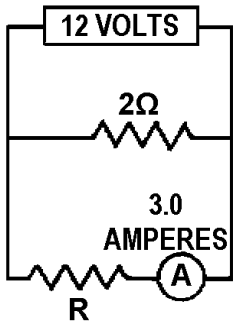
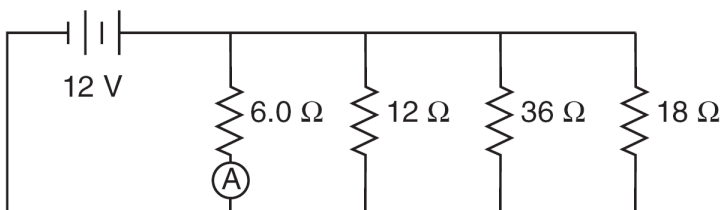


1. Two resistors are connected in parallel to a 12-volt battery as shown in the diagram.



If the current in resistor R is 3.0 amperes, the rate at which R consumes electrical energy is

- A) $1.1 \times 10^2\ \text{W}$ B) 36 W
 C) 24 W D) 4.0 W
2. An electrical appliance draws 9.0 amperes of current when connected to a 120-volt source of potential difference. What is the total amount of power dissipated by this appliance?
- A) 13 W B) 110 W
 C) 130 W D) 1100 W
3. Base your answer to the following question on the diagram below, which represents an electric circuit consisting of four resistors and a 12-volt battery.



How much power is dissipated in the 36-ohm resistor?

- A) 110 W B) 48 W C) 3.0 W D) 4.0 W
-
4. If the potential difference applied to a fixed resistance is doubled, the power dissipated by that resistance
- A) remains the same B) doubles
 C) halves D) quadruples
5. The heating element on an electric stove dissipates 4.0×10^2 watts of power when connected to a 120-volt source. What is the electrical resistance of this heating element?
- A) $0.028\ \Omega$ B) $0.60\ \Omega$
 C) $3.3\ \Omega$ D) $36\ \Omega$

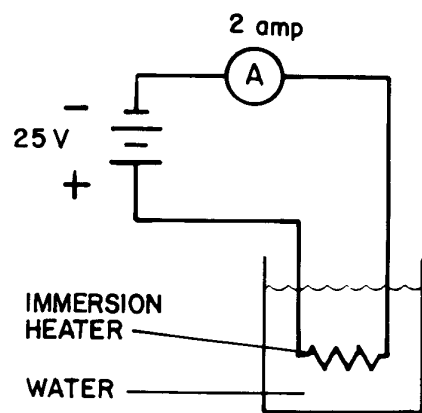
6. A toaster connected to a 120-volt outlet draws a current of 6.0 amperes. How much electrical energy does the toaster use in 5.0 seconds?

- A) 1.4×10^2 J B) 7.2×10^2 J
 C) 3.6×10^3 J D) 2.2×10^4 J

7. Which combination of units can be used to express electrical energy?

- A) $\frac{\text{volt}}{\text{coulomb}}$
 B) $\frac{\text{coulomb}}{\text{volt}}$
 C) volt•coulomb
 D) volt•coulomb•second

8. How long will it take the immersion heater shown in the diagram below to deliver 1000 joules of heat to the water?



- A) 0.2 sec B) 2 sec
 C) 20 sec D) 200 sec

9. Base your answer to the following question on the information below.

An electric heater rated at 4,800 watts is operated on 120 volts.

If the original heater were operated at less than 120 volts, the amount of heat produced would

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

10. What is the total electrical energy used by a 1500-watt hair dryer operating for 6.0 minutes?

- A) 4.2 J B) 250 J
 C) 9.0×10^3 J D) 5.4×10^5 J

11. A 10-volt potential difference maintains a 2-ampere current in a resistor. The total energy expended by this resistor in 5 seconds is

- A) 10 J B) 20 J C) 50 J D) 100 J

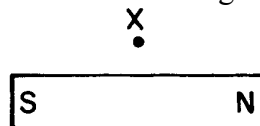
12. The total amount of electrical energy used by a 315-watt television during 30.0 minutes of operation is

- A) 5.67×10^5 J B) 9.45×10^3 J
 C) 1.05×10^1 J D) 1.75×10^{-1} J

13. An operating 100.-watt lamp is connected to a 120-volt outlet. What is the total electrical energy used by the lamp in 60. seconds?

