

Properties of Matter

Lesson 3b: Moving Molecules in Matter

Grade 2	Length of lesson: 47 minutes	Placement of lesson in unit: 3b of 5 two-part lessons on properties of matter, with two additional extension lessons
Unit central questions: What is matter made of? How can matter change?		Lesson focus question: How do water molecules move in a solid and a liquid?
Main learning goal: The atoms or molecules that make up a particular kind of matter are the same whether the matter is in a solid form, such as ice, or a liquid form, such as liquid water. But the arrangement and motion of the atoms and molecules change when heat is added or taken away.		
Science content storyline: The atoms or molecules that make up matter move in different ways in solid and liquid forms. In a solid state, atoms and molecules vibrate in a rigid structure. When heat is added to a solid, its atoms or molecules begin to move faster. When they move fast enough, they break away from their rigid structure and move around more freely as a liquid. When heat is taken away from a substance and the matter cools, the atoms or molecules slow down and move closer together. When they slow down enough, they form a rigid structure and vibrate in place as a solid.		
Ideal student response to the focus question: In solid matter, the molecules are in a rigid structure and don't move around very much. They vibrate in place instead. In liquid matter, the molecules move around more and slide past each other. The small pieces or molecules of matter don't change, but the way they're arranged and how they move changes when heat is added or taken away.		

Preparation

<p>Materials Needed</p> <ul style="list-style-type: none"> • Science notebooks • Chart paper and markers • For each group of 4 students: <ul style="list-style-type: none"> • 10 preassembled Lego-brick water molecules (10 red, 2 × 4"; 20 white, 2 × 2") in a small, sealable plastic sandwich bag (from lesson 3a) • Cardboard box (about 3 1/2" × 4 1/2") • Water and ice cubes in plastic cups (from lesson 3a) <p>Student Handouts</p> <ul style="list-style-type: none"> • 3.1 Lego Model (from lesson 3a) • 3.2 Solid and Liquid (1 per student) 	<p>Ahead of Time</p> <ul style="list-style-type: none"> • Review the content background document. • Place ice cubes and water in the cups just before the lesson begins. • As needed, review the new science ideas and words that were in the previous lesson, including <i>hydrogen</i>, <i>oxygen</i>, <i>atoms</i>, and <i>molecules</i>. • Gather the student drawings you selected at the end of lesson 3a and prepare them for display on a document reader. The drawings should show different ideas of what ice and water are made of and how water molecules are arranged. At least two of the drawings should clearly show that both water and ice are made up of water molecules. • ELL support: Introduce ELL students to the lesson content, structure, materials, and activities in advance so they understand what's expected of them and can participate more fully in the lesson. Review vocabulary words from the previous lesson, including <i>hydrogen</i>, <i>oxygen</i>, <i>atom</i>, <i>molecule</i>, <i>model</i>, <i>microscope</i>, and the abbreviation H₂O. Identify words in the lesson plan to introduce ahead of time, such as <i>vibrate</i>, <i>vibrate in place</i>, <i>rigid</i>, and <i>move freely</i>. Consider having students write these words and their meanings in their science notebooks or add them to a key-word or picture dictionary. Also post them on a word wall for students to refer to as needed.
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Lesson 3b General Outline

