Science Unit Plan

Learning Goals

GLCE Content Standards and/or NGSS Disciplinary Core Ideas	Specific Science Concepts Contained Within the Content Standards
P.PM.04.16 Measure the weight (spring scale) and mass (balances in grams or kilograms) of objects. **P.PM.04.17** Measure volumes of liquids in milliliters and liters. **P.PM.04.23** Compare and contrast the states (solids, liquids, gases) of matter. **P.CM.04.11** Explain how matter can change from one state liquid, solid, gas) to another by heating and cooling. **P.PM.04.18 Demonstrate** the use of centimeter cubes poured into a container to estimate the container's capacity. **5-PS1-1.** Develop a model to describe that matter is made of particles too small to be seen. **5-PS1-2.** Measure and graph quantities to provide evidence that regardless of the type of change that occurs when heating, cooling, or mixing substances, the total weight of matter is conserved.	Solid – Molecules in a solid are tightly packed, usually in a regular pattern and vibrate (jiggle), but do not move from place to place. A solid retains a fixed volume, rigid shape, and is not easily compressible. Liquid – Molecules in a liquid are close together with no regular arrangement, and vibrate. A liquid has more space than a solid, so it can move about, and molecules can slide past each other. A liquid assumes the shape of the part of the container in which it occupies. Gas – Molecules are well separated with no regular arrangement, vibrate and move freely at high speeds. A gas assumes the shape and volume of its container. If you add heat to a solid, it will change to a liquid. If you add heat to a liquid, it will change to a gas. If you take away heat from a gas, it will change to liquid. If you take away heat from a liquid, it will change to a solid. All matter has mass. Matter is neither created nor destroyed. Matter is everything in the universe that takes up space. Volume is a measure of how much space an object takes up.
GCLE Inquiry Standards (Process, Analysis, Reflection) and/or NGSS Scientific Practices	**Specific Skills and Practices Contained Within the Process and Practice Standards**

S.IP.04.14 Manipulate simple tools that aid observation and data collection (for example: hand lens, balance, ruler, meter stick, measuring cup, thermometer, spring scale, stop watch/timer, graduated cylinder/beaker). **S.IP.04.15** Make accurate measurements with appropriate units (millimeters centimeters, meters, milliliters, liters, Celsius, grams, seconds, minutes) for the measurement tool. **S.IA.04.13** Communicate and present findings of observations and investigations. **S.RS.04.11** Demonstrate scientific concepts through various illustrations, performances, models, exhibits, and activities.	You can measure an object's mass by using a spring scale and making accurate measures. You can compare the mass of two objects using a balance. Measurements must be accurate for data to be reliable. Make observations to produce data. Look at data for patterns and regularities. You must share your knowledge with others to help us figure out whether our ideas and patterns make sense and are accurate compared to those of others. Through investigations, you are able to come up with your own theories and understand concepts rather than just memorizing information. Making and observing models helps you understand abstract ideas and concepts.
Learning Outcomes for the unit that combine science content with skills and practices. Students will be able to carry out investigations to determine the differences between solids, liquids and gases. Students will be able to make observations and produce data about how to measure matter. Students will be able to construct an explanation of how matter changes state.	

EPE Chart For *Why Does a Popsicle Melt When I'm Eating it in the Summer?*

Experiences	Patterns	Explanations
Measuring solids, liquids and gases using a balance and spring scale. - Measure rocks, paper clips, water and oil on a spring scale. - Make a balance out of a hangar and put a deflated balloon on one side and an inflated balloon on the other. Students move as if they are solid, liquid and gas particles. Put solids, liquids and gases into containers. - Put rocks, paper, pencils, ice, water, and oil into a container. - Blow up a balloon. Experiment with what is matter and takes up space. - Submerge rocks, balls, and water into water. - Put a Kleenex in a bottom of a cup and submerge the cup upside down into a cup of water. Take away and add heat to solids, liquids and gases. - Put food coloring in a cold glass of water, a room temperature glass of water and a hot glass of water.	All matter takes up space and has mass. If you add heat to a solid, it will change to a liquid. If you add heat to a liquid, it will change to a gas. If you take away heat from a gas, it will change to liquid. If you take away heat from a liquid, it will change to a solid. Solids don't take the shape of its container. Liquids and gases take the shape of it container. If it doesn't take up space, it is not matter.	Molecules in a solid are tightly packed, usually in a regular pattern and vibrate (jiggle) but generally do not move from place to place. A solid retains a fixed volume and rigid shape and is not easily compressible. Molecules in a liquid are close together with no regular arrangement, vibrate, move about, and slide past each other, and assumes the shape of the part of the container which it occupies. Molecules in a gas are well separated with no regular arrangement, vibrate and move freely at high speeds, and assumes the shape and volume of its container. Matter is anything made of atoms and molecules. Matter is anything that has mass and takes up space. Atoms cannot be created or destroyed.

