

Properties of Matter

Lesson 2a: Matter Can Change from a Solid to a Liquid and from a Liquid to a Solid

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| Grade 2 | Length of lesson: 47 minutes | Placement of lesson in unit: 2a 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: What causes matter to change from a solid to a liquid or from a liquid to a solid? |
| Main learning goal: Solids can become liquids when heat is added. Liquids can become solids when heat is removed and the liquid matter cools. | | |
| Science content storyline: Heating and cooling (removing heat) can cause changes in matter. Matter in its solid form can become a liquid when heat is added. This is called <i>melting</i> . Matter in its liquid form can become a solid when heat is removed and the liquid matter cools. | | |
| Ideal student response to the focus question: Matter can change from a solid to a liquid when you add heat. Matter can change from a liquid to a solid when you take heat away and the matter cools. | | |

Preparation

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| <p>Materials Needed</p> <ul style="list-style-type: none"> • Science notebooks • Chart paper and markers • For demonstration: <ul style="list-style-type: none"> • Small griddle (A Presto Liddle Griddle works well.) • 3 clear-glass, heat-resistant beakers (The beakers need to be clear so that students can see what happens.) • 3 wooden craft sticks (for stirring) • 4 pot holders (from lesson 1a) • Chocolate chips (milk chocolate) • Crayons (one color) • Ice | <p>Ahead of Time</p> <ul style="list-style-type: none"> • Review the content background document. • Consider the best place in the classroom to conduct the demonstration where everyone will be able to see, but no one will trip over electrical cords or accidentally spill materials. • Assemble and set up the demonstration materials. • On chart paper or a Smart Board, create a class data table using the table on slide 9 as a model. Write the title “Heating and Cooling Matter” at the top. • For the melting/freezing demonstration, set up the griddle and beakers before the lesson begins, making sure to place them in a location where no one will trip over the electrical cord or accidentally knock over the beakers. Turn on the griddle (low to medium heat) at the beginning of the lesson to let it warm up. Don’t place the beakers of chocolate, crayons, and butter on the griddle until the demo begins. |
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Lesson 2a General Outline

| Time | Phase of Lesson | How the Science Content Storyline Develops |
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| 5 min | Link to previous lesson: The teacher reviews student data recorded on the class data table in previous lessons. Then students categorize the changes in matter they observed into changes that can and can't be reversed. | <ul style="list-style-type: none"> Matter can change, and we can observe these changes. Some changes in matter are reversible (the matter can change back to the way it was before), and some changes can't be reversed. |
| 2 min | Unit central questions and lesson focus question: The teacher reviews the unit central questions, <i>What is matter made of? How can matter change?</i> Then the teacher introduces the focus question, <i>What causes matter to change from a solid to a liquid or from a liquid to a solid?</i> | |
| 10 min | Setup for activity: Students draw on what they learned about matter in previous lessons as they consider why different substances change from a solid to a liquid or from a liquid to a solid. | <ul style="list-style-type: none"> Heating and cooling (removing heat) can cause changes in matter. |
| 15 min | Activity: Students observe three substances—ice, chocolate chips, and crayon pieces—melting on a small griddle and cooling on a pot holder. Then they record their observations on a class data table. | <ul style="list-style-type: none"> Heating and cooling (removing heat) can cause changes in matter. When matter is heated, it can change from a solid to a liquid. This process is called <i>melting</i>. |
| 10 min | Follow-up to activity: Students describe what happened to the ice, chocolate chips, and crayon pieces after heating and cooling. Then they review the data they recorded on the class data table, focusing on the words <i>solid</i> and <i>liquid</i> . | <ul style="list-style-type: none"> Heating and cooling (removing heat) can cause changes in matter. When matter is heated, it can change from a solid to a liquid. This process is called <i>melting</i>. Matter can also change from a liquid to a solid when heat is removed and the liquid matter cools. |
| 4 min | Synthesize/summarize today's lesson: The teacher summarizes key science ideas from the lesson. | <ul style="list-style-type: none"> When matter is heated, it can change from a solid to a liquid. Matter can also change from a liquid to a solid when heat is removed and the liquid matter cools. |
| 1 min | Link to next lesson: The teacher announces that in the next lesson, students will consider another way to show how matter can change from a solid to a liquid and back to a solid again. | |

