EQuIP Rubric for Science

Space: Sky Patterns

What patterns of the Sun, Moon, and stars can we observe, describe, and predict?

Curriculum Developer: OpenSciEd

GRADE 1 | JULY 2025

nsta
National Science Teaching Association

Category I Rating

A	B	C	D	E	F
Explaining Phenomena/ Designing Solutions	Three Dimensions	Integrating the Three Dimensions	Unit Coherence	Multiple Science Domains	Math and ELA
EXTENSIVE	EXTENSIVE	EXTENSIVE	EXTENSIVE	EXTENSIVE	EXTENSIVE

Score Category I: 3

Category II Rating

A	B	C	D	E	F	G
Relevance and Authenticity	Student Ideas	Building Progressions	Scientific Accuracy	Differentiated Instruction	Teacher Support for Unit Coherence	Scaffolded Differentiation Over Time
EXTENSIVE	EXTENSIVE	EXTENSIVE	EXTENSIVE	EXTENSIVE	EXTENSIVE	EXTENSIVE

Score Category II: 3

Category III Rating

A	B	C	D	E	F
Monitoring 3D Student Performance	Formative	Scoring Guidance	Unbiased Tasks/Items	Coherent Assessment System	Opportunity to Learn
EXTENSIVE	EXTENSIVE	EXTENSIVE	EXTENSIVE	EXTENSIVE	EXTENSIVE

Score Category III: 3

UNIT 1.3

Sum Categories	**9**
Rating	**E**

Overall Summary Comments

This unit is designed for the *Next Generation Science Standards* (*NGSS*), including clear and compelling evidence of the following criteria:

- **I.A. Explaining Phenomena/Designing Solutions.** Reviewers found extensive evidence that student sensemaking drives learning. Lessons are organized around three sky-related experiences– the Sun is out when we go for walks at some times but other times it is not, the Sun is in our eyes at some times but not others, and the Moon and stars are sometimes visible- that motivate students to ask questions and seek evidence to support explanations.
- **I.C. Integrating the Three Dimensions.** Student performances require integration of SEPs, CCCs, and DCIs simultaneously to explain phenomena, such as using observation data and pattern identification to explain the apparent motion of the Sun. Integration is evident in all lessons, not isolated to one activity.
- **III.A. Monitoring 3-D Student Performance.** Assessments elicit direct, observable evidence of three-dimensional learning. Students produce artifacts—like written claims with evidence from observations—that show they are using practices with core ideas and crosscutting concepts to make sense of sky patterns.

The unit was reviewed to "provide constructive criterion-based feedback and suggestions for improvement to developers" (EQuIP Rubric for Lessons & Units: Science [Version 3.1]). Reviewers recommend focusing on the following criteria during revisions:

- **I.D. Unit Coherence.** While coherence is generally strong, reviewers suggest improving connections between lessons. Specifically, teachers could be guided more explicitly to remind students of the original phenomenon from Lesson 1 when introducing related Moon observations in Lesson 5.
- **II.B. Student Ideas.** While the unit provides multiple opportunities for students to share and build on their ideas, reviewers recommend including artifacts that capture how individual student thinking and reasoning change over time. For example, teachers could be prompted to collect and revisit student science notebook entries, annotated models, or contributions to class charts (like *Our Growing Ideas*) across lessons. Explicit guidance to document how students revise explanations or add new evidence would make these shifts in thinking more visible and support teachers in monitoring student growth in understanding.

Why are there two colors of text in this report?

Black text is used in this report to identify direct quotations or paraphrases of a lesson/unit (the evidence) and why/how this evidence indicates the criterion is being met (the reasoning). (EQuIP Rubric for Lessons & Units: Science [Version 3.1])

Black text is also used for evidence and reasoning that does not affect the rating of the criterion.

Purple text is used in this report to identify direct quotations or paraphrases of a lesson/unit (the evidence) and why/how this evidence indicates that the criterion is NOT being met (the reasoning). (EQuIP Rubric for Lessons & Units: Science [Version 3.1]) The exception to this is when a criterion is rated as "extensive." In those cases, purple is used as a visual cue to *"provide constructive criterion-based feedback and suggestions for improvement to developers"* (EQuIP Rubric for Lessons & Units: Science [Version 3.1]).

