

Three States of Matter

Grade: 2		Subject: Science	
Materials: Tarp, 4 empty plastic water bottles, water, a balloon, alka-seltzer tablets, a marble, anchor chart		Technology Needed: N/A	
Instructional Strategies: ≤ Direct instruction ≤ Peer teaching/collaboration/cooperative learning ≤ Guided practice ≤ Visuals/Graphic organizers ≤ Socratic Seminar ≤ PBL ≤ Learning Centers ≤ Discussion/Debate ≤ Lecture ≤ Modeling ≤ Technology integration ≤ Other (list)		Guided Practices and Concrete Application: ≤ Large group activity ≤ Hands-on ≤ Independent activity ≤ Technology integration ≤ Pairing/collaboration ≤ Imitation/Repeat/Mimic ≤ Simulations/Scenarios ≤ Other (list) Explain:	
Standard(s) 2-PS1-1 Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties.		Differentiation Below Proficiency: For students below proficiency, I will carefully watch to see if they understand the content as I am teaching. Above Proficiency: Students above proficiency will be able to help with different parts of the lesson to increase their engagement in the lesson. Approaching/Emerging Proficiency: Students approaching proficiency will be able to partake in the lesson and have equal chances of being called on. Modalities/Learning Preferences: Kinesthetic- Game that involves students being each state of matter. Visual- Anchor chart of the states of matter.	
Objective(s) By the end of this lesson, students will be able to name and identify the 3 states of matter: liquid, solid, and gas through observing each state and completing an activity. Bloom's Taxonomy Cognitive Level: Remember, Understand		Classroom Management- (grouping(s), movement/transitions, etc.) ● Students will be expected to transition calmly.	
Classroom Management- (grouping(s), movement/transitions, etc.) ● Students will be expected to transition calmly.		Behavior Expectations- (systems, strategies, procedures specific to the lesson, rules and expectations, etc.) ● Do not crush water bottle as you are passing it around the circle. ● During the game, students will be expected to stay within the boundaries.	
Minutes	Procedures		
45	Set-up/Prep: 1) Create anchor chart for the states of matter (30 mins). 2) I will have 3 plastic water bottles. The first one will be half-way filled with water. The second will simply contain air. The third will have one marble with no water. 3) I will have a tarp set up under a table to keep any potential spill contained. On the table, I will have a water-bottle that is half full, alka-seltzer tablets, and a balloon.		
3	Engage: (opening activity/ anticipatory Set – access prior learning / stimulate interest /generate questions, etc.) 1) After Paige finishes her activity, I will ask the students to have a seat in the learning area. If students are not yet finished with their distance learning they will be excused from coming to the learning area. Otherwise, students will be expected to come to the front. Once the students are gathered, I will begin. 3) I will take my 3 plastic water bottles with different contents and show the students. a) “As you all can see, I have 3 water bottles. Each water bottle has something different inside of it. I would like each of you to carefully observe (or look at) each one. What happens when you tilt the water bottles? What happens when you gently shake the water bottles? These are the kinds of questions I would like you to ask yourselves as they are passed to you. Please be gentle as you are observing. Does anyone have any questions?” *I will answer any questions that might arise and then I will pass out the water bottles.* 3) Once the water bottles have made it to each student I will ask my fellow teachers to collect them. “Alright! Can anyone raise their hand and tell me what they noticed about the water bottles? a) E.g. of what they might have noticed: the water bottle was only half-full of water, as the water moved in the bottle it changed shape, the marble did not change shape when it was in the water bottle, etc. b) A mistake they might make is thinking that the water bottle with nothing extra is empty. If this is indeed brought up, I will explain that it is not empty. In fact, it is full. Full of air. We cannot see it but it is there.		
15	Explain: (concepts, procedures, vocabulary, etc.) 1) “Thank you so much for your observations! In each water bottle we had different materials. Did you notice how the marble did not change shape inside of the water bottle? It does not matter how I hold it (up, down, sideways, etc.) the		

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marble does not change. It moves around but it does not look any different. What about the water bottle with water inside of it? Did the water change shape?" *Students should answer yes.* "That's right. If I hold the water bottle straight upwards, the water fills the bottom of the water bottle. And when I tilt the water bottle, the water changes its shape to match the water bottle. The last water bottle looked pretty empty compared to the other two, didn't it? Well, funny enough, that water bottle is actually full. It is full of air. Air is hard to see, but it is definitely there.

2) "Each of these materials is made up by something called matter. Matter is what everything is made of! It is anything that takes up space. From the air that we breathe to the games that we play to the chocolate milk that we drink. There are 3 different kinds of matter: solids, liquids, and gases. We just saw an example of each one of those in the water bottles.

3) "The first one we saw was the solid. What do we know about solids from the marble inside of the water bottle?"

- A) Solids do not change shape.
- B) Feel hard.

(Referencing my anchor chart:) "Do you see how under the big word "Solid" there is a circle with a bunch of teeny tiny circles stuck together in it? It almost seems like they are stuck together like glue, doesn't it? There is no space in-between the circles. No room for them to move around. This shows that solids do not change their shape. The marble rolled all around inside of that water bottle, but it did not change its shape. By raise of hand, can anyone tell me what another example of a solid would be?"

- Allow time for student(s) to answer.
- Examples might include: a block, a car, a chair, etc.

"Next, we have liquids. The liquid in the water bottle was...you guessed it! Water. Liquids can be poured and they can fill a container. They change shape. Just like the water in the water bottle. (Referencing my anchor chart:) Do you see the little circles representing the liquid state? They are close together, but they are not touching like the solids did. This shows us that they can change their shape to match the container they are in. If I have a pitcher of lemonade and I pour some lemonade into a glass will the lemonade change shape to fit in the glass? Absolutely. Does anyone have any other ideas for what a liquid might be?"