- Put a cup of water on the window sill for a week. - Boil a cup of water. - Leave an ice cube out in the classroom. - Put a cup of water in the freezer over night. - Leave a cold pop can out in the classroom.		

Unit Central Question and Model Response

Central Question for the Unit
Why does my popsicle melt while I am eating it, but if I put it back in the freezer, it stops melting?
Age Appropriate and Scientifically Accurate Model Response
Popsicles melt as you eat them because heat is added to the popsicle. The popsicle is very cold (below 32 degrees Fahrenheit) and starts out as a solid. The molecules in are tightly packed and vibrating. Heat is added to the popsicle from the sun. The molecules start moving faster, spread out a little and slide past one another, and the popsicle melts into a liquid. The liquid takes the shape of its container. If you left the popsicle out for a few days, there would be more heat added to the popsicle from the sun, and the liquid molecules would start spreading out even further, move faster and bounce off of each other. The liquid popsicle would evaporate into a gas. If you put the liquid popsicle back into the freezer, heat would be taken away from the popsicle and the molecules would start slowing down, become tightly packed and vibrate. The popsicle freezes and is now a solid again. In the solid state, it stays whatever shape it was during the freezing process (bowl shape). During these state changes, the molecules are never created or destroyed; they are always there but you cannot see them in the gas state. If all molecules were present in all the states of matter of the popsicle, the mass of the popsicle would not change because mass is how much matter something is made of, so if no molecules were lost (drips on the ground), the mass would be the same.

Instructional Approach/Activity Sequence for Science Unit

Students will be able to make observations and produce data about how to measure matter.

Students will be able to carry out investigations to determine the similarities and differences between solids, liquids and gases.

Students will be able to construct an explanation of how matter changes state through heating and cooling.

No.	Name for Activity	Activity Description	The Function and Purpose of the Activity (Why this activity here in this sequence? Use I-AIM as reference)
1	Brainstorm why measuring is important	Students will do a think-pair-share to brainstorm why it is important that we know how to measure states of matter. What types of things do you do on a day-to-day basis that require measuring?	Establish a question and elicit student responses.
2	Investigating measuring liquids	Students will be given cubes and cups and asked to explore how you could estimate the volume of the cup.	Establish new question and explore phenomena for patterns: Explore ideas about measuring liquid.
3	Sharing ideas	Students will discuss as a class ways to estimate the volume of the cup with cubes.	Elicit student responses: Share ideas and show that people have different ideas about how to measure volume.
4	Investigati	Students will be given water, a cup and a	Explore phenomena for patterns:

	ng measuring liquids	measuring cup to test their hypothesis.	Explore ideas about how to estimate and measure volume of a liquid.
5	Exploring the mass of matter	Students examine the weight/mass of various solids, liquids and gases. They will write down a first draft definition of the generalization of weight/mass in solids, liquids and gases (all matter has mass).	Establish a question: Establishes a question of 'Do all solids, liquids and gases have mass?' and elicits student's initial ideas about it.
6	Sharing ideas	Students share their explanations. The class shares their ideas and teacher lists the different ideas.	Elicit students' ideas: Share ideas and show that people have different ideas about what has mass/weight and what doesn't.
7	Investigating the mass of solids and liquids	Students will be given a balance, solids, liquids, frozen popsicle, and melted popsicle. They will be asked to measure the mass of the objects using the balance. They will record their observations. Students will understand that a frozen popsicle and a melted popsicle have the same mass (as long as all particles were still present) and that larger objects does not mean more mass.	Explore phenomena for patterns: Students will explore ideas about solids and liquids and their mass.
8	Investigating the mass of gases	In order to test whether gasses are matter and have mass, students will be given a balloon, an oxygen filled balloon, a hangar, and a meter stick. They will be asked to create a balance and measure the mass of the two objects and record their observations.	Explore phenomena for patterns: Students will explore ideas about the relationship of gases and mass.
9	Forming a rule	Students will discuss their findings with the class and will form a rule about matter and how objects with matter have mass.	Explore ideas about patterns: Look for patterns in what has mass and relate to matter.
10	Investigati	Class will have a discussion about their thoughts	Explore phenomena for patterns

