

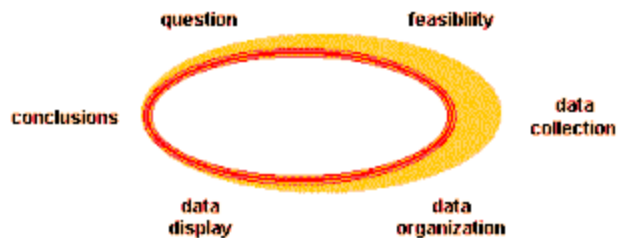
Buoyancy of Aluminum Boats

LEARNING AREA: Inquiry and Research
EDUCATIONAL LEVEL: Middle School
CONTENT STANDARD: Controlled Experiments

A student shall design and conduct a controlled experiment or investigation and interpret the results by: using relevant information to generate a hypothesis or frame a question in a given topic.

1. Defining the controls, variable, and sample size or number of repetitions.
2. Setting up a method to test the hypothesis.
3. Determining how to record and organize data.
4. Conducting experiment and record data.
5. Analyzing data and evaluating the hypothesis.
6. Identifying areas for further investigation.

LARGE PROCESSES/CONCEPTS:



Next Step: Assessment Task---

Buoyancy of Aluminum Boats continued---

Assessment Task---

Description:

Students will create a boat and testing devices, follow laboratory procedures, complete a formal report of the project.

Products/Evidence of Learning:

1. Boat/buoyancy design and testing
2. Formal laboratory report
3. Procedure: Define controls, variables, number of repetitions; give a step-by-step description
4. Conclusion: Evaluate hypothesis and analyze data; identify areas for further investigation

Overview:

Students will create products, follow procedures, design testing devices and record information in a laboratory lab format and analyze the results.

Problem: Buoyancy is always a concern for boating design. In some cases, extra weight is added to boats to increase stability.

Solution: Can you design a testing device to show how buoyancy can be measured on student constructed aluminum boats?

1. Each student will be given a six inch by six inch piece of aluminum foil. (That is the only material that can be used for boat construction.) The student will be asked to state a feasible hypothesis about the best boat design to hold the maximum mass. The student will also be asked to design a testing device to show how buoyancy can be measured using their boats.
2. In the student report, first state the **title, purpose, hypothesis, and procedure** used. (Here define the **controls, variable**, and number of **repetitions**. The procedure is a method used to test the **hypothesis**.)
3. The student will determine how to **record and organize data**.
4. The student will now conduct the experiment as described in their **procedure section** and record data in the **data section** of the report.
5. The student will analyze data and evaluate the hypothesis in the conclusion section of the report.
6. The student will identify areas for further boat buoyancy investigation. This should be located at the end of the conclusion.

Next step: check list---

Buoyancy of Aluminum Boats continued---

Check list---

STUDENT	TEACHER
_____	_____ Used an appropriately framed hypothesis
_____	_____ Demonstrated that direct observations were sufficiently made.
_____	_____ Student showed that the data is displayed appropriately and included:
_____	_____ -identification of relevant patterns in observable data
_____	_____ -relating findings to new situations or large group findings
_____	_____ -answers a complex question effectively using the data
_____	_____ -identifies appropriate areas for further investigation
_____	_____ Showed sufficient direct observations.
_____	_____ Accurately detailed and recorded facts relating to the issue.
_____	_____ Information concerning history, facts, values, beliefs and emotions are gathered from a variety of credible sources.
_____	_____ A variety of points of view are identified and explained.
_____	_____ Used information gathered and processed to defend a position on the issue.
_____	_____ Provided a summary of the findings in a written form.