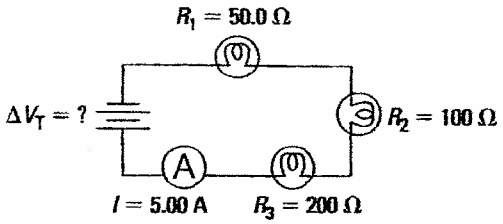
6. Explain what happens to a series circuit if one component in the circuit breaks.

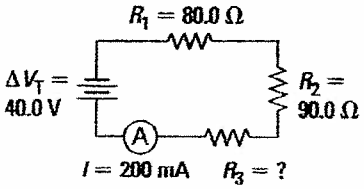
A series circuit contains three resistors: R_1 is 12.0 Ω, R_2 is 18.0 Ω, and R_3 is 45.0 Ω. A battery provides a potential difference of 100.0 V.
(a) What is the total resistance of the circuit?
(b) What current flows through the circuit?
(c) What is the voltage drop across each resistor?

8. Determine the potential difference across the battery and the three light bulbs shown in the following circuit diagram.



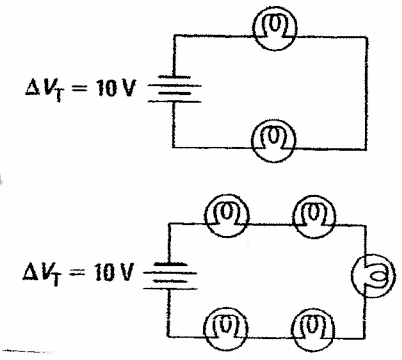
Question 8

9. Determine the value of the third resistor shown in the following circuit diagram.



10. Two resistors are in series. Determine the resistance (in kΩ) provided by R_1 if $\Delta V_T = 20.0$ V, $I = 5.00$ mA, and $R_2 = 1.00$ kΩ. The SI prefix kilo- (k) is equal to 10^3.

11. All of the light bulbs shown in the circuits below are identical and have the same resistance.
(a) Explain which circuit would have a larger current.
(b) In which circuit would the light bulbs glow brightest? Explain your answer.



page 380, Check and Reflect 11.2

7. (a) 75.0 Ω (b) 1.33 A
(c) $\Delta V_1 = 16.0$ V
$\Delta V_2 = 24.0$ V
$\Delta V_3 = 60.0$ V
8. $\Delta V_T = 1.75 \times 10^3$ V
$\Delta V_1 = 250$ V
$\Delta V_2 = 500$ V
$\Delta V_3 = 1.00 \times 10^3$ V
9. $R_3 = 30.0\ \Omega$
10. $R_1 = 3.00 \times 10^3\ \Omega$

Practice Problems

1. Determine the total resistance, total current, and the currents through each branch of the following circuit.

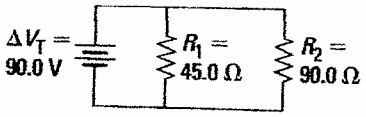


Figure 11.29

2. Determine the total resistance, total current, and the currents through each branch of the following circuit.

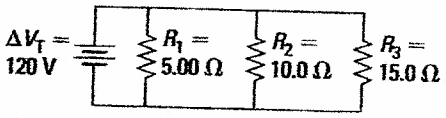


Figure 11.30

Answers

1. $R_T = 30.0\ \Omega$, $I_T = 3.00$ A, $I_1 = 2.00$ A, $I_2 = 1.00$ A
2. $R_T = 2.73\ \Omega$, $I_T = 44.0$ A, $I_1 = 24.0$ A, $I_2 = 12.0$ A, $I_3 = 8.00$ A

