

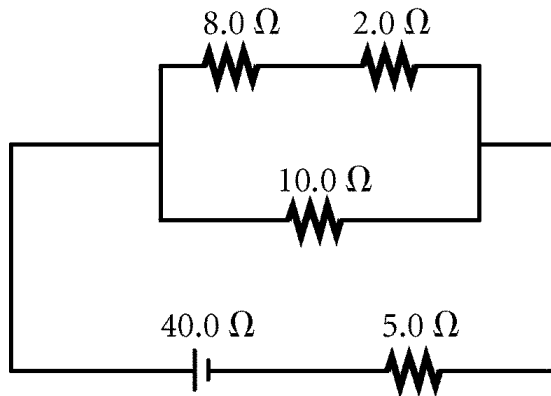
## Electric Current - Sample Test

### Multiple Choice

Identify the letter of the choice that best completes the statement or answers the question.

- How is current affected if the number of charge carriers decreases?
  - The current increases.
  - The current decreases.
  - The current initially decreases and then is gradually restored.
  - The current is not affected.
- A wire carries a steady current of 0.1 A over a period of 20 s. What total charge moves through the wire in this time interval?
  - 200 C
  - 20 C
  - 2 C
  - 0.005 C
- Which of the following wires would have the *least* resistance, assuming that all of the wires have the same cross-sectional area?
  - an iron wire 10 cm in length
  - an iron wire 5 cm in length
  - a copper wire 10 cm in length
  - a copper wire 5 cm in length
- Which of the following wires would have the *least* resistance?
  - an aluminum wire 20 cm in diameter at 40°C
  - an aluminum wire 20 cm in diameter at 60°C
  - an aluminum wire 40 cm in diameter at 40°C
  - an aluminum wire 40 cm in diameter at 60°C
- When compared in a given time interval with other lightbulbs connected to a 120 V circuit, a 60 W lightbulb
  - converts the same electrical energy to heat and light as a 40 W lightbulb.
  - converts more electrical energy to heat and light than a 100 W lightbulb.
  - converts less electrical energy to heat and light than a 40 W lightbulb.
  - converts less electrical energy to heat and light than a 100 W lightbulb.
- An electric toaster requires 1100 W at 110 V. What is the resistance of the heating coil?
  - 3.3  $\Omega$
  - 9.0  $\Omega$
  - 10  $\Omega$
  - 11  $\Omega$
- Which process will double the power dissipated by a resistor?
  - doubling the current while doubling the resistance
  - doubling the current and making the resistance half as big
  - doubling the current and doubling the potential difference
  - doubling the current while making the potential difference half as big
- A high-voltage transmission line carries 1000 A at 700 000 V. What is the maximum power carried in the line?
  - 700 MW
  - 400 MW
  - 100 MW
  - 70 MW
- A microwave draws 5.0 A when it is connected to a 120 V outlet. If electrical energy costs \$0.090 per kW•h, what is the cost of running the microwave for exactly 6 h?
  - \$2.70
  - \$1.60
  - \$0.72
  - \$0.32
- When electrons move through a metal conductor,
  - they move in a straight line through the conductor.
  - they move in zigzag patterns because of repeated collisions with the vibrating metal atoms.
  - the temperature of the conductor decreases.
  - they move at the speed of light in a vacuum.
- A flashlight bulb with a potential difference of 4.5 V across it has a resistance of 8.0  $\Omega$ . How much current is in the bulb filament?
  - 36 A
  - 9.4 A
  - 1.8 A
  - 0.56 A
- If the potential difference across a pair of batteries used to power a flashlight is 6.0 V, what is the potential difference across the flashlight bulb?
  - 3.0 V
  - 6.0 V
  - 9.0 V
  - 12 V
- A circuit has a continuous path through which charge can flow from a voltage source to a device that uses electrical energy. What is the name of this type of circuit?
  - a short circuit
  - a closed circuit
  - an open circuit
  - a circuit schematic