- A) 0.60 J B) 1.7 J
 C) 6.0×10^3 J D) 7.2×10^3 J

14. A compass is located at point X near a bar magnet as shown in the diagram below.



Which diagram shows the proper direction of the compass needle?

- A) B)
 C) D)

15. Which diagram best represents the lines of magnetic flux between the ends of two bar magnets?

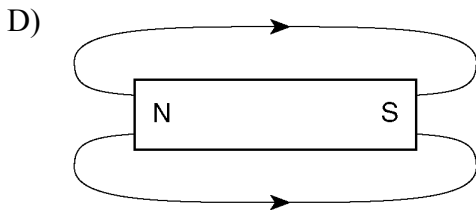
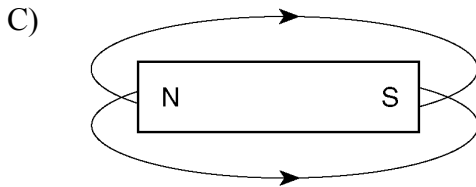
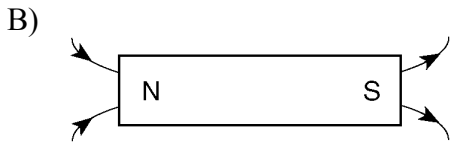
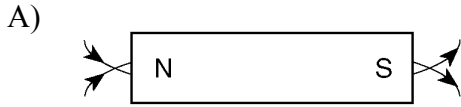
- A) B)
 C) D)

16. The diagram below shows the magnetic field lines between two magnetic poles, *A* and *B*.

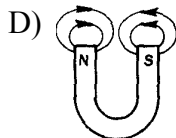
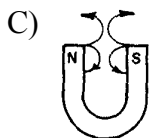
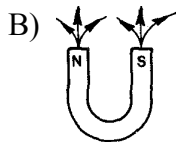
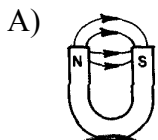


Which statement describes the polarity of magnetic poles *A* and *B*?

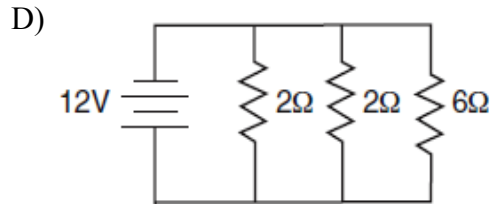
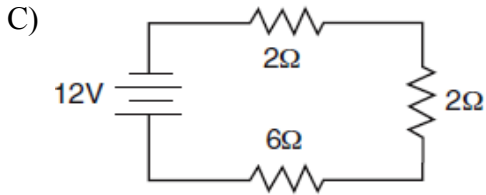
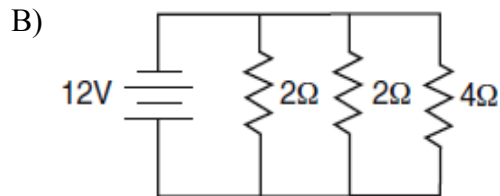
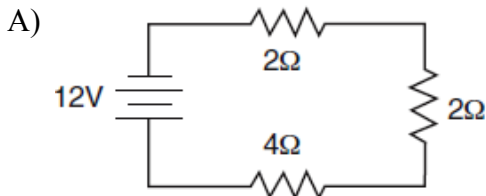
- A) *A* is a north pole and *B* is a south pole.
 - B) *A* is a south pole and *B* is a north pole.
 - C) Both *A* and *B* are north poles.
 - D) Both *A* and *B* are south poles.
17. Which diagram best represents magnetic flux lines around a bar magnet?



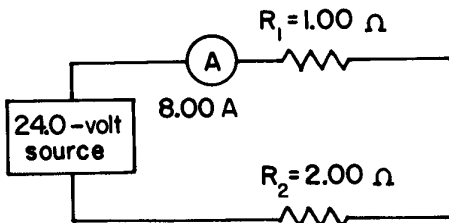
18. Which diagram best represents the magnetic field near the poles of a horseshoe magnet?



