Gold Seal Lesson:

Copernicus Education Gateway

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

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.

Basic Concepts and Knowledge
Students develop an understanding of scientific concepts using facts, theories, principles, and models.

Science as Inquiry
Students demonstrate knowledge and skills necessary to perform scientific inquiry.

Habits of Mind
Students develop habits of mind including curiosity, open-mindedness and persistence.

Performance Task

Your task is to make a Cartesian diver that is yours to keep and share with family and friends. You will need a small test tube or an eyedropper from a medicine bottle or almost anything tube-like with a closed end and an open end. You will also need a clear 2-liter plastic soda bottle with the cap. Remove the label and fill with water. Your objective is to fill the diver (test tube or medicine dropper) with enough water so that the diver barely floats in a glass of water without sinking. Place the diver into the 2-liter bottle without loosing any water. Seal the 2-liter bottle by placing the lid on top.

Squeeze the 2-liter bottle gently and record what happens in a well-organized chart. Let the squeeze go and record what happens in your chart. The chart should reflect your action and the response of the diver.

How does temperature affect your diver? Place in the sunlight and come back one hour later. Record your results. Place in a refrigerator to see how lower temperature affects the diver. Record the results.

Vary the pressure. Squeeze hard, soft, medium and record the results (notice the volume of air in the diver as you do this).

Your task must include a well-organized and free from grammatical errors conclusion write-up. The conclusion must offer reasons why your diver behaved as it did in your recorded results. It must also relate the concepts of density and buoyancy to the divers' behavior. You may use any text books, human resources, the Internet, and encyclopedias to aid in answering the following: How does your diver relate to a fish being able to stay and swim at almost any depth in the ocean when the pressure becomes greater as the depth increases?

Finally, you are to use your creativity and ingenuity in constructing and decorating another diver to replace the one in your 2-liter bottle. Again you may use any resources.

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)
Present information in well-organized fashion that will be clear to the target audience. (ela11)
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:

Rate each with this scale

3. Excellent quality with no errors
2. Satisfactory quality with no more than 3 errors
1. Unsatisfactory quality with many errors
0. Does not attempt or does not show knowledge or skill

CHARACTERISTIC	SCORE
First Cartesian Diver	_____
Organization of behavior of diver chart	_____
Accuracy in observation of observed responses	_____
Answering of questions in write-up	_____
Understanding of the concepts of density and buoyancy	_____
Second home made diver	_____
Grammatical and spelling errors in write-up 2errors=3, 5 errors=2, 8 errors=1, 0=>9	_____

Keywords

English Language Arts	Mathematics	Science
Reading **comprehension** **independent reading** **research**	**Algebra**	**Earth Science** **Scientific inquiry**
Writing **grammar** **punctuation** **journal** **expository**	**Geometry**	**Life Science**
Communications	**Statistics**	**Chemistry**
Literature	**Calculus**	**Physics** **density** **fluid mechanics**
Other	**Trigonometry**	**Other**
	Other	