B6 · Extra practice

Potential difference: energy per 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 · B6-X01. A charge of 2.50×10^{-18} C is moved through a potential difference of 12.0 V. Find the change in its electric potential energy in joules.

Response: _____

Easy · B6-X02. An electron gains 4.80×10^{-18} J of kinetic energy. Express this energy in electron volts. Use 1 eV = 1.60×10^{-19} J.

Response: _____

Easy · B6-X03. Which pair shows the same unit?

A. 1 volt = 1 coulomb per joule
B. 1 volt = 1 joule × coulomb
C. 1 volt = 1 newton per coulomb
D. 1 volt = 1 joule per coulomb

Response: _____

Medium · B6-X04. A proton starts from rest and is accelerated through a potential difference of 2400 V. Use e = 1.60×10^{-19} C and proton mass mp = 1.67×10^{-27} kg. Find its final speed in m/s.

Response: _____

Medium · B6-X05. An electron and a proton are each released from rest and accelerated through the same 100 V. Which statement is correct?

A. The proton gains more kinetic energy, so it ends up faster.

B. They gain the same kinetic energy, and the electron ends up faster.

C. They gain the same kinetic energy and end up at the same speed.

D. The electron gains more kinetic energy because it is lighter.

Response: _____

Medium · B6-X06. An alpha particle (q = 3.20×10^{-19} C) starts from rest and gains 5.12 × 10^{-16} J of kinetic energy. Find the potential difference it crossed, in volts.

Response: _____

Challenging · B6-X07. An electron moves at 3.00×10^{6} m/s into a region where it slows to rest. Use $e = 1.60 \times 10^{-19}$ C and electron mass $m_e = 9.11 \times 10^{-31}$ kg. Find the size of the potential difference that stops it, in volts.

Response: _____

Challenging · B6-X08. A charge q is moved from point A to point B between charged plates and gains an amount of potential energy ΔE. A second charge, 2q, is moved between the same two points. Compare the energy change and the potential difference for the two charges, and explain.

Response: _____