Unit Plan

Fundamentals of Cellular Components and their Processes

Standards with Corresponding Objectives

Standard 1: Students understand the unifying concepts and processes of science.

7.1.1. Explain how models can be used to illustrate scientific principles (e.g., osmosis, cell division)

9-10.1.4. Describe the relationship between form and function (e.g., solids, liquids, gases, cell specialization, simple machines, and plate tectonics)

Standard 2: Students use the process of science inquiry.

7.2.1. Communicate the results of scientific investigations using an appropriate format (e.g., journals, lab reports, diagrams, presentations, discussions)

Standard 3: Students understand the basic concepts and principles of physical science.

8.3.2. Explain the relationship between phases of matter and temperature

9-10.3.1. Classify elements according to similar properties. (e.g., metal, nonmetal, solids, liquids, gases)

Standard 4: Students understand the basic concepts and principles of life science.

9-10.4.1. Relate cell function to cell structure (i.e., cell wall, cell membrane, nucleus, mitochondria, chloroplast)

9-10.4.12. Compare and contrast photosynthesis and cellular respiration

Standard 6: Students understand relations between science and technology.

9-10.6.1. Use appropriate technologies and techniques to solve a problem (e.g., computer-assisted tools, Internet, research skills)

Book: Nowicki. Stephen. (2017). **Book.** Orlando, Florida: Houghton Mifflin Harcourt Publishing Company.

Examples of DI (differentiation instruction) – Hands on labs, technology based, individual research, direct instruction, PBLs, literature circles, Visual projects

Note: This unit requires students to know the fundamentals of cellular process and how to preform basic algebra problems. This content builds on the knowledge students have developed in life science, and physical science classes.

OCTOBER

Monday	Tuesday	Wednesday	Thursday	Friday
1 **Teach lesson on Solids, liquids, and Gas.** **-Class interactive activity** **Assessment: worksheet**	**2** Introduce Density -ask students to research the components of density -tell students to bring a liquid to calculate density	**3** **Teach Density lesson** **Assessment: worksheet**	**4** **Density Calculating Lab** Assessment: Post lab Q's	**5** Work Day/Vocab activities (Finish up HW/Lab Q's)
8 **Teach lesson on Cellular organelles** **Assessment: cellular organelle worksheet**	9 **Technology lesson with cellular organelles** **-Introduce/assign Canva project**	10 **Teach lesson on Cellular Movements** **Assignment: Read pre-lab for tomorrow's lab** **Assessment: Exit slip**	11 **Osmosis lab** **Assessment: Post lab Q's**	12 Assign Cell model project -review weekly lessons -answer homework/lab questions
15 **Teach Photosynthesis** **Assessment: Diagram the process of photosynthesis.**	16 **Formal Assessment:** Present Cell models to class -vocabular activity	17 **Teach Inquiry lesson** **-student research any science related topic** **Assessment: Choice of paper, presentation, or PPT**	18 **Performance Assessment: Photosynthesis Diagram model**	19 Review/Vocab Games -answer homework/lab questions -Unit Test Next Monday (formative assessment)

Week 1

1. Solids, liquids, and Gases Lesson Plan

Grade: 7th-8th	**Subject:** Science
Materials: group interactive page, homework worksheet	**Technology Needed:** PowerPoint system, computer, projector
Instructional Strategies: *Direct instruction *Guided practice *Learning Centers *Lecture *Technology integration * Peer teaching/collaboration/ cooperative learning *Visuals/Graphic organizers *Discussion/Debate	**Guided Practices and Concrete Application:** *Large group activity *Independent activity *Pairing/collaboration *Simulations/Scenarios *Hands-on *Technology integration
Standard(s) Standard 1: Students understand the unifying concepts and processes of science. Standard 3: Students understand the basic concepts and principles of physical science. **Objective(s)** 9-10.1.4. Describe the relationship between form and function (e.g., solids, liquids, gases, cell specialization, simple machines, and plate tectonics) 8.3.2. Explain the relationship between phases of matter and temperature **Bloom's Taxonomy Cognitive Level:** Application, Analysis	**Differentiation** **Below Proficiency:** If a student identifies as below proficiency I would put them into groups or with a partner to aid them. **Above Proficiency:** If a student identifies as above proficiency I would have them look further into the topic by researching on the computer more examples of solids, liquids, and gases. **Approaching/Emerging Proficiency:** If students are emerging proficiency they should be able to complete and understand the homework. **Modalities/Learning Preferences:** I encourage students to move around the classroom, interact with students, and ask questions.
Classroom Management- (grouping(s), movement/transitions, etc.) During the lecture, students will be arranged in tables with 3 to 4 students. It's the students' responsibility to take notes during the lecture and participate in group activities. I will create a positive environment by engaging the students in an activity. I will provide instruction for moving around the room during transition times.	**Behavior Expectations- (systems, strategies, procedures specific to the lesson, rules and expectations, etc.)** I expect students to sit through the lecture and ask questions as we go through the content. I will provide a group worksheet the students can work on together at their table and around the room. I will regain students' attention and assign homework for the evening.

