Unit Exam II: Problem #1 (Spring '07)

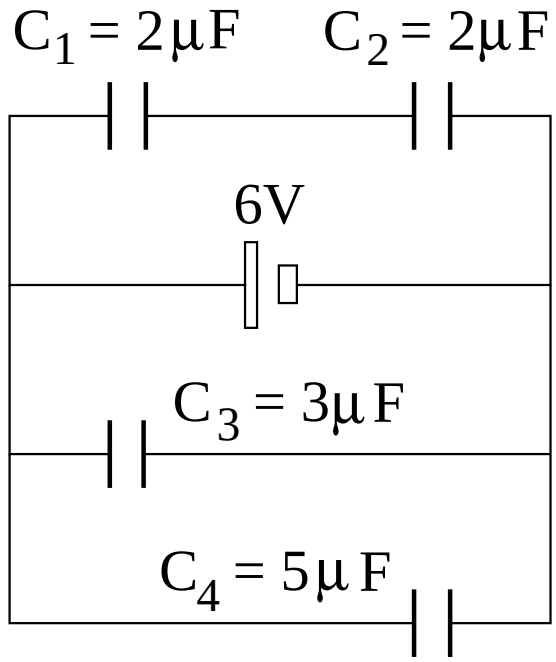
Consider the configuration of two point charges as shown.

(a) Find the energy U_3 stored on capacitor C_3.

(b) Find the voltage V_4 across capacitor C_4.

(c) Find the voltage V_2 across capacitor C_2.

(d) Find the charge Q_1 on capacitor C_1.



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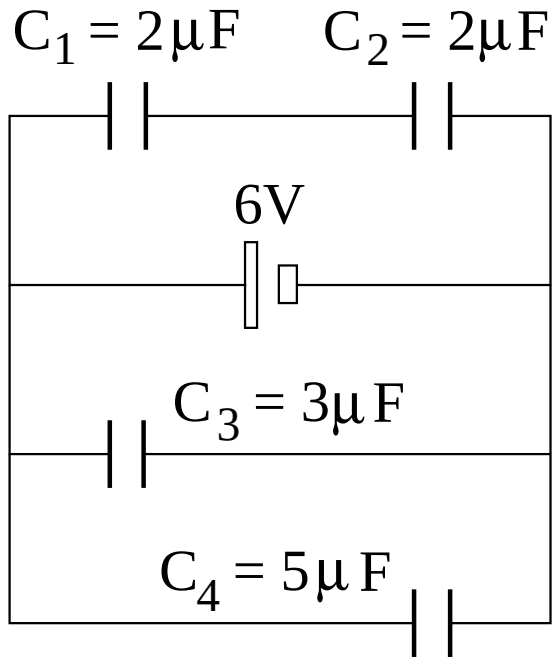


Solution:

(a) $U_3 = \frac{1}{2}(3\mu\text{F})(6\text{V})^2 = 54\mu\text{J}.$

(b) $V_4 = 6\text{V}.$

(c) $V_2 = \frac{1}{2}6\text{V} = 3\text{V}.$

(d) $Q_1 = (2\mu\text{F})(3\text{V}) = 6\mu\text{C}.$

Unit Exam II: Problem #2 (Spring '07)

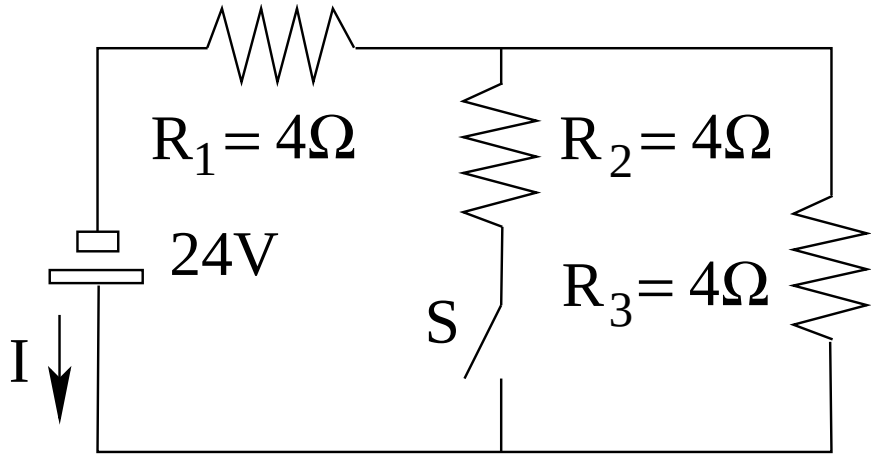
Consider the electric circuit shown.

(a) Find the current I when the switch S is open.

(b) Find the power P_3 dissipated in resisistor R_3 when the switch is open.

(c) Find the current I when the switch S is closed.

(d) Find the power P_3 dissipated in resisistor R_3 when the switch is closed.