	ng the weight of matter	on mass versus weight. Then, they will be asked to measure the weight of each object that they measured with mass except now they will use a scale. They will record their results in science journals.	and ideas for patterns and introduce students to the scientific explanation: Students will explore ideas about the difference in weight and mass.
11	Investigating mass vs. weight	Students will do a simulation on the promethean board to see measure mass and weight of objects on different planets. They will record the results in their science journal.	Application of ideas: Apply ideas about the difference between weight and mass.
12	Assessing student learning	Students will write a journal response responding to these two questions: “On Earth, a dog weighs 25lbs and has a mass of about 11kg. The dog then travelled to the moon. How would his weight and mass compare on the moon? Why?” and “I have two cups that are exactly the same with an ice cube in each that are exactly the same size. I put one cup in the freezer and left one in the classroom. The one left in the classroom is now liquid. If I put them on a balance, what would happen? Why?”	Apply to near contexts: Use the idea of weight versus mass to explain scenarios.
13	Exploring states of matter	Students examine a variety of solids, liquids and gases. They construct a first draft chart of the properties of each.	Establish a Question: Establishes a question for the sequence, “What are similarities and differences of solids, liquids and gases?” and elicits student’s initial ideas about it.
14	Sharing ideas	Students share their ideas about similarities and differences. The class shares their ideas and teacher lists the different ideas. The class comes to some consensus that these objects may (a) be	Elicit Students’ Ideas: Share ideas and show that people have different ideas about what properties something must have to be a solid,

		similar in that they all take up space (b) be different in that they either take the shape of their container or not and (c) all have mass or not. The purpose of the next activities is to test those ideas.	liquid or gas.
15	Investigating what is matter	The students will be given a cup of water, a cup, a Kleenex, a flashlight, a rock, and a paper clip. They will be asked to explore with these items and focus on which items take up space depending of if they are a solid, liquid or gas.	Establish a new question and explore phenomena for patterns: Explore ideas about what takes up space and therefore is matter.
16	Discussing the findings/ Forming a rule	Students write in journals about what took up space and what didn't. As a class, we discuss the patterns we have found and construct a rule for matter.	Explore ideas about patterns: Look for patterns in what took up space in the cup of water and what did not. Discuss patterns and form a rule.
17	Investigating shapes of matter	Students will be given a balloon, containers, water, and various solids. They will be asked to put solids, liquids and gases into the balloon and containers and focus on what takes the shape of the container.	Establish a new question and explore phenomena for patterns: Explore ideas about what takes the shape of its container and what does not.
18	Discussing the findings/ Forming a rule	Students record in journals which items took the shape of its container and which did not. As a class, we discuss the patterns we have found and construct a rule about solids, liquids and gases.	Explore ideas about patterns: Look for patterns in what took the shape of its container and what did not. Discuss patterns and form a rule.
19	Explain ideas about solid, liquid and	Students draw and share their ideas of what a solid, liquid and gas could look like at a really close up level if they could zoom in based on the patterns they just found in their explorations as well as their imagination.	Students explain patterns.

