

Weather and Seasons

Lesson 3b: Pomona Weather during the Day

Grade: Kindergarten	Length of lesson: 40 minutes	Placement of lesson in unit: 3b of 5 lessons on weather
Unit central questions: Is weather the same everywhere all of the time? How do you know?		Lesson focus question: How does our weather in Pomona change from morning to afternoon?
Main learning goal: Analyzing weather data reveals patterns in how the weather changes from morning to afternoon.		
Science content storyline: Weather can change during the course of the day. For example, it can be cloudy in the morning and sunny in the afternoon. Temperatures can also change during the day. Using weather data, we can identify patterns in how the weather changes throughout the day. Our weather data for Pomona showed a pattern of cooler, cloudy mornings and warmer, sunnier afternoons.		
Ideal student response to the focus question: In Pomona, the weather changes during the day. The pattern we found is that it's usually cloudy and cool in the mornings and sunny and warmer in the afternoons.		

Preparation

Materials Needed

- Science notebooks
- Chart paper and markers
- Class weather calendar with morning and afternoon temperature data collected a month before the Weather unit began
- Crayons (red, yellow/orange, green, blue) (1 set per student)
- Weather flow chart from lesson 3a

Student Handouts and Teacher Masters

- 3.1 Alisa's Trip to the Zoo (Teacher Master) (from lesson 3a)
- 3.2 Class Thermometer (Teacher Master) (laminated, 8.5 × 14")
- 3.3 Morning and Afternoon Temperature Chart (2 worksheets per page; 1 per student)

Ahead of Time

- Review the content background document.
- A month before the Weather unit begins, students will collect and record morning and afternoon temperatures on a class weather calendar for use in this lesson. Students should collect the temperatures in the morning when school begins and at the end of the school day. To ensure the most accurate temperature readings, place the working thermometer in an outside area that isn't in direct sunlight throughout the day (e.g., the hot side of the building in the afternoon) or in excessive shade.
- Choose a week of temperature readings with the clearest pattern of changes from morning to afternoon for comparison during the lesson.
- Laminate handout 3.2 (Class Thermometer) and display it at the front of the room where everyone can see it. Also display the class weather calendar for students to refer to throughout the lesson.
- Handout 3.3 (Morning and Afternoon Temperature chart) has two worksheets per page, so you'll need to cut it in half and give each student one worksheet.
- Decide which option to use for the weather-data activity: (1) Have students complete handout 3.3 (Morning and Afternoon Temperature Chart) themselves; (2) give students a completed handout and have them focus on analyzing the temperature data; or (3) provide students with fake data that shows temperatures changing from cool to warm on four days and from warm to cool on one 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 in the lesson. Identify vocabulary terms in the lesson plan to review with students in advance, including *weather/temperature pattern, zoo, data, predict/prediction, and flow chart.*

Lesson 3b General Outline

Time	Phase of Lesson	How the Science Content Storyline Develops
5 min	Link to previous lesson: The teacher reviews the story about Alisa and her class trip to the zoo from the previous lesson, and students summarize how the weather changed in the story throughout the day.	<ul style="list-style-type: none"> Weather can change from morning to afternoon.
1 min	Lesson focus question: The teacher introduces the focus question, <i>How does our weather in Pomona change from morning to afternoon?</i>	
6 min	Setup for activity: Students pair up and talk about whether Pomona’s weather changes from morning to afternoon. Then they share their ideas and evidence in a class discussion.	
10 min	Activity: Students review the morning and afternoon temperature data they collected the previous month. Then they complete a chart to help them identify temperature patterns from day to day.	<ul style="list-style-type: none"> Weather can change during the course of the day. For example, it can be cloudy in the morning and sunny in the afternoon. Temperatures can also change during the day. We can use weather data to help us identify patterns in how weather changes throughout the day. Our weather data for Pomona shows a pattern of cooler, cloudy mornings and warmer, sunnier afternoons.
8 min	Follow-up to activity: Students compare the morning and afternoon temperature data on their charts and look for patterns in how temperatures changed from morning to afternoon.	
8 min	Synthesize/summarize today’s lesson: The teacher reviews the focus question. Then students engage in a writing or drawing task to summarize the morning and afternoon weather patterns in Pomona and support their ideas with evidence from the temperature chart.	
2 min	Link to next lesson: The teacher announces that in the next lesson, students think about whether a place like Detroit has different weather than Pomona.	

