8 An electron is travelling in a vacuum at a speed of $3.4 \times 10^7\,\text{m s}^{-1}$. The electron enters a region of uniform magnetic field of flux density 3.2 mT, as illustrated in Fig. 8.1.

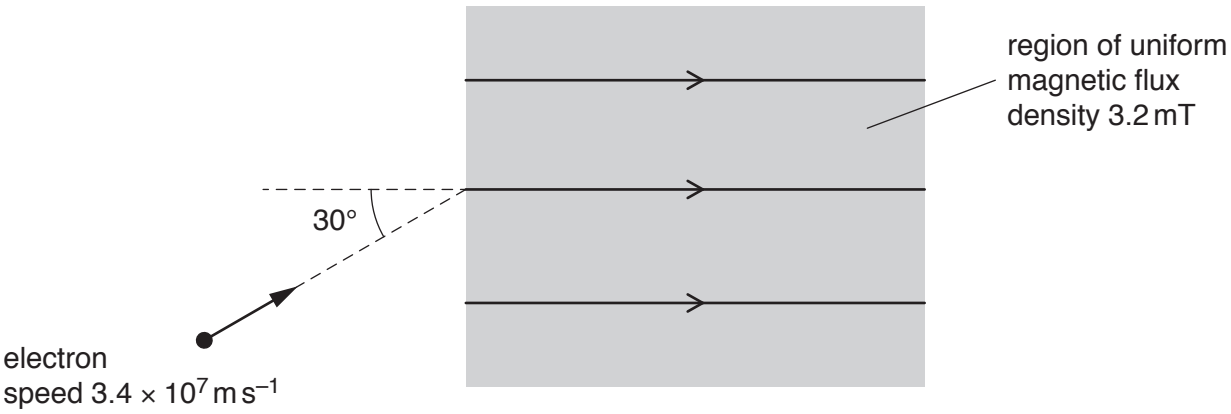

Fig. 8.1

The initial direction of the electron is at an angle of 30° to the direction of the magnetic field.

(a) When the electron enters the magnetic field, the component of its velocity v_N normal to the direction of the magnetic field causes the electron to begin to follow a circular path.

Calculate:

(i) v_N

v_N = ... m s^{-1} [1]

(ii) the radius of this circular path.

radius = ... m [3]

(b) State the magnitude of the force, if any, on the electron in the magnetic field due to the component of its velocity along the direction of the field.

.....[1]

(c) Use information from **(a)** and **(b)** to describe the resultant path of the electron in the magnetic field.

.....

.....[1]

[Total: 6]