Series vs parallel circuit key 1

CHAPTER 9 Parallel Circuits

BLM 3-29

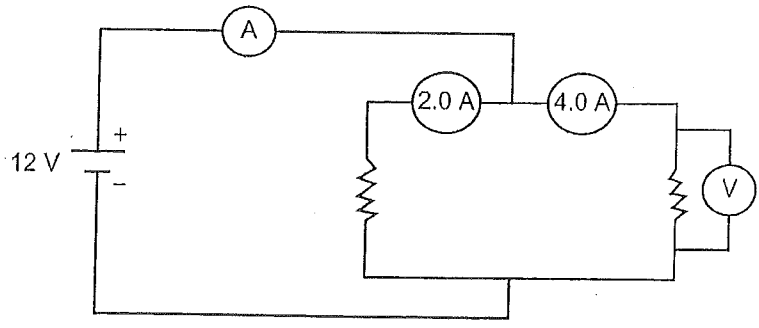> **Goal** • Review your understanding of parallel circuits.

What to Do

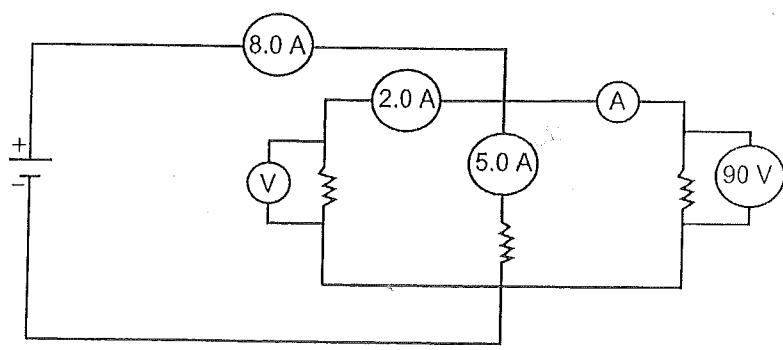Circle the best term in the parentheses to correctly complete each statement.

1. A parallel circuit has (*only one*, (*more than one*)) path for current to travel.

2. Two different resistors are connected in parallel. The current through one of the resistors will be (*equal to*, (*different from*)) the current through the other resistor.

3. If two different resistors are connected in parallel, the voltage across one resistor will be ((*equal to*) *different from*) the voltage across the second resistor.

4. By adding a resistor in parallel with an original resistor, the total resistance of the circuit (*increases*, (*decreases*))   *Think of a traffic jam r a new lane opens*

5. The total current entering the junction of a parallel circuit must be ((*equal to*) *different from*) *up·* the sum of the currents through each branch of the parallel circuit.

Find the unknown voltage at V, and current at A, in each of the following circuits.

6. Voltage =
   _12 V_
   Current =
   _6 A_

7. Voltage =
   _90 V_
   Current =
   _1 A_

CHAPTER 9 **Series Circuits**   **BLM 3-28**

Goal • Review your understanding of series circuits.

What to Do

Circle the best term in the parentheses to correctly complete each statement.

1. A series circuit has (*more than one*, *only one*) path for current to travel.

2. In a series circuit, the current at one location in the circuit is (*equal to*, *different from*) the current at another location in the circuit.

3. If two different resistors are connected in series, the voltage across one resistor will be (*equal to*, *different from*) the voltage across the second resistor.

4. By adding a resistor in series with an original resistor, the total resistance of the circuit (*increases*, *decreases*).

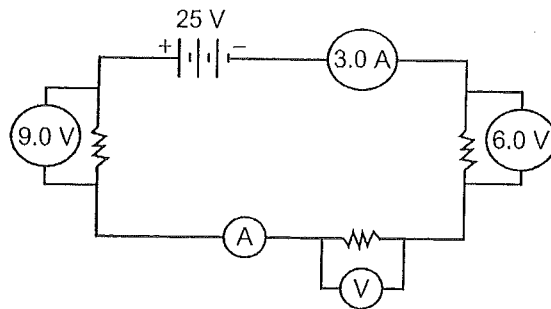5. The sum of the voltages across each of the resistors in a series circuit is (*equal to*, *different from*) the voltage supplied by the battery.

