**3**

**(a)**

Define electric field strength.

……

……

[1]

**(b)**

A particle of charge $+3.2 \times 10^{-19}$ C is travelling at constant velocity in a straight line in a vacuum as shown in Fig. 3.1. It enters the region between two horizontal charged plates with a potential difference of 100 V. The plates are separated by a distance of 6.0 cm.

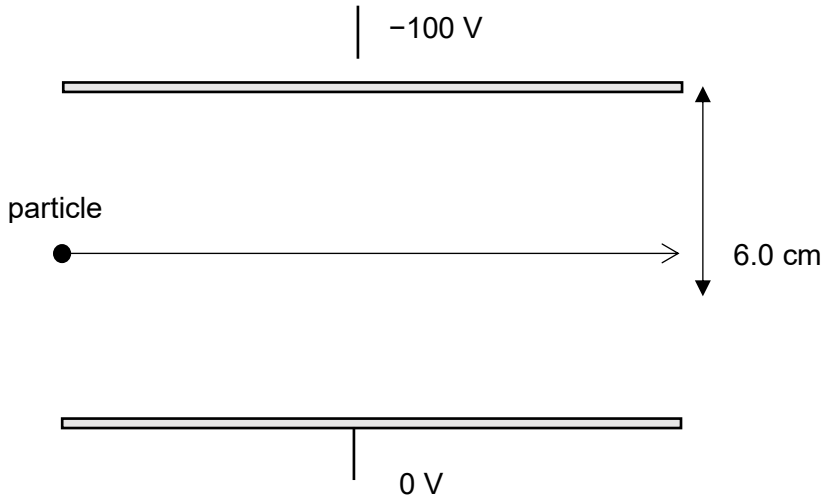


**Fig. 3.1**

Calculate the mass of the particle. Explain your working.

mass of particle = …… kg

[3]

**(c)**

The potential at the upper plate is subsequently decreased to −200 V.

**(i)**

State and explain how the path of the particle as shown in Fig. 3.1 would change.

……

……

……

……

……

[3]

**(ii)**

The vertical distance from the upper plate towards the lower plate is given as $d$.

Fig. 3.2 shows the variation with $d$ of the potential $V$ within the horizontal plates.

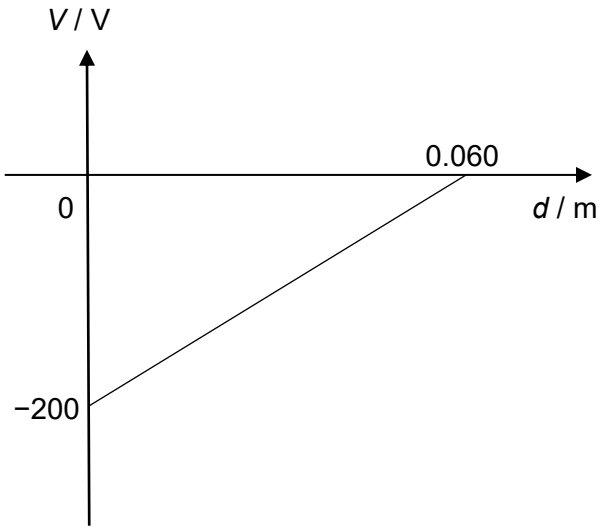


**Fig. 3.2**

With reference to Fig. 3.2, calculate the magnitude of the electric force acting on the particle.

electric force on particle = …… N

[2]

**(iii)**

Hence or otherwise, determine the acceleration of the particle and its direction just *before it* exits the metal plates.

acceleration of particle = …… m $s^{-2}$

direction : ……

[3]