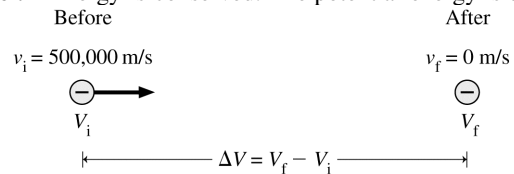


**29.15. Model:** Energy is conserved. The potential energy is determined by the electric potential.

**Visualize:**



The figure shows a before-and-after pictorial representation of an electron moving through a potential difference.

**Solve:** (a) Because the electron is a negative charge and it slows down as it travels, it must be moving from a region of higher potential to a region of lower potential.

(b) Using the conservation of energy equation,

$$\begin{aligned}
 K_f + U_f &= K_i + U_i \Rightarrow K_f + qV_f = K_i + qV_i \\
 \Rightarrow V_f - V_i &= \frac{1}{q}(K_i - K_f) = \frac{1}{(-e)}\left(\frac{1}{2}mv_i^2 - 0 \text{ J}\right) \\
 \Rightarrow \Delta V &= -\frac{mv_i^2}{2e} = -\frac{(9.11 \times 10^{-31} \text{ kg})(5.0 \times 10^5 \text{ m/s})^2}{2(1.60 \times 10^{-19} \text{ C})} = -0.712 \text{ V}
 \end{aligned}$$

**Assess:** The negative sign with  $\Delta V$  verifies that the electron moves from a higher potential region to a lower potential region.