

Name \_\_\_\_\_

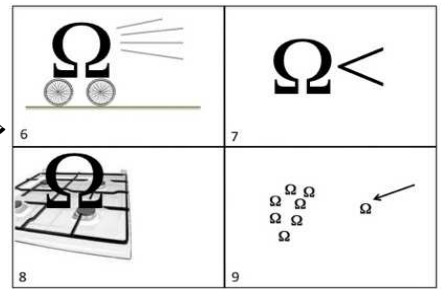
Period \_\_\_\_\_

## HONORS PHYSICS

### Lesson 11: Electric Circuits (Quick Version)

#### 11.1 Current and Voltage in Series

Some Ohm Riddles! ->

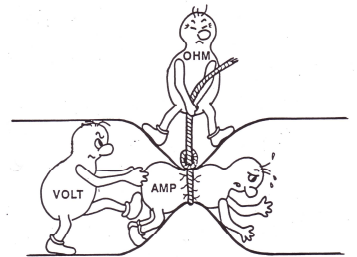
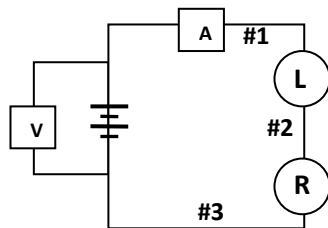


For this experiment, make a circuit containing one round bulb and one long bulb in series. We will be measuring how current and voltage split up in a series circuit.

(a) PREDICT: Will there be the most charge flow (current) through the round bulb, the long bulb, or the battery?

(b) PREDICT: Will there be more voltage difference across the round bulb or the long bulb?

(c) Make the appropriate measurements to fill in the table. Remember that the ammeter **A** must be connected in series by breaking open the circuit and inserting it between the 2 parts.



	I (A)	$\Delta V$ (V)	$I \cdot \Delta V$ (W)
#1 Entering L			
#2 Entering R			
#3 Through Battery			

(d) Which bulb had more current flow through it?

(e) Which bulb had more voltage across it?

Circle the correct words in the following statements in the next two steps:

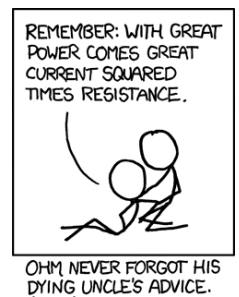
(f) The current / voltage is always the same in all parts of a series circuit.

(g) In series, the current / voltage adds up to the total across the battery (the “emf” or  $\mathcal{E}$ ).

(h) If you multiply current and voltage, you calculate the power output of the resistor in units of Joules per second or Watts [W]. This is the rate at which the energy from the battery is used. For light bulbs, energy leaves the circuit as heat and light, so it is related to bulb brightness. More power output (more Watts) means more brightness.

PREDICT: If you add up all the outputs, should they equal more or less than the input from the battery?

Why?



(i) Now try it. Add up all the outputs you measured and compare the total to the battery's output.

$$P_{\text{Round}} + P_{\text{Long}} = (\text{ } \text{W}) + (\text{ } \text{W}) = \text{ } \text{W}$$

$$P_{\text{battery}} = \text{ } \text{W}$$

(j) Is there a significant difference?

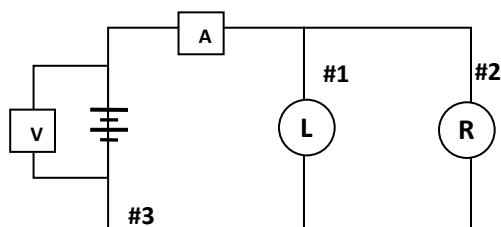
### 11.2 Current and Voltage in Parallel

This time, put the round bulb and long bulb in parallel with each other and connect the battery.

(a) PREDICT: Will there be more charge flow (current) through the round bulb, the long bulb, or the battery?

(b) PREDICT: Will there be more voltage difference across the round bulb or the long bulb?

(c) Make the appropriate measurements to fill in the table.



	I (A)	$\Delta V$ (V)	$I \cdot \Delta V$ (W)
#1 Entering L			
#2 Entering R			
#3 Through Battery			

(d) Which bulb had more current flow through it?

(e) Which bulb had more voltage across it?

Circle the correct words in the following statements in the next two steps:

(f) The **current / voltage** is always the same across each resistor in parallel.

(g) In parallel, the **current / voltage** splits so that it adds up to the total in the branch before and after the paths split.

(h) Examine the power outputs and input column. Add up all the outputs and compare it to the input from the battery. Is there a significant difference?

(i) What physical conservation law would be violated if the outputs were different than the input?