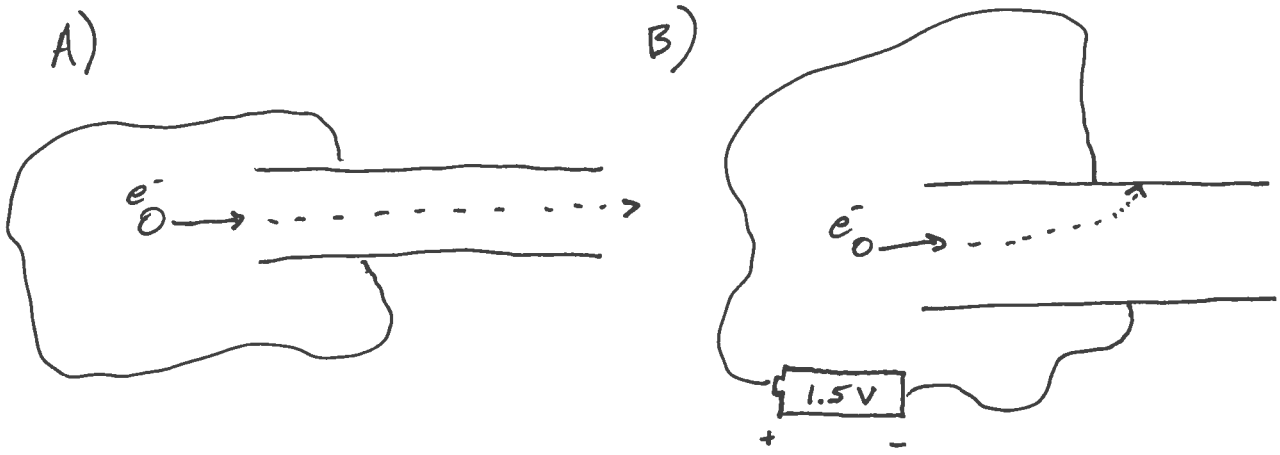
1. Two separate electrons are each moving between separate pairs of large, conducting plates as seen below. In case A the two plates are connected directly to each other with a wire. In case B the two plates are connected to a AA battery (1.5 volts) via wires. Using dashed or dotted lines, draw the trajectories that each of the electrons will travel.



2. Using the above example, if the electrons are initially exactly between the pairs of plates, moving at an initial velocity of 3.0 x 10^5 m/s along the plates, separately provide the final velocities of each electron when they either pass through the pair of plates or impact one of the plates. Assume the plates are very long.

$\Delta V = 1.5V/2$ since the electron is starting halfway between the capacitors plates.

$\Delta U = +q\,\Delta V$

$= (-1.6\times10^{-19}C)(0.75\,V)$

$= -1.2\times10^{-20}J$

$V_x = 3\times10^5\ m/s$

$V_y = \left(\frac{-2\Delta U}{m}\right)^{1/2}$ since $\Delta U = -\Delta KE$ and $\Delta KE = \frac{1}{2}mV_f^2 - \frac{1}{2}mV_i^2$

$= 5.14\times10^5\ m/s$

$V_{TOT} = \sqrt{V_x^2 + V_y^2}$

$= 5.95\times10^5\ m/s$