8 **(a)** Define the *tesla*.

....

....

.... [2]

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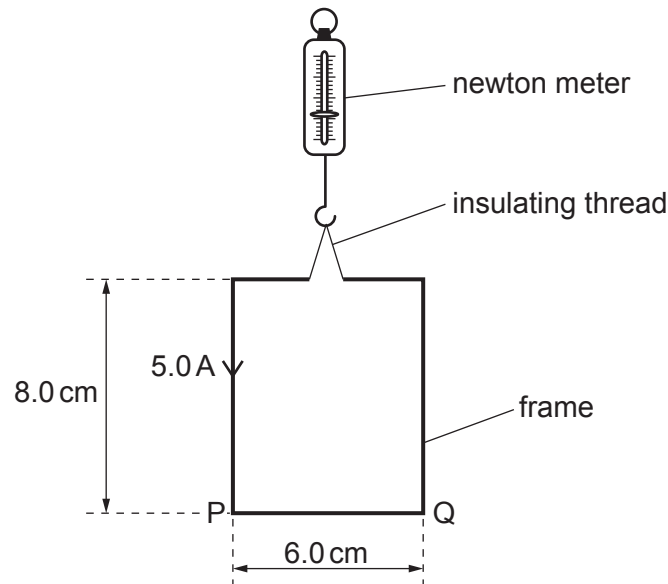

Fig. 8.1

The open ends of the frame are connected to a power supply so that there is a current of 5.0 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° to PQ, as shown in Fig. 8.2.
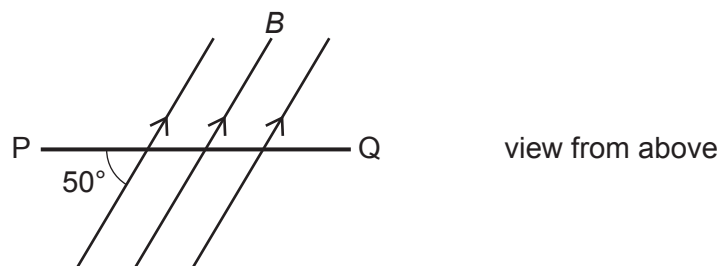

view from above

Fig. 8.2

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

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

B = ... mT [2]

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

....

....

.... [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.

....

....

.... [1]

[Total: 6]