Practice Problems

1. Determine the current and potential difference through each resistor in Figure 11.38.

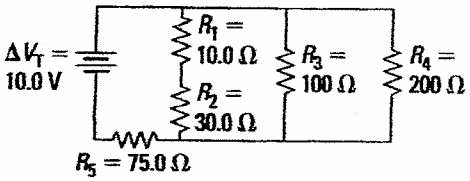


Figure 11.38

2. Determine the current and potential difference through each resistor in Figure 11.39.

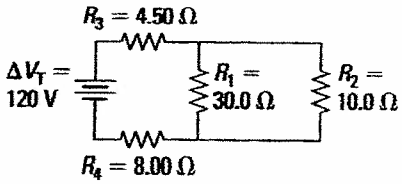


Figure 11.39

Answers

1. $I_1 = 0.0625$ A, $I_2 = 0.0625$ A, $I_3 = 0.0250$ A, $I_4 = 0.0125$ A, $I_5 = 0.100$ A, $\Delta V_1 = 0.625$ V, $\Delta V_2 = 1.88$ V, $\Delta V_3 = 2.50$ V, $\Delta V_4 = 2.50$ V, and $\Delta V_5 = 7.50$ V
2. $I_1 = 1.50$ A, $I_2 = 4.50$ A, $I_3 = 6.00$ A, $I_4 = 6.00$ A, $\Delta V_1 = 45.0$ V, $\Delta V_2 = 45.0$ V, $\Delta V_3 = 27.0$ V, and $\Delta V_4 = 48.0$ V

11.3

Key Concept Review

1. Copy the following table into your notebook, and fill in the cells with the appropriate equations.

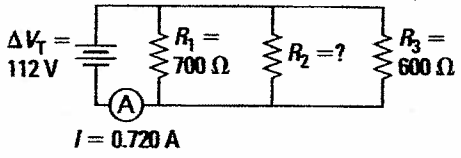
Circuit Summary

Type of Circuit	Potential Difference	Resistance	Current
Series circuit			
Parallel circuit			

2. What is a parallel circuit?
3. Draw a circuit diagram that shows three resistors in parallel.
4. What effect does increasing the number of paths in a parallel circuit have on (a) the total resistance and (b) the total current?
5. If a parallel circuit develops a short circuit in one of the paths, what will happen to the current flow through the other paths?
6. If a parallel circuit contains three paths, each containing resistors of exactly the same value, explain what will happen if a resistor in one of the paths burns out and does not allow current to flow.
7. If two pathways in a parallel circuit have different resistances, will the current in each pathway be the same? Explain your answer.

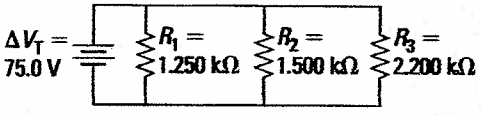
Connect Your Understanding

8. Determine the value of R_2 in the following circuit diagram.



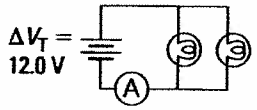
Question 8

9. Determine the total resistance and the current through the branches of the following circuit.

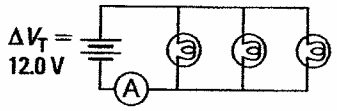


10. Determine the current through the ammeter in the circuit with (a) two light bulbs in parallel and (b) after a third light bulb has been added in parallel. All light bulbs have a resistance of 4.00 Ω.

(a)

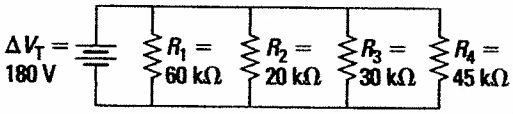


(b)



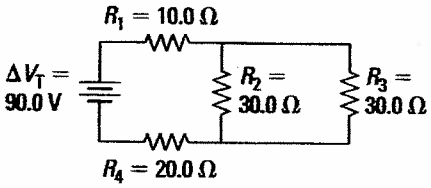
Question 10

11. Determine the total current and the current through all the branches of the following parallel circuit.



Question 11

12. Determine the voltage drops and current through all the resistors in the following circuit diagram.



Question 12

page 389, Check and Reflect 11.3

8. $R_2 = 300\ \Omega$
9. $R_T = 520.5\ \Omega$
   $I_1 = 6.00 \times 10^{-2}$ A
   $I_2 = 5.00 \times 10^{-2}$ A
   $I_3 = 3.41 \times 10^{-2}$ A
10. (a) 6.00 A (b) 9.00 A
11. $I_T = 0.022$ A
    $I_1 = 0.0030$ A
    $I_2 = 0.0090$ A
    $I_3 = 0.0060$ A
    $I_4 = 0.0040$ A
12. $\Delta V_1 = 20.0$ V $\quad \Delta V_3 = 30.0$ V
    $\Delta V_2 = 30.0$ V $\quad \Delta V_4 = 40.0$ V
    $I_1 = 2.00$ A $\quad I_3 = 1.00$ A
    $I_2 = 1.00$ A $\quad I_4 = 2.00$ A