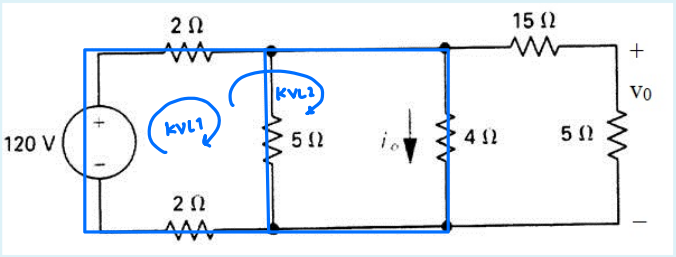


P3.04_6ed

a) Find the equivalent resistance seen by the source.

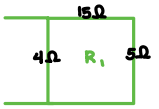
R_{Eq} = 6 ✔ Ω (Ohm)

b) Find the current i_0 through the 4 Ω (Ohm) resistor.

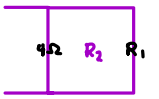
i_0 = 10 ✔ A

c) Find the voltage v_0.

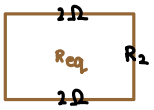
v_0 = 10 ✔ V



$R_1 = \frac{(4\Omega)(15\Omega+5\Omega)}{4\Omega+(15\Omega+5\Omega)} = \frac{10}{3}\Omega$



$R_2 = \frac{(5\Omega)(R_1)}{5\Omega+R_1} = \frac{(5\Omega)(\frac{10}{3}\Omega)}{5\Omega+\frac{10}{3}\Omega} = 2\Omega$



$R_{eq} = 2\Omega + R_2 + 2\Omega$

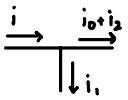
$= 2\Omega + 2\Omega + 2\Omega = 6\Omega$

KVL2: $-120V + i(2\Omega) + i_o(4\Omega) + i(2\Omega) = 0$

$i_o = \frac{120 - 2[(20)(2\Omega)]}{4\Omega} = 10\ A$

KVL1: $-120V + 80V + i_1(5\Omega) = 0$

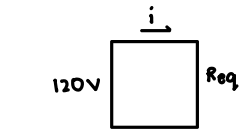
$i_1 = 8\ A$



$i = i_1 + i_o + i_2$

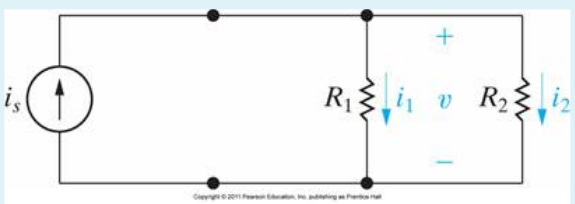
$i_2 = 20 - 8 - 10 = 2\ A$

$V_o = (2A)(5\Omega) = 10\ V$



$V = iR$

$i = V/R = 120/6 = 20A$



CQ3.06a

Given:

i_s = 58 Amps R_1 = 262 Ω (Ohms) R_2 = 714 Ω (Ohms)

Find the current i_1.

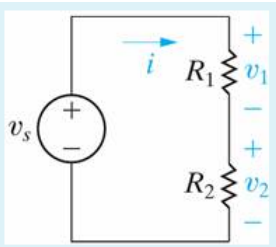
Answer: 42.43 ✔

$V = i_1R_1 = i_2R_2$

$i_sR_{eq} = i_1R_1 = i_2R_2$

$i_s\left(\frac{R_1R_2}{R_1+R_2}\right) = i_1R_1 = i_2R_2$

$i_1 = \frac{i_sR_2}{R_1+R_2} = \frac{(58\ A)(714\ \Omega)}{262\Omega+714\Omega} = 42.43\ A$



CQ3.05a

Given:

vs = 88 Volts R1 = 167 Ω (Ohms) R2 = 205 Ω (Ohms)

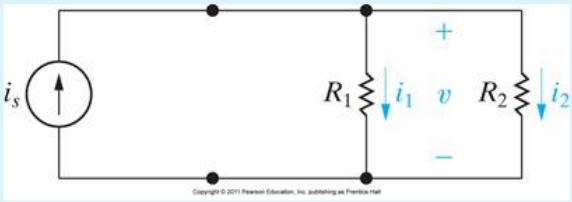
Find the voltage v_1.