	gas molecules		
20	Investigating the particles of matter	Students will be given three cups with beans in each. One will be fully packed, one will be ½ full, and the other will only have a few beans. Teacher will explain that these are the particles, or smallest unit of matter, in a solid, liquid and gas. Students discuss in small groups which beans represent a solid, liquid and gas. As a class, discuss how particles in a solid, liquid and gas move and why.	Introducing scientific ideas.
21	Acting out particles in solid, liquid and gas.	Students will separate into 3 groups and assigned to act out particles in a solid, liquid or gas. Students will be the particles in the state of matter based off of their observations from the previous activities and act out in front of class.	Students explore scientific explanation. Students show their ideas about what is going on at a molecular level to solids, liquids and gases, developing conclusions from explorations.
22	Testing the patterns	Students are given the same materials they were given on the first day. They return to their first draft charts and explain how those materials are solids, liquids and gasses from the particles model.	Introduce scientific ideas: Create a complete chart of the properties of a solid, liquid and gas.
23	Assessing students' learning	Students will play a matching game on the promethean board to match properties of states of matter with the correct states.	Apply to near contexts: Use the ideas of properties of solids, liquids and gases to play a matching game and assess student knowledge. Explain why their answers are correct or incorrect (how could they tell that it's a solid, liquid or gas).
24	Introduce	Teacher will explain scenario of eating a popsicle	Introduce a question. Students will

	changing states of matter	on a hot summer day and ask students to imagine what happens if you eat it slowly.	be introduced to the idea of changing states of matter.
25	Forming a hypothesis	Students will construct a first draft explanation of how they think a popsicle will react once set on the tray in front of them.	Introduce the experience. Students will be introduced to the central object within the question of the unit in order to create ideas.
26	Sharing Ideas	Students share their explanations. The teacher will list the different ideas.	Elicit Ideas: Share ideas and show that each student has different ideas about popsicles.
27	Exploring a popsicle and investigating	Students will be given a popsicle. They will make observations on what they see and feel from the initial look, and every five minutes afterward for ten minutes. Another popsicle will be placed inside a cup. Before the end of the day, the students will find it melted completely. A line will drawn on the cup where the liquid begins. Over the course of a few days, a new line will be drawn on the cup.	Establish a Question and Explore Phenomena for Patterns: “Why does my popsicle melt while I am eating it…”
28	Sharing Ideas	Students share their observations, and compare them to the initial list of ideas.	Elicit Ideas: Share ideas, and show that each student has different ideas.
29	Forming a hypothesis	Students will construct first draft explanations of how they think the popsicle will react once put back into the freezer.	Elicit Ideas: Share ideas and show that each student has different ideas.
30	Investigati	A candle will be lit. Students will carefully	Explore phenomena for patterns:

	ng	observe what is occurring as time goes by for five minutes.	Explore phenomena through observing a candle after it is lit.
31	Investigating	Students will make Jell-O and distinguish between the solids, liquids and gases during the experiment and how they change from one state to another.	Explore phenomena for patterns: Explore phenomena through distinguishing between different substances and temperatures when making Jell-O.
32	Forming a rule	Students will refer back to the popsicle activity to relate to the candle activity to form a rule about the similar results.	Explore ideas about patterns: Students will look for patterns in what occurs after heat is added to matter.
33	Explaining the rule	Students will share their rules. Once each rule is compared and contrasted, the teacher will have students discuss with each other to form one main rule. Students will write in their journals. Students will use their newfound knowledge of the molecules within solids and liquids to form explanations.	Students explain patterns: Conclusions will be developed from evidence of the melting patterns of the solids.
34	Investigating cooling of liquids	Students will check the melted popsicle that was placed in the freezer. Students will make observations. Students will also observe a candle that has been blown out after lit for five minutes to see what occurs.	Explore phenomena for patterns: Students will explore the new form of matter as the melted popsicle has changed back into a solid popsicle. Students will explore the liquid from a candle turning back into a solid.