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| 5 min | <p>Link to Previous Lesson</p> <p>Synopsis: The teacher reviews student data recorded on the class data table in previous lessons. Then students categorize the changes in matter they observed into changes that can and can't be reversed.</p> <p>Main science idea(s):</p> <ul style="list-style-type: none"> • Matter can change, and we can observe these changes. Some changes in matter are reversible (the matter can change back to the way it was before), and some changes can't be reversed. | Engage students in analyzing and interpreting data and observations. | <p>Show slides 1 and 2.</p> <p>In our first two lessons, we observed matter at four different stations and saw some of the ways it can change.</p> <p>Let's look at the descriptions we recorded on our class data table and see if we can find any patterns in the ways matter can change.</p> <p>What do you notice about how you described the changes in matter you observed?</p> <p>Are some of the changes similar to other changes you observed?</p> <p>Do you see any patterns in the ways matter can change? Do any of the changes seem to go together?</p> <p>NOTE TO TEACHER: <i>Use this discussion to help students think about how they can use the data on the table to group similar changes in matter together. For example, they might place reversible changes in one group and changes that aren't reversible in another group based on the data in column 3. Or they might think about the similarities and differences between the underlined words in column 1 of the data table (see sample probe and challenge questions in column 6). They might distinguish matter that is heated from matter that is burned and matter that changes without heat (baking soda and vinegar). Guide students toward grouping changes in matter that illustrate a substance changing from a solid to a liquid and</i></p> | <p>We used the same words to describe some of the changes we saw at different stations.</p> <p>Well, for the changes in the ice and butter, we used the word <i>melt</i>. Maybe those changes go together.</p> <p>You have to heat up the matter to make it melt.</p> <p>You might add the burned paper to that group because it</p> | <p>Can you give me an example?</p> <p>Why do you think those changes might go together?</p> |

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| | | | <p><i>possibly changing back to a solid again (melting and freezing).</i></p> <p><i>Note that with the exception of lesson 1b and the extension lessons, all of the lessons in this unit focus on understanding physical changes in matter that involve matter changing from a solid to a liquid and from a liquid to a solid as heat is added or removed. The goal of these lessons is to help students recognize that matter can undergo many kinds of change—reversible (physical) changes and irreversible (chemical) changes—but they aren't expected to understand these changes in depth. Chemical changes in matter will be explored more extensively in later grades.</i></p> | <p>needed heat to change.</p> <p>I don't think so because we also wrote down <i>heat</i> when we described the paper burning. But that change isn't the same as heat melting something.</p> <p>The places where we described things melting also had a yes in the last column, so we thought those changes in matter could go back to the way they were</p> | <p>In column 2 on our data table, we described things heating up or cooling down several times. Would you group the changes you saw based on these descriptions?</p> <p>Is there anything else on the table that might help us group the changes we saw?</p> |

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| | | | | before. | Do you think that any of the changes we said were <i>not</i> reversible are similar to solids that change to liquids and then can change back to solids? Or are they different kinds of changes? |
| 2 min | <p>Unit Central Questions and Lesson Focus Question</p> <p>Synopsis: The teacher reviews the unit central questions, <i>What is matter made of? How can matter change?</i> Then the teacher introduces the focus question, <i>What causes matter to change from a solid to a liquid or from a liquid to a solid?</i></p> | Set the purpose with a <u>focus question</u> or goal statement. | <p>Show slide 3.</p> <p>Who can tell me what our two unit central questions are?</p> <p>That’s right! These are important questions to keep in mind every day as we learn more about matter and how it can change.</p> <p>Show slide 4.</p> <p>Our focus question for today’s lesson is <i>What causes matter to change from a solid to a liquid or from a liquid to a solid?</i></p> <p>Write this question on a new 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 throughout the</i></p> | What is matter made of? How can matter change? | |

