

- 8 (a) Define the tesla.

[2]

- (b) A stiff metal wire is used to form a rectangular frame measuring  $8.0\text{cm} \times 6.0\text{cm}$ . The frame is open at the top, and is suspended from a sensitive newton meter, as shown in Fig. 8.1.

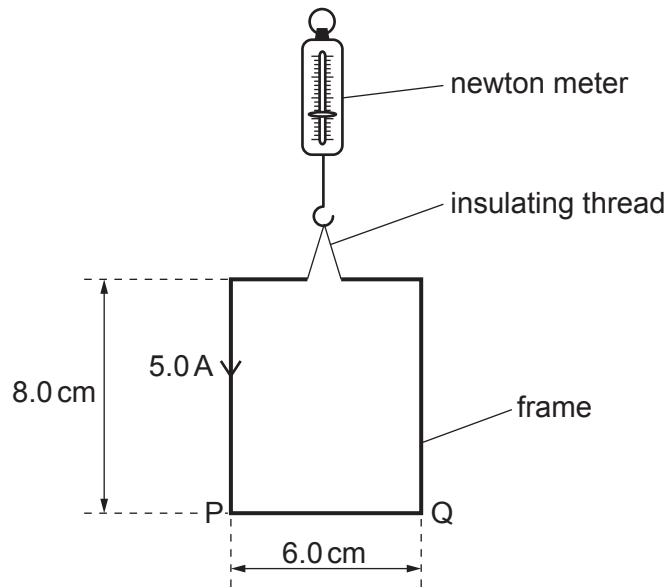


Fig. 8.1

The open ends of the frame are connected to a power supply so that there is a current of  $5.0\text{A}$  in the frame in the direction indicated in Fig. 8.1.

The frame is slowly lowered into a uniform magnetic field of flux density  $B$  so that all of side PQ is in the field. The magnetic field lines are horizontal and at an angle of  $50^\circ$  to PQ, as shown in Fig. 8.2.

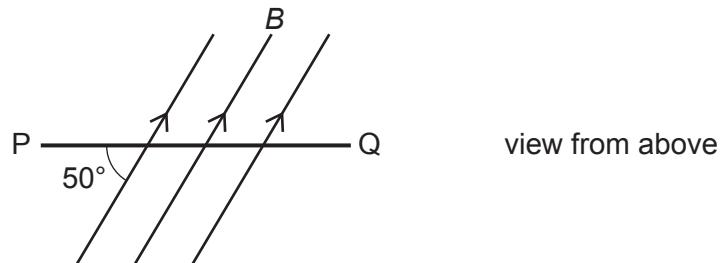


Fig. 8.2

When side PQ of the frame first enters the magnetic field, the reading on the newton meter changes by  $1.0\text{mN}$ .

- (i) Determine the magnetic flux density  $B$ , in mT.

$$B = \dots \text{ mT} [2]$$

- (ii) State, with a reason, whether the change in the reading on the newton meter is an increase or a decrease.

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..... [1]

- (iii) The frame is lowered further so that the vertical sides start to enter the magnetic field.

Suggest what effect this will have on the frame.

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