35	Forming a rule	Students will refer to the new solid popsicle and candle. Students will compare the results to form a rule.	Explore ideas about patterns: Students will look for patterns in what occurs after heat is taken away from matter.
36	Explaining the rule	Students will write in journals. Students will use what they know about molecules within liquids and solids to explain how the states of matter change.	Students explain patterns. Conclusions will be developed from evidence of the cooling patterns of the liquids.
37	Investigating through simulation	Students will participate in a simulation on the Promethean board. It will be a review of what occurs when heat is added to a solid block of ice. Once the ice has started to become a liquid, heat will further be added. Students will see how molecules actually move through the simulation as more and more heat is added. They will see a new state change as the liquid water is changing into a gas as the molecules move faster to move away from the liquid, and into the air.	Explore phenomena for patterns: Students will observe the state changes from a solid to a liquid, and from a liquid to a gas when heat is added.
38	Sharing ideas and Forming a rule	Students will discuss what occurred as the liquid water changed into a gas. Once a list is created, students will form a rule.	Elicit ideas and explore ideas about patterns: Students will see different ideas and form a rule about how liquids change into gases when heat is added.
39	Explaining the rule	Students will write in journals. Students will explain how molecules reacted when heat was added to the liquid.	Students explaining patterns: Conclusions will be developed from the evidence of liquids changing

			into gases.
40	Exploring the melted popsicle	Students will retrieve the liquid popsicle in the cup to see where the new line should be drawn as it has been a few days. Students will make observations in journal.	Students exploring phenomena for patterns: Students will notice what has occurred to the liquid over time.
41	Sharing ideas	Students will share ideas about what has occurred to the melted popsicle.	Elicit ideas: Students will share ideas, and will notice different ideas.
42	Revising explanations of what occurs with the popsicle over time	Students apply the concepts of states of matter changing from a solid to a liquid, and a liquid to a gas. Students will use what they learned from observing the popsicle. In their journals, they will put it together to show the process from a solid to a liquid, and to a gas as heat was added to the popsicle. In the journals, students will also respond to, "What happens when you put a Hershey chocolate bar inside a microwave, and then put it all over snow?"	Students summarize knowledge of changing states of matter and Apply to near contexts: Students will use a new scenario.
43	Constructing a variety of stories	In partners, or small groups, students will construct their own scenario about changing states of matter. The scenario will involve patterns that were created. Students must use knowledge of molecules. A class book will be created to show various scenarios made by each group.	Apply with fading support: Students will use ideas and patterns formed to create scenarios of their own. Students will demonstrate knowledge of molecules, and will show what occurs when heat is added and/or taken away from matter.

Daily Lesson Plan #1

Teacher: Jenna Lepkowski ***Date submitted:*** April 3, 2014

Overall lesson topic/title: Matter Takes Up Space

Process and content GLCEs or NGSS for this lesson:
P.PM.04.23 Compare and contrast the states (solids, liquids, gases) of matter.
S.IA.04.13 Communicate and present findings of observations and investigations.
S.RS.04.11 Demonstrate scientific concepts through various illustrations, performances, models, exhibits, and activities.
S.IP.04.14 Manipulate simple tools that aid observation and data collection (for example: hand lens, balance, ruler, meter stick, measuring cup, thermometer, spring scale, stop watch/timer, graduated cylinder/beaker).

Rationale: *Why is it important for students to learn and do what is required in this lesson? How is it important to students? What is the real life context of this lesson for students?*
Matter is important because it makes up everything around you. When it comes to making/building things, you need to know how much space things will take up and that gas does take up space and what materials will be best to use for certain projects. When it comes to cooking and baking, it is important to understand the ingredients and what effect the ingredients will have on the end product so you know how to correctly handle them.

Materials & supplies needed:
- 23 States of Matter Properties charts
- 23 Science Experiment Hand Out
- 6 Blocks

- Water
- 6 clear measuring cups
- 6 flashlights
- Colored water
- Ice cubes
- Rocks
- Clear cups with tissue