Time	Phase of Lesson	How the Science Content Storyline Develops
8 min	Link to previous lesson: The teacher displays sample drawings from the previous lesson that show what students think liquid water and solid water (ice) are made of. Then students share their ideas and explanations.	<ul style="list-style-type: none"> All matter is made up of very small pieces. Atoms are the smallest pieces of matter. When atoms combine, they form molecules, which are also very small pieces of matter. Each kind of matter, such as water, is made up of a particular arrangement of atoms or molecules. The atoms or molecules that make up a particular kind of matter are the same in both solid and liquid forms.
1 min	Lesson focus question: The teacher introduces the focus question, <i>How do water molecules move in a solid and a liquid?</i>	
10 min	Setup for activity: Students describe the characteristics of a solid and a liquid and then write definitions for these terms on their graphic organizers. Then they relate the definitions to solid water (ice) and liquid water.	<ul style="list-style-type: none"> Solid matter is rigid and has a definite shape. Consequently, the shape of a solid doesn't change when it's placed in containers that have different shapes. Liquid matter moves around more freely and doesn't have a definite shape. Consequently, it can take the shape of any container it fills.
15 min	Activity: Using the Lego water molecules they built in the previous lesson, students create models of water molecules in solid and liquid forms. Then they use their models to show that the particles or molecules in both forms are the same even though they're arranged and move differently.	<ul style="list-style-type: none"> The atoms or molecules that make up matter are arranged and move in different ways in solid and liquid forms. In a solid state, atoms or molecules vibrate in place in a rigid structure. In a liquid state, atoms or molecules move around more freely and slide past one another.
7 min	Follow-up to activity: The teacher revisits the questions from the previous lesson comparing the arrangement of water molecules in solid and liquid forms. Then students use their Lego models to demonstrate how they think water molecules move in solid and liquid forms.	<ul style="list-style-type: none"> Each kind of matter, such as water, is made up of a particular arrangement of atoms or molecules. The atoms or molecules that make up water are the same in both the solid (ice) and liquid forms. In a solid state, atoms or molecules vibrate in place in a rigid structure. In a liquid state, atoms or molecules move around more freely and slide past one another.
5 min	Synthesize/summarize today's lesson: Students answer the focus question; then the teacher summarizes key science ideas from the lesson.	<ul style="list-style-type: none"> In solid matter, molecules vibrate in place in a rigid structure. In liquid matter, molecules move around more freely and slide past each other. The small pieces or molecules of matter don't change, but the way they're arranged and how they move changes when heat is added or taken away.
1 min	Link to next lesson: The teacher foreshadows the next lesson in which students consider what causes molecules in solid and liquid forms to move differently and how heat may be involved.	

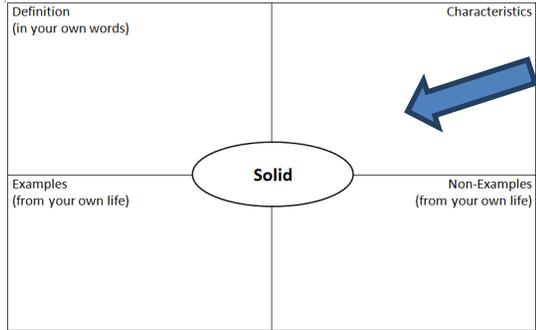
Time	Phase of Lesson and How the Science Content Storyline Develops	STeLLA Strategy	Teacher Talk and Questions	Anticipated Student Responses	Possible Probe/Challenge Questions
8 min	<p>Link to Previous Lesson</p> <p>Synopsis: The teacher displays sample drawings from the previous lesson that show what students think liquid water and solid water (ice) are made of. Then students share their ideas and explanations.</p> <p>Main science idea(s):</p> <ul style="list-style-type: none"> All matter is made up of very small pieces. Atoms are the smallest pieces of matter. When atoms combine, they form molecules, which are also very small pieces of matter. Each kind of matter, such as water, is made up of a particular arrangement of atoms or molecules. The atoms or molecules that make up a particular kind of matter are the same in both solid and liquid forms. 	Highlight key science ideas and focus question throughout.	<p>Show slides 1 and 2.</p> <p>In our last lesson, we explored two focus questions: <i>What is liquid water made of? What is solid water (ice) made of?</i></p> <p>At the end of the lesson, you drew some pictures showing what you think liquid water and solid water, or ice, are made of.</p> <p>I selected a few samples of your drawings to share with the class. As I show you the pictures, compare them with the pictures you drew in your notebooks and think about how they're alike and different.</p> <p>After we look at these sample drawings, we'll share our ideas about what liquid water and solid water, or ice, are made of.</p> <p>NOTE TO TEACHER: <i>Display on a document reader each of the sample drawings you selected from the previous lesson. Show them one at a time and ask students to compare each drawing with their own drawings. Invite students to share the similarities and differences they notice. Also record on chart paper student ideas about what liquid and solid water are made of.</i></p> <p><i>The purpose of this presentation and discussion is to help students think through their ideas about what matter is made of. Some students might not have made the connection that water is water in both its liquid and solid forms, and that</i></p>		