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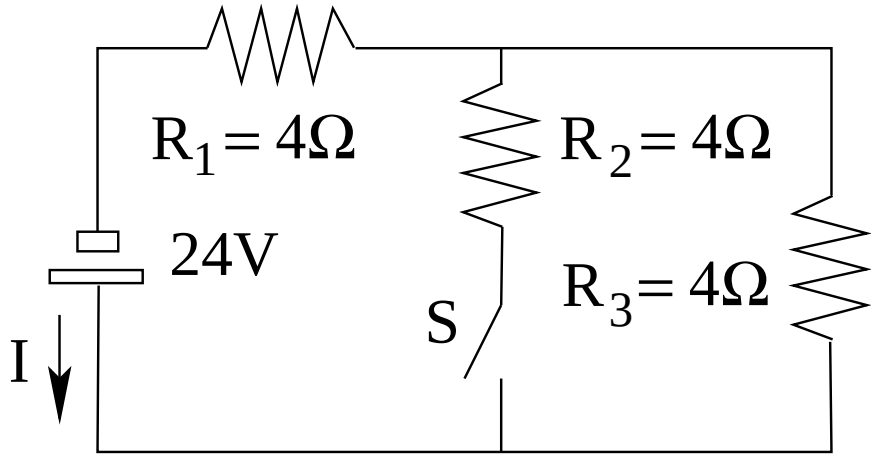


Solution:

(a) $I = \dfrac{24\text{V}}{8\Omega} = 3\text{A}.$

(b) $P_3 = (3\text{A})^2(4\Omega) = 36\text{W}.$

(c) $I = \dfrac{24\text{V}}{6\Omega} = 4\text{A}.$

(d) $P_3 = (2\text{A})^2(4\Omega) = 16\text{W}.$

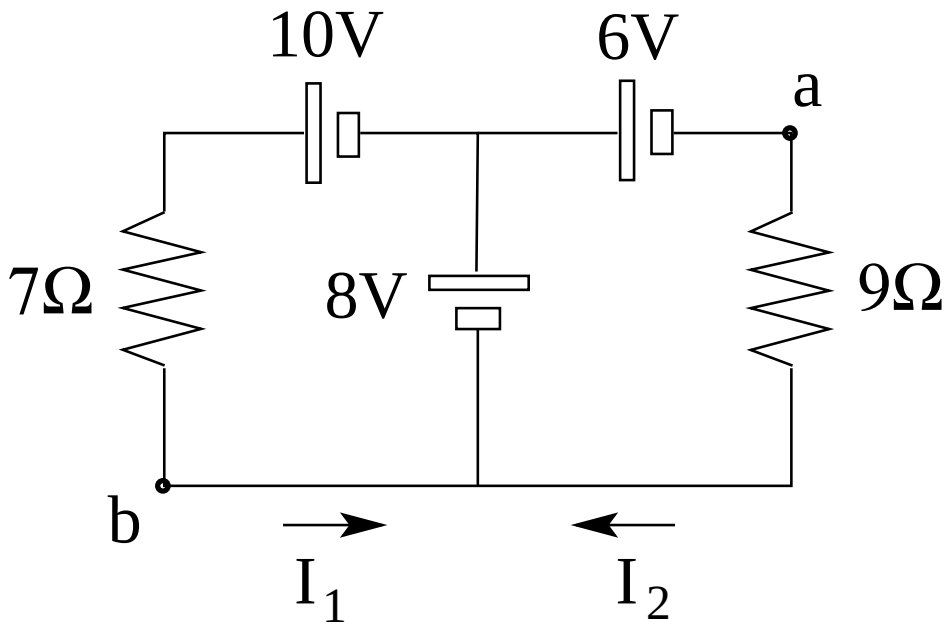
Unit Exam II: Problem #3 (Spring '07)

Consider the two-loop circuit shown.

(a) Find the current I_1.

(b) Find the current I_2.

(c) Find the potential difference $V_a - V_b$.



Unit Exam II: Problem #3 (Spring '07)

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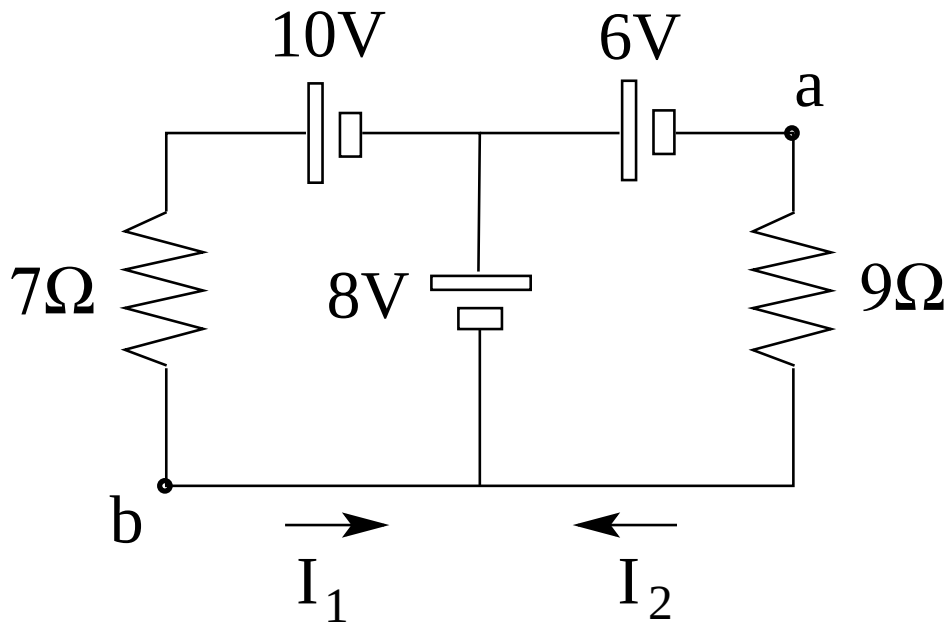
(a) Find the current I_1.

(b) Find the current I_2.

(c) Find the potential difference $V_a - V_b$.



Solution:

(a) $I_1 = \dfrac{8\text{V} + 10\text{V}}{7\Omega} = 2.57\text{A}.$

(b) $I_2 = \dfrac{8\text{V} - 6\text{V}}{9\Omega} = 0.22\text{A}.$

(c) $V_a - V_b = 8\text{V} - 6\text{V} = 2\text{V}.$