

Layered Separation

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Course Name: 7th Grade Integrated Science

Core Curriculum Standard Fulfilled: Standard II: Students will understand the relationship between properties of matter and Earth's structure.

Core Curriculum Objective Fulfilled: Objective 1: Examine the effects of density and particle size on the behavior of materials in mixtures.

Intended Learning Outcomes (ILOs) Fulfilled:

1: Use Science Process and Thinking Skills

1a. Observe objects and events for patterns and record qualitative and quantitative information.

Time Needed To Complete Inquiry: 20 minutes

Inquiry:

- a. What is the research question to be scientifically investigated by the students?
 - ❖ Will common earth material separate into layers when shaken?
 - ❖ Will those layers be predictable?
 - ❖ What factors determine the layering phenomenon?
- b. Will you use Structured Inquiry, Guided Inquiry, or Open Inquiry as the teaching method? Structured Inquiry

Prior Knowledge Needed:

- a. What background knowledge and skills do the students need to be prepared for this inquiry?

The students will have an understanding of density and use the values they calculated in the previous exercise “Calculating Density of Earth’s Materials”.

Introduction:

a. Tell how you will introduce the inquiry to your students to make it meaningful and relevant.

Teacher will begin by asking students “Why does wood float on water? Students answers will vary, but they should bring up something about wood being less dense. Next ask the students “When you get a bag of potato chips, why do all of the small pieces fall to the bottom? Again answers will vary, but they should bring up that the potato crumbs must be denser than chips that are not broken up.

Materials / Resources Needed for the Investigation:

1. One 32 oz. or larger plastic bottle with larger opening (like Gatorade bottles)

For each of the following about 200 ml (3/4 cup) depending on size of container:

- 2. Pebbles (or small rocks)
- 3. Steel Nuts
- 4. Water
- 5. Small pieces of wood

Procedures of the Investigation:

a. Describe the actual investigation.

Teacher will mix 200 ml each of steel nuts, rocks, water and a few pieces of wood in a bottle. After adding materials the teacher should ask the class for some predictions of what will happen if you shake the bottle. After asking the class for their predictions, then the teacher should shake the bottle up and down until the materials have separated into layers. Once it has the teacher should return to the prediction that the students had formed and question why they were correct or incorrect. The students should be guided to an answer that the steel must be the densest, then rocks, then water, and then wood.

Depending on the amount of materials available, you can also have students do this in small lab groups, rather than as a demonstration.

Data Collection: How will students collect and organize data (tabulation)? Students will visually observe the results of the demonstration.

Data Analysis: How will students be able to interpret the data (e.g., graphs), to reach consensus (if appropriate)? How will they draw conclusions? N/A

Assessment:

a. How will you know that your students have met the objective?

Students will assess the correctness of their predictions and account for any discrepancies between predictions and observations.