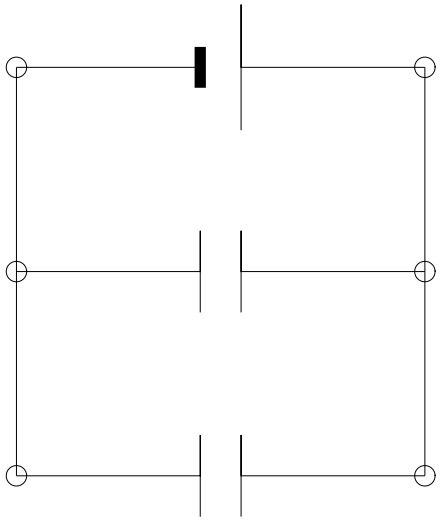
Capacitors

1. When the electric field in a certain dielectric exceeds $10^6\, V/m$ it experiences *dielectric breakdown* (gets destroyed). What is the breakdown voltage of a $10 \times 10\, cm^2$, $1\, \mu F$ capacitor if $\kappa = 3.7$?

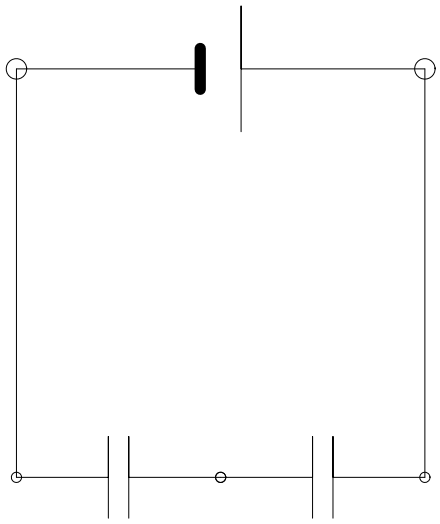
2. In the circuit below $V = 12\, volt$, $C_1 = C_2 = 1\, nF$.



   (a) Find C_{eq} , V_1 , V_2 , q_1 , q_2 and charge taken from the battery

   (b) the same, if the space between the plates of C_2 (lower) is filled with $\kappa = 2$.

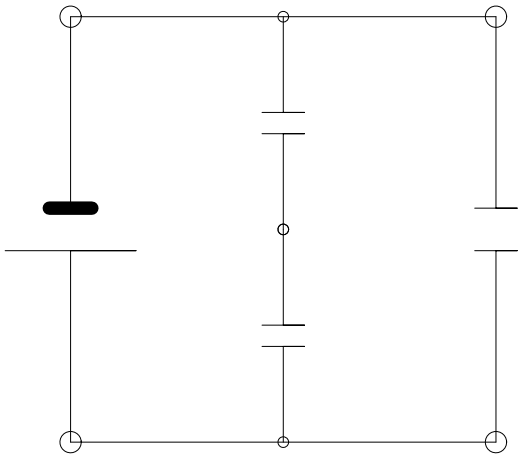
3. In the circuit below $V = 12\, volt$, $C_1 = C_2 = 1\, nF$.



   (a) Find C_{eq} , V_1 , V_2 , q_1 , q_2 and charge taken from the battery

   (b) the same, if the space between the plates of C_2 (right) is filled with $\kappa = 2$.

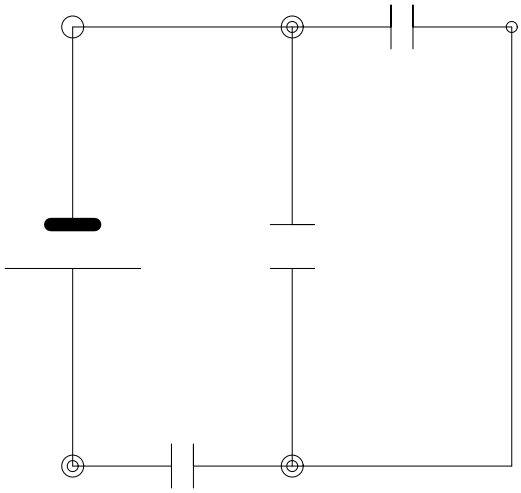
4. In the circuit below $V = 10\,volt$, $C_1 = C_2 = C_3 = 1\,\mu F$.



   (a) Find C_{eq} and charge taken from the battery

   (b) Find V_1 , V_2 , V_3 , q_1 , q_2 , q_3

5. In the circuit below $V = 10\,volt$, $C_1 = C_2 = C_3 = 1\,\mu F$.



   (a) Find C_{eq} and charge taken from the battery

   (b) Find V_1 , V_2 , V_3 , q_1 , q_2 , q_3