RESPeCT Summer Institute Professional Development Leader Guide (PDLG)

Grade Level	K	**Day**	2	**STeLLA Strategy**	STL Strategies 1, 2, 3: Elicit, Probe, and Challenge Questions	**Subject Matter Focus**	Weather and Seasons
Focus Questions	• How can lesson analysis help us better understand how elicit, probe, and challenge questions can reveal and challenge student thinking? • What do we notice about our weather from month to month? • What do we notice about weather patterns from morning to afternoon?						
Main Learning Goals	Participants will understand the following: • Student thinking can be made more visible in science classrooms when the teacher asks questions that elicit and probe student ideas and predictions and challenge student thinking. • Lesson analysis allows us to slow down teaching so we can clarify our understandings of the distinct purposes of elicit, probe, and challenge questions and how they can be used effectively in science lessons. • We can observe weather patterns over time and how these patterns can change from month to month and from morning to afternoon.						

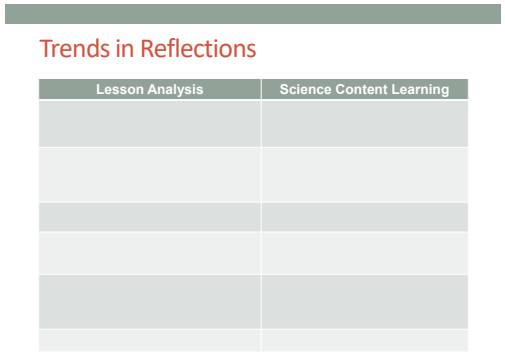
Preparation	**Materials**	**Videos**
Daily Setup Tasks • Check that video clips are correctly linked to PowerPoint (PPT) slides. • Set up PowerPoint. • Make sure video clips play correctly with good sound. • Arrange furniture and food. • Arrange participant materials. • Put up posters and charts. **Planning and Preparation Tasks** • Study the PDLG, PowerPoint slides (PPTs), video clips, and handouts. Make changes to the PPTs, if needed. • Review the reflections from day 1 and create a summary slide. • Cut apart the elicit-question cards from the PD leader master to pass out for practice interviews. • Watch video clips and anticipate participant	**Posters and Charts** • STeLLA Framework and Strategies poster • Day-2 Agenda (chart) • Day-2 Focus Questions (chart) • Norms for Working Together (chart) • Effective Science Teaching chart (from day 1) • Strategy charts from day 1 (STL strategies 1–3) • Common Student Ideas chart • Parking Lot poster **Handouts in RESPeCT PD Binder Front Pocket** • Z-fold summary chart: Student Thinking Lens Strategies **Handouts in RESPeCT PD Binder, Day 2** • 2.1 Transcript for Video Clip 2.1 • 2.2 Transcript for Video Clip 2.2 • 2.3 Transcript for Video Clip 2.3 • 2.4 Map of Average Temperatures in the United States, December–February	Video clips from one Weather and Seasons lesson: • Video Clip 2.1: Alan interview, Johnson classroom (elicit and probe questions); 2.1_mspcp_kinder_weather_johnson_pre.Alan_c1 • Video Clip 2.2: Gaines classroom (probe and challenge questions); 2.2_mspcp_kinder_weather_gaines_L1_c1 • Video Clip 2.3: Gaines classroom (probe and challenge questions); 2.3_mspcp_kinder_weather_gaines_L3_c1–3

responses. • Prepare charts for the day's agenda and focus questions. • On chart paper, create a Common Student Ideas chart (see resources section in lesson plans binder) and post it at the front of the class. Make sure to leave space in the left-hand margin to apply sticker dots. This chart will be used during lesson analysis (slide 19).	• 2.5 Map of Average Temperatures in the United States, June–August • 2.6 (The Sun's Incoming Energy—Angle Related to Latitude at Position 1) • 2.7 (The Sun's Incoming Energy—Angle Related to Latitude at Position 3) • 2.8 Daily Reflections—Day 2 **PD Leader Masters, Days 1–4** • PD Leader Master: Elicit Question Cards—Weather and Seasons (for practice interviews) **Supplies** • Science notebooks • Chart paper and markers • Red and blue sticker dots (or pencils) • Sticky notes (for Parking Lot poster) **PD Resources** • STeLLA strategies booklet • RESPeCT PD program binder • RESPeCT lesson plans binder **Resources in Lesson Plans Binder** *Resources section:* • Weather and Seasons Content Background Document • Common Student Ideas about Weather and Seasons *Pretabs section:* • Weather and Seasons: Learning Goals for Students and Teachers	

DAY 2 SESSION OUTLINE

Time	Activities	Purpose
8:00–8:30 30 min	**Getting Started: Housekeeping, Day-1 Reflections, Norms, Agenda, Focus Questions, Review STL Strategies**	• Build community by sharing participants' reflections from day 1 and reviewing/revising the norms. • Set the stage for a day of learning by introducing the focus questions for day 2 and reviewing the purposes and key features of elicit, probe and challenge questions. (These strategies will be the focus of today's lesson analysis work.)
8:30–9:20 50 min	**STL Lesson Analysis: Elicit and Probe Questions**	• Begin to develop an understanding of the RESPeCT lesson analysis process. • Deepen understandings of elicit and probe questions (STL strategies 1 and 2) and how they reveal student thinking. • Deepen science-content knowledge of weather through lesson analysis.
9:20–11:30 130 min (Includes 10-min break)	**STL Lesson Analysis: Probe and Challenge Questions**	• Develop a deeper understanding of the RESPeCT lesson analysis process. • Deepen understandings of probe and challenge questions (STL strategies 2 and 3), how they reveal student thinking, and how they move student thinking forward. • Deepen science-content knowledge of weather through lesson analysis. • Understand that science-content knowledge is essential for using probe and challenge questions effectively in the classroom.
11:30–12:00 30 min	**Practice Using Elicit and Probe Questions: Interviews**	• Deepen understandings of elicit and probe questions. • Begin to develop the ability to ask elicit and probe questions effectively. • Appreciate that science-content knowledge is essential for using elicit and probe questions effectively in the classroom.
12:00–12:45 45 min	**LUNCH**	
12:45–3:15 150 min (Includes 10-min break)	**Content Deepening: Weather and Seasons**	• Deepen participants' understandings of science concepts from lessons 2 and 3 of the Weather and Seasons unit. • Expand participants' science-content knowledge of how weather patterns can change from month to month and during the day.
3:15–3:30 15 min	**Wrap-Up: Summary, Homework, and Reflections**	• Summarize and reflect on the day's learning, including progress made in understanding weather and the relationship between lesson analysis and asking effective elicit, probe, and challenge questions.

DAY 2

PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
8:00–8:30 30 min **Getting Started** Slides 1–8	**Purpose** • Build community by sharing participants' reflections from day 1 and reviewing/revising the norms. • Set the stage for a day of learning by introducing the focus questions for day 2 and reviewing the purposes and key features of elicit, probe, and challenge questions. (These strategies will be the focus of today's lesson analysis work.) **Content** • Norms enable the group to build trust and productivity. • Probe questions seek to understand what students are saying/writing and encourage them to explain their ideas more clearly or fully (**not** to change their thinking). • Challenge questions seek to engage students in ways that will challenge them to think, reconsider their ideas, change their initial ideas, and move toward more-scientific understandings. **What Participants Do** • Discuss the reflections from day 1 and how the group is doing		**Display Slide 1.** RESPeCT PD Program (3 min) a. Take care of any housekeeping issues.
			**Display Slide 2.** Trends in Reflections (5 min) a. Give participants time to review your summary of their reflections from day 1 and offer reactions and comments or ask follow-up questions.

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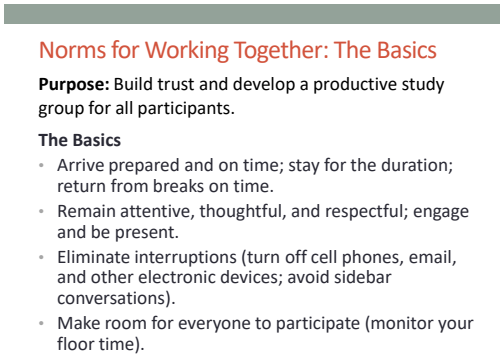
	with the norms. • Study a short transcript example from the STeLLA strategies booklet to identify probe and challenge questions. • Review and contrast the purposes and key features of probe and challenge questions. **Posters and Charts** • STeLLA Framework and Strategies poster • Norms for Working Together (chart) • Day-2 agenda (chart) • Day-2 focus questions (chart) **PD Resources** • STeLLA strategies booklet • Half-page sheet of norms (pasted into science notebooks)		**Display Slide 3.** Norms for Working Together: The Basics (5 min) a. **Provide context:** "Since we'll be working together throughout the Summer Institute and the academic year, we need norms that will enable us to build trust and productivity as a group. Today we'll start our analysis of other teachers' classroom videos. In the fall, we'll analyze videos from each other's classrooms. For this work to be meaningful, we'll need to push and challenge each other. This will require mutual respect and a common understanding of our goals." b. "Do you want to clarify or revise any of these norms?" **Note:** Have participants locate the half-page sheet of norms they pasted into their science notebooks on day 1. Remind them to leave space for revising the norms. c. Encourage participants to ask clarifying questions regarding the meaning of any of the norms and jot notes in their science notebooks. d. Ask participants if they're willing to live with these norms today, and let them know they'll have an opportunity to revise them tomorrow. Remind them of this at the end of the session.

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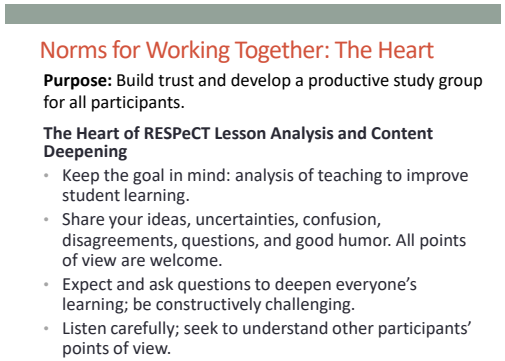
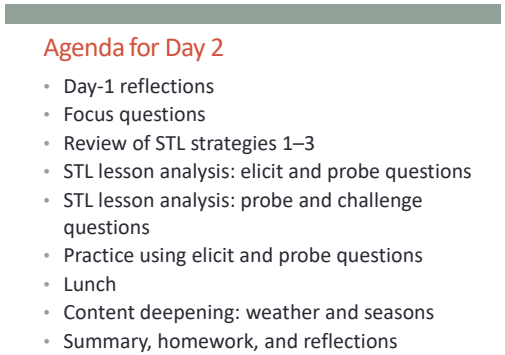
			**Display Slide 4.** Norms for Working Together: The Heart (5 min) a. "Now let's review the norms at the heart of the RESPeCT PD program." b. "Do you want to clarify or revise any of these norms?" c. "Do you want to add any norms to this list?" d. Ask participants if they're willing to live with these norms today, and announce that they'll have an opportunity to revise them tomorrow.
			**Display Slide 5.** Agenda for Day 2 (Less than 1 min) a. Talk through the agenda for the day.

