2

(a)

Fig. 2.1 shows a mass initially travelling at right angles to the Earth's uniform gravitational field.

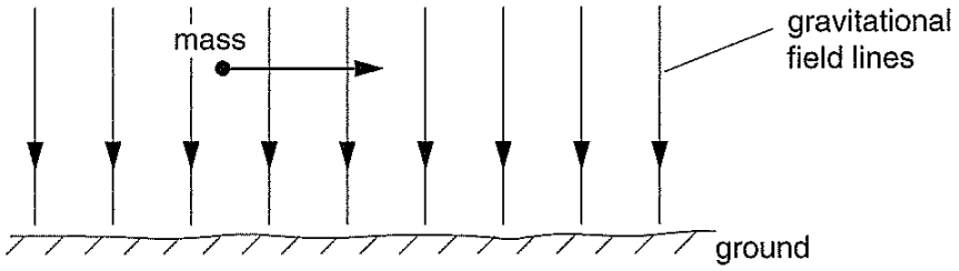


Fig. 2.1

Describe the subsequent motion of the mass.

……

…… [1]

(b)

Fig. 2.2 shows an electron initially travelling parallel to a uniform electric field.

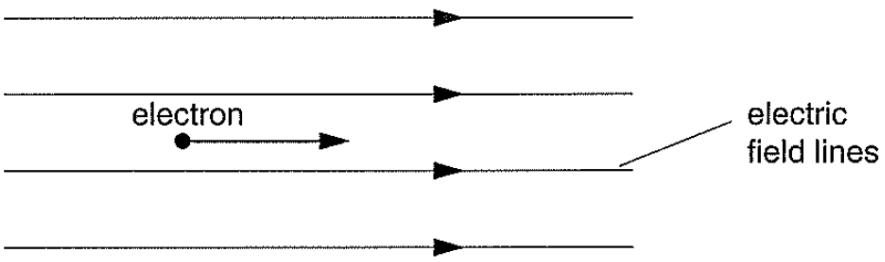


Fig. 2.2

Describe the subsequent motion of the electron.

……

……

……[2]

(c)

Fig. 2.3 shows a long molecule placed in a uniform electric field.

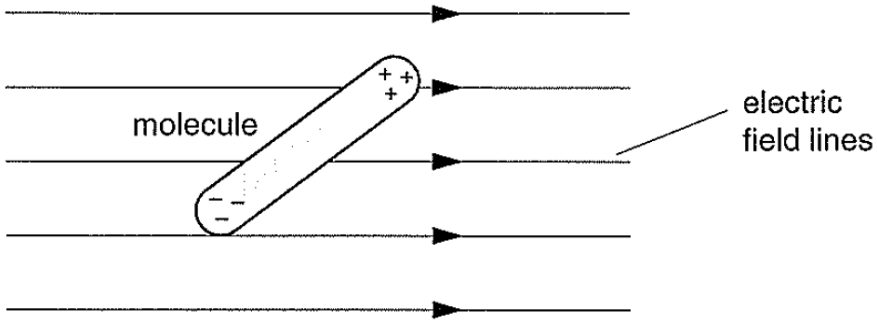


Fig. 2.3

The ends of the molecule have equal but opposite charges. Describe and explain the initial motion of the molecule in the electric field.

……

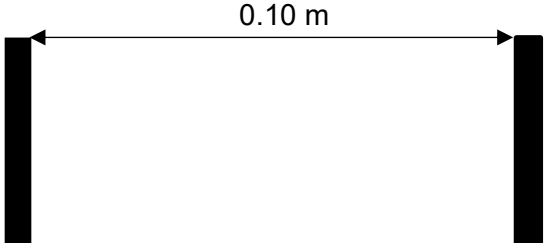
……

……

…… [2]

(d)

Fig. 2.4 shows a sphere of weight 1.6×10^{-2} N with an electric charge of +2.0 μC. It is released from rest, in vacuum, between two parallel, vertical metal plates. The separation of the plates is 0.10 m. One plate has a potential of +80 V and the other plate has a potential of -80 V.



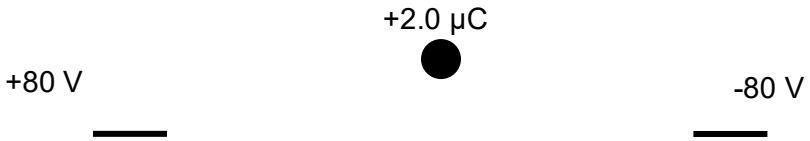


Fig. 2.4

(i)

Determine the electric force experienced by the sphere.

force = …… N [2]

[Turn over

(ii)

On Fig. 2.4, sketch the path taken by the sphere after it is released. [1]

(e)

The variations with separation of the gravitational potential energy U_G and of the electric potential energy U_E between two protons are shown in Fig. 2.5.

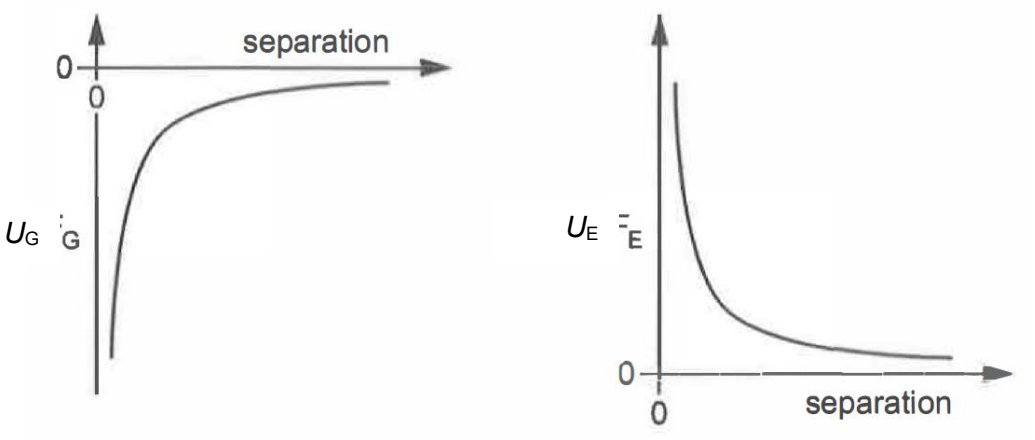


Fig. 2.5

Explain why the gravitational potential energy and the electric potential energy have opposite signs.

....

....

....

.... [2]

[Total: 10]