

Teacher Notes

The first link is for a video introducing the Lake Nyos disaster. It tells the story, but does not explain the science so it intrigues students. Students need to make a reasonable claim about why the people died, support it with evidence from the article, and then try to use scientific principles to explain why the people died.

Stations for the Explore

Station 1- In a large, clear, water filled container put objects that sink or float. I like to use Cola, Diet Cola, rhyolite, and pumice.

Station 2- Create a density column. Use the links below.

[3 Layer Density Column](#)

[7 Layer Density Column](#)

Station 3- Lava Lamp. I used my personal lamp. Great for discussions of convection currents.

Station 4- Find two objects of the same volume but different densities. The physical science teachers will be a great help. I used an iron and aluminum bar.

Station 5- Put raw eggs in the shell into two beakers. One with fresh water and one with salt water. The salt water one will float.

Station 6- This is the hard one. The point is to have two objects of the same mass but very different volumes. This year I used a rock and a tennis ball.

Demonstration- This where the pieces can start to come together. In a larger container put a few tablespoons of baking soda. Then pour in vinegar and cover the container right away. Light a candle and tell the students to watch carefully. Pour the CO₂ that developed in the jar over the candle until it extinguishes. This is what happened at Lake Nyos, so it is a good call back.

When the students are completing the Explore I answer a few questions and ask many. The point is for them to start to see and think about factors that affect density. After they complete the Explain I go over the stations for the students to apply what they saw to what they learned in the Explain.

The Explain is more traditional notes to get the basics of matter and density.

Unit 2- Density 5E

The Elaborate is a chance for students to apply what they learned to get close to a real life situation. In different times, I would do a hands on lab.

The Evaluate is a time to put the pieces together. The students make a claim about what killed the people of Lake Nyos. They collect evidence to support their claim from the sources provided. Then the students need to explain how density is the reason the CO₂ settled into the valleys for the reasoning.

Engage

Watch the [video](#).

Claim: What do you think happened to the people in the villages?

Evidence: What evidence do you have to support your claim?

Reasoning: Why did this happen?

Unit 2- Density 5E

Station 3

a. Take a picture of the lava lamp and insert it below.

b. On the picture draw the motion of the blobs.

c. What is happening to cause this movement?

Station 4

a. What is the same about the bars?

b. What is different about the bars?- Hint the balance is here for a reason.

c. Why is there a difference?

Explain

Atoms: Complete the [worksheet](#) in Schoology on Atoms and submit it.

Define the following

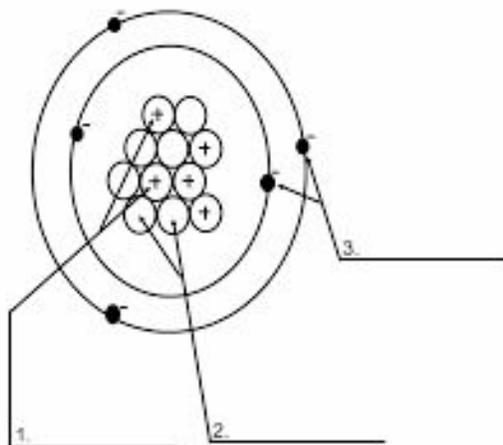
Atom:

Proton:

Neutron:

Electron:

Label the diagram:



Unit 2- Density 5E

Read the article on this [link](#).

Answer the following questions.

1. How do scientists define matter?
2. What is mass?
3. What is the basic SI unit of mass?
4. What does volume measure?
5. Name two different units that might be used to measure volume.

Density

Read the article on this [link](#).

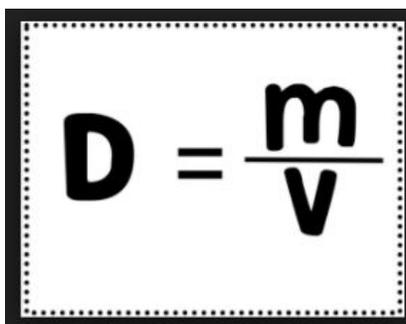
Answer the following questions.

1. What is density?
2. Find the density of an object that has a mass of 5 kg and a volume of 50 cm³.

Unit 2- Density 5E

3. Create a sketch that shows the particles of matter in two substances that differ in density. Label the sketch to show which substance has greater density.

Density Problems

The image shows the density formula $D = \frac{m}{v}$ enclosed in a rectangular box with a dotted border.

Density = mass divided by volume

The density of water 1 g/mL or 1 g/cm³

1. $M = 35\text{g}$, $V = 17\text{cm}^3$

2. You have a box that has a volume of 412 cm³ and weighs 42g. What is its density?

3. Calculate the density of a 500 g rectangular block with the following dimensions: length=8 cm, width=6 cm, height=5 cm. (Hint: L x W x H)

4. Why does wood float?

Unit 2- Density 5E

5. An irregular object with a mass of 118 g displaces (changes the level of the water) 25 mL of water when placed in a graduated cylinder. Calculate the density of the object.

6. Godzilla was running wild in Lake City but was finally captured. The Police Department needs you to tell them his density (the FBI must know this). You have a huge vat of water filled to the 1,000 L level. You drop the kicking and roaring Godzilla into the vat. It now reads 2,716 L. At the bottom of your vat is a scale. You empty the water and weigh Godzilla. His mass is 8,000kg. What is his density?

7. Water has a density of 1 g/cm^3 . You drop an object into the water that has a mass of $.86 \text{ g/cm}^3$. What will happen to the object?

Elaborate

Density Lab

Open this [link](#) for the interactive.

1. At the top Turn the Fluid to Water.
2. Use the interactive to determine the density of the following objects.

Object	Mass	Initial (Starting) Volume	Final Volume	Volume of Object	Density (M/V)
Gold		25.5			
Iron		25.5			
Lead		25.5			
Wood		25.5			
Foam		25.5			
Rubber		25.5			
Ice		25.5			
?????		25.5			

Analysis Questions

1. Which objects floated? What was their density?
2. Which objects sank? What was their density?
3. Reset the interactive at the top. Now test the objects in the fluid. Which one will now float?

Evaluate

Read the article on this [link](#), watch this [video](#), or read this [entry](#).

Claim: What caused the disaster at Lake Nyos?

Evidence: Use evidence in the article to support your claim.

Unit 2- Density 5E

Reasoning: Why did this happen? Use topics from this packet to explain what happened.
Words to use: atoms, density, mass, and volume.