

Objective: To explore voltage, current and resistance in computer simulations.

Instructions:

Your group will work through simulations. Follow the instructions for each simulation and answer the questions.

① **Go to PHET SIMS**

② → → Under Physics, click on Electricity, Magnets & Circuits

SIM 1: Click on Battery-Resistor Circuit → On Control Panel: Check "show inside battery"

1. Explain the following according to the circuit diagram.

a) Voltage _____

b) Resistance _____

2. What must happen to the voltage and resistance for the circuit to get hot? _____

3. What happens to the current in this scenario? _____

4. What must happen to the voltage and resistance for the circuit to get cold? _____

5. What happens to the current in this scenario? _____

SIM 2: Go back to Simulations—Physics—Electricity, Magnets, & Circuits. Click on Resistance in a Wire

1. What variables affect the resistance in the wire? _____

2. What must happen for the wire's resistance to be at its greatest? _____

3. What must happen for the wire's resistance to be at its least? _____

SIM 3: Go back to Simulations—Physics—Electricity, Magnets, & Circuits. Click on Ohm's Law

1. The equation in this simulation is shown a little differently. Write the equation here: _____

2. Now divide both sides by I , the current. Now what is the equation? _____

3. What happens to I when V increases? _____

4. What happens to I when R increases? _____

5. Let Voltage = 6.0 V. How many 1.5 V batteries do you need? _____

6. Let Resistance = 750 ohms. Calculate the current. SHOW FORMULA & WORK WITH NUMBERS AND UNITS!

7. A) Does your answer match with the simulation's answer? (mA means milliamp.....1000 mA = 1 A) _____
B) If not, explain: _____

SIM 4: Go back to Simulations—Physics—Electricity, Magnets, & Circuits. Click on John Travoltage

1. How does John Travoltage pick up charge? _____
2. What is his charge as he rubs his foot against the carpet? _____
3. What is the carpet's charge? _____
4. What happens when John Travoltage touches the metal door knob? _____
5. What is this term called? _____

SIM 5: Go back to Simulations—Physics—Electricity, Magnets, & Circuits. Click on Circuit Construction Kit (DC Only)

BUILD a circuit using at least ONE OF EACH components: wire, resistor, battery, light bulb, and switch.

- From the tools use the Voltmeter AND Ammeter. **Show your instructor!**

1) a) What is the voltage? _____ b) What is the current? _____

c) Calculate resistance using Ohm's Law: **Show formula and work with numbers and units!**

- 2) What happens to the voltage if you put in more batteries? _____
- 3) What happens to the voltage if you put in more light bulbs? _____
- 4) What happens to the voltage if you put in more resistors? _____
- 5) What happens to the current if you put in more batteries? _____
- 6) What happens to the current if you put in more light bulbs? _____
- 7) What happens to the current if you put in more resistors? _____
- 8) Add at least one thing from the grab bag. What did you add? _____ What happened? _____

SIM 6: Go back to Simulations—Physics—Electricity, Magnets, & Circuits. Click on Circuit Construction Kit (AC+DC)

BUILD a circuit using at least ONE OF EACH components: wire, resistor, light bulb, switch, AC voltage, capacitor, and inductor, *so you can LIGHT the BULB! DRAW circuit on back.*

- From the tools use the Voltmeter AND Ammeter. **Show your instructor!**

1) a) What is the voltage? _____ b) What is the current? _____

c) Calculate resistance using Ohm's Law: **Show formula and work with numbers and units!**

- 2) a) What is a capacitor, and what does it do in your circuit? (You can use your book or the Internet to help you answer this).

1) What is an inductor, and what does it do in your circuit? (You can use your book or the Internet to help you answer this).

4) What happens to the voltage if you put in more light bulbs? _____

5) What happens to the voltage if you put in more resistors? _____

6) What happens to the current if you put in more batteries? _____

7) What happens to the current if you put in more light bulbs? _____

8) What happens to the current if you put in more resistors? _____

9) Add at least one thing from the grab bag. What did you add? _____ What happened? _____

OTHER SIMS: Go back to Simulations—Physics—Electricity, Magnets, & Circuits.

Click on *and run the other simulations.*

1. Describe and explain what happens in Balloons and Static Electricity.

2. Describe and explain what happens in at least one other simulation. a) Which simulation did you do? _____
b) What happened? _____

BONUS : Extra Credit!

3. Try running other physics simulations in different sections of the site if you have time. Briefly explain what you learn from each simulation. *More explanations = more BONUS POINTS! Use the back of this sheet if needed, or your own paper. STAPLE all sheets to receive credit.