Weather and Seasons Lesson 0c: How Can We Measure the Temperature Outside?

Grade: Kindergarten Length of lesson: 42 minutes		Placement of lesson in unit: 0c of 4 prelessons on weather (taught at the beginning of the year before the lesson series begins)
Unit central question: Is time? How do you know?	s weather the same everywhere all of the ?	Lesson focus question: How can we measure the temperature outside?

Main learning goal: Weather can be observed and described, but the temperature can also be measured using a thermometer.

Science content storyline: Weather is what it looks like and feels like outside. Weather includes temperature, sunlight, clouds, rain or snow, and wind. Sometimes it's warm outside, and other times, it's cold. We can observe and feel weather, but we can also measure how hot or cold it is outside (temperature). Thermometers are used to measure the temperature.

Ideal student response to the focus question: *[Students should describe weather qualitatively.]* Weather is what it looks like and feels like outside. We can observe the weather by looking outside, and we can use a thermometer to measure the temperature so we can see how hot or cold it is.

Preparation

Materials Needed

- Science notebooks
- Chart paper and markers
- Large, blank monthly calendars (school year)
- Large demonstration thermometer with sliding red ribbon to show temperature settings (Learning Resources Demonstration Thermometer with giant, mercury-free display) (See Ahead of Time.)
- One large working thermometer (Springfield Big and Bold Vertical Thermometer, 15") (See Ahead of Time.)
- Red marker for shading in thermometer on class weather calendar
- **Optional:** "Check Out the Weather" song (YouTube video, https://www.youtube.com /watch?v=RmSKsyJ15yg)

Student Handouts and Teacher Masters

- 0.1 Label for Demo Thermometer (Teacher Master)
- 0.2 Label for Thermometer (Teacher Master)
- 0.3 Weather Cards, laminated (Teacher Master) (for word wall)

Ahead of Time

- Review the content background document.
- Prepare and laminate handout 0.3 (Weather Cards). Post the weather cards from handout 0.3 on a weather word wall.
- Post a blank monthly calendar where everyone will be able to see it.
- Laminate and cut apart the color scales in handouts 0.1 (Label for Demo Thermometer) and 0.2 (Label for Thermometer). Once cut, paste each color scale on one side of the thermometer (Celsius side), making sure it aligns with the corresponding degrees.
- Find a place for the large working thermometer in a location outside where it will give the most accurate temperature readings throughout the year. Avoid direct sunlight. If possible, choose a spot that is shady, but not in consistent shade all day long. A constantly shady location won't allow for variations in morning and afternoon temperatures. (**Note:** You'll place the working thermometer in this location during the activity.)
- Throughout the fall and winter, students will collect weather data each weekday and use temperature and weather stickers to record the data on a class calendar. You won't collect weekend weather data for this lesson series. Save the calendars to use for the lesson series in the spring. *The month before the lesson series begins in the spring, collect morning and afternoon temperature data for use in lesson 3.* Collect temperatures at the same time of day, such as when school begins and releases each day.
- ELL support: Meet with ELL students in advance and introduce them to the lesson content, structure, materials, and activities so they know what's expected and can participate more fully. Identify vocabulary terms in the lesson plan to review with students in advance, including *temperature*, *thermometer*, *hot and cold*, *measure*, and *degrees*. Introduce the words *cool* and *warm* and ask students to describe how they're different. Also ask students to name things that are hot, warm, cool, and cold.

