***Heavy Air***

**Background**: The air around us is made of atoms and molecules. Despite the small size of these molecules and atoms, the quantity exerts weight on us known as air pressure. Since are bodies are designed to live in this environment, we do not notice the pressure. We know that all matter has certain characteristics, such as having mass. Since air is made of atoms and molecules, is full of matter, we know it has mass.

**Heavy Air Directions:**

1. Place 2 unfilled balloons on the pans in the balance. (Think balanced teeter-totter.) Observe.
2. Take off one of the balloons and replace it with a balloon that is filled. Observe.
3. Extend: Try different sizes of balloons, or different combinations. What property of air is being explained here?
4. Answer all questions.

**Questions**:

1. When you measure air pressure, what are you really measuring?

2. Make a prediction before blowing up one of the balloons: If one end were heavier, would the heavier end move up or down?

3. Would adding air to the balloon add mass to that side of the meter stick, Which direction would that end move?

4. What happens when one balloon is removed from the end of the meter stick? Why?

5. Why do baseballs travel farther in moist air than dry air? (Hint: Think Density!)

***A Pressing Engagement***

**Background**: We typically do not “feel” atmospheric pressure. Why? Since air surrounds our bodies, and all things, the pressure, as a result of the air is applied equally on all sides. For example, if someone holds an 8 ½” x 11” sheet of paper by their hand at arms length, the weight of the air directly above the sheet is over 1,300 pounds. Obviously the paper does not weigh that much. Why? That same pressure (14.7 pounds per square inch) is also pressing up on the bottom side of the paper. The equal pressure on all sides cancel each other out so all that is left is the weight of material that comprises the paper.

**A Pressing Engagement Directions**:

1. Lay a paint stick on the table with about 3” hanging over the edge. Press gently on the end and observe what happens.
2. Lay a sheet of printer paper over the entire stick and press down again. Observe.
3. Repeat the same step replacing the printer paper with a large sheet of opened newspaper. Observe.
4. Answer all questions.

**Questions**:

1. Why don’t we “feel” the atmospheric pressure?
2. How was the movement of the stick different when you pressed down with the plain stick vs. with printer paper vs. with newspaper?
3. Explain why the newspaper was more difficult to lift than the printer paper.
4. Draw a diagram with arrows that shows the pressure that was influencing the movement of the stick and newspaper. Make larger arrows to show more air pressure and smaller arrows to show less.

***Marshmallow Madness***

**Background**: Air Pressure can be increased and decreased by changing the volume, speed, or temperature of the air. You will use marshmallows and plastic syringes to test this complex set of scientific laws and theories. A syringe has a finite amount of volume available. Pushing the plunger in decreases the amount of space the air can take up (less volume). Pulling the plunger in increases the amount of space the air can take up (more volume). The amount of air molecules will be held constant by placing your finger over the opening.

**Marshmallow Madness Directions:**

1. Place two little marshmallows inside the syringe and replace the plunger.
2. Make a prediction as to what will happen to the marshmallow as you increase the space or decrease the space. (Questions #1&2)
3. While the plunger is out at the end, place your finger on the tip to block the air from escaping. Observe what happens to the marshmallow as you push the plunger in. Stop before you squish the marshmallow.
4. Take your finger off the tip and observe the marshmallow.
5. While the plunger is pushed in, place your finger on the tip to block the air from escaping. Observe what happens to the marshmallow as you pull the plunger out. Stop before you pull the plunger out completely.
6. Take your finger off the tip and observe the marshmallow.
7. Answer all questions.

**Questions**:

1. Make a Prediction:
   1. What will happen to the marshmallow as the space is decreased inside the syringe (Push the plunger in)?
   2. What will happen to the marshmallow as the space is increased inside the syringe (Pull the plunger out)?
2. What happened to the marshmallow as space is decreased inside the syringe (Push the plunger in)? Why did this happen?
3. What happened to the marshmallow as the space is increased inside the syringe (Pull the plunger out)? Why did this happen?
4. If this happens to marshmallows in an environment with no air pressure, what would happen to people in a similar environment?
5. Why are marshmallows a good material for this experiment?
6. Where and when might you be able to experience no/low/high air pressure?

***Air Pressure Article Homework***

Read the Article called Air Pressure on the [SWS-Weather](http://sciencewithspence.weebly.com/weather.html) page. Make sure you read page 1 and 2!! After write 5 questions that you could ask someone else about the article. They can be factual questions or what if type questions. Write the answer to your question as well.

1.

Answer:

2.

Answer:

3.

Answer:

4.

Answer:

5.

Answer: