Name _____ Date _____

AP Physics Lab Activity #10 (60 pts)

Period _____ Mrs. Nadworny

Partners: Due Date _____

Buoyancy Stations

NO Lab Write-Up Required
must be neatly written in pencil

Purpose

- To utilize Archimedes' principle and concepts of buoyancy.

Station #1 Hanging Cube

Purpose

- To calculate the density of a metal cube.

Procedure

1. Place the beaker of water directly on the electronic balance and note its reading.
2. With the container still on the balance, slowly lower the metal block into the water by the string so that you are holding the block completely submerged but not touching any of the sides of the beaker. Note the new reading on the scale.
3. Gently lower the block to the bottom of the beaker and let go of the string. Note the new reading on the scale.
4. From these three measurements only, calculate the density of the metal block.

Data Collection (4)

Make a clearly labeled table for organizing the raw and processed data that you expect you will collect.

Data Processing (7)

Include an analysis of the data collected, including sample calculations of processing the data.

- Compare your result to the literature value by calculating a percent error. (2)

Station #2 — Anchors Aweigh!

Purpose

- To predict the behavior of a system, then model and observe its actual behavior, and then come up with a suitable explanation for it.

Procedure

1. Read the cartoon and discuss the answer to the question. Decide on a prediction, either individually or as a consensus. Write down your prediction before continuing.
2. Model the system described in the cartoon with the materials at this station. Be very careful to lower the weight down gently into the glass beaker by the string. Do not drop it or you may break the beaker.
3. Observe the behavior of the system and record your observations.
4. Discuss an explanation for it based on appropriate physics principles with your group.
5. Write an explanation for the system's behavior based on appropriate physics principles.

Note – They are discussing the water level of the lake, not the water level on the side of the boat.

Data Collection (4)

- Prediction:

- Observation:

Data Processing (4)

- Explanation:

Station #3 Floating Dowel

Purpose

- To measure the density of the wooden dowel by two different methods.

Method #1 – Floating Dowel

Procedure

1. Float the wooden dowel in the graduated cylinder. Observe and take measurements necessary to calculate the density of the dowel without removing it from the water.
    - Do not use the balance or ruler for this method.
2. **Do not put the dowel back in the cylinder so that it may dry.**

- Estimate what percent of your dowel is submerged when it is floating in the cylinder. (1)

10 25 33 50 67 75 90 100

Data Collection (4)

Make a clearly labeled table for organizing the raw and processed data that you expect you will collect.

Data Processing (3)

Include an analysis of the data collected, including sample calculations of processing the data.

Method #2 – Traditional

Procedure

1. Measure the mass and volume of the dowel using a ruler and an electronic balance.
2. Calculate the density of the dowel.

Data Collection (4)

Make a clearly labeled table for organizing the raw and processed data that you expect you will collect.

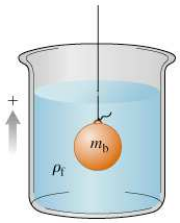
Data Processing (4)

Include an analysis of the data collected, including sample calculations of processing the data.

- Calculate a percent difference between these two methods for finding the density. (2)

- Compare your calculated density (as a fraction of water's density) to the percent of the dowel submerged. Is this what you expected? Explain. (2)

Station #4 Hanging Mass



Purpose

- To determine the volume of the hanging mass by two methods.

Method #1 – Hanging Mass

Procedure

1. Observe the mass hanging from the spring scale in the beaker of water. Do not touch, measure, or change any parts of the setup at this station. Simply observe and analyze. From your analysis, calculate the volume of the hanging mass.

Data Collection (4)

Make a clearly labeled table for organizing the raw and processed data that you expect you will collect.

Data Processing (4)

Include an analysis of the data collected, including sample calculations of processing the data.

Method #2 – Traditional

Procedure

1. Use a ruler to take measurements necessary to calculate the volume of the second (nearly) identical mass at the lab station.

Data Collection (4)

Make a clearly labeled table for organizing the raw and processed data that you expect you will collect.

Data Processing (2)

Include an analysis of the data collected, including sample calculations of processing the data.

- Calculate a percent difference for the two values of volume. (2)

(3)
neatness