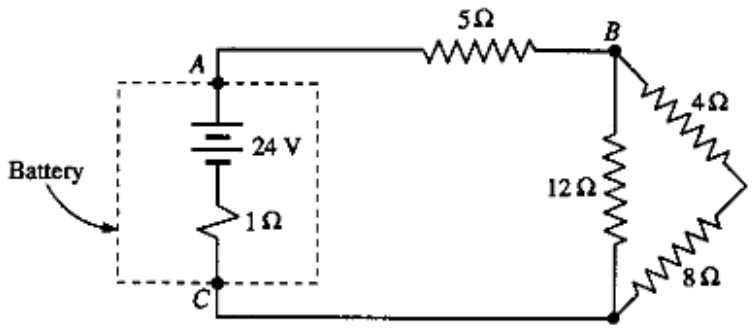
AP Physics 2 – Chapter 18 Circuit Homework



A battery with an emf of 24 volts and an internal resistance of 1 ohm is connected to an external circuit as shown above.

Determine each of the following:

(a) the equivalent resistance of the combination of the 4-ohm, 8-ohm, and 12-ohm resistors

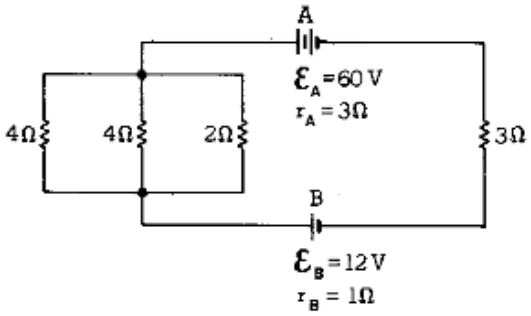
(b) the current in the 5-ohm resistor

(c) the terminal voltage, V_{AC}, of the battery

(d) the rate at which energy is dissipated in the 12-ohm resistor

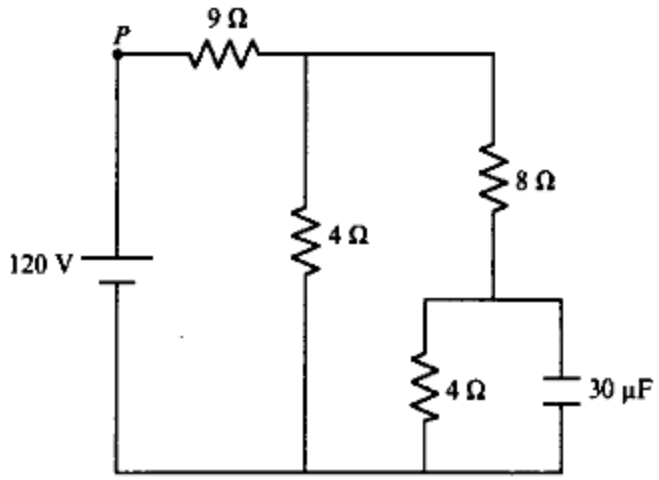
(e) the magnitude of the potential difference V_{BC}

(f) the power delivered by the battery to the external circuit



A circuit consists of battery A of emf $\mathcal{E}_A$ = 60 volts and internal resistance r_A = 3 ohms; battery B of emf $\mathcal{E}_B$ = 12 volts and internal resistance r_B = 1 ohm; and four resistors connected as shown in the diagram above.

(a) Calculate the current in the 2-ohm resistor.
(b) Calculate the power dissipated in the 3-ohm resistor.
(c) Calculate the terminal voltage of battery B.



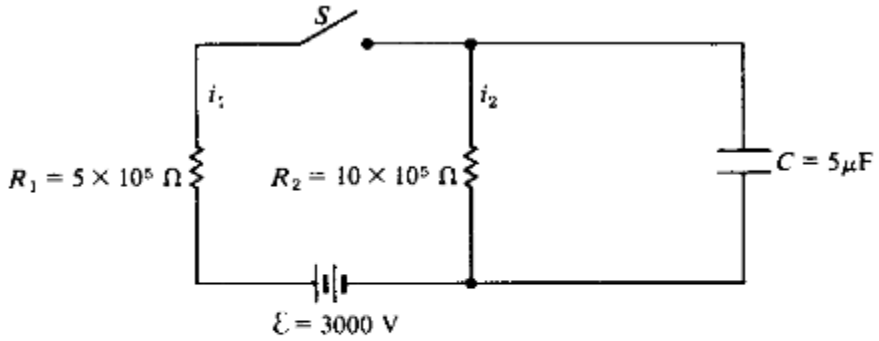
In the circuit shown above, the battery has been connected for a long time so that the currents have steady values. Given these conditions, calculate each of the following.

(a) The current in the 9-ohm resistor

(b) The current in the 8-ohm resistor

(c) The potential difference across the 30-microfarad capacitor

(d) The energy stored in the 30-microfarad capacitor



In the circuit shown above, i_1 and i_2 are the currents through resistors R_1 and R_2, respectively. V_1, V_2, and V_c are the potential differences across resistor R_1, resistor R_2, and capacitor C, respectively. Initially the capacitor is uncharged.

(a) Calculate the current i_1 immediately after switch S is closed.

Assume switch S has been closed for a long time.

(c) Calculate the current i_2.

(d) Calculate the charge Q on the capacitor.

(e) Calculate the energy U stored in the capacitor.