- Allow student(s) time to answer.
- Examples might include: Apple juice, soda, chocolate milk

"Finally, we have gas. Gas is hard to see but it can fill up a container. The third water bottle was filled with air which is a gas. Another example of a gas is a balloon. The balloon is filled with gas, but, similar to air, we cannot see it. (Referencing the anchor chart:) In this circle, the little circles are very spread out. They have lots of room to move around.

"I would like you all to be the states of matter today. The first state you will be is a solid. Normally solids are so close together that they are touching, but for today you are not going to touch each other. You will just be as close as you can without touching. Does anyone have any questions? If not, I would like everyone to stand up and form a solid." *Once students form solid matter I will check to see if the students understand the concept.*

"Wonderful! You all must be the most beautiful solid I have ever seen. You can spread out a little bit and become the state of liquid. Remember, liquid stays pretty close together, but you can move around a little bit." *Students will form the state of liquid.*

"Thank you my friends! I appreciate how great you are at being the state of liquid. Finally, you can become the state of gas. Please stay within this main area, but feel free to move around as you like inside of it."

I will ask my fellow teachers to monitor the molecules of gas and I will head to the table where we will conduct an experiment.

- 5 Explore: (independent, concrete practice/application with relevant learning task -connections from content to real-life experiences, reflective questions- probing or clarifying questions)
- 1) Once the students finish their states of matter game, they will come around the table.
 - 2) "We are going to do a little experiment to help us better understand the states of matter. I would like everyone to gather around." *Allow time for everyone to gather around and ensure that everyone can see.* "I have a water bottle that is filled half-way with water. I also have a little tablet.. Who can tell me what my solids are?" *Allow time for an answer.* "Who can tell me what my liquid is?"
 - a) Solids: Water bottle, tablet
 - b) Liquid: Water
 - 2) "Great. So my solids are a water bottle and a tablet and my liquid is water. I am going to drop the tablet inside of the water and we are going to see what happens."
 - a) Bubbles should pop up at the surface of the water.
 - 3) "Does everyone see the bubbles on top of the water? The bubbles are a gas. We combined a solid and a liquid and created a gas. Now that was pretty cool, but I think we can do better. We are going to add more tablets to the water and we are going to cover the top of the water bottle with a balloon."
 - a) I will add 2 tablets to the water and quickly cover the top with a balloon. The trapped gas from the carbon dioxide bubbles will cause the balloon to inflate.
 - 5) "Should we add even more tablets to the water and see what happens?"
 - a) This only slightly blows up the balloon. Adding more tablets will blow up the balloon even more.










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	6) We will add 2 more tablets and the balloon will expand more.	
1	<p>Review (wrap up and transition to next activity):</p> <p>1) Still around the table, I will tell the students: "The states of matter are part of our every day lives. Without the solid of food, we cannot eat. Without the liquid of water, we cannot stay properly hydrated. Without the gas of air, we cannot breathe.</p> <p>2) "That is all today for the states of matter. We have a little time before we go to snack. If you have not finished your distance learning work, please go work on it. Otherwise, you can find a game to play."</p>	
<p>Formative Assessment: (linked to objectives)</p> <p>Progress monitoring throughout lesson- clarifying questions, check-in strategies, etc.</p> <p>I will ask questions regarding the states of matter throughout. Based on student age level, I will expect different answers. E.g. Kindergartners will be expected to know that there are three states of matter and can list 1 vs. 5th graders will be expected to know that there are three states of matter and can list examples of each state of matter.</p> <p>Consideration for Back-up Plan:</p>	<p>Summative Assessment (linked back to objectives)</p> <p>End of lesson:</p> <p>If applicable- overall unit, chapter, concept, etc.:</p>	
<p>Reflection (What went well? What did the students learn? How do you know? What changes would you make?):</p> <p>What went well during this lesson was the engagement of the students. They asked questions, they answered my questions, they wanted to share their thoughts, they had good comments, and they were attentive to what I was saying. At one point, I had to tell the students that we had to move on to the next state of matter because we had spent a lot more time on one than I had anticipated. Another thing that went well was the experiment that we did at the end. While it did not directly benefit the lesson, it was something to show the students that the states of matter can be fun. I believe that for an introductory lesson the students left with a basic understanding of the 3 states of matter. I know this because of the activity we did where the students were the states of matter. I also know this because I asked them for examples at the end, and they were able to answer the questions I asked. Everyone seemed to enjoy it and I am proud of how well it went.</p> <p>If I were to teach this lesson to students of such a variety of ages again, I would try to differentiate more than I did. I believe that while I did my best, I could have done better. I tried to simplify the material enough where the younger students were able to understand and the older students were engaged. While I succeeded in keeping the older students engaged, looking back, I think I was more focused on engagement for the older students rather than actual learning. I could have had the older students help more or had more in-depth content for the older students. I had considered explaining the experiment to the students, but I thought that gravitated away from the 3 states of matter and into a whole different concept. I also could have involved my fellow teachers more. I do not feel like I utilized their presence as much as I could have.</p> <p>Overall, I felt confident, comfortable, and prepared. I spent time prepping and I think it paid off. I was nervous that the time would go by too fast but the time was right on track. Next time I will focus less on engagement and more on learning.</p>		

Appendix A:

Three States of Matter

States of Matter

Solid	Liquid	Gas			
					
<ul style="list-style-type: none">• feels hard• doesn't change	<ul style="list-style-type: none">• can pour• fills container	<ul style="list-style-type: none">• hard to see• fills container			
 wooden block	 car	 milk	 water	 balloon	 cake