19. Which circuit has the largest equivalent resistance?



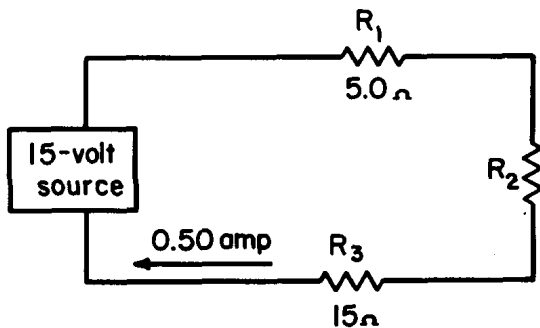
20. Base your answer to the following question on the diagram below.



What is the total resistance of the circuit?

- A) 0.500 Ω B) 2.00 Ω
C) 3.00 Ω D) 4.00 Ω

21. Base your answer to the following question on the diagram below which shows 3 resistors connected to a 15-volt source.



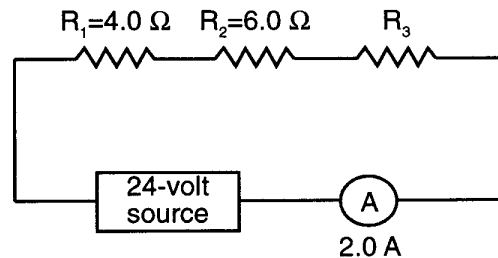
The total resistance of the circuit is

- A) 10 Ω B) 20 Ω C) 30 Ω D) 40 Ω

22. A student needs a 4-ohm resistor to complete a circuit. Only a large quantity of 1-ohm resistors are available. Which of the following should be done to complete the circuit?

- A) Connect four 1-ohm resistors in series.
B) Connect four 1-ohm resistors in parallel.
C) Connect two of the 1-ohm resistors in series and two in parallel.
D) Connect only two 1-ohm resistors in parallel.

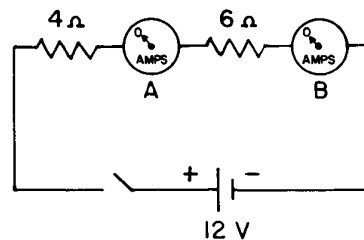
23. The diagram below shows a circuit with three resistors.



What is the resistance of resistor R_3 ?

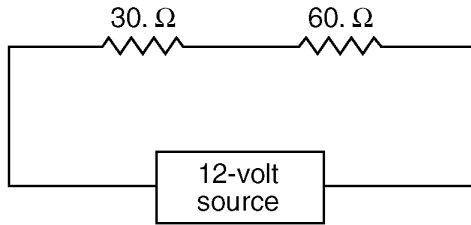
- A) 6.0 Ω B) 2.0 Ω C) 12 Ω D) 4.0 Ω

24. When the circuit shown below is completed what will be the reading on the ammeter at B ?



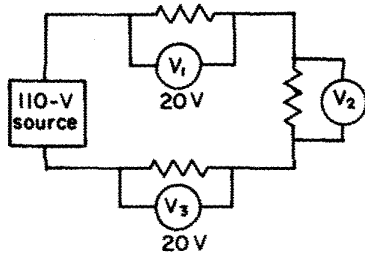
- A) less than the reading at A
B) greater than the reading at A
C) the same as the reading at A

25. A 30.-ohm resistor and a 60.-ohm resistor are connected in an electric circuit as shown below.



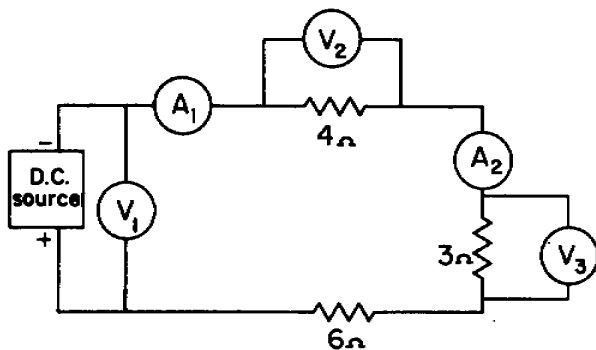
Compared to the electric current through the 30.-ohm resistor, the electric current through the 60.-ohm resistor is

- A) smaller B) larger
C) the same
26. In the circuit diagram below, which is the correct reading for meter V_2 ?



