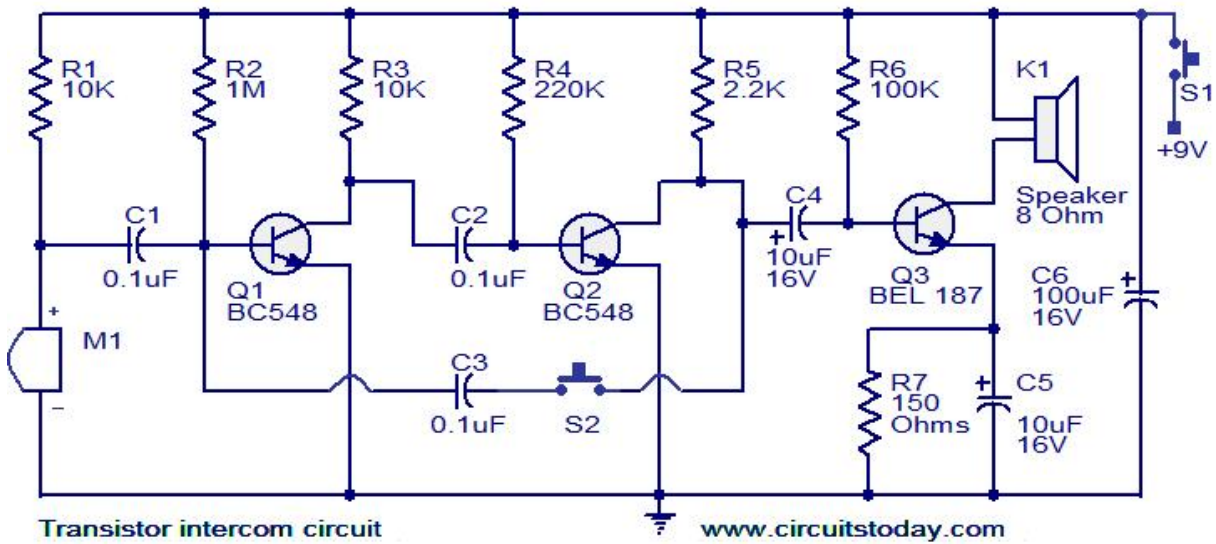


Section 11.9 - Circuit Analysis



Summary

Series Circuits

$$V_{\text{source}} = V_1 + V_2 + V_3 + \dots$$

$$I_{\text{source}} = I_1 = I_2 = I_3$$

$$R_{\text{total}} = R_1 + R_2 + R_3 + \dots$$

Parallel Circuits

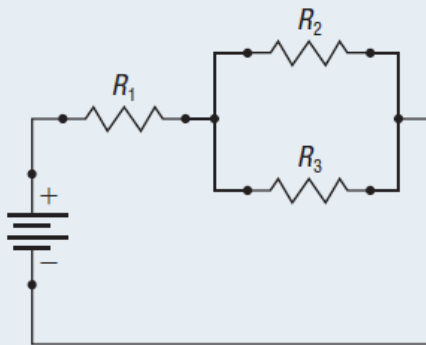
$$V_{\text{source}} = V_1 = V_2 = V_3$$

$$I_{\text{source}} = I_1 + I_2 + I_3 + \dots$$

$$\frac{1}{R_{\text{total}}} = \frac{1}{R_1} + \frac{1}{R_2} + \dots$$

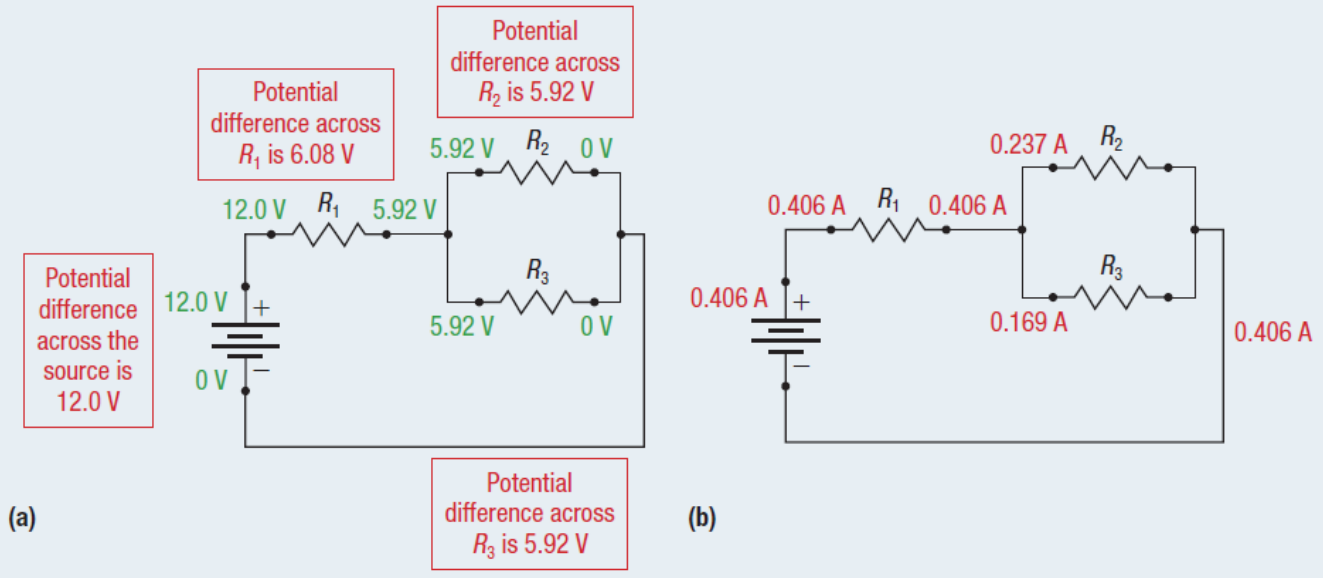
