

DR. CHRISTOPHER'S

DENSITY EXPERIMENT INSTRUCTIONS



Background Information

Mass is similar to weight. It is the amount of matter or substance that makes up an object.

Volume means the amount of space that something takes up.

Density is a scientific term that expresses the relationship between something's mass and volume.

Example: Two containers have different contents. Both have the same volume and take up the same amount of space. But, one container is filled with brown sugar and the other is filled with cotton balls. Brown sugar has more mass than cotton balls. So, the container with brown sugar is more dense than the container with cotton balls.

Buoyancy is the ability for something that is less dense than water to float.

Boyle's Law states that when the pressure on a gas is increased, the gas compresses into a smaller volume. *In the Cartesian Diver Activity, you will see that air particles can be compressed, but liquids and solids cannot.*

Watch the Video
on Youtube



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Density Column Activity

Estimated Time to Complete: 10 minutes

Supplies Needed

- A tall, clear cup
- Corn Syrup*
- Water*
- Dish Soap
- Vegetable Oil

Optional

- Food Coloring*

* Means that this item is not provided in your stem kit. Please make sure you have permission to use it, if you have it at home.

1. If using **food coloring**, add a couple of drops to your **corn syrup**. Then, add corn syrup to your **cup**.
2. If using food coloring, add a couple of drops to your **water**. Then, add water to your cup.
3. Add dish soap to your cup.
4. Add vegetable oil to your cup.
5. Give your couple a few moments to settle after adding all of your liquids.
6. Observe

The most dense liquids are at the bottom of the cup. Which order are your liquids and what does that mean about their density?



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Cartesian Diver Activity

Estimated Time to Complete: 30 minutes

Supplies Needed

- Large, clear cup
- Plastic Pipette or Dropper
- Hex Nut
- Ruler
- Scissors
- Marker
- Sea Creature Diver
- 2 liter bottle filled with water*

* This item is not provided with your STEM kit

Choking Hazard Warning: There are many small parts in this activity that are a choking hazard.

Part 1: Building the Cartesian Diver

1. Use the **ruler** to measure 15mm of the stem of the **pipette**.
2. Use a **marker** to mark the measurement.
3. Use the **scissors** to cut the pipette. (refer to Figure 1)
4. Screw the **hex nut** into the pipette.

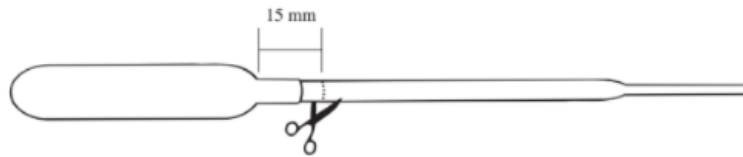


Figure 1. Cutting the Pipet

Part 2: Calibrating the Cartesian Diver

1. You can see that if we put the Cartesian diver into a cup of water, it floats but we want to get it to a point where it barely floats.
2. Add some water to the Cartesian Diver by squeezing it and adding some water.
3. You may need to remove a few drops or add a few more drops of water.

Part 3: Diving with the Cartesian Diver

1. Take your **2-Liter bottle** filled with water and place the Cartesian Diver inside of it.
2. Securely put the top back on the bottle.
3. Squeeze the bottle. Then, release the bottle.
4. Repeat this activity again with the **sea creature diver**

Observe: What happens when you squeeze and release the bottle?

