Physics

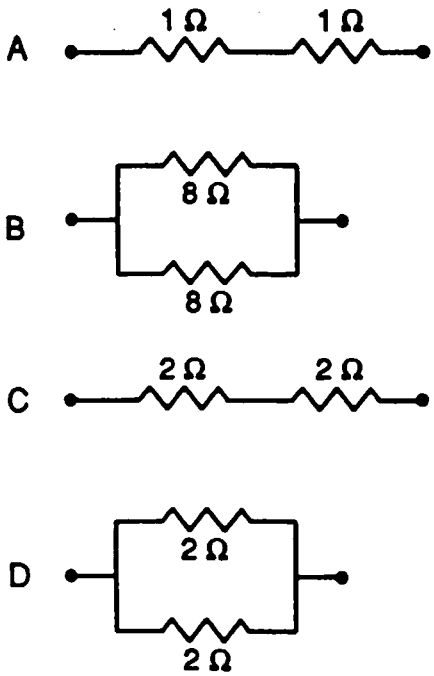
Name _____

Circuits Review

1 A copper wire is connected across a constant voltage source. The current flowing in the wire can be increased by increasing the wire's

1 cross-sectional area
2 length
3 resistance
4 temperature

2 Which two of the resistor arrangements shown below have equivalent resistance?



(1) *A* and *B*
(2) *B* and *C*
(3) *C* and *D*
(4) *D* and *A*

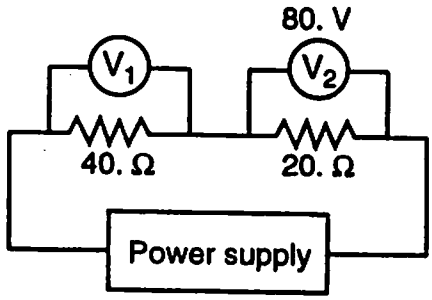
3 A clothes dryer connected to a 240-volt line draws 30. amperes of current for 20. minutes (1,200 seconds). Approximately how much electrical energy is consumed by the dryer?

(1) 4.8×10^3 J
(2) 7.2×10^3 J
(3) 1.4×10^5 J
(4) 8.6×10^6 J

4 A metal conductor is used in an electric circuit. The electrical resistance provided by the conductor could be increased by

1 decreasing the length of the conductor
2 decreasing the applied voltage in the circuit
3 increasing the temperature of the conductor
4 increasing the cross-sectional area of the conductor

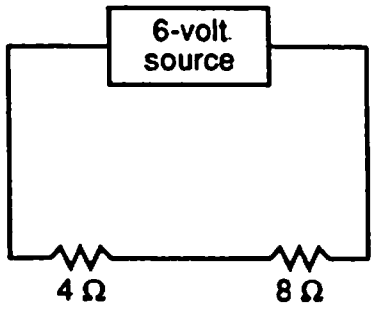
5 In the circuit shown below, voltmeter V_2 reads 80. volts.



What is the reading of voltmeter V_1?

(1) 160 V
(2) 80. V
(3) 40. V
(4) 20. V

6 The diagram below shows a circuit with two resistors.



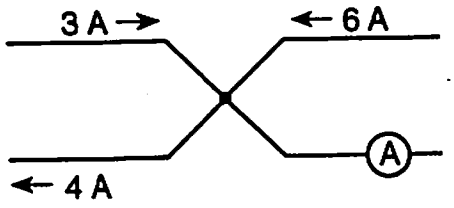
Compared to the potential drop across the 8-ohm resistor, the potential drop across the 4-ohm resistor is

1 the same
2 twice as great
3 one-half as great
4 four times as great

7 In a lightning strike, a charge of 18 coulombs is transferred between a cloud and the ground in 2.0×10^{-2} second at a potential difference of 1.5×10^6 volts. What is the average current produced by this strike?

(1) 3.6×10^{-1} A
(2) 9.0×10^2 A
(3) 3.0×10^4 A
(4) 7.5×10^7 A

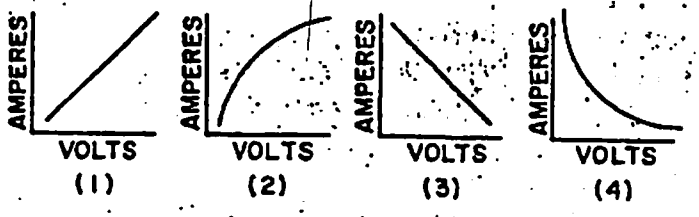
8 The diagram below shows the current in a segment of a direct current circuit.



