

## Floating Liquid Rainbow Challenge.



4 item density tower.

### What you will need:

Clear glass cylinder (vase, jar, water glass, etc.)

- Food coloring
- Food baster (optional)
- syrup
- Water
- Vegetable oil
- dish soap
- Rubbing alcohol
- Honey

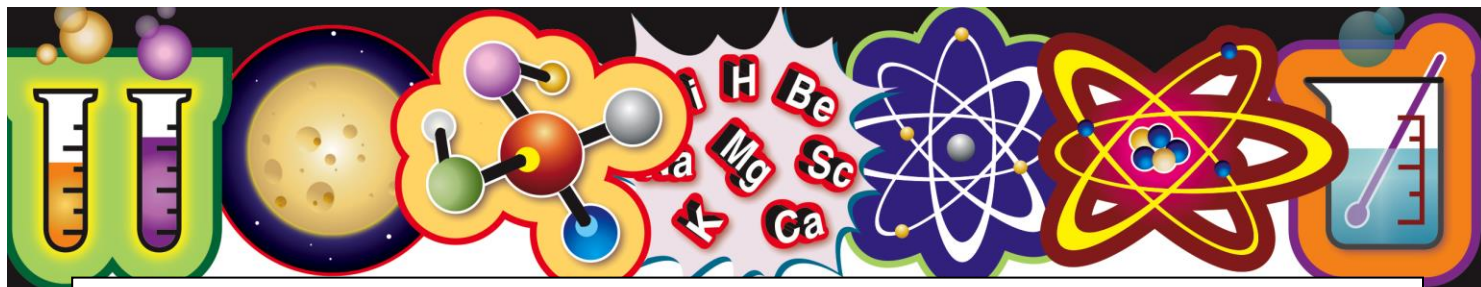
If you don't have one of the items on the list don't worry, your tower will just have less layers. You can colour the liquids using food colouring if you like. You will need roughly the same amount of each liquid. You need to add each layer very carefully and slowly (use a food baster if you have one). Try not to touch the side of the container as you put the liquid in.

**You will layer the liquids in this order, starting at the bottom of the cylinder and working to the top:**

1. Honey – yellow/gold
2. Corn syrup – we dyed ours red
3. Dish soap – blue
4. Water – colorless (dye it a color if you'd like)
5. Vegetable oil – pale yellow
6. Rubbing alcohol – we dyed ours green

Leave to settle for a few hours if layers have mixed slightly.





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## The science behind it:

Density is basically how much "stuff" is packed into a particular volume. It's a comparison between an object's mass and its volume.

Remember the all-important equation:  $\text{density} = \text{mass} \div \text{volume}$ .

Based on this equation, if the weight (or mass) of something increases but the volume stays the same, then density goes up. Likewise, if the mass decreases but the volume stays the same, then density goes down. Lighter liquids (like water or vegetable oil) are less dense than heavier liquids (like honey or corn syrup) so they float on top of the heavier liquids. The same amount of two different liquids you used in the container will have different densities because they have different masses. The liquids that weigh more (a higher density) will sink below the liquids that weigh less (a lower density).

To test this, you might want to set up a sensitive kitchen scale and weigh each volume of the liquids that you added to the column. Make sure that you weigh identical volumes of each liquid. You should find that the weights of the liquids correspond to each different layer of liquid. For example, the honey will weigh more than the dish soap. By weighing the same volume (e.g.  $\frac{1}{4}$  cup, 60 ml) of these liquids, you will find that density and weight are closely related.

## Take it further:

Things you could try:

- What other liquids do you have? Will one float on the other?
- Can you do the same experiment but just using water, food colours and salt?  
[https://warwick.ac.uk/fac/sci/chemistry/about/schools/primary/densitytower/density\\_tower\\_experiment\\_instructions.pdf](https://warwick.ac.uk/fac/sci/chemistry/about/schools/primary/densitytower/density_tower_experiment_instructions.pdf)
- Can you get solids to float at different points in your liquid layers?  
<https://www.stevespanglerscience.com/lab/experiments/density-tower-magic-with-science/>

