B14 · Extra practice

The motor effect | 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 · B14-X01. A straight wire 0.120 m long carries 3.5 A at right angles to a magnetic field of 0.400 T. Find the size of the magnetic force on the wire, in newtons.

Response: _____

Easy · B14-X02. A charge of 24.0 C passes through a wire in 8.0 s. Find the current in amperes.

Response: _____

Easy · B14-X03. Two long parallel wires carry currents in the same direction. What do the wires do?

A. They repel each other.

B. They do not affect each other.

C. They attract only if the currents are different sizes.

D. They attract each other.

Response: _____

Medium · B14-X04. A wire 0.150 m long carries 2.5 A at right angles to a magnetic field. The magnetic force on it is 0.0450 N. Find the size of the field, in tesla.

Response: _____

Medium · B14-X05. A horizontal wire of mass 3.00×10^{-3} kg and length 0.100 m is held up by a magnetic force from a horizontal field of 0.200 T at right angles to the wire. Use $g = 9.81\ m/s^2$. Find the current in amperes.

Response: _____

Medium · B14-X06. A wire carries conventional current to the right across the page. The magnetic field points into the page. Which way is the magnetic force on the wire?

A. Up the page
B. Down the page
C. Into the page
D. To the left

Response: _____

Challenging · B14-X07. A wire 0.300 m long is in a field at right angles to it. A graph of the force on the wire against the current is a straight line through (1.00 A, 0.15 N) and (4.00 A, 0.42 N). Find the size of the field, in tesla.

Response: _____

Challenging · B14-X08. A graph of magnetic force on a wire against current is a straight line that does not pass through the origin: the force is 0.020 N when the current is zero. Give a reason for this and say what it means for the slope.

Response: _____