Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Score \_\_\_\_\_\_\_\_\_\_\_\_\_

***To Sink or Not to Sink – That is Your Problem***

***Or***

***Aluminum Boat Lab – TAKE 2***

**INTRODUCTION**

Each student will be given a piece of aluminum foil and asked to design and build a boat that will hold as much weight as possible without sinking.

**CONCEPT**

Archimedes principle states that the magnitude of the buoyant force equals the weight of the fluid displaced by the object. The buoyant force acting on the aluminum acting on the aluminum and mass in the boat is the same as the buoyant force acting on an equivalent amount of water.

**PROJECT PARAMETERS**

1. You may use ONLY aluminum foil.

2. Your boat just float with the mass loaded on for at least 5 seconds to count

3. The more mass your boat holds without sinking, the higher your score!!

**MATERIALS**

Tub of water, 1 rectangle of aluminum foil, cup of pennies (2.6 grams each penny), ruler, stopwatch (use phone or timer)

**PROCEDURE**

1. Make a hypothesis as to how many pennies the boat will hold. Write your hypothesis in the HYPOTHESIS section. Example…….If I build the boat \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, then the boat will hold \_\_\_\_\_\_ pennies because \_\_\_\_\_\_\_\_.
2. Using your experience in “Aluminum Boat Lab – Take 1”, design a better boat using a new sheet of aluminum foil.
3. Describe and draw (using dimensions) a picture of your boat in the DATA section, #1
4. Name your boat. Record name in DATA, #2.
5. Build your boat, CAREFULLY! Place it in the tub of water.
6. Add one penny to the boat at a time until the boat starts to sink. Record amount of pennies (minus the one that sank it) in the DATA section, #3.
7. Clean up any spilled water and your work area. **Dry off the pennies** and return them to the cup.
8. Answer the remaining questions: DATA #4, and CONCLUSION #1-3

**HYPOTHESIS** (needs to be in an “If \_\_\_\_\_\_\_\_\_\_\_, then \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.” statement.”

**DATA**

1. Drawing of boat design with dimensions: (use centimeters or inches)

2. Name of boat: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

3. Actual Result: My boat DID hold \_\_\_\_\_\_\_\_\_\_ pennies (multiply \_\_\_\_\_\_\_pennies by 2.6 = \_\_\_\_\_\_\_\_\_\_\_= grams)

4. Description of boat design and why you chose that design.

**CONCLUSION**

1. The number of pennies that your boat carries before it sinks is the **(independent / dependent)** variable because it varies depending on the design of your boat.

2. The design of your boat is your **(independent / dependent)** variable because it is the main variable being tested.

3. Describe the results of the investigation which you have conducted and write about your findings. Answer in complete sentences – CSIQ)

-Were your results from the 2nd boat better / worse than your first boat?

-Why do you think your results were better / worse?

-What did you learn from this investigation about building boats and buoyancy?

**SCORING RUBRIC**

|  |  |  |
| --- | --- | --- |
|  | **Points Available** | **Points Earned**  **Student / Teacher** |
| **Hypothesis** | 10 | / |
| **Draft of Boat**  \*Name *(Data #2)*  \*Drawing of Boat *(Data #1)*  \*Dimensions *(Data #1)*  \*Written Description & why you chose the design *(Data #4)* | 30  \*5  \*5  \*5  \*15 | /  /  /  / |
| **Testing Evaluation *(Data #3)***  \*Holds more than 10 pennies  \*Holds more than 30 pennies  \*Holds more than 50 pennies | Up to 30 possible  *\*10*  *\*20*  *\*30* | / |
| **Conclusion**  \*Identified the Dependent/Independent variables *(Concl 1&2)*  \*Write about the results *(Concl #3)* | 30 total  \*10  \*20 | /  / |