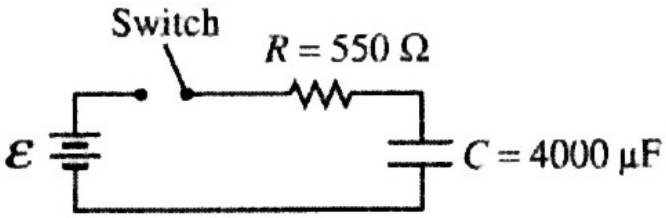
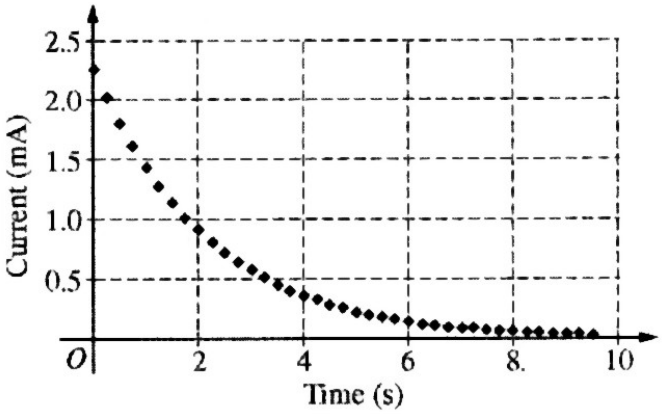
AP Physics C Test #10 Pretest Problem Name _____

Period _____



A student sets up the circuit above in the lab. The values of the resistance and capacitance are as shown, but the constant voltage ε delivered by the ideal battery is unknown. At time t = 0, the capacitor is uncharged and the student closes the switch. The current as a function of time is measured using a computer system, and the following graph is obtained.

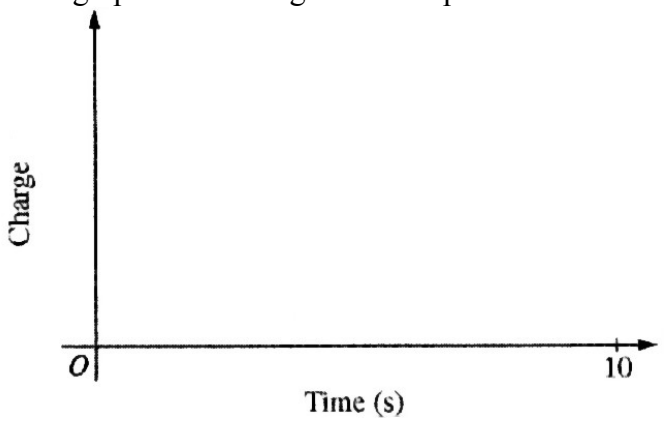


(a) Using the data above, calculate the battery voltage ε.

(b) Calculate the voltage across the capacitor at time t = 4.0 s.

(c) Calculate the charge on the capacitor at t = 4.0 s.

(d) On the axes below, sketch a graph of the charge on the capacitor as a function of time.



(e) Calculate the power being dissipated as heat in the resistor at t = 4.0 s.

(f) The capacitor is now discharged, its dielectric of constant $\kappa = 1$ is replaced by a dielectric of constant $\kappa = 3$, and the procedure is repeated. Is the amount of charge on one plate of the capacitor at t = 4.0 s now greater than, less than, or the same as before?

_____Greater than _____Less than _____The same

Justify your answer.