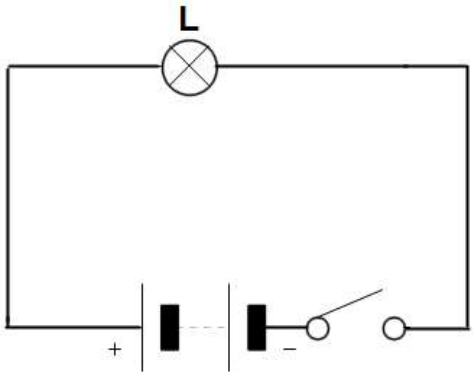
PSI Physics Electric Current and Circuits

Multiple Choice Questions

1. The amount of charge flowing through a cross-sectional area of a wire per unit of time is called:
   A. Voltage B. Power C. Resistance D. Work E. Current



2. What is the direction of the conventional current through the light bulb in the circuit presented by the diagram above?

   A. → B. ← C. ↓ D. ↑ E. Out of the page

3. A wire of length L and cross-sectional area A has a resistivity ρ. Which of the following formulas can be used to calculate the resistance of the wire?

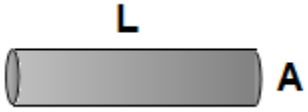
   A. $R = \frac{\rho L}{A}$

   B. $R = \frac{\rho A}{L}$

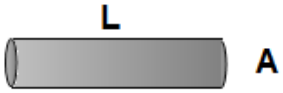
   C. $R = \frac{L}{\rho A}$

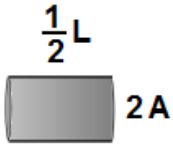
   D. $R = \frac{A}{\rho L}$

   E. $R = \frac{\rho}{A}$

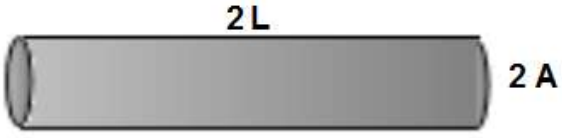


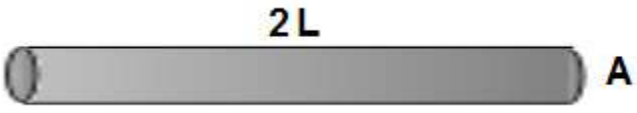
4. All of the following wires are made of the same material but are different sizes. Identify the wire with the lowest resistance.

A.


B.


C.


D.


E.


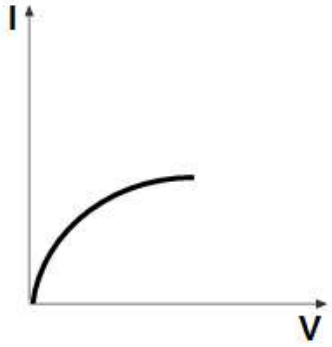
5. Two copper wires have the same cross-sectional area but have different lengths. Wire X has a length L and wire Y has a length 2L. The ratio between the resistance of wire Y and wire X is:

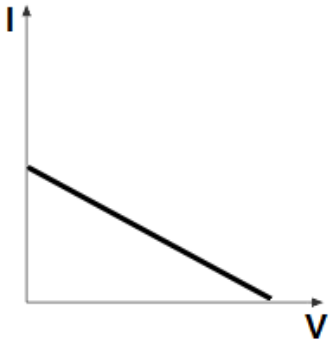
A. $\frac{R_y}{R_x} = \frac{1}{1}$ B. $\frac{R_y}{R_x} = \frac{1}{2}$ C. $\frac{R_y}{R_x} = \frac{2}{1}$ D. $\frac{R_y}{R_x} = \frac{1}{4}$ E. $\frac{R_y}{R_x} = \frac{4}{1}$

6. Two aluminum wires A and B are presented by the diagram. Wire B has twice the radius of that of wire A. How does the resistance of wire B compare to the resistance of wire A.