CATEGORY I
NGSS 3D Design

I.A. Explaining Phenomena / Designing Solutions

EXTENSIVE

Making sense of phenomena and/or designing solutions to a problem drive student learning.

i. Student questions and prior experiences related to the phenomenon or problem motivate sense-making and/or problem solving.

ii. The focus of the lesson is to support students in making sense of phenomena and/or designing solutions to problems.

iii. When engineering is a learning focus, it is integrated with developing disciplinary core ideas from physical, life, and/or earth and space sciences.

The reviewers found **extensive** evidence that making sense of phenomena drives student learning. Materials are organized so that students are figuring out sky-related events in three lesson sets. In Lesson Set 1, students figure out how the Sun is sometimes in our eyes, but not at other times. In Lesson Set 2, students make sense of how they sometimes notice the Moon and stars in the sky, but not at other times. In Lesson Set 3, students figure out why it is light out when they go for evening walks sometimes, but not at other times. Student questions and prior experiences related to the phenomenon consistently motivate sensemaking and/or problem solving.

i. Student questions and prior experiences related to the phenomenon or problem motivate sense-making and/or problem-solving.

Student-centered focus on phenomena or problems

- Unit Front Matter "The anchoring phenomena for this unit are three sky-related experiences that happen sometimes, but not all the time: evening walks when it is sometimes (but not all the time) light out, how we sometimes (but not all the time) notice the Moon and stars in the sky, and how the Sun is sometimes (but not all the time) in our eyes." (Unit Front Matter)
- Lesson 1, Connect, Step 1: "Have you had an experience like this, when the Sun was shining in your eyes (when you were in the car, when you were at recess)? What was that like? Does that always happen? What else have you noticed in or about the sky outside? What was that like? Does that always happen? Point out for students how we shared many different experiences. These suggest that the sky is not always the same! You might say something like, Isn't that interesting? It seems like sometimes the sky is really bright out and sometimes it's really dark out, sometimes the Sun is shining in our eyes, but other times it's not! (Lesson 1, Teacher Guide)
- Lesson 1, Connect, Step 1: "Invite students to first think and then turn and talk with a partner about when they or someone they know may have had a similar experience of the Sun in their eyes. The purpose of this turn-and-talk discussion is to support students in generating initial connections with this common phenomenon and to motivate engaging with others' experiences using a text next...Invite some students to share their own or their partner's experiences of a time when the Sun was shining in their eyes. Welcome students' varied ways of communicating about their and others' experiences, including gesturing or miming actions. Consider inviting students to use gestures ("me, too") or hand-signs (thumb up) to indicate a similar experience." (Lesson 1, Teacher Guide)
- Lesson 1, Connect, Step 1: "Sarah, Korey, and their family live in Laurel, Delaware. They like to walk in their neighborhood in the evening. Sarah likes it best when they walk to the playground down the road. Sometimes, it is bright outside on their walks. When it is bright, Sarah and Korey can swing at the playground. But at other times, it is dark outside on their walks. When it is too dark, Sarah and Korey do not stop to swing." (Lesson 1, Observing the Sky in Our Communities Book)

