

- 6 (a) A charged particle may experience a force in an electric field and in a magnetic field.

State two differences between the forces experienced in the two types of field.

1.

.....

2.

.....[4]

- (b) A proton, travelling in a vacuum at a speed of $4.5 \times 10^6 \text{ m s}^{-1}$, enters a region of uniform magnetic field of flux density 0.12 T. The path of the proton in the field is a circular arc, as illustrated in Fig. 6.1.

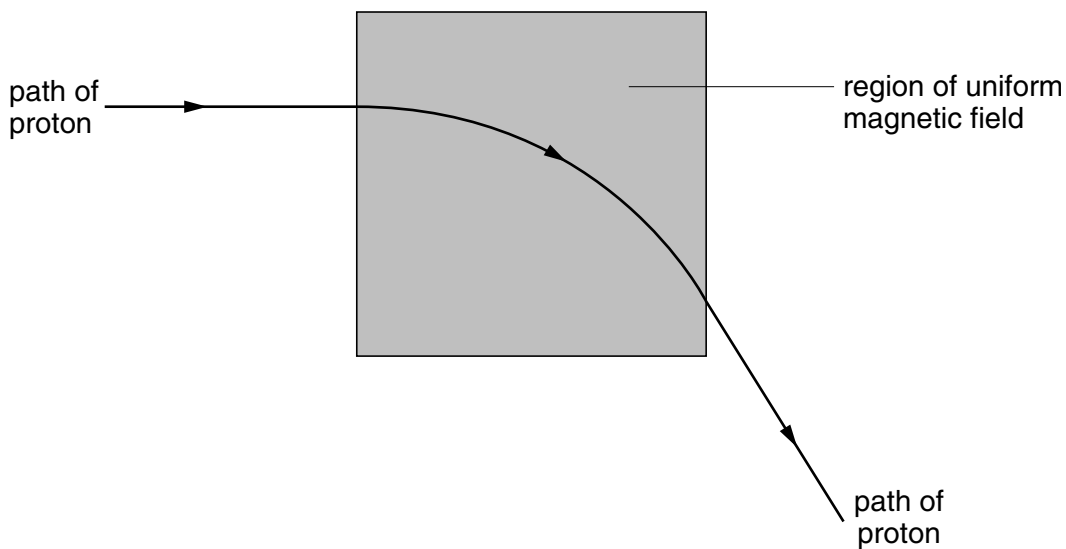


Fig. 6.1

- (i) State the direction of the magnetic field.

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- (ii) Calculate the radius of the path of the proton in the magnetic field.

radius = m
[4]

(c) A uniform electric field is now created in the same region as the magnetic field in Fig. 6.1, so that the proton passes undeviated through the region of the two fields.

(i) On Fig. 6.1 mark, with an arrow labelled E , the direction of the electric field.

(ii) Calculate the magnitude of the electric field strength.

field strength = V m^{-1}
[3]

(d) Suggest why gravitational forces on the proton have not been considered in the calculations in (b) and (c).

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.....[1]