

PROGRAM

# Water Color Density Experiment!

Time Required:	Materials Needed:
35 Minutes	5 clear cups, water, food color (4 different colors), sugar, pipette or straw

### Brief Description of Activity:

Youth will use warm sugar water and food colors to see how density impacts the layering. Youth will pipette the different colored water in one at a time and see how they sit on top of each other.

### Kid-Friendly Purpose of Activity:

*We are going to see how density (compactness) can make layers with colored water!*

### Step-by-Step Guide:

1. First explain what density is. For **younger youth**, explain that it is how much room something takes up. You can squish a pillow down into a smaller size but you can't squish a rock into a smaller size because it has a higher density. For **older youth** you can explain that it is mass per unit of volume, and still use the pillow and rock example.
2. You can start by explaining that all things have density. Water has density as well. Ask them if they think something with a higher density than water will float or sink? A higher density item will sink and lower density item than water will float. (if you want, you can ask about different objects and then test it out! A straw, rock, etc.)
3. For the experiment, you will want 4 clear cups with ¼ cup of warm water in each cup.
4. Add 1 tbsp of sugar to the first cup, 2 tbsp of sugar to the second, 3 tbsp of sugar to the third, and 4 tbsp of sugar to the final cup.
5. Add the 4 separate food colorings to the 4 cups (darker colors will work best in the last cup working your way back – 4 tbsp =blue, 3 tbsp = green, 2 tbsp=yellow, 1 tbsp= red. Use any colors you have and it will still work!)
6. Stir the food coloring and sugar in each cup until the sugar is completely dissolved and the food coloring is mixed well. If the sugar is not dissolving all the way, put the cup in the microwave for 5-10 seconds to rewarm the water.
7. Add half of the cup with 4 tbsp of sugar to the 5<sup>th</sup> cup.
8. Use a pipette or straw (using your finger to suck up the water and releasing your finger slowly to let the water dribble in) suck up the liquid from the 3 tbsp cup. Slowly pipette the colored water on top of the water in the 5<sup>th</sup> cup. If the water is released into the 5<sup>th</sup> cup too quickly, the colors will mix and won't layer properly. Pipette in half of the water from the 3 tbsp cup.
9. Once you have your second layer, repeat the process with the 2 tbsp cup, followed by the 1 tbsp cup.
10. You should have 4 layers of color in your 5<sup>th</sup> cup!



#### Reflection

- **Why did the different colors stay separated when released slowly? Why would it not work if they were released in quickly?**
- **What would happen if you put the same amount of sugar in each cup and tried the experiment?**
- **What would happen if you put the cup with 1 tbsp on the bottom and worked your way up?**

#### Level Adjustments

- **For older youth, ask more questions about density. Why do you think a rock sinks, but a boat floats?** An object will float if it weighs less than the amount of water it displaces. This explains why a rock will sink while a huge boat will float. The rock is heavy, but it displaces only a little water. It sinks because its weight is greater than the weight of the small amount of water it displaces. A boat takes up a lot of space, which is a lot of water to displace. All that water weighs more than the boat, so the boat floats.
- **Older youth can use a bathtub and make guesses on what objects will float and which will sink on a bigger scale with more thought about the weight of the object and the water it displaces.**