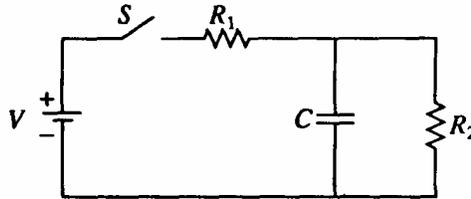AP Physics C Review 17 Capacitors

1.   A 10 nF parallel-plate capacitor holds a charge of 50 μC on each plate.
     a. What is the potential difference between the plates?
   b. If a distance of 0.2 mm separates the plates, what is the area of each plate?

In the circuit shown above, the battery supplies a constant voltage V when the switch S is closed. The value of the capacitance is C, and the value of the resistances are R_1 and R_2.

2. Immediately after the switch is closed, the current supplied by the battery is
    A) $V/(R_1 + R_2)$ B) V/R_1 C) V/R_2 D) $V(R_1 + R_2)/R_1R_2$ E) zero

3. A long time after the switch has been closed, the current supplied by the battery is
    A) $V/(R_1 + R_2)$ B) V/R_1 C) V/R_2 D) $V(R_1 + R_2)/R_1R_2$ E) zero

4.   a) Find the equivalent capacitance for the circuit.
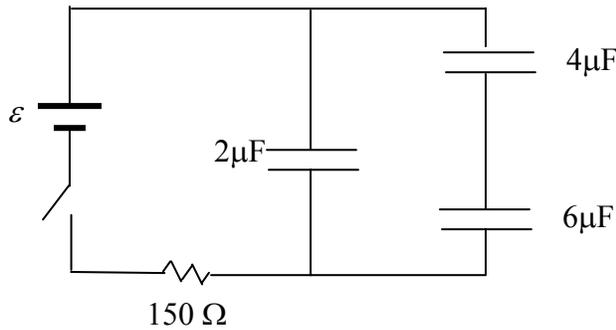
b) If $\varepsilon = 6$ V and the switch is closed, what is the current through the resistor?

c) If the switch is closed for a while, find the charge on each capacitor.

3. A uniform electric field **E** is established between two capacitor plates, each of area A, which are separated by a distance **s** as shown below.
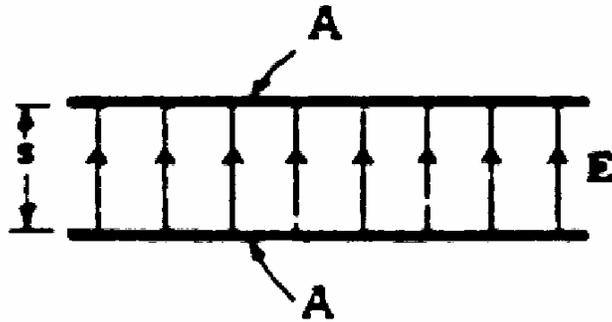
(a) What is the electric potential difference V between the plates?

(b) Specify the sign of the charge on each plate.

The capacitor shown is then connected electrically through a resistor to a second parallel-plate capacitor, initially uncharged, whose plates have the same area A but a separation of only **s**/2.

(c) Indicate on the diagram below the direction of the current in each wire, and explain why the current will eventually cease.
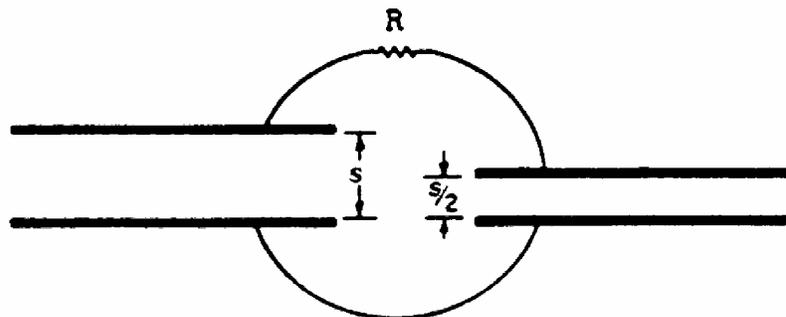
(d) After the current has ceased, which capacitor has the greater charge? Explain you reasoning.

(e) The total energy stored in the two capacitors after the current has ceased is less then the initial stored energy. Explain qualitatively what has become of this "lost" energy.