Time	Phase of Lesson and How the Science Content Storyline Develops	STeLLA Strategy	Teacher Talk and Questions	Anticipated Student Responses	Possible Probe/Challenge Questions
5 min	<p>Link to Previous Lesson</p> <p>Synopsis: The teacher reviews the story about Alisa and her class trip to the zoo from the previous lesson, and students summarize how the weather changed in the story throughout the day.</p> <p>Main science idea(s):</p> <ul style="list-style-type: none"> Weather can change from morning to afternoon. 	Link science ideas to other science ideas.	<p>Show slides 1 and 2.</p> <p>In our last lesson, we read a story about Alisa’s trip to the zoo and how the weather changed during the day.</p> <p>What weather changes did we notice in the story?</p> <p>NOTE TO TEACHER: <i>Display the weather flow chart from the previous lesson.</i></p> <p>ELL support: To help ELL students develop English-language skills, highlight comparatives for key weather terms (e.g., cool, cooler, coolest) throughout the lesson.</p> <p>What other changes did you notice? What about the temperature?</p> <p>Did we list any other weather changes on our flow chart?</p>	<p>It started out sunny, but then it got windy and cloudy.</p> <p>The weather.</p> <p>The weather was sunny in the morning, and it was rainy and snowy in the afternoon.</p> <p>The temperature was warm in the morning, because Alisa didn’t wear a jacket to school.</p> <p>It got really cold in the afternoon and started to snow!</p>	<p>What do you mean by “it”?</p> <p>And how did the temperature change in the afternoon?</p>

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		Summarize key science ideas.	<p>What did we learn from our story about whether weather can change during the day?</p> <p>So big weather changes can happen from the morning to the afternoon. The day that Alisa and her classmates went to the zoo, the weather in the afternoon was very different from the weather in the morning!</p>	We learned that weather can change a lot from the morning to the afternoon.	
1 min	<p>Lesson Focus Question</p> <p>Synopsis: The teacher introduces the focus question, <i>How does our weather in Pomona change from morning to afternoon?</i></p>	Set the purpose with a <u>focus question</u> or goal statement.	<p>Show slide 3.</p> <p>Today we'll think about the focus question, <i>How does our weather in Pomona change from morning to afternoon?</i></p> <p>NOTE TO TEACHER: <i>Write this question on the board and draw a box around it.</i></p> <p>The month before our Weather unit began, we went outside every school day to collect weather and temperature data in the morning and the afternoon. <i>Data</i> is information we collect about something we're studying.</p> <p>In this lesson, we'll use the data we collected to help us answer our focus question.</p>		
6 min	<p>Setup for Activity</p> <p>Synopsis: Students pair up and talk about whether</p>		<p>Show slide 4.</p> <p>In our story about Alisa's trip to the zoo, the weather changed very fast from the morning to the afternoon.</p>		

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	<p>Pomona’s weather changes from morning to afternoon. Then they share their ideas and evidence in a class discussion.</p>	<p>Ask questions to elicit student ideas and predictions.</p>	<p>It started off sunny and warm and ended up cold and snowy!</p> <p>Do you think our weather in Pomona could change like that?</p> <p>Have you ever experienced a day where the weather changed in a big way from morning to afternoon?</p> <p>When we collected our weather and temperature data in the morning and the afternoon, did we have any days like the one in the story?</p> <p>So maybe our weather in Pomona doesn’t change very much during the day, but in some places on</p>	<p>We don’t get snow here, so I don’t think so!</p> <p>Well, it snows up on Mount Baldy, so maybe our weather can change very fast.</p> <p>When I lived in Michigan, one time it snowed all morning, and then the Sun came out in the afternoon.</p> <p>Sometimes it can be foggy in the morning and sunny in the afternoon.</p> <p>No, we didn’t have any snow or rain.</p> <p>We only had a little wind.</p>	<p>What do others think?</p>

