

Subject/Grade: Science 8
Teacher: Taelynn Chesney

Lesson Title: Measuring Different Densities

Stage 1: Identify Desired Results

Outcome(s)/Indicator(s):

FD8.1

Investigate and represent the density of solids, liquids, and gases based on the particle theory of matter.

- (a) Illustrate the relationship between mass, volume, and density of solids, liquids, and gases using the particle theory of matter.
- (c) Use instruments safely, effectively, and accurately for collecting data about the density of solids, liquids, and gases.
- (e) Value accuracy, precision, and honesty when gathering data about the density of objects.
- (h) Compare the densities of common substances to the density of water and discuss practical applications that are based on differing densities.

<p>Key Understandings: ('I Can' statements)</p> <ul style="list-style-type: none"> -I can illustrate the relationship between mass, volume, and density -I can understand how different substances have different densities by mathematically measuring density and through experiment -I can understand how examining relationships on graphs can help determine variables -I can identify the relationship between the particle theory of matter when measuring density of mass and volume using an equation (density=mass/volume) 	<p>Essential Questions:</p> <ul style="list-style-type: none"> -How does the particle theory of matter illustrate the relationship between mass, volume, and density of solids, liquids, and gases? -How can density be calculated? -How does density affect buoyancy (floating/sinking) in water, corn syrup, or oil?
<p>Prerequisite Learning:</p> <ul style="list-style-type: none"> -States of matter; solids, liquids, gases -Particle theory of matter <p>VOCABULARY:</p> <ul style="list-style-type: none"> -Particle theory of matter: All matter is made of tiny particles. -Density: is a physical property that measures how closely packed together a substance's particles are. It explains why some objects float while others sink. The density of any material can be determined by dividing the material's mass by its volume. Is the measurement of how tightly a material is packed together. It is defined as the mass per unit volume. Mass per volume; $m/V=D$. -Mass: the amount of matter of an object; an object's weight without gravity. -Volume: The space a three-dimensional shape takes up. -Buoyancy: The ability for an item to float or sink in a fluid. We can figure out if an object will float or sink based on its density compared to the density of the fluid it is placed in. An object that is less dense than the fluid will float and is positively buoyant (left on diagram). An object that is denser will sink and is negatively buoyant (right on diagram). An object with the same density will float somewhere in the middle of the fluid, this is called neutral buoyancy (middle of diagram). -Note: The density of water is 1g/mL 	
<p>Instructional Strategies:</p> <ul style="list-style-type: none"> -Video -Class discussion -Experimental learning -Reflection 	
<p>Stage 2: Determine Evidence for Assessing Learning</p>	

Pre-Assessment: Formative – Students review their prior knowledge of the particle theory of matter by viewing a YouTube video “Density of Different States”.

Post-Assessment: Summative –

Students will:

- Measure the mass of an object (using a scale)
- Measure the volume of an object using water, corn syrup, and vegetable oil (using a gradual cylinder)
- Calculate density when given the mass and volume of an object ($d=m/v$)

Students will work on “Measuring Density” document along with a word puzzle and answer the following:

The worksheet documents will be used as an Exit Slip for a participation and completion of the worksheet for a mark out of /4 with the aid of a rubric.

- Relate an object’s density to whether or not it floats or sinks in water (buoyancy)
- Understand that some materials are denser and some are less dense and use the particle theory of matter to explain why different solids, liquids, and gases have different densities.
- Use the particle theory of matter theory to explain why the material determined in the investigation has the highest density.

Stage 3: Build Learning Plan

Set (Engagement): **Length of Time:**

15 minutes

Prior to the lesson, the teacher has the option to write the vocabulary on the board as a review.

The teacher will introduce the unit with a video to review the particle theory of matter in order to elaborate on learning how to calculate density.

The teacher will hand out the “Measuring Density” document along with the rubric (for clear expectations) as the students are watching the video.

After the video ask the students: **What are your predictions about which objects will sink, and which objects will float in the corn syrup, water, and vegetable oil?** The students will record their predictions on the handout.

Development:

Time: 1 hour

- Divide the students into groups of 3-4 to conduct the lab.
- Review safety precautions with students.
- Students record their observations on the handout provided as well as be given opportunities for open discussion.
- The students will observe the teacher conducting a demonstration of the experiment.

