B15 · Extra practice

The generator effect and Lenz’s law | 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 · B15-X01. A metal rod 0.500 m long moves at 4.0 m/s at right angles to a magnetic field of 0.300 T. Find the potential difference across its ends, in volts.

Response: _____

Easy · B15-X02. A rod 0.300 m long moves through a field of 0.150 T at right angles. The potential difference across it is 0.45 V. Find the speed of the rod, in m/s.

Response: _____

Easy · B15-X03. The north pole of a bar magnet is pushed toward a coil that is part of a closed circuit. Which statement is correct?

A. The induced current makes a field that pulls the magnet in faster.

B. No current is induced, because the magnet is not touching the coil.

C. The current flows only after the magnet stops.

D. The induced current makes a field that opposes the motion, pushing the magnet away.

Response: _____

Medium · B15-X04. A rod 0.400 m long moves at right angles to a field of 0.500 T. At 3.0 m/s the potential difference across it is 0.600 V. Find the speed that gives a potential difference of 1.5 V.

Response: _____

Medium · B15-X05. A rod moves to the right through a magnetic field that points into the page. Which end of the rod becomes positive?

A. The bottom end
B. The top end
C. The right end, in front of the motion
D. Neither end; the rod stays neutral

Response: _____

Medium · B15-X06. A wire of length 1.20 m moves at 15 m/s at right angles to a field of 75 mT. Convert the field to tesla first. Find the potential difference across the wire, in volts.

Response: _____

Challenging · B15-X07. The north pole of a bar magnet is released above a closed copper ring and falls toward it. Which statement describes the force of the ring on the magnet?

A. It points downward, helping the fall.

B. It is zero, because copper is not magnetic.

C. It points sideways.

D. It points upward, opposing the fall.

Response: _____

Challenging · B15-X08. A rod slides on two rails. Explain why a current flows only when the rails are joined by a circuit, and why pulling the rod gets harder when the circuit is closed.

Response: _____