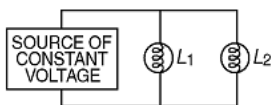


Parallel Circuits

Directions: Read online textbook pages 740 – 745. Solve the following problems using the GUESS method and proper significant figures. Be sure to show ALL work.

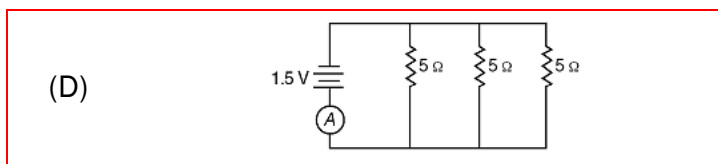
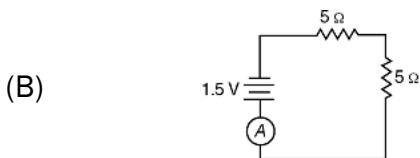
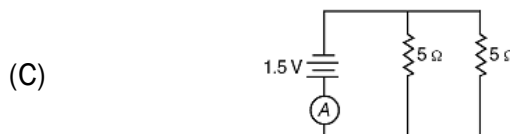
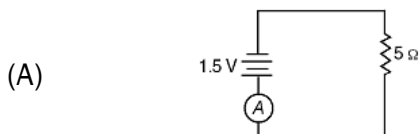
1. In the diagram below, lamps L_1 and L_2 are connected to a constant voltage power supply.



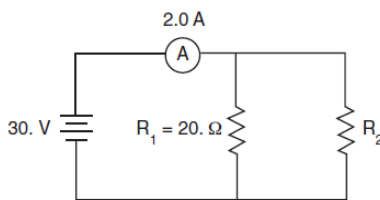
If lamp L_1 burns out, the brightness of L_2 will

- (A) increase (B) decrease (C) remain the same

2. In which circuit would ammeter A show the greatest current?



3. A 20. ohm resistor, R_1 , and a resistor of unknown resistance, R_2 , are connected in parallel to a 30. volt source, as shown in the circuit diagram below. An ammeter in the circuit reads 2.0 amperes.



a. Calculate the equivalent resistance of the circuit.

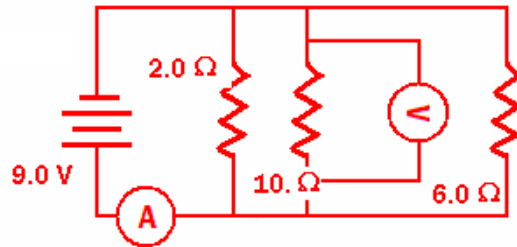
$$R_{eq} = \frac{V_T}{I_T} = \frac{30V}{2.0A} = 15\Omega$$

b. Calculate the resistance of R_2 .

$$\frac{1}{R_2} = \frac{1}{R_{eq}} - \frac{1}{R_1} = \frac{1}{15\Omega} - \frac{1}{20\Omega}$$

$$R_2 = 60.\Omega$$

4. A 9.0 volt battery is connected in parallel to a 10. Ω resistor, a 2.0 Ω resistor and a 6.0 Ω resistor. There is an ammeter to measure the total current flowing through the circuit and a voltmeter to measure the potential difference across the 10. Ω resistor.
- a. Draw a circuit diagram using proper schematic symbols.



- b. The current through each resistor

$$I_{R1} = \frac{V_{R1}}{R_1} = \frac{9.0V}{10.\Omega} = 0.90A$$

$$I_{R2} = \frac{V_{R2}}{R_2} = \frac{9.0V}{2.0\Omega} = 4.5A$$

$$I_{R3} = \frac{V_{R3}}{R_3} = \frac{9.0V}{6.0\Omega} = 1.5A$$

- c. The total current in the circuit

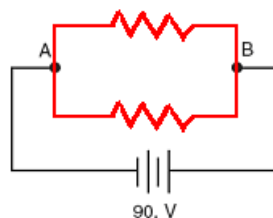
$$I_{total} = I_{R1} + I_{R2} + I_{R3} = 0.90A + 4.5A + 1.5A = 6.9 A$$

- d. The equivalent resistance of the circuit.

$$R_{total} = \frac{V_{total}}{I_{total}} = \frac{9.0V}{6.9A} = 1.3\Omega \quad \frac{1}{R_{eq}} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} = \frac{1}{10.\Omega} + \frac{1}{2.0\Omega} + \frac{1}{6.0\Omega}$$

$$R_{eq} = 1.3\Omega$$

5. A 15 ohm resistor, R_1 , and a 30. ohm resistor, R_2 , are to be connected in parallel between points A and B in a circuit containing a 90. volt battery. Complete the diagram below to show the two resistors connected in parallel between points A and B.



Answers in size order: 0.90, 1.3, 1.5, 4.5, 6.9, 15, 60.