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| | | | <p><i>lesson.</i></p> <p>You probably already have some ideas for answering this question. We'll gather more ideas in today's lesson!</p> | | |
| 10 min | <p>Setup for Activity</p> <p>Synopsis: Students draw on what they learned about matter in previous lessons as they consider why different substances change from a solid to a liquid or from a liquid to a solid.</p> <p>Main science idea(s):</p> <ul style="list-style-type: none"> • Heating and cooling (removing heat) can cause changes in matter. | <p>Make explicit links between science ideas and activities before the activity.</p> <p>Ask questions to elicit student ideas and predictions.</p> | <p>Show slide 5.</p> <p>Let's start by thinking about why matter changes in some real-life scenarios.</p> <p>Our first scenario is an ice cube melting on a table.</p> <p>Why do you think an ice cube changes to a liquid, or melts, when it's sitting on a table?</p> <p>Think-Pair-Share (2 min): Think about this question for a moment. Then share your ideas and reasons with an elbow partner.</p> <p>Whole-class discussion: What ideas do you have for explaining why an ice cube melts or changes to a liquid when it's sitting on a table?</p> <p>NOTE TO TEACHER: <i>Invite several students to share their ideas. Record ideas on chart paper and refer to them later to help you adapt the next lesson based on student thinking and understandings. Most students are likely to say that the ice warms up. Listen for any language about heating the ice, but don't state the correct or best answer. Also listen for the words solid and liquid and highlight the use of these terms. Don't spend a lot of time probing student ideas at this</i></p> | <p>I think the ice cube melts because the room is warm.</p> <p>If the room is warm, it will warm up the ice.</p> | <p>What does the temperature of the room have to do with the ice melting?</p> |

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| | | | <p><i>point, but after recording key ideas on the chart, come up with a statement that summarizes student thinking.</i></p> <p> Listen to students' ideas. What's visible about student thinking?</p> <p>Show slide 6.</p> <p>For our second scenario, imagine that you're holding a piece of chocolate in your hand.</p> | <p>The ice cube might melt because the table is warm.</p> <p>The table might make the ice warm up, and that makes it melt.</p> | <p>So you're saying that the ice gets some warmth from the room?</p> <p>Does anyone else have an idea?</p> <p>Say more about the ice cube melting because the table is warm.</p> <p>So what I hear you saying is that the ice needs to get warm to melt, and it has to get that warmth from somewhere. Does everyone agree with that? Does anyone have any different ideas?</p> |

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| | | Ask questions to probe student ideas and predictions. | <p>What do you think will happen to the chocolate in your hand? Would the same thing happen if the chocolate sat on a table? Why or why not?</p> <p>Turn and Talk (3 min): Talk about these questions with your partner and share your ideas.</p> <p>Whole-class discussion: Let’s hear your ideas. What do you think would happen to a piece of chocolate if you held it in your hand?</p> <p>NOTE TO TEACHER: <i>Invite several students to share their ideas, and record them on chart paper. Most students are likely to say that the warmth from their hands would cause the chocolate to melt. If students mention that the solid chocolate would melt and turn into a liquid, highlight their use of the terms solid and liquid. Probe student ideas about why chocolate sitting on a table wouldn’t melt like an ice cube would, but don’t state the correct or best answer. Simply listen to students’ ideas and ask questions to clarify their thinking.</i></p> <p> Listen to students’ ideas. What’s visible about student thinking?</p> | <p>I think the chocolate would melt because my hand is warm.</p> <p>I think the chocolate would turn from a solid to a liquid when my hand heats it up.</p> <p>Maybe the chocolate would melt because my hand is kind of wet.</p> <p>Well, the sweat on my hand might mix with the chocolate.</p> | <p>Can you use the science words <i>solid</i> and <i>liquid</i> in your answer?</p> <p>Does anyone have a different idea?</p> <p>What might your wet hand have to do with melting the chocolate?</p> |