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		<p>Ask questions to probe student ideas and predictions.</p> <p>Ask questions to challenge student thinking.</p> <p>Highlight key science ideas and focus question throughout.</p>	<p><i>all water is made up of water molecules. Let students convince one another that the water molecules they created in the previous lesson are the tiny pieces of matter that make up both liquid water and ice.</i></p> <p><i>Encourage students to express their ideas by asking them probe questions, such as “Can you tell me more about that?” “Do others have anything to add?” or “What do mean when you say ...?”</i></p> <p><i>Also ask questions that challenge student thinking, such as “Can you add the idea of molecules to your explanation?” “Can you explain how that happens?” “Why do you think this is what water is made of?” or “How can you use water molecules in your explanation?”</i></p> <p><i>As needed, review the information about water molecules from the reading in A Drop of Water. Encourage students to demonstrate their ideas using the Lego water molecules they built. You might also set out a cup of water and a cup of ice for students to use as a resource.</i></p> <p>Who can tell me what liquid water is made up of?</p>	<p>Liquid water is made up of pieces of water.</p> <p>Small pieces.</p>	<p>Tell me what you mean by “pieces of water.”</p> <p>What might a</p>

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			<p>So liquid water is made up of tiny pieces or molecules of water. What is solid water made up of? Do you think it's made up of the same tiny molecules as liquid water or different molecules? What makes you think so?</p>	<p>Atoms and molecules.</p> <p><i>[A student holds up the Lego bricks that represent a water molecule.]</i></p> <p>It's part of liquid water.</p> <p>I think the molecule is in ice, too.</p> <p>I think solid water is made up of tiny molecules of water just like liquid water.</p>	<p>scientist call these small pieces? What are our science words?</p> <p>Who can show us a water molecule using our Lego model?</p> <p>Is this molecule of water part of liquid water or solid water?</p> <p>Does anyone agree? Disagree?</p> <p>What makes you think that solid water and liquid</p>

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			<p>I like the way you're thinking about water molecules and how well you're sharing your ideas!</p>	<p>Well, they're both water; they're just in different forms.</p>	<p>water are made up of the same molecules?</p> <p>Does anyone agree? Disagree?</p>
1 min	<p>Lesson Focus Question</p> <p>Synopsis: The teacher introduces the focus question, <i>How do water molecules move in a solid and a liquid?</i></p>	<p>Set the purpose with a <u>focus question</u> or goal statement.</p>	<p>Show slide 3.</p> <p>Let's revisit our unit central questions, <i>What is matter made of? How can matter change?</i></p> <p>We already have some ideas for answering these questions, don't we?</p> <p>Today we'll think more about why liquid water and solid water, or ice, don't look or act the same, even though they're both water and are made up of water molecules.</p> <p>Show slide 4.</p> <p>The question we'll focus on in this lesson is <i>How do water molecules move in a solid and a liquid?</i></p> <p>Write this question on a clean page in your science notebooks and draw a box around it.</p> <p>NOTE TO TEACHER: <i>Write the focus question on the board for students to refer to</i></p>		

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			<i>throughout the lesson.</i>		
10 min	<p>Setup for Activity</p> <p>Synopsis: Students describe the characteristics of a solid and a liquid and then write definitions for these terms on their graphic organizers. Then they relate the definitions to solid water (ice) and liquid water.</p> <p>Main science idea(s):</p> <ul style="list-style-type: none"> • Solid matter is rigid and has a definite shape. Consequently, the shape of a solid doesn't change when it's placed in containers that have different shapes. Liquid matter moves around more freely and doesn't have a definite shape. Consequently, it can take the shape of any container it fills. 	<p>Make explicit links between science ideas and activities before the activity.</p> <p>Select content representations and models matched to the learning goal and engage students in their use.</p> <p>Ask questions to elicit student ideas and predictions.</p>	<p>Let's think a bit more about the differences between solids and liquids.</p> <p>First, I'd like you to gather in your groups from last time and have one volunteer from your group come and get one cup of water and one cup of ice cubes from our supply table.</p> <p>NOTE TO TEACHER: <i>Give students time to gather in their groups and have a volunteer retrieve the cups of water and ice. Then distribute handout 3.2 (Solid and Liquid) and introduce the setup activity.</i></p> <p>The diagrams on this handout are graphic organizers we'll use to record our observations and ideas about solids and liquids.</p> <p>First, let's describe the features or characteristics of a solid and a liquid. Look at the water and ice in each cup and think about the differences between a solid and a liquid.</p> <p>How would you describe the characteristics of a solid? What makes it different from a liquid?</p> <p>NOTE TO TEACHER: <i>For this discussion, display handout 3.2 (Solid and Liquid) on a document reader and record student ideas on the graphic organizers. Also have students copy the information onto their own handouts. Alternatively, you could use handout 3.2 as a</i></p>	<p>A solid is hard.</p> <p>A pillow isn't hard, but it's a solid.</p>	<p>Are all solids hard? Can you think of anything that's solid that isn't hard?</p>

