PS Physics **Chapter 7 Investigating Electricity Lab**

There are multiple parts to this lab in which you will be moving from station to station. Please listen to your instructor for further instructions.

Station 1: Add a Bulb

Background Information: An electrical circuit is a network that has a closed loop, giving a return path for the current. An electrical circuit consists of, at a minimum, a voltage source, a current, and a resistor.

Materials: Battery, Two light bulbs, insulated conducting wires with alligator clips

Procedure:

- Make a circuit by using one battery, one light bulb, and two wires.
- Observe the brightness of the bulb.
- Draw a diagram of the circuit you made. Be sure to include labels.
- Make a new circuit by using one battery, two light bulbs and three wires.
- Observe the brightness of the bulbs.

Questions:

1. In the circuits you built, what provides the voltage difference? What provides the resistance?
2. Assuming that a brighter bulb indicates a greater current, what can you conclude about the relationship between resistance and current?

Station 2: Lemon Battery

Background Information: Chemical energy is the source of power in batteries. The simplest batteries consist of two different metals (electrodes) floating in a bath of acid. Atoms from one metal travel through the acid to the other metal releasing electrons. Eventually, when all the mobile atoms have been transferred, no additional electrons may be released, and the battery is dead. Because the two metals are different, the electrons get pushed harder in one direction than the other. If the metals were the same, the push would be equal and no electrons would flow.

The battery that starts a car and the batteries that power your flashlight are electrochemical cells. Electrodes are placed in an electrolyte (ionized solution), and an electric circuit is completed. Electrons will flow from the "-" electrode of a battery, through a conductor, towards the "+" electrode of a battery.

Materials: Scissors, Lemon, Washer, Penny, Two Insulated conducting wires with alligator clips, small light bulb.

Procedure:

- Use the scissors to make two slits in the lemon wide enough for the washer and penny to fit in. Slits should be beneath the skin of lemon.
- Put the washer in one slit and the penny into the other slit.
- Use the clips to connect a wire to each piece of metal. Attach the other end of each wire to a terminal on the light socket as shown in Figure 1.
- Watch the bulb light up.
- Label resistance (R), source for voltage difference (V), and current (I) on Figure 1.

Questions:

1. What was the electrolyte for your battery? What were the electrodes?

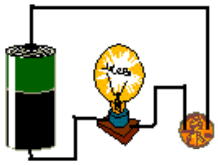
Station 3: Conductors or Insulators?

Background Information: Conductors are materials which permit electrons to flow freely from atom to atom and molecule to molecule. An object made of a conducting material will permit charge to be transferred across the entire surface of the object. In contrast to conductors, insulators are materials which impede the free flow of electrons from atom to atom and molecule to molecule. If charge is transferred to an insulator at a given location, the excess charge will remain at the initial location of charging. The particles of the insulator do not permit the free flow of electrons; subsequently charge is seldom distributed evenly across the surface of an insulator.

Materials: Battery, One light bulb, insulated conducting wires with alligator clips, string, nails, paper clip, staples, pennies, nickels, dimes, quarters, aluminum, paper, wax crayons, rocks, leather, plastic, styrofoam, cardboard, paper, and rubber band.

Procedure:

- Make a circuit by using one battery, one light bulb, and two wires.
- Observe the brightness of the bulb.
- Using the circuit you created, determine whether or not the objects are conductors or insulators of electricity.
- Record your observations on a data chart.



Questions:

1. How can you determine if a material is a better conductor than another material?

Station 4: Pie in the Sky

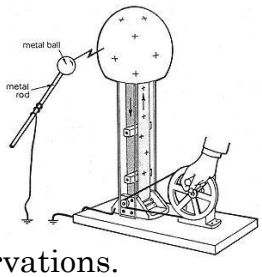
Materials: Van de Graaff generator, metal pie tins

Procedure:

- Place a small aluminum foil pie pan upside down on the dome of your VDG.
- Turn on the power. Record your observation.
- Turn off the VDG.
- Place two pie pans upside down (one nested on top of the other).
- Turn the power on. Record your observation.
- Turn off Van de Graaff generator
- Place an entire stack of thin foil pie pans upside-down on top of your generator.
- Turn the power on. Record your observation.

Questions:

1. What do you think caused the tin pans to move as they did?



Station 5: DANCING BUBBLES

Materials: Bubble solution and wand, Van de Graaff generator

Procedure:

- Blow soap bubbles at your VDG terminal. Record your observations.

Explanation: They will initially be attracted, but then will become charged by ion wind and will then be violently repelled from the generator sphere. They will also be attracted to any other object.

Try this: With practice you can hold your hand above a charged bubble and keep it aloft by attraction.

PS Physics **Chapter 7 Investigating Energy Lab**

Name(s) _____ _____ _____

Station 1: Add a Bulb

Draw a diagram of the circuit you made. Be sure to include labels.

1. In the circuits you built, what provides the voltage difference? What provides the resistance?

2. Assuming that a brighter bulb indicates a greater current, what can you conclude about the relationship between resistance and current?

Station 2: Lemon Battery

Label resistance (R), source for voltage difference (V), and current (I) on Figure 1.

1. What was the electrolyte for your battery? What were the electrodes?

Station 3: Conductors or Insulators?

Record your observations on a data chart.

Material	Conductor (C) or Insulator (I)	Material	Conductor (C) or Insulator (I)	Material	Conductor (C) or Insulator (I)
String		Dimes		Leather	
Nails		Quarters		Plastic	
Paper Clip		Aluminum		Styrofoam	
Staples		Paper		Cardboard	
Pennies		Wax Crayon		Paper	
Nickels		Rocks		Rubber Band	

1. How can you determine if a material is a better conductor than another material?

Station 4: Pie in the Sky

Record your observation.

1. What do you think caused the tin pans to move as they did?

Station 5: DANCING BUBBLES

Record your observations.