6 A sphere of mass 1.6×10^{-10} kg has a charge of +0.27 nC. The sphere is in a uniform electric field that acts vertically upwards, as shown in the side view in Fig. 6.1.

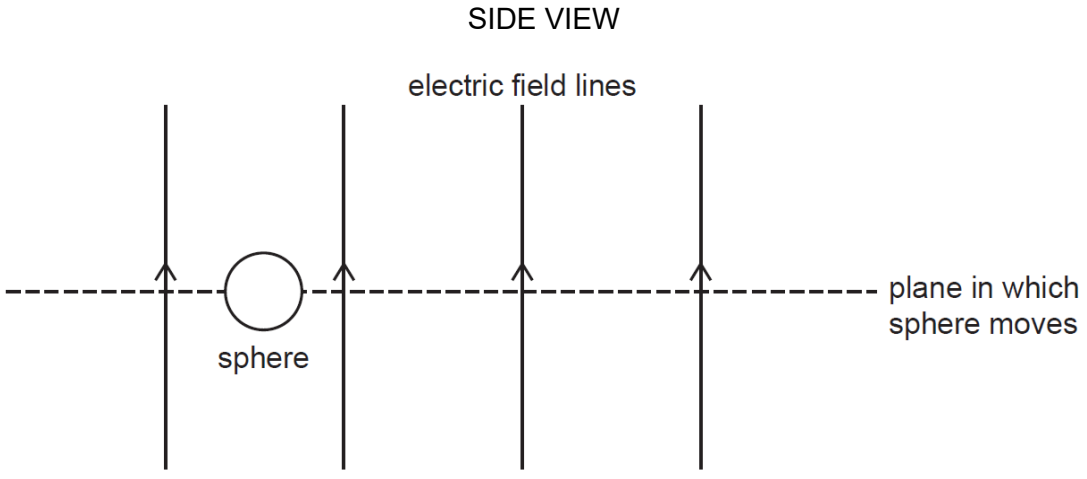

Fig. 6.1

The force exerted on the sphere by the electric field causes the sphere to remain at a fixed vertical height in a horizontal plane.

There is a uniform magnetic field in the region of the electric field. The sphere moves at a speed of 0.78 m s^{-1} in the horizontal plane. The magnetic field causes the sphere to move in a circular path of radius 3.4 m, as shown in the view from above in Fig. 6.2.

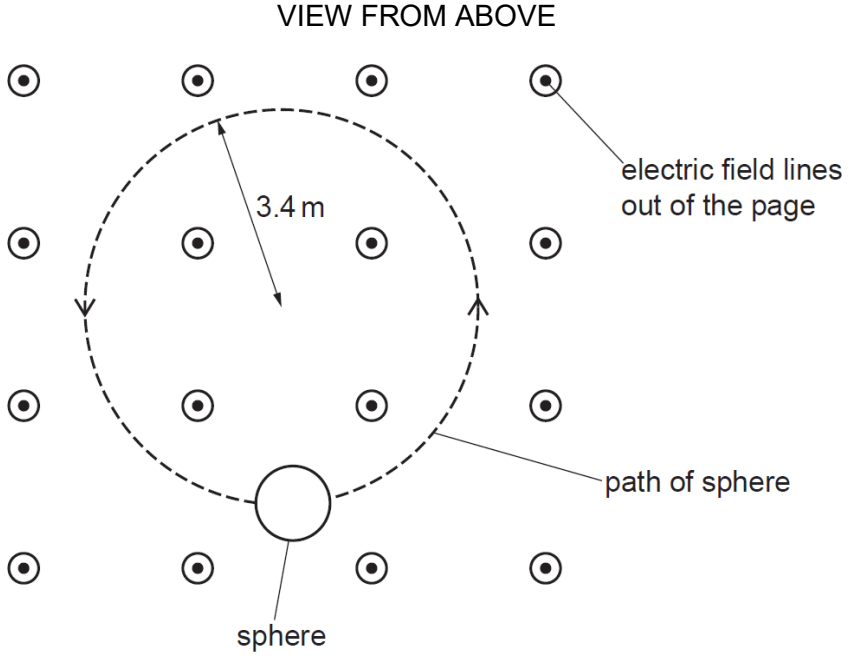

Fig. 6.2

(a) **(i)** State the direction of the uniform magnetic field from the SIDE VIEW in Fig. 6.1.

..... [1]

(ii) Explain why the sphere moves at constant speed in the circular path.

……

……

…… [2]

(b) Calculate the strength of the uniform electric field.

electric field strength = ... N C^{-1} [2]

(c) By considering the magnetic force on the sphere, show that the flux density of the uniform magnetic field is 0.14 T.

[3]

[Total: 8]