A. $\frac{R_B}{R_A} = \frac{1}{1}$ B. $\frac{R_B}{R_A} = \frac{1}{2}$ C. $\frac{R_B}{R_A} = \frac{2}{1}$ D. $\frac{R_B}{R_A} = \frac{1}{4}$ E. $\frac{R_B}{R_A} = \frac{4}{1}$

7. Which of the following graphs represents Ohm's law for a solid conductor at the constant temperature?

A.


B.


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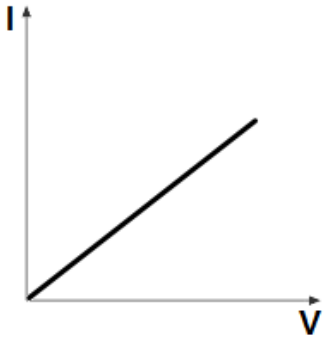
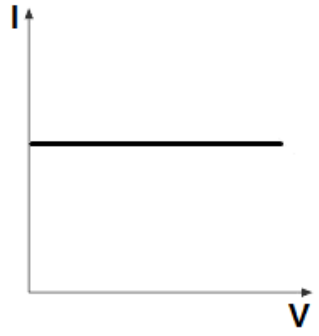
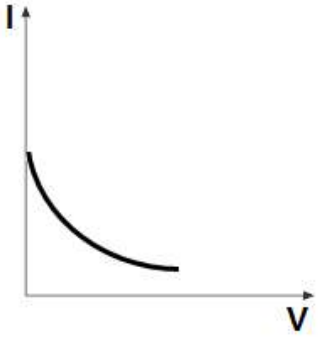
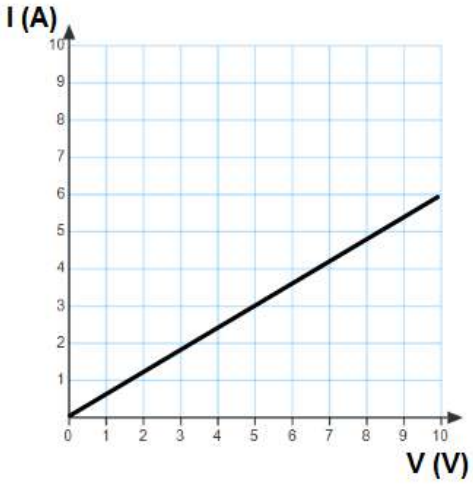


D.


E.


The electric current as a function of voltage of a wire is presented by the graph to the right. Use this graph for questions 8 and 9.

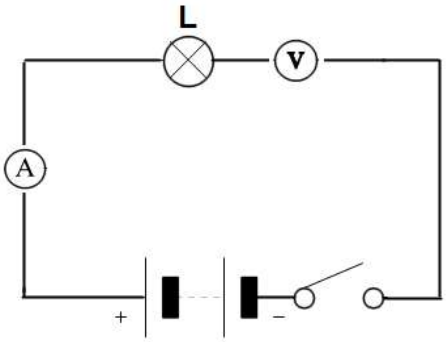


8. What is the resistance of the wire?
   A. 1Ω B.0.8 Ω C.1.6 Ω
   D. 0.4 Ω E. 0.2 Ω

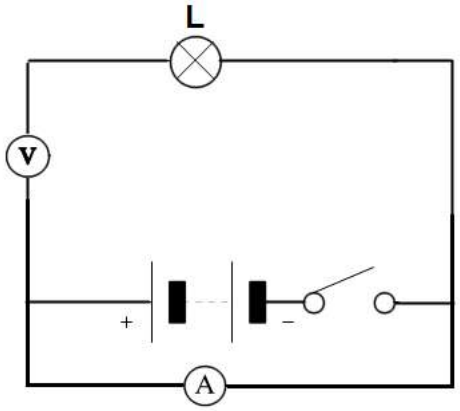
9. The electric current as a function of voltage of a wire is presented by the graph. What is the power dissipated in the resistor when the applied voltage is 5 V?
   A. 5 W B.10 W C.15 W
   D. 20 W E. 25 W

10. A group of physics students performs an experiment with electric circuits. Which of the following circuits can be used to measure the electric current and voltage?

