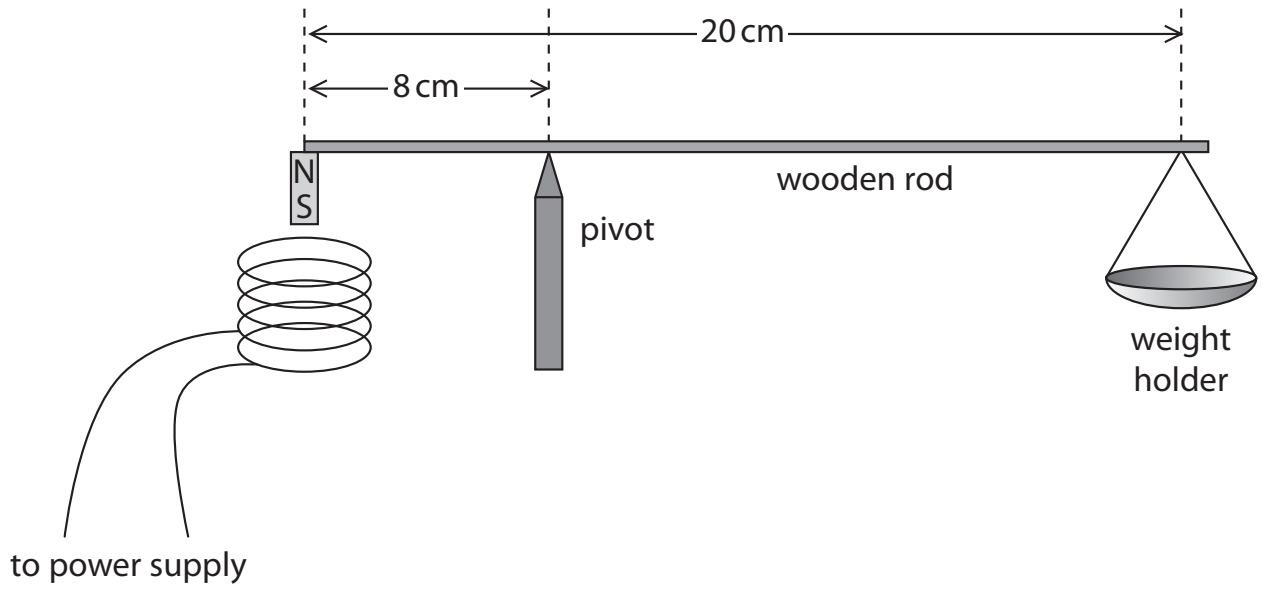
6 A student uses this apparatus to investigate how the strength of the magnetic field in a current-carrying coil varies as the current changes.



This is the student's method.

- attach a small magnet to one end of a wooden rod
- place the rod on a pivot that is 8 cm from the magnet
- attach a weight holder to the other end of the rod
- place a current-carrying coil underneath the magnet

(a) A weight of 0.1 N is needed to balance the rod when the current in the coil is zero.

Calculate the weight of the magnet.
[ignore weight of rod and weight holder]

(3)

weight of magnet = ... N

(b) The student increases the current and observes that the rod rotates anticlockwise and the magnet moves towards the coil.

Explain this observation.

(3)

(c) The student adds weights to balance the rod for different currents.

The table shows her results.

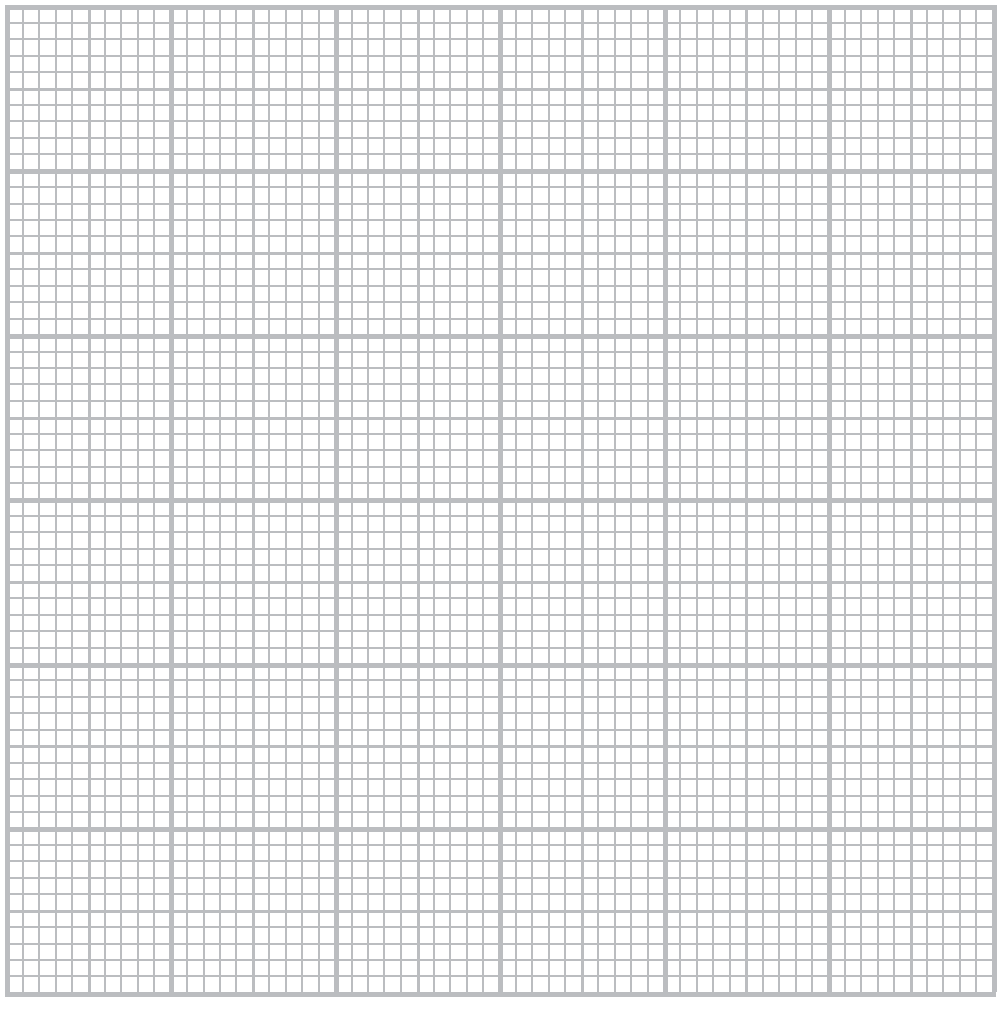
Current in A	Total weight added in N
0.0	0.1
0.1	0.5
0.5	2.1
0.7	2.5
0.9	3.7
1.1	4.5

(i) Plot a graph of the student's results, with the independent variable on the *x*-axis.

(4)

(ii) Draw a straight line of best fit.

(1)



(iii) Suggest why the student should repeat the reading for a current of 0.7 A.

(2)

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(iv) Describe the relationship between the current and the force produced by the magnetic field.

(2)

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(v) Estimate the weight needed to balance the rod when the current is 2 A.

(2)

weight needed = ... N

(Total for Question 6 = 17 marks)