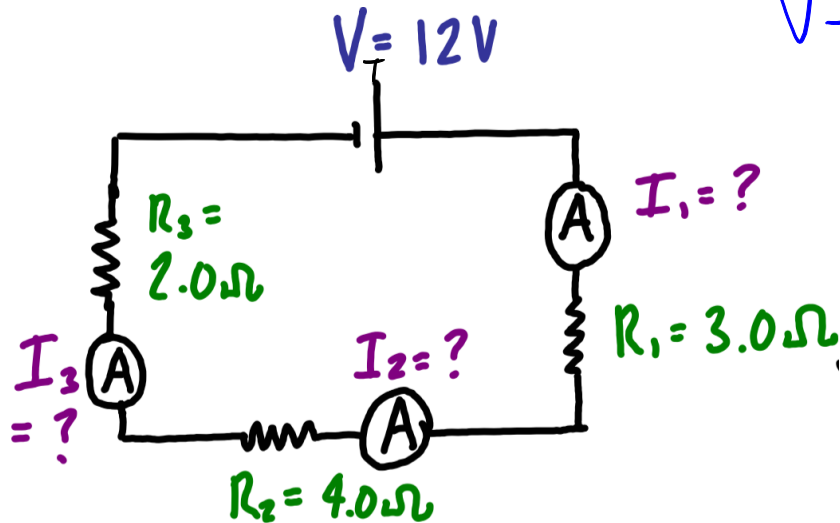


Worksheet 6.2 Kirchhoff's Laws

In class examples

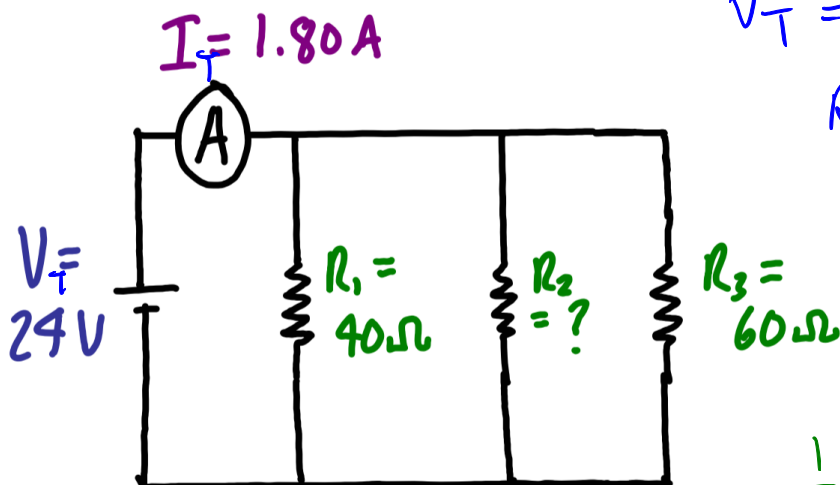
1) What are the values of I_1 , I_2 , and I_3 ?

$$V_T = I_T R_T$$

$$I_T = I_1 = I_2 = I_3$$

$$\begin{aligned} R_T &= R_1 + R_2 + R_3 \\ &= 3.0\Omega + 4.0\Omega + 2.0\Omega \\ &= 9.0\Omega \end{aligned}$$

$$I_T = \frac{V_T}{R_T} = \frac{12V}{9.0\Omega} = \boxed{1.3A}$$

2) What is the value of R_2 in the circuit below?

$$V_T = I_T R_T$$

$$R_T = \frac{V_T}{I_T} = \frac{24V}{1.80A} = 13.\overline{3}\Omega$$

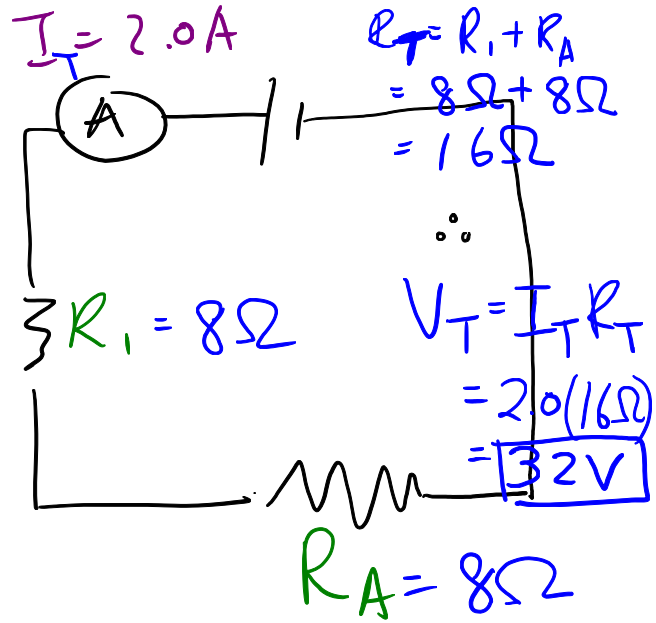
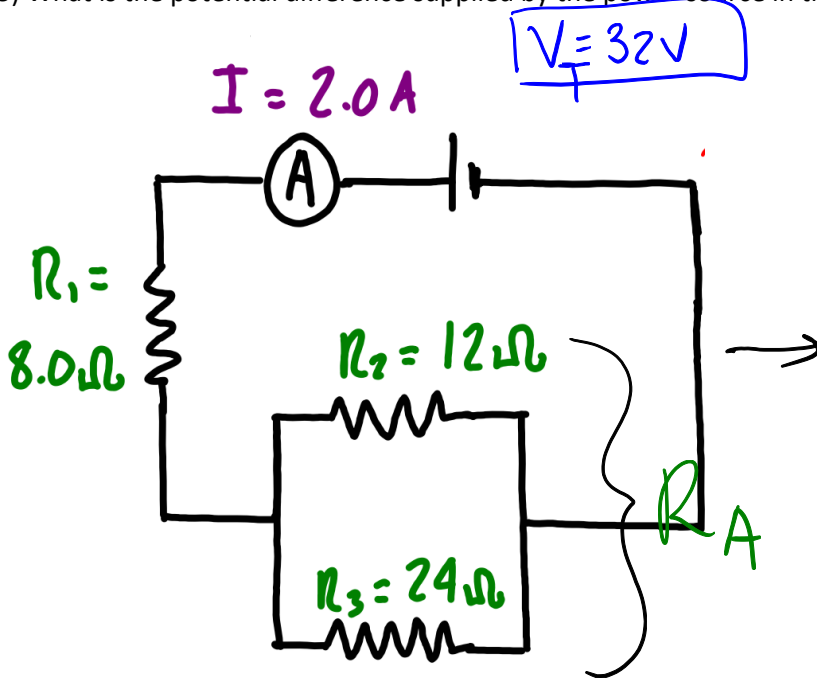
$$\frac{1}{R_T} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$$