Find the unknown voltage at V, and current at A, in each of the following circuits.
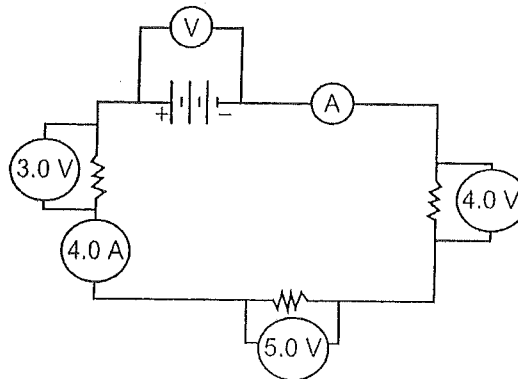
6. Voltage =
   10 V
   Current =
   3 A

25 V

(3.0 A)

(9.0 V)   (6.0 V)

(A)   (V)

$3 + 6 = 9 V$

7. Voltage =
   12 V
   Current =
   4 A

(V)

(3.0 V)   (A)

(4.0 V)

(4.0 A)

(5.0 V)

Calculate the Current

Goal • Practise calculating current.

What to Do

Calculate the current in each of the following circuit diagrams. The current at the source is represented by I_s

$I_{series} \rightarrow I_T = I_1 = I_2$

$I \; parallel \;\; I_T = I_1 + I_2$

$I_s = 15\,A$

$I_1 = 9.0\,A$ $I_2 = 6$

1. $I_2 =$ __6__

$I_s = 10\,A$

$I_1 = 2.5\,A$ $I_2 = 3.5\,A$ $I_3 = 4$

2. $I_3 =$ __4__

$V_s = 12\,V$ $I_s = 6.0\,A$

$V_1 = 4.0\,V$ $I_2 = 6$

$I_5 = 2$ $I_5 = 4.0\,A$ $I_3 = 6$

3. $I_2 = 6$
$I_3 = 6$
$I_5 = 2$

CHAPTER 8   Calculate the Potential Difference   **BLM 3-18**

Goal • Practise potential difference calculations.

What to Do V_{series} $V_T = V_1 + V_2$ $V_{parallel}$ $V_T = V_1 = V_2$

Calculate the missing potential difference in each of the following circuit diagrams. The voltage at the source is represented by Vs [V_s]