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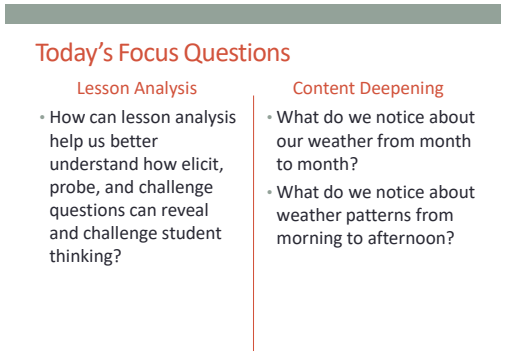
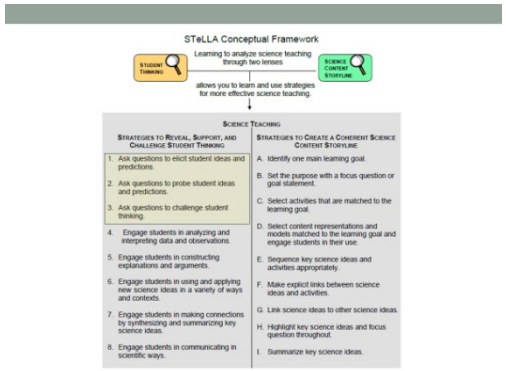
			**Display Slide 6.** Today's Focus Questions (1 min) a. Introduce the focus questions that will guide today's session. b. "Each day we're going to have at least one lesson analysis focus question and one content deepening focus question." c. "Here are our focus questions for today's session."
			**Display Slide 7.** The STeLLA Conceptual Framework (1 min) a. Point out the strategies highlighted on the slide. b. "During today's session, we'll focus again on the first three Student Thinking Lens strategies: elicit, probe, and challenge questions."

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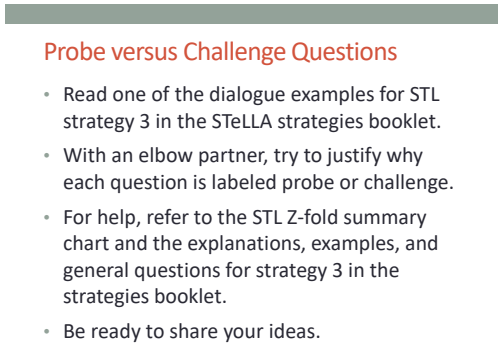
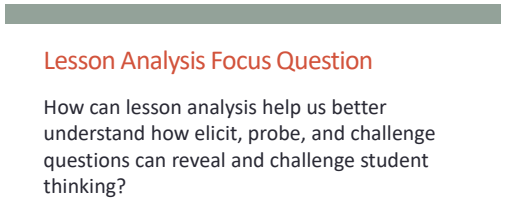
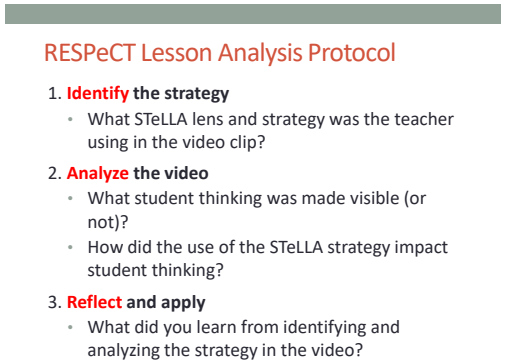
			**Display Slide 8.** Probe versus Challenge Questions (10 min) a. Have participants look in the STeLLA strategies booklet at a dialogue example for STL strategy 3 that highlights probe and challenge questions. b. The purposes of this activity are as follows: 1. To get participants' heads back into the questioning strategies discussed on day 1. 2. To make sure participants understand the distinct purposes of probe and challenge questions: • **Probe questions** seek to understand what students are saying/writing and encourage them to explain their ideas more clearly or fully (not to change their thinking). • **Challenge questions** seek to engage students in ways that will challenge them to think, reconsider their ideas, change their initial ideas, and move toward more-scientific understandings.

PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
8:30–9:20 50 min **STL Lesson Analysis: Elicit and Probe Questions** Slides 9–15	**Purpose** • Begin to develop an understanding of the RESPeCT lesson analysis process. • Deepen understandings of elicit and probe questions (STL strategies 1 and 2) and how they reveal student thinking. • Deepen science-content knowledge of weather through lesson analysis. **Content** • Elicit questions are designed to reveal a variety of ideas, misconceptions, and experiences that students bring with them when learning new science content. • Probe questions follow up on student statements to find out more about what students are trying to say. • Lesson analysis involves a three-step protocol: (1) Identify the strategy, (2) analyze the use of the strategy in classroom videos, and (3) reflect on learning from the lesson analysis. • The lesson analysis protocol		**Display Slide 9.** Lesson Analysis Focus Question (Less than 1 min) a. "Today we'll explore this focus question: How can lesson analysis help us better understand how elicit, probe, and challenge questions can reveal and challenge student thinking?" b. "But first let's discuss what lesson analysis involves."
			**Display Slide 10.** RESPeCT Lesson Analysis Protocol (3 min) a. "This is the three-step protocol that will guide our video-based lesson analysis work. Although we'll follow the protocol a bit more loosely during the Summer Institute, we'll rely heavily on this explicit three-step format as we move into the fall study groups." b. Review the steps on the slide; then tell participants, "Framing our analysis in this way and following specific steps will help us focus more holistically on the teaching and the impact of the STeLLA strategies on student thinking and learning and the storyline students are constructing (i.e., the Student Thinking Lens and the Science Content Storyline Lens)."

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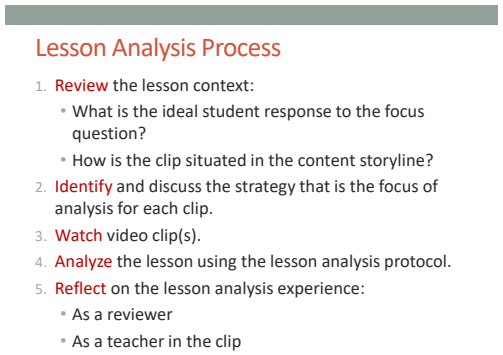
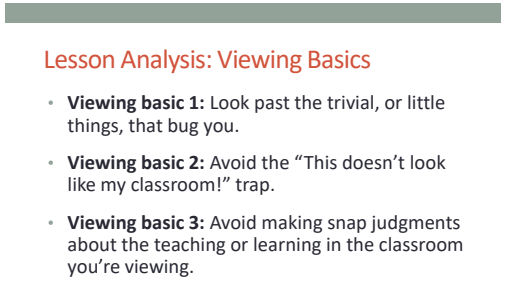
	follows a five-step process: (1) Review the lesson content, (2) identify and discuss the STeLLA strategy in focus, (3) watch the video clip, (4) analyze the clip using the three-step protocol, and (5) reflect on the lesson analysis experience. • The analysis phase of lesson analysis involves making claims related to the STeLLA framework and providing evidence and reasoning to support the claims. **What Participants Do** • Review the lesson analysis video viewing basics. • Use the five-step lesson analysis process to identify and analyze the use of elicit and probe questions in a student interview (video clip 1). **Videos** • Video Clip 2.1, Alan interview **Handouts in PD Binder** • 2.1 Transcript for Video Clip 2.1 **Supplies** • Science notebooks **PD Resources** • STeLLA strategies booklet • STL Z-fold summary chart	 	**Display Slide 11.** Lesson Analysis Process (3 min) a. "The lesson analysis protocol includes this five-step process." b. Review the steps on the slide and note that in the study groups, these steps will be followed more explicitly than they will be during the Summer Institute. **Display Slide 12.** Lesson Analysis: Viewing Basics (2 min) a. **Ask:** "Why is each of these viewing basics important? Which will be hardest for you?" b. Tell participants they can find further details on the viewing basics in the STeLLA strategies booklet and refer to this information later. c. **Highlight:** "The videos we'll be viewing throughout the program aren't necessarily exemplary, but rather they provide real-world examples of teachers implementing the STeLLA strategies. Examples like these deepen our thinking because we can see the sometimes unintended results of teacher decisions and consider missed opportunities." d. **Honor the videocase teachers!** All of these courageous teachers are not only working hard to improve their own teaching practice but are also willing to make their practice public so that others can learn from it. None of them would claim to be

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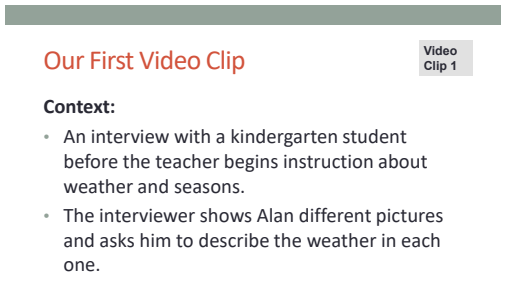
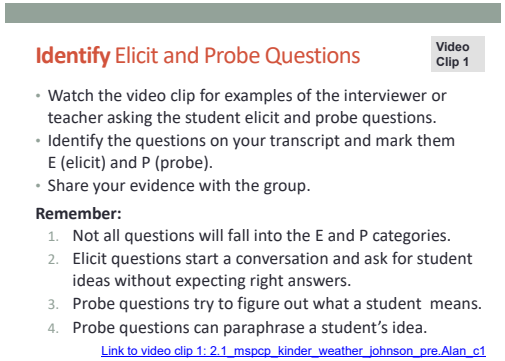
			exemplary science teachers.
			**Display Slide 13.** Our First Video Clip (2 min) a. Describe the context of the first video clip participants will watch. (See the top of the transcript—handout 2.1 in the PD program binder.) b. "This student interview showcases the use of elicit and probe questions. Even though this clip doesn't take place in the context of an actual classroom, the idea is to look at the quality and form of the questions. Our second video clip will feature probe and challenge questions in a classroom context."
			**Display Slide 14.** Identify Elicit and Probe Questions, Video Clip 1 (20 min) a. Provide instructions for watching video clip 1 and using the transcript to identify questions that elicit (E) and probe (P) student ideas and predictions. b. Remind participants that the purpose of watching the video clip is to deepen their shared understandings of these strategies and to build their individual and collective lesson analysis skills. c. **Individuals:** Allow time for participants to review the video transcript and mark E and P questions. d. **Whole group:** Discuss what participants found in the transcript. Encourage them to use evidence from the transcript and reasons from their Z-fold summary charts or the STeLLA strategies booklet to support their ideas. Participants should work to differentiate elicit and probe questions and distinguish them from other types of teacher

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			questions or statements. **Examples of elicit questions:** • **Video segment 00:00:17:** "What can you tell me about the weather that day?" • **Segment 00:01:43:** "OK. So now I want to look at this picture. What can you tell me about the weather that day?" • **Segment 00:02:23:** "OK. So tell me about … this day." **Examples of probe questions:** • **Video segment 00:00:24:** "What makes you say that?" • **Segment 00:00:31:** "OK. And the wind is making it a little cold. Can you tell?" • **Segment 00:00:53:** "What do you mean 'the waves are different'?" • **Segment 00:01:35:** "OK. A little hot and sweaty. And … and in this picture, you think it's colder because it's windier?" • **Segment 00:02:01:** "What makes you say that?" • **Segment 00:02:08:** "OK. And what makes you think the wind go … [is] blowing?" **Note:** This video clip contains other questions and comments that probe student thinking, but they aren't as clear cut. For example, at segments 00:02:48–03:02, the interviewer tries to find out what Alan thinks about the likelihood of rain at different times of year (seasons). In this instance, the interviewer is trying to find out what Alan thinks, not looking for correct answers.

