Heating and Cooling [kindergarten]

Kyla McGlynn
Trinity University

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Unit Title: Heating and Cooling

Grade Level: K

Subject/Topic Area(s): Science

Designed By: Kyla McGlynn

Time Frame: 10 days

School District: East Central ISD

School: Highland Forest Elementary

School Address and Phone: 3736 SE Military Drive, San Antonio, TX 78223 (210) 333-7385

**Brief Summary of Unit** (Including curricular context and unit goals):

Students will practice making, recording and discussing their observations of materials that have changed through heating and cooling. Students will be able to identify if a material has been changed by adding or removing heat, and will accurately record the change through drawings and labels.
### Stage 1 – Desired Results

#### Transfer

*Students will independently use their learning to...*

- investigate how properties of materials can be changed based on the condition of their surroundings
- carefully observe things and events to discover patterns in nature

#### Meaning

**Understandings**

*Students will understand that...*

- a material can change when heat is added or taken away
- scientists make careful observations

**Essential Questions**

- What happens to a material when it is heated?
- What happens to a material when it is cooled?
- How do you know if a material has changed?
- Why do scientists make observations?

#### Acquisition

**Knowledge**

*Students will know...*

- materials can change when heat is added or taken away
- how to make an observation
- changes can be studied

**Skills**

*Students will be able to...*

- observe and identify if a material has changed due to heating or cooling
- record an observation and discuss changes of a material due to heating or cooling

### Stage 2 – Evidence

<table>
<thead>
<tr>
<th>CODE (M or T)</th>
<th>Evaluative Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Performance Task(s)</td>
<td>Students will demonstrate meaning-making and transfer by...</td>
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<tr>
<td>---------------------</td>
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<tr>
<td>Students observe and record properties of chocolate bar using pictures and words.</td>
<td></td>
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<tr>
<td>- Students tell partners what they predict will happen to chocolate bar when it is left out in the sun for the afternoon. Students check and record properties of chocolate bar in the sun using pictures and words.</td>
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<tr>
<td>- Students tell partners what they predict will happen to chocolate bar when it stays in the freezer overnight. Students check and record properties of chocolate bar after freezer.</td>
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<tr>
<td>- In small groups, students discuss how the chocolate bar changed in the sun and the freezer.</td>
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</tbody>
</table>

Other Evidence (e.g., formative)
- Thumbs up/down
- Partner talk
- Ticket out the door
- Hot and cold game

### Stage 3 – Learning Plan

<table>
<thead>
<tr>
<th>CODE (A, M, T)</th>
<th>Pre-Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>A, M</td>
<td>How will you check students’ prior knowledge, skill levels, and potential misconceptions?</td>
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<tr>
<td></td>
<td>Observe and record statements in science talk about heating and cooling.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Learning Activities</th>
<th>Progress Monitoring (e.g., formative data)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Day 1: Science Talk, What We Know About Heating and Cooling</strong></td>
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<tr>
<td>Students engage in science talk, discussing the following questions:</td>
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<tr>
<td>- How can you make something warmer?</td>
<td></td>
</tr>
<tr>
<td>- How can you make something colder?</td>
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<tr>
<td>Record students’ answers, noting any misconceptions.</td>
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<tr>
<td>Show students a bowl of water; explain that it has been sitting out all day. Ask if they think it is warm or cold. Allow students to test with finger. Record picture and short description of water temperature on chart paper while students record in science journal.</td>
<td></td>
</tr>
<tr>
<td>Add ice to the water and allow students to predict if it will be cold, warm or the same. Allow them to test water with finger to determine temperature. Record picture and short description of</td>
<td></td>
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</tbody>
</table>
### Day 2: The Power of Observation

Greet students as scientists and tell them that they will have an opportunity to practice observation skills. Remind them that observing means looking closely. Have them copy signal for observe (circles around eyes, like glasses).

- Place 3 objects on overhead/elmo and allow students to look closely at objects. Allow a few students to share what they noticed.
- Hiding objects with a manila folder, add another object, then reveal to students. Ask for thumbs up or thumbs down if there has been a change. Allow a few students to share what they noticed.
- Add another object, change positioning, spacing of objects. Ask for thumbs up/down if there has been a change. Allow a few students to share the changes they observed.
- Pretend to change order of object, but leave same as before. Ask for thumbs up/down if there has been a change. Allow a few students to share what they observed.
- Ask and discuss: Why is it important to observe an object?

### Day 3: Penny Observation

Greet students as scientists and tell them that they will be playing the penny memory game to further practice their observation skills. Scientists use careful observation to gather information about an object.

