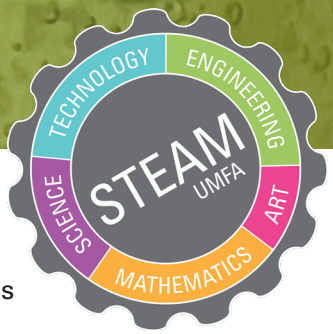
UMFA
UTAH MUSEUM OF FINE ARTS

LESSON PLAN:
Art, Density and Lava Lamps

by Katie Seastrand



Explore density through art! Look closely at cup artworks and discuss their density before making artistic observations with a hands-on experiment.

Objectives:

Student will...

- look at and sort pictures of cups in the UMFA's collection based on their perceived weight.
- discuss density and the reason that different materials weigh different amounts.
- do a lava lamp experiment and carefully record their observations.
- create an artwork to show the movement they saw in their experiment.

Grade level:

2-3rd, adaptable for 6th

Duration:

30-40 minutes

Materials:

- Cut out images of the selection of cup artworks from the UMFA (below).
- Lava Lamp Materials:
  - Lava Lamp Experiment Worksheet (below)
  - Coloring utensils
  - Recycled plastic bottles
  - Water
  - Vegetable oil
  - Food coloring
  - Alka Seltzer (or store brand Effervescent) tablets – broken in half

Materials cont:

- Artwork Extension:
  - Watercolor paper or other sturdy paper
  - Watercolors or other coloring utensils

Vocabulary/Key Terms:

- Density: a physical property that measures how closely packed together a substance's particles are. The density of any material can be determined by dividing the material's mass by its volume. – Britannica Kids
- Mass: the amount of matter (i.e., electrons, protons, and neutrons) an object contains. – sciencing.com
- Volume: amount of space occupied by an object.
- Weight: the force gravity applies to an object. Think about the weight on another planet. It's different but the principle is the same– sciencing.com
- Material: what something is made of.
- Observation: the action or process of observing something or someone carefully to gain information.

Activity

Part 1 | Prep

- Print out the pictures of artworks from the UMFA and cut into individual squares (enough for small groups) or have the group cut it out themselves.
- For a week before this activity ask students to gather used and cleaned plastic bottles (from water, sodas, other drinks).
- Print out experiment worksheets.

Part 2 | Small Group Work

- Divide students into small groups and pass out a set of the cut-out cup pictures to each group.
- As a class discuss what's similar between these pictures? (They are cups, etc.) What's different? (Materials, size, style, etc.)
- Working in their groups, and based on their observations of the cups, have the students organize the artworks from the heaviest to the lightest. When finished, students can discuss the below questions in their small groups.

Part 2 | Small Group Work cont.

1. Which is your favorite cup? How is the material they are made of affect how they are decorated?
2. Why would some of these cups weigh more than the others? Why wouldn't they all weigh the same amount?
3. Which do you think is the heaviest? Why?
4. Which do you think is the lightest? Why?
5. Why might you use one material over another?

- As a class discuss the above questions to have a shared understanding.

Part 3 | Large Group: Density Discussion

- What is density?
- How can one material be lighter than another that's the same size/amount?
- It's not just solid materials! Let's look at the density of two different liquids.

Part 4 | Lava Lamps

- In those same small groups have the students gather their materials. Depending on amount of materials, experiment can be done with a group sharing one lava lamp bottle or each group member having their own.
    1. Lava Lamp Experiment Worksheet (below)
    2. Coloring utensils
    3. Recycled plastic bottles
    4. Water
    5. Vegetable oil
    6. Food coloring
    7. Alka Seltzer (or store brand Effervescent) tablets – broken in half
- Pass out the experiment worksheet and coloring utensils. Explain that students should fill out their worksheet with each step, coloring in their different observations.

Part 4 cont. | Lava Lamps

Step 1: Fill up a 1/4th of your bottle with water. Ask what students think will happen when you pour in vegetable oil in the next step.

Step 2: Pour in vegetable oil until the bottle is almost full. Wait a couple minutes and look closely observing what happens. Because of their different densities they separate into two distinct bands.

Step 3: Add one drop of food coloring. Where did the color go? Why? (It's denser than the oil and is the same as water so they mixed)

Step 4: Pick a different color and ask students what they think will happen. When the colors mix, what color will we get? Add one drop of this different color and see what happens. It make take a minute for the colors to go into the water/mix. Feel free to gently swirl!

