

Name _____

Solids, Liquids, and Gases - Oh My

Different materials - and even the same substance in different states - can have **very different densities**. Solids are usually **densest**, liquids are **less dense**, and gases are **least dense** because particles are farther apart.

Use these formulas to solve the problems:

$$D = \frac{m}{V}, m = D \times V, V = \frac{m}{D}$$

Water's Density: 1.0 g/mL

Objects with density > **1.0 g/mL** will sink in water; those < **1.0 g/mL** will float.



1. A wooden block has a mass of 60 g and a volume of 100 cm³. What is its density, and will it float in water?
2. A sample of cooking oil has a mass of 46 g and a volume of 50 mL. Calculate its density. Will it float or sink in water?
3. A piece of iron has a density of 7.9 g/cm³. If its volume is 3 cm³, what is its mass?
4. An air sample occupies 1,000 mL and has a mass of 1.3 g. What is the density of air in g/mL?
5. A cube of ice (solid water) has a mass of 18 g and a volume of 19.6 cm³. What is its density, and why does ice float on liquid water?
6. Compare these three substances by density and rank them from least to greatest:

A: Helium gas - 0.00018 g/mL B: Water - 1.0 g/mL C: Aluminum - 2.7 g/mL

_____ < _____ < _____

7. A balloon filled with helium has a volume of 5,000 mL and a mass of 0.9 g. What is its density? Explain why it rises in air.
8. A bottle contains 50 mL of water and 50 mL of vegetable oil. The mass of the water is 50 g, and the mass of the oil is 45 g. Which liquid will float on top?
9. A student says, "Liquids are always denser than gases." Is that true? Explain using what you know about particle spacing.
10. A sealed can of soda has a density of 1.03 g/mL, while a can of diet soda has a density of 0.97 g/mL. Which one will float in water and why?