- Lesson 1, Connect, Step 1: "Calia and Trudy live in Oxford, Mississippi. Every Friday, they go outside before bed to take out the trash and recycling. The sky looks different when Calia and Trudy take the trash and recycling outside before bed. Sometimes, they see the Moon in the sky. Tonight, they see the Moon in the sky when they walk out of their front door. But at other times, they do not." (Lesson 1, Observing the Sky in Our Communities Book)
- Lesson 1, Connect, Step 1: "Sometimes, Malayna and Lincoln leave the library, and the Sun is in their eyes! Malayna and Lincoln walk slowly and use their hands to block the Sun from their eyes. But at other times, the Sun is not in Malayna and Lincoln's eyes. Today, they can leave the library without needing to use their hands to block the Sun from their eyes." (Lesson 1, Observing the Sky in Our Communities Book)
- Lesson 1, Navigate, Step 2: "For example, remind students that the first phenomenon we discussed is how evening events (like an evening walk) can happen when it's bright out and when it's dark out. Then share a few recorded noticings and a few wonders. The second is how the Moon and stars can sometimes be observed in the sky, but not always, and the third is how the Sun can sometimes shine in our eyes, but not all the time." (Lesson 1, Teacher Guide)
- Lesson 1, Navigate, Step 2 "Many of our suggestions are about the Sun; what questions do you think we should start with related to what we just read about the Sun in our book?... Build on students' suggested questions to co-construct the first lesson set question, likely something similar to, How can the Sun be in my eyes sometimes, but not other times?... What could we do next to begin figuring out how the Sun can be in our eyes sometimes, but not all the time?... How would we know if the Sun is in our eyes or not?" (Lesson 1, Teacher Guide)
- Lesson 2, Navigate, Step 1: "Gather students in a Scientists Circle so they can see the Sun Observations chart (refer to slide A). Use the following prompts to engage students in a brief discussion to help students recall our work in the last lesson and reconnect with our lesson set phenomenon in ways that motivate making additional observations of the Sun in the sky in this lesson...What did we do in our last science lesson? What did we figure out?... Why did we do this; what were we wondering about the Sun?... Why the Sun is sometimes in our eyes." (Lesson 2, Teacher Guide)
- Lesson 3, Navigate, Step 7: "Use a personal anecdote to connect to our lesson set question, How can the Sun be in our eyes sometimes, but not all the time?, and motivate figuring out more about the Sun's locations in the sky. You might consider saying something like, "I help outside our school at lots of different times of day, like when I do recess duty or help with the buses. I really dislike when the Sun is in my eyes! I wish I knew where the Sun was in the sky, so I could keep it out of my eyes every single time. We figured out where the Sun is in the morning and afternoon, but I wonder if there's a way to know where the Sun is in the sky at all the times of day?" (Lesson 3, Teacher Guide)
- Lesson 5, Synthesize, Step 4: "Share experiences about the Sun in our eyes. Invite students to turn and talk about their experiences and connections to the initial phenomenon, referencing Our Experiences chart as needed. Then invite students to share some experiences with the class. What experiences have you had when the Sun was in your eyes? When did that happen? Where were you? Where do you think the Sun was in the sky? Why do you think that?" (Lesson 5, Teacher Guide)
- Lesson 5, Synthesize, Step 5: "Remind students that our goal in this Consensus Discussion is to make a claim that answers our lesson set question, How can the Sun be in our eyes sometimes, but not all the time? Once multiple students have shared and responded to one another's ideas, add a synthesis of the class' ideas to the column titled, "What did we figure out?... What claim can we make about our lesson set question: How can the Sun be in our eyes sometimes, but not all the time? The Sun changes locations in the sky, so it's not always in the same place. Because it depends on where we are facing and where the Sun is in the sky! When the Sun is low near the ground, that is when it might be in our eyes. It's only low in the sky at certain times of day, like morning. If we are facing east and it is morning, the Sun might be in our eyes! But not if we are facing west and it is morning. If we are facing west and it is evening, the Sun might be in our eyes, but not if we are facing east!" (Lesson 5, Teacher Guide)

