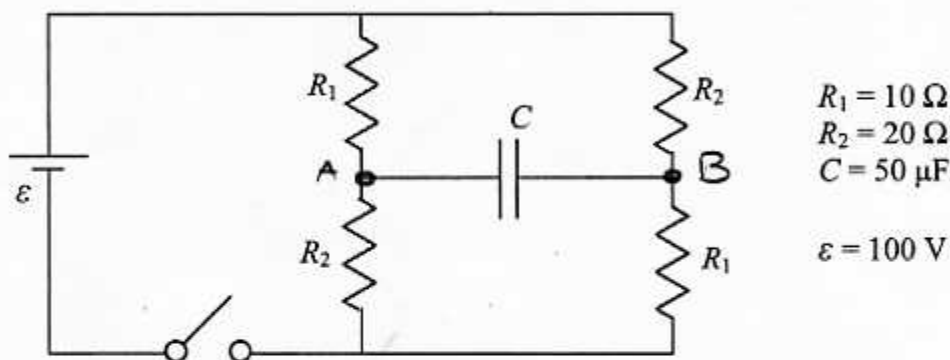


Name: _____ Section: _____

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Quiz 8A

In the circuit below, the switch is originally open and the capacitor is uncharged. At $t = 0$, the switch is closed.



a. What is the current through the battery right after the switch is closed?

↳ C is like a wire



$$R_{eq} = 2 \frac{1}{\frac{1}{R_1} + \frac{1}{R_2}} = \frac{2R_1R_2}{R_1 + R_2} = 13.3 \Omega$$

$$I = \frac{100V}{13.3\Omega} = \boxed{7.5 A}$$

b. "A long time after the switch has been closed, the potential difference across the capacitor is ϵ ". True or false? Explain.

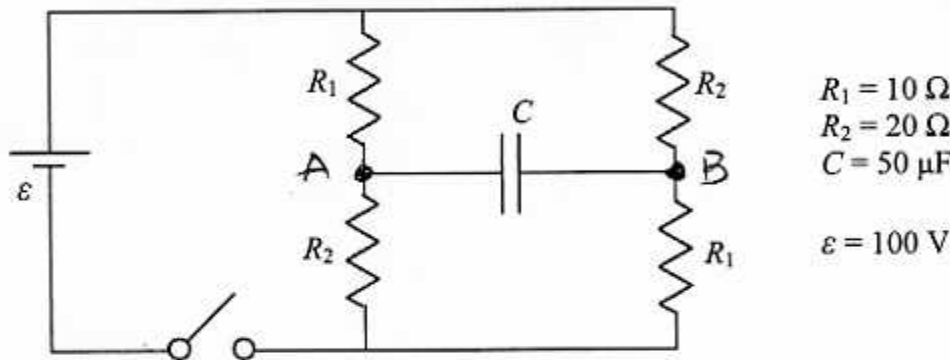
False. $|V_A - V_B| \neq \epsilon$ because there is a current through the resistors located between A/B and the battery.

$$|V_A - V_B| < \epsilon$$

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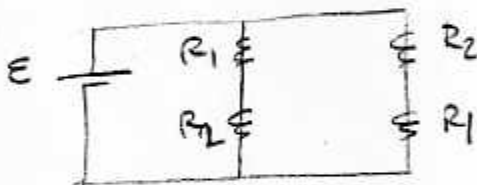
Quiz 8B

In the circuit below, the switch is originally open and the capacitor is uncharged. At $t = 0$, the switch is closed.



- a. What is the current through the battery a long time after the switch is closed?

$\hookrightarrow C$ is like an open switch



$$R_{eq} = \frac{1}{\frac{1}{R_1+R_2} + \frac{1}{R_2+R_1}} = 15 \Omega$$

$$I = \frac{100V}{15\Omega} = \boxed{6.7A}$$

- b. "A long time after the switch has been closed, the potential difference across the capacitor is ϵ ". True or false? Explain.