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		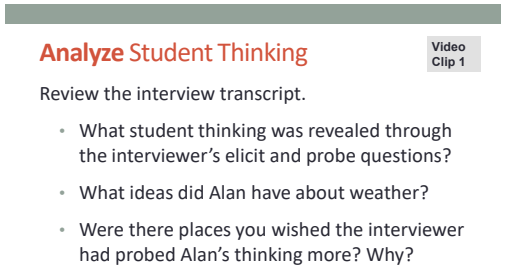	**Display Slide 15.** Analyze Student Thinking, Video Clip 1 (20 min) a. Give participants time to review the video transcript and develop an answer to one of the analysis questions on this slide. Encourage them to write down their answers in their science notebooks. b. For this first video analysis, do a round-robin and have each participant share. Ask probe and challenge questions to support participants in communicating their ideas clearly and completely: • **Probe question:** "Can you say more about what you mean by …?" • **Challenge question:** "Can you point to a specific place in the transcript that supports your idea?" c. As participants share, encourage others to respond by asking questions like these: • Do others have additional evidence to support (or challenge) this idea? • Do others have a different interpretation? **Observations:** • Alan seems to think it's always hot when the Sun is hot (video segments 00:01:13–01:35) and that it's always cold when it's windy (00:00:22–00:31; 00:01:42; 00:02:04) and cloudy (00:02:04). However, Alan recognizes (possibly from experience?) that rainy days are hot in Mexico (00:03:28–03:40). • Alan thinks it only rains in the spring (segments 00:02:29–00:03:02). • Alan doesn't seem to recognize that the weather in

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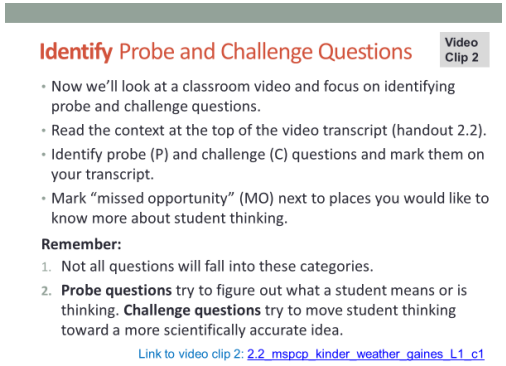
			Mexico is different from the weather in Denver. Instead of comparing the weather in the two places, he describes the weather in Mexico (00:03:17–03:40). Further probing would have helped to clarify whether Alan think the weather in Mexico and Denver is different. For example, at segment 00:03:40, the teacher could have asked, "Is that the same in Denver?"
9:20–11:30 130 min (Includes 10-min break) **STL Lesson Analysis: Probe and Challenge Questions** Slides 16–26	**Purpose** • Develop a deeper understanding of the RESPeCT lesson analysis process. • Deepen understandings of probe and challenge questions (STL strategies 2 and 3), how they reveal student thinking, and how they move student thinking forward. • Deepen science-content knowledge of weather through lesson analysis. • Understand that science-content knowledge is essential for using probe and challenge questions effectively in the classroom. **Content** • Probe questions follow up on student statements to find out more about what students are trying to say.		**Display Slide 16.** Identify Probe and Challenge Questions, Video Clip 2 (20 min) a. Provide instructions for watching video clip 2 and using the transcript (handout 2.2) to identify questions that probe student ideas and predictions and challenge student thinking. b. Encourage participants to refer to the strategy charts from day 1 (STL strategies 1–3), their Z-fold summary charts, and the STeLLA strategies booklet for help differentiating probe and challenge questions. Remind them that other types of questions (such as elicit questions) may appear in this video clip. c. **Set the context:** Read the context for video clip 2 (at the top of the transcript). d. Emphasize that the students in this class haven't yet studied anything about weather. e. Show the video clip and allow time for participants to study the transcript before advancing to the next slide.

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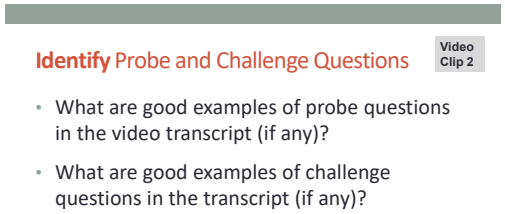
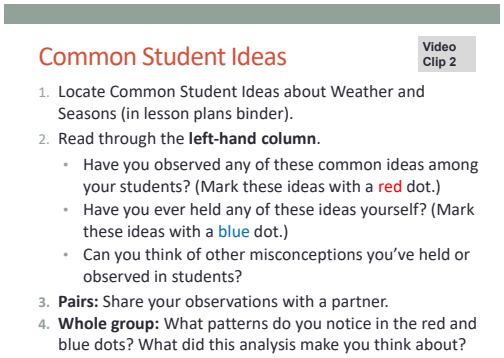
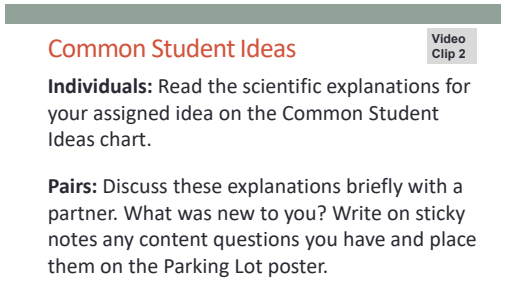
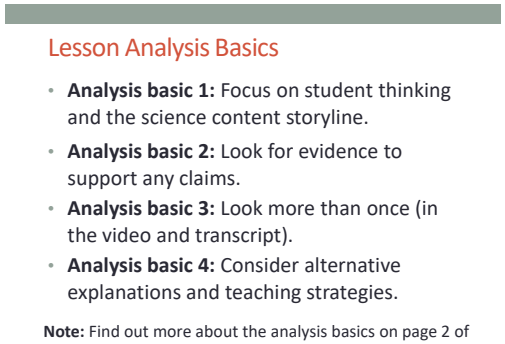
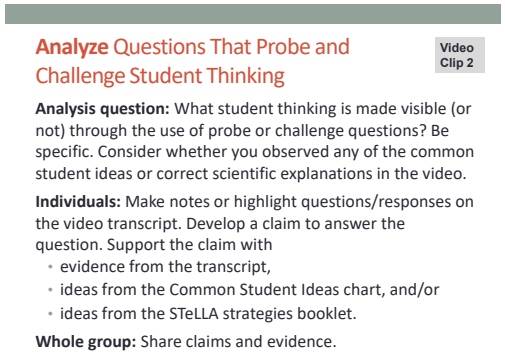
	• Challenge questions are designed to push students to think hard, make new connections, change their ideas, and move toward more-scientific understandings. • The lesson analysis process involves making claims related to the STeLLA framework and providing evidence and reasoning to support those claims. • Viewing basics and analysis basics guide the lesson analysis process. **What Participants Do** • Identify probe and challenge questions in a classroom video (video clip 2). • Review common student ideas about weather. • Analyze the use of probe and challenge questions in a classroom video (video clip 2). • Identify and analyze the use of probe and challenge questions in another classroom video (video clip 3). • Discuss the importance of science-content knowledge in using probe and challenge questions effectively in the classroom. **Posters and Charts** • Strategy charts from day 1 (STL		**Display Slide 17.** Identify Probe and Challenge Questions, Video Clip 2 (5 min) a. After each suggested probe or challenge question, ask participants the following: • "What makes this a probe/challenge question?" • "Did others mark this as a probe/challenge question?" • "Can you point to any of our resources (the Z-fold summary chart, our strategy charts from day 1, or the STeLLA strategies booklet) to support your answer?" b. Don't worry about debate and lack of agreement on some questions. **The important thing** is that participants clearly understand the difference between the purposes of probe and challenge questions. Sometimes it's hard to tell whether the teacher in the video intended to find out what a student meant (probe) or move student thinking toward more-scientific understandings (challenge). The teacher may also be asking elicit questions to reveal student ideas and misconceptions. **Examples of probe questions:** • There aren't any strong probe questions in this video clip (e.g., "Can you tell me more about that?"), but the teacher does ask Caden and Emma for clarification (Caden at segment 00:00:44, "You notice it's what?" and Emma at 00:01:15, "It's cold?"). • The most successful probe question is when the teacher asks Emma, "What tells you that it's cold up here [on the calendar]?" (segment 00:01:15). At segment 00:01:19, Emma gives an unexpected