Procedures and approximate time allocated for each event	***How is this lesson differentiated based on information gained from the pre-assessment/science talk?***
• ***Introduction to the lesson*** *(What will I say to help children understand the purpose of the lesson? How will I help them make connections to prior lessons or experiences? How will I motivate them to become engaged in the lesson?) (5 minutes)* Let's remind ourselves: What do we already know about matter? (It has mass). What are some things that have mass? What do we use matter for? (Everything!) Right. Matter is all around us and apart of our everyday lives. We must understand matter to build, cook get ready in the morning, etc. Why would we need to know about matter when we do these activities? Today, we are going to investigate matter and find out more about it. YOU will be the scientists and work together to find out more properties of matter. What are some things that scientists do to come up with their theories? (Predict, come up with experiment, record data, talk with peers, come up with conclusions). Yes! And you will be doing all of these things today. I am counting on you to be the scientists and come up with a property of matter. • ***OUTLINE of activities during the lesson*** *(Include details about how I will begin and end each activity; what discussion questions I will use; How will key ideas be expressed? What kinds of specific activities or tasks will I engage them in? How ALL students will be engaged all of the time? How I will help children understand behavior expectations during the lesson; when/how I will distribute supplies and materials) Identify each activity and the estimated time for each.* **Explain Experiment/Make Predictions (12 minutes)**	This lesson will be differentiated by having groups mixed based on how they did on the pre-assessment and what information they gave during the science talk. I could tell during the science talk and from the pre-assessment that there were some students already knew about matter and others who knew very little. Therefore, this will be a good time for the expert students to share help the other students. This will not only help the students who did not know much about matter but also the expert students. It will challenge them to really see how well they know the information based on if they can teach it to someone else. If they cannot answer another students' question, this will challenge them to work together and think about the concept. Also, working with students of different levels helps students understand how others think. Some students may think about the same thing in a totally different way but may

(Hand out the science observation sheet). Today, you will be working in small groups, which I will choose. Each group will be given a measuring cup with water. The first thing you will do is record the volume of the water in the measuring cup. You will also be given this bag of objects. What do you notice about all of these objects? (They are all solids). You will be putting these solids in the cup of water and observing what happens. When you do this, you are not playing with the water or with the different solids. Make sure you are recording your observations on the handout. Before we do that, I would like you to make an observation of what might happen. Think about the level of the water. (Give time to make prediction). Once you record your observations, you will return the bag of solids and get a cup of colored water. What state of matter is water? (Liquid). You will be pouring the liquid into the measuring cup of water and observing what you see then record your observations. Right now, I would like you to make a prediction of what might happen when you pour the colored water into the measuring cup of water. Remember to think about the level of the water. Once you record your observations, you will then be given a cup with a tissue in the bottom of the cup. Do not remove the tissue. You will put the cup exactly upside down in the measuring cup of water. Push it down until it is all the way under water. Without tipping the cup, take the cup out of the water and write down your observations. Right now, I would like you to make a prediction of what might happen to the tissue once you take the cup out of the water. When you are done recording your observations, you will return the cup with tissue, and get a flashlight. You will turn the flashlight on but not shine it in anyone's face. You will shine it in the measuring cup of water and observe what happens. You will record your observations and then return all of your materials. As a group, you will think about what you saw in each part of the experiment and what conclusion you can come up with about matter. Remember that these materials are not to play with but to experiment with. I hope that I can see scientists in the classroom today. Are there questions as to what you will be doing? (Show students the groups and explain roles of each student.) **<u>Group Work Time (20 minutes)</u>** Give students time to work in groups. While students are working, I will go around to help groups that are having trouble or further students' thinking. Some questions that I will ask students are: - What did you notice when you put the solid, liquid, upside down cup with	help other students understand better. Based off of the science talk, I realized that a lot of students thought of matter as something that you can touch. Therefore, I thought that it was important to spend a day just on one of the properties of matter. This way, they not only knew the properties, but they also were able to come up with the properties on their own to really understand it rather than just memorize it.