What is the reading of ammeter A?

(1) 1 A
(2) 5 A
(3) 7 A
(4) 8 A

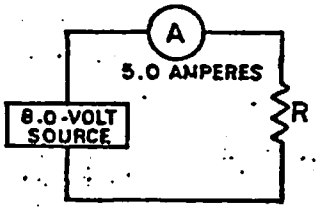
9 Which graph best represents a material behaving according to Ohm's law?



10 Three resistances of 2 ohms, 4 ohms, and 6 ohms are connected in parallel. The equivalent resistance of the three resistors is

1 less than 2 ohms
2 between 2 ohms and 4 ohms
3 between 4 ohms and 6 ohms
4 greater than 6 ohms

11 The circuit represented in the diagram at the right is a series circuit. The electrical energy expended in resistor R in 2.0 seconds is



(1) 20. J
(2) 40. J
(3) 80. J
(4) 120 J

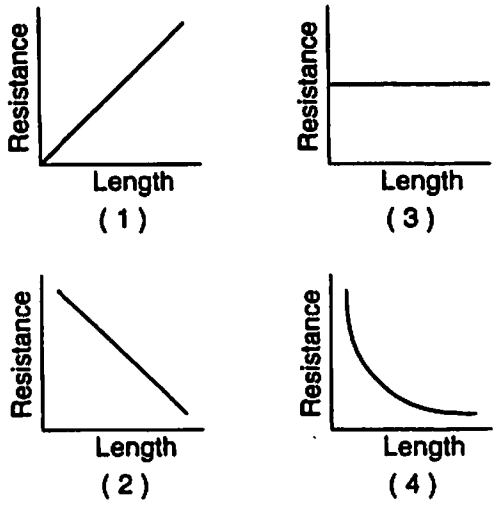
12 As the temperature of a metallic conductor increases, its resistance

1 decreases
2 increases
3 remains the same

13 An operating lamp draws a current of 0.50 ampere. The amount of charge passing through the lamp in 10. seconds is

(1) 0.050 C
(2) 2.0 C
(3) 5.0 C
(4) 20. C

14 Which graph best represents the relationship between the resistance of a copper wire of uniform cross-sectional area and the wire's length at constant temperature?



15 Which is a vector quantity?

1 electric charge
2 electrical resistance
3 electrical potential difference
4 electric field intensity

16 To increase the brightness of a desk lamp, a student replaces a 60-watt light bulb with a 100-watt bulb. Compared to the 60-watt bulb, the 100-watt bulb has

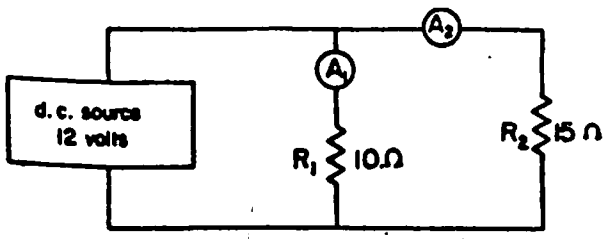
1 less resistance and draws more current
2 less resistance and draws less current
3 more resistance and draws more current
4 more resistance and draws less current

17 An electric dryer consumes 6.0×10^6 joules of energy when operating at 220 volts for 30. minutes (1800 seconds). During operation, the dryer draws a current of approximately

(1) 10. A
(2) 15 A
(3) 20. A
(4) 25 A

circuits #3

Base your answers to questions 18 through 22 on the diagram below which represents an electrical circuit.



18 The equivalent resistance of the circuit is
(1) 25 Ω
(2) 6.0 Ω
(3) 5.0 Ω
(4) 0.17 Ω

19 The potential difference across R_2 is
(1) 1.0 V
(2) 2.0 V
(3) 10. V
(4) 12 V

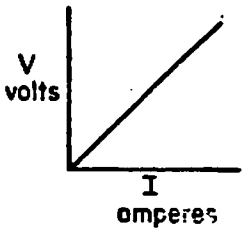
20 The magnitude of the current in ammeter A_1 is
(1) 120 A
(2) 2.0 A
(3) 1.2 A
(4) 0.83 A

Note that questions 21 and 22 have only three choices.

21 Compared to the current in A_1, the current in A_2 is
1 less
2 greater
3 the same

22 If another resistance were added to the circuit in parallel, the equivalent resistance of the circuit would
1 decrease
2 increase
3 remain the same

23 The graph at the right shows how the voltage and current are related in a simple electric circuit. For any point on the line, what does the ratio of V to I represent?