Diagrams

$$35V$$

$V1 = \underline{}$

$V_s = 120\,V$

$R_1 = R_4$
$V_1 = V_4$

$V_2 = 25\,V$

$V_3 = 25\,V$

$V_4 = 35\,V$

$V_s = 120V = V_1 + V_2 + V_3 + V_4$

1. $V_1 = \underline{35V}$

$V_1 \quad 120 - 85 =$

$V_2 + V_3 + V_4 = 25 + 25 + 35$
$= 85$

$V_1 = 10\,V$ $V_2 = 35\,V$

$V_s = \underline{}$

$V_3 = 45\,V$

$V_4 = 20\,V$

2. $V_s = \underline{110v}$

$V_s = V_1 + V_2 + V_3 + V_4$

$= 10 + 35 + 45 + 20$

$= 110v$

$V_s = 9.0\,V$

$V_1 = 9v$

3. $V_1 = \underline{9v}$

CHAPTER 9   **Understanding Circuit Diagrams**   **BLM 3-32**

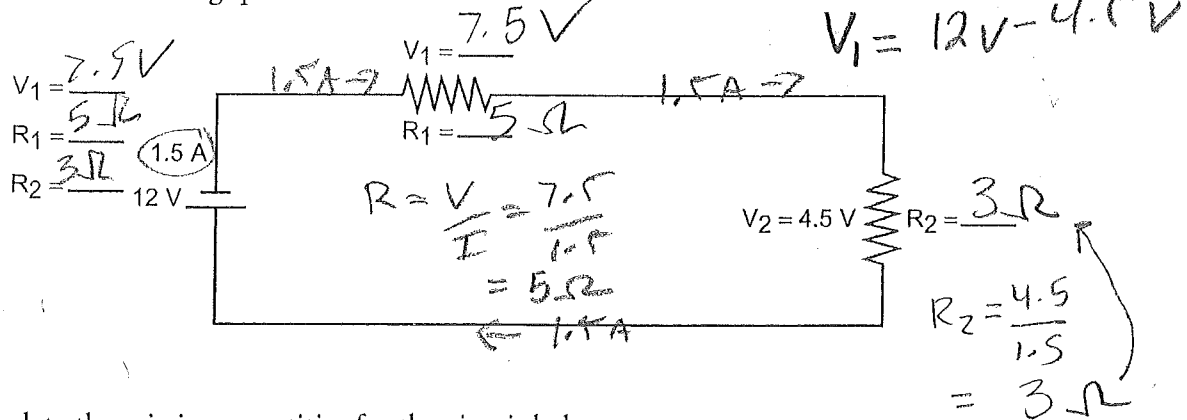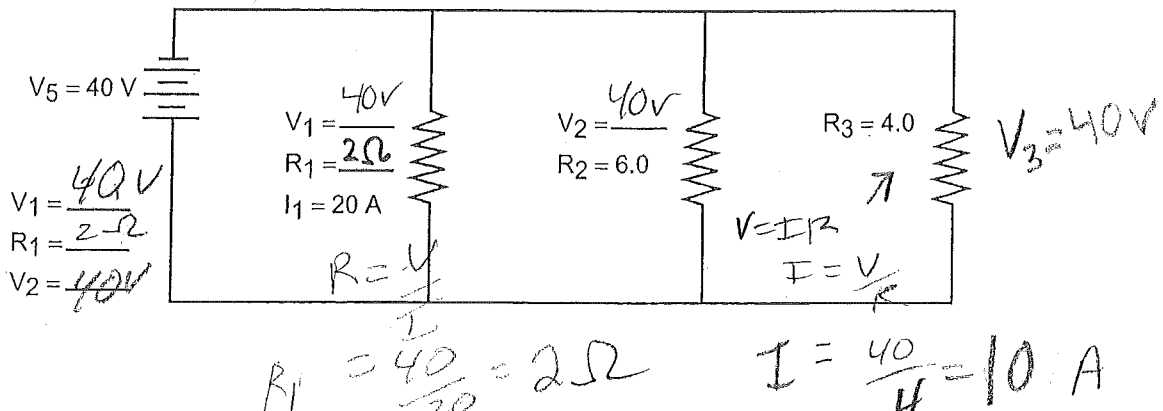**Goal** • Practise interpreting circuit diagrams.

What to Do
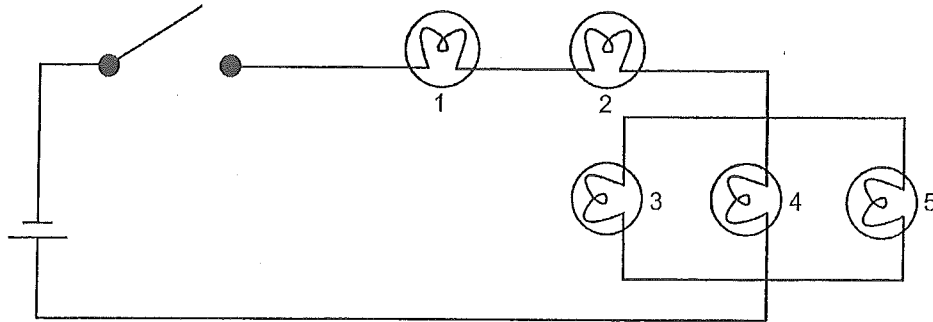
1. Describe what will happen in the circuit shown above if...