Sample Problem 1

The circuit shown in **Figure 1** has a source voltage of 12.0 V and resistance values of $R_1 = 15.0 \Omega$, $R_2 = 25.0 \Omega$, and $R_3 = 35.0 \Omega$. Find values for I_{source} , I_1 , I_2 , I_3 , V_1 , V_2 , V_3 , and R_{total} .

**Figure 1**

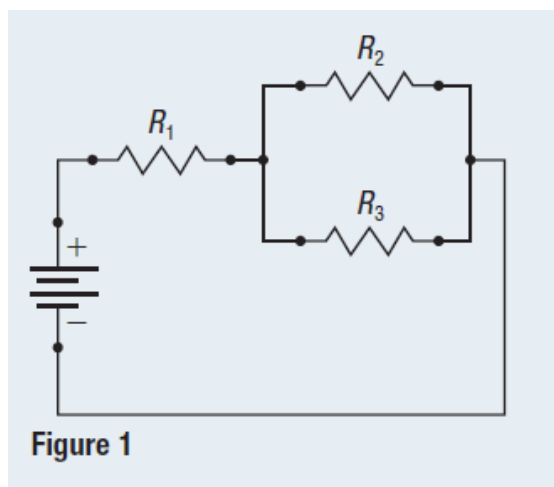
To find specific information for any point in the circuit we need to know the power source attributes. Therefore we need to find the equivalent resistance to analyze the circuit.

