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

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.....

..... [3]

**(b)** A magnet produces a uniform magnetic field of flux density *B* in the space between its poles.

A rigid copper wire carrying a current is balanced on a pivot. Part PQLM of the wire is between the poles of the magnet, as illustrated in Fig. 8.1.

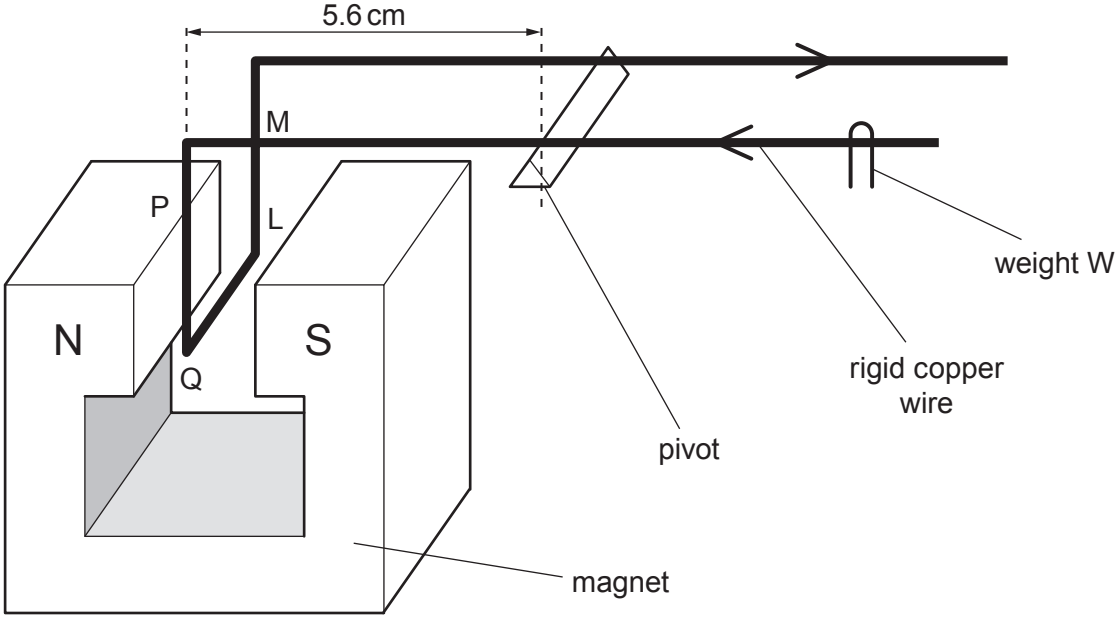


**Fig. 8.1** (not to scale)

The wire is balanced horizontally by means of a small weight W.

The section of the wire between the poles of the magnet is shown in Fig. 8.2.

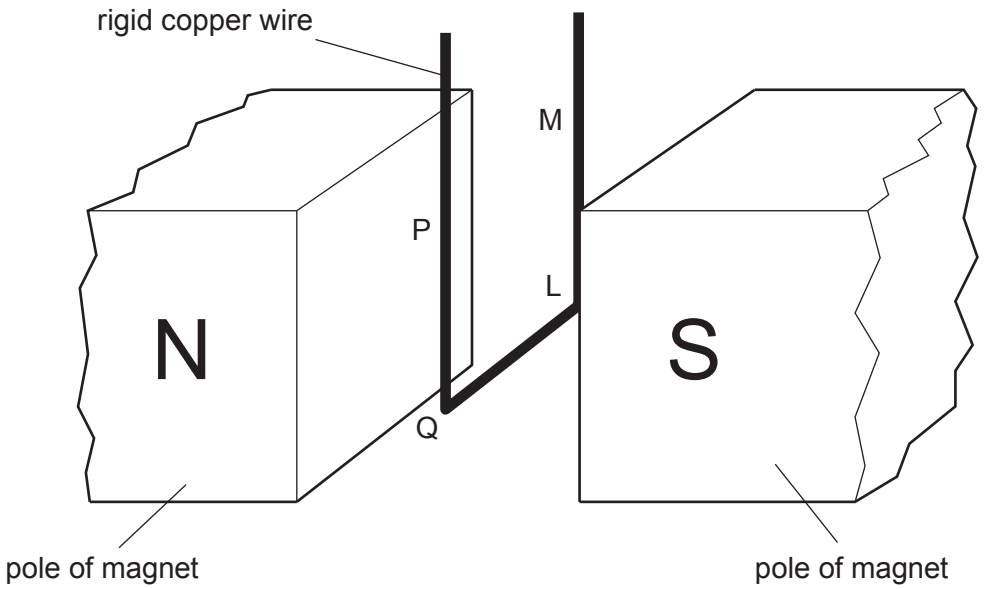


**Fig. 8.2** (not to scale)

Explain why:

**(i)** section QL of the wire gives rise to a moment about the pivot

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..... [3]

**(ii)** sections PQ and LM of the wire do not affect the equilibrium of the wire.

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..... [2]

**(c)** Section QL of the wire has length 0.85 cm.

The perpendicular distance of QL from the pivot is 5.6 cm.

When the current in the wire is changed by 1.2 A, W is moved a distance of 2.6 cm along the wire in order to restore equilibrium. The mass of W is $1.3 \times 10^{-4}$ kg.

**(i)** Show that the change in moment of W about the pivot is $3.3 \times 10^{-5}$ N m.

[2]

**(ii)** Use the information in **(i)** to determine the magnetic flux density $B$ between the poles of the magnet.

$B$ = ..... T [3]

[Total: 12]