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| | | | <p>Do you think the same thing would happen if the piece of chocolate sat on a table? Do you think it would melt like the ice on the table?</p> | <p>Maybe the chocolate would melt if the room or the table was warm enough.</p> <p>I don't think the chocolate on the table would melt, because the table isn't sweating like my hand.</p> <p>I don't think the chocolate would melt, because the table isn't warm enough. It has to be as hot as your hand for the chocolate to melt.</p> <p>I think the chocolate</p> | <p>What do others think about that idea? Do you agree or disagree?</p> <p>That's one idea. Does anyone have another idea?</p> <p>So why would the ice melt on the table but not the chocolate?</p> |

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| | | | <p>Show slide 7.</p> <p>Let's think about one more scenario.</p> <p>In lesson 1, we saw butter melt, or become a liquid, when we added heat. Then we saw the liquid butter become a solid again when we took it off the heat.</p> <p>NOTE TO TEACHER: <i>Show students the solidified butter from the previous investigation (Station 1 from lesson 1a) if it's still a solid. (If your room is air-conditioned, the butter should remain solidified.) If not, place the melted butter in the refrigerator overnight; then set it out right before the lesson. If</i></p> | <p>needs to be warmer than the ice to melt.</p> <p>Yes. That's what <i>melting</i> means. When something melts, it changes from a solid to a liquid.</p> | <p>You said the word <i>melt</i>. Is that the same as something changing from a solid to a liquid?</p> <p>Does everyone agree with that?</p> <p>For something to melt, do we always need to add heat?</p> |

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| | | Ask questions to probe student ideas and predictions. | <p><i>students don't think the butter has solidified, ask a volunteer to touch the surface. Students should realize that it changed back to its original state—solid butter they can slice and spread on toast. If students insist that the butter isn't the same as the original pat because it's a different shape, ask them what would have happened if they had allowed the butter to cool in a mold that was the same shape as the original pat of butter. They should realize that it would have changed back to its original shape.</i></p> <p>Why do you think the melted butter changed back to solid butter when we took away the heat?</p> <p>Turn and Talk (2 min): Talk about this question with your partner and share your ideas.</p> <p>Whole-class discussion: So why do you think the melted butter changed back to solid butter when we took away the heat? Let's hear your ideas.</p> <p>NOTE TO TEACHER: <i>Invite several students to share their ideas, and record them on chart paper. Most students will likely say that the butter turned back to a solid because it cooled off. Help students move from the idea of adding cold to something toward the idea of adding or taking away heat. For this to happen, students need to think about where the heat goes. At this point, don't correct students' language or provide the correct or best answer. Simply probe student thinking about why the melted butter changed back to a solid and what happened to the heat from the melted butter.</i></p> | <p>The butter got hard again because it cooled off.</p> <p>The butter melted and changed to a liquid when you added the heat. Then it cooled down again and became solid when you took away the heat.</p> | <p>Could you use the words <i>solid</i> and <i>liquid</i> to describe what happened?</p> |

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| | | |  Listen to students' ideas. What's visible about student thinking? | <p>I guess the heat went into the room.</p> <p>Yes.</p> <p>Maybe since the room was colder, some of the cold from the room went into the hot butter.</p> | <p>How did the butter cool off? What did I do to allow the butter to cool off? Where did the heat go?</p> <p>So you're saying that the butter became a solid again when the heat moved from the butter to the room or the air.</p> <p>Do others agree or disagree? Who has another idea?</p> <p>So you think the room just made the butter cool, and the heat didn't have to go anywhere? Do you have a picture in your head of how that happened?</p> |

