# B11 · Extra practice

Magnetic force on a moving charge | Diploma-style set of 8

Constants from the Alberta Physics 30 data sheets: $k = 8.99 \times 10^{9}$ N·m²/C², $e = 1.60 \times 10^{-19}$ C, electron mass $m_e = 9.11 \times 10^{-31}$ kg, proton mass $m_p = 1.67 \times 10^{-27}$ kg, $g = 9.81$ m/s².

Easy · B11-X01. An electron moves at $2.00 \times 10^{6}$ m/s at right angles to a magnetic field of 0.0300 T. Use $e = 1.60 \times 10^{-19}$ C. Find the size of the magnetic force on it, in newtons.

Response: _____

Easy · B11-X02. A proton sits at rest in a magnetic field. What is the magnetic force on it?

A. Zero
B. It is along the field.
C. It is at right angles to the field.
D. It depends on the proton’s mass.

Response: _____

Medium · B11-X03. An alpha particle ($q = 3.20 \times 10^{-19}$ C) moves at $5.00 \times 10^{5}$ m/s at right angles to a field of 0.800 T. Find the size of the magnetic force, in newtons.

Response: _____

Medium · B11-X04. A proton moves at $8.00 \times 10^{5}$ m/s at 30° to a magnetic field of 0.500 T. Use $e = 1.60 \times 10^{-19}$ C. Find the size of the magnetic force, in newtons.

Response: _____

Medium · B11-X05. Take east, north and up as directions. An electron moves east through a magnetic field that points north. Which way is the magnetic force on the electron?

A. Up
B. Down
C. West
D. South

Response: _____

Challenging · B11-X06. An electron moving at $4.00 \times 10^{6}$ m/s at right angles to a magnetic field feels a force of $1.92 \times 10^{-13}$ N. Use $e = 1.60 \times 10^{-19}$ C. Find the size of the field in tesla.

Response: _____

Challenging · B11-X07. A proton moves at right angles to a field of 0.400 T and feels a force of $6.40 \times 10^{-15}$ N. Use e = $1.60 \times 10^{-19}$ C. Find the speed of the proton in m/s.

Response: _____

Challenging · B11-X08. A charged particle moves through a magnetic field at constant speed in a circle. Explain why the magnetic force does not change the particle’s speed.

Response: _____