Lesson 0c General Outline

Time	Phase of Lesson	How the Science Content Storyline Develops
5 min	Link to previous lesson: The teacher engages students in reviewing what weather is and what they observed about the weather outside in the previous lesson.	• Weather is what it looks like and feels like outside. We can describe the weather outside as sunny or cloudy, windy or calm, hot or cold, rainy, snowy, or dry.
5 min	Lesson focus question: The teacher introduces the focus question, <i>How can we measure the temperature outside?</i> Then students consider what it means to measure something and how they might do this.	 We can measure the temperature to find out how hot or cold it is outside. One way we can find out how hot or cold it is outside is by using a thermometer to measure the temperature.
8 min	Setup for activity: The teacher sets up the activity by explaining how a thermometer works. Then students practice reading temperatures using the red bar on a real thermometer and looking at a color gauge to determine whether it's hot, warm, cool, or cold outside.	 Weather is what it looks like and feels like outside. We can observe and describe what the weather is like, but we can also measure how hot or cold it is outside. One way we can find out how hot or cold it is outside is by using a thermometer to measure the temperature.
10 min	Activity: The teacher takes the class outside to measure the temperature and then mark the height of the red bar using the demonstration thermometer.	
8 min	Follow-up to activity: Students record their outdoor temperature reading on a class weather calendar, and the teacher explains that recording daily temperatures can help them identify changes and patterns in the weather. Then students make temperature predictions for the next day.	
5 min	Synthesize/summarize today's lesson: The teacher reviews the focus question. Then students summarize how they can measure the temperature outside using a thermometer.	 Weather is what it looks like and feels like outside. Weather includes temperature, sunlight, clouds, rain or snow, and wind. Sometimes it's warm outside, but other times, it's cold. We can observe and describe what the weather is like, but we can also measure how hot or cold it is outside. Thermometers are used to measure temperatures.
1 min	Link to next lesson: The teacher announces that students will collect other kinds of weather data to record on their class weather calendar, and they'll continue recording temperature data each day as well.	

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5 min	 Link to Previous Lesson Synopsis: The teacher engages students in reviewing what weather is and what they observed about the weather outside in the previous lesson. Main science idea(s): Weather is what it looks like and feels like outside. We can describe the weather outside as sunny or cloudy, windy or calm, hot or cold, rainy, snowy, or dry. 	Summarize key science ideas. Link science ideas to other science ideas.	 Show slide 1. Let's think about what we learned about our weather when we went outside last time. First, who can tell what weather is? Show slide 2. That's right! Weather is what it looks like and feels like outside. And what words did we use to describe the weather we observed outside? Look at the words on our class weather chart if you need a reminder. 	Weather is what it looks like and feels like outside. Sample dialogue: We said it was partly cloudy. Because the Sun was out, but there were some clouds in the sky too.	Why did we say it was partly cloudy? And we talked about whether we would call it mostly sunny or mostly cloudy or partly cloudy, when there were both clouds and

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			So we used our eyes to find out whether it was sunny or cloudy. What other words did we use to describe the weather outside?		Sun, right?
			Did we see or feel any rain? What else did we notice about the weather? So we could <i>feel</i> the breeze.	No! It was breezy! We could feel a little wind on our faces and arms.	And how did we know it was breezy?
		Highlight key science ideas and focus question throughout.	 What else could we feel that told us what the weather was like outside? ELL support: Make sure to introduce the words cool and warm during the lesson preview. Ask ELL students how these terms are different and have them name things that are hot, warm, cool, and cold. So we could <i>see</i> the Sun and the clouds, we could <i>feel</i> on our skin that it was very warm, and there was a little wind, and we could <i>see and feel</i> that there was no rain. NOTE TO TEACHER: This might be a good time to talk about how people feel things differently. For 	We could feel on our skin that it was really warm!	Yes. We could feel the heat from the Sun and the warm air on our skin.

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		Ask questions to elicit student ideas and predictions. Ask questions to probe student ideas and predictions.	example, some people feel hot, and some people feel cold in the same kind of weather. People can make different observations based on what they feel, but a thermometer is gives an exact temperature reading that isn't based on feelings. Scientists use both their eyes to make observations and instruments like thermometers or other scientific devices. Show slide 3. So how would you describe today's weather? What does it look like and feel like outside? Let's use the words on our chart to describe today's weather.	Sample dialogue: It's hot today. Because it felt hot on my skin when I walked to school. It's mostly cloudy. I see more clouds than Sun. There isn't any rain. There's no breeze or wind.	How do you know it's hot today? What tells you that it's mostly cloudy?
					know it isn't