   (a) the switch is closed   _the bulbs will light_

   (b) the switch is closed and the first bulb is removed   _bulbs will not light_

   (c) the switch is closed and the fifth bulb is removed   _all other bulbs will stay lit_

$V_T = V_1 + V_2$
$V_1 = 12V - 4.5V$

2. Calculate the missing quantities for the circuit below.

$V_1 = \underline{7.5V}$
$R_1 = \underline{5\Omega}$
$R_2 = \underline{3\Omega}$ 1.5 A   12 V

$V_1 = \underline{7.5V}$

$1.5A \rightarrow$ $R_1 = \underline{5\Omega}$ $1.5A \rightarrow$

$R = \dfrac{V}{I} = \dfrac{7.5}{1.5}$
$= 5\Omega$
$\leftarrow 1.5A$

$V_2 = 4.5V$ $R_2 = \underline{3\Omega}$

$R_2 = \dfrac{4.5}{1.5}$
$= 3\Omega$

3. Calculate the missing quantities for the circuit below.

$V_5 = 40V$

$V_1 = \underline{40V}$
$R_1 = \underline{2\Omega}$
$V_2 = \underline{40V}$

$V_1 = \underline{40V}$
$R_1 = \underline{2\Omega}$
$I_1 = 20 A$

$R = \dfrac{V}{I}$

$V_2 = \underline{40V}$
$R_2 = 6.0$

$R_3 = 4.0$

$V_3 = 40V$

$V = IR$
$I = \dfrac{V}{R}$

$R_1 = \dfrac{40}{20} = 2\Omega$ $I = \dfrac{40}{4} = 10A$
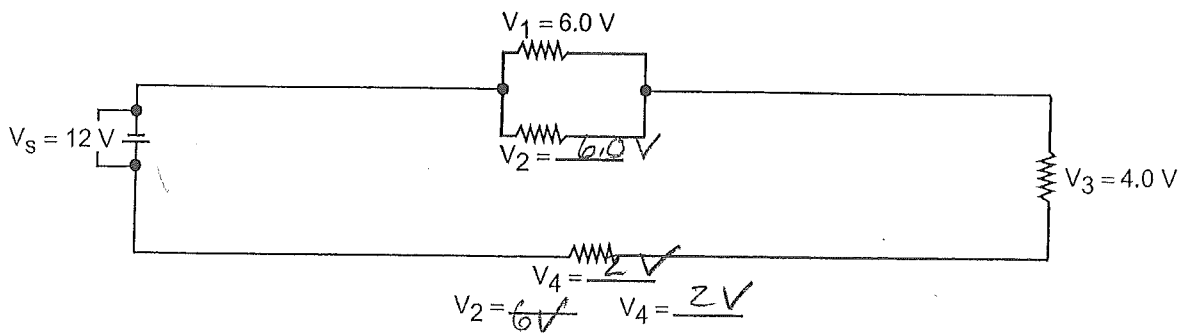
CHAPTER 9   Calculate Voltage and Current   BLM 3-33

Goal • Practise calculating voltage and current in a circuit.

What to Do

Calculate the missing values in the circuits below. Be sure to show your calculations.

$$V_T = V_1 + V_3 + V_4 \Rightarrow 12v = 6 + 4 + \boxed{}$$
$$V_2 \qquad\qquad \frac{}{2}$$

1.

$V_1 = 6.0\ V$

$V_S = 12\ V$

$V_2 = \underline{6.0}\ V$

$V_3 = 4.0\ V$

$V_4 = \underline{2}\ V$

$V_2 = \underline{6v} \qquad V_4 = \underline{2V}$

2.

$20A \leftarrow \quad 8+12$

$I_1 = \underline{}$

$V_S = 24\ V$

$I_5 = \underline{14A}$

$I_2 = 12\ A \qquad I_3 = 8.0\ A$

$20\ A$

$I_4 = 6.0\ A$

$I_1 = \underline{20A} \qquad I_5 = \underline{14A}$

ie $14 + 6 = 2A$