

Exploring Density

FRAMEWORK

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| I. | Scientific and Engineering Practices 2. Developing and using models 4. Analyzing and interpreting models 7. Engaging in argument from evidence |
| II. | Cross-Cutting Concepts 1. Patterns |
| III. | Physical Sciences PS 1. Matter and its interactions |

SKILLS/OBJECTIVES

- To understand the concept of density as a property of liquids, solids and gases
- Understanding how concepts of density relate to everyday situations

MATERIALS

- Large container
- Can of diet coke
- Can of regular coke
- Balloons (one filled with helium, one filled with heavier gas)
- Carrots
- Salt
- Sugar
- Sand
- Clear cups/jars
- Food Coloring
- Cooking Oil
- Salt

NOTES

Activity 1 should probably be done in two separate stations; separate into two groups for the next two activities. For activity 3, do this activity with the whole group; they will keep their jar at the end of the activity.

BACKGROUND

- Density is how much something of the same size weighs compared to something else of the same size. So, for example, a cup of one liquid that weighs more than a cup of another liquid is denser.
- Show this by doing coke/diet coke demo. **Fill up a large container with water. Ask the kids if they think the coke can will sink or float. (it will sink) Repeat with diet coke (it should float).**
- Explain that this happens because there is less sweetener/sugar in the diet coke, so it weighs less, and is less dense.
- Next, take the two balloons. **One should float, and one should drop to the ground.** Explain this is because the gas in the one that floats is less dense than air, and the gas in the one that drops is denser than air.

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| Activity # 1 | Carrots and Salt Water |
| Materials | <ul style="list-style-type: none">○ 2 cups of water○ Salt○ Carrots○ Stirrer |
| Worksheet | No |

- **Fill up two cups with water**, and get a few small pieces of carrots
- **Dissolve as much salt as you can into one of the cups**
- Ask the students if they think the carrots will sink or float in each of the cups
- The carrot should sink in the plain water, and float in the salt water
- This is because the salt water is more dense, and less dense things float on more dense things

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| Activity # 2 | Colors |
| Materials | <ul style="list-style-type: none">○ 3 cups○ Water○ Oil○ Food Coloring○ Stirrer○ Pencil |
| Worksheet | No |

- Get three cups. **Fill one with water, one with oil, and one about 2/3 water 1/3 oil.**
- **Add food coloring to the plain water and plain oil cups**
- **Add food coloring to the mixed cup**
- Try seeing what happens when you push the food coloring around in the cups with a pencil, and what happens when the **cups are mixed**
- The food coloring is water based, so it will not mix with the oil, but will mix with the water.
- Also, point out that the mixed cup has two distinct layers; water and oil on top. Oil and water will not mix, and the oil is always on top because it is less dense.

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| Activity # 3 | Lava Lamps |
| Materials | <ul style="list-style-type: none"> ○ Jars ○ Water ○ Oil ○ Food coloring ○ Salt |
| Worksheet | No |

- **Give every kid a clear jar of their own**
- Have them fill their **jars about ½ to 2/3 of the way up with water**
- **Add a layer of oil on top of the water**
- Have the kids **add food coloring to their jar**, making whatever color they want.
- **Add a little bit of salt on the top of the cup.**
- Have the kids observe what happens, and discuss why it does. (bubbles of oil should form and attach to the salt, and go down in the cup, and then lose the salt and come back up. If that doesn't happen, or happens very slowly, add some more salt to the jar)
- When all of the salt reaches the bottom, gently shaking the jar, and inverting it carefully should help make the bubbles reappear

CONCLUSIONS

- Ask the kids which is more dense, ice or water?
- Why would one be more dense than the other?
- Is water or oil denser? How did we see the answer to this today?