Capacitor Structure Practice Problems

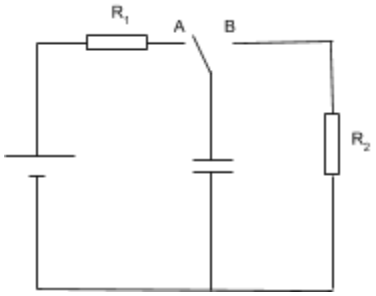
1. Calculate the voltage required to store 7.2×10^{-5} C of charge on a 6.0 μF capacitor.

2. A parallel plate capacitor has a capacitance of 10 μF.
   a. Determine the capacitance if the area doubles.
   b. Determine the capacitance if the spacing between doubles.
   c. Determine how the capacitance will change if the dielectric between the plates is doubled.

3. A parallel plate capacitor of 7.0 μF when filled with a dielectric. The area of each plate is 1.5 m^2 and the separation between the plates is 1.0×10^{-5} m. Calculate the dielectric constant of the dielectric.

4. A capacitor has a capacitance of 2.5×10^{-8} F. In the charging process, electrons are removed from the positive plate and added to the negative plate. Determine the number of electrons transferred when the potential difference between the plates is 45 V.

5. In the circuit to the right, the ideal battery has a potential difference of 6.0 volts. R_1 = 1000 **Ω** and R_2 = 100 **Ω**. The capacitor has a capacitance of 5.0 μF. The capacitor begins uncharged.



   a. What is the current out of the power supply when the switch is originally turned to the A position?
   b. Sketch the graph of the potential difference across R_1 from the moment the switch is turned to the A position until much later.
   c. Sketch the graph of the potential difference across the capacitor from the moment the switch is turned to the A position until much later.
   d. How much energy is stored in the capacitor when it is fully charged?
   e. Calculate the current through R_2 immediately after the switch is flipped to position B.
   f. Sketch the graph of the potential difference across R_2 from the moment the switch is turned to the B position until much later.
   g. What happened to the energy that was stored in the capacitor?
   h. Compare the time to charge the capacitor to the time to discharge. Explain your reasoning.