1. Hand out the materials needed to perform the experiment
2. Add the water, oil, and corn syrup sequentially
3. Allow the students to analyze what they found
4. Add the bottle caps, wrench nuts, and grape in each group, Allow the students to express their findings.
5. Allow the students to record their findings on their work documents.

-Note: In case of a substitute teacher watch this example video before class:

Materials/Resources:

-Video:

<https://www.youtube.com/watch?v=nVrsgESZh-Y>

Individual:

-Worksheet/word puzzle document:

<https://docs.google.com/document/d/1-QSbbySbk75UQNzSM3ZmFRQRghIGXWBfuDVcrm1gFMY/edit?usp=sharing>

(Aided resource:

<https://www.chemed.org/wp-content/uploads/Density-Totem.pdf>)

-Rubric – linked below

-Pencils

For each group:

-Vegetable oil

-Water

-Corn syrup

-Food colouring

-A spoon

-A lid/wrench nut/a grape/a piece of sponge

-A clear gradual cylinder

-A clear cups

Possible Adaptations/**Differentiation:**

- If there aren't enough supplies the teacher can demonstrate the lab in front of the class
- Children with learning exceptionalities who may be triggered by the texture of the materials used in the experiment, these students can either observe the other students as we conduct the science experiment or they can be aided by another student or teacher.
- Children with learning exceptionalities can have a private discussion with the teacher, another student, or an educational assistant about what they learnt from the experiment verbally if they are unable to complete the exit slip independently. The students will not be required to complete the worksheet, they will instead be given marks based on attempting to answer questions and/or expressing their understanding of density either verbally, through action throughout the experiment, or through writing.

Management Strategies:

- Make sure the students are updated on their timelines between each activity in order to provide them with time management.

<https://youtu.be/Z50jEi1igNQ?si=it9GYRW M1YZa3xkg>

Learning Closure:

Time: 15 minutes

The students will be asked to reflect and conclude their understanding about density while filling out the rest of the document. Students may also have the opportunity to work on a crossword puzzle if time is permitted.

-Model ideal behavior

-Clap once – to get the students attention

Safety Considerations:

-Students must be reminded not to consume any of the corn syrup, oil, or water used throughout the experiment even though the materials are safe for consumption, these materials are to be used only for the experiment.

Stage 4: Reflection



Science Grade 8 Physical Science: Forces, Fluids, and Density (FD)					
Outcome		1 – Little Evidence With help, I understand parts of the simpler ideas and do a few of the simpler skills.	2 – Partial Evidence I understand the simpler ideas and can do the simpler skills. I am working on the more complex ideas and skills.	3 – Sufficient Evidence I understand the more complex ideas and can master the complex skills that are taught in class. I achieve the outcome.	4- Extensive Evidence I have a deep understanding of the complex ideas, and I can use the skills I have learned in situations that were not taught in class.
FD8.1 I can investigate and represent the density of solids, liquids, and gases based on the particle theory of matter.	Investigate	<ul style="list-style-type: none"> I can carry out simple processes to illustrate the relationship between mass, volume, and density of solids, liquids, and gases based on the particle theory of matter. 	<ul style="list-style-type: none"> I can carry out simple processes with some accuracy to illustrate the relationship between mass, volume, and density of solids, liquids, and gases based on the particle theory of matter. 	<ul style="list-style-type: none"> I can carry out processes accurately to illustrate the relationship between mass, volume, and density of solids, liquids, and gases based on the particle theory of matter. 	<ul style="list-style-type: none"> I can design and carry out an accurate investigation to illustrate the relationship between mass, volume, and density of solids, liquids, and gases based on the particle theory of matter.
	Represent	<ul style="list-style-type: none"> With developing accuracy, and with help, I can record and interpret data related to the density of solids, liquids, and gases based on the particle theory of matter. 	<ul style="list-style-type: none"> With developing accuracy, I can record and interpret data related to the density of solids, liquids, and gases based on the particle theory of matter. 	<ul style="list-style-type: none"> I can accurately record and interpret data related to the density of solids, liquids, and gases based on the particle theory of matter. 	<ul style="list-style-type: none"> I can accurately record, interpret, and evaluate data related to the density of solids, liquids, and gases based on the particle theory of matter.
Comments					