Minutes	Procedures
30	**Set-up/Prep:** Create CH 8 PowerPoint/group activity/worksheet. Set up PowerPoint before class. Print worksheets.
5	**Engage: (opening activity/ anticipatory Set – access prior learning / stimulate interest /generate questions, etc.)** I will start class by accessing student's prior knowledge to matter and explaining the three forms. Do any of you know what matter is? Can anyone give me a few examples? I found this cool video to help describe the three forms of matter. https://youtu.be/X_jPQFOd5yQ https://youtu.be/RIQqVqQs9Xs

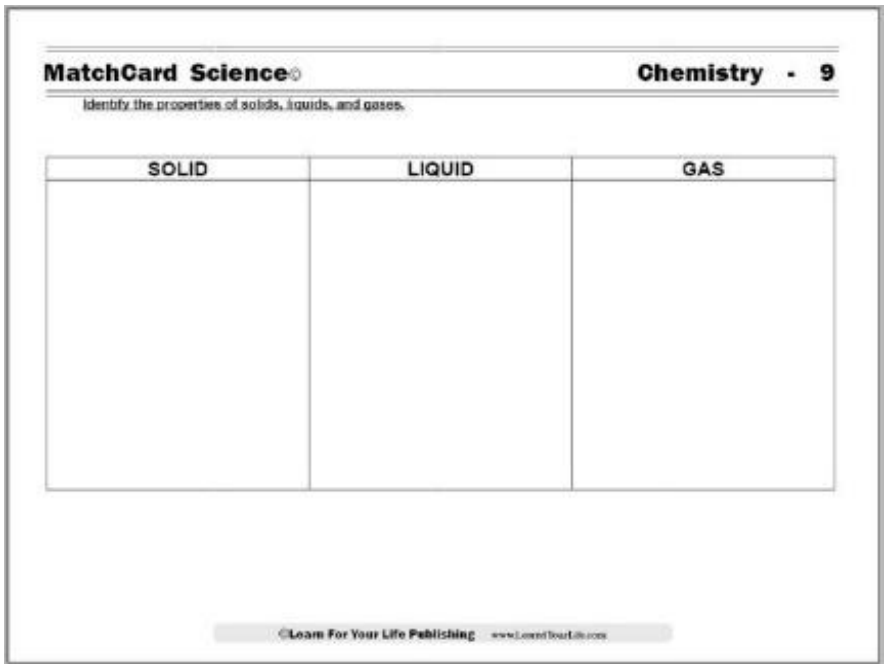
20	**Explain: (concepts, procedures, vocabulary, etc.)** The main concepts and components of solids, liquids, and gases are explained. I will use the PowerPoint lecture to guide and build on the states of matter. Important terms are discussed deeply and are relevant to students' prior knowledge. I will ask questions to promote student engagement and provide real world examples to help students connect with the content. I will make sure to explain all pictures and describe each form of matter.
20	**Explore: (independent, concreate practice/application with relevant learning task -connections from content to real-life experiences, reflective questions- probing or clarifying questions)** After the lecture material I will arrange the students for a group activity. The group activity will require students to resemble the particles of each form of matter. I will first have the students stand in a tile directly next to each other in a square on the floor. I will ask the students to vibrate. As they twist and spin I will explain to them this is how solid particles behave. I then will have the students spread out and vibrate to simulate the effects of a liquid. The same will take place for gases. As the students do the activity I will relate it to the lecture. If time remains I will give them a worksheet to work on. This requires the students to walk around the room and identify objects as solids, liquids, and gases.
5	**Review (wrap up and transition to next activity):** I will ask students if they have any remaining questions and have them cleanup/pack up for their next class. If I feel the students need more practice I will pass out a short homework worksheet that is due the next day.