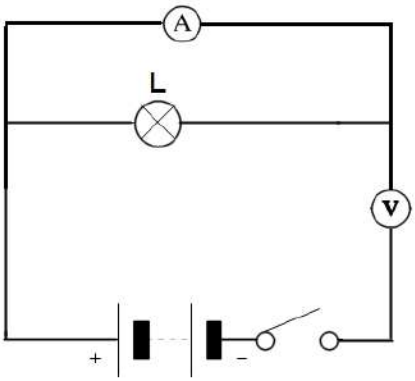
A.



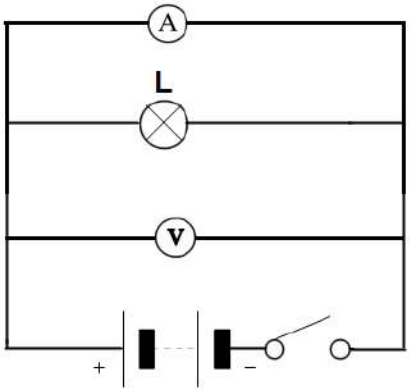
B.



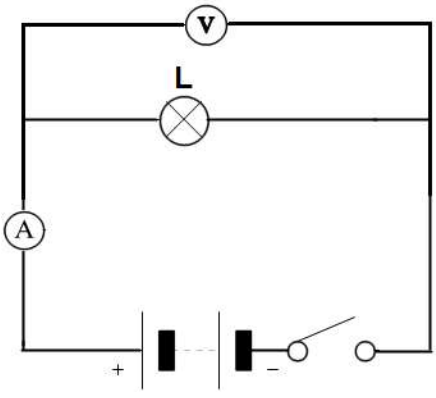
C.



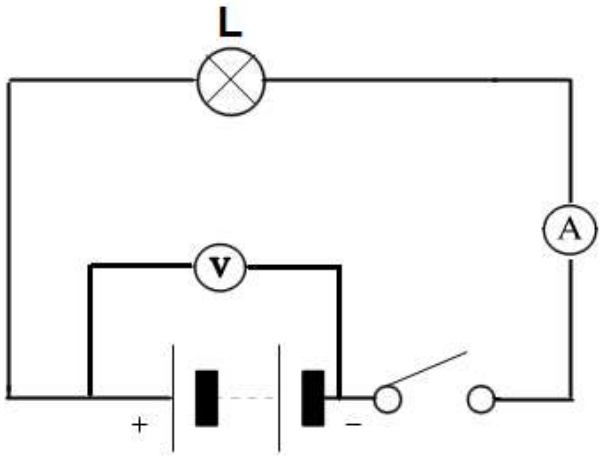
D.



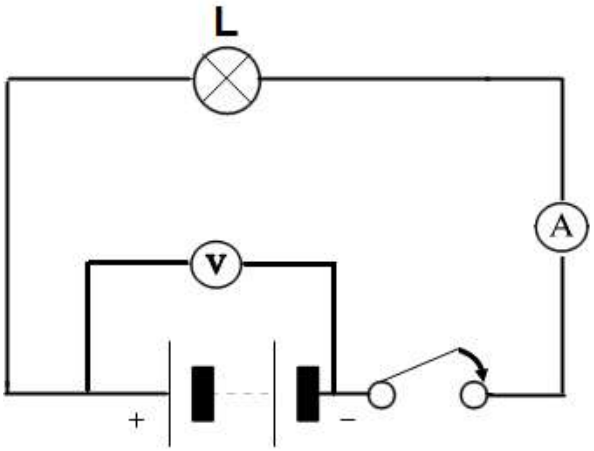
E.

