6.\_geothermal energy (using heat from below the Earth) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

7.\_biofuels (burning plants eg wood etc) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_