- Lesson 5, Navigate, Step 7: "As at other times we have generated questions, it may be helpful to problematize students' observations and experiences into questions. For example, if some students have noticed the Moon before bedtime, but not others, you can identify for students, Some of us have observed the Moon before we go to bed but not all of us, that makes us wonder, Where is the Moon before we go to bed? Where can we see the Moon in the sky? Or When can we see the Moon in the sky?... What questions do we have about our different experiences with the Moon and stars?.. So far, we have observed the Sun's location in the sky and how it seems to move in an ongoing path across the sky. What questions do you have about whether the Moon or stars seem to move that way or a different way?.. Summarize students' existing and new questions about objects in the sky (besides the Sun), specifically the Moon and stars. Build on students' suggestions to co-construct a new (the second) lesson set question: When and where do we see the Moon and stars in the sky?" (Lesson 5, Teacher Guide) The way the Moon and stars phenomenon is reintroduced in Lesson 5 differs from its use in Lesson 1. In Lesson 1, students read about children who notice the Moon and stars when taking out the trash or recycling; sometimes they see them, and sometimes they don't. In Lesson 5, however, teachers are encouraged to draw on their own class's sky observations to motivate the learning in Lessons 5 and 6. This shift in framing, combined with the variety of possible observations that students may report, may make it difficult for students to know exactly what it is they are figuring out.
- Lesson 6, Navigate, Step 1: "Point out to students that many of us have experiences noticing the Moon, and we seem to be describing it in different locations in the sky. You might say something like, Wait! Am I hearing that we have seen the Moon in different spots in the sky? Invite students to turn and talk about their ideas related to the Moon appearing in different locations in the sky. Do you think that the Moon changes locations in the sky? Why do you think that? Then, engage in a brief whole-class discussion, the goal of which is to elevate the different ideas in the room about whether or not the Moon changes locations in the sky and why we think that." (Lesson 6, Teacher Guide)
- Lesson 7, Synthesize, Step 4: "Put together the pieces to answer the Lesson Set Question. Engage students in a discussion connecting their work in Lesson 6 and Lesson 7 to the Lesson Set Question: When and where do we see the Moon and stars? During this discussion, ensure students can reference both lessons' rows in Our Growing Ideas chart...Our lesson set question that we are working on figuring out is When and where do we see the Moon and stars? How has our work in Lesson 6 helped us? (Refer to Our Growing Ideas for Lesson 6)" (Lesson 7, Teacher Guide)
- Lesson 8, Navigate, Step 1: Make connections and review questions. Use the following prompts to support students in making connections to their ideas and questions about the Delaware community where Sarah and Korey's evening walks sometimes happen in the daytime (bright) and sometimes in the nighttime (dark), that helped us co-construct our lesson set question, How can evening events (evening walks) sometimes happen in the daytime and sometimes in the nighttime?, as well as to other questions on our Notice and Wonder chart related to daytime and nighttime... What questions did we have about Sarah and Korey in their Delaware community and their evening family walks that sometimes happen in the daytime and sometimes happen in the nighttime?"
- Lesson 9, Navigate, Step 1 "Remind students that the Day A and Day B data from our last lesson are from Sarah and Korey's class in Laurel, Delaware and that we also found out about Sarah and Korey in our Observing the Sky in Our Communities book (refer to slide A): Sometimes Sarah and Korey would swing at the playground when they took their evening walk because it was daytime (bright), but other times it was nighttime (dark) so they wouldn't swing. Invite students to connect with Sarah and Korey's experience from the text by showing whether or not they would prefer to take an evening walk when it's daytime or nighttime. Consider using a show of hands (raised hand for yes), a thumb up/thumb down, or standing up (stand up for yes) to have students share. (Hand up) if you would prefer to take an evening walk in the daytime and play on the swings. (Hand up) if you would prefer to take an evening walk in the nighttime and not stop at the swings. Anticipate that most students will indicate wanting to take an evening walk in the daytime to play on the swings and use this as motivation to focus on "daytime" next. If this is not how your class responds, consider suggesting we focus on daytime because Sarah and Korey (in the book) want to play on the swings and are disappointed whenever it is too dark to stop at the playground." (Lesson 9, Teacher Guide)

- Lesson 9, Navigate, Step 7: "Remind students that we have now figured out when Day A and Day B happened in Delaware, where Sarah and Korey from our Observing the Sky in Our Communities book are from. Remind students of how we were discussing Sarah and Korey's experiences going for evening walks where they live in Delaware at the start of this lesson (refer to slide M). Suggest that we likely have new ideas about this phenomenon now that we have figured out that daytimes can be longer and shorter depending on the season. Give students a moment to turn and talk to share their ideas about the following prompt with a partner before discussing as a whole class. If needed, point out resources around the room (e.g., the class Word Wall, Monthly Daytime Graph, Day A and Day B Graph, etc.), as well as those on Our Growing Ideas chart, for students to use...Now that we've figured out a seasonal pattern of shorter and longer daytime lengths and what causes this pattern, what ideas do you have about how Sarah and Korey's evening walks can sometimes happen in the daytime and sometimes in the nighttime?" (Lesson 9, Teacher Guide)
- Lesson 10, Navigate, Step 1: "Recall our questions. Display slide A and our Notice and Wonder chart. Recall with students where we left off: we have figured out a lot about our Lesson Set Question, How can evening events (evening walks) sometimes happen in the daytime and sometimes in the nighttime?, but we still have some things we aren't sure about. Point out students' questions on our Notice and Wonder chart and read aloud a few students' questions--likely related to Sarah and Korey's experiences in Delaware--such as "When are their evening walks?", "Are they walking in the summer or the winter?", or "Do they walk before or after sunrise or sunset?". (Lesson 10, Teacher Guide)

