1. For the circuit shown in the figure:

(a) Find the total current through the battery, and the total power delivered to the circuit by the battery.

\[
R_{23} = R_2 + R_3 = 8 \Omega + 16 \Omega = 24 \Omega
\]

\[
\frac{1}{R_{tot}} = \frac{1}{R_1} + \frac{1}{R_{23}} \Rightarrow R_{tot} = 8 \Omega
\]

\[
I = \frac{V}{R_{tot}} = \frac{12 \text{ V}}{8 \Omega} = 1.5 \text{ A}
\]

\[
\rho = I \cdot V = 12 \text{ V} \cdot 1.5 \text{ A} = 18 \text{ W}
\]

(b) Find the current through each resistor, and the power dissipated in each resistor. Are your results here consistent with question (a)?

\[
I_1 = \frac{V}{R_1} = \frac{12 \text{ V}}{12 \Omega} = 1 \text{ A}
\]

\[
P_1 = V \cdot I_1 = 12 \text{ V} \cdot 1 \text{ A} = 12 \text{ W}
\]

\[
I_2 = \frac{V}{R_{23}} = \frac{12 \text{ V}}{24 \Omega} = 0.5 \text{ A}
\]

\[
P_2 = I_2^2 R_2 = (0.5 \text{ A})^2 \times 8 \Omega = 2 \text{ W}
\]

\[
P_3 = I_2^2 R_3 = (0.5 \text{ A})^2 \times 16 \Omega = 4 \text{ W}
\]

As you can see, \(I = 1.5 \text{ A} = I_1 + I_2 = 1 \text{ A} + 0.5 \text{ A}\) consistent.

\[
\rho = 18 \text{ W} = P_1 + P_2 + P_3 = 12 \text{ W} + 2 \text{ W} + 4 \text{ W}
\]

(c) Find the voltage across each resistor.

\[
V_1 = V = 12 \text{ V}
\]

\[
V_2 = I_2 R_2 = 0.5 \text{ A} \times 8 \Omega = 4 \text{ V}
\]

\[
V_3 = I_2 R_3 = 0.5 \text{ A} \times 16 \Omega = 8 \text{ V}
\]

[Group Work Continued on the other side]
2. For the circuit shown in the figure:

(a) Find the current through the 4 Ω resistor, and the voltage drop across the 4 Ω resistor.

\[ R_{23} = \frac{R_2 \cdot R_3}{R_2 + R_3} = \frac{15 \Omega \cdot 10 \Omega}{15 \Omega + 10 \Omega} = 6 \Omega \]

\[ V = 12 \text{ V} \]

\[ R_{\text{Total}} = R_1 + R_{23} = 4 \Omega + 6 \Omega = 10 \Omega \]

\[ I = \frac{V}{R_{\text{Total}}} = \frac{12 \text{ V}}{10 \Omega} = 1.2 \text{ A} \]

\[ V_1 = I \cdot R_1 = 1.2 \text{ A} \cdot 4 \Omega = 4.8 \text{ V} \]

(b) Find the voltage drop across the 10 Ω resistor, and the current through the 10 Ω resistor.

\[ V = V_1 + V_2 \Rightarrow V_2 = V - V_1 = 12 \text{ V} - 4.8 \text{ V} = 7.2 \text{ V} \]

\[ I_2 = \frac{V_2}{R_2} = \frac{7.2 \text{ V}}{10 \Omega} = 0.72 \text{ A} \]