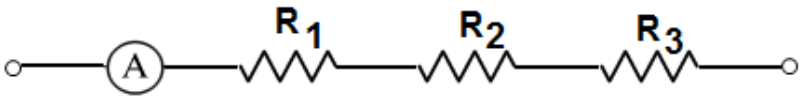


11. When the switch in the circuit presented by the diagram to the right is open, the voltmeter reading is referred to as:
    A. Terminal voltage
    B. EMF
    C. Current
    D. Resistance
    E. Power



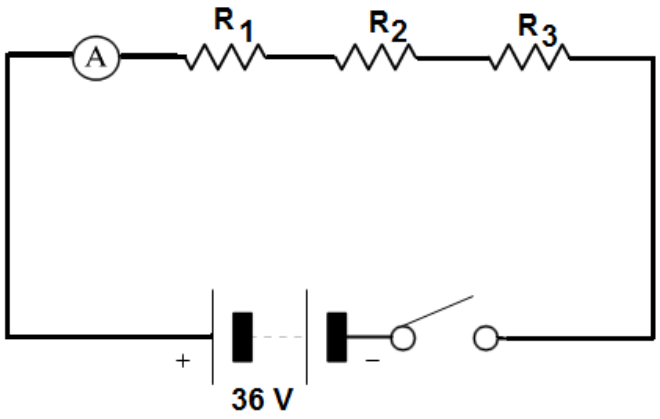
12. When the switch in the circuit presented by the diagram above is closed, the voltmeter reading is referred to:
    A. Terminal voltage
    B. EMF
    C. Current
    D. Resistance
    E. Power





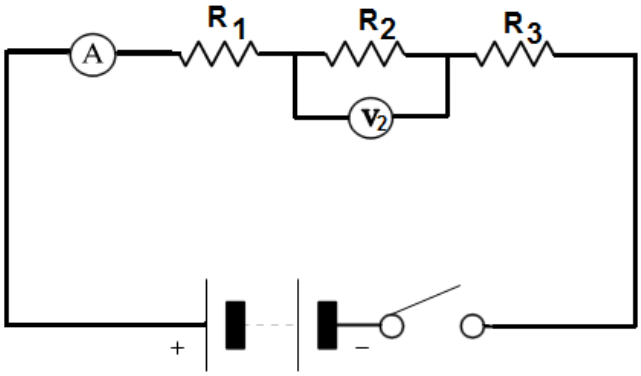
13. An ammeter connected in series with three resistors reads an electric current of 2 A. What is the electric current flowing trough resistor R_3?
    A.1 A B.2 A C. 3 A D. 4 A E. 5 A

14. Three resistors: $R_1 = 3\ \Omega$, $R_2 = 6\ \Omega$, and $R_3 = 9\ \Omega$ are connected in series to each other and to a 36 V battery. What is the ammeter reading after the switch is closed?
    A. 6 A B. 5 A C. 4 A
    D. 3 A E. 2 A



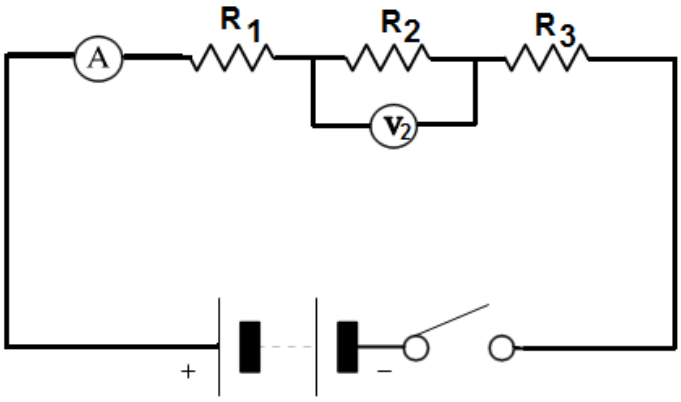
15. Three resistors: $R_1 = 5\ \Omega$,$R_2 = 3\ \Omega$, and $R_3 = 4\ \Omega$ are connected in series to each other. A voltmeter connected in parallel to resistor R_2 measures voltage of 6 V. What is the current through the battery?

