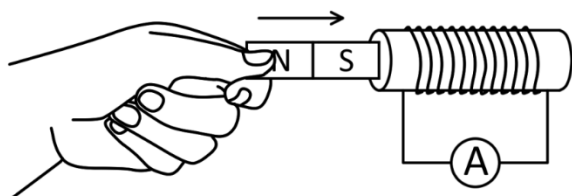


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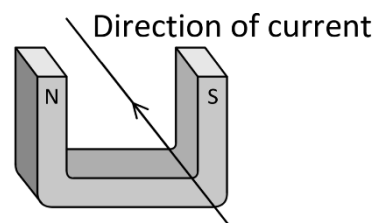
A student inserts a magnet into a coil of wire.



What is induced across the ends of the coil of wire?

Potential difference

A wire is placed between the poles of a magnet, perpendicular to the magnetic field lines.



Which direction will the wire move when a current flows?

Down

The table below gives some information about an electric kettle.

Energy transferred to the kettle	525 000 J
Mass of water	1.2 kg
Starting temperature of water	25 °C
Final temperature of water	100 °C
Specific heat capacity of water	4200 J / kg °C

- i. Calculate the efficiency of the kettle described in the table above.
Give your answer as a percentage.

change in thermal energy = mass × specific heat capacity × change in temperature

$$\text{change in thermal energy} = 1.2 \times 4200 \times 75$$

$$\text{change in thermal energy} = 378\,000 \text{ (J)}$$

Efficiency = useful output energy transfer ÷ input energy transfer

$$\text{Efficiency} = 378\,000 / 525\,000$$

$$\text{Efficiency} = 0.72$$

$$\text{Efficiency} = 72 \%$$

$$\text{Efficiency} = \mathbf{72 \%$$

- ii. The water can also be heated using a 12 V heater. A transformer is used to change a 120 V supply into 12 V. The current in the secondary coil is 9.0 A.
Calculate the current in the primary coil.

$$I_p = I_s \times V_s \div V_p$$

$$I_p = 12 \times 9.0 \div 120$$

$$I_p = 0.9 \text{ A}$$

$$\text{Current in the primary coil} = \mathbf{0.9 \text{ A}}$$