

Name: \_\_\_\_\_ Class: \_\_\_\_\_ Date: \_\_\_\_\_

## INTEGRATED PHYSICS & CHEMISTRY

### Welcome to IPC Introduction Lab

#### **STATION 1: FORCES & MOTION**

##### **Background:**

Simple machines make work easier for us. For example, we can **move** (read WORK) heavy objects with a **LONG** (read distance) lever using with less force.

##### **Procedure:**

Place a book under end of a meter stick. Now place your hand at the 20cm mark and lift the book. Repeat by placing hand at the 50 cm mark and finally at the 100cm.

##### **Questions:**

1. Please circle the position that required less effort (read Force),  
A. 20 cm                      B. 50 cm                      C. 100 cm
2. Which of the following is an example of a lever?  
A. Screw driver              B. Crane                      C. Pulley                      D. Wheels

#### **STATION 2: WAVES & SOUND**

##### **Background:**

Sound, Light and Electricity travel as a wave. We can make waves with a rope or with any musical string instrument (violin, cello, viola, and guitar, piano).

##### **Procedure:**

Two students each hold one end of a string and make a wave by moving it up and down.

##### **Questions:**

1. When the string makes a wave, did you see that it has a maximum point and a minimum point?
2. Which point from question #1 would match the word Crest? Would it be the minimum or the maximum?



## STATION 3: ENERGY

### **Background:**

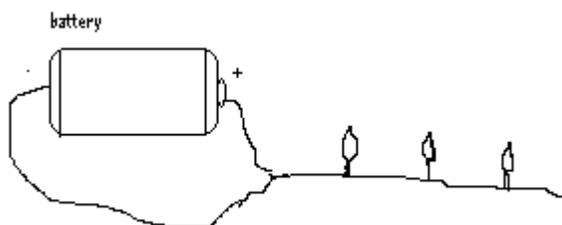
Energy is the ability to do work. The easiest way to view energy is to think of the human body. We eat food which provides us with energy. This energy is used for our bodies to function throughout the day. If we did not eat and continued to work hard, then our bodies would feel drained and exhausted. This exhaustion leads to a decline in the amount of work we can perform. Simply put, this means energy is required to perform work. If you do not have energy, you cannot perform work. Although we discussed energy from a biological view, it is important that we recognize that there are several forms of energy. These forms of energies still follow the same rules as in the previous discussion of the body; a flashlight will not work with a bad battery, a car would not start if it did not have the chemical energy provided by fuel, and nuclear reactions would not take place if there was no energy in atoms.

### **Materials:**

Set of holiday lights, and battery (D, C, AA, or 9V)

### **Procedures:**

Obtain a battery and a set of holiday lights from the table. Connect one end of the end of the holiday lights to the positive (+) end of the battery. Connect the other end of the holiday lights to the negative end of the battery. Observe the holiday lights and answer the following questions.



### **Questions:**

1. What object supplies the energy for the lights?
2. What do you think would happen to the lights if one of the wires connected to the battery was torn or cut?
3. Can a battery lose energy? If so, what will happen if it does?

## STATION 4: CHEMICAL REACTIONS

### **Background:**

Chemical reactions are occurring all around you. The bread we eat for sandwiches would look like a tortilla if it wasn't for a chemical reaction that makes it light and fluffy. When different chemicals are put together they react by forming a gas, a new chemical or sometimes nothing happens.

### **Procedures:**

Have one student hold the water bottle with the vinegar already in it steady. Another student should carefully attach the balloon with the baking soda in it to the top of the bottle without spilling the baking soda. Now all at once lift the balloon so the baking soda falls in to the bottle quickly but be careful not to unhook the balloon.

### **Questions:**

1. What happens in the bottle when you dump the baking soda in? What happens to the balloon?
2. Did the bottle get warm or stay the same temperature after dumping the baking soda into the vinegar?

## **STATION 5: PROPERTIES OF MATTER**

**MATERIALS:** Rubber Band, Syrup, Water, Sheet of Aluminum (Al), Empty Soda Can, Pieces of Chalk, Coins or Pictures of Coins, Pictures of Diamonds, and lengths of Copper Wire

- PROCEDURE:**
1. At each station, you will examine the various materials and try and match which property of matter is represented by the example.
  2. By using your prior knowledge and by picking up each object, write down your observations in the data table and make an initial guess of the property of matter.
  3. Now, based on the observations, and by reading the definitions of the various properties of matter, make your final answer selection and write an explanation in your own words of the property of matter.

**DATA & OBSERVATIONS:** Use the following terms for the initial guess - **Luster, Ductility, Brittleness, Hardness, Malleability, Elasticity, Viscosity**

<b>OBJECT</b>	<b>OBSERVATIONS</b>	<b>INITIAL GUESS</b>	<b>FINAL ANSWER</b>	<b>OWN WORDS EXPLANATION</b>
Rubber Band				
Water				
Syrup				
Aluminum Sheet				
Soda Can				
Chalk				
Coins				
Diamonds				
Copper Wire				

### **QUESTIONS:**

1. Did any of the objects share the same properties? Give examples.
2. Which object / material did you like the best? Why?
3. After reading the explanations of the different properties of matter and by looking at the objects, do you feel you understand the various properties of matter?

## STATION 6 – IDENTIFYING ACIDS & BASES

### **Background:**

What gives lemon its sour taste? A lemon contains a substance called an acid. All acids have the following characteristics: a) sour taste b) contain hydrogen c) reacts with metals to produce hydrogen

Why does soap have a bitter taste? Soap belongs to a group of compounds called bases. All bases have the following characteristics: a) taste bitter b) feel slippery c) contain the OH radical

The way to determine if a substance is an acid or base is to find out how they react to indicators. Indicators change color to identify acids or bases. Some indicators tell the pH of substances.

Litmus Paper – turns from blue to red in acids  
- turns from red to blue in bases

pH paper - acids have a pH from 0 to 7  
- bases have a pH from 7 to 14

### **Procedure:**

1. Take a strip of red litmus paper and dip the end into the cup of Baking soda. Record the color.
2. Repeat step 1 using the red litmus paper with each remaining substance and recording the results.
3. Repeat steps 1 and 2 with the blue litmus paper, and again with the pH paper, recording your results.

<b>Substance</b>	<b>red litmus paper</b>	<b>blue litmus paper</b>	<b>pH paper color/number</b>	<b>Acid or Base</b>
<b>baking soda</b>	<b>blue</b>	<b>blue</b>		<b>base</b>
<b>vinegar</b>				
<b>weak ammonia</b>				
<b>aspirin</b>				
<b>milk of magnesia</b>				

### **Questions:**

1. Which of the substances are acids?
2. Which of the substances are bases?