5

Time	Phase of Lesson and How the Science Content Storyline Develops	STeLLA Strategy	Teacher Talk and Questions	Anticipated Student Responses	Possible Probe/Challenge Questions
				Because I can't see any leaves moving on the trees outside. I didn't feel any breeze on my face or arms when I was outside earlier.	breezy or windy today?
5 min	 Lesson Focus Question Synopsis: The teacher introduces the focus question, <i>How can we</i> <i>measure the temperature</i> <i>outside?</i> Then students consider what it means to measure something and how they might do this. Main science idea(s): We can measure the temperature to find out how hot or cold it is outside. One way we can find out how hot or cold it is outside is by using a thermometer to measure the temperature. 	Set the purpose with a <u>focus</u> <u>question</u> or goal statement. Ask questions to elicit student ideas and predictions.	 Show slide 4. The focus question we're going to think about today is <i>How can we measure the temperature?</i> NOTE TO TEACHER: Write the focus question on the board and draw a box around it. Then point to each word as students repeat the question aloud with you. What do you think it means to measure something? NOTE TO TEACHER: Include units of measure during this discussion (feet, inches, pounds, hours, minutes) and encourage students to use them rather than telling them what they are. They'll learn about degrees of temperature during the activity setup. 	It means to see how big something is. It's like seeing how tall you are. We could use a	Any other ideas about what the word <i>measure</i> means? So we can measure how tall you are. How could we do that?

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				ruler.	Yes. We could use a ruler. We could also use a tape measure.
			What other kinds of things can we measure?	We can measure how much we weigh.	How could we measure how
				We could use a scale.	And what would the scale tell us?
				How many pounds we are.	Right! A scale measures our weight in
			Now let's think about the weather. We know how to observe and describe the weather, but how can we measure it?		pounds.
			For example, could we use a scale to measure the weather?	No! The weather isn't heavy.	
			Could we use a measuring tape to see how tall the weather is?	No! You can't measure how tall the weather is.	
			When we talked about the weather earlier, we said it was warm outside today. Is there any way we could measure how warm or cold it is outside?	I think the weather person on TV uses a	

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		Highlight key science ideas and focus question throughout.	Show slide 5. So using a thermometer is one way to measure temperature. A thermometer tells us how hot or cold the weather is outside. Today we're going to use a thermometer to measure the temperature outside our building. Then we'll record the temperature on a weather calendar.	thermometer to tell if it's hot or cold. When I'm sick, my mom uses a thermometer to see if I have a temperature. The doctor sometimes puts a thermometer in my mouth to check my temperature.	Yes! We use thermometers to see if we have a temperature. Right! Doctors and nurses check our temperatures with a thermometer too.
8 min	Setup for Activity		NOTE TO TEACHER: <i>Hold up the large working thermometer so that everyone can see it.</i>		

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	 Synopsis: The teacher sets up the activity by explaining how a thermometer works. Then students practice reading temperatures using the red bar on a real thermometer and looking at a color gauge to determine whether it's hot, warm, cool, or cold outside. Main science idea(s): Weather is what it looks like and feels like outside. We can observe and describe what the weather is like, but we can also measure how hot or cold it is outside. One way we can find out how hot or cold it is outside is by using a thermometer to measure the temperature. 	Select content representations and models matched to the learning goal and engage students in their use. Make explicit links between science ideas and activities before the activity.	 This is one kind of thermometer we can use to tell whether it's hot or warm or cool or cold. On one side of the thermometer, it shows the temperature in numbers. This measurement is in degrees. [Point to the number scale in degrees on the thermometer.] For example, if it's 80 degrees, the red bar will line up with the number 80. [Point to 80 degrees on the thermometer.] ELL support: It might be helpful to compare the word degrees with other measurement words like pounds or feet. Point out that degrees are numbers that show how hot or cold the temperature is. On the other side of the thermometer are colors to help us remember how hot or cold it is. [Point to the color gauge on the thermometer.] So when it's 80 degrees, and the red bar lines up with the number 80, what color is on the other side of the temperature is. And what does the label say next to the red color? [Refer to the thermometer weather card and point to the label next to the color gauge.] Right now, you can see that the red bar inside the thermometer.] 	Red! Hot!	

