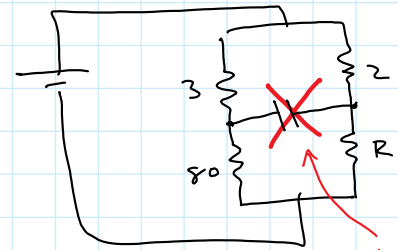
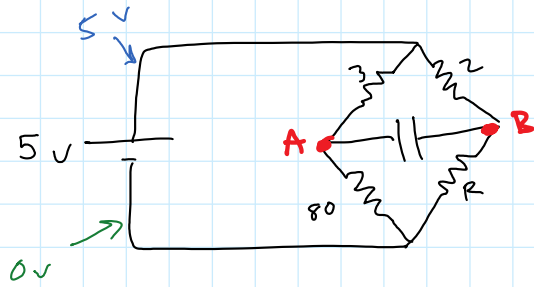


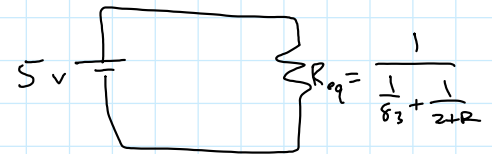
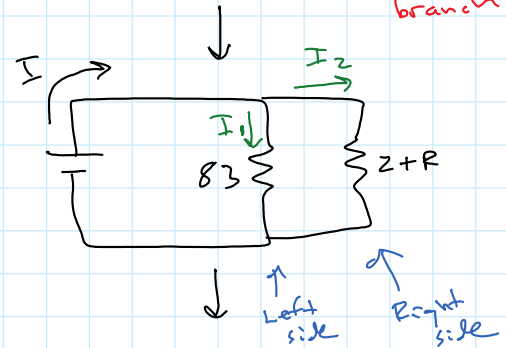
Book Problem 28-70



if we know V_{AB}

then

$$Q = C V_{AB}$$



$$V = IR$$

$$I = \frac{V}{R_{eq}} = 5 \left(\frac{1}{83} + \frac{1}{2+R} \right)$$

$$V = IR$$

for both sides

Left side

Right side

$$5 = I_1 (83)$$

$$I_1 = \frac{5}{83} \text{ A}$$

$$5 = I_2 (2+R)$$

$$I_2 = \frac{5}{2+R} \text{ A}$$

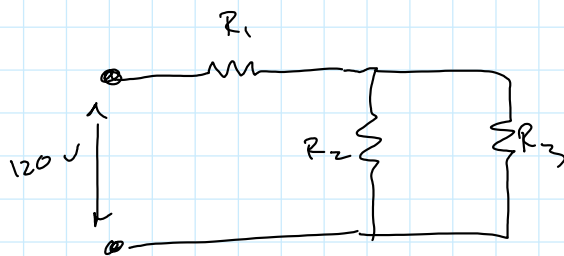
$$V_A = 5 - I_1 (3) = 5 - \left(\frac{5}{83} \right) (3) = 5 - \frac{15}{83}$$

$$V_B = 5 - I_2 (2) = 5 - \left(\frac{5}{2+R} \right) (2) = 5 - \frac{10}{2+R}$$

$$|V_{AB}| = |V_A - V_B| = \left| -\frac{15}{83} + \frac{10}{2+R} \right|$$

$$Q = C V_{AB} = (3 \times 10^{-6}) \left| -\frac{15}{83} + \frac{10}{2+R} \right|$$

28-72 (with some changes)



bulbs
 $R_1 \rightarrow 40 \text{ W}$
 $R_2 \rightarrow 60 \text{ W}$
 $R_3 \rightarrow 100 \text{ W}$

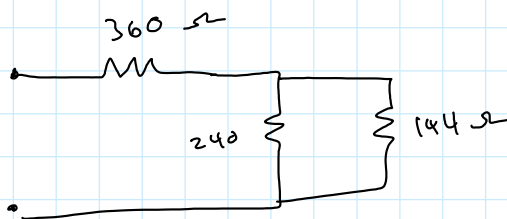
Find R for each light bulb:

$$P = \frac{V^2}{R} \Rightarrow R = \frac{V^2}{P}$$

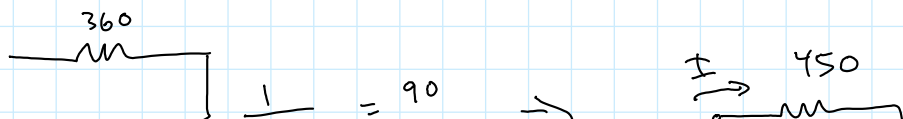
$$R_1 = \frac{120^2}{40} = 360 \Omega$$

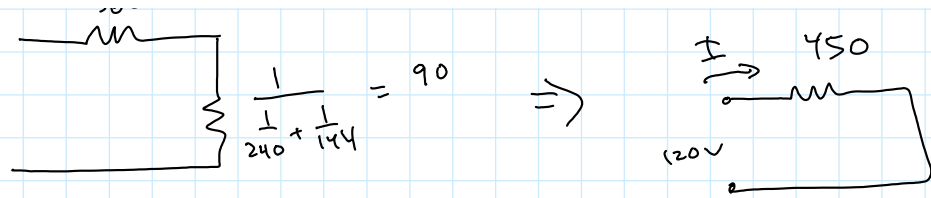
$$R_2 = \frac{120^2}{60} = 240 \Omega$$

$$R_3 = \frac{120^2}{100} = 144 \Omega$$



↓





$$V = I R$$

$$120 = I (450 \Omega)$$

$$I_{\text{total}} = \frac{4}{15} \text{ A} = I_1$$

$$\begin{aligned} V_1 &= I_1 R_1 \\ &= \frac{4}{15} (360) \\ &= 96 \text{ V} \end{aligned}$$

$$\text{so, } V_2 = V_3 = 120 - 96 = 24 \text{ V}$$

$$I_2 = \frac{V_2}{R_2} = \frac{24}{240} = \frac{1}{10}$$

$$I_3 = \frac{V_2}{R_3} = \frac{24}{144} = \frac{1}{6}$$

$$\left. \begin{aligned} I_2 + I_3 &= I_1 \\ \frac{1}{10} + \frac{1}{6} &= \frac{4}{15} \quad \checkmark \end{aligned} \right\}$$

$$P_1 = I_1 V_1 = \left(\frac{4}{15}\right) (96) = 25.6 \text{ W}$$

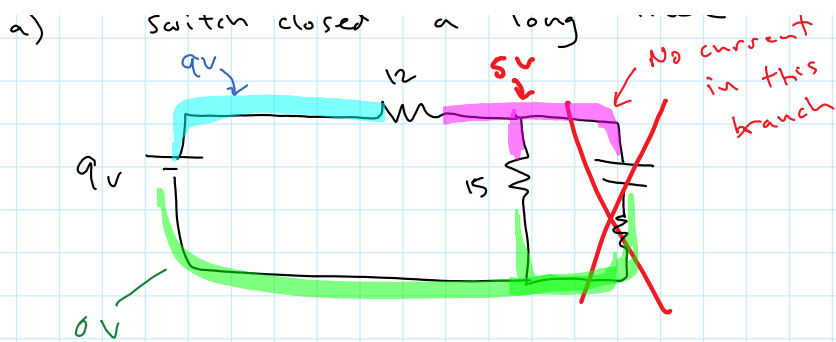
$$P_2 = I_2 V_2 = \left(\frac{1}{10}\right) (24) = 2.4 \text{ W}$$

$$P_3 = I_3 V_3 = \left(\frac{1}{6}\right) (24) = 4 \text{ W}$$

$$\text{Total Power} = 32 \text{ W}$$

28-75

a) switch closed a long time



$$I_3 = 0$$



$$V = IR$$

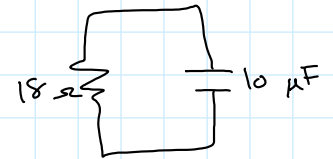
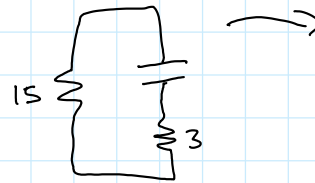
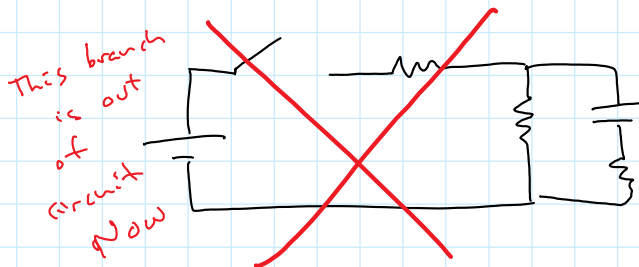
$$9 = I(12 + 15)$$

$$I_{12} = I_{15} = \frac{9}{27} = \frac{1}{3} \text{ A}$$

so, find Q

$$\begin{aligned} Q &= CV \\ &= (10 \mu\text{F})(5 \text{ V}) \\ &= 50 \mu\text{C} \end{aligned}$$

b) open switch



$$q = Q_0 e^{-\frac{t}{RC}}$$

discharging cap.

$$50 \mu\text{C}$$

$$R = 18 \Omega$$

u - u -

$$R = 18 \Omega$$

$$C = 10 \mu F$$