Consistent student-driven learning over time

Student questions or prior experiences related to the phenomena and problems consistently create an explicit need, from the students' perspective, for the students to engage in learning throughout the materials. Students have frequent opportunities to feel as if they are driving the learning sequence.

- Lesson 3, Navigate, Step 1: "Elevate different predictions. Affirm with students that we made some different predictions. Point out how it is interesting that (some, many) students predict the Sun will be in the same location in the sky this morning as it was in the morning when we made observations in Lesson 2. However, we noticed we don't all agree! Some of us predict the Sun will be in a different location in the sky than when we observed it in the morning in Lesson 2. Consider where to go next. Invite students' ideas for what to do next: We have different predictions for where the Sun will be in the sky; how can we find out more? This brief discussion supports sharing ideas and language that will be used to co-construct the lesson question next...Use students' disagreement and uncertainty about whether the Sun's observed locations in the sky repeat on other mornings and afternoons to co-construct the lesson question together. This may be something similar to: Do the Sun's different locations in the sky repeat?" (Lesson 3, Teacher Guide)
- Lesson 5, Navigate, Step 7: "Engage students in a discussion to identify unanswered questions on the Notice and Wonder chart and find and share related experiences on Our Experiences chart related to the Moon and stars....What questions did we have about other objects in the sky, besides the Sun? (point to Wonder side of Notice and Wonder chart)...What experiences have we had with the Moon and stars? Where and when have we seen the Moon and stars in the sky? (point to Our Experiences chart)." (Lesson 5, Teacher Guide)
- Lesson 7, Navigate, Step 1: "Revisit our Notice and Wonder chart and co-construct the lesson question. Gather students in a Scientists Circle and ensure they can all see our Notice and Wonder chart (refer to slide A). Using the Notice and Wonder chart and questions from the end of last lesson, review with students how many of us had questions about the Moon and when we can see it, about what objects are in the sky in the daytime and nighttime, and about what makes it daytime and nighttime, anyway! Use these connections to co-construct the lesson question: *What makes it daytime or nighttime?* (refer to slide B; be sure to update the lesson question on the slide to reflect the question the class co-constructs.)" (Lesson 7, Teacher Guide)

When multiple phenomena and /or problems are used

- Lesson 1, Navigate, Step 2: "For example, remind students that the first phenomenon we discussed is how evening events (like an evening walk) can happen when it's bright out and when it's dark out. Then share a few recorded noticings and a few wonders. The second is how the Moon and stars can sometimes be observed in the sky, but not always, and the third is how the Sun can sometimes shine in our eyes, but not all the time. After this brief review, tell students that their questions will help us decide what to do next." (Lesson 1, Teacher Guide)
- Lesson 5, Navigate, Part 7: "Turn attention to the Moon and stars. To move into the next lesson set, you will want to reconnect with students' questions and experiences with the Moon and stars. One way to do this is to say something like, So far, we have only been making observations and conducting investigations related to the Sun! What about the experiences with other objects in the sky, like the Moon and stars?... Review unanswered questions and related experiences. Continue to ensure students have access to both the Notice and Wonder chart and Our Experiences chart (refer to slide Q). Engage students in a discussion to identify unanswered questions on the Notice and Wonder chart and find and share related experiences on Our Experiences chart related to the Moon and stars...Summarize students' existing and new questions about objects in the sky (besides the Sun), specifically the Moon and stars. Build on students' suggestions to co-construct a new (the second) lesson set question, When and where do we see the Moon and stars in the sky?" (Lesson 5, Teacher Guide)

ii. The focus of the unit is to support students in making sense of phenomena and/or designing solutions to problems.

Close match between the phenomena/problems and the student learning objectives throughout the materials

Almost all of the student learning in the three dimensions targeted by the materials is in service of students making sense of phenomena or designing solutions to a problem.