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			<p><i>model and create two graphic organizers on chart paper, one with the word Solid in the middle, and a second with Liquid in the middle. As students share their ideas, record them on the chart.</i></p>  <p>ELL support: Introduce the graphic organizers to ELL students during the lesson preview and complete them together so they'll know what's expected of them and will be prepared to participate fully during the lesson.</p>	<p>Playdough can be soft and still be a solid.</p> <p>When you touch a solid, you don't get wet.</p> <p>A solid has a certain shape.</p> <p>They're square.</p> <p>They're shaped like a cube.</p> <p>Yes! You can make ice into lots of different shapes.</p>	<p>Any other ideas?</p> <p>So even though many solid things are hard, some are soft.</p> <p>What are some other characteristics of a solid?</p> <p>What do you mean by that?</p> <p>What shape do the ice cubes in the cup have?</p> <p>Do you think you could make the ice cubes a different shape?</p> <p>So are you saying that ice isn't always shaped like a square or cube?</p>

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			<p>That's a good start! Now how would you describe the features or characteristics of a liquid? What makes it different from a solid?</p>	<p>Most ice cubes are squares, but it depends on the shape of the container you put the liquid water in when you put it in the freezer.</p> <p>It keeps its shape.</p> <p>I think most solids stay the same shape, but some solids, like playdough, can have different shapes.</p> <p>Solids have a certain shape.</p> <p>A liquid is wet.</p>	<p>So when an ice cube is frozen, can it become a different shape, or does it keep its shape?</p> <p>Can other solids change into different shapes, or do they stay the same shape?</p> <p>So what should we write on our graphic organizer about solids?</p> <p>What other ideas do</p>

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				<p>A liquid is soft.</p> <p>If you touch it, it isn't hard like a solid. It's more squishy, like a pillow.</p> <p>If you put your hand in a liquid, it moves out of the way. It doesn't stay the same shape.</p> <p>It's the same shape as the inside of the cup.</p> <p>It would have the shape of the inside of the bowl.</p>	<p>you have about liquids?</p> <p>What do you mean by "soft"?</p> <p>Does that have something to do with how a liquid moves?</p> <p>You mentioned shape. Earlier we said that a solid has a certain shape. What is the shape of the liquid water in the cup?</p> <p>What if I poured the water into a big bowl?</p> <p>So does a liquid have a shape?</p>

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		Highlight key science ideas and focus question throughout.	<p>You've shared some wonderful ideas!</p> <p>Now let's see what the dictionary has to say about solids and liquids.</p> <p>Show slide 5.</p> <p>If we looked up the word <i>solid</i> in the dictionary, it would tell us that a solid is something that's rigid and has a definite shape.</p> <p>If we looked up the word <i>liquid</i> in the dictionary, it would say that a liquid is something that moves or flows and takes the shape of its container.</p> <p>Let's write these definitions on our graphic organizers.</p> <p>NOTE TO TEACHER: <i>Write these definitions in the appropriate boxes on the graphic organizers. The definitions should be stated clearly and concisely so that students can use them to understand and explain the phenomena they experienced earlier.</i></p> <p>One example of a solid is ice, but let's think of some other examples so we have a clear picture</p>	It has the shape of whatever it's in.	Can we say, then, that a liquid takes on the shape of its container?

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			<p>in our minds of what is and isn't a solid.</p> <p>Who can give me an example of another kind of solid?</p> <p>Can you give me some examples of things that <i>aren't</i> solids?</p> <p>Now what are some examples of different kinds of liquids?</p> <p>Can you give me some examples of things that <i>aren't</i> liquids?</p>	<p>My desk is a solid!</p> <p>The floor is a solid!</p> <p>A rock is a solid.</p> <p>A soda.</p> <p>Rain.</p> <p>The air isn't a solid.</p> <p>Rain.</p> <p>Orange juice is a liquid.</p> <p>My sports drink is a liquid.</p> <p>Gasoline is a liquid.</p> <p>No! Gasoline and rain aren't safe to drink.</p> <p>Solids aren't</p>	<p><i>Probe questions:</i></p> <ul style="list-style-type: none"> • What makes it solid? • Why is that not a solid? <p>Are all of these liquids OK to drink?</p>

