5 An electron is travelling in a straight line through a vacuum with a constant speed of $1.5 \times 10^7\,\text{m s}^{-1}$. The electron enters a uniform electric field at point A, as shown in Fig. 5.1.

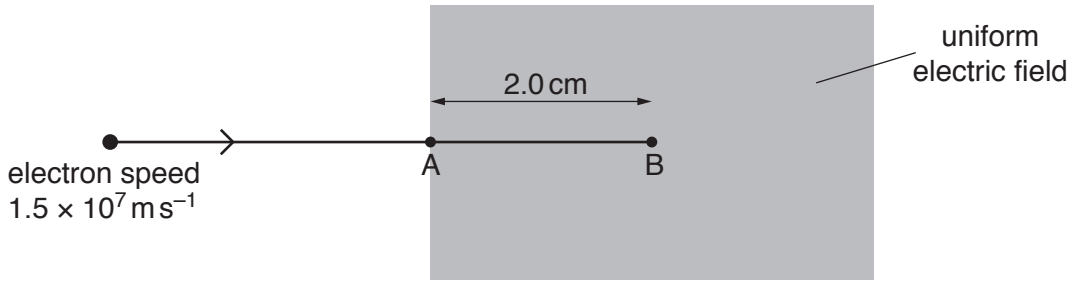

Fig. 5.1

The electron continues to move in the same direction until it is brought to rest by the electric field at point B. Distance AB is 2.0 cm.

(a) State the direction of the electric field.

.....[1]

(b) Calculate the magnitude of the deceleration of the electron in the field.

deceleration = ...m s^{-2} [2]

(c) Calculate the electric field strength.

electric field strength = ...V m^{-1} [3]

(d) The electron is at point A at time $t = 0$.

On Fig. 5.2, sketch the variation with time t of the velocity v of the electron until it reaches point B. Numerical values of v and t do not need to be shown.

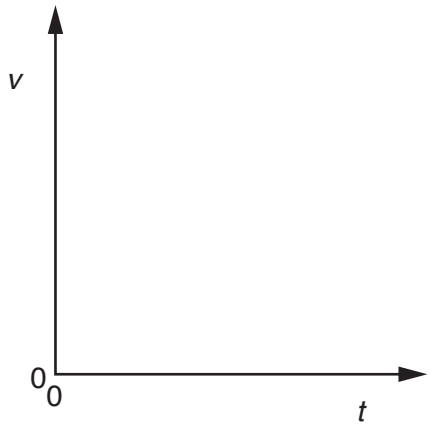

Fig. 5.2

[1]

[Total: 7]