- A) 20 V B) 70 V
C) 90 V D) 110 V

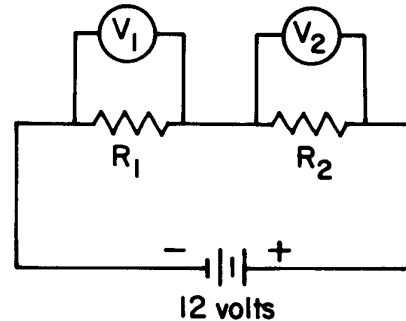
Base your answers to questions 27 and 28 on the diagram below. The reading of voltmeter V_1 is 26 volts, and the reading of ammeter A_1 is 2 amperes.



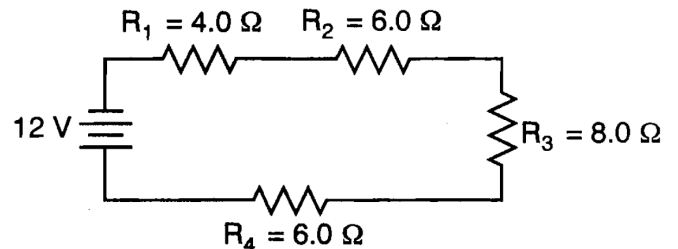
27. The reading of ammeter A_2 is
A) 6 A B) 2 A C) 3 A D) 52 A

28. If additional resistances are added in series and the applied voltage is kept constant, the reading of voltmeter V_3 will
A) decrease B) increase
C) remain the same

29. A 12-volt battery is connected to resistors R_1 and R_2 as shown in the diagram below. If the reading of voltmeter V_1 is 8 volts, what is the reading of voltmeter V_2 ?



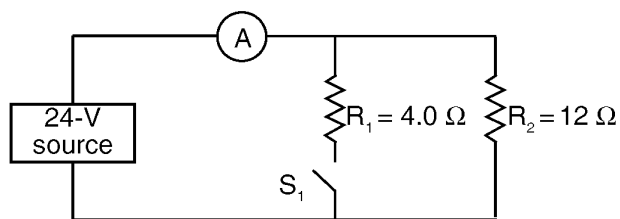
- A) 20. volts B) 12 volts
C) 8 volts D) 4 volts
30. The circuit diagram below represents four resistors connected to a 12-volt source.



What is the total current in the circuit?

- A) 0.50 A B) 2.0 A
C) 8.6 A D) 24 A

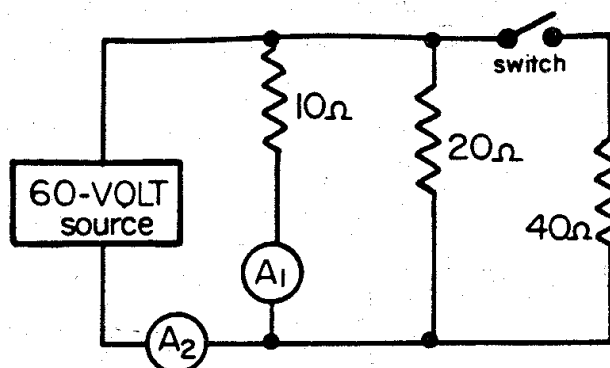
31. Base your answer to the following question on the circuit diagram below.



