Physical Science: Ohm's Law Practice **Name** Answers **Per**____

Solve the following problems. Show all your work and use correct units.

Formulas: $I = V/R$ $V = IR$ $R = V/I$

I = current in Amperes (A) V = Voltage in Volts (V) R = Resistance in ohms (Ω)

1. How much current would flow through a circuit that has 1000 ohms of resistance if powered by 1.5 volts?

$$I = \frac{V}{R} = \frac{1.5V}{100\Omega} = 0.015A$$

2. How many amperes of current will flow through a circuit that has 3 ohms of resistance if powered by a 12 volt battery?

$$I = \frac{V}{R} = \frac{12V}{3\Omega} = 4A$$

3. The side lights of a car have 10 ohms of resistance. How much current will a 12 volt battery create through the lights?

$$I = \frac{V}{R} = \frac{12V}{10\Omega} = 1.2A$$

4. What is the current in the 30 ohm heating coil of a coffee maker that operates on a 120 volt circuit?

$$I = \frac{V}{R} = \frac{120V}{30\Omega} = 4A$$

5. How much resistance allows 6 V battery to produce a current of 0.006 A?

$$R = \frac{V}{I} = \frac{6V}{0.006A} = 100\Omega$$

6. What is the resistance of a curling iron that draws 12 A of current on a 120 V circuit?

$$R = \frac{V}{I} = \frac{120V}{12A} = 10\Omega$$

7. What is the voltage across a 100 ohm circuit element that draws a current of 1 A?

$$V = I \cdot R = (1A)(100\Omega) = 100V$$

8. What voltage will produce 3 A through a circuit that has 15 ohms of resistance?

$$V = I \cdot R = 3A \cdot 15\Omega = 45V$$

9. Household circuits in the United States commonly run on 120 volts of electricity. Frequently, circuit breakers are installed that open a circuit if it is drawing more than 15 amps of current. What is the minimum amount of resistance that must be present in the circuit to prevent the circuit breaker from activating?

$$R = \frac{V}{I} = \frac{120V}{15A} = 8\Omega$$

10. The current in an incandescent lamp is 0.5 Amperes when connected to a 120 Voltage circuit, and 0.2 Amperes when connected to a 10 Voltage source. Does the resistance of the lamp change in these cases? Explain your answer using your notes (hint: connect voltage to temperature of the circuit and temperature to resistance of the circuit). Support your answer mathematically.

$$R = \frac{V}{I} = \frac{120V}{0.5A} = 240\Omega$$

$$R = \frac{V}{I} = \frac{10V}{0.2A} = 50\Omega$$

-yes, resistance is greater when voltage is higher. The temperature of the lightbulb's filament increases which causes the resistance to increase