Solution



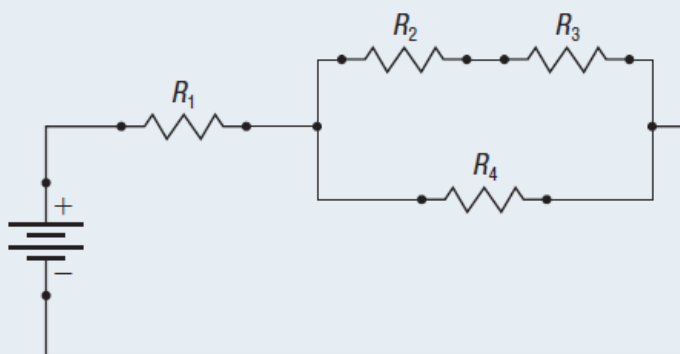
Practice

1. Repeat Sample Problem 1 with the following values: $V_{\text{source}} = 40.0 \text{ V}$, $R_1 = 25.0 \ \Omega$, $R_2 = 30.0 \ \Omega$, and $R_3 = 30.0 \ \Omega$. [T/I](#)

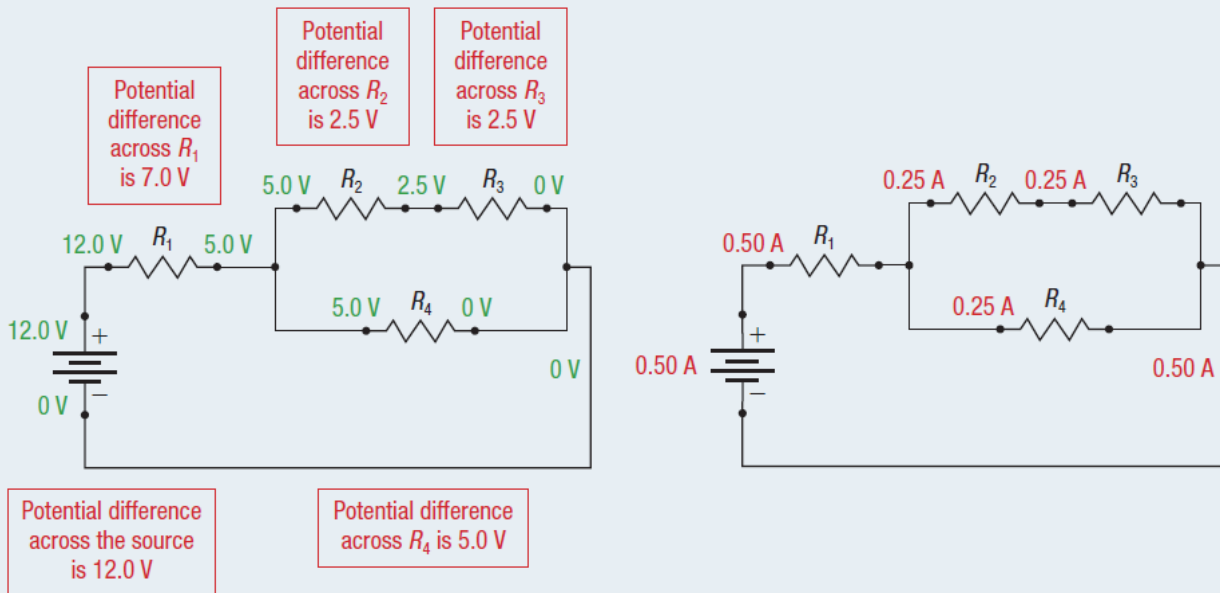


Sample Problem 2

The circuit shown in Figure 4 has $V_{\text{source}} = 12.0 \text{ V}$, $I_1 = 0.50 \text{ A}$, $V_3 = 2.5 \text{ V}$, $V_4 = 5.0 \text{ V}$, and $R_3 = 10.0 \Omega$. Find I_{source} , I_2 , I_3 , I_4 , V_1 , V_2 , R_1 , R_2 , R_4 , and R_{total} .

