

Chapter 23 Study Guide

Series and Parallel Circuits

Vocabulary Review

- h
- e
- i
- g
- b
- c
- d
- a
- k
- f
- j

Section 23.1 Simple Circuits

- b
- c
- d
- a
- a
- b
- b
- The circuit's electric energy source raises the potential by an amount equal to the potential drop produced when the current passes through the resistors.
- Multiply the current in the circuit by the resistance of the individual resistor.
- A series circuit is used as a voltage divider.
- A voltage divider produces a voltage source of desired magnitude from a higher-voltage battery.
- The resistance of a photoresistor depends on the amount of light that strikes it. A photoresistor is made a material that naturally has a higher resistance in the dark.
- A circuit that includes a photoresistor is used in a light meter. The electronic circuit detects the potential difference and converts it to a measurement of illuminance.
- b
- b
- c

17. d

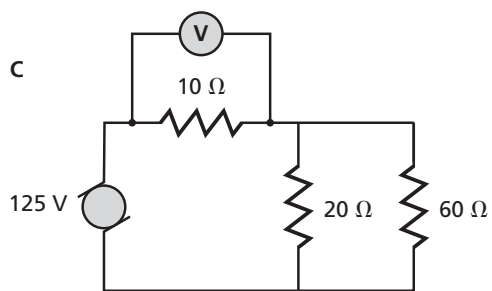
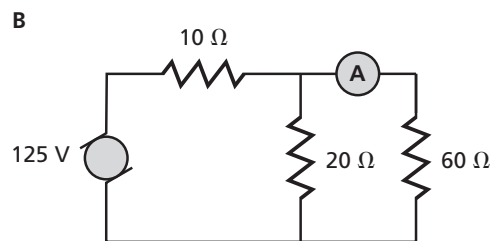
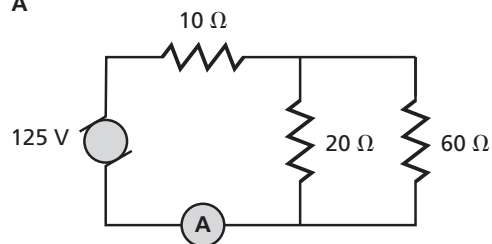
18. a

Section 23.2 Applications of Circuits

- true
- thickness
- closes
- true
- parallel
- large
- First draw a schematic of the circuit. Then reduce the problem to a set of series circuits and a set of parallel circuits. Combine the resistances of the parallel circuits into one circuit, and calculate the single equivalent resistance that can replace them. That leaves only a series circuit. Add the resistors in series to calculate the equivalent resistance.

8. a

9. A



10. voltmeter
11. ammeter
12. high
13. low
14. series
15. parallel
16. ammeter
17. high, parallel
18. voltmeter
19. resistance
20. ammeter

Section 23-1 Quiz

1. The equivalent resistance is the sum of all the individual resistances along the series circuit. To calculate equivalent resistance in a series circuit, add all the individual resistances of the resistors ($R_{\text{total}} = R_A + R_B + \dots$).
2. A voltage divider is a series circuit used to produce a voltage source of desired magnitude from a higher-voltage battery. To create a voltage divider, a circuit designer would connect two resistors in a series circuit with the battery. The desired voltage is the voltage drop that can be measured across the second resistor. The values of the two resistors would be chosen based on the voltage of the battery and the desired voltage.

3. $R = R_A + R_B + R_C$
 $R = 25 \Omega + 30 \Omega + 40 \Omega = 95 \Omega$

$$I = \frac{V}{R} = \frac{6.0 \text{ V}}{95 \Omega} = 0.063 \text{ A}$$

4. $\frac{1}{R} = \frac{1}{R_A} + \frac{1}{R_B} + \frac{1}{R_C}$

$$\frac{1}{R} = \frac{1}{25 \Omega} + \frac{1}{30 \Omega} + \frac{1}{40 \Omega}$$

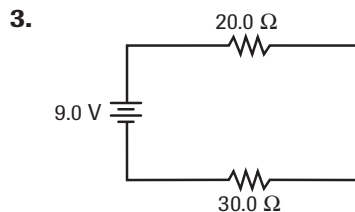
$$R = \frac{600}{59} \Omega$$

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

$$I = \frac{6.0 \text{ A}}{\left(\frac{600}{59} \Omega\right)} = 0.6 \text{ A}$$

Section 23-2 Quiz

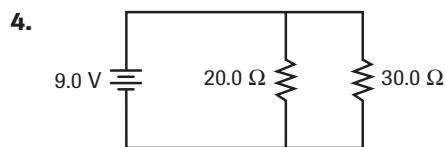
1. When a short circuit occurs, the electricity is traveling along a shorter path because a sizable part of the circuit has been cut out. There is a higher-current intensity in the part of the circuit that remains. A fuse is a short piece of metal that melts when too much current passes through it. The fuse acts as a safety device by preventing this high current flow from continuing and possibly causing an electrical fire.
2. An ammeter measures current in any part of a circuit. To use an ammeter, place it in series in the circuit in the place where you want to measure the current. A voltmeter measures the voltage drop across a resistor. Connect the voltmeter in parallel to the resistor to measure the voltage drop.



$$R = R_A + R_B$$

$$R = 20.0 \Omega + 30.0 \Omega = 50.0 \Omega$$

$$I = \frac{V}{R} = \frac{9.0 \text{ V}}{50.0 \Omega} = 0.18 \text{ A}$$



$$\frac{1}{R} = \frac{1}{R_A} + \frac{1}{R_B}$$

$$\frac{1}{R} = \frac{1}{20.0 \Omega} + \frac{1}{30.0 \Omega}$$

$$R = 12.0 \Omega$$

$$I = \frac{V}{R} = \frac{9.0 \text{ V}}{12.0 \Omega} = 0.75 \text{ A}$$