Lesson: Density	Name:
Teacher:	Date:

Density Rainbow Experiment Free Lesson Plan – STEM Scholars Hub
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Florida State Standard: SC.8.P.8.3 – Explore and describe densities of various materials through measurement of their masses and volumes.
Florida State Benchmark: SC.8.P.8.4 – Classify and compare substances on the basis of characteristic physical properties that can be demonstrated or measured.
NGSS Alignment: MS-PS1-2 – Analyze and interpret data on the properties of substances before and after the formation of a mixture to determine if a chemical reaction has occurred (focus on physical properties and density).

Lesson Focus

Understanding density and how differences in density cause liquids to layer without mixing.

Materials

- Clear plastic or glass container (tall glass or beaker)
- Honey or syrup
- Dish soap
- Water
- Vegetable oil
- Rubbing alcohol
- Food coloring (optional for visibility)
- Dropper or spoon (for careful pouring)
- Small objects (optional, for testing density of solids)

Lesson Objectives

By the end of the lesson, students will be able to:

1. Define density and describe its effect on liquid layering.
2. Conduct the Density Rainbow Experiment to observe density differences.
3. Record and interpret observations of liquid layers.

4. Apply density concepts to explain why some objects float and others sink.

Procedures

1. Introduction (10 minutes)

- Discuss density as mass per unit volume.
- Give examples (oil floating on water, boats, submarines).
- Introduce the "density rainbow" concept and explain that students will see liquids layer according to density.

2. Experiment (20 minutes)

1. Pour honey or syrup into the container (bottom layer, highest density).
2. Carefully add dish soap on top.
3. Add water slowly, optionally colored.
4. Pour vegetable oil on top of water.
5. Top off with rubbing alcohol.
6. Optional: Drop small objects to test where they settle in the layers.

3. Observation (10 minutes)

- Students record each layer and differences between liquids.
- Note where small objects settle based on density.

4. Generalization (10 minutes)

- Discuss why the liquids did not mix (density differences + intermolecular forces).
- Explore real-world applications (oil spills, salad dressings, buoyancy).
- Connect observations to physical properties and material behavior.

Data Table (Example)

Liquid Layer	Observed Order	Relative Density (High → Low)	Notes/Observations
Honey/Syrup	Bottom	1	Thick, slow movement
Dish Soap	Second layer	2	Forms clear boundary
Water	Middle	3	Optionally colored
Vegetable Oil	Second to top	4	Floats above water
Rubbing Alcohol	Top	5	Light, floats above oil
Small Objects	Position	—	Settled at specific layers

Assessment

Formative:

- Ask students to define density and explain liquid layering in their own words.

Summative:

- Short worksheet or lab report:

1. List liquids used and rank by density.
2. Draw and label layers.
3. Predict where small objects settle and explain why.
4. Describe why liquids do not mix.

Safety Notes

- Handle all liquids carefully, especially rubbing alcohol.
- Do not ingest materials.
- Pour slowly to avoid spills.
- Keep workspace clean to prevent slipping.
- Supervise all students during the experiment.

Accommodations for ELL and ESE Students

- Provide visual aids and pre-teaching of key vocabulary (density, layer, float, sink).
- Pair students for peer support.
- Step-by-step written and visual instructions.
- Offer sentence starters and guided questions for responses.