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				liquids! A car isn't a liquid. My shoe isn't a liquid.	
15 min	<p>Activity</p> <p>Synopsis: Using the Lego water molecules they built in the previous lesson, students create models of water molecules in solid and liquid forms. Then they use their models to show that the particles or molecules in both forms are the same even though they're arranged and move differently.</p> <p>Main science idea(s):</p> <ul style="list-style-type: none"> The atoms or molecules that make up matter are arranged and move in different ways in solid and liquid forms. In a solid state, atoms or molecules vibrate in place in a rigid structure. In a liquid state, atoms or molecules move around more freely and slide 	<p>Make explicit links between science ideas and activities during the activity.</p> <p>Ask questions to elicit student ideas and predictions.</p> <p>Select content representations and models matched to the learning goal and engage students in</p>	<p>Show slide 6.</p> <p>OK. It looks as if we have a pretty good idea of the differences between solids and liquids.</p> <p>Now let's think about ice cubes. If you could shrink really, really small so you could fit inside an ice cube, what do you think you'd see?</p> <p>NOTE TO TEACHER: <i>Encourage students to refer to the pictures they drew in the previous lesson to help refresh their memories. As needed, review the ideas about what water molecules in a liquid and a solid are made up of (recorded on chart paper at the beginning of this lesson).</i></p> <p>An ice cube is a solid, isn't it? How do you think the water molecules in an ice cube might be arranged to give it a rigid shape?</p> <p>That's what we'll investigate next using our Lego models.</p> <p>ELL support: Walk ELL students through this activity before the actual lesson so they understand what's expected of them and can participate more fully in the actual lesson.</p>	<p>I'd see very small pieces of water.</p> <p>Water molecules.</p>	<p>Please use our science words. What do scientists call small pieces of water?</p>

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		<p>using and applying new science ideas in a variety of ways and contexts.</p> <p>Select content representations and models matched to the learning goal and engage students in their use.</p>	<p>together as a group to arrange as many of them as you can inside your cardboard box. Place them next to each other on the same level; don't stack them on top of each other. You might not be able to fit all of the molecules in that space, but do the best you can.</p> <p>Molecules are always moving. That might be difficult to imagine because a solid—like your desk—doesn't look like it's moving at all. But the tiny molecules that make up the desk are always moving.</p> <p>Watch how I jiggle the box just a little bit to show how molecules move in a solid. Now jiggle your boxes the same way.</p> <p>NOTE TO TEACHER: <i>Jiggle the box of Legos very gently to demonstrate how molecules in a solid vibrate in place rather than move around freely.</i></p> <p>Pass the box around so that everyone in your group can jiggle it very gently and watch the water molecules move just a little bit.</p> <p>Who can describe how the water molecules move when you jiggle the box?</p>	<p>They can only wiggle a little bit.</p> <p>They stay where they are, but they can wiggle just a</p>	<p>Who can add to that idea?</p>

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		<p>Engage students in analyzing and interpreting data and observations.</p> <p>Highlight key science ideas and focus question throughout.</p>	<p>Those are all good descriptions.</p> <p>Do you think our Lego model of an ice cube fits our definition of a solid? Remember that a solid is something that's rigid and has a definite shape.</p> <p>Let's think about our focus questions again: <i>How do water molecules move in a solid and a liquid?</i></p> <p>Now look at the ice cubes in your cups and try to imagine the tiny molecules of water that make up the ice. These tiny molecules are barely moving. Scientists talk about the molecules in a solid <i>vibrating</i> in place.</p> <p>So who can use our science words in a complete sentence to describe the way water molecules move in a solid?</p>	<p>little in their spaces in the box.</p> <p>They can't really move around at all. They stay in the same position.</p> <p>Yes, I think our model fits the definition of a solid. But is a solid really rigid if the molecules are always jiggling around?</p> <p>Water molecules in</p>	<p>That's a good question. What do others think?</p>

