Name: _____ Date: _____ Period: _____

AP Physics: Current, Ohm's Law, Resistivity, and Power HW

Instructions: Complete these problems on separate paper. Show all of your work for calculations or give a detailed explanation.

1. Car batteries are often rated in ampere-hours. Does this unit designate the amount of current, power, energy, or charge that can be drawn from the battery? Explain.

2. In a particular television picture tube, the measured beam current is 60.0 μA. How many electrons strike the screen every second?

3. A current *I* flows through a circuit. By what factor does the current change if
   - The voltage is doubled?
   - The voltage is halved?
   - The resistance is doubled?
   - The resistance is halved?
   - The voltage and resistance are both quadrupled?

4. What voltage would be necessary to produce a current of 0.2A through a 30Ω resistor?

5. A device is specified to have a current of 5 mA. If it is supplied with a 12 Volt battery, what size resistor should be used?

6. When a toaster is plugged into a 120-V wall socket it produces a current of 4.2 A. How much current would flow through the toaster if it were plugged into a 220-V socket?

7. A hair dryer draws 7.5 A when plugged into a 120-V line.
   - What is its resistance?
   - How much charge passes through it in 15 min?

8. A 9.0-V battery is connected to a bulb whose resistance is 1.6 Ω. How many electrons leave the battery per minute?

9.
The resistance of a 60.-watt lightbulb operated at 120 volts is approximately

(1) 720 Ω   (3) 120 Ω
(2) 240 Ω   (4) 60. Ω

10.
An operating electric heater draws a current of 10. amperes and has a resistance of 12 ohms. How much energy does the heater use in 60. seconds?

(1) 120 J   (3) 7200 J
(2) 1200 J   (4) 72,000 J

11. A wire, made of an unknown material with a cross-sectional area of $3 \times 10^{-9} m^2$, is cut into several segments of varying length. The resistance of each segment is measured. This data is recorded in the table below.

Length (m)	Resistance (Ω)	
0.1	1.0	
0.2	1.8	
0.3	2.7	
0.4	3.9	
0.5	4.4	

You will find the resistivity of the wire graphically. Choose two quantities that can be graph to produce a straight best fit line.
   a. Which two quantities should be graphed so that the slope of the best fit line is the resistivity? Which axis should each be placed on?
   b. Fill out the empty column in the data table with a quantity that will be plotted on your graph.
   c. On the graph paper below, label the axes, plot your data points, and draw a best fit line using a ruler.
   d. Calculate the slope of your best fit line. Show all work.
   e. Determine the resistivity of the wire.