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| | | | Great discussion, everyone! Next, we'll explore some more examples of matter changing from a solid to a liquid or from a liquid to a solid. | I don't think the heat has to go anywhere. I think anything that's hot just cools off over time unless you keep it near a hot stove or something. | |
| 15 min | <p>Activity</p> <p>Synopsis: Students observe three substances—ice, chocolate chips, and crayon pieces—melting on a small griddle and cooling on a pot holder. Then they record their observations on a class data table.</p> <p>Main science idea(s):</p> <ul style="list-style-type: none"> • Heating and cooling (removing heat) can cause changes in matter. When matter is heated, it can change from a solid to a liquid. This process is called <i>melting</i>. | <p>Make explicit links between science ideas and activities during the activity.</p> <p>Ask questions to elicit student ideas and predictions.</p> | <p>Show slide 8.</p> <p>In this investigation, we'll focus on changes in matter that are reversible, or where matter can change back to the way it was before. We'll watch what happens to different kinds of matter as they heat and cool, and then we'll record our observations on a class data table.</p> <p>Each of these three beakers contains a different kind of matter. One contains ice, another contains chocolate chips, and another contains broken bits of crayon.</p> <p>What do you think will happen to the matter when I place these beakers on a griddle and turn on the heat?</p> <p>ELL support: Preview these questions and the activity with ELL students before the lesson so they know what to expect and can participate more fully in the activity.</p> | <p>I think the beakers will burn.</p> <p>I think the beakers will get hot.</p> | <p>Do you think the</p> |

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| | | | <p>SAFETY NOTE: <i>Make sure to use heat-resistant beakers for this investigation. Don't use small bowls! Most bowls are oven safe, but they'll shatter if they're placed directly on a griddle or hot plate.</i></p> <p><i>Have students gather where they can watch the demonstration from a safe distance. Make sure they aren't standing or sitting near the griddle or any cords.</i></p> <p>NOTE TO TEACHER: <i>Place the three beakers on the griddle so that students can see them. Then turn on the heat and set it at low to medium. Use the wooden craft sticks to stir the substances as they melt. Ask students to describe what they see happening. As soon as a substance melts, remove the beaker from the griddle. For safety, make sure to use pot holders to handle the beakers, and place the beakers on pot holders to cool.</i></p> <p>What do you see happening in the beakers?</p> <p>So it looks like the ice will be the first substance to completely change.</p> <p>What do you think will happen to the melted ice after I remove it from the griddle?</p> | <p>I think the matter will melt.</p> <p>The ice is melting.</p> <p>The chocolate chips are just beginning to melt.</p> <p>It might freeze</p> | <p>matter in these beakers will change in any way?</p> |

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| | | <p>Ask questions to elicit student ideas and predictions.</p> <p>Ask questions to probe student ideas and predictions.</p> <p>Ask questions to challenge student thinking.</p> | <p>NOTE TO TEACHER: <i>If the chocolate isn't melting yet, turn the griddle to 200 degrees.</i></p> <p>It looks like the chocolate is almost melted.</p> <p>What do you think will happen after I remove the chocolate from the griddle?</p> <p>NOTE TO TEACHER: <i>At this point, turn the griddle to about 300 degrees to make sure the crayon wax melts.</i></p> | <p>again.</p> <p>I disagree. I don't think anything will happen. It won't be cold enough for the water to freeze again.</p> <p>It has to be as cold as it is in the freezer, and I don't think the room will get that cold.</p> <p>I think the chocolate will get hard again.</p> | <p>Why do you think the water might freeze again? What makes you think this will happen?</p> <p>Does anyone agree or disagree?</p> <p>What do you mean by "cold enough"?</p> <p>What makes you think the chocolate will change back to a solid?</p> |

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| | | | <p>Next, let's look at the crayons. What do you think will happen to the crayon wax after I take it off the griddle?</p> | <p>Just like the water, it might not be cold enough in the room for the chocolate to change back to a solid.</p> <p>The wax will definitely get hard.</p> <p>I think the wax will get hard because the crayons were the hardest.</p> | <p>Does anyone have another idea?</p> <p>How cold do you think it would have to be for the chocolate to get hard again?</p> <p>Does anyone think that the melted chocolate will stay a liquid once it melts, no matter what we do to it?</p> <p>What makes you think this will happen?</p> <p>What do you mean by "the hardest"?</p> |