tissue and the light in the water? - Did you notice anything about the water level? - Why do you think this happened? - What can we say about light? - What can this tell us about matter? - When putting the cup with tissue in the water, what else is present? - Why do you think that the tissue did not get wet? • ***Closure for the lesson*** *(How will I bring closure to the lesson and help children reflect on their experiences? How will I help them make connections to prior lessons and experiences or prepare for future experiences? How will I include metacognition [How do you know that? questions]in the closure task? What kind of feedback do I want from them at this time?) (13 minutes)* Once students have come up with conclusions with their group, we will have a class discussion to bring closure to the lesson and help the students reflect on their experiences. Some questions that I will ask are: - What did you notice when you put the solids and liquid in the water? - Did you notice anything about the water level? - Why do you think this happened? - Why do you think that the tissue did not get wet? - When putting the cup with tissue in the water, what else is present? - What can you say about solids and space? Liquids? Gases? - What happened when you shined the light in the water? - What can we say about light? - What can this tell us about matter? - Now we know a couple of different properties of matter. Can we modify our definition of matter to fit with our newly found information? They will then right their newly formed definition of matter in their journals that includes both mass and space.	
Formative assessment *(How will I gauge the students' learning as I implement the lesson plan and once the lesson is completed? Specifically, what will I look for that will accurately tell me the students learned what I intended? How will I use what I am learning to inform my next lesson?)* During group work, I will visit the different groups, observe, and ask questions so that I can gauge how students are thinking about the science process as well as the concepts. Just by observing, I will be able to tell which students are participating and thinking like scientists. By asking questions, I will be able to tell how students are	***Differentiation during assessment*** I looked at a lot of different aspects that were apart of the lesson to assess student learning. Some of my students would prefer to talk about what they learned while others would rather write it down. For example, my autistic student refuses

thinking during the experiment and if they are on the right track to the objective of the lesson. Also, it will help me see if they are making sense of the concepts rather than just waiting for someone to tell them the answer. I will also look at their Science Experiment Observation sheets. Since there is only one of me and 23 of them, this will help understand what the students did throughout the experiment, how they thought about the experiment, and what conclusions they came up with in their groups. I will be able to see which students went through the science process and how they came to their conclusions. From this information, I will decide if I need to spend extra time on this concept with the entire class if they did not understand it or if we can move on with the next lesson. Also, if there were only a few students who I notice have not fully grasped the concept, I will pull these students aside during work time to give them extra support to understand it.	to write a lot of time. He is so intelligent and understands concepts, but it is hard for him to show it on paper. Therefore, it is important to assess students in different ways. By observing students and having conversations about the experiment, I can see how they are thinking and if they understand the concepts. This will be beneficial for students who have a strength of speaking rather than writing. By analyzing their recording sheets, I can also see how they are thinking and if they understand the concepts, but this way will be more beneficial for students who may be shy but have a strength in writing.

Daily Lesson Plan #2

Teacher: Jenna Lepkowski ***Date submitted:*** April 3, 2014

Overall lesson topic/title: Molecules of Solids, Liquids and Gases

Process and content GLCEs or NGSS for this lesson:
P.PM.04.23 Compare and contrast the states (solids, liquids, gases) of matter.
S.IA.04.13 Communicate and present findings of observations and investigations.
S.RS.04.11 Demonstrate scientific concepts through various illustrations, performances, models, exhibits, and activities.

Rationale: *Why is it important for students to learn and do what is required in this lesson? How is it important to students? What is the real life context of this lesson for students?*

Matter is important because it makes up everything around you. Knowing how the molecules are positioned and how they move will help explain why solids, liquids and gases act the way they do. It also helps explain that gas is not nothing and is made of something. When they are breathing in air, they are breathing in molecules required to live.

Materials & supplies needed:

- Beans
- Condiment cups
- Student journals
- Internet simulation
- PowerPoint

Procedures and approximate time allocated for each event

- ***Introduction to the lesson*** *(What will I say to help children understand the purpose of the lesson? How will I help them make connections to prior lessons or experiences? How will I motivate them to become engaged in the lesson?) (5 minutes)*

What do we know about matter so far? (Matter has mass and takes up space?) How did we know that gas took up space? (The tissue did not get wet in the water because gas was protecting it.) Does gas have anything in it? How was it protecting the tissue if it is nothing? Today we will be talking about molecules. Has anyone heard of or know what molecules are? Molecules are a tricky subject because you actually cannot see them, so we need to be very clever scientists today to understand something that we can't even see!

- ***OUTLINE of activities during the lesson*** *(Include details about how I will begin and end each activity; what discussion questions I will use; How will key ideas be expressed? What kinds of specific activities or tasks will I engage them in? How ALL students will be engaged all of the time? How I will help children understand behavior expectations during the lesson; when/how I will distribute supplies and materials) Identify each activity and the estimated time for each.*

How is this lesson differentiated based on information gained from the pre-assessment/science talk?