If switch S_1 is open, the reading of ammeter A is

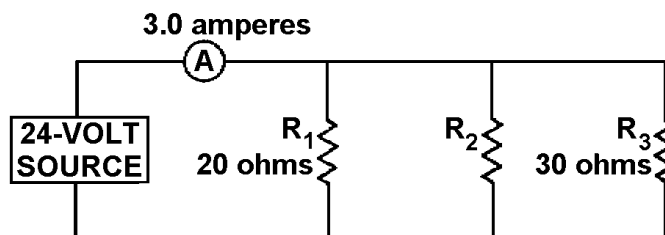
- A) 0.50 A B) 2.0 A
 C) 1.5 A D) 6.0 A
32. Circuit A has four 3.0-ohm resistors connected in series with a 24-volt battery, and circuit B has two 3.0-ohm resistors connected in series with a 24-volt battery. Compared to the total potential drop across circuit A , the total potential drop across circuit B is
- A) one-half as great B) twice as great
 C) the same D) four times as great
33. A 3-ohm resistor and a 6-ohm resistor are connected in parallel across a 9-volt battery. Which statement best compares the potential difference across each resistor?
- A) The potential difference across the 6-ohm resistor is the same as the potential difference across the 3-ohm resistor.
 B) The potential difference across the 6-ohm resistor is twice as great as the potential difference across the 3-ohm resistor.
 C) The potential difference across the 6-ohm resistor is half as great as the potential difference across the 3-ohm resistor.
 D) The potential difference across the 6-ohm resistor is four times as great as the potential difference across the 3-ohm resistor.

34. Base your answer to the following question on the electric circuit below. The switch is in the open position.



Compared to the potential drop across the 10.-ohm resistor, the potential drop across the 20. Ω resistor is

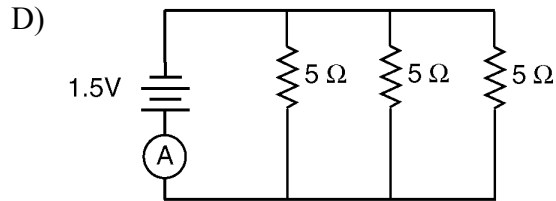
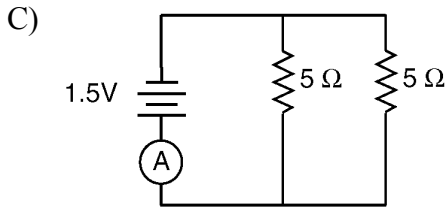
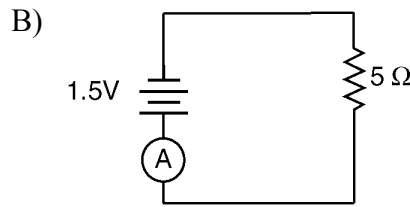
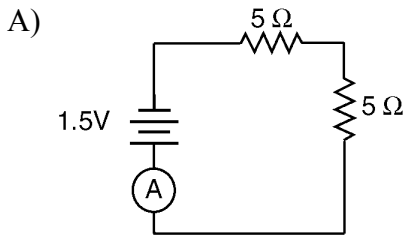
- A) less B) greater
 C) the same
35. Base your answer to the following question on the diagram below which represents three resistors connected in parallel across a 24-volt source. The ammeter reads 3.0 amperes.



The potential difference across R_3 is

- A) 8.0 V B) 24 V C) 48 V D) 72 V
36. Three resistors, 4 ohms, 6 ohms, and 8 ohms, are connected in parallel in an electric circuit. The equivalent resistance of the circuit is
- A) less than 4 Ω
 B) between 4 Ω and 8 Ω
 C) between 10 Ω and 18 Ω
 D) 18 Ω

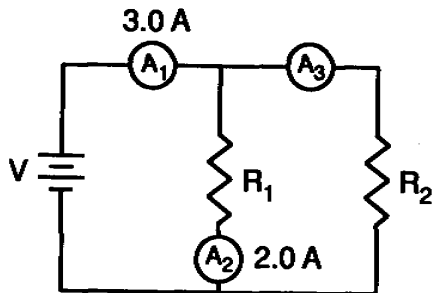
37. In which circuit would ammeter A show the greatest current?



38. As more resistors are added in parallel, the total resistance of a circuit

- A) decreases B) increases
C) remains the same

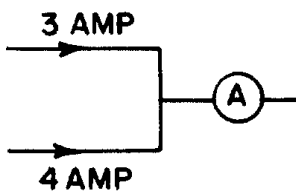
39. Ammeters A_1 , A_2 and A_3 are placed in a circuit as shown below.