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			What color is next to the [70] right here? [Point to the color yellow on the gauge.]	Yellow.	
			What does the label say next to the yellow color? [Refer to the thermometer weather card and point to the label next to the color gauge.]	Warm.	
			So the thermometer tells us that it's [70] degrees in our classroom right now, and that means it's [warm]. [Refer to the thermometer weather card and point to 70 degrees on the number scale. Then point to the word warm next to the color scale.]		
			When the red bar is down here [point to 65 degrees on the thermometer], that means it's cool. [Refer to the thermometer weather card and point to the word cool next to the color scale.]		
			If the red bar goes this low [point to 40 degrees], then we say it's cold. [Refer to the thermometer weather card and point to the word cold next to the color scale.]		
			That's how we can tell what the temperature is.		
			NOTE TO TEACHER: Circulate around the classroom and show students the thermometer. Point to the top of the temperature gauge so they can see how high the red bar can go.		
			Where do you think the red bar would be if I put the thermometer in the refrigerator?	It would be really cold.	And what do you think would

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			That's right! When it's cold, like in a refrigerator, the red bar is lower on the thermometer. [Point to 40 degrees or lower.] So if we wanted to remember the temperature in our classroom, we could use this other demonstration thermometer. This thermometer has a ribbon that slides up and down to show where the red bar is on a real thermometer. NOTE TO TEACHER: Show students the demonstration thermometer with the red ribbon that slides up and down to represent different temperatures. That way, if the temperature in our room changes overnight, and we forgot what today's temperature was, we'd still be able to look at this demonstration thermometer and know that it was [hot] today. NOTE TO TEACHER: Show students how to pull the red ribbon up to the same temperature as the working thermometer.	I think it would go down, because when it's cold outside, the weather person shows that the temperature is down low on the thermometer.	happen to the red bar on the thermometer?

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			Is the red ribbon at the same level as the red bar on the real thermometer? So the demonstration thermometer is at [70] degrees just like the real thermometer. In a moment, we're going to head outside and measure the temperature using a real thermometer. We'll take our demonstration thermometer with us so we can mark the temperature with the ribbon. That way, when we come back inside, we can remember where the red bar was on the outdoor thermometer.	Yes. It's up high like the real thermometer.	And the temperature is easier to see on the big demonstration thermometer, isn't it?
10 min	Activity Synopsis: The teacher takes the class outside to measure the temperature and then mark the height of the red bar using the demonstration thermometer. Main science idea(s): • Weather is what it looks	Select activities that are matched to the learning goal.	NOTE TO TEACHER: Organize the class to go outside and place the working thermometer in the location you chose in advance. Then select a student volunteer to take the first temperature reading. Since students will be taking daily temperature readings throughout the fall and winter, have a different student read the outdoor thermometer each time so that everyone will get a turn. When students take a temperature reading, make sure they hold the thermometer by the edges so the heat from their hands doesn't affect the reading.		

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	 like and feels like outside. We can observe and describe what the weather is like, but we can also measure how hot or cold it is outside. One way we can find out how hot or cold it is outside is by using a thermometer to measure the temperature. 	Select content representations and models matched to the learning goal and engage students in their use.	 OK. I'm going to ask a volunteer to look at our thermometer. Can you point to where the red bar is on the thermometer? NOTE TO TEACHER: If the volunteer knows how to read two-digit numbers, encourage him or her to do that. If not, ask the volunteer to read the first and second numbers aloud and then tell students what the number is. So the top of the red bar is here on our thermometer. [Point to the top of the red bar.] NOTE TO TEACHER: You can decide if you want to read the numbers out each time or just emphasize the height of the red bar on the thermometer. Now let's make our demonstration thermometer look the same. Can I have our volunteer come up again and help me mark where the temperature is? Good job! The temperature outside is [80] degrees on both of our thermometers. NOTE TO TEACHER: Show students both thermometers so they can see that they match. Now let's talk about how the weather feels today. Is it hot or warm or cool or cold? 	<i>Sample dialogue:</i> It feels hot today.	And how can you

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		Make explicit links between science ideas and activities during the activity. Summarize key science ideas.	So we can feel how hot or cold it is outside with our skin. But now we have another way to tell how hot or cold it is. We can <i>measure</i> the temperature by looking at our thermometer. We'll leave this real working thermometer outside because we marked the temperature on our demonstration thermometer. Now let's go back inside and talk about how we can record the temperature we measured.	My skin feels sweaty!	tell that?
8 min	Follow-Up to Activity Synopsis: Students record their outdoor temperature reading on a class weather calendar, and the teacher explains that recording daily temperatures can help them identify changes and patterns in the weather. Then students make temperature predictions for the next day. Main science idea(s): • Weather is what it looks like and feels like	Make explicit links between science ideas and activities after the activity. Select content	 NOTE TO TEACHER: When students return to class, have them gather around the large, blank weather calendar. Let's gather over here by this big calendar. We're going to use this calendar as a class weather calendar where we'll record, or show, the temperature readings and weather we observe every day. Today we learned how to measure the temperature outside by using a thermometer to see how hot or cold it is. Let's look at our demonstration thermometer and see how high the red bar is. Can I have someone come up and point to where the red bar is on our demonstration thermometer? 	It's right here, by	

