

Discovering Buoyancy Worksheet

Part A. Data Table 1. Empty Vial

Radius (r) cm	Height (h) cm	Volume of Vial ($\pi r^2 h$) cm ³

Part B. Observations

What happens to the reading on the spring scale as the vial is lowered into the water?

Data Table 2. Vials 2–5

Vial	Weight out of Water (F_g) N	Weight in Water (Net force) N	F_B ($F_g - \text{Net force}$) N
Vial 2 BBs			
Vial 3 Gravel			
Vial 4 Iron filings			
Vial 5 Sand			

Data Table 3. Water Displacement

Volume of displaced water (cm ³)	Mass of displaced water		Weight of displaced water (F_g) N
	g	kg	

Post-Lab Questions and Calculations *(Show your work for all calculations.)*

1. Calculate the buoyant force, F_B , for each vial numbered 2–5. Record these values in Data Table 2.

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2. Examine the buoyant force for each vial.
 - a. How does the buoyant force compare from one vial to the next?

 - b. Does there seem to be a correlation between the weight of the vial out of water and the buoyant force?

 - c. Does there seem to be a correlation between the volume of the vial and the buoyant force?

3. Consider the volume of the vial as recorded in Data Table 1.
 - a. When the vial is completely submerged, what is the volume of the displaced water? Record this value in Data Table 3.

 - b. What is the mass of the displaced water in grams? *Hint: See Pre-Lab Question 1c.* Record the mass in Data Table 3.

 - c. Remember that $1 \text{ g} = 0.001 \text{ kg}$. Calculate and record the mass of the displaced water in kg.

4. Since force = mass \times acceleration ($F = ma$), by multiplying the mass of the displaced water in kg by the acceleration due to gravity (9.8 m/s^2), one can find the weight (F_g) of the displaced water in newtons.
 - a. Calculate and record the weight of the displaced water.

 - b. How does the weight of the displaced water compare to the buoyant force acting on the vial?

5. Archimedes described the relationship between the weight of water displaced by an object and the buoyant force acting on the object. Write Archimedes' Principle in your own words.