What is the reading on ammeter A_3 ?

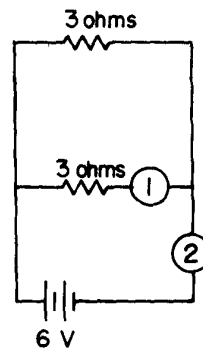
- A) 1.0 A B) 2.0 A C) 3.0 A D) 5.0 A

40. The diagram below represents a segment of a circuit. What is the current in ammeter A ?



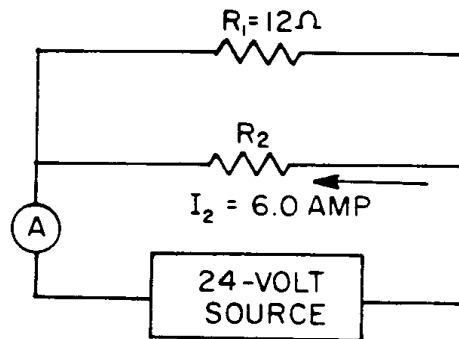
- A) 1 A B) 0 A C) 3.5 A D) 7 A

41. In the circuit at the right, if an ammeter is moved from position 1 to position 2, the current measured will



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

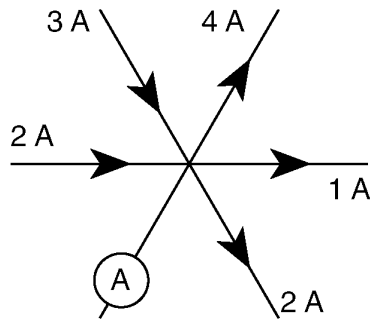
42. Base your answer to the following question on the diagram of the circuit below.



If resistance R_2 were removed, the current in ammeter A would

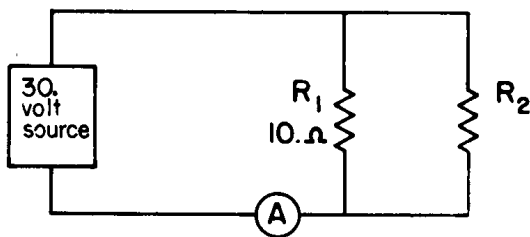
- A) decrease B) increase
C) remain the same

43. The diagram below represents currents in a segment of an electric circuit.



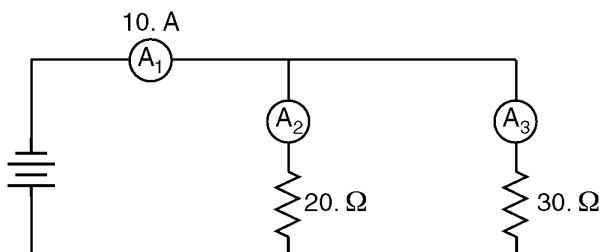
What is the reading of ammeter A ?

- A) 1 A B) 2 A C) 3 A D) 4 A
44. Base your answer to the following question on the diagram below which represents two resistances (R_1 and R_2) and an ammeter connected to a constant 30. volt source. The combined resistance of the circuit is 6.0 ohms.



If the resistance of R_2 were increased, the current through R_2 would

- A) decrease B) increase
C) remain the same
45. In the circuit diagram shown below, ammeter A_1 reads 10. amperes.



What is the reading of ammeter A_2 ?

