

- 7 Two oppositely-charged parallel metal plates are situated in a vacuum, as shown in Fig. 7.1.

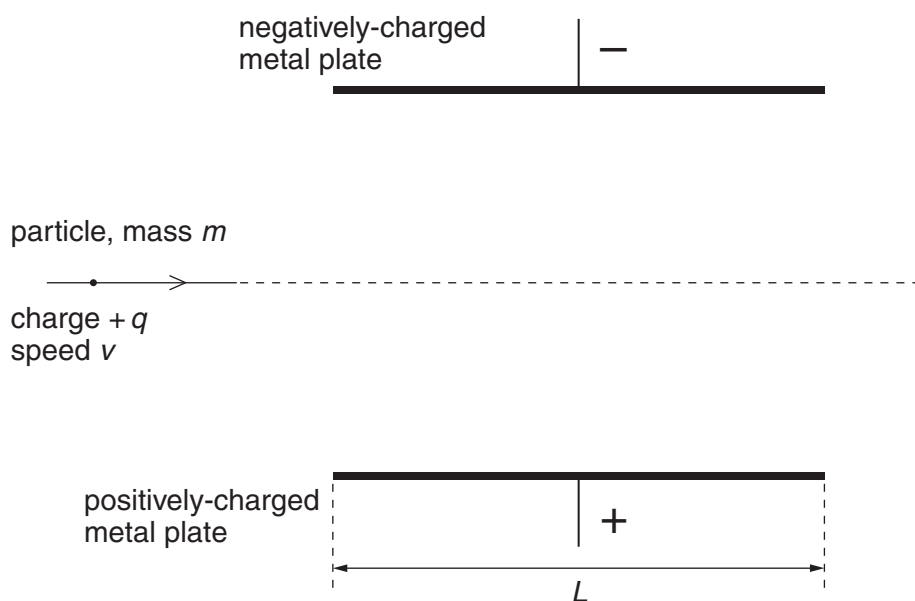


Fig. 7.1

The plates have length L .

The uniform electric field between the plates has magnitude E . The electric field outside the plates is zero.

A positively-charged particle has mass m and charge $+q$. Before the particle reaches the region between the plates, it is travelling with speed v parallel to the plates. The particle passes between the plates and into the region beyond them.

- (a) (i) On Fig. 7.1, draw the path of the particle between the plates and beyond them. [2]

- (ii) the particle in the region between the plates, state expressions, in terms of E , m , q , v and L , as appropriate, for

1. the force F on the particle,

..... [1]

2. the time t for the particle to cross the region between the plates.

..... [1]

(b) (i) State the law of conservation of linear momentum.

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..... [2]

(ii) Use your answers in **(a)(ii)** to state an expression for the change in momentum of the particle.

..... [1]

(iii) Suggest and explain whether the law of conservation of linear momentum applies to the particle moving between the plates.

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..... [2]