14. Which of the following is the best description of a schematic diagram?
- uses pictures to represent the parts of a circuit
  - determines the location of the parts of a circuit
  - shows the parts of a circuit and how the parts connect to each other
  - shows some of the parts that make up a circuit
15. How does the potential difference across the bulb in a flashlight compare with the terminal voltage of the batteries used to power the flashlight?
- The potential difference is greater than the terminal voltage.
  - The potential difference is less than the terminal voltage.
  - The potential difference is equal to the terminal voltage.
  - It cannot be determined unless the internal resistance of the batteries is known.
16. Which of the following statements about a battery as a source of electric current is *not* true?
- A battery is a source of emf.
  - A battery provides the energy that moves charge.
  - The terminal voltage of a battery is equal to its emf.
  - The terminal voltage of a battery is the voltage it delivers to the load.
17. Three resistors with values of  $4.0\ \Omega$ ,  $6.0\ \Omega$ , and  $8.0\ \Omega$ , respectively, are connected in series. What is their equivalent resistance?
- $18\ \Omega$
  - $8.0\ \Omega$
  - $6.0\ \Omega$
  - $1.8\ \Omega$
18. A circuit is composed of resistors wired in series. What is the relationship between the equivalent resistance of the circuit and the resistance of the individual resistors?
- The equivalent resistance is equal to the largest resistance in the circuit.
  - The equivalent resistance is greater than the sum of all the resistances in the circuit.
  - The equivalent resistance is equal to the sum of the individual resistances.
  - The equivalent resistance is less than the smallest resistance in the circuit.
19. Three resistors connected in parallel carry currents labeled  $I_1$ ,  $I_2$ , and  $I_3$ . Which of the following expresses the total current  $I_t$  in the combined system?
- $I_t = I_1 + I_2 + I_3$
  - $I_t = \left( \frac{1}{I_1} + \frac{1}{I_2} + \frac{1}{I_3} \right)$
  - $I_t = I_1 = I_2 = I_3$
  - $I_t = \left( \frac{1}{I_1} + \frac{1}{I_2} + \frac{1}{I_3} \right)^{-1}$
20. Two resistors having the same resistance value are wired in parallel. How does the equivalent resistance compare to the resistance value of a single resistor?
- The equivalent resistance is twice the value of a single resistor.
  - The equivalent resistance is the same as a single resistor.
  - The equivalent resistance is half the value of a single resistor.
  - The equivalent resistance is greater than that of a single resistor.
21. Three resistors with values of  $4.0\ \Omega$ ,  $6.0\ \Omega$ , and  $10.0\ \Omega$  are connected in parallel. What is their equivalent resistance?
- $20.0\ \Omega$
  - $7.3\ \Omega$
  - $6.0\ \Omega$
  - $1.9\ \Omega$
22. In any complex resistance circuit, the voltage across any resistor in the circuit is always
- less than the voltage source.
  - equal to or less than the voltage source.
  - equal to the voltage source.
  - greater than the voltage source.
23. The equivalent resistance of a complex circuit is usually determined by
- inspection.
  - simplifying the circuit into groups of series and parallel circuits.
  - adding and subtracting individual resistances.
  - dividing the sum of the individual resistances by the number of resistances.



24. What is the equivalent resistance for the resistors in the figure shown above?  
 a. 25 Ω                      b. 10.0 Ω                      c. 7.5 Ω                      d. 5.0 Ω

**Short Answer**

25. What is an ohmic material and what would a graph of Voltage vs. Current look like?

**Problem**

26. What amount of charge moves through an electric fan in 15.1 s if the current through the fan is 1.27 A?
27. What is the resistance of a resistor if the potential difference across the resistor is 4.0 V when a current of 10.0 A flows through the resistor?
28. A 13.2 Ω resistor has 0.049 A of current in it. What is the potential difference across the resistor?
29. A blow dryer is connected across a 125 V outlet. If the resistance of the blow dryer is 14.3 Ω, how much power is dissipated in the form of electromagnetic radiation and heat?
30. Three resistors with values of 64 Ω, 135 Ω, 92 Ω, respectively, are connected in series. What is their equivalent resistance?
31. A current of 0.20 A passes through a 3.0 Ω resistor. The resistor is connected in series with a 6.0 V battery and an unknown resistor. What is the resistance value of the unknown resistor?
32. Four resistors are wired in parallel with a 2.50 V battery. The total circuit current is 1.85 A, and three of the resistors have resistances of 2.70 Ω, 8.20 Ω, and 12.6 Ω. What is the resistance of the fourth resistor?
33. Three resistors are wired in series with a 22.0 V battery. The resistances are 22.5 Ω, 33.6 Ω, and 9.9 Ω. What is the voltage across the 9.9 Ω resistor?