Answer: 39.51 ✔

$V = iR \rightarrow i = V/R$

$i = i_1 = i_2$

$\frac{V_s}{R_{eq}} = \frac{V_1}{R_1}$ $V_1 = \frac{V_sR_1}{R_1+R_2} = \frac{(88)(167)}{167+205} = 39.51\ V$



CQ3.06b

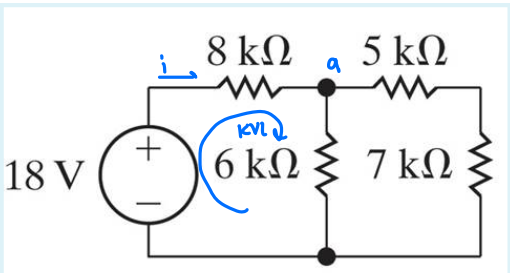
Given:

i_s = 13 Amps R_1 = 275 Ω (Ohms) R_2 = 262 Ω (Ohms)

Find the current i_2.

Answer: 6.66 ✔

$$i_2 = \frac{i_s R_1}{R_1 + R_2} = \frac{(13\ A)(275\ \Omega)}{275\Omega + 262\Omega} = 6.66\ A$$



P3.23_10ed

a) Use voltage division to find the voltage across the 6kΩ (kilo Ohm) resistor, positive at the top.

$V_{6k\Omega}$ = 6 ✔ Volts

b) Use $V_{6k\Omega}$ from part a) and voltage division to find the voltage across the 5 kΩ (kilo Ohm) resistor.

$V_{5k\Omega}$ = 2.5 ✔ Volts

$$R_{eq} = 8k\Omega + \frac{6k\Omega\,(5k\Omega + 7k\Omega)}{6k\Omega + (5k\Omega + 7k\Omega)} = 12\ k\Omega$$

$$i = 18V / 12\ k\Omega = 1.5 \times 10^{-3}\ A$$

KVL: $-18V + (1.5\times10^{-3}A)(8k\Omega) + V_{6k\Omega} = 0$

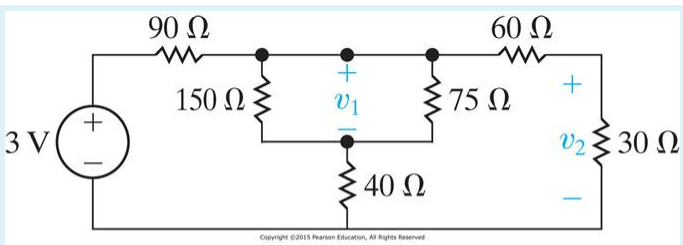
$$V_{6k\Omega} = 6\ V$$

$$i_{6k\Omega} = 1\times10^{-3}\ A$$

$$i = i_{6k\Omega} + i_{5k\Omega}$$

$$i_{5k\Omega} = 0.5\times10^{-3}\ A$$

$$V_{5k\Omega} = 2.5\ V$$

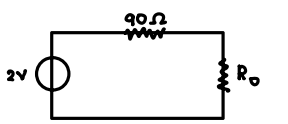


P3.30_10ed

Find the voltage v_1 and v_2 using voltage and/or current division.

v_1 = 0.56 ✔ Volts

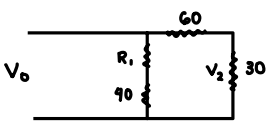
v_2 = 0.33 ✔ Volts



$$I_S = I_{90} = I_0$$

$$\frac{V_S}{R_{eq}} = \frac{V_0}{R_0}$$

$$V_0 = \frac{V_S R_0}{R_{eq}} = 3V\left[\frac{45\Omega}{45\Omega + 90\Omega}\right] = 1V$$



$$V_0 = V_{60+30}$$

$$I_{60+30} = I_{60} = I_{30}$$

$$\frac{V_{60+30}}{R_{60+30}} = \frac{V_2}{R_{30}}$$

$$V_2 = \frac{V_0 R_{30}}{R_{60+30}} = 1V\left[\frac{30}{60+30}\right] = \frac{1}{3}V = 0.33V$$

$$R_1 = 150\Omega \,||\, 75\Omega$$

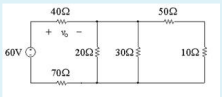
$$R_1 = \frac{(150)(75)}{150+75} = 50\Omega$$