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		<p>Ask questions to probe student ideas and predictions.</p> <p>Make explicit links between science ideas and activities before the</p>	<p>Earth, the weather can change like it did in our story! In the morning, it can be sunny and warm, but by afternoon, it can turn cold and snowy. Big weather changes can happen very quickly!</p> <p>Do you think our weather in Pomona changes during the day, even if it's not very much? What evidence do you have?</p> <p>Turn and Talk: Share your ideas and evidence with an elbow partner, and be ready to share with the class.</p> <p>NOTE TO TEACHER: <i>Briefly review what evidence is and give students some examples.</i></p> <p>Whole-class share-out: So do you think our weather in Pomona changes during the day? Let's hear your ideas and evidence.</p> <p>NOTE TO TEACHER: <i>Invite several students to share their ideas and evidence. Ask probe questions to make their thinking visible.</i></p> <p>Next, we're going to look at the temperatures we collected in the mornings and the afternoons and see what they tell us about changes in our weather.</p>	<p>Yes. Sometimes it's dark in the morning and sunny in the afternoon.</p> <p>Lots of clouds block out the Sun.</p> <p>Sometimes it rains a little bit and then stops.</p>	<p>What makes it dark?</p>

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		activity.			
10 min	<p>Activity</p> <p>Synopsis: Students review the morning and afternoon temperature data they collected the previous month. Then they use a chart to help them identify temperature patterns from day to day.</p> <p>Main science idea(s):</p> <ul style="list-style-type: none"> Weather can change during the course of the day. For example, it can be cloudy in the morning and sunny in the afternoon. Temperatures can also change during the day. We can use weather data to help us identify patterns in how weather changes throughout the day. Our weather data for Pomona shows a pattern of cooler, cloudy mornings and warmer, sunnier afternoons. 	<p>Select content representations and models matched to the learning goal and engage students in their use.</p> <p>Make explicit links between science ideas and activities during the activity.</p>	<p>NOTE TO TEACHER: <i>Distribute handout 3.3 (Morning and Afternoon Temperature Chart) and have students paste it in their science notebooks. Give each student a set of red, yellow/orange, green, and blue crayons as well. Then introduce the activity and walk students through the directions based on the option you decided to use. The following content is based on option 1.</i></p> <p>Show slide 5.</p> <p>On the temperature charts I just gave you, we're going to record a week's worth of morning and afternoon temperatures that we collected before this unit began. Then we'll use this data to help us find patterns in how our weather changed.</p> <p>I'll give you the temperatures we recorded each morning and afternoon on our class weather calendar, and I want you to color the boxes on the handout to match the temperatures on our thermometer color scale.</p> <p>For example, if the temperature on Monday morning was cool, use a green crayon to color in the box on the handout for Monday morning.</p> <p>NOTE TO TEACHER: <i>In addition to the color key on the handout, draw student's attention to the class thermometer and color scale (handout 3.2) posted at the front of the room. You might also want to display a copy of the temperature chart (handout 3.3) on a</i></p>		

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			<p><i>document reader or overhead projector and work through the first morning temperature together so they know how to color in the boxes.</i></p> <p>We'll do all of the morning temperatures first. Make sure to look at the color key on your handouts or the color scale on our class thermometer so you know what color to use.</p> <ul style="list-style-type: none"> • If the temperature was hot, color the box red. • If the temperature was warm, color the box yellow [or orange]. • If the temperature was cool, color the box green. • If the temperature was cold, color the box blue. <p>NOTE TO TEACHER: <i>Students can also draw symbols for the weather conditions they recorded on the class weather calendar (Sun, rain, wind, and clouds).</i></p> <p>Once we finish coloring our boxes, we'll talk about any patterns we notice.</p> <p>NOTE TO TEACHER: <i>Call out the morning temperatures for one week (Monday–Friday) on the class weather calendar. If you recorded the numerical temperatures on the weather calendar, you could call out both the number and the color-coded temperature. If not, just use the color-coded temperatures (hot, warm, cool, and cold).</i></p> <p>Show slide 6.</p>		