Formative Assessment: (linked to objectives) **Progress monitoring throughout lesson- clarifying questions, check-in strategies, etc.** Why do you think it's important that the particles in a solid are packed tightly? What is more massive gas or solid? **Consideration for Back-up Plan:** I have prepared an additional worksheet for the students.	**Summative Assessment (linked back to objectives)** **End of lesson:** As you all can see solids, liquids, and gases are all around us. Their components are the foundation to understanding the basic science concepts. Their attraction, packaging, and the orientation of the particles determine its overall shape. **If applicable- overall unit, chapter, concept, etc.:** Unit 2: Chapter 8, Solids, liquids, and gases

Reflection (What went well? What did the students learn? How do you know? What changes would you make?):
Delivering the content went well. The students were able to learn about the components of each form of matter. They were able to answer the questions I asked during the lecture and they only had a few questions on the homework. I need to work on my teacher voice and becoming more comfortable teaching to students. I could also slow down and explain more.

Solids, liquids, and Gas Class activity.

Directions: Students are asked to go around the room filling in as many objects into the following columns on the worksheet.



MatchCard Science© Chemistry - 9

Identify the properties of solids, liquids, and gases.

SOLID	LIQUID	GAS

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Assessment:

Solids, liquids, Gas, and Plasma

Name:_____

1) Draw how the particles are arranged in each form.

Solid-

Liquid-

Gas-

2) Which from has stronger attraction forces solid or liquid? Please explain.

3) Which fluid has a higher viscosity corn syrup or grape juice.

4) Define matter in your own words.

5) Sort the forms of matter from highest to lowest based on attractive forces.

2. Calculating Density

Grade: 7th-8th	**Subject:** Science
Materials: notebook, calculator, pencil, scratch paper	**Technology Needed:** PowerPoint, computer, projector
Instructional Strategies: *Direct instruction *Guided practice *Learning Centers *Lecture *Technology integration *Peer teaching/collaboration/ cooperative learning *Visuals/Graphic organizers *Modeling	**Guided Practices and Concrete Application:** *Large group activity *Pairing/collaboration *Hands-on *Technology integration Explain: Students will work together in a large group while I give them guided instructions.
Standard(s) Standard 2: Students use the process of science inquiry. Standard 3: Students understand the basic concepts and principles of physical science.	**Differentiation** **Below Proficiency:** If a student identifies as below proficiency I would put them into groups or with a partner to aid them. **Above Proficiency:** If a student identifies as above proficiency I would have them look further into the topic by researching on the computer how to find the density of a solid or a gas. **Approaching/Emerging Proficiency:** If students are emerging proficiency they should be able to complete and understand the homework. **Modalities/Learning Preferences:** I encourage students to move around the classroom, interact with students, and ask questions.
Objective(s) 9-10.6.1. Use appropriate technologies and techniques to solve a problem (e.g., computer-assisted tools, Internet, research skills) 9-10.3.1. Classify elements according to similar properties. (e.g., metal, nonmetal, solids, liquids, gases) **Bloom's Taxonomy Cognitive Level:** Analysis, Application	
Classroom Management- (grouping(s), movement/transitions, etc.) During the lecture students will be arranged in tables with 3 to 4 students. It's the students' responsibility to take notes during the lecture and participate in group activities. I will create a positive environment by engaging the students in an activity. I will provide instruction during the activity, so students receive ultimate learning. During transitions I expect students to go from one task to the next.	**Behavior Expectations- (systems, strategies, procedures specific to the lesson, rules and expectations, etc.)** As I lecture for a few short minutes I expect students to be attentive and participate in discussion. During the large group activity, I encourage students to maintain an inside voice and be respectful while everyone participates. I expect all students to complete the calculations as a class.

