



Author(s): Michael Lucky Voiselle			Lesson Title: WHY DO SOME THINGS FLOAT AND SOME SINK?			
Grade Span			ICLE Application Model			
K-4	5-8	9-12 X	A	B	C X	D

Instructional Focus:

Reading

Students read a variety of grade level materials, applying strategies appropriate to various situations

Writing

Students write for a variety of purposes and audiences with sophistication and complexity appropriate to the grade level.

Measurement

Students use a variety of tools and techniques of measurement in a problem-solving situation. Students communicate the reasoning used in solving these problems.

Unifying Concepts and Processes

Students recognize patterns and processes, making connections in terms of systems and subsystems that explain the interrelationships of the natural and designed world.

Performance Task

Your task is to determine the density of 5 wooden objects. You are to prepare and organize a data table to record the necessary data of volume and mass of each object and the computed density. The student must prepare a graph of the results with mass as the responding variable. You are to predict the mass from its dimensions using your graph. Record the data of a sixth wooden object in your table. You are also required to research the concept of density and buoyancy as expressed by Archimedes centuries ago. Your next task involves finding the volume and mass of an irregular lead weight such as a fishing sinker. This may require the use of another method to find volume since the shape cannot be measured properly with a caliper. You also need to find the density of 10 mls of water to include in your chart.

A write-up is necessary to describe why some objects float and why some sink in water. You may use any method of gathering information such as your experiences during the experiment, other people, encyclopedias, and the Internet. You need to demonstrate an understanding of your concept of density in the write-up.

Materials needed: triple beam balance, 6 pieces of wood constructed out of 1 x 4 boards so that no two pieces have the same dimensions and measure no larger than 10cms on a side, calipers, ruler, graduated cylinder.

ICLE Essential Skills

Apply in writing the rules and conventions of grammar, usage, punctuation, paragraphing and spelling. (ela1)

Gather information from a variety of sources, including electronic sources, and summarize, analyze, and evaluate its use for a report. (ela3)

Identify, collect and/or select pertinent information while reading. (ela5)

Understand **basic algebraic properties** (i.e., commutative: $ab = ba$; associative: $ab(c) = a(bc)$; and distributive: $a(b+c) = (ab)+(ac)$). (m3)

Compute the volume of three-dimensional figures (solids). (m17)
Make observations using senses and instruments. Inferences and interpretations are arrived at based on observations. Classify observable properties and organize observations in a meaningful and logical way. (s5)
Exhibit good data management skills by collecting, organizing, and graphing data. (s19)
Understand the characteristics of density and how it varies in materials with the change of temperature, pressure, and phase (gas, liquid, solid). (s22)

Scoring Guide:

<p>4. The student has determined the density of 5 wooden objects and placed the data in a neatly organized data table. The graph is used to predict correctly the mass of a 6th object. The research paper contains the necessary information that demonstrates an understanding of density by including the concepts expressed by Archimedes centuries ago. The student further demonstrates an understanding of density by finding the density of an irregular shaped object and the density of 10 ml of water and writing his interpretations of why some objects float and why some sink in the paper</p> <p>3. The student determines the density of 5 wooden objects, constructs a graph and predicts the mass of a 6th wooden object correctly. The student includes Archimedes Buoyancy Principle in his write-up. The student determines the density of an irregular object and 10 ml of water. The student does not exhibit an understanding of density in the write-up. There are also one or two spelling and grammatical errors in the paper.</p> <p>2. The student determines the density of 5 wooden objects, constructs a graph and predicts the 6th object correctly. The graph and data table are disorganized and an understanding of density is not reflected in the write-up. The student includes Archimedes Principle but cannot relate to the density of objects. The student attempts to answer the question of why some objects sink and why some float. The write-up contains more than 6 spelling and grammatical errors.</p> <p>1. The student shows some initiative in finding the density of the 5 wooden objects. The data chart is disorganized and graph is unclear. An attempt is made at a write-up including Archimedes Principle and to include information on the density of the other objects specified.</p> <p>0. The student makes no attempt to participate in the experiment. The graph, write-up and conclusions are extremely incomplete.</p>
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Keywords

English Language Arts	Mathematics	Science
Reading independent reading research	Algebra coordinates equations graphs tables	Earth Science
Writing grammar spelling technical writing	Geometry	Life Science
Communications	Statistics	Chemistry buoyancy
Literature	Calculus	Physics density
Other	Trigonometry	Other
	Other	

Picture, Chart, or Graph file name(s):

Why Do Some Things Float and Some Sink? - Data Table

Wood #	Mass (g)	Length (cm)	Width (cm)	Height (cm)	Volume = l x w x h (cm ³)	Density = $\frac{M(g)}{V(\text{cm}^3)}$
1	7.28g	2.6cm	3.4cm	1.9cm	16.8cm ³	.43g/cm ³
2	9.95g	3.5cm	3.9cm	1.9cm	25.9cm ³	.38g/cm ³
3	16.0g	4.2cm	4.3cm	1.9cm	34.3cm ³	.45g/cm ³
4	22.65g	4.4cm	6.3cm	1.9cm	52.7cm ³	.42g/cm ³
5	43.6g	11.0cm	4.7cm	1.9cm	98.2cm ³	.44g/cm ³
6	Prediction					

Density Comparison
Mass (g) vs. Volume (cm³)