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| | | | <p>Show slide 9.</p> <p>Now let's record our observations on a data table.</p> <p>NOTE TO TEACHER: <i>Record observations on the data table ("Heating and Cooling Matter") that you created in advance on chart paper or a Smart Board (based on the model on the slide). If you use a Smart Board, you might consider having students record their own observations, if time allows.</i></p> <table border="1" data-bbox="814 902 1409 1235"> <thead> <tr> <th data-bbox="814 902 961 1078">Substance (Kind of Matter)</th> <th data-bbox="961 902 1157 1078">What Happened When the Solid Matter Was Heated?</th> <th data-bbox="1157 902 1409 1078">What Happened When the Liquid Matter Was Removed from the Heat?</th> </tr> </thead> <tbody> <tr> <td data-bbox="814 1078 961 1118">Ice</td> <td data-bbox="961 1078 1157 1118"></td> <td data-bbox="1157 1078 1409 1118"></td> </tr> <tr> <td data-bbox="814 1118 961 1159">Chocolate</td> <td data-bbox="961 1118 1157 1159"></td> <td data-bbox="1157 1118 1409 1159"></td> </tr> <tr> <td data-bbox="814 1159 961 1235">Crayon Pieces</td> <td data-bbox="961 1159 1157 1235"></td> <td data-bbox="1157 1159 1409 1235"></td> </tr> </tbody> </table> <p>First, let's answer the question in the second column of our table: <i>What happened when the solid matter was heated?</i></p> <p>NOTE TO TEACHER: <i>Encourage students to use</i></p> | Substance (Kind of Matter) | What Happened When the Solid Matter Was Heated? | What Happened When the Liquid Matter Was Removed from the Heat? | Ice | | | Chocolate | | | Crayon Pieces | | | | <p>Does anyone agree or disagree with this idea? Do you have anything to add?</p> |
| Substance (Kind of Matter) | What Happened When the Solid Matter Was Heated? | What Happened When the Liquid Matter Was Removed from the Heat? | | | | | | | | | | | | | | | |
| Ice | | | | | | | | | | | | | | | | | |
| Chocolate | | | | | | | | | | | | | | | | | |
| Crayon Pieces | | | | | | | | | | | | | | | | | |

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| | | | <p><i>complete sentences and include science ideas and words in their descriptions (e.g., “The ice becomes liquid water,” or “The solid ice cubes melted into a liquid”). As students share their observations of each substance, record them in column 2 of the data table.</i></p> | | |
| 10 min | <p>Follow-Up to Activity</p> <p>Synopsis: Students describe what happened to the ice, chocolate chips, and crayon pieces after heating and cooling. Then they review the data they recorded on the class data table, focusing on the words <i>solid</i> and <i>liquid</i>.</p> <p>Main science idea(s):</p> <ul style="list-style-type: none"> • Heating and cooling (removing heat) can cause changes in matter. When matter is heated, it can change from a solid to a liquid. This process is called <i>melting</i>. Matter can also change from a liquid to a solid when heat is removed and the liquid matter cools. | <p>Engage students in analyzing and interpreting data and observations.</p> <p>Engage students in communicating in scientific ways.</p> | <p>Next, we’ll answer the question in column 3 of our data table: <i>What happened when the liquid matter was removed from the heat?</i></p> <p>Let’s see what happened to our melted ice, the melted chocolate, and the melted crayons after I removed them from the griddle.</p> <p>NOTE TO TEACHER: <i>Use a document camera to project the substances on a screen or have small groups of students gather around the beakers to observe what happened. As students share their observations of each substance, record them in column 3 of the data table.</i></p> <p><i>Throughout this discussion, encourage students to use the science words solid and liquid whenever possible. Also use these terms when you summarize students’ observations on the data table. Engage students in responding to each other’s ideas by agreeing or disagreeing, asking questions, or adding their own ideas.</i></p> <p>Who can describe what happened to the melted ice, or water, when we took away the heat?</p> | <p>When we removed the water from the griddle, it didn’t</p> | |

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| | | | <p>What should I write on our data table about the water?</p> <p>OK. So the water began as ice, which is a <i>solid</i>. Then it turned into a <i>liquid</i> when we added heat. And it's still a liquid even though we removed it from the heat.</p> <p>Who can describe what happened to the melted chocolate when we removed it from the heat?</p> <p>Who can describe what happened to the melted crayons when we removed them from the heat?</p> | <p>turn into ice again. It's still a liquid.</p> <p>The water stayed a liquid. It didn't turn back into ice.</p> <p>When we took the melted chocolate off the heat, it cooled and became a solid again.</p> <p>The melted crayons cooled off and became a solid again, but the shape changed.</p> | <p>Does anyone agree or disagree with this observation?</p> <p>Do you have a different idea?</p> <p>Does anyone agree or disagree with this observation?</p> |

