A particle with charge $q = 0.050$C and mass $m = 0.10$kg passes point A with a speed of $5\frac{m}{s}$. Some time later the charge passes point B. The electric potential at point A is 15 volts and the electric potential at point B is 31 volts. What is the speed of the particle when it passes point B?

$$\Delta K + \Delta U = 0$$

$$\Delta K + q\Delta V = 0$$

$$\Delta K = -q\Delta V$$

$$\tfrac{1}{2}mv_B^2 - \tfrac{1}{2}mv_A^2 = -q(V_B - V_A)$$

$$v_B^2 - v_A^2 = -\frac{2q}{m}(V_B - V_A)$$

$$v_B^2 = v_A^2 - \frac{2q}{m}(V_B - V_A)$$

$$v_B = \sqrt{v_A^2 - \frac{2q}{m}(V_B - V_A)}$$

$$v_B = \sqrt{(5\tfrac{\text{m}}{\text{s}})^2 - \frac{2(0.050\text{C})}{(0.10\text{kg})}(31\text{V} - 15\text{V})} = 3.0\tfrac{\text{m}}{\text{s}}$$