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ID# \_\_\_\_\_ Seat \_\_\_\_\_

U of W Physics 122 Unit #4 Name \_\_\_\_\_

Last

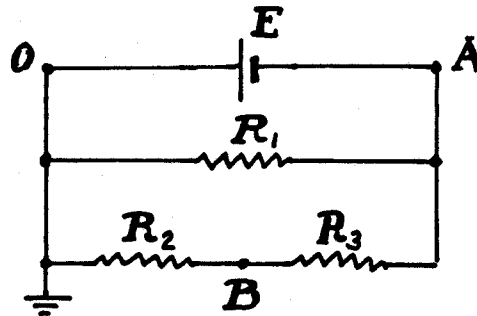
First

Initial

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Signature \_\_\_\_\_

**Part I:** The figure represents an electric circuit with three *equal* resistors:  $R_1$ ,  $R_2$ , and  $R_3$ . There is also a battery with negligible internal resistance and electromotive force  $E$ . The circuit is grounded as shown. The voltages at points  $A$ ,  $B$  are given below. The battery current is  $I$ .



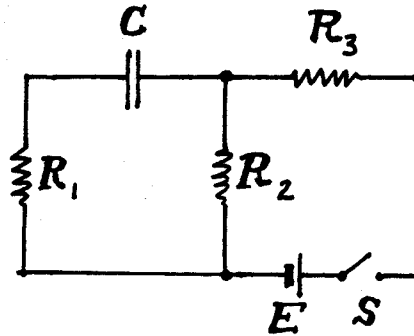
$$V_A = -8.00 \text{ Volts} \quad V_B = -4.00 \text{ Volts} \quad I = 2.70 \text{ mA}$$

1. (2) What is the voltage at point  $O$ ? (In Volts.)
2. (2) What is the electromotive force  $E$ ? (In Volts.)
3. (2) What is  $R_1$ ? (In  $k\Omega$ .)
4. (2) What is the current in  $R_2$ ? (In  $mA$ .)

Answer questions 5 through 8 by indicating whether the current through  $R_1$  will increase, decrease, or remain the same when the specified change is made. After each change the original conditions are restored before the next change is made.

5. (2) The circuit is broken at point  $B$ .
6. (2) Another equal electromotive force  $E$  is connected in series with the first.
7. (2)  $R_1$  is decreased.
8. (2)  $R_3$  is shorted out.

**Part II:** Switch  $S$  in the circuit shown at the right has been *open* for a very long time. The battery has electromotive force  $E$  and negligible internal resistance.



$$R_1 = R_2 = R_3 = 5.50 \text{ M}\Omega \quad E = 3.00 \text{ Volts} \quad C = 0.250 \text{ nF}$$

1. (2) What is the battery current? (In  $\mu\text{A}$ .)
2. (2) What is the voltage across  $R_2$ ? (In  $\text{Volts}$ .)
3. (2) What is the charge on the capacitor  $C$ ? (In  $\mu\text{C}$ .)

Now switch  $S$  is closed. After 200 seconds,

4. (2) What is the current in  $R_2$  (In  $\mu\text{A}$ .)
5. (2) What is the capacitor voltage? (In  $\text{Volts}$ .)

Next, switch  $S$  is opened again. After 2.5 seconds,

6. (2) What is the current in  $R_2$  (In  $\mu\text{A}$ .)
7. (2) What is the capacitor voltage? (In  $\text{Volts}$ .)