- Lesson 3, Lesson Learning Goal 3b: **Construct an argument using evidence to support a claim that the Sun's different locations in the sky at different times of day** (morning, afternoon) **repeat.**
  - Lesson 3, Synthesize, Step 6: Support students in sharing claims with evidence. Use the following prompts to support students in sharing claims (votes) and evidence. The purpose of this discussion is to provide students an opportunity to share their claims with evidence, listen to each other, and move toward agreement on an answer to the lesson question...What claim can you make if your sticky note is in the "yes" column? What is your evidence? Who can add on to _____'s claim? Who can restate _____'s claim and evidence?... Following this discussion, summarize students' convergence on a consensus claim based on our evidence; this could sound something like, "It sounds like we are agreeing on 'Yes, the Sun's different locations in the sky repeat!'" Suggest that we record this claim on Our Growing Ideas chart and transition to that bolded step." (Lesson 3, Teacher Guide)
- Lesson 6, Lesson Learning Goal 6b: **Use observations to describe the pattern** of **the Moon's apparent motion across the sky in an ongoing path**.
  - Lesson 6, Explore, Part 4: "Show a Moon time-lapse video. Tell students that you have a time-lapse video, like the one we used in Lesson 4 to view the Sun's changing location in the sky, but with the Moon in it (refer to slide H). Remind students that a time-lapse video is a recording that shows what happens over a long time, in a shorter amount of time. In this way, it can show us what we would see between each Moon Location card as if we had images from every single minute! Show students the Moon Timelapse video....After viewing the video, use the following prompt to engage students in a brief discussion with the goal of supporting students in describing their observations of the Moon's apparent motion across the sky in an ongoing path. Prompts to use: What did we observe about the Moon's changing location in the sky, using that video?" (Lesson 6, Teacher Guide)

- Lesson 9, Lesson Learning Goal 9b: **Analyze data to describe the pattern of longer daytimes in summer (more daytime hours; earlier sunrise/later sunset) and shorter daytimes in winter (fewer daytime hours; later sunrise/earlier sunset)**.
  - Lesson 9, Explore, Step 2: "Introduce additional data. Display slide C and tell students that you were able to locate additional data collected by Sarah and Korey's first grade class in Laurel, Delaware. Show students just the December page (page 1) from the Monthly Data handout. Invite students to discuss how this data is similar to and different from the Day A Data and Day B Data handouts we used in our last lesson...How is this new December Data handout similar to the Day A Data and Day B Data handouts we used last time? I heard you say they both have boxes with suns or stars; what do the boxes represent? How many are there? The boxes are hours in the day. They both have 24. 24 - that's the number of hours in a day...Summarize similarities/differences in sky observations data. Review students' noticings to ensure we all recognize that the new Monthly Data is similar to the Day A and B Data in that they both show observations of the sky over 24 hours (one day), a sky observation each hour, and whether it was daytime (Sun) or nighttime (no Sun, represented with a star). They are different because the December Data shows sky observations for one day during a specific month (example on slide C is December)." (Lesson 9, Teacher Guide)

Criterion-Based Suggestions for Improvement:

- "Phenomena and/or problems are clearly connected to each other in a logical way from the students' perspective and build on each other coherently." [Detailed Guidance, p. 7]
  - Lesson 5 does not explicitly use the same phenomenon that students experience in Lesson 1. Consider using the same Moon phenomenon in both lessons to ensure students understand specifically what it is they are making sense of.

I.B. Three Dimensions

[All 3 dimensions must be rated at least "adequate" to mark "adequate" overall]

EXTENSIVE

Builds understanding of multiple grade-appropriate elements of the science and engineering practices [SEPs], disciplinary core ideas [DCIs], and crosscutting concepts [CCCs] *that are deliberately selected to aid student sense-making of phenomena and/or designing of solutions.*

Document evidence and reasoning, and evaluate whether or not there is sufficient evidence of quality for each dimension separately.

Evidence needs to be at the *element level* of the dimensions [see rubric introduction for a description of what is meant by "element"]

The reviewers found **extensive** evidence that the materials give students opportunities to build understanding of grade-appropriate elements of the three dimensions because students regularly engage in elements of all three dimensions to make sense of the anchoring or lesson-level phenomenon. The unit centers on students using targeted elements of all three dimensions that are clearly identified and addressed throughout the unit to explain sky-related phenomena.