1 work in joules
2 power in watts
3 resistance in ohms
4 charge in coulombs

Base your answers to questions 24 through 28 on the information below.

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

24 What is the resistance of the heater?
(1) 576,000 Ω
(2) 120 Ω
(3) 3.0 Ω
(4) 40. Ω

25 How much energy is used by this heater in 10.0 seconds?
(1) 1.15 J
(2) 40. J
(3) 4.8×10^3 J
(4) 4.8×10^4 J

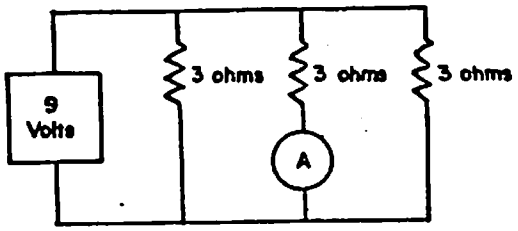
Note that questions 26 through 28 have only three choices.

26 If the heater were replaced by one having a greater resistance, the amount of heat produced each second would
1 decrease
2 increase
3 remain the same

27 If another heater is connected in parallel with the first one and both operate at 120 volts, the current in the first heater will
1 decrease
2 increase
3 remain the same

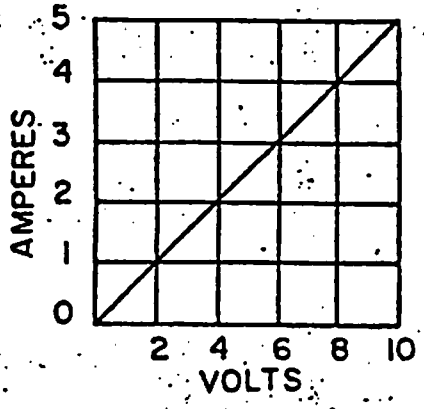
28 If the original heater were operated at less than 120 volts, the amount of heat produced would
1 decrease
2 increase
3 remain the same

29 What is the current in ammeter A in the diagram below?



(1) 1 A
(2) $\frac{1}{3}$ A
(3) 3 A
(4) 9 A

Base your answers to questions 30 through on the graph below which represents data obtained by applying different potential differences to a metallic conductor at a constant temperature.



30 The resistance of the conductor is approximately
(1) 1.0 ohm (3) 0.5 ohm
(2) 2.0 ohms (4) 4.0 ohms

31 At 6.0 volts, what is the rate of use of energy by the conductor?
(1) 54 watts (3) 12 watts
(2) 18 watts (4) 6.0 watts

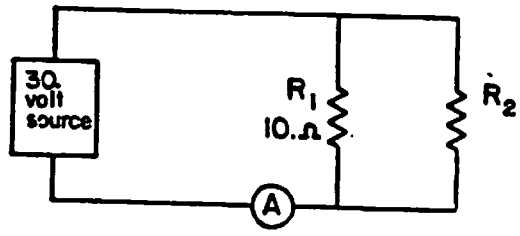
Note that questions 32 through 34 have only three choices.

32 If the temperature of the conductor is increased, the amount of current at 10 volts would be
1 less
2 greater
3 the same

33 If the length of the conductor were increased, the amount of current at 10 volts would be
1 less
2 greater
3 the same

34 Compared to a conductor of the same material with a larger cross-sectional area, the resistance of this conductor is
1 less
2 greater
3 the same

Base your answers to questions 35 through 39 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.



35 The resistance of R_2 is equal to
(1) 6.0 Ω (3) 15 Ω
(2) 2.0 Ω (4) 4.0 Ω

36 Ammeter A reads
(1) 7.5 A (3) 3.0 A
(2) 5.0 A (4) 1.2 A

37 What power is developed in resistor R_1 alone?
(1) 60. W (3) 150 W
(2) 90. W (4) 250 W

Note that questions 38 and 39 have only three choices.

38 Compared to the potential difference across the source, the potential difference across R_2 is
1 less
2 greater
3 the same

39 If the resistance of R_2 were increased, the current through R_2 would
1 decrease
2 increase
3 remain the same

40 A 10-volt potential difference maintains a 2-ampere current in a resistor. The total energy expended by this resistor in 5 seconds is
(1) 10 J (3) 50 J
(2) 20 J (4) 100 J