

## SMS 491/EDW742, Spring 2007

### Pressure lab

#### **Station 1: Vacuum**

Explore how pressure affects the following (by evacuating air out of the container and then releasing the valve):

Balloon filled with air

Balloon filled with water

Tangerine

Cherry tomato

\* Don't forget to reflect in your journal.

Based on your observations what do you think will happen to the marshmallow when you evacuate the container?

Draw a face on a marshmallow and test your prediction. Now, release the valve and observe the marshmallow

In your journal, explain your observations

#### **Station 2: Bernoulli**

Below are three challenges. Experiment with them and explain your approach.

(1) Can you fill the bag in one blow? Have a friend holding the bag at the knotted end so the bag is horizontal.

(2) Can you tilt the flame of a candle to the left side/right side, using a straw?

(3) Hold the piece of paper just under your bottom lip. Can you lift it up without touching it with your other hand?

What is the common to all these experiments? Discuss it with your group and reflect in your journal.

Hint: draw the pressure distribution in each of these experiments.

#### **Station 3: perception of weight**

You have two steel balls (a big and a small one).

1. Hold each ball in one palm. Which one is heavier?

2. Choose a volunteer and cover his/her eyes. Place each ball in a funnel (note, a small beaker was inserted to each funnel to hold the ball still. Experiment does not work well if the ball is rolling) and ask the volunteer to hold each funnel at its collar. Ask the

volunteer which ball is heavier and record his/her answer. Repeat this experiment with another volunteer/s.

Was the perception of weight in the “blind” test different from the original one (1)?

Why? Explain in your journal.

Weight the balls to determine which one is heavier and reflect in your journal.

#### **Station 4: hydrostatic pressure**

You have a pipe with 1 small exit hole near the bottom and several large holes plugged with rubber stoppers. By removing a stopper and letting water overflow through the hole, you can fix the height of water column above the exit hole.

1. What do you expect to happen when you fill the tube with water and open the exit hole? Explain your observations in terms of the forces acting on the fluid.

2. What do you expect will happen when the water height is increased? Why?

Begin by removing the lowest rubber stopper. Hold your finger over the small exit hole, and fill the pipe with water until it runs out the hole the stopper was in. Measure the height of the water column above the exit hole. Then let the water run out the small exit hole while you keep filling the pipe with water. Note how far the water travels (when it first strikes the ruler). Repeat the steps for the four lower holes.

#### **Homework:**

Using what you learned about pressure in today’s laboratory activities, explore in writing possible ways that marine organisms deal with ocean pressure. Speculate on how ocean pressure affects the organisms’ body cavities and solubility of gases in their blood, as well as how they can utilize pressure for feeding and locomotion.

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