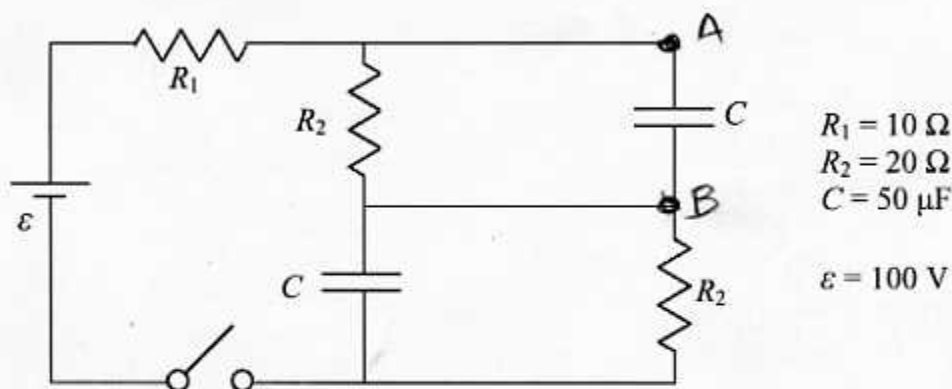
False. $|V_A - V_B| \neq \epsilon$ because there is a current through the resistors located between A/B and the battery.

$$|V_A - V_B| < \epsilon$$

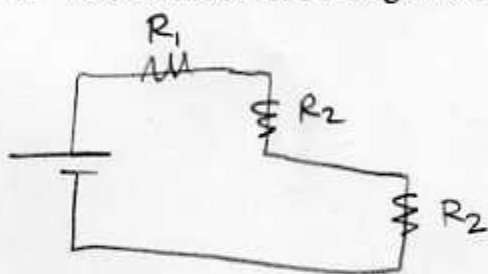
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Quiz 8C

In the circuit below, the switch is originally open and the capacitors are uncharged. At $t = 0$, the switch is closed.



- a. What is the current through the battery a long time after the switch is closed?



\hookrightarrow C is like an open switch

$$R_{\text{eq}} = R_1 + 2R_2 = 50 \Omega$$

$$I = \frac{100\text{V}}{50 \Omega} = \boxed{2 \text{ A}}$$

- b. "A long time after the switch has been closed, the potential difference across each capacitor is $\varepsilon/2$ ". True or false? Explain.

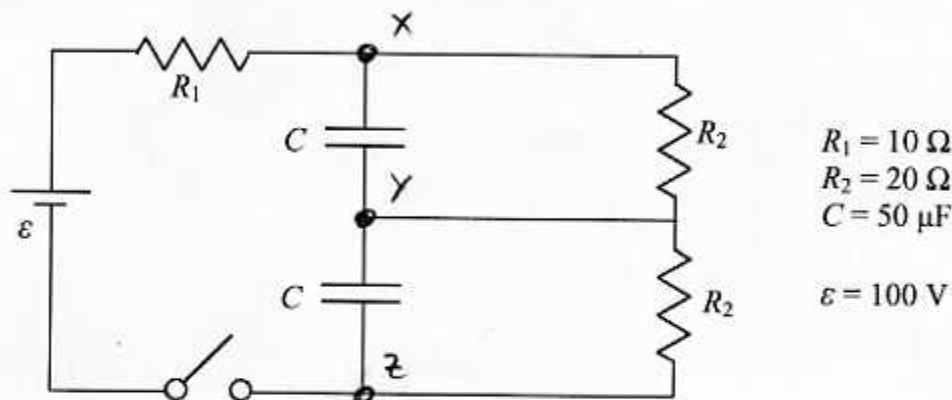
False. $V_A - V_B = IR_2 = (2 \text{ A})(20 \Omega) = 40 \text{ V} < \varepsilon/2$
(50V)

Same this ΔV across the other capacitor

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Quiz 8D

In the circuit below, the switch is originally open and the capacitors are uncharged. At $t = 0$, the switch is closed.



- a. What is the current through the battery a long time after the switch is closed?

$\hookrightarrow C$ is like an open switch

$R_{\text{eq}} = R_1 + 2R_2 = 50 \Omega$

$I = \frac{100\text{V}}{50\Omega} = \boxed{2\text{A}}$

- b. "A long time after the switch has been closed, the charge in each capacitor is $\varepsilon C/2$ ". True or false? Explain.

False. The potential difference between the plates of the top capacitor is

$$V_X - V_Y = IR_2 = (2\text{A})(20\Omega) = 40\text{V} < \frac{\varepsilon}{2} (50\text{V})$$

Same for the other capacitor.