First, allow students draw a penny from memory in their science journals. Encourage students to do their best job, even if they don’t remember much.
<table>
<thead>
<tr>
<th>Day</th>
<th>Activity</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>Second, allow students to look/observe penny for one minute (use timer), then hide penny. Students draw what they remember from both sides of the penny. Discuss how this drawing is different from their first drawings. Third, allow students to observe the penny carefully with a hand lenses (remind students how to use hand lenses) and draw what they see on both sides. Using a student’s drawings as an example, discuss as a class what they notice about the last drawing. Where there details missed before? Why is it important for scientists to record their observations?</td>
<td>Science journal</td>
</tr>
</tbody>
</table>
| A, M      | **Day 4: Heat Sources**  
Greet students as scientists and tell them that they will be using their observation skills (signal) to understand more about heat. Read *All About Heat* by Lisa Trumbauer (Rookie Read About Science). Ask: Where does heat come from? Chart some sources of heat. Students record heat sources in their journals. Students experiment with how they feel standing in the sun verses standing in shade. Further discuss sun as source of heat. Ask students if any of their parents hang wet clothes outside to dry. Tell students we will hang one wet shirt inside our classroom, and one wet shirt outside in the sun. Students feel shirts and record properties of both in science journal. Remind students to observe carefully (signal). At end of the day, students observe both shirts and record their properties. In a class discussion, ask students to compare the shirts. Ask: Why is one shirt drier? What happened to the water on it? | Science journal, Discussion/observation |
| A         | **Day 5: Ice Cube Race**  
Greet students as scientists and tell them that we are going to figure out how to create heat in the classroom. In pairs, students race to melt two ice cubes in plastic baggie in the shortest amount of time. Record the time that each pair finishes. Compare melted cubes with a control (bag of two ice cubes untouched). Discuss what strategies students used to melt ice cubes. Identify how this produced heat to melt cubes. (So students understand how their bodies produce heat, have students put their hands together and start rubbing them together really fast to make them warm). Students record a strategy to melt the ice cubes using pictures and words in science journal. Ticket out the door: How can you produce heat with your body? or What happens to ice when you add heat to it? | Science Journal, Ticket out the door |
| A         | **Day 6: Cool Juice**  
Greet students as scientists, and tell they that we are going to |                             |
figure out how to cool materials today. Read *Hot and Cold* by Alan Fowler. Discuss: What does cooling mean? What happens when we cool something? Identify cooling as taking heat away from a material. Students observe juice in a small cup and record observations in science journal (tastes, feels, what it looks like). Remind students it is important to record observations so they can know if the material changes or not. Students tell partners what they think will happen when the juice is put in the freezer.

**Day 7: Heating and Cooling Exploration centers**

Greet students as scientists and tell them that we are going to carefully observe (signal) materials to see if they have been heated or cooled. Students observe and record state of juice after it comes out of freezer. Students share and describe observations with partners.

Allow students to explore materials in small groups at each table.

1. Bowl of room temperature grapes, bowl of frozen grapes
2. Bowl of ice cream, bowl of melted ice cream
3. Bowl of popcorn kernels, bowl of popped popcorn
4. Bowl of carrots, bowl of cooked carrots

Observe students and informally ask what they notice about properties of each food. Ask students to compare the properties of the food at each table, then determine if the second food was heated or cooled.

**Day 8: Play Hot and Cold Game.**

Greet students as scientists, and tell them that we will play a game to see if they can use their observation skills to notice if a material has been changed by heat, or if it has been cooled. In Hot and Cold PowerPoint, students will see pictures of a material before it was heated or cooled, then after it was heated or cooled. Student holds up red card if material was changed by heat, blue card if the material was cooled. Facilitate discussion about how students know if second material was heated or cooled.

Conduct science talk: Are there more ways to heat something or more ways to cool something?
<table>
<thead>
<tr>
<th>Day</th>
<th>Activity Description</th>
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</table>
| **M,T**   | **Day 9: Performance task.**  
Tell students that they will use their best observation skills to notice and record how chocolate changes when it is heated and cooled. Students observe and record properties of chocolate bar using pictures and words.  
-Students tell partners what they predict will happen to chocolate bar (in plastic baggie) when it is left out in the sun for the afternoon. Students check and record properties of chocolate bar in the sun using pictures and words.  
-Students tell partners what they predict will happen to chocolate bar when it stays in the freezer overnight. |
| **M,T**   | **Day 10: Finish performance task.**  
-Students check and record properties of chocolate bar after freezer.  
-In small groups, students discuss how the chocolate bar changed in the sun and the freezer. |
Materials List

- eight bowls (use one on first day, eight on seventh day)
- ice
- variety of small objects for observation game (second day)
- penny for each student (third day)
- two t-shirts (fourth day)
- plastic bag with two ice cubes for each pair of students (fifth day)
- small cups half filled with juice for each student (sixth day)
- grapes, half frozen, half room temp (seventh day)
- popcorn kernels, popped popcorn (seventh day)
- melted ice cream, frozen ice cream (seventh day)
- raw carrots, cooked carrots (seventh day)
- sandwich plastic bags with 1/3 of chocolate bar for each student (performance indicator)
# Heating and Cooling Performance Task

Name: ____________________________

<table>
<thead>
<tr>
<th></th>
<th>![Sun]</th>
<th>![Refrigerator]</th>
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<tbody>
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</tbody>
</table>
## Heating and Cooling Performance Task Rubric

<table>
<thead>
<tr>
<th></th>
<th>Exceeding</th>
<th>Meeting</th>
<th>Approaching</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>recording</strong></td>
<td>Student draws and labels three or more properties</td>
<td>Student draws and labels/dictates one or two properties</td>
<td>Students draws observation and fails to label/dictate a property OR Student inaccurately draws observations OR Student omits one or more observation drawings</td>
</tr>
<tr>
<td><strong>predicting</strong></td>
<td>Student makes two detailed predictions and explains reasoning behind prediction</td>
<td>Student makes two predictions</td>
<td>Student makes only one prediction or no reasonable predictions</td>
</tr>
<tr>
<td><strong>discussing</strong></td>
<td>Student contributes two meaningful observations to discussion</td>
<td>Student contributes one meaningful observation to discussion</td>
<td>Student contributes inaccurate or unrelated observation to discussion OR Student does not contribute to discussion</td>
</tr>
</tbody>
</table>