

Labs: Trigonometry Based
Physics Part I

Pre-Lab EXP 11

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PRE-LAB Instructions:

Print out these pages. Feel free to refer to the lab instructions and other materials, your physics textbook, other students, etc. to help you to ponder, understand, and work out answers to the following question(s). Attach additional pages to show your work and reference item numbers on your attached pages.

Comment [O1]: 100 points total

PRE-LAB Questions:

- 1) **How** will you measure the volume of the solid objects in this experiment? Explain the differences in measuring volume of, for example, a rectangular prism, a cylinder, and an irregularly shaped object.
- 2) **Explain** how and why the buoyant force originates from pressure?
- 3) **Derive** the equation $F_b = \rho_f g V_d$ where F_b is the buoyant force, ρ_f is the density of the fluid, g is the acceleration due to gravity (9.8 m/sec²), and V_d is the volume of the fluid displaced.
- 4) **For** what density of an object will an object sink? For what density will an object float? Explain.
- 5) **What** is the difference in density and specific gravity? What is the density and specific gravity of water in cgs (centimeter-gram-seconds) units and SI (meter-kg-sec-ampere) units? Why is it convenient to use cgs units? Explain.
- 6) **How** would you determine the density of an object less dense than water by employing Archimede's Principle and submerging the object in water?
- 7) **You** may determine the density of a floating object in water. Perhaps you've heard the expression, "you only see 10% of an iceberg." From this information, what is the density and specific gravity of ice? Hint: Consider the volume of water displaced compared to the total volume of the iceberg.
- 8) **An** object is suspended from a mass balance. When the object is surrounded by air, the mass balance reads 150 g. When the object is completely submerged in water, the mass balance reads 90 g.
 - a) What is the volume of the object?
 - b) What is the density of the object?
 - c) The object is completely submerged in an unknown liquid. If the mass balance reads 75 g, what is the density of the unknown liquid?
- 9) **If** during the submerged weighing procedure air bubbles were to adhere to the object, how would the experimental results be affected?
- 10) **Explain** how the hydrometer measures a liquid's density.
- 11) **How else** (besides using a hydrometer or direct measurement) could you determine the density of a fluid?
Hint: Refer to Question 8.c.

Comment [O2]: 10 points per Bloom's

Comment [O3]: 5 points per Bloom's

Comment [O4]: 10 points per SOLVE

Comment [O5]: 10 points per Bloom's

Comment [O6]: 10 points per Bloom's

Comment [O7]: 10 points per Bloom's

Comment [O8]: 10 points per SOLVE

Comment [O9]: 15 points, 3 parts, 5 points each per SOLVE

Comment [O10]: 10 points per Bloom's

Comment [O11]: 5 points per Bloom's

Comment [O12]: 5 points per Bloom's