Worksheet 3:Ohms Law, circuits and Power

Name: _____ Date:_____

1. The three terms in Ohm's Law are voltage, current, and resistance. Which term refers to moving electrons? current

   Which term deals with the role of atoms in the conducting wire that carries the current? resistance

   Which term causes electrons to move? voltage

   Which term accounts for the heating of wires? resistance

2. What exactly is meant when you say that a wire carries a current? Explain in terms what you would see in the wire if you could see a current. A current is defined as moving electrons so a wire carrying a current has its free electrons moving within the wire.

3. Thin wires have higher resistance than thick wires. If you want to minimize the risk of an electrical fire, should you use thick wires or thin wires? Explain. You would want to minimize the heating in the wires so you want lower resistance. Thus, you should use thick wires.

4. Suppose you use a filament that has much less resistance than the connecting wires. How would the heating in the wires and filament compare to each other? Electrons have a more difficult time moving through the wire than through the filament, it should be the other way around.
   Is this a good idea? Since heating happens in regions of higher resistance, the wires (more resistance) would heat up more than the filament (less resistance). The wires would get very hot and the filament would not get hot enough to glow….not a good idea.

5. A friend of yours asks you to explain how currents can start electrical fires. How would you answer in terms of energy conversion? A current in a wire consists of electrons moving from high Electric Potential Energy (EPE) to low EPE, thereby losing EPE. This energy is not really lost but converted into thermal energy of the wires. The increased thermal energy of the wires is accompanied by an increase in the wire temperature and it will heat up. If the wires get hot enough, they can start an electrical fire.

6. You measure the resistance of an incandescent night-light to be 7,200 Ω. The outlet you plug into at home provides a voltage of 120 V. What is the current in the night-light when it is on? Include the correct units. 0.0166 A

   What is the power output of the night-light? Include the correct units.
   P= IV = 2 W

7. A microwave is rated at 1500 W when it is given a voltage of 120 V. What is the current in the microwave? 12.5 A Include the correct units.

   What is the resistance of the microwave? Include the correct units. 9.6 Ω