**Figure 4**

Solution



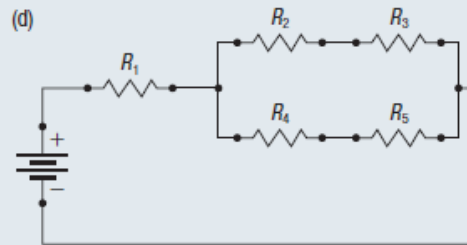
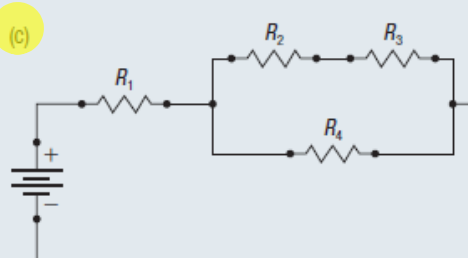
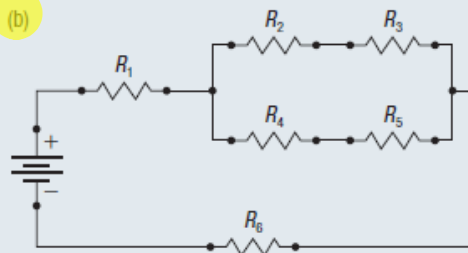
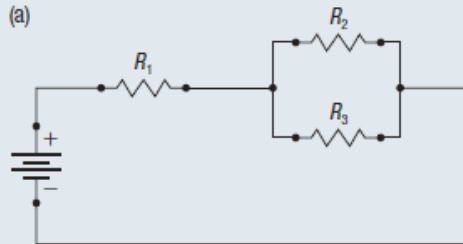
Practice

1. Repeat Sample Problem 2 with the following values: $V_{\text{source}} = 42.0 \text{ V}$, $I_1 = 1.75 \text{ A}$, $V_2 = 8.75 \text{ V}$, $V_4 = 17.5 \text{ V}$, and $R_2 = 35.0 \Omega$. Find I_{source} , I_2 , I_3 , I_4 , V_1 , V_3 , R_1 , R_3 , R_4 , and R_{total} . T/I

ans:

11.9 Questions

1. For each of the circuit diagrams below, the source has a voltage of 6.0 V. Each resistor has resistance 12.0 Ω. Find all the other values of current, voltage, and resistance. **T/A**



2. Draw a circuit diagram with a voltage source and three resistors connected in series. $V_{\text{source}} = 15.0 \text{ V}$, $V_2 = 4.0 \text{ V}$, $R_1 = 30.0 \Omega$, and $I_2 = 0.20 \text{ A}$. Find V_1 , V_3 , I_1 , I_3 , I_{source} , R_2 , R_3 , and R_{total} . **T/A C**
3. Draw a circuit diagram with a voltage source and three resistors connected in parallel. $V_{\text{source}} = 1.5 \text{ V}$, $I_1 = 0.10 \text{ A}$, $R_2 = 7.5 \Omega$, and $R_3 = 5.0 \Omega$. Find V_1 , V_2 , V_3 , I_2 , I_3 , I_{source} , R_1 , and R_{total} . **T/A C**
4. For the circuit diagram shown in **Figure 6**, $V_1 = 2.5 \text{ V}$, $V_3 = 5.0 \text{ V}$, $I_2 = 0.30 \text{ A}$, $I_3 = 0.50 \text{ A}$, $I_4 = 0.10 \text{ A}$, and $R_4 = 70.0 \Omega$. Find V_{source} , V_2 , V_4 , V_5 , I_{source} , I_1 , I_5 , R_1 , R_2 , R_3 , R_5 , and R_{total} . **T/A**

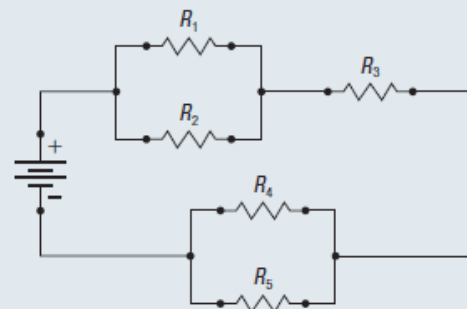


Figure 6

Section 11.9 #1b,c