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		<p>Engage students in using and applying new science ideas in a variety of ways and contexts.</p> <p>Select content representations and models matched to the learning goal and engage</p>	<p>NOTE TO TEACHER: <i>Help students revise this sentence so it's scientifically accurate. Then write it on the board or on chart paper. Also have students write the sentence in their science notebooks.</i></p> <p>Next, let's think about how the molecules in a liquid move.</p> <p>Look at the liquid water in your cups. How do you think the water molecules are moving? Do you think they're vibrating in place like the molecules in the ice cubes?</p> <p>Show slide 8.</p> <p>Now I'd like you to use your Lego water molecules to make a model of a liquid. Take all of your Lego molecules out of the cardboard box and put them in the plastic sandwich baggie without taking them apart. If you had any leftover Legos you couldn't fit in the box, put</p>	<p>a solid, like an ice cube, vibrate in place.</p> <p>I think they're rolling around and moving all over the place.</p>	<p>Can you use your hands or the Lego water molecules to show me what you're thinking?</p> <p>Does anyone have another idea?</p>

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		<p>students in their use.</p> <p>Engage</p>	<p>those in the bag as well.</p> <p>Remember, the atoms have to stay connected at all times for them to be a water molecule, so don't take the molecules apart.</p> <p>Move the baggie around gently to show how liquid water molecules move. Then pass the bag around so that everyone in your group can move it and watch the water molecules.</p> <p>Who can describe how the liquid molecules move in the plastic baggie?</p> <p>Now look at your cups of liquid water again and try to imagine the tiny molecules moving around like the Lego molecules in the baggie.</p> <p>Do you think this Lego model fits our definition</p>	<p>They can move around more than the molecules in the box.</p> <p>No, they can move around.</p>	<p>Yes, the liquid water molecules can move around more in the plastic bag.</p> <p>How about their position? Do they vibrate in place like the molecules in the ice cubes?</p>

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		students in analyzing and interpreting data and observations.	<p>of a liquid? Remember that a liquid is something that moves or flows and takes the shape of its container.</p> <p>Who can use our science words in a complete sentence to describe how water molecules move in a liquid?</p> <p>NOTE TO TEACHER: <i>Help students revise this sentence so it's scientifically accurate. Then write it on the board or on chart paper. Also have students write the sentence in their science notebooks.</i></p> <p>What would happen to the water molecules if they weren't in a container?</p> <p>Why do you think a liquid is able to move around more and change shapes, but a solid stays the same shape and can only vibrate in place?</p> <p>Show slide 9.</p> <p>Think about the cups of water and ice cubes and</p>	<p>Water molecules in a liquid can move all around the container they're in, but they stay inside the container.</p> <p>If the water molecules weren't in the baggie or the cup, they would go all over the place!</p>	<p>That's a good observation! So we can say that the water molecules in a liquid take the shape of their container.</p>

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		Ask questions to elicit student ideas and predictions.	<p>the Lego models you made of a solid and a liquid.</p> <p>Why do you think a solid has a definite shape, but a liquid takes the shape of its container?</p> <p>Turn and Talk: Talk about this question with an elbow partner; then write your ideas in your science notebooks.</p> <p>NOTE TO TEACHER: <i>Based on what they learned in lesson 2, students may connect the role of heat in state change to molecular movement in solids and liquids. If they make the connection, great! If they don't, they'll learn about the role of heat in molecular movement in lesson 4.</i></p> <p>ELL support: During the lesson preview, let ELL students know you'll be asking them to share their ideas with the class. Give them an opportunity to practice answering the Turn and Talk question. Then make sure to ask them to share their ideas during the actual lesson. Let students know it's OK to repeat someone else's ideas. This is good practice and will make their thinking visible.</p> <p>Whole-class share-out: Let's hear your ideas. Why do you think a solid has a definite shape, but a liquid takes the shape of the container it fills?</p> <p>NOTE TO TEACHER: <i>Try to elicit a variety of</i></p>	In a liquid, the molecules move around more, so	

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		Engage students in communicating in scientific ways.	<p><i>ideas from students during this discussion. Encourage students to agree or disagree with the ideas others share and to add their own ideas.</i></p> <p> Listen to students' ideas. What's visible about student thinking?</p>	<p>they can take the shape of any container. But the molecules in a solid can't go anywhere. They can only vibrate in place.</p> <p>In our model, the solid water molecules were in a box, so they couldn't move very much. But the liquid water molecules had more space to move around in the plastic bag. They didn't stay in the same place, so they could fill up the entire bag.</p>	
7 min	<p>Follow-Up to Activity</p> <p>Synopsis: The teacher revisits the questions from the previous lesson comparing the arrangement of water molecules in solid and liquid forms. Then students use their Lego models to demonstrate how they think water molecules move in solid and liquid</p>	<p>Make explicit links between science ideas and activities after the activity.</p> <p>Highlight key science ideas and focus</p>	<p>Show slide 10.</p> <p>To show what you've learned about solids and liquids in today's lesson, I'd like you to answer the questions on the slide in your small groups.</p> <p>The first two questions are the same ones you talked about in your groups last time, and the third question relates to today's focus question, <i>How do water molecules move in a solid and a liquid?</i></p>		