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		<p>Engage students in analyzing and interpreting data and observations.</p> <p>Ask questions to elicit student ideas and predictions.</p>	<p>OK. Let's look at the morning temperatures on our handouts. Do you see any patterns?</p> <p>So one pattern we noticed is that most of the temperatures in the morning are cool.</p> <p>Do you notice any weather patterns in the mornings? What are most mornings like?</p> <p>Show slide 7.</p> <p>Now let's think about the afternoons and make some predictions about the temperatures. To predict means to say what you think will happen.</p> <p>Turn and Talk: What do you predict or think most of our afternoon temperatures will be like? Share your ideas and reasons with a partner, and be ready to share with the class.</p> <p>Whole-class share-out: What do you predict about the afternoon temperatures? When you share your ideas, use the sentence starter on the slide:</p> <p><i>I predict that our afternoon temperatures will be _____.</i></p>	<p>Most of the boxes are green!</p> <p>The temperatures in the morning are mostly cool.</p> <p>Most mornings are cloudy.</p> <p>I predict the afternoon temperatures will be different than the</p>	<p>What do you think that means?</p>

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			<p>OK. Let's find out if our ideas about the afternoon temperatures match our data.</p> <p>As I call out the afternoon temperatures we recorded on our class weather calendar, I want you to color the boxes on your temperature chart so they match the</p>	<p>morning temperatures.</p> <p>Maybe hotter.</p> <p>Because sometimes I'm really sweating at afternoon recess, but not in the morning.</p> <p>I disagree, because sometimes the afternoon temperature is about the same as the morning temperature.</p> <p>Because the thermometer is about the same some days.</p>	<p>What do you mean by "different"?</p> <p>Why do you think that?</p> <p>Does anyone agree, disagree, or want to add on?</p> <p>How do you know?</p>

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			<p>temperatures.</p> <p>NOTE TO TEACHER: <i>Call out the afternoon temperatures for one week (Monday–Friday) on the class weather calendar. If you recorded the numerical temperatures on the weather calendar, you could call out both the number and the color-coded temperature. If not, just use the color-coded temperatures (hot, warm, cool, and cold).</i></p> <p>Show slide 8.</p> <p>Now let’s look at the afternoon temperatures on our charts. Do you see any patterns?</p> <p>ELL support: ELL students might benefit from a review of the weather words and/or color words you want them to use for this discussion.</p>	<p>They’re mostly warm!</p> <p>The temperatures.</p> <p>Because most of the boxes are yellow, not red, green, or blue.</p> <p>Yellow means warm, red means hot, green means cool, and blue means cold.</p>	<p>What do you mean by “they”?</p> <p>And how do you know the temperatures are mostly warm?</p> <p>Say more about the colors. What do they represent?</p>

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			Do you notice any weather patterns in the afternoons? What are most afternoons like?	Most afternoons are sunny.	
8 min	<p>Follow-Up to Activity</p> <p>Synopsis: Students compare the morning and afternoon temperature data on their charts and look for patterns in how temperatures changed from morning to afternoon.</p> <p>Main science idea(s):</p> <ul style="list-style-type: none"> Weather can change during the course of the day. For example, it can be cloudy in the morning and sunny in the afternoon. Temperatures can also change during the day. We can use weather data to help us identify patterns in how weather changes throughout the day. Our weather data for Pomona shows a pattern of cooler, cloudy mornings and 	<p>Make explicit links between science ideas and activities after the activity.</p> <p>Summarize key science ideas.</p> <p>Select content representations and models matched to the learning goal and engage students in</p>	<p>Show slide 9.</p> <p>So we noticed two patterns on our temperature charts. Who can tell us what the temperature pattern is in the morning?</p> <p>What about the temperature pattern in the afternoon?</p> <p>Show slide 10.</p> <p>Now let’s look at both the morning and afternoon temperatures for each day. I want you to mark on your charts how the temperatures changed from morning to afternoon.</p> <p>In the row on your handouts that says “What Changed?” draw an up arrow if the temperature went</p>	<p>The pattern in the morning is mostly cool temperatures.</p> <p>It’s mostly warm.</p> <p>The pattern in the afternoon is mostly warm temperatures.</p> <p>Because the colors are mostly orange.</p>	<p>Can you use the word <i>pattern</i> in your sentence?</p> <p>And how do you know that it’s mostly warm in the afternoon?</p>

