

- 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.

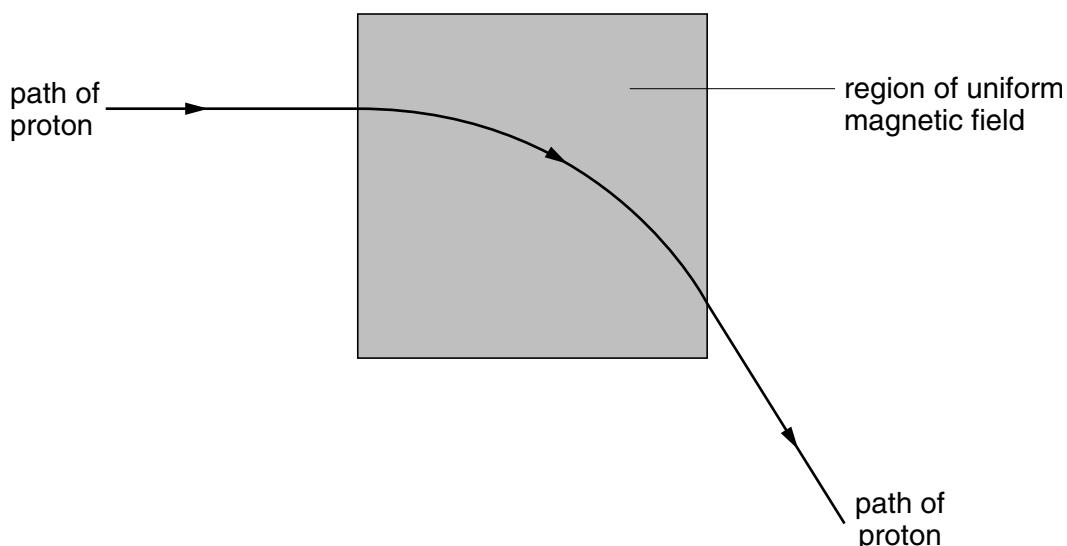


Fig. 6.1

- (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 = Vm^{-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]