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	<p>forms.</p> <p>Main science idea(s):</p> <ul style="list-style-type: none"> Each kind of matter, such as water, is made up of a particular arrangement of atoms or molecules. The atoms or molecules that make up water are the same in both the solid (ice) and liquid forms. In a solid state, atoms or molecules vibrate in place in a rigid structure. In a liquid state, atoms or molecules move around more freely and slide past one another. 	<p>question throughout.</p> <p>Engage students in making connections by synthesizing and summarizing key science ideas.</p> <p>Engage students in constructing explanations and arguments.</p>	<ol style="list-style-type: none"> Are the molecules in liquid water the same as the molecules in ice cubes? Why do you think so? How do you think the molecules might be arranged or “put together” in liquid water and the ice cubes? Are they arranged in the same way or in a different way? Do the molecules in liquid water and ice cubes move in the same way or in different ways? Why do you think so? <p>In your explanations, make sure to include the science ideas and words we’ve been learning about. You can also use your Lego models to show what you’re thinking.</p> <p>Record your group’s answers in your science notebooks and be prepared to share your ideas with the class.</p> <p>ELL support: During the lesson preview, let ELL students know you’ll be asking them to share their ideas with the class. Give them an opportunity to practice answering the questions. Then make sure to ask them to share their ideas during the actual lesson. Let them know it’s OK to repeat someone else’s ideas. This is good practice and will make their thinking visible.</p> <p>NOTE TO TEACHER: <i>Give small groups about 3 minutes to discuss their ideas for answering the questions. Encourage them to use their Lego water molecules to illustrate what they’re thinking. Also have a cup of ice and a</i></p>		

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			<i>cup of water available for students to use as resources.</i>		
5 min	<p>Synthesize/Summarize Today's Lesson</p> <p>Synopsis: Students answer the focus question; then the teacher summarizes key science ideas from the lesson.</p> <p>Main science idea(s):</p> <ul style="list-style-type: none"> In solid matter, molecules vibrate in place in a rigid structure. In liquid matter, molecules move around more freely and slide past each other. The small pieces or molecules of matter don't change, but the way they're arranged and how they move changes when heat is added or taken away. 	<p>Highlight key science ideas and focus question throughout.</p> <p>Summarize key science ideas.</p>	<p>Show slide 11.</p> <p>So based on our what we learned from our Lego model today, how would you answer our focus question, <i>How do water molecules move in a solid and a liquid?</i></p> <p>Show slide 12.</p> <p>Let's summarize the science ideas we've been learning about in this unit:</p> <ul style="list-style-type: none"> Matter is made up of atoms or molecules. The atoms or molecules that make up a substance are always in motion. A solid is something that's rigid and has a definite shape. In solid matter, the molecules vibrate in place. A liquid is something that moves or flows and takes the shape of its container. 	<p>In a solid, water molecules can hardly move at all. They just vibrate in place and don't change shape. But in a liquid, water molecules move around more and they can take the shape of their container.</p>	

Time	Phase of Lesson and How the Science Content Storyline Develops	STeLLA Strategy	Teacher Talk and Questions	Anticipated Student Responses	Possible Probe/Challenge Questions
			<ul style="list-style-type: none"> In liquid matter, the molecules move around more freely in their container. 		
1 min	<p>Link to Next Lesson</p> <p>Synopsis: The teacher foreshadows the next lesson in which students consider what causes molecules in solid and liquid forms to move differently and how heat may be involved.</p>	Link science ideas to other science ideas.	<p>Show slide 13.</p> <p>Today we used our Lego models to help us understand how molecules move in a solid and a liquid.</p> <p>But what causes molecules in solids and liquids to move differently? Could heat have something to do with it?</p> <p>We'll find out next time!</p>		