Scientific Method Project

Objective – Students will investigate the scientific method by designing and implementing an experiment.

Key Vocabulary – Observation, research, hypothesis, experiment, analyze, conclusion, communicate

Materials needed – Various

Procedure:

Students will design a scientific experiment using the Scientific Method to come to conclusions. Students must choose a topic they want to investigate. Students will ask a question they would like to have answered about their chosen topic, conduct research and make observations about the subject of their question. Students will form a hypothesis about what they observe and design and conduct an experiment to test their hypothesis. Students will collect and analyze data and experimental results. They will draw conclusions about their experiment and results. Finally, they must communicate their findings to their peers in class.

1. Problem/Question
2. Observation/Research
3. Formulate a Hypothesis
4. Experiment
5. Collect and Analyze Results
6. Conclusion
7. Communicate the Results

Example:

Layered Liquids (A Study in Density)

Objective

This project examines liquids of different densities.

The goals of this project are:

1. To determine the comparative densities of various liquids.
2. To discover the ways in which liquids of different densities are used.

Materials and Equipment

1. Computer with internet access
2. Digital camera
3. Typical office/craft/hobby supplies (paper, pens & poster-board, glue, etc.)
4. Large clear plastic straws.
5. Modeling clay
6. Medicine droppers or pipettes
7. Salt
8. Food coloring

All materials can be found in your home, at local stores, or on ebay.

Introduction

Density can be described as the amount of material stuffed into a limited space. If two objects take up the same amount of space, but one weighs more than the other, the heavier object has the greater density. In this project we measure the densities of various liquids, and create a colorful demonstration.

Research Questions

1. How is density measured?
2. What are the practical applications of differences in liquid density?

Terms and Concepts to Start Background Research

Density

Experimental Procedure

1. Research related materials (see bibliography below and search terms listed above)
2. To make a graduated cylinder, set a small piece of clay on the table, and stick a straw into the clay so it stands straight. Make several more of these.
3. Put some water in four different cups.
4. Add food coloring so that each cup holds a different color liquid.
5. Put two tablespoons of salt in one cup. Stir until dissolved.
6. Put one tablespoon of salt in a second cup. Stir until dissolved.
7. Leave the third cup with plain colored water.
8. Use the dropper to put 10 drops of the saltiest water into the straw.
9. Put 10 drops of the less salty water in the same straw.
10. Add 10 drops of plain colored water to that.
11. Try the experiment again, using different materials, such as sugar, honey, vegetable oil, dish soap, or whatever you can dream up.
12. Write down and photograph all observations.
13. Analyze the data.
14. Interpret your results and describe your ideas in a detailed report.
15. Include layered liquid samples in your science fair display.
16. Show interesting photos taken throughout the course of the project.

Time Estimate: 4 hours.