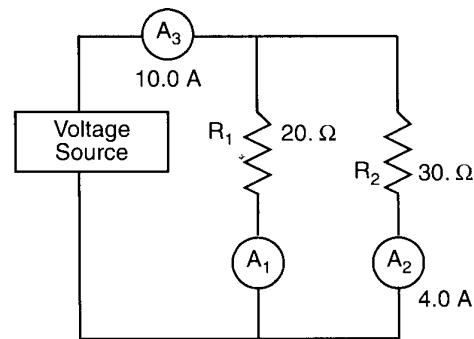
- A) 6.0 A B) 10. A C) 20. A D) 4.0 A

46. In the circuit diagram shown below, what is the current through the 4.0-ohm resistor?



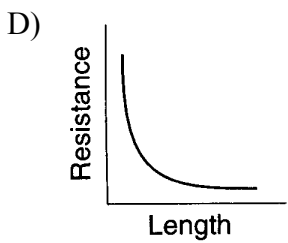
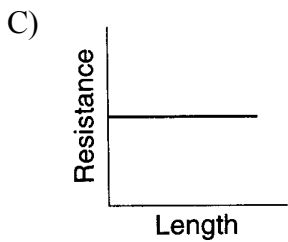
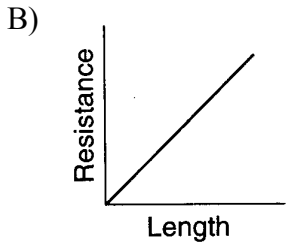
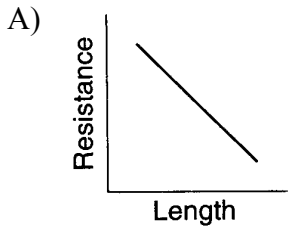
- A) 1.0 ampere B) 0.33 ampere
C) 3.0 amperes D) 48 amperes
47. As the number of resistors in a parallel circuit is increased, what happens to the equivalent resistance of the circuit and total current in the circuit?
- A) Both equivalent resistance and total current decrease.
B) Both equivalent resistance and total current increase.
C) Equivalent resistance decreases and total current increases.
D) Equivalent resistance increases and total current decreases.

Base your answers to questions 48 and 49 on the diagram below, which shows two resistors and three ammeters connected to a voltage source.



48. What is the current reading of ammeter A_1 ?
- A) 10.0 A B) 6.0 A
C) 3.0 A D) 4.0 A
49. What is the potential difference across the source?
- A) 440 V B) 220 V
C) 120 V D) 60. V

50. A copper wire is part of a complete circuit through which current flows. Which graph best represents the relationship between the wire's length and its resistance?



51. A manufacturer recommends that the longer the extension cord used with an electric drill, the thicker (heavier gauge) the extension cord should be. This recommendation is made because the resistance of a wire varies

- A) directly with length and inversely with cross-sectional area
- B) inversely with length and directly with cross-sectional area
- C) directly with both length and cross-sectional area
- D) inversely with both length and cross-sectional area

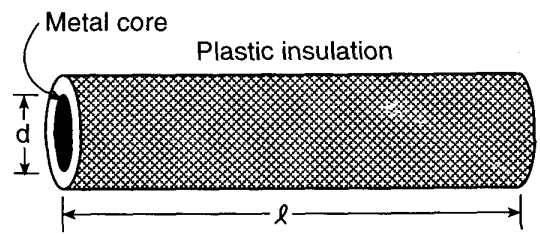
52. A complete circuit is left on for several minutes, causing the connecting copper wire to become hot. As the temperature of the wire increases, the electrical resistance of the wire

- A) decreases
- B) increases
- C) remains the same

53. The resistance of a copper wire is measured to be 4 ohms at 20°C. If the wire is heated to 30°C, the resistance of the wire will be

- A) zero ohms
- B) less than 4 ohms
- C) more than 4 ohms
- D) 4 ohms

54. Plastic insulation surrounds a wire having diameter d and length ℓ as shown below.



A decrease in the resistance of the wire would be produced by an increase in the

- A) thickness of the plastic insulation
- B) length of the wire
- C) diameter d of the wire
- D) temperature of the wire

55. The electrical resistance of a metallic conductor is inversely proportional to its

- A) temperature
- B) length
- C) cross-sectional area
- D) resistivity

56. In a simple electric circuit, a 110-volt electric heater draws 2.0 amperes of current. The resistance of the heater is

- A) 0.018 Ω
- B) 28 Ω
- C) 55 Ω
- D) 220 Ω

57. A lamp has a current of 2.0 amperes at 6.0 volts. The resistance of the lamp must be

- A) 1.5 Ω
- B) 6.0 Ω
- C) 3.0 Ω
- D) 12 Ω

58. In a simple electric circuit, a 24-ohm resistor is connected across a 6.0-volt battery. What is the current in the circuit?

A) 1.0 A

B) 0.25 A

C) 140 A

D) 4.0 A