



# **A Level Physics A**

**H556/02** Exploring physics

## **Question Set 9**

- 1 (a)\* A student conducts an experiment to confirm that the uniform magnetic flux density  $B$  between the poles of a magnet is 30 mT.

A current-carrying wire of length 5.0 cm is placed perpendicular to the magnetic field.

The current  $I$  in the wire is changed and the force  $F$  experienced by the wire is measured. Fig. 22.1 shows the graph plotted by the student.

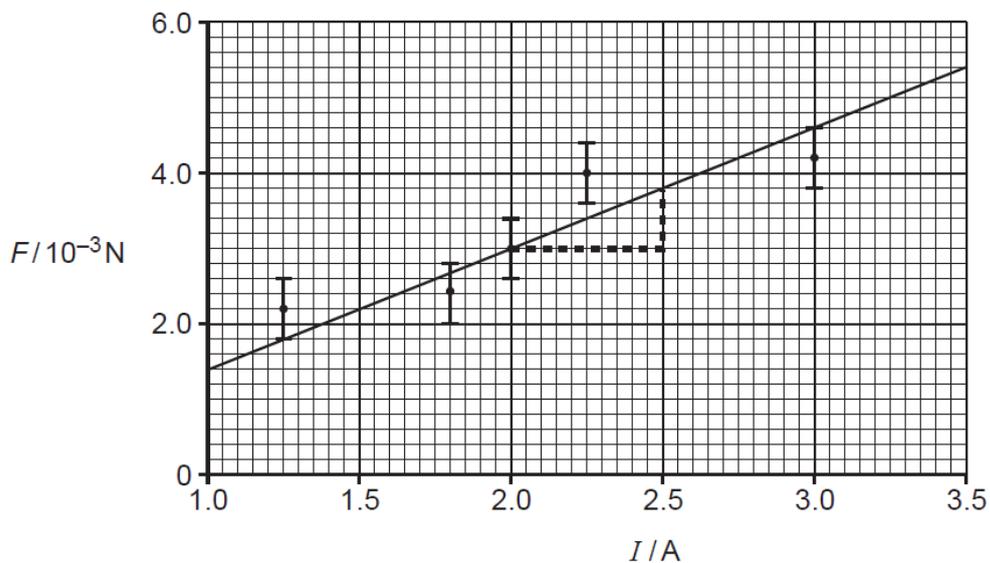


Fig. 22.1

The student's analysis is shown on the graph of Fig. 22.1 and in the space below.

$F = BIL$

$$\text{gradient} = BL = \frac{(3.8 - 3.0) \times 10^{-3}}{2.5 - 2.0} = 0.0016$$

$$B = \frac{0.0016}{0.05} = 0.032 \text{ T} = 32 \text{ mT}$$

This is just 2 mT out from the 30 mT value given by the manufacturer, so the experiment is very accurate.

Evaluate the information from Fig. 22.1 and the analysis of the data from the experiment. No further calculations are necessary.

(b) Fig. 22.2 shows a transformer circuit.

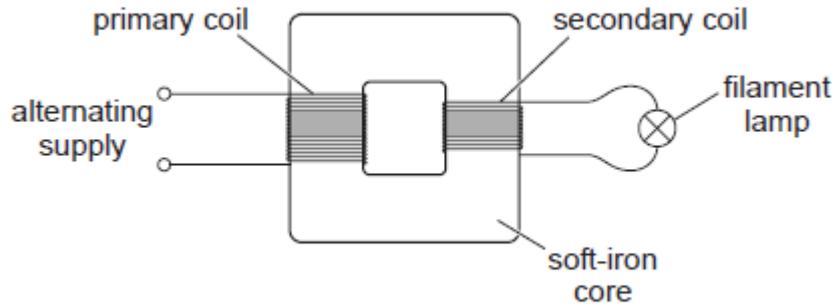


Fig. 22.2

The primary coil is connected to an alternating voltage supply. A filament lamp is connected to the output of the secondary coil.

(i) Use Faraday's law of electromagnetic induction to explain why the filament lamp is lit. [3]

(ii) The primary coil has 400 turns and the secondary coil has 20 turns. The potential difference across the lamp is 12 V and it dissipates 24 W. The transformer is 100% efficient.

1. Calculate the current in the primary coil.

current = .....A [2]

2. The alternating voltage supply is replaced by a battery and an open switch in series. The switch is closed. The lamp is lit for a short period of time and then remains off. Explain this observation.

[2]

**Total Marks for Question Set 9: 13**

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