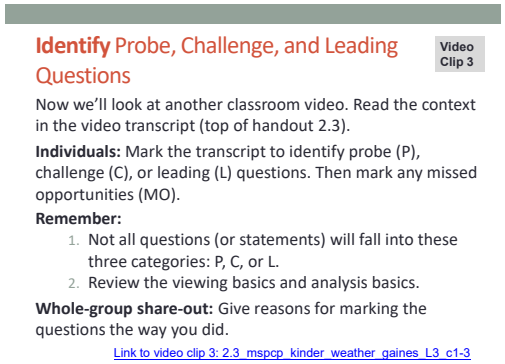
PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
	strategies 1–3) • Common Student Ideas chart • Parking Lot poster **Videos** • Video Clip 2.2, Gaines classroom • Video Clip 2.3, Gaines classroom **Handouts in PD Binder** • 2.2 Transcript for Video Clip 2.2 • 2.3 Transcript for Video Clip 2.3 **Supplies** • Red and blue sticker dots (or pencils) • Sticky notes **PD Resources** • STeLLA strategies booklet • STL Z-fold summary chart **Resources in Lesson Plans Binder** *Resources section:* • Common Student Ideas		response ("The … rain"), which tells us that she associates rain with cold weather, a common misconception. **Possible example of a challenge question:** • At segment 00:00:50, the teacher asks Caden, "How did you know that it was sunny?" and at 00:01:15, she asks Emma, "What tells you that it's cold up here [on the calendar]?" In both instances, you could argue that the teacher is challenging students to move toward correct science ideas. You could also argue that these are probe questions, asked simply to find out what Caden and Emma think, or that they're leading questions. For example, when the teacher asks Caden, "How did you know that it was sunny?" instead of waiting for a response, she immediately asks, "What picture did you see up here [on the calendar]?" (00:00:50). So it seems that she just wanted students to show her that they understood the symbols on the calendar.
		Identify Missed Opportunities to Probe Student Thinking Video Clip 2 **Individuals:** Locate one missed opportunity in the video where the teacher could have asked a probe question. Suggest a probe question to better understand student thinking. **Turn and Talk:** Turn to a partner and share your possible probe question. Provide each other with feedback. Ask, "Is this a probe question? Why or why not?" **Whole group:** Do you need any clarification?	**Display Slide 18.** Identify Missed Opportunities to Probe Student Thinking, Video Clip 2 (10 min) a. **Individuals:** "Identify a missed opportunity for a probe question in the video transcript." b. **Turn and Talk:** Have participants pair up and discuss their suggested probe questions. Listen to their conversations to assess whether they truly comprehend that a probe question is designed to help them understand what students are thinking. c. **Whole group:** Participants may need guidance about when to ask probe questions. Remind them that probe questions are appropriate when

PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
			students make vague or abbreviated statements, or when they simply use a vocabulary term without saying what it means. Do they really understand the term or concept, or do they have misconceptions? Ask a probe question to find out! d. **Remind participants:** "Don't probe everything a student says. Just probe responses that seem relevant to the lesson's main learning goal and might reveal interesting student thinking." **Possible missed opportunities:** • **Video segment 00:00:46:** When students look at some pictures and observe that it's "sunny," the teacher could have asked, "Why do you say that? Can you come up to the calendar and tell us more about what you're noticing?" • **Segment 00:01:19:** When Emma observes that the rain in the picture told her that it's cold, the teacher could have asked, "So rain makes you think it's cold? Why?" • **Segment 00:02:17:** When Alessandra mentions clouds in the photo, the teacher could have asked, "Can you tell me what you notice about clouds?"
	10-MINUTE BREAK		

PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
			**Display Slide 19.** Common Student Ideas, Video Clip 2 (15 min) a. "Now let's consider some commonly held student ideas (misconceptions). Then we can analyze whether any of these ideas appear in our video clips." b. Have participants locate the Common Student Ideas chart in the resources section of their lesson plans binders. c. "This Common Student Ideas chart shows some commonly held student ideas that are interesting but aren't scientifically accurate." d. **Individuals:** Have participants mark with a red sticker dot any ideas they've observed among their students, and mark with a blue sticker dot any ideas they've had themselves. e. **Pairs:** Have participants discuss their observations with a partner. f. **Whole group:** Ask participants to share which ideas they've observed in their students and themselves. During this share-out, apply sticker dots to the Common Student Ideas chart at the front of the room as participants to highlight patterns in the results. Then discuss the following questions: • "What conceptual patterns do you notice in the red and blue dots?" • "What reactions do you have to this analysis? What did it make you think about?" **Note:** If time is short, skip this pattern analysis and discussion.

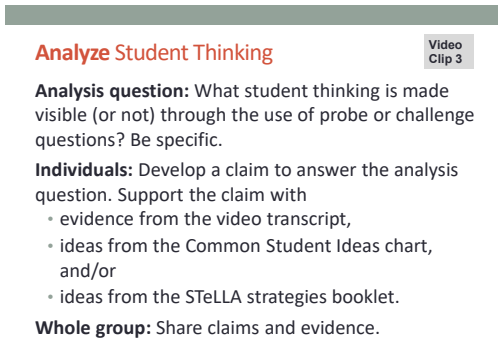
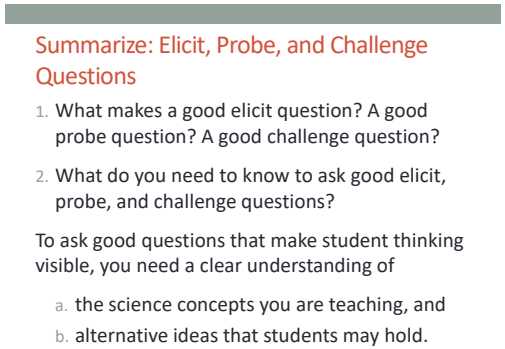
PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
			g. "We've recognized these common ideas in students or held them ourselves. It's important to be aware of them when we're analyzing student thinking in the video clips or planning and teaching lessons in the future." h. "Now let's look for evidence of these common student ideas in a video clip."
			**Display Slide 20.** Common Students Ideas, Video Clip 2 (10 min) a. Have participants count off in ones and twos (1, 2, 1, 2, 1, 2). "Ones" will focus on the odd-numbered ideas on the Common Student Ideas chart, and "twos" will focus on the even-numbered ideas. b. **Individuals:** "Read the scientific explanations for your assigned idea on the Common Student Ideas chart." c. **Pairs:** "Discuss these explanations briefly with a partner. What was new to you? Write on sticky notes any content questions you have and place the notes on the Parking Lot poster."

PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
			**Display Slide 21.** Lesson Analysis Basics (5 min) a. "Before we analyze the video clip, let's think about our lesson analysis process." b. Review the analysis basics on the slide. **Note:** Direct participants to page 2 in the strategies booklet if they have specific questions that require more information. c. **Why the analysis basics are important:** "The analysis basics will help us dig deeper and learn more from our videocase analyses while keeping us focused on the ultimate goal of improved student learning." **Note:** This lesson analysis process is **not** about critiquing teachers but about improving student learning. d. "We'll use a more structured lesson analysis protocol when we begin reviewing each other's videos in the fall study-group sessions."
			**Display Slide 22.** Analyze Questions That Probe and Challenge Student Thinking, Video Clip 2 (15 min) a. Remind participants of the purposes of video analysis: to deepen understandings of STeLLA strategies; to develop their ability to analyze student thinking; and, ultimately, to improve student learning. b. **Tell participants:** "Remember to refer to your Common Student Ideas chart as you analyze the video clip."

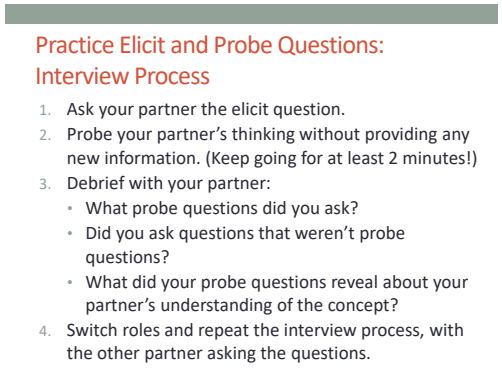
PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
			c. **Individuals:** Review the slide instructions before participants begin working independently on the tasks. d. **Whole group:** • Have several participants share their claims and evidence. • **Ask:** "Did you recognize any of the common student ideas in the students' responses?" • **Ask:** "What probe or challenge questions might you ask to better understand student thinking?" **Note:** Remember to use probe and challenge questions as you interact with participants.
			**Display Slide 23.** Identify Probe, Challenge, and Leading Questions, Video Clip 3 (20 min) a. Read the context for this video clip at the top of the transcript (handout 2.3). Make sure participants understand that the students in this clip are continuing to wrestle with the three claims from the previous lesson. b. Provide instructions for watching video clip 3 and using the transcript to identify questions that probe student ideas and predictions and challenge student thinking. **Participants should also be on the lookout for leading questions and missed opportunities.** (**Note:** Leading questions provide hints or make it easy for students to give the "right" answer.) Remind participants that other types of questions (such as elicit questions) may appear in this video clip. c. **Individuals:** Review the slide instructions before

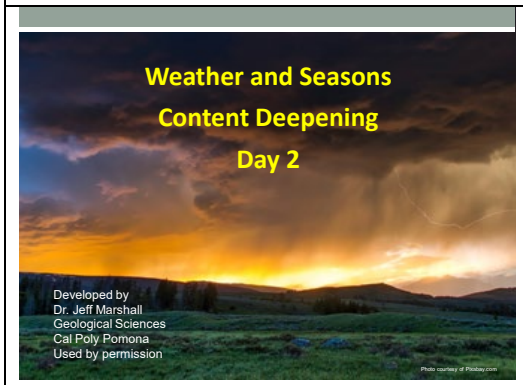
PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
			participants begin working independently on the tasks. d. **Whole group:** • Challenge participants to clearly state their reasons for identifying a question as probe, challenge, or leading. • Encourage participants to provide evidence from the STeLLA strategies booklet to support their claims. **Possible probe questions:** • **Video segment 00:01:36:** "And the Sun was more?" • **Segment 00:02:13:** "It's what?" • **Segment 00:03:31:** "What paper?" • You could also make a good argument that 00:02:37 is a probe question: "The Sun's lesser than what?" **Possible challenge questions:** • **Video segment 00:00:25–00:45:** "Tell me what you remember about a [weather] pattern in the month of September in Colorado Springs." • **Segment 00:01:51:** "Who can … tell me the pattern that you see in December?" • **Segment 00:02:33:** "What can you tell me about the Sun?" • **Segment 00:02:37:** "The Sun's lesser than what?" • **Segments 00:02:53 and 00:03:02:** "Is the weather pattern the same month to month? … How do you know that?" **Possible leading questions:** • The teacher asks multiple times, "Do you guys agree with that?" It seems as if students know that she always wants them to say yes to this question

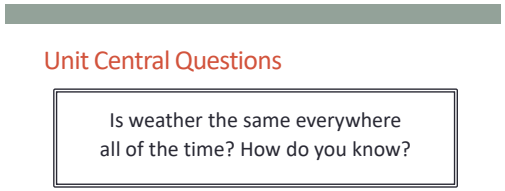
PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
			(see segments 00:01:38, 00:02:17, and 00:03:35). • The question at segment 00:03:37 is also a leading question: "And then we made a …." • At segment 00:03:02 the teacher asks a challenge question ("How do you know that?") but immediately follows with a question that hints at the answer she wants: "Where do you look for that information?" **Missed opportunities for probe questions:** • **Video segment 00:00:45:** When a student mentioned a repetitive pattern of sunny and cloudy days, the teacher could have asked, **"**Show me where you see that pattern on our graph" or "Show me how you're thinking about this." • **Segment 00:02:14:** When a student observed that there were "more clouds" on the graph, the teacher could have said, "Tell me what you mean by "more clouds." **Missed opportunities for challenge questions:** • **Video segment 00:03:02:** The teacher could have paused after asking, "And how do you know that?" and let students respond rather than following immediately with a leading question. • **Segment 00:03:09:** When Paisley said that she could see the weather pattern on the class calendar, the teacher could have said, "Show me where you see the weather pattern on the calendar" or "How does the calendar tell us that the weather pattern is different from month to month?" • **Segment 00:03:20:** When a student referred to the graph, the teacher could have said, "Show me how the graph tells us that the weather pattern is different from month to month."

PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
			**Display Slide 24.** Analyze Student Thinking, Video Clip 3 (10 min) a. **Emphasize:** "Remember to refer to your Common Student Ideas chart as you analyze the video." b. **Individuals:** Review the slide instructions before participants begin working independently on developing a claim to answer the analysis question. c. **Whole group:** • Have several participants share their claims and evidence. • **Ask:** "Did you recognize any of the common student ideas in the students' responses?" • **Ask:** "What probe or challenge questions might you ask to better understand student thinking?" **Note:** Remember to use probe and challenge questions as you interact with participants.
			**Display Slide 25.** Summarize: Elicit, Probe, and Challenge Questions (5 min) a. Pose the first question on the slide. If participants need support, point them to the descriptions of strategies 1, 2, and 3 in the STeLLA strategies booklet (especially the Summary of STeLLA Student Thinking Lens Strategies). b. Pose the second question. Do participants come up with the idea that science-content knowledge is essential for asking good elicit, probe, and challenge questions?

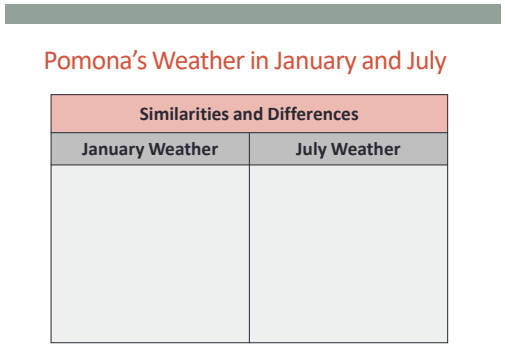
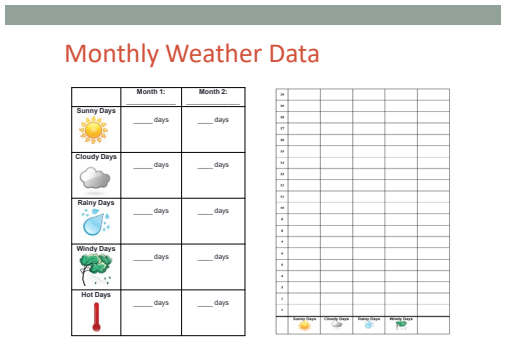
PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
			c. Use the rest of the time to highlight the importance of knowing science content and being aware of common student ideas.
		Reflect on Your Learning Respond to these questions in a quick write: 1. What did you learn about student thinking from analyzing these videos? 2. How did the analysis process help you better understand the questioning strategies? Be prepared to share your ideas.	**Display Slide 26.** Reflect on Your Learning (5 min) a. Ideally, participants will first respond to the questions in a quick write and then share their ideas with the group. But if time is running short, you can have them simply think for a minute and then share their ideas. But be sure to give them time to think before opening up the discussion.
11:30–12:00 30 min **Practice Using Elicit and Probe Questions: Interviews** Slides 27–29	**Purpose** • Deepen understandings of elicit and probe questions. • Begin to develop the ability to ask elicit and probe questions effectively. • Appreciate that science-content knowledge is essential for using elicit and probe questions effectively in the classroom. **Content** • Understanding the purposes and key features of elicit and probe questions is essential for implementing the STeLLA	Practice Elicit and Probe Questions: Interview Planning • **The challenge:** Pair up and practice using elicit and probe questions. First ask your partner an elicit question and then ask **only** probe questions to find out what your partner thinks. • **To prepare:** a. Read your elicit question. b. Read the common student ideas and scientific explanations that relate to your question. c. Plan probe questions to clarify ideas you think might emerge.	**Display Slide 27.** Practice Elicit and Probe Questions: Interview Planning (12 min) a. **Describe the challenge:** "Next, you and a partner will practice using elicit and probe questions by interviewing each other. The challenge is to ask your partner an elicit question and then follow up by asking **only** probe questions." b. Give each participant a different elicit question (from the PD leader master cards). c. Direct participants to prepare for the interviews by following the slide instructions. **Note:** Participants may refer to the Common Student Ideas chart as a resource for this activity.

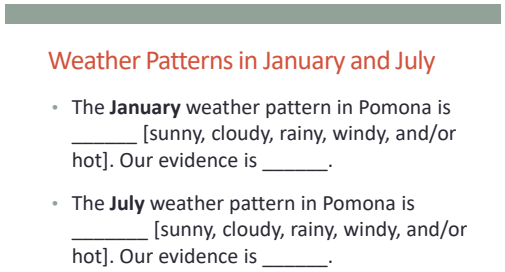
PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
	questioning strategies effectively in the classroom. **What Participants Do** • Consider possible responses an elicit question (related to weather) might produce, and plan probe questions to follow up on these responses. • Work in pairs, taking turns being the interviewer and asking each other an elicit question and then following up with only probe questions. • Participate in a group discussion afterward that focuses on the difficult aspects of the pairs work and the interesting thinking it revealed. **Posters and Charts** • Common Student Ideas chart **PD Leader Masters** • PD Leader Master: Elicit Question Cards (cut apart) **Resources in Lesson Plans Binder** *Resources section:* • Common Student Ideas	 	**Display Slide 28.** Practice Elicit and Probe Questions: Interview Process (12 min) a. Review the instructions on the slide. b. "Each interviewer will have 5 minutes to ask questions. Try to keep going with your probe questions for at least 2 minutes." c. **Interviewees:** "Don't pretend to be an elementary student; be yourself. Help your partner by pushing yourself to explain things in more depth than you actually understand. Try to come up with possible explanations that go beyond the surface vocabulary. Don't worry about being wrong; this will actually make the task more like what you might encounter in the classroom." **Display Slide 29.** Group Discussion (6 min) a. **Whole group:** Discuss the questions on the slide. b. If there's time, ask participants, "How might it help your teaching to do more of this type of practice (with a partner or small group)?"
12:00–12:45 45 min	**LUNCH**		

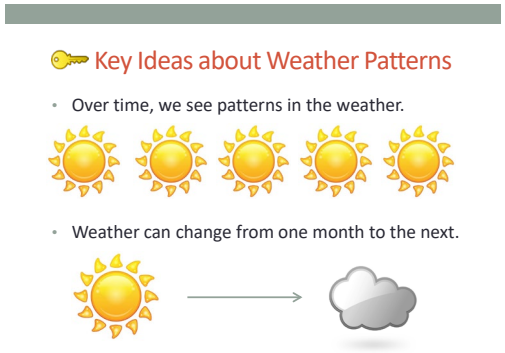
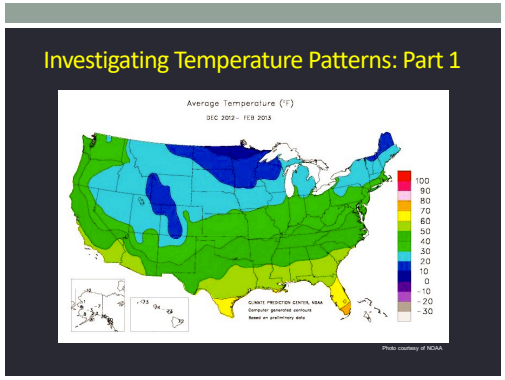
PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
12:45–3:15 150 min (Includes 10-min break) **Content Deepening: Weather and Seasons** Slides 30–64	**Purpose** • Deepen participants' understandings of science concepts from lessons 2 and 3 of the Weather and Seasons unit. • Expand participants' science-content knowledge of how weather patterns can change from month to month and during the day. **Content** • We can observe and identify weather patterns over time. • Weather patterns can change from month to month and from morning to afternoon. **What Participants Do** • Discuss similarities and differences in Pomona's weather in January and July based on first-hand experience. • Identify weather patterns in a variety of scenarios and discuss possible causes.		**Display Slide 30.** Content Deepening: Weather and Seasons (Less than 1 min) a. "Now let's work together to deepen our understandings of weather and weather patterns." **Note:** Throughout this content deepening phase, refer as needed to the content background document, the Common Student Ideas chart, and Weather and Seasons: Learning Goals for Students and Teachers.
			**Display Slide 31.** Content Deepening: Day 2 (Less than 1 min) a. "Today's content deepening work will focus on science ideas from lessons 2 and 3 of the Weather and Seasons unit. We'll also explore ideas about weather patterns that aren't part of this lesson series."

PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
	• Explore how Earth's orbit around the Sun affects weather patterns and seasons on Earth. • Explore how Earth's orbital positions and solar radiation striking Earth's surface at different latitudes relates to temperatures and seasons on Earth. • Predict the temperature patterns their students will identify when they collect data on morning and afternoon temperatures in Pomona. • Identify and compare weather patterns in Pomona in the morning and afternoon. **Posters and Charts** • Common Student Ideas chart **Handouts in PD Binder** • 2.4 Map of Average Temperatures in the United States, December–February • 2.5 Map of Average		**Display Slide 32.** Unit Central Questions (Less than 1 min) a. Review the unit central questions on the slide. b. Remind participants that these questions will guide student learning throughout the Weather and Seasons lesson sequence. c. "Today we'll continue exploring the key science ideas that will help us answer these questions."
			**Display Slide 33.** Weather and Seasons: Lesson 2 (Less than 1 min) a. "First, we'll explore key science ideas about weather from lesson 2."

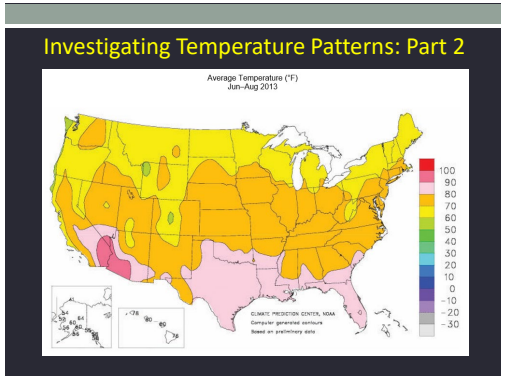
PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
	Temperatures in the United States, June–August • 2.6 (The Sun's Incoming Energy—Angle Related to Latitude at Position 1) • 2.7 (The Sun's Incoming Energy—Angle Related to Latitude at Position 3) **Supplies** • Science notebooks • Chart paper and markers **PD Resources** • RESPeCT lesson plans binder **Resources in Lesson Plans Binder** *Resources section:* • Content background document • Common Student Ideas *Pretabs section:* • Weather and Seasons: Learning Goals for Students and Teachers	Content Deepening: Focus Question 1 What do we notice about our weather from month to month?	**Display Slide 34.** Content Deepening: Focus Question 1 (Less than 1 min) a. Read the focus question on the slide. b. Have participants copy this question into their science notebooks and leave space to write a response.
		Pomona's Weather in January and July • How would you compare Pomona's weather in January and July? • What do you think causes any similarities or differences?	**Display Slide 35.** Pomona's Weather in January and July (3 min) a. "Think for a moment about what the weather in Pomona is typically like in January and July." b. "How would you compare the weather in January with the weather in July? What do you think causes any similarities or differences?" c. **Pairs:** "Discuss these questions with an elbow partner and work together to develop concise answers. Be prepared to share your ideas and reasoning with the group."

PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
			**Display Slide 36.** Pomona's Weather in January and July (5 min) a. Create a two-column table on chart paper like the one on the slide. b. "So how would you compare the weather in January with the weather in July here in Pomona? What do you think causes any similarities or differences?" c. Invite participants to share their ideas and reasoning. Elicit differing points of view during this discussion and ask questions to probe and challenge participants' thinking. d. As participants share similarities and differences between the weather in January and July, record key ideas on the table. Also note the possible causes.
			**Display Slide 37.** Monthly Weather Data (1 min) a. "In our first content deepening session, we talked about the kind of weather data students will collect over a period of several months before the Weather unit begins." b. "After recording their data on a class weather calendar for each month, students look for weather patterns." c. "To help them identify weather patterns, students count the number of sunny, cloudy, rainy, and windy days on their class weather calendars and record them on monthly observation charts like the one on the left side of the slide. They also count

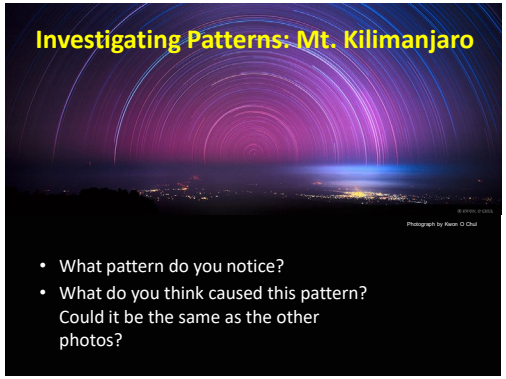
PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
			the total number of hot, warm, cool, and cold days every month. Then they use weather stickers to create picture or bar graphs for each month like the one on the right side of the slide." d. "These graphs make it easier for students to identify weather patterns and compare these patterns from month to month."
			**Display Slide 38.** Weather Patterns in January and July (5 min) a. "When students compare weather patterns for different months, they use sentence starters like the ones on this slide to describe their findings." b. **Turn and Talk:** "Pair up again with your elbow partner and describe the weather in January and July using these sentence starters. Also include evidence to support your descriptions. The evidence would be stronger if we had actual weather data to use instead of relying on our memories and experiences." c. **Whole group:** Invite participants to share their descriptions and evidence with the group. Record key ideas on chart paper and work toward a group consensus about the weather patterns in January and July, as well as evidence that supports the weather pattern.

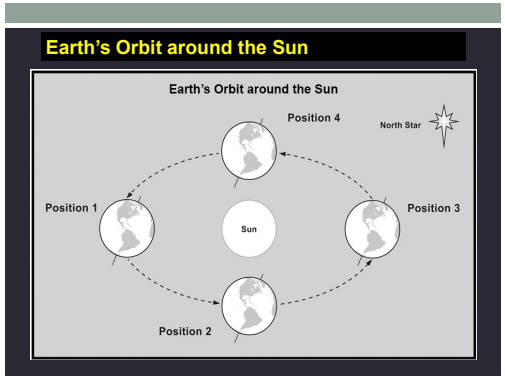
PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
			**Display Slide 39.** Key Ideas about Weather Patterns (2 min) a. Read the key ideas about weather patterns on the slide. b. "Do you think these ideas will be easy or challenging for your kindergartners to understand? Why or why not?" c. Elicit a variety of responses and record possible challenges on chart paper. **Possible challenges for students:** • Understanding what a weather pattern is • Understanding what a month is • Noticing weather changes if the weather doesn't change dramatically • Interpreting monthly weather data (How will students be able to use data to draw conclusions?)
			**Display Slide 40.** Investigating Temperature Patterns: Part 1 (7 min) a. "Next, we'll engage in activities that are designed to enhance your knowledge of weather patterns even though they don't appear in the kindergarten lessons." b. "The map on this slide shows average temperatures across the United States from December 2012 through February 2013." c. Have participants pair up and locate handout 2.4 (Map of Average Temperatures in the United States, December–February) in their PD program

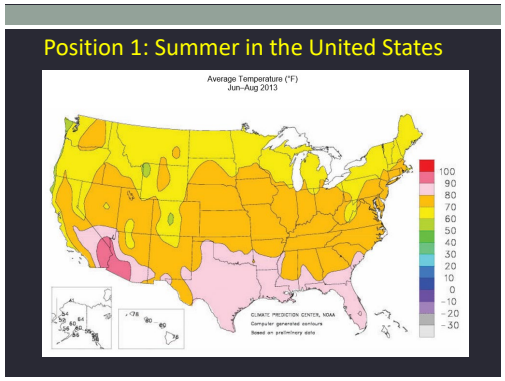
PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
			binders. d. **Pairs:** "What temperature patterns do you notice on this map? Discuss this question with an elbow partner and be ready to share your observations. Look at overall temperature patterns, as well as how patterns vary from north to south and east to west." e. **Whole group:** Invite participants to share the patterns they identified on the map. Record key ideas on chart paper. f. Ask participants the following questions during the discussion: • What overall temperature patterns do you see? • How do temperatures vary from north to south? • How do temperatures vary from east to west? • What other patterns do you notice? g. Encourage participants to agree or disagree, ask questions, or add on during the discussion. Work together to reach a consensus about the temperature patterns in January.

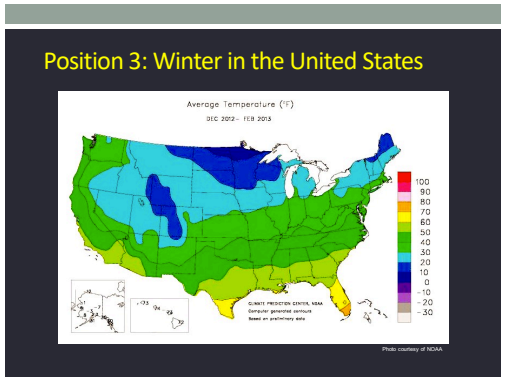
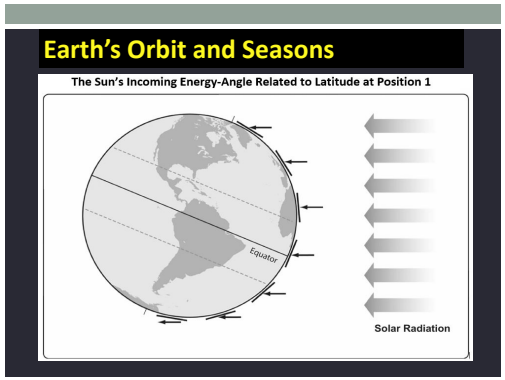
PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
			**Display Slide 41.** Investigating Temperature Patterns: Part 2 (7 min) a. "This map shows average temperatures across the United States from June 2013 through August 2013." b. Have participants locate handout 2.5 (Map of Average Temperatures in the United States, June–August) in their PD program binders. c. **Pairs:** "What temperature patterns do you notice on this map? Discuss this question with an elbow partner and be ready to share your observations. Look at overall temperature patterns, as well as how patterns vary from north to south and east to west. Then compare this map with the first map and discuss similarities and differences." d. **Whole group:** Invite participants to share the patterns they identified on the map, as well as any similarities or differences they observed when they compared the two maps. Record key ideas on chart paper. e. Ask participants the following questions during the discussion: • What overall temperature patterns do you see? • How do temperatures vary from north to south? • How do temperatures vary from east to west? • What other patterns do you notice? • What similarities and differences in weather patterns did you observe when you compared the two maps? • What do the maps tell us about weather

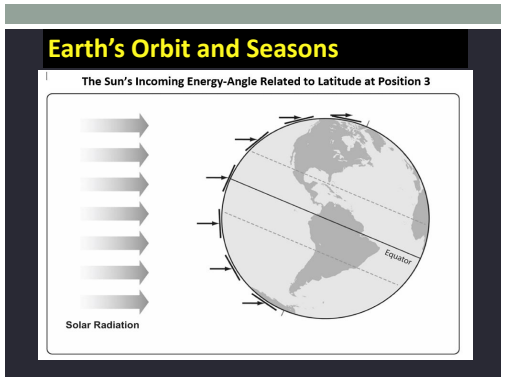
PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
			patterns in Pomona in January and July?
	10-MINUTE BREAK		
			**Display Slide 42.** Investigating Patterns: Mojave Desert (6 min) a. "This time-lapse photograph shows the night sky in California's Mojave Desert, just to the east of Los Angeles." b. **Pairs:** "Discuss the questions on the slide with your partner and be prepared to share your ideas with the group." c. **Whole group:** Elicit ideas and questions from participants about the pattern they observed in the photograph. Encourage participants to wonder and try to explain the possible cause. Summarize their ideas on chart paper before advancing to the next slide.
			**Display Slide 43.** Investigating Patterns: Yukon, Canada (6 min) a. "This time-lapse photograph shows the night sky above a lake in Yukon, Canada." b. **Pairs:** "Discuss the questions on the slide with your partner. What are the similarities and differences between this photo and the previous one? Be prepared to share your ideas with the group." **Note:** As needed toggle back and forth between this slide and the previous slide so that participants

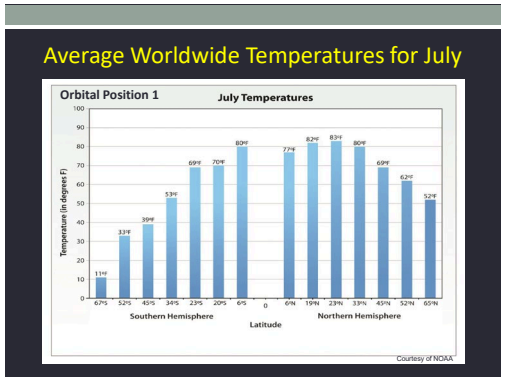
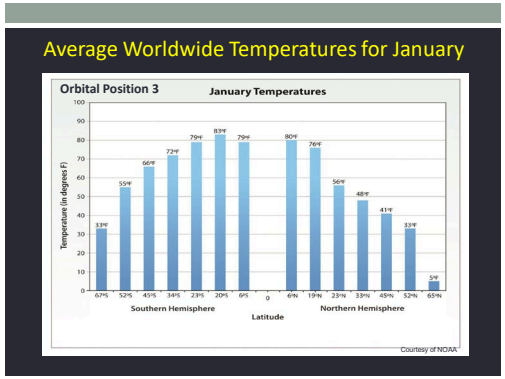
PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
			can compare the photographs. c. **Whole group:** Elicit ideas from participants about the pattern they observed in the photo and the possible cause. Ask participants about the similarities and differences they observed when they compared the two images. Summarize their ideas on chart paper before advancing to the next slide.
			**Display Slide 44.** Investigating Patterns Mt. Kilimanjaro (6 min) a. "This time-lapse photograph shows the night sky above Mount Kilimanjaro, Tanzania." b. **Pairs:** "Discuss the questions on the slide with your partner. What are the similarities and differences between this photo and the previous two? Be prepared to share your ideas with the group." **Note:** As needed toggle back and forth between the three photos (slides 42–44) so that participants can compare them. c. **Whole group:** Elicit ideas from participants about the pattern in the photo and the possible cause. Ask participants about the similarities and differences they observed when they compared the three images. Summarize their ideas on chart paper before advancing to the next slide.

