

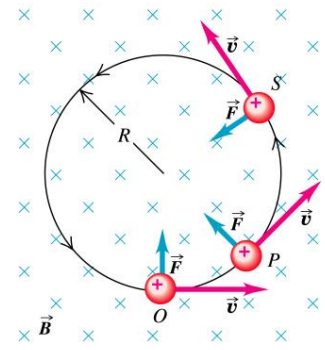
Particle in a Magnetic Field Examples

1. A proton moves at 7.50×10^7 m/s perpendicular to a magnetic field. The field causes the proton to travel in a circular path of radius 0.800 m. What is the field strength?

$$BQ = \frac{mV}{r}$$

$$B(1.6 \times 10^{-19}) = \frac{(1.67 \times 10^{-27})(7.5 \times 10^7 \text{ m/s})}{0.8 \text{ m}}$$

$$B = 0.97 \text{ T}$$



(a)

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2. An oxygen-16 ion with a mass of 2.66×10^{-26} kg travels at 5.00×10^6 m/s perpendicular to a 1.20-T magnetic field, which makes it move in a circular arc with a 0.231-m radius. What positive charge is on the ion?

Answer: 4.79×10^{-19} C

3. A cosmic ray of electrons moves at 7.50×10^6 m/s perpendicular to the Earth's magnetic field at an altitude where field strength is 1.00×10^{-5} T. What is the radius of the circular path the electrons follows?

Answer: 4.27m