IB PHYSICS

Name: _____

Period: _____ Date: _____

DEVIL PHYSICS

BADDEST CLASS ON CAMPUS

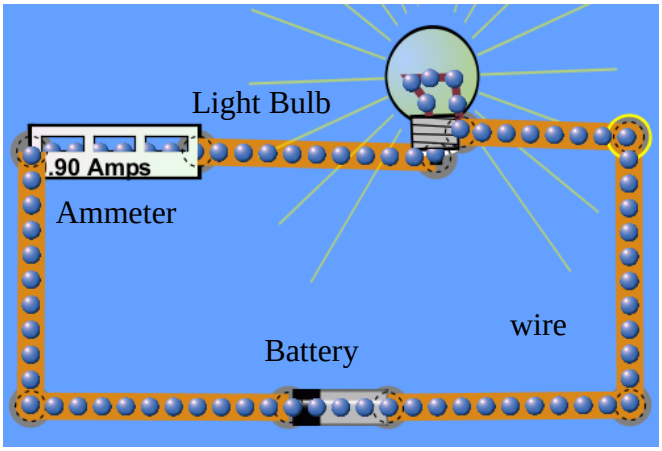
PhET Resistance in Series and Parallel Circuits

(1/2 point each, 14 points total)

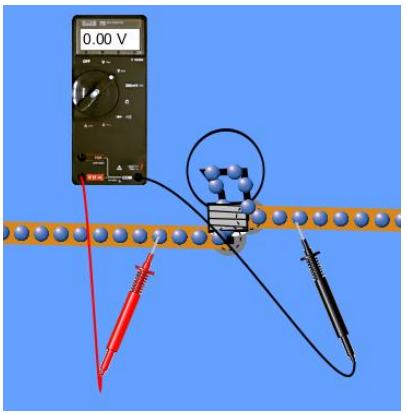
This lab adapted from a lab submitted to PhET by James Giessner (jgiessner@yahoo.com) of the Gwinnett County Public Schools on 2/3/2011.

Go to http://phet.colorado.edu/en/simulation/circuit-construction-kit-dc.

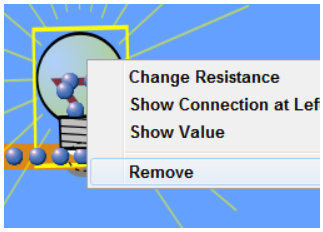
Experiment 1



1. Grab components from the right side of the screen and drag them to the work space. Build this circuit. You will have to click the check box next to ammeter to use it.
2. Now check the box for Voltmeter. Attach one the Voltmeter's wires to each side of the light bulb.



3. Record the voltage across the light bulb and the current through it in the table below. Then "right-click" the light bulb to remove it.
4. Click on the "Grab Bag" and add a penny to your circuit. Record its voltage & current.
5. Next, measure and record the voltage & current of a pencil.

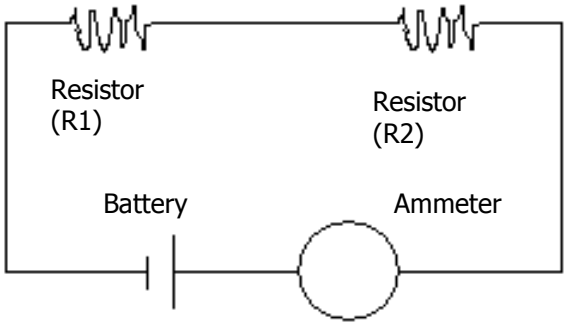


6. Use **Ohm's Law (V = I R)** to calculate the resistance of each item.

Table 1 (1pt each)

Item	Voltage (V)	Current (A)	Resistance (Ω)
light bulb			
penny			
pencil			

Experiment 2



1. Press the "Reset" button to delete your old circuit. You will now build a **Series** Circuit by connecting two resistors *(one after the other)* to a battery and ammeter.
2. Using the Voltmeter, measure the voltage across each resistor. Record them here.

V@R1 =		**V@R2 =**	

3. Measure and record the voltage across the battery here.

V =

4. Record the current here.

I =

5. What relationship do you see between the voltages across the resistors and the battery?

Answer:

6. Plug the battery's voltage and the current into Ohm's Law to calculate the total Resistance.

Answer:

7. Rebuild the series circuit with the ammeter in-between the two resistors. Record the current here. Is there a difference?

I =

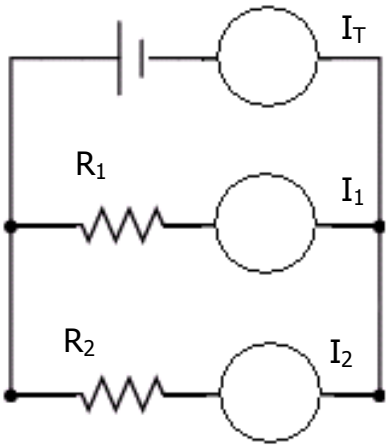
8. Use Ohm's Law to calculate the value of each resistor.

R1 =		**R2 =**	

9. What is the relationship between the individual resistors and the total resistance?

Answer:

Experiment 3



1. Press the "Reset" button to delete your old circuit. You will now build a **Parallel** Circuit by splitting the path out of the battery to 2 resistors then re-combining it. Each circle represents an ammeter.
2. Record each current in the corresponding circle and below.

I_T =

I_1 =

I_2 =

3. What relationship do you see between the currents?

Answer: _____

_____

4. Using the Voltmeter, record the voltage across the battery here.

V =

5. Record the voltages across the resistors here.

V@R_1 =

V@R_2 =

6. Use Ohm's Law to calculate the total Resistance and the resistance across each resistor.

R_1 =

R_2 =

R_T =

7. Which is greater (the individual resistances, or the total resistance)?

Answer:

8. Add a third resistor in parallel with the first two. Record the individual currents and total current, then use Ohm's law to compute total resistance.

I_T =
I_1 =
I_2 =
I_3 =
R_T =

9. What is the relationship between the individual resistances and the total resistance in parallel circuits?

Answer:

Conclusions

1. In which type of circuit was there more total resistance? (Series, or Parallel)

Answer:

2. In which type of circuit did more current flow? (Series, or Parallel)

Answer:

3. In Experiment 2, if you added a 3rd resister in series, would the total resistance (increase, or decrease)?

Answer:

4. In Experiment 3, if you added a 3rd resistor in parallel, would the total resistance (increase, or decrease)?

Answer:

2-Point Bonus:

Design a circuit with four light bulbs in which one light bulb is three times brighter than the other three. Confirm your results with the simulator and sketch the circuit below.

Answer:

The answers on this lab are a product of my own work and effort. Though I may have received some help in understanding the concepts and/or requirements, I did the work myself.

_____

Student Signature
(for electronic submission, type student number in lieu of signature)

ROOM FOR IMPROVEMENT

APPLICABILITY: This lab is best suited for (check all that apply):

☐ Physics I Honors/ Pre-IB Physics ☐ IB Physics 2 ☐ IB Physics 3 ☐ None of These

Comments:

IMPROVEMENT: This lab can be improved by:

Comments:

When complete, turn in a printed hardcopy or upload an electronic copy to Focus.
Ensure your filename is "LastNameFirstinitialPerXLabName"