Minutes	Procedures
30	**Set-up/Prep:** Create CH 4 PowerPoint/group activity/worksheet. Set up PowerPoint before class.
6	**Engage: (opening activity/ anticipatory Set – access prior learning / stimulate interest /generate questions, etc.)** Good morning, today we are going to retouch on the concept of density and investigate it further by calculating the density. Can someone tell me what density means? What components do we need to find density? What do we use density for in the real world? Here is a quick video that describes the effects of density. https://youtu.be/MzsORE0ae10
25	**Explain: (concepts, procedures, vocabulary, etc.)** I will use the PowerPoint as a guide to present the information on density. I will start by explaining the concept behind density then describe how to calculate it. I will describe what is needed to calculate density and what units are needed. I will relate different densities to real world examples like water and honey. After the content is present I will demonstrate in class how to calculate density problems. I will ask the student to turn and talk to discussion their answers.
20	**Explore: (independent, concreate practice/application with relevant learning task -connections from content to real-life experiences, reflective questions- probing or clarifying questions)**

	After we calculate the densities of a few problems in class. I will provide more problems that the students will compute with guided help. I used problems that are more challenging and require rearrangement of the equation. I will help the students get started and make sure they are using the correct units.
10	**Review (wrap up and transition to next activity):** I will wrap up by explaining to students how a substance with a higher density sinks and a lower density rises. If I feel they are not understanding the concept I will provide them with a small homework worksheet that is due the following day. I will have the students clean up all their materials and get ready for the next class.

Formative Assessment: (linked to objectives) **Progress monitoring throughout lesson- clarifying questions, check-in strategies, etc.** Why do we need to compare the amount of mass to the amount of volume to find the density? What are the correct units to use for volume. **Consideration for Back-up Plan:** If the students are not understanding the content I will break down each component and provide more examples to help them. I can also provide more homework.	**Summative Assessment (linked back to objectives)** **End of lesson:** Every form of matter has a density and they can all be found by measuring the mass and dividing it by the volume. Fluids of different densities tend to not mix. Also, unknown volumes and masses can be found by using known information. **If applicable- overall unit, chapter, concept, etc.:** Unit 1, Chapter 4, Lesson 1, Calculating Densities
Reflection (What went well? What did the students learn? How do you know? What changes would you make?): Delivering the content went well. The students were able to learn what components they need for calculating density. They were able to answer the questions and compute the example problems I provided. I need to work on my teacher voice and becoming more comfortable teaching to students. I could also slow down and explain more.	

Assessment below: Density worksheet

Density Worksheet

Name _____ Date _____

D=m/v

1. A brick has a mass of 550 g and volume of 2500 cm^3. What is the density of the brick?

2. An amazon box has a mass of 6.0 g and a volume of 15.0 cm3. What is the density of the amazon box?

3. The density of an unknown substance is 3.0 g/cm3. If a sample of the substance has a volume of 15 cm3, then what is its mass of the substance.

4. You have a lead ball with a mass of 450 g. The density of lead is 10.5 g/cm3. What is the volume of the ball?

5. A student has a rectangular block. It is 4 cm wide, 6 cm tall, and 23 cm long. It has a mass of 350 g. First, calculate the volume of the block: Volume= length*width*height)

   Determine the density of the block.

3.Measuring Density lab

Grade: 7th -8th	**Subject: Science**
Materials: scale, measuring beakers, water, vinegar, dish soap, pop, honey, calculators	**Technology Needed:** PowerPoint, computer, projector, calculator
Instructional Strategies: *Direct instruction *Guided practice *Learning Centers *Technology integration *Peer teaching/collaboration/ cooperative learning *Visuals/Graphic organizers *Discussion/Debate *Modeling	**Guided Practices and Concrete Application:** *Large group activity *Pairing/collaboration *Hands-on *Technology integration *Imitation/Repeat/Mimic Explain: Students will work in their lab groups to calculate the density of 4 household objects.
Standard(s) Standard 2: Students use the process of science inquiry. Standard 3: Students understand the basic concepts and principles of physical science**.**	**Differentiation** **Below Proficiency:** If a student identifies as below proficiency I would put them into groups or with a partner to aid them. **Above Proficiency:** If a student identifies as above proficiency I would have them look further into the topic by researching on the computer how to find the density of a solid or a gas. **Approaching/Emerging Proficiency:** If students are emerging proficiency they should be able to complete and understand the homework. **Modalities/Learning Preferences:** I encourage students to move around the classroom, interact with students, and ask questions.
Objective(s) 6.2.4. Use appropriate tools and techniques to gather and analyze data. 9-10.3.1. Classify elements according to similar properties. (e.g., metal, nonmetal, solids, liquids, gases) **Bloom's Taxonomy Cognitive Level:** Applying and Analyzing	
Classroom Management- (grouping(s), movement/transitions, etc.) Students will be broken up into lab groups of 2 or 3. They will complete the lab procedure by following the directions. They will transition between tasks effortlessly and be aware of other groups materials.	**Behavior Expectations- (systems, strategies, procedures specific to the lesson, rules and expectations, etc.)** All students are expected to participate equally in the lab. They must follow the lab contract by using equipment property and putting it away clean.

