6 Two horizontal metal plates A and B are situated a distance d apart in a vacuum, as shown in Fig. 6.1.

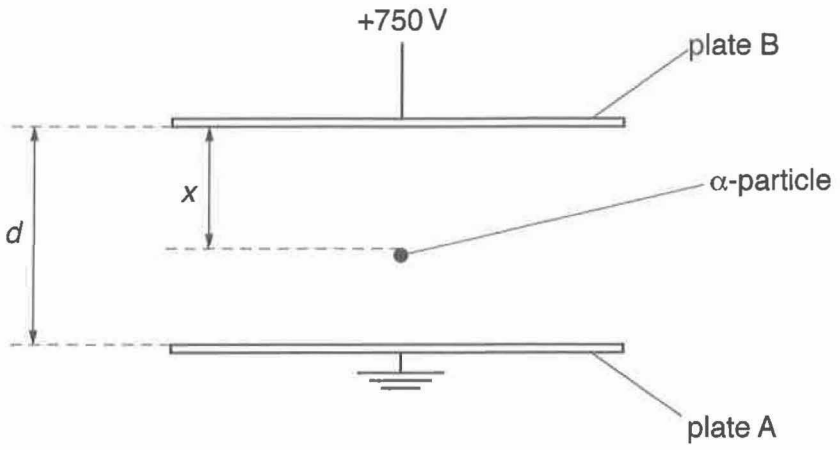

Fig. 6.1

Plate A is earthed and plate B is at a potential of +750 V.
There is a uniform electric field in the region between the plates.

An α-particle is free to move in the region of the uniform electric field.

Any change in gravitational potential energy of the α-particle is negligible compared with any change in electric potential energy.

The α-particle is initially stationary and in contact with plate B where its distance x from plate B is zero.

For the α-particle, as it moves from a position where $x = \frac{d}{3}$ to a position where $x = \frac{2d}{3}$,

(a) show that the energy gained by the α-particle is independent of the separation d,

[2]

(b) calculate the change in speed of the α-particle.

change in speed = ... $m\,s^{-1}$ [5]