A. 2 A B. 5 A C. 4 A D. 3 A
E. 6 A



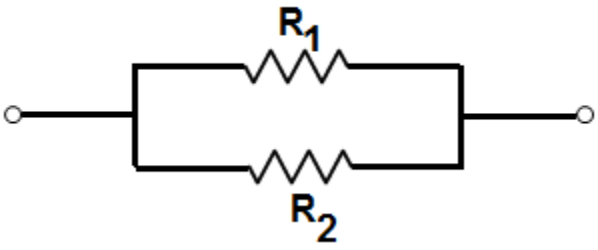
16. Three resistors: $R_1 = 5\ \Omega$,$R_2 = 3\ \Omega$, and $R_3 = 4\ \Omega$ are connected in series to each other. A voltmeter connected in parallel to resistor R_2 measures voltage of 6 V. What is the net voltage in the circuit?

A. 24 V B. 20 V C. 16 V
D. 12 V E. 4 V



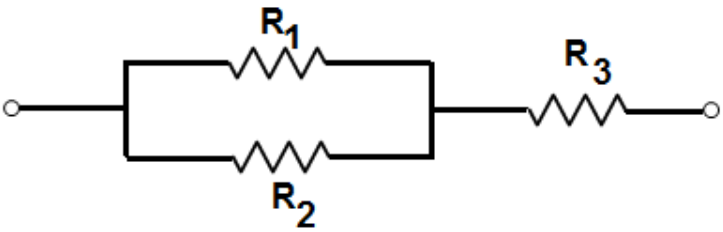
17. Two resistors $R_1 = 3\ \Omega$ and $R_2 = 6\ \Omega$ are connected in parallel. What is the net resistance in the circuit?

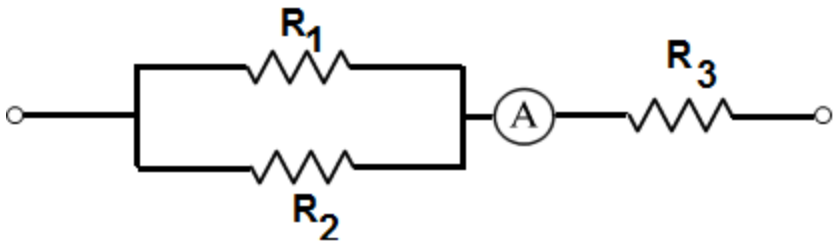
A. 1 Ω B. 3 Ω C. 6 Ω
D. 2 Ω E. 9 Ω



18. Two resistors $R_1 = 6\ \Omega$ and $R_2 = 12\ \Omega$ are connected in parallel to each other and in series to R3 = 2 Ω. What is the net resistance in the circuit?

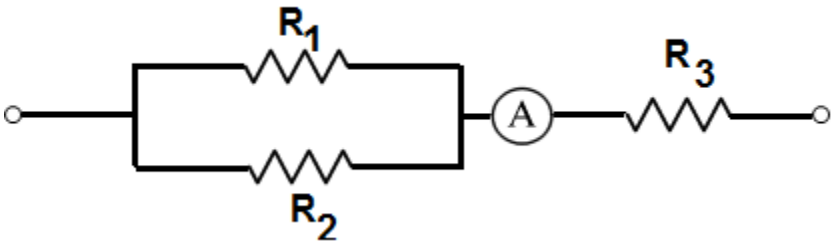
A. 1 Ω B. 3 Ω C. 6 Ω
D. 2 Ω E. 9 Ω





19. Two resistors R_1 = 6 Ω and R_2 = 12 Ω are connected in parallel to each other and in series to R_3 = 2 Ω. An ammeter measures an electric current of 3 A flowing though resistor R_3. What is the net voltage applied to the circuit?

    A. 6 V B. 12 V C. 18 V D. 24 V E. 36 V



20. Two resistors R_1 = 6 Ω and R_2 = 12 Ω are connected in parallel to each other and in series to R_3 = 2 Ω. An ammeter measures an electric current of 3 A flowing though resistor R_3. What is the current in 12 Ω resistor?

    A. 6 A B. 1 A C. 3 A D. 5 A E. 7 A

Answer Guide

1. E
2. A
3. A
4. B
5. C
6. D
7. C
8. C
9. C
10. E
11. B
12. A
13. B
14. E
15. A
16. A
17. D
18. C
19. C
20. B