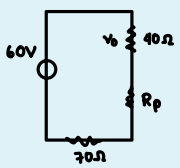
$$R_0 = \frac{(R_1+90)(60+30)}{(R_1+90)+(60+30)} = 45\Omega$$

$$V_0 = V_{R_1+90}$$

$$I_{R_1+90} = I_{R_1} = I_{90}$$

$$\frac{V_0}{R_1+90} = \frac{V_1}{50} \qquad V_1 = 1V\left[\frac{50\Omega}{50\Omega+90\Omega}\right] = \frac{5}{9}V \approx 0.56\ V$$





AP3.04_9ed

a) Use voltage division to determine the voltage v_0 across the 40 Ω (Ohm) resistor.

v_0 = 20 ✔ Volts

b) Use v_0 from part a) to determine the current through the 40 Ω (Ohm) resistor, and use this current and current division to calculate the current in the 30 Ω (Ohm) resistor.

$I_{30\Omega}$ = 166.67 ✔ mA (milli A)

c) How much power is absorbed by the 50 Ω (Ohm) resistor?

$P_{50\Omega}$ = +347.22 ✔ mW (milli W)

"-" = delivering and "+" = absorbing power

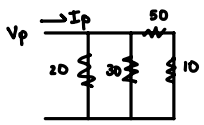
$$\frac{1}{R_p} = \frac{1}{20} + \frac{1}{30} + \frac{1}{50+10} \longrightarrow R_p = 10\Omega$$

$$I = I_{40\Omega}$$

$$\frac{60V}{R_{eq}} = \frac{V_0}{40\Omega}$$

$$V_0 = 60V\left[\frac{40\Omega}{40\Omega + R_p + 70\Omega}\right]$$

$$I_0 = V_0/40\Omega = \frac{20}{40} = 0.5\ A = I_p$$



$$V_p = I_p R_p = 5V$$

$$V_p = V_{30}$$

$$I_p R_p = I_{30} R_{30}$$

$$I_{30} = \frac{I_p R_p}{R_{30}} = \frac{(0.5)(10)}{30}$$

$$= 0.1667\ A \approx 166.67\ mA$$

$$V_p = V_{50+30}$$

A1.02_9ed

Given the following set of equations:

$25\ i_1 - 5\ i_2 - 20\ i_3 = 50$

$-5\ i_1 + 10\ i_2 - 4\ i_3 = 0$

$-5\ i_1 - 4\ i_2 + 9\ i_3 = 0$

Find the three currents.

i_1 = 29.6 ✔ A

i_2 = 26 ✔ A

i_3 = 28 ✔ A

A1.01_9ed

Given the following set of equations:

$1.7\ v_1 - 0.5\ v_2 = 10$

$-0.5\ v_1 + 0.6\ v_2 = 2$

Find the two voltages.

v_1 = 9.091 ✔ V

v_2 = 10.909 ✔ V

A1.08_9ed

Given this set of equations:

$$\frac{v_0 - 10V}{10\Omega} + \frac{v_0}{40\Omega} + \frac{v_0 - (-20i_\Delta)}{20\Omega} = 0$$

$$v_0\left(-\frac{1}{10\Omega}\right) + i_\Delta\left(-\frac{1}{3}\right) = -1.333$$

Find the voltage and current.

v_0 = 23.992 ✔ V

i_Δ = -3.1986 ✔ A

$I_{50\Omega} = I_{50}$

$\frac{V_0}{50\Omega + 10\Omega} = I_{50}$

$I_{50} = \frac{1}{12}$ A

$P = + (1/12)^2 (50) = 0.34722 \approx 347.22$ mW