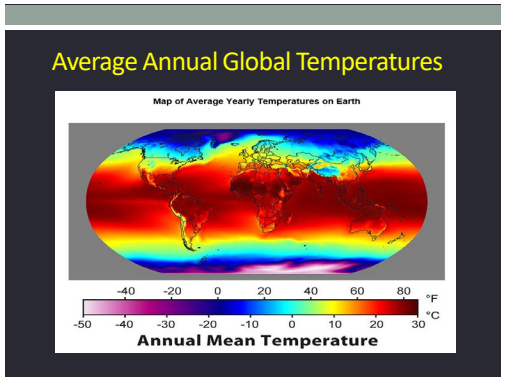
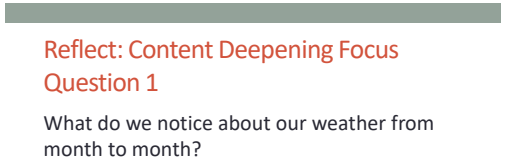
PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
			**Display Slide 45.** Explaining the Pattern: The North Star (Less than 1 min) a. "The patterns we observed in these photos are circular star trails spiraling around the North Star, which seems to remain in a fixed position. These star trails are caused by Earth rotating on its axis, which is aligned with the North Star or Polaris. The North Star appears higher in the sky to someone farther from the equator, such as in Canada, and lower in the sky to someone at a latitude closer to the equator, such as Tanzania."
			**Display Slide 46.** Earth's Orbit around the Sun (7 min) a. "This idealized figure shows Earth in four different positions along its orbit around the Sun. Note that Earth's axis, which passes through the North and South Poles, always stays aligned with or points toward the North Star. This means that the Northern Hemisphere tilts toward the Sun part of the year and away from the Sun the other part of the year." b. "Look at all four positions of Earth's orbit on the diagram. What season do you think it is in the United States in each position?" c. **Pairs:** "Share your ideas and reasoning with an elbow partner, and be prepared to share with the group." d. **Whole group:** "So which season do you think it is in each of the four positions in Earth's orbit around the Sun? Let's hear your ideas and reasons."

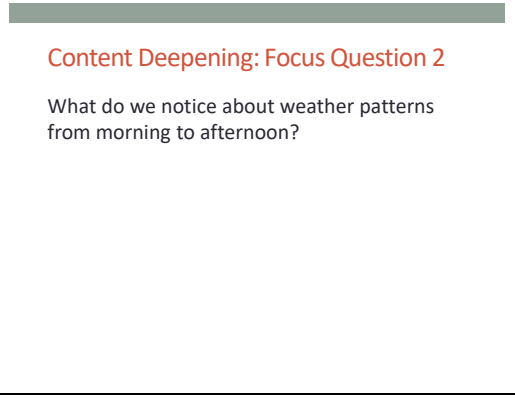
PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
			e. Record participants' ideas on chart paper and make sure everyone understands that winter occurs in the United States when Earth is tilted away from the Sun in its orbit (position 3). Summer occurs when Earth is tilted toward the Sun (position 1), and spring and fall occur when Earth is tilting neither toward nor away from the Sun (positions 2 and 4). **Ideal response:** • Position 1: summer • Position 2: fall • Position 3: winter • Position 4: spring
			**Display Slide 47.** Position 1: Summer in the United States (6 min) a. "Now let's think about how the positions in Earth's orbit around the Sun affect average temperatures in the United States. This map shows temperatures from June through August when Earth is in position 1 in its orbit around the Sun." b. Toggle back and forth between this slide and the next slide to show how average US temperatures change between position 1 (summer) and position 3 (winter). c. Ask participants, "How do the temperature patterns on these maps relate to Earth's orbit around the Sun?" **Ideal response:** • In position 1, the Northern Hemisphere is tilting toward the Sun, which results in warmer temperatures (summer). In position 3, the Northern Hemisphere is tilting away from the

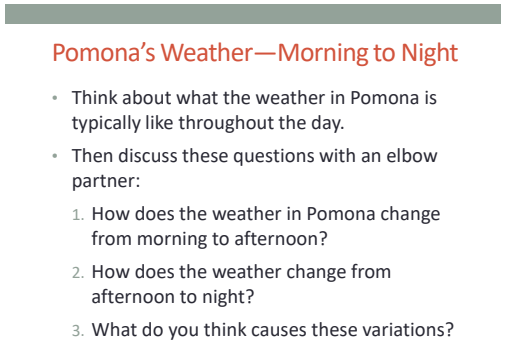
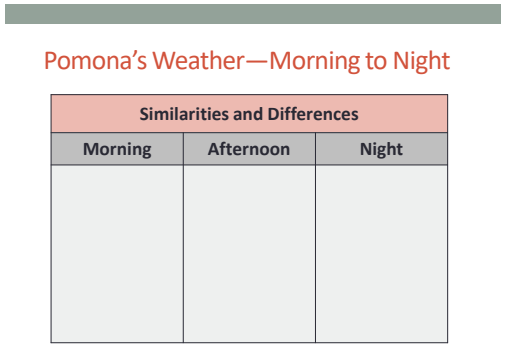
PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
			Sun, which results in cooler temperatures (winter).
			**Display Slide 48.** Position 3: Winter in the United States (Less than 1 min) a. Toggle back and forth between this slide and the previous slide to show how average US temperatures change between position 1 (summer) and position 3 (winter).
			**Display Slide 49.** Earth's Orbit and Seasons (7 min) a. Have participants pair up with an elbow partner and locate handout 2.6 (The Sun's Incoming Energy—Angle Related to Latitude at Position 1) in their PD program binders. b. "In our last content deepening session, we used a flashlight and a tray to simulate light energy from the Sun striking Earth's surface at different angles based on latitude." c. "This diagram is similar to the diagram we used last time to illustrate the Sun's incoming energy, but there's one very important difference. In this version of the diagram, Earth is tilted on its axis 23.5 degrees. Another difference is that Earth is in orbital position 1, with the Northern Hemisphere tilting toward the Sun. So the light energy is approaching Earth from the right side instead of

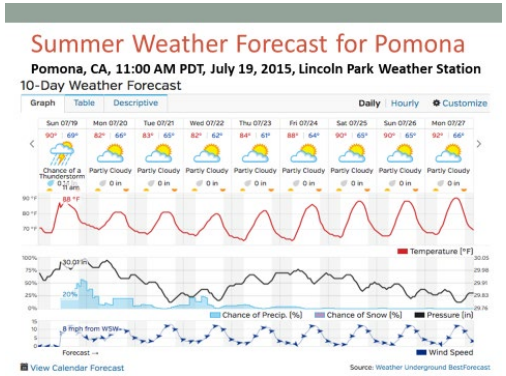
PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
			the left side." d. **Pairs:** "Using this diagram, how would you explain the temperature patterns in the United States during the summer? Briefly discuss this question with your elbow partner and develop a concise explanation to share with the group." **Note:** For this activity, have pairs refer to handout 2.5 (Map of Average Temperatures in the United States, June–August). e. **Whole group:** Invite participants to share their explanations with the group. Ask questions to clarify their thinking and work toward a consensus.
			**Display Slide 50.** Earth's Orbit and Seasons (5 min) a. Have participants locate handout 2.7 (The Sun's Incoming Energy—Angle Related to Latitude at Position 3) in their PD program binders. b. "This diagram shows Earth in orbital position 3, with the Northern Hemisphere tilting away from the Sun." c. **Pairs:** "Using this diagram, how would you explain the temperature patterns in the United States during the winter? Briefly discuss this question with your elbow partner and develop a concise explanation to share with the group." **Note:** For this activity, have pairs refer to handout 2.4 (Map of Average Temperatures in the United States, December–February). d. **Whole group:** Invite participants to share their explanations with the group. Ask questions to

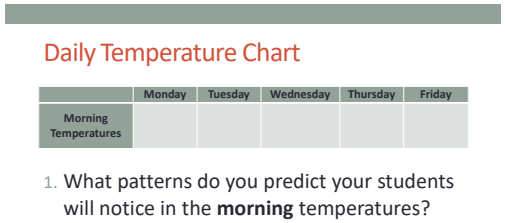
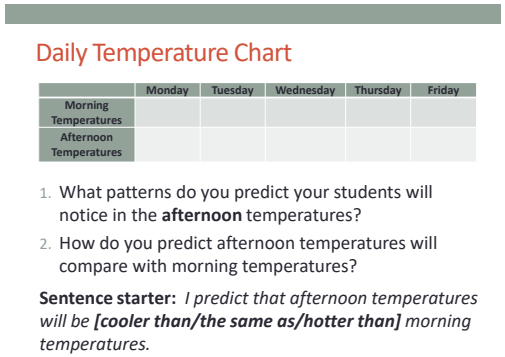
PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
			clarify their thinking and work toward a consensus.
			**Display Slide 51.** Average Worldwide Temperatures for July (5 min) a. "This bar graph shows average temperatures around the world during the month of July. The *x*-axis shows different latitudes, with the equator at 0 degrees in the center. Latitude increases moving north toward the North Pole on the right side of the graph and south toward the South Pole on the left side. The *y*-axis shows the temperature in degrees Fahrenheit." b. **Pairs:** Ask pairs to compare this graph with handout 2.6 and explain how the temperature patterns on the graph relate to position 1 of Earth's orbit. c. **Whole group:** Invite participants to share their explanations with the group. Ask questions to clarify their thinking and work toward a consensus.
			**Display Slide 52.** Average Worldwide Temperatures for January (5 min) a. "This bar graph shows average temperatures for different latitudes around the world during the month of January." b. Toggle back and forth between this slide and the previous slide to compare the average temperatures in January and July. c. **Pairs:** Ask pairs to compare this graph with handout 2.7 and explain how the temperature patterns on the graph relate to position 3 of Earth's