Minutes	Procedures
30	**Set-up/Prep:** Before lab I will gather scales, beakers, household supplies, and any other material needed for the lab. I will ensure lab stations are clean and ready for use.
5	**Engage: (opening activity/ anticipatory Set – access prior learning / stimulate interest /generate questions, etc.)** I will start off the lab by briefly stating what is expected of the students during lab. I will walk through the procedure with the students stating the objectives, and what materials the students will need to gather. I will divide the lab groups up heterozygous and allow the students to get started.
30	**Explain: (concepts, procedures, vocabulary, etc.)** Students will have approximately 35 minutes to calculate the density of four different household products. They will use the equations given to them during lecture, and the background they have developed from solving density problems from their homework. Students will use the scales to find the mass of the liquid. They will use graduated cylinders to measure the volume of liquid. They will use both values to plug into the density equation. The students will repeat this process for each household object.
10	**Explore: (independent, concreate practice/application with relevant learning task -connections from content to real-life experiences, reflective questions- probing or clarifying questions)** After the students have completed the lab they will use this time to check answers with their lab partners and ensure proper units. Each student will compile their answers, so they are neat and clearly labeled. They will

	hand in their lab post lab in the correct homework bin. If not completed after lab, students will have until the next day to turn in the post lab.
5	**Review (wrap up and transition to next activity):** Students will use this time to clean up their lab stations, wash materials, and pack up their supplies. This will be excused when the bell rings.

Formative Assessment: (linked to objectives) **Progress monitoring throughout lesson- clarifying questions, check-in strategies, etc.** What 2 components do we need to calculate density? How do we rearrange the equation to solve for mass or volume? **Consideration for Back-up Plan:** If the students are having a hard time understanding the lab, I would regroup the students back into the whole class and demonstrate how to find the density of one liquid. Then I would tell students to go back into their groups	**Summative Assessment (linked back to objectives)** **End of lesson:** As we can see, it takes the volume and mass of the liquid in order to determine the density. We need to subtract the mass of the beaker when computing the mass to take into consideration the beaker's mass. Also, to find mass or volume requires simple algebra to rearrange the equation. **If applicable- overall unit, chapter, concept, etc.:** Fundamental cells and their movements.
Reflection (What went well? What did the students learn? How do you know? What changes would you make?): The lab went great. Students were able to follow along with the procedures and calculate the densities of each liquids. I would like to add some solid objects such as blocks or other objects for the students to measure.	

Assessment: Lab with Post lab questions (see below)

Calculating Density Lab Procedure.

Name:_____ Grade:_____

Make sure to maintain proper lab safely and return clean materials.

1. Weigh the mass of one beaker. Record this value. This is the beaker you will use to measure each liquid.
2. Add approximately 50-100 ml of vinegar to the beaker. Record the volume of the vinegar in (mL).
3. Set the beaker of Vinegar on a scale and record the total mass in grams of both the beaker and the liquid.
4. Subtract the mass of the beaker from the previous value that was obtained to find the mass of only the liquid.
5. Plug in the volume and mass values obtained from the previous sets to calculate the density of vinegar.
6. Repeats sets 1-5 with the three other liquids. (honey, water, dish soap)

Post lab Questions (Show all Units)

1. Record the calculated density for each liquid.

2. Which liquid had the highest density? What does this mean?

3. What is viscosity? Which liquid had the highest viscosity?

4. Write the equation for density and label each component with units.

5. Where is the real world do people solve for density?