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	 outside. We can observe and describe what the weather is like, but we can also measure it. One way we can find out how hot or cold it is outside is by using a thermometer to measure the temperature. 	representations and models matched to the learning goal and engage students in their use.	Thank you. So the number on our thermometer is [80]. This means that today's temperature is [80] degrees. So would you say that it felt [hot] or [warm] today? What does it say on our thermometer next to the color and number? [Refer to the thermometer weather card and point to the word [hot] next to the color gauge.] I'm going to look very carefully at where the red bar is on our demonstration thermometer and then draw a thermometer on our blank thermometer on the weather calendar. Here is the line showing [80] on our calendar thermometer. That's [80] degrees, and that means the temperature is hot!	the [eight] and the [zero]. It says [hot]!	
			 Can I have a volunteer come up and use a red marker to shade in the thermometer on our weather calendar to show the temperature today? Thank you. What does it say next to that temperature on our thermometer? So today it's <i>[hot]</i>, and last time it was very <i>[warm]</i>. To find out whether our temperatures are different from one day to the next, we'll go outside every day during the week and measure the temperature on our 	It says <i>[hot]</i> !	

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		Ask questions to elicit student ideas and predictions.	 outdoor thermometer. Then we'll mark the temperature on our demonstration thermometer and record our observations on our weather calendar. That way, we can look at what is happening with the weather from day to day and see if anything changes. Show slide 6. What do you think the temperature will be like tomorrow? We'll find out if we're right when we measure the temperature again next time. 	I think it will be [hot] tomorrow too! I think it will be [warm].	
5 min	Synthesize/Summarize Today's Lesson		Show slide 7.		
	 Synopsis: The teacher reviews the focus question. Then students summarize how they can measure the temperature outside using a thermometer. Main science idea(s): Weather is what it looks like and feels like outside. Weather includes temperature, sunlight, clouds, rain or snow, and wind. 	Highlight key science ideas and focus question throughout. Engage students in making connections by synthesizing and summarizing key science	Let's revisit our focus question, <i>How can we measure the temperature outside?</i> What have we learned so far that can help us answer this question? How can we tell how hot or cold it is outside?	We can feel how hot or cold it is on our skin.	Yes. And what did we find out today that helps us measure how

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	Sometimes it's warm outside, but other times, it's cold. • We can observe and describe what the weather is like, but we can also measure it. Thermometers are used to measure temperatures.	ideas. Summarize key science ideas.	Show slide 8. So we can feel with our skin if it's hot or warm or cool or cold outside. But we can also find out how hot or cold it is by using a thermometer to measure the temperature.	We can use a thermometer! We look to see where the red bar is. It's hot! That means it's warm.	hot or cold we feel? What do we look for when we use a thermometer? When the red bar is up high, what does that tell us? What about when the red bar is down here? [Point to the warm range on the thermometer.]
1 min	Link to Next Lesson		Show slide 9.		
	Synopsis: The teacher announces that students will collect other kinds of	Link science ideas to other science ideas.	Every day during the week, we'll go outside to observe the weather and measure the temperature. Then we'll record this information on our class		

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	weather data to record on their class weather calendar, and they'll continue recording temperature data each day as well.		 weather calendar so we can keep track of how the weather changes from day to day. Each day, I'll ask one of you to be our lead weather investigator. You'll be responsible for measuring the temperature outside and recording it on our calendar, just like a weather person on TV! NOTE TO TEACHER: You can use your own procedure to collect the weather data, but the data must be collected at the same time each day using a consistent method. It must also include different conditions, such as sunny or cloudy, rainy or dry, and windy or calm, as well as the temperature reading on the thermometer (see next lesson). This is important so that students will have comparison data to use later in the lesson series. When you've finished collecting weather for each month, store the classroom calendars in a safe place to use again when the lesson series begins. It will be helpful to have a variety of months to choose from during the lesson series, so don't get rid of the calendar data until the lesson series is complete. 		