Edexcel IGCSE Physics

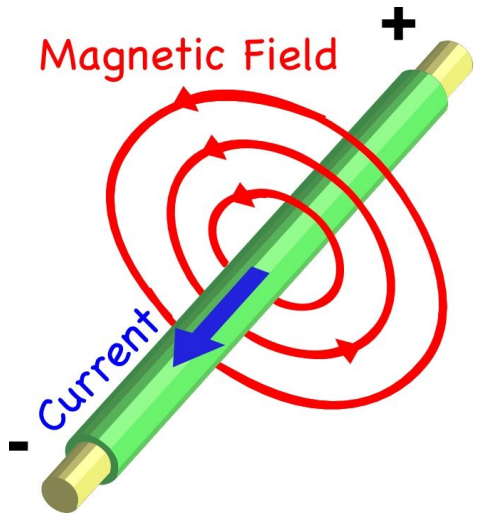
6 - Magnetism and Electromagnetism (Physics Only)

Flashcards

What is the shape of the magnetic field created around a straight wire when a current is running through?

What is the shape of the magnetic field created around a straight wire when a current is running through?

It is circular.



What rule can you use to determine the direction of a current or magnetic field around a wire?

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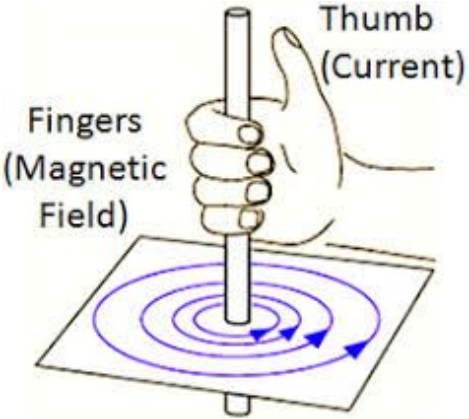
The right hand grip rule.

- The thumb shows the direction of current
- The fist represents the direction of the magnetic field.



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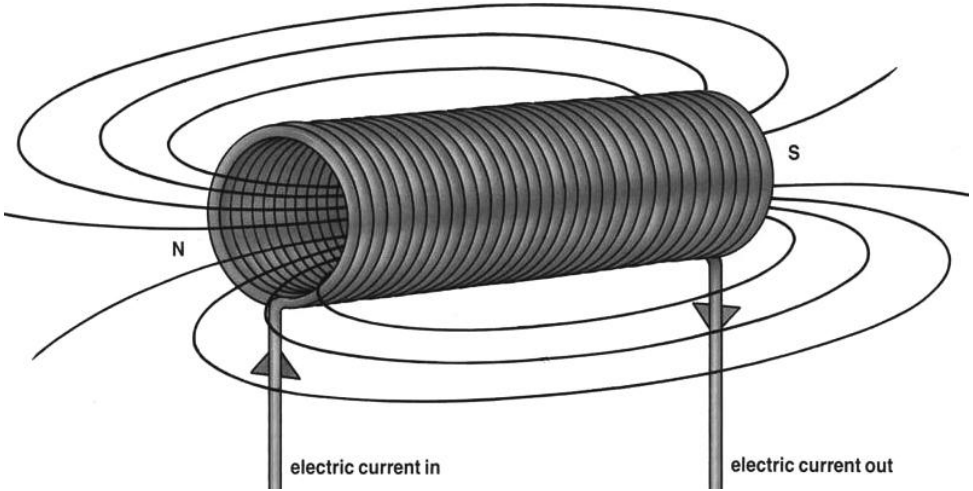
What is a solenoid?

What is a solenoid?

A coil of wire which turns into an electromagnet when there is a current flowing through it.



How can you make a magnetic field in a solenoid stronger

- Increase the current
- Use more turns of wire
- Use an iron core

What is a transformer?

What is a transformer?

A device which consists of a primary and secondary coil, which both surround an iron core. A transformer changes the size of an alternating voltage.

In a transformer, how does an alternating current in one circuit cause an alternating current in the other?

In a transformer, how does an alternating current in one circuit cause an alternating current in the other?

- The two coils of wire are placed by an iron core
- One of the coils produces a changing magnetic field when an a.c. current is passed through it
- This field can be carried to the second coil through the iron core
- The iron core can increase the strength of the field, causing the magnetic field to pass through the other coil
- The magnetic field then causes a current in the next coil

On a step-down transformer, does the secondary coil have more or less turns?

On a step-down transformer, does the secondary coil have more or less turns?

The secondary coil has fewer turns.

What is an advantage of a step down transformer in the national grid?

What is an advantage of a step down transformer in the national grid?

It means that the voltage can be reduced to a value safe enough to be used in houses.

Why is it important to have step up transformers in the national grid?

Why is it important to have step up transformers in the national grid?

It can increase efficiency as it decreases the heat loss in transmission lines. This is because, for the same power, a higher voltage will lead to a lower current ($P=VxI$). The lower the current, the less energy that is lost since since $P=I^2R$.

How does a step up transformer work?

How does a step up transformer work?

- The primary coil has fewer turns than the secondary
- An a.c. current is connected to the primary coil
- This produces a magnetic field.
- The iron core causes that magnetic field to pass through the secondary coil
- The magnetic field induces a current in the secondary coil, but as it has more turns in the coil, the voltage will be higher

State an equation linking primary voltage, secondary voltage, number of turns in primary coil, number of turns in secondary coil

What equation can you use to determine the voltage/number of turns on primary and secondary coils?

$$\frac{N_p}{N_s} = \frac{V_p}{V_s}$$

$$\frac{primary\,turn\,number}{secondary\,turn\,number} = \frac{primary\,voltage}{secondary\,voltage}$$

Where are step-up and step-down transformers used in the national grid?

Where are step-up and step-down transformers used in the national grid?

Step-up transformers are used at power stations, whilst step-down transformers are used locally.

State the power equation for transformers with a 100% efficiency (using voltage and current).

State the power equation for transformers with a 100% efficiency (using voltage and current).

$$I_1V_1 = I_2V_2$$

$$P_1 = P_2$$

What are some advantages of transmitting power in high voltage cables?

What are some advantages of transmitting power in high voltage cables?

High voltage cables lead to a lower current in the wires, reducing any energy lost to the environment via heating, and increasing the efficiency since $P=I^2R$.