



Exploring the Relationship Between Mass, Volume, and Density

GRADE 8, Fluids

CRITICAL LEARNING: BIG IDEAS

How do the properties of fluids affect fluid behaviour and determine fluid use?

FOCUS QUESTIONS

How can the skills of scientific inquiry be used to determine the mass to volume ratio (Density) of a substance?

CURRICULUM EXPECTATIONS	
<p>2. Developing Investigation and Communication Skills</p> <p>2.2 determine the mass-to-volume ratio of different amounts of the same substance (e.g., water, corn syrup, copper pennies)</p> <p>2.3 investigate and compare the density of a variety of liquids (e.g., water, salt water, corn syrup, liquid soap)</p> <p>2.7 use appropriate science and technology vocabulary, including viscosity, density, particle theory of matter, hydraulic, and pneumatic, in oral and written communication</p> <p>3. Understanding Basic Concepts</p> <p>3.2 describe the relationship between mass, volume, and density as a property of matter</p>	<p>LEARNING GOALS</p> <p>This investigation is designed to allow students to estimate the densities of different objects using liquids of known densities.</p>
MINDS ON...(ELICIT & ENGAGE)	ASSESSMENT & EVALUATION
<p>Floating Egg Demonstration</p> <ul style="list-style-type: none"> • Ask students to predict what will happen when an egg is placed in equal volumes of salt and fresh water. • Add water to two beakers or cups. Mix five to six teaspoons of salt into one beaker to create a saltwater solution. Place an egg into the freshwater and saltwater beakers. Students will observe that the egg sinks in the fresh water and floats in the saltwater solution. • Ask students why the egg sinks in fresh water and floats in salt water. • Add 100 mL of each liquid to a graduated cylinder and find the mass of each. After subtracting the mass of the graduated cylinder, students will find that 100 mL of fresh water has a mass of 100 g and that 100 mL of salt water has a mass of 102–104 g. 	<p>The debriefing session serves as a formative assessment. Students record their results in a table.</p>
ACTION! (EXPLORE & EXPLAIN)	ASSESSMENT & EVALUATION
<p>EXPLORE:</p> <p>Students use the <i>Density via Comparison</i> Gizmo at www.explorelearning.com</p> <ul style="list-style-type: none"> • Using four beakers of liquids with known densities, estimate the density of a variety of objects. Place each object into each beaker to see whether it sinks or floats, and then use this information to compare the densities of the objects. 	<p>*See <u>Consolidation</u> Section</p>

<p><u>EXPLAIN:</u> Complete the questions below the Gizmo activity and check the answers.</p>	
<p>CONSOLIDATION (ELABORATE, EVALUATE, & EXTEND)</p>	<p>ASSESSMENT & EVALUATION</p>
<p>Students work in groups to answer the following questions:</p> <ol style="list-style-type: none"> 1. If an object floats in a liquid, what can you say about its density? 2. If an object sinks in a liquid, what can you say about its density? 3. How can you compare the densities of two objects that both float in a liquid? 4. How can you compare the densities of two objects that both sink in a liquid? 5. Why do swimmers float so easily in the Dead Sea? 	<p>Students use <i>Smart Ideas</i> software to create a graphic organizer with DENSITY as the central term. It must include information learned from the inquiry (specifically how the mass to volume ratio affect density)</p>
<p>REFERENCES</p>	
<p><u>EXPLORE & CONSOLIDATION</u></p> <p>Explore Learning. <u>Density Via Comparison Activity</u>. http://www.explorelearning.com/</p>	