OCR
Oxford Cambridge and RSA

A level Physics B

H557/03 Practical skills in physics

Question Set 3

1 (a) (i) This question is about the measurement of the **B**-field between a pair of slab magnets.

Fig. 1.1 shows the arrangement of the apparatus used in the experiment. It consists of a pair of slab magnets, with opposite poles facing one another, fixed onto a piece of U-shaped soft iron. The magnet assembly sits on top of an electronic balance. A rigidly fixed wire is shaped to carry a current I between the magnetic poles. The force created alters the balance reading.

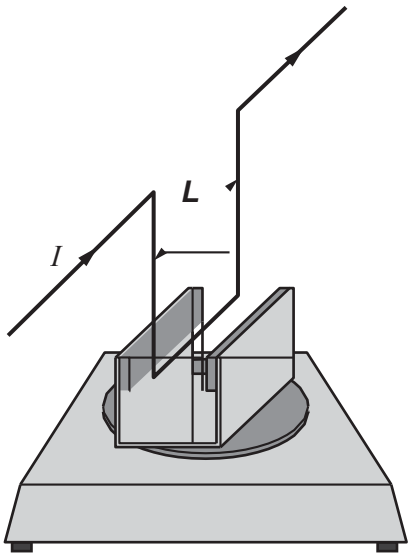

Fig.1.1

Fig. 1.2 shows a section through the magnet assembly. The dot in the centre represents the wire.

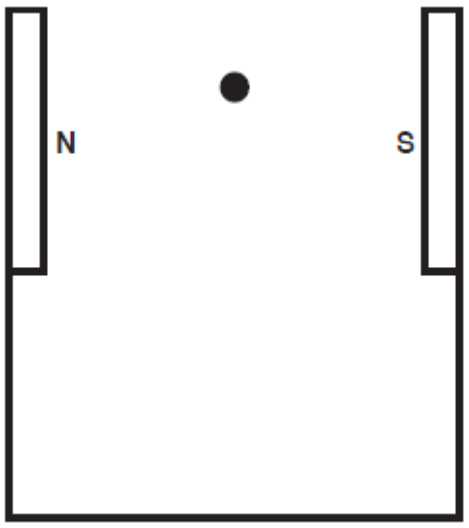

Fig.1.2

Draw, on **Fig. 1.2**, at least **three** lines to represent the magnetic field in the region between the magnetic poles when the current in the wire is zero. **[2]**

(ii) Explain why the balance reading changes to a new value when the wire carries a current. **[2]**

(b) **(i)** The longest length of wire that could be used is 5.0 cm. The current I is varied and the change in the balance reading is recorded as shown in **Fig. 1.3**.

	Change in balance reading / g				
I / A	Trial 1	Trial 2	Trial 3	Mean change / g	F / $\times 10^{-3}$ N
0.5	0.08	0.05	0.06	0.06	0.59
1.0	0.14	0.16	0.16	0.15	1.5
1.5	0.22	0.20	0.23	0.22	2.2
2.0	0.31	0.29	0.31	0.30	2.9
2.5	0.38	0.39	0.35		
3.0	0.44	0.48	0.48		

Fig. 1.3

Complete the table by calculating the mean change in balance reading and the corresponding values of force F for the last two current values.
$g = 9.8\,\text{N kg}^{-1}$

[2]

(ii) Use the table to determine the uncertainty in F. Explain your reasoning.

[2]

(iii) Plot the last two points from the table, **Fig. 1.3**, on the graph **Fig. 1.4**. Draw a line of best fit.

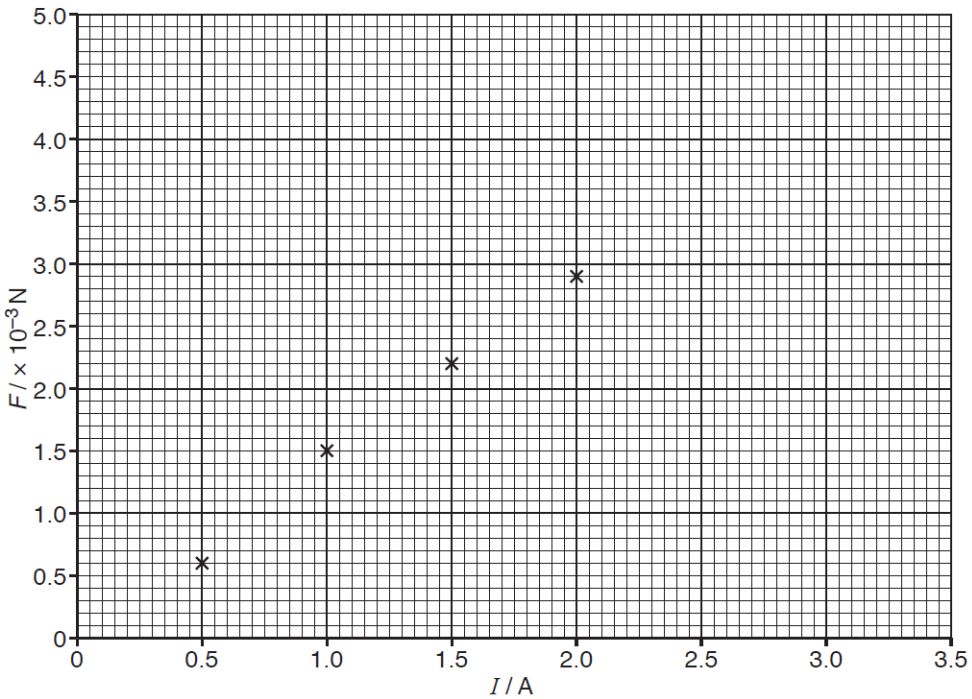

Fig. 1.4

[2]

(iv) Use the graph to estimate the value of the **B**- field between the faces of the slab magnets.

B = ... mT

[3]

Total Marks for Question Set 3: 13

OCR
Oxford Cambridge and RSA

Copyright Information

OCR is committed to seeking permission to reproduce all third-party content that it uses in its assessment materials. OCR has attempted to identify and contact all copyright holders whose work is used in this paper. To avoid the issue of disclosure of answer-related information to candidates, all copyright acknowledgements are reproduced in the OCR Copyright Acknowledgements Booklet. This is produced for each series of examinations and is freely available to download from our public website (www.ocr.org.uk) after the live examination series.

If OCR has unwittingly failed to correctly acknowledge or clear any third-party content in this assessment material, OCR will be happy to correct its mistake at the earliest possible opportunity.

For queries or further information please contact The OCR Copyright Team, The Triangle Building, Shaftesbury Road, Cambridge CB2 8EA.

OCR is part of the Cambridge Assessment Group; Cambridge Assessment is the brand name of University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge