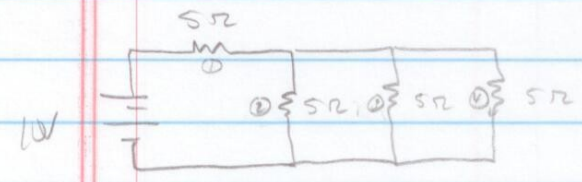
Ch 23 25, 52

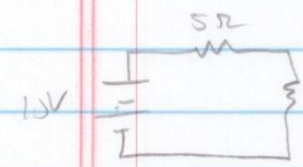


Find the current through and potential difference across each resistor

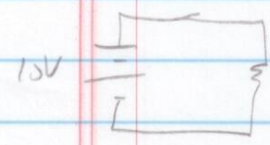
1. Reduce the circuit to one equivalent resistor

The 3 resistors on the right are in parallel

$\frac{1}{5} + \frac{1}{5} + \frac{1}{5} = \frac{1}{R_{234}}$ $R_{234} = 5/3\ \Omega$



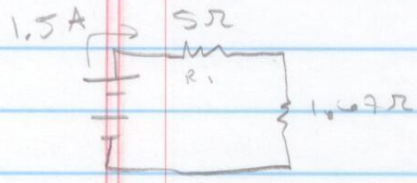
Now 5Ω & 5/3Ω resistor are in series $R_{eq} = 5\Omega + 5/3\ \Omega = 20/3\ \Omega$



2. Now you can find the total current flowing in the circuit

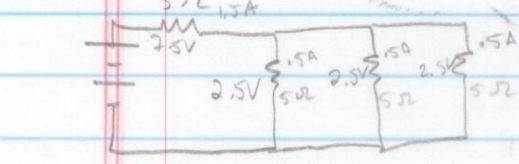
$V = IR$ so $I = V/R = 10V/6.67\Omega = \underline{1.5\ A}$

3. Now build back out



$\Delta V_1 = I_1 R_1 = 1.5A\ 5\Omega = \underline{7.5V}$

$\Delta V_{234} = I_{234} R_{234} = 1.5A\ 1.67\Omega = \underline{2.5V}$



$\Delta V_{234} = \Delta V_2 = \Delta V_3 = \Delta V_4$ because they are in parallel

$I_2 = V_2/R_2 = 2.5V/5\Omega = \underline{0.5A}$

$I_3 = V_3/R_3 = 2.5V/5\Omega = \underline{0.5A}$

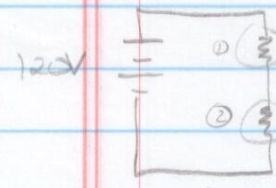
$I_4 = V_4/R_4 = 2.5V/5\Omega = \underline{0.5A}$

52. Two 75W lightbulbs are wired in series, then the combination is attached to a 120V supply. How much power is dissipated by each bulb?

A bulb that is marked 75W is assuming that it's supplied directly with 120V as it would be in a North American residence.

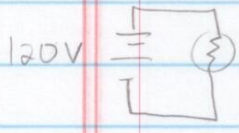
Find the resistance of a 75W bulb, then you can build the circuit.

$P = V^2/R$ so $R = V^2/P = \frac{(120V)^2}{75W} = 192\Omega$



Find current through the circuit and then use $P = I^2R$

$R_{TOT} = 192\Omega + 192\Omega = 384\Omega$



$I = V/R = 120V/384\Omega = 0.3125A$

$P_1 = (0.3125A)^2\ 192\Omega = \boxed{18.75W}$

$P_2 = (0.3125A)^2\ 192\Omega = 18.75W$