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| | | Engage students in constructing explanations and arguments. | <p>What should I write on our data table about the chocolate and crayons?</p> <p>So the both the chocolate and the pieces of crayon began as <i>solids</i>. Then the matter became a <i>liquid</i> after we heated the chocolate and the crayons on the griddle. But when we removed them from the heat, they changed back to <i>solids</i>.</p> <p>So these three kinds of matter didn't behave in the same way after we removed the heat, did they?</p> <p>Show slide 10.</p> <p>Why do you think the water didn't turn back to a solid but the chocolate and crayon wax did? What's different about the water?</p> <p>NOTE TO TEACHER: <i>Don't expect students to know the answers to these questions. The most important thing for them to recognize is that not all solids melt and freeze (solidify) at the same rate or temperature. Because the melting point (and freezing point) of substances varies, different types of matter will change from a solid to a liquid and from a liquid to a solid at different temperatures. Students have prior experience with water and ice, so they already know that water must be much colder than room</i></p> | <p>Both the melted chocolate and the melted crayons cooled off and became hard again.</p> <p>I guess the water needs to be really cold to change back to a solid, but the chocolate and the crayons don't need to be that cold.</p> | Do you have a different idea? |

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| | | | <p><i>temperature to turn back into solid ice.</i></p> <p>I have just one more question for you: When the three substances changed to liquids, do you think they also changed into a different kind of matter? Or are they still the same kind of matter?</p> <p>Do you think ice and water are the same kind of matter? Is melted chocolate still chocolate? Is melted crayon wax still a crayon? Why or why not?</p> | <p>I think they're all still the same kind of matter; they just look different.</p> <p>I think the chocolate is still chocolate because it still looks like chocolate and it probably still tastes like chocolate. But I don't think that the water and the crayon wax are still the same matter because they look really different from the way they looked before.</p> | |
| 4 min | <p>Synthesize/Summarize Today's Lesson</p> <p>Synopsis: The teacher</p> | Highlight key science ideas | <p>Show slide 11.</p> <p>Today, we've been thinking about the focus question, <i>What causes matter to change from a solid to a liquid</i></p> | | |

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| | <p>summarizes key science ideas from the lesson.</p> <p>Main science idea(s):</p> <ul style="list-style-type: none"> When matter is heated, it can change from a solid to a liquid. Matter can also change from a liquid to a solid when heat is removed and the liquid matter cools. | <p>and focus question throughout.</p> <p>Summarize key science ideas.</p> | <p><i>or from a liquid to a solid?</i></p> <p>What have we learned so far about what causes matter to change?</p> <p>Show slide 12.</p> <p>To help us make sense of all the science ideas we've been learning about, let's review what we observed in today's investigation:</p> <ul style="list-style-type: none"> Each kind of matter—ice, chocolate chips, and crayon pieces—became a liquid when we heated it. Each kind of matter melted at a different rate. Some kinds of matter changed back to a solid when we took them off the heat. The chocolate and crayon wax changed back to solid matter, but the water didn't. Each kind of matter stayed the same even though it changed from a solid form to a liquid form. The water was still water. The chocolate was still chocolate. And the crayons were still crayons. Only the form changed! | <p>Adding or taking away heat causes matter to change.</p> | |
| 1 min | <p>Link to Next Lesson</p> <p>Synopsis: The teacher announces that in the next lesson, students will consider another way to show how matter can</p> | <p>Link science ideas to other science ideas.</p> | <p>Show slide 13.</p> <p>In our next lesson, we'll explore another way to show how matter can change from a solid to a liquid and then back to a solid again.</p> <p>Stay tuned!</p> | | |

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| | change from a solid to a liquid and back to a solid again. | | | | |