Step 5: What do students think will happen when you drop in a piece of Effervescent tablet? What does it mean if it floats at the top? What does it mean if it sinks to the bottom?

- As it's dissolving its making gas or carbon dioxide. Where do these gas bubbles fall on our density scale? As the water in the gas bubble gets to the oil it gets heavy again and sinks.

Step 6: For a final observation add another piece of tablet and look close to record what happens. How can you add lines and shapes to show the movement?

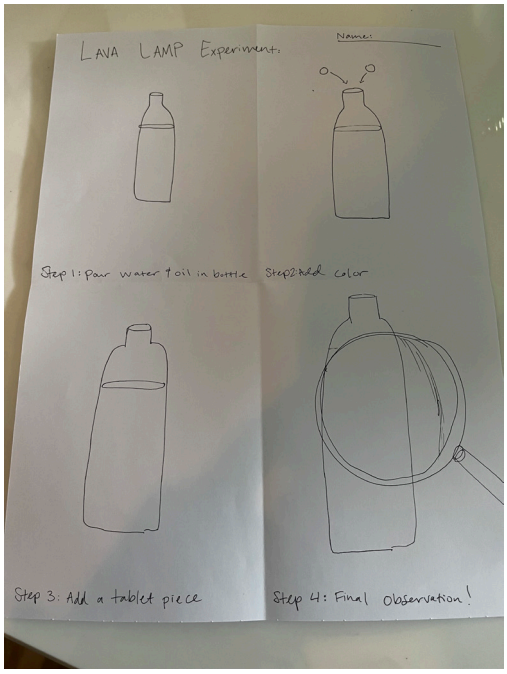
- Use watercolors and your experiment worksheet as inspiration to create a work of art! For inspiration look at Norman Bluhm's *Untitled* artwork, UMFA1995.002.003 and discuss what types of movement you see in the painting. How can students show movement in their own artworks?

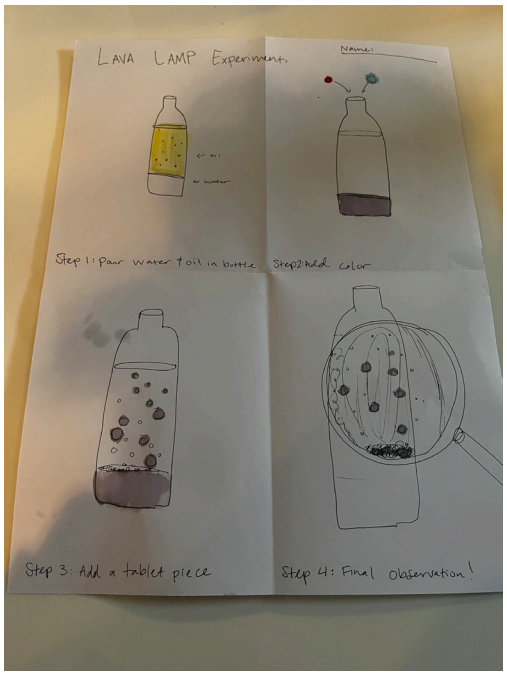
Methods for Assessment:

- Gauge understanding by the small group and large group discussions
- Review the Experiment Worksheet to see student work and observations

Additional Resources

Examples:





Additional Resources cont.

State Core Links:

Science Strand 2.3: Properties of Matter: All things are made of matter which exists with different forms and properties. Matter can be described and classified by its observable properties. Materials with certain properties are well-suited for specific uses. Heating or cooling some types of matter may or may not irreversibly change their properties.