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		<p>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>Engage students in constructing explanations and arguments.</p> <p>Engage students in communicating in scientific ways.</p>	<p>NOTE TO TEACHER: <i>Sometimes this analysis can be messy, especially if you only have five days of temperature data to look at. The data may not illustrate a strong pattern for students. There might be a couple of cool mornings and warm mornings, and then warm afternoons with a few hot afternoons. Students might also have a hard time finding a pattern for the week by looking only at the colors, but looking at the third row on the handout that shows how the temperatures changed (warmer, cooler, or the same) should help them see that every day (or almost every day), the temperatures were warmer in the afternoon.</i></p>	<p>in the morning and red in the afternoon.</p> <p>The pattern goes orange, red; green, orange; green, orange; green; orange; orange, orange.</p> <p>It usually got warmer during the day.</p> <p>The weather pattern is that it usually got warmer in the afternoon.</p> <p>Well, the mornings are mostly green, and the afternoons</p>	<p>That's the temperature change for one day. What about the pattern of change through the whole week?</p> <p>Those are the colors on the chart, but what do the colors tell us about patterns of temperature changes during the week?</p> <p>What do you mean by "it"?</p> <p>What's your evidence?</p>

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			<p>What do we know about other weather patterns during the week? Was it sunny or cloudy most of the mornings or afternoons? Look at the weather stickers for that week on our class weather calendar.</p> <p>Do you see any other weather patterns in the mornings and afternoons besides the temperature?</p> <p>OK. So one temperature pattern we noticed is that temperatures usually got warmer in the afternoons. Why do you think that happened?</p> <p>ELL support: Encourage ELL students to respond to one another's ideas during this discussion so they explore ideas collectively and develop collaborative understandings.</p>	<p>are mostly orange, so it got warmer.</p> <p>It looks like the mornings were sometimes cloudier than the afternoons.</p> <p>It was cooler in the mornings, maybe because it was cloudier.</p> <p>It looks like we only had rain in the mornings, not in the afternoons.</p> <p>Because of the Sun?</p> <p>Because the Sun is really hot and makes us hot too. And we had more Sun in the afternoons.</p>	<p>What do others think?</p> <p>Say more about why the Sun might cause warmer temperatures.</p> <p>Any other ideas?</p>

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		<p>Summarize key science ideas.</p> <p>Ask questions to elicit student ideas and predictions.</p> <p>Engage student in constructing explanations</p>	<p>So if temperatures get warmer in the afternoon because the Sun comes out and warms things up, what do you think happens with temperatures at night?</p> <p>NOTE TO TEACHER: <i>It's OK if students aren't able to explain why afternoons are warmer or what happens to temperatures at night, since these aren't learning goals for the lesson series. However, this might be a good opportunity for students to make connections to the science ideas as they look at temperatures warming up each day.</i></p> <p>OK. So we think that temperatures get warmer in the afternoons because the Sun warms things up. And we think temperatures might be cooler at night because the Sun isn't out. Those are some interesting ideas!</p> <p>Do you think temperatures always get warmer in the afternoon? Is that what happened in our story about Alisa's trip to the zoo?</p>	<p>Maybe if it rains in the morning but not in the afternoon, then it can't warm up until the afternoon because the Sun is behind the clouds.</p> <p>If we don't see the Sun at night, then it can't give us heat, so it would be cooler at night.</p> <p>No. Temperatures don't always get warmer in the afternoon. In the story, it got really cold in the</p>	

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		and arguments.	<p>That’s right! So we can say that temperatures <i>usually</i> get warmer in the afternoons here in Pomona because that’s the pattern we noticed on our temperature charts. But sometimes, like in Alisa’s story, the temperature can get colder in the afternoon, like when a storm moves into an area.</p> <p>Can anyone think of an example of how temperatures or weather conditions can change during the day here in Pomona or in another place?</p> <p>NOTE TO TEACHER: <i>This might be a good time to share examples of recent weather changes in your area during the day. For instance, did it rain one day? Did the temperatures cool off suddenly? Or did it become very cloudy one day? These are all good examples that help students think about how weather can change from morning to afternoon. Encourage students to share examples of weather changes they’ve seen in other places they’ve lived or visited.</i></p>	afternoon.	
8 min	<p>Synthesize/Summarize Today’s Lesson</p> <p>Synopsis: The teacher reviews the focus question. Then students engage in a writing or drawing task to summarize the morning and afternoon weather patterns in Pomona and support their ideas with</p>	Highlight key science ideas and focus question throughout.	<p>Show slide 11.</p> <p>Let’s revisit our focus question for today: <i>How does our weather in Pomona change from morning to afternoon?</i></p> <p>Does our weather in Pomona change the way it did in Alisa’s story?</p>	I don’t think so. It’s usually pretty sunny here.	What did our temperature data show us?

