4 Fig. 4.1 shows the path of a charged particle in a uniform magnetic field.

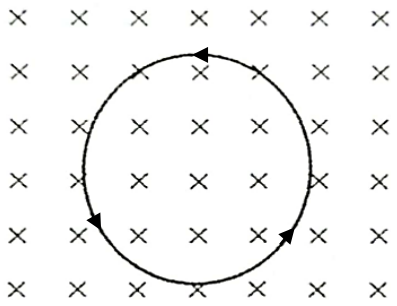

Fig. 4.1

(a) Explain why the charged particle travels in a circular path.

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……..... [2]

(b) Derive an expression for the time taken T for the charged particle to complete one full circle in terms of its mass m, charge q, and the magnetic flux density B of the uniform magnetic field.

[3]

(c) The mass of the charged particle is 4.5×10^{-26} kg and its speed is 4.8×10^{5} m s^{-1}. Given that the diameter of the circular path is 0.60 m, and that the magnetic flux density of the uniform magnetic field is 0.15 T, determine the charge of the particle.

charge = ……. C [2]