$$\frac{1}{R_2} = \frac{1}{R_T} - \frac{1}{R_1} - \frac{1}{R_3}$$

$$\frac{1}{R_2} = \frac{1}{13.\overline{3}\Omega} - \frac{1}{40\Omega} - \frac{1}{60\Omega} = \frac{1}{15}$$

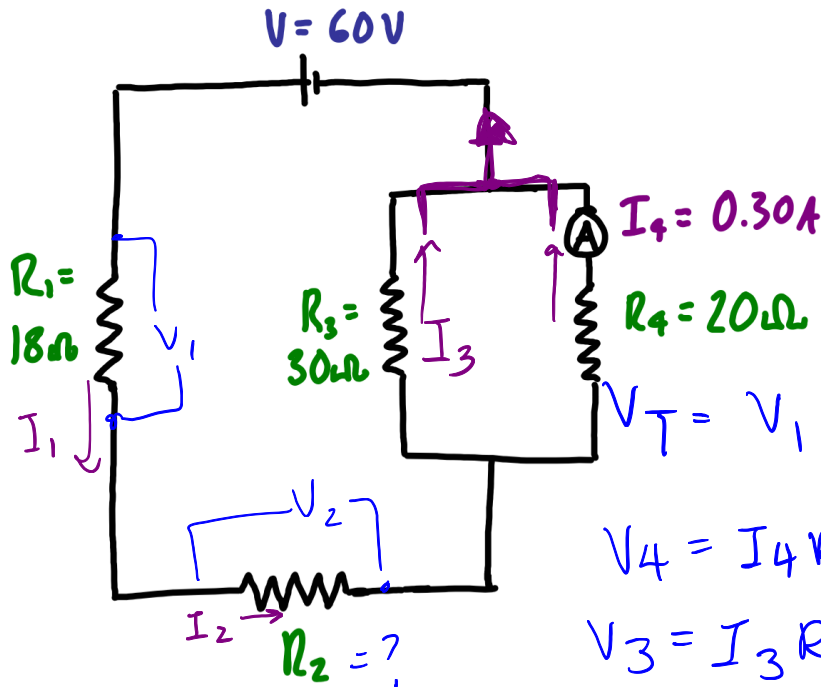
$$\boxed{R_2 = 15\Omega}$$

3) What is the potential difference supplied by the power source in this circuit?



$$\frac{1}{R_A} = \frac{1}{R_2} + \frac{1}{R_3} = \frac{1}{12\Omega} + \frac{1}{24\Omega} = \frac{1}{R_A}$$

4) What are the values of V_1 , V_2 , and R_2 in the circuit?



$$V_T = 60V = I_T R_T$$

$$I_1 = I_2$$

$$I_3 + I_4 = I_1 = I_2$$

$$V_T = V_1 + V_2 + V_3/V_4; V_4 = V_3$$

$$V_4 = I_4 R_4 = 0.30A (20\Omega) = 6V = V_3$$

$$V_3 = I_3 R_3 \rightarrow I_3 = \frac{V_3}{R_3} = \frac{6V}{30\Omega} = 0.20A = I_3$$

$$I_3 + I_4 = I_1 / I_2 = 0.20A + 0.30A = \underline{0.50A}$$

$$V_1 = I_1 R_1 = 18\Omega (0.50A) = \underline{9V}$$

$$V_T = V_1 + V_2 + V_3/V_4 \Rightarrow 60 = 9 + V_2 + 6; \underline{V_2 = 45V}$$

$$V_2 = I_2 R_2 \Rightarrow R_2 = V_2 / I_2 = \frac{45V}{0.50A} = \underline{90\Omega}$$