- **Standard 2.3.1**

Plan and carry out an investigation to classify different kinds of materials based on patterns in their observable properties. Examples could include sorting materials based on similar properties such as strength, color, flexibility, hardness, texture, or whether the materials are solids or liquids. (PS1.A)

- **Standard 2.3.2**

Construct an explanation showing how the properties of materials influence their intended use and function. Examples could include using wood as a building material because it is lightweight and strong or the use of concrete, steel, or cotton due to their unique properties. (PS1.A)

Science Strand 3.3: Force Affects Motion

- **Standard 2.3.2**

Construct an explanation showing how the properties of materials influence their intended use and function. Examples could include using wood as a building material because it is lightweight and strong or the use of concrete, steel, or cotton due to their unique properties. (PS1.A)

Science Strand 6.2: Energy Affects Matter: Matter and energy are fundamental components of the universe. Matter is anything that has mass and takes up space. Transfer of energy creates change in matter. Changes between general states of matter can occur through the transfer of energy. Density describes how closely matter is packed together. Substances with a higher density have more matter in a given space than substances with a lower density. Changes in heat energy can alter the density of a material. Insulators resist the transfer of heat energy, while conductors easily transfer heat energy. These differences in energy flow can be used to design products to meet the needs of society.

- **Standard 6.2.1**

Develop models to show that molecules are made of different kinds, proportions and quantities of atoms. Emphasize understanding that there are differences between atoms and molecules, and that certain combinations of atoms form specific molecules. Examples of simple molecules could include water (H2O), atmospheric oxygen (O2), and carbon dioxide (CO2). (PS1.A)

Artwork Spotlights:

Left to right | Tiffany and Co. (American), *Wedding cup,* early 20th century, silver and gilt. Gift of Herbert I. & Elsa B. Michael, UMFA1975.035.029.020; Unidentified artist, Democratic Republic of Congo, Lele peoples, *Cup,* 20th century, wood. The Owen D. Mort, Jr. Collection of African Art assisted by the George S. and Dolores Doré Eccles Foundation, UMFA1985.053.066; German, *Horn Vessel with Silver Trim,* 1785–1799, porcelain, enamel, and silver. Gift of Mrs. J.P. (Virginia) Gibbons, UMFA1992.052.025

Artwork Spotlights cont:

Top | Robert Lazzarini (American, born 1965), *Distorted Teacup,* 2003, porcelain. Gift of Peter Norton and the Norton Family Foundation, UMFA2003.36.1_B

Left | David James Gilhooly (American, 1943–2013), *Untitled Frog Cup #1,* 1973, stoneware. Purchased with funds from the Nora Eccles Treadwell Harrison Fund, UMFA1974.027.004.00

Bottom | Pacific Islands, *Kava Cup,* circa 1940s, coconut. Gift of the Peacock Revocable Trust, UMFA2005.1.28_AG

Right | Vietnamese, *Teacup with stem*, 17th century, porcelain with blue underglaze, Gift of the Christensen Fund, UMFA1999.55.157

Artwork Spotlights cont:

Norman Bluhm (American, 1921–1999), *Untitled,* 1984, acrylic, ink, pastel, paper. Gift of Mr. and Mrs. William A. Small, Jr., in honor of Director E. Frank Sanguinetti, years of service 1967–2001, UMFA1995.002.003

Contributer Bio:

Katie Seastrand is the Manager of School and Teacher programs at the Utah Museum of Fine Arts. After receiving a Bachelor's in Art History and a Master's in Museum Education, Katie began working at the UMFA in September 2019. She's passionate about arts integration and the power of art in learning and understanding complex ideas and concepts. In her free time, Katie likes to knit, bake, and read mystery novels.

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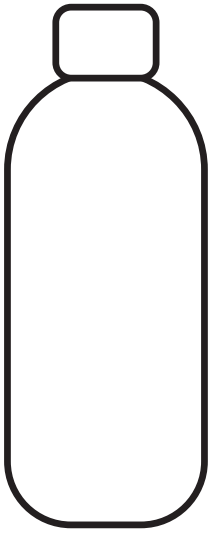
Lava Lamp Experiment Observation Sheet

Steps 1-2:

Fill up a 1/4th of your bottle with water.

Pour in vegetable oil until the bottle is almost full.



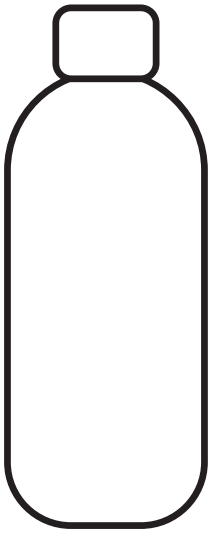
Steps 3-4:

Add one drop of food coloring.

Add a drop of a different color.

Steps 5:

Drop in a tablet piece.



Steps 6:

Drop in another tablet piece and make a final observation showing movement of bubbles.