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	<p>evidence from the temperature chart.</p> <p>Main science idea(s):</p> <ul style="list-style-type: none"> Weather can change during the course of the day. For example, it can be cloudy in the morning and sunny in the afternoon. Temperatures can also change during the day. We can use weather data to help us identify patterns in how weather changes throughout the day. Our weather data for Pomona shows a pattern of cooler, cloudy mornings and warmer, sunnier afternoons. 	<p>Engage students in making connections by synthesizing and summarizing key science ideas.</p> <p>Select content representations and models matched to the learning goal and engage students in their use.</p>	<p>Show slide 12.</p> <p>To answer our focus question, I want you to make a chart with two columns in your science notebooks. Label the first column “Morning,” and label the second column “Afternoon.”</p> <p>NOTE TO TEACHER: <i>On chart paper, create a two-column class chart and show students how to label the columns. At the top of the chart, write the title “How Our Weather Changes.”</i></p> <p>In each box, or column, on your charts, draw or write about the weather pattern in Pomona for morning and for afternoon. What is the weather and temperature like in Pomona on most mornings during the week and on most afternoons?</p> <p>Use the words on the slide and on our word wall to help you write your descriptions. And be ready to support your ideas with evidence from your temperature charts and our class weather calendar.</p> <p>NOTE TO TEACHER: <i>In addition to the weather calendar and students’ temperature charts, make sure the picture and bar graphs from previous lessons are also available for students to refer to.</i></p>	<p>In the story, it got really cold and snowed. We only have snow in the mountains.</p>	

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		<p>Engage students in constructing explanations and arguments.</p> <p>Ask questions to probe student ideas and predictions.</p> <p>Ask questions to challenge student thinking.</p> <p>Engage students in communicating in scientific ways.</p> <p>Highlight key science ideas and focus question throughout.</p>	<p>Individual work time.</p> <p>Whole-class share-out: So what did you write or draw on your charts to show how weather changes in Pomona in the morning and the afternoon? Let's have a few of you come up and share with the class.</p> <p>NOTE TO TEACHER: <i>Invite a few students to share their drawings and/or writings with the class. You may want to display their drawings on a document reader so everyone can see them. As students share, record their ideas on the class chart you created. Make sure that students support their ideas with evidence from their temperature charts and/or the class weather calendar. Ask probe and challenge questions to clarify student thinking. Challenge students to explain the connections between science ideas and their drawings. Encourage other students to ask questions, agree or disagree, and add on or give feedback.</i></p> <p>Show slide 13.</p> <p>Who can summarize what we learned today? How would you answer our focus question, <i>How does our weather in Pomona change from morning to afternoon?</i></p>	<p>Our weather in Pomona changes from being mostly cool and cloudy in the morning to mostly warm and sunny in the afternoon.</p>	

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			<p>Show slide 14.</p> <p>So today we studied weather data like scientists, and we learned that our weather in Pomona changes from morning to afternoon. In the morning, the weather pattern is usually cooler and cloudy, and in the afternoon, the pattern is usually warmer and sunny.</p>		
2 min	<p>Link to Next Lesson</p> <p>Synopsis: The teacher announces that in the next lesson, students think about whether a place like Detroit has different weather than Pomona.</p>	<p>Link science ideas to other science ideas.</p> <p>Ask questions to elicit student ideas and predictions.</p>	<p>Show slide 15.</p> <p>Now we know about the weather pattern in Pomona, but what is the weather like in other places far away from here? That’s what we’ll explore next time.</p> <p>Show slide 16.</p> <p>Does this place have different weather than we do in Pomona?</p> <p>How do you know? What do you notice?</p> <p>In our next lesson, we’ll talk about how the weather is the same or different in different places.</p>	<p>Yes!</p> <p>It’s cold and snowy like the weather we have on Mount Baldy.</p> <p>There’s snow everywhere!</p>	