4 A horseshoe magnet is placed on a top pan balance. A rigid copper wire is placed between the poles of the magnet, as illustrated in Fig. 4.1

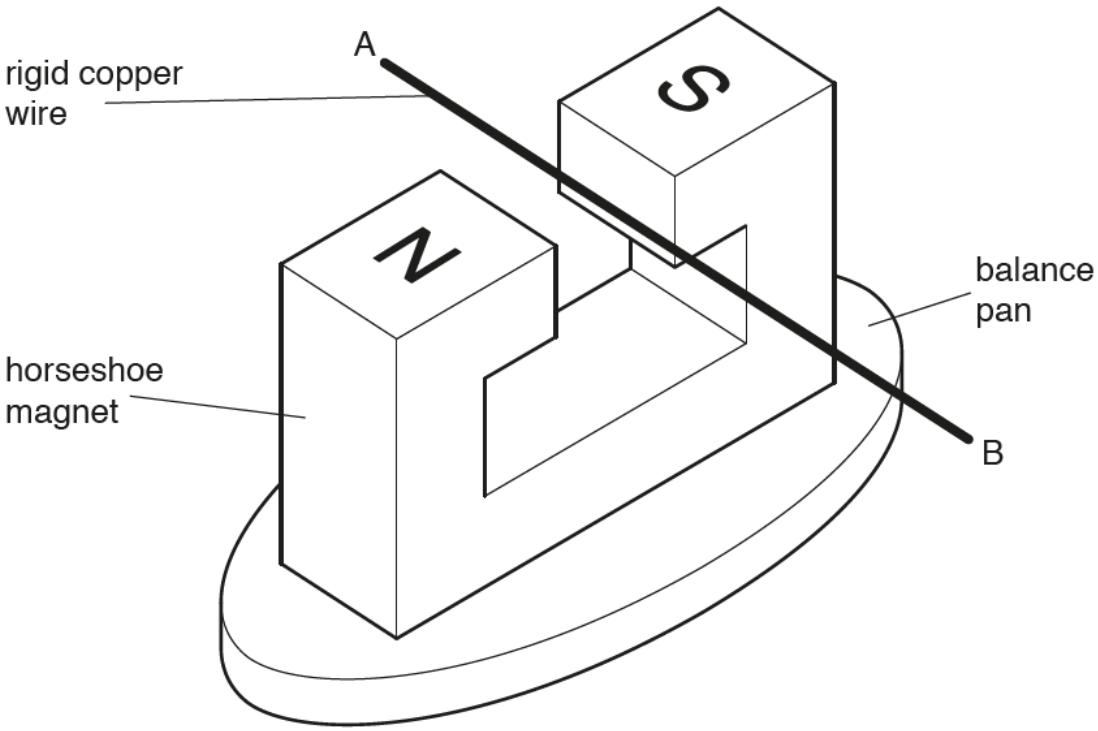

Fig. 4.1

The wire is clamped at ends A and B.

(a) When a direct current flows in the wire, the reading on the balance is seen to **decrease**. State and explain the direction of

(i) the magnetic force acting on the wire,

……

……

……

……[3]

(ii) the current in the wire.

……

……

……[2]

(b) A direct current of 4.6 A in the wire causes the reading on the balance to change by 4.5×10^{-3} N.

The direct current is now replaced by an alternating current of frequency 40 Hz and root-mean-square (r.m.s.) value of 4.6 A.

On the axes of Fig. 4.2, sketch a graph to show the change in balance reading over a time of 50 ms.

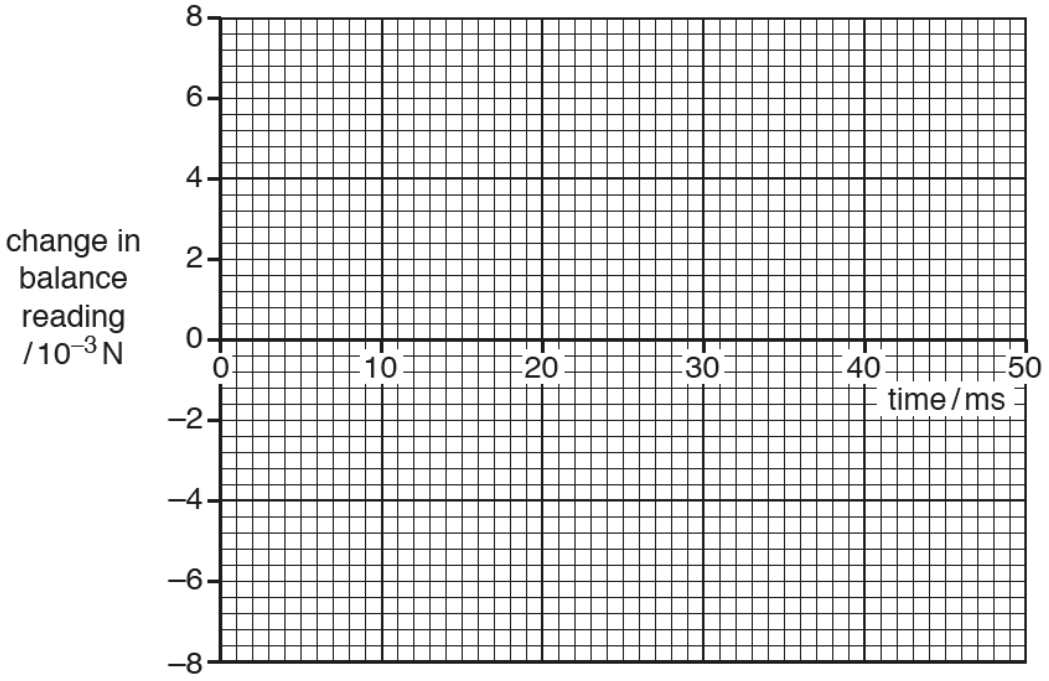

Fig. 4.2

[3]

[Total: 8]