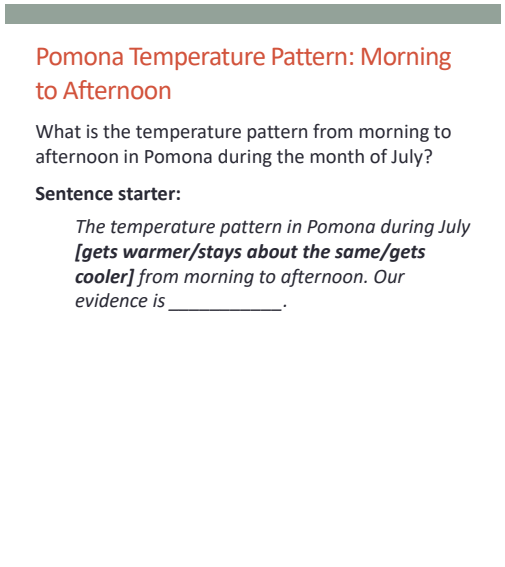
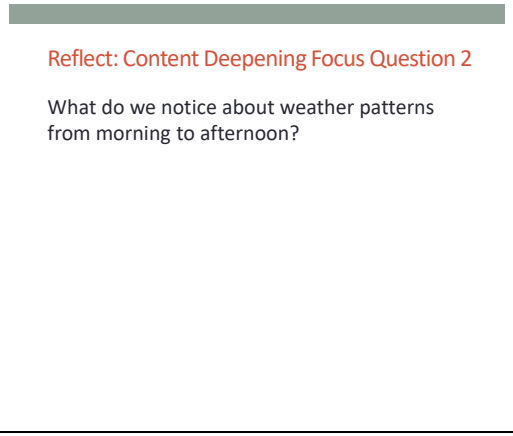
PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
			orbit. d. **Whole group:** Invite participants to share their explanations with the group. Ask questions to clarify their thinking and work toward a consensus.
			**Display Slide 53.** Average Annual Global Temperatures (3 min) a. "In our last session, we identified patterns on this map of average annual global temperatures. We observed that temperatures are generally warmer near the equator and cooler moving north and south toward the poles." b. "How would you explain the temperature patterns on this map now, based on what we've learned about Earth's orbital positions in relationship to the Sun?" c. Elicit a variety of ideas from participants and reach a group consensus that this map represents annual average temperatures in *all positions* of Earth's orbit around the Sun.
			**Display Slide 54.** Reflect: Content Deepening Focus Question 1 (5 min) a. Review the focus question on the slide. b. **Individuals:** Have participants answer the question in their science notebooks. c. **Whole group:** Invite a few participants to share their answers, using ideas and evidence from the investigations they just completed. d. As participants share their answers, write down

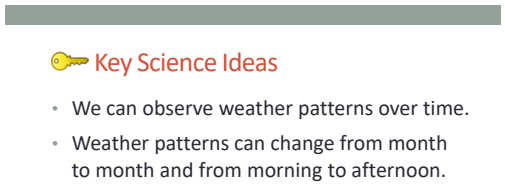
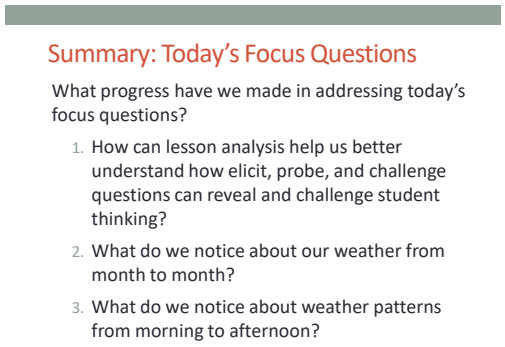
PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
			key ideas on chart paper.
			**Display Slide 55.** Weather and Seasons: Lesson 3 (Less than 1 min) a. "Next, we'll explore key science ideas from lesson 3 of the Weather and Seasons unit."
			**Display Slide 56.** Content Deepening: Focus Question 2 (Less than 1 min) a. Read the focus question on the slide. b. Have participants copy the question into their science notebooks and leave space to write a response.

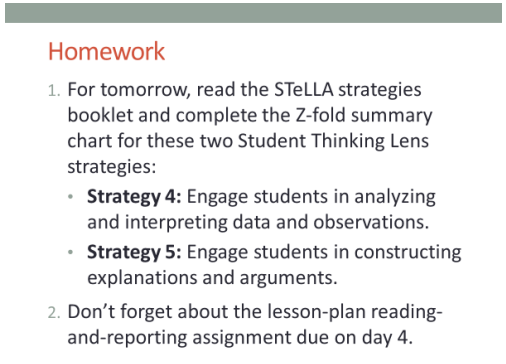
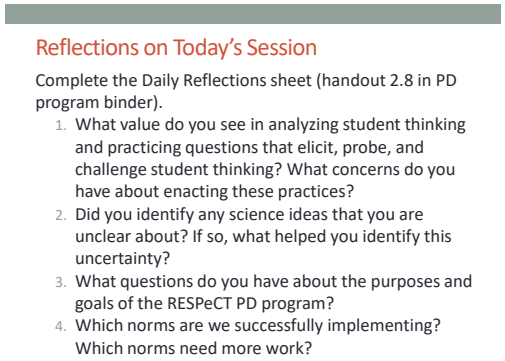
PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
			**Display Slide 57.** Pomona's Weather—Morning to Night (3 min) a. Read the questions on the slide. b. **Pairs:** "Discuss these questions with an elbow partner and work together to develop concise answers. Think about similarities and differences in the weather from morning to afternoon and from afternoon to night. Be prepared to share your ideas and reasoning with the group."
			**Display Slide 58.** Pomona's Weather—Morning to Night (6 min) a. Create a three-column table on chart paper like the one on the slide. b. Invite participants to share their answers to the questions from the previous slide: 1. How does the weather in Pomona change from morning to afternoon? 2. How does the weather change from afternoon to night? 3. What do you think causes these variations? c. Record key ideas on the table and note possible causes. Elicit differing points of view and ask probe and challenge questions to clarify participants' thinking.

PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
			**Display Slide 59.** Summer Weather Forecast for Pomona (6 min) a. "This slide shows a weather forecast for Pomona over a 10-day period in July." b. Point out that this forecast is for a specific weather station (Lincoln Park) that records weather data every day all day long. This data is used to make predictions about how the weather will change in coming days. c. Also highlight the temperature, precipitation, and wind data that shows predicted changes throughout the day. d. **Pairs:** "What patterns can you identify in this forecast that show how the weather is expected to change from morning to afternoon and from afternoon to night each day? Be prepared to support your claims with evidence from the weather chart." e. **Whole group:** Invite participants to share the patterns and evidence they identified on the chart. Encourage them to agree or disagree with one another's claims and add ideas and evidence to the discussion. Work toward a group consensus and record the patterns on chart paper.

PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
			**Display Slide 60.** Daily Temperature Chart (3 min) a. "Students will use a chart like the one on this slide to record the morning temperatures they measure outside each day with a thermometer. Then they'll use the chart to help them identify patterns." b. "What patterns do you predict your students will notice in the morning temperatures? Will morning temperatures in July be hot, warm, cool, or cold?" c. Ask participants to list some temperature patterns they think their students will notice. Record their ideas on chart paper.
			**Display Slide 61.** Daily Temperature Chart (3 min) a. "Students will also record afternoon temperatures on this chart and use the data to help them identify patterns. Then they'll compare the morning and afternoon data to identify patterns in how temperatures change throughout the day." b. "What patterns do you predict your students will notice in the afternoon temperatures? Will afternoon temperatures in July be hot, warm, cool, or cold? How do you predict afternoon temperatures will compare with morning temperatures?" c. Ask participants to list some temperature patterns they think their students will notice in the afternoon temperatures. Record their ideas on chart paper. Then invite one or two participants to use the sentence starter on the slide to predict how morning and afternoon temperatures will differ.

PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
			d. Ask, "What will you do if the temperature data don't reveal the expected pattern?"
			**Display Slide 62.** Pomona Temperature Pattern—Morning to Afternoon (3 min) a. Have participants look at the weather patterns they identified earlier on the July weather forecast table for Pomona. These patterns should have been recorded on chart paper, but you may also want to toggle back and forth between this slide and the forecast table on slide 59. b. "What is the temperature pattern from morning to afternoon in Pomona during the month of July?" c. Ask participants to use the sentence starter on the slide to describe the temperature patterns they identified on the weather-forecast table for Pomona (slide 59) and use evidence from the table to support their claims.
			**Display Slide 63.** Reflect: Content Deepening Focus Question 2 (5 min) a. Review the focus question on the slide. b. **Individuals:** Have participants answer the question in their science notebooks. c. **Whole group:** Invite a few participants to share their answers, using ideas and evidence from the investigations they just completed. d. As participants share their answers, write down key ideas on chart paper.

PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
			**Display Slide 64.** Key Science Ideas (Less than 1 min) a. Read the key science ideas on the slide.
3:15–3:30 15 min **Wrap-Up: Summary, Homework, and Reflections** Slides 65–67	**Purpose** • Summarize and reflect on the day's learning, including progress made in understanding weather and the relationship between lesson analysis and asking effective elicit, probe, and challenge questions. **What Participants Do** • Synthesize key ideas about the science content, questioning strategies, and lesson analysis. • Copy down the homework assignment for day 3.		**Display Slide 65.** Summary: Today's Focus Questions (8 min) a. Divide participants into three groups. Have Group 1 come up with some conclusions/key ideas related to focus question 1. Have Group 2 come up with conclusions/key ideas for focus question 2, and have Group 3 do the same thing for focus question 3. b. Give each group 2 minutes to come up with ideas and conclusions. c. Allow a 2-minute share-out for each group.

PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
	• Write reflections on STeLLA strategies 1, 2, and 3, and the science content. **Handouts in PD Binder** • 2.8 Daily Reflections—Day 2 **Supplies** • Science notebooks		**Display Slide 66.** Homework (1 min) a. Forecast that tomorrow you'll tackle two new, closely interconnected Student Thinking Lens strategies. b. Have participants copy the homework assignment into their science notebooks. c. Remind participants about their homework for Friday (becoming experts on the lesson plan assigned to them).
			**Display Slide 67.** Reflections on Today's Session (6 min) a. Make sure participants have **at least 5 minutes** to think about the questions on the reflections sheet (handout 2.8 in the PD program binder) and write down their reflections.