This unit is differentiated based on information gained from the pre-assessment/science talk by starting from the very beginning of the topic with basic terms. Since almost all students were not familiar with what molecules are or how they act, I started off with brainstorming and explaining what molecules are before I got into talking about solids, liquids and gases. Also, to help students since they had no prior experience with molecules, I introduced the material in a variety of ways, including showing pictures on a powerpoint, making models, doing an internet simulation and acting it out to reach a variety of learners.

Explaining Experiment Molecules are tiny particles of matter that make up solids, liquids and gases. There are tons of molecules in one ball or one cup of water or in an air-filled balloon, but there are different amounts and move differently in each state, and this is what we are going to explore today. First, I would like you to close your eyes and imagine what molecules would act like in each state (solid, liquid and gas) and draw it in your journals. Think about how solids act, liquids act and gases act when you can see them and relate that to how you think the molecules would act. For our first activity, we are going to make models of molecules in solids, liquids and gases. You will make these models in groups, which I will choose. When you get in groups, the supplies manager will come get 3 cups and a bag of beans. In one cup, you will fill it all the way and put the cap on it and label it 'solid'. Imagine that the beans are molecules in a solid (like a ball). Shake it and observe how the molecules move and how they are positioned. Record your observations in your journal. In the second cup, you will fill the cup about half way up with beans, put the cap on it and label it 'liquid'. Imagine that these beans are molecules of a cup of water. Shake it and observe how the molecules move and how they are positioned. Record your observations in your journal. In the third cup, you will only put about 5 beans in the cup, put the cap on it and label it 'Solid'. Imagine that these beans are molecules of air. Yes! Air has something in it! Shake it and observe how the molecules move and how they are positioned. Record your observations in your journal. Remember that these beans are not to play with and are only using them in the cups. Are there any questions? **Whole Group Discussion** When you shook the cup with the beans in the 'solid' container, what did you notice? Why do you think they were like that? When you shook the cup with the beans in the 'liquid' container, what did you notice? Why do you think they were like that? When you shook the cup with the beans in the 'gas' container, what did you notice? Why do you think they were like that?	

Now, we will see an internet simulation where we can see the molecules in each state of matter. What do you notice as I add heat to the molecules? Take away heat? Now, you will be put into one of three groups: solid, liquid or gas. When you are in your group, you will have to work together to come up with a way to act out the molecules in whichever state you are in. Each person in the group will represent one molecule. You will be given a few minutes to plan and then present it to the class. Are there questions? [Assign groups, planning and presenting time] • ***Closure for the lesson*** *(How will I bring closure to the lesson and help children reflect on their experiences? How will I help them make connections to prior lessons and experiences or prepare for future experiences? How will I include metacognition [How do you know that? questions]in the closure task? What kind of feedback do I want from them at this time?) (5 minutes)* When acting out the molecules, what did you notice about the solid group? Liquid? Gas? How did you know that it was the solid, liquid or gas group? Is there anything you would change for any of the groups? Next time, we will be thinking about changing states of matter. I will leave you with the question: what happens to the molecules in a liquid when the liquid turns into a gas?	
Formative assessment *(How will I gauge the students' learning as I implement the lesson plan and once the lesson is completed? Specifically, what will I look for that will accurately tell me the students learned what I intended? How will I use what I am learning to inform my next lesson?)* Based on the whole-group discussion, writing in their journals and acting out the molecules, I will be able to tell how well students are understanding molecules and how they act in each state. If students write in their journals that molecules act the same in all states, I will know that they need further instruction on the topic. Also, if they do not act out the molecules correctly, I will also know that they need more help. If they accurately describe, discuss and act out the molecules, I will know that I am able to move on to the next lesson. If most students are not understanding molecules, I will spend review time during the next lesson to do more activities that involve molecules.	***Differentiation during assessment*** For the assessment of the lesson, I used a variety of activities so that I could see the full potential of every student. For those that are better at speaking their ideas than writing, I used the whole-group discussion to assess student learning. For those that are better at writing, I used their journal writing to assess their learning. And for those that like to move around, I used the acting out the molecules to assess learning.