Rating for Criterion: SEP **EXTENSIVE**

i. Provides opportunities to *develop and use* specific elements of the SEP(s).

The reviewers found **extensive** evidence that the materials provide opportunities to develop and use specific elements of the SEPs:

- **INV-P2: Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence to answer a question**.
- **INV-P4: Make observations (firsthand or from media) and/or measurements to collect data that can be used to make comparisons.**
- **DATA-P3: Use observations (firsthand or from media) to describe patterns and/or relationships in the natural and designed world(s) in order to answer scientific questions and solve problems.**
- **MATH-P2: Use counting and numbers to identify and describe patterns in the natural and designed world(s).**
- **MATH-P3: Describe, measure, and/or compare quantitative attributes of different objects and display the data using simple graphs.**
- **ARG-P5: Listen actively to arguments to indicate agreement or disagreement based on evidence, and/or to retell the main points of the argument.**
- **ARG-P6: Construct an argument with evidence to support a claim.**

The materials explicitly support the development and use of these elements as students make sense of the sky-related phenomena in each lesson set. Students are supported in developing deep competence in these specific elements, so that they can be applied to more than one context.

INV: Planning and Carrying Out Investigations

Claimed Element: **INV-P2: Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence to answer a question.** Claimed in Lessons 1, 2, 3, 4, and 6. Evidence was found in all claimed lessons. Examples include:

- Lesson 1, Explore, Step 3: "Introduce or remind students that an investigation is a plan scientists use to help them answer their question and figure out what to do next. Tell students that, as we make decisions together about how we can investigate where the Sun is in the sky, we can develop our own Sun Investigation Plan. Show students a (blank) Sun Investigation Plan on chart paper (folded in half so only the right-side is visible) or in a digital space and prepare to co-create it together (including editing slide H) with students...Invite students to turn and talk with a partner about what they could do to begin to answer our lesson question, Where is the Sun in the sky today? How do you think we can answer our lesson question, Where is the Sun in the sky today? Then, facilitate a discussion with the whole class to gather students' input on planning our investigation...What ideas do you have about how we can answer our lesson question, Where is the Sun in the sky today?.. Summarize students' ideas for going outside and finding the Sun in the sky and ensure students' decisions are recorded on the Sun Investigation Plan. Revoice students' use of the word observations or--if students did not use this word--connect their ideas for

noticing the Sun in the sky with making observations, which are details we notice using our senses." (Lesson 1, Teacher Guide)

- Lesson 2, Explore, Step 3: "Consider similarities and differences to the Lesson 1 investigation. Engage students in a discussion to collaboratively plan an investigation that will help us answer our new lesson question, Where is the Sun in the sky throughout the day? Using the Sun Investigation Plan from Lesson 1 as a reference for how to make and record observations in the same and different ways provides a scaffold that can support routinizing students' decisions, allowing them to build on past experiences and positioning them to successfully plan additional investigations in the next lessons." (Lesson 2, Teacher Guide)
- Lesson 3, Explore, Step 5: "Revisit and update the Sun Investigation Plan. Ensure students can see their Sun Investigation Plan (refer to slide K). With students' input, review and update the Sun Investigation Plan, possibly by adding checks to steps they should continue to do (go outside, wear Sun safety goggles) and by circling, adding to, and/or crossing out steps that are different from previous investigations (e.g., cross out "midday;" circle "afternoon" and "green"). Suggest to students that we make and record these afternoon observations individually, since we have had so many opportunities to work with each other in partnerships already and this can build their independence in making and recording observations." (Lesson 3, Teacher Guide)
- Lesson 4, Explore, Step 2: "Use the following prompt to engage in a Think, Pair, Share discussion through which students can consider how to use the 'time of day' labels to organize their Sun Location cards sequentially and investigate the lesson question. Ensure this step is then added to the class's Sun Investigation Plan, in the "Use images" column (refer to slide E)…How could we use these times/labels to organize the Sun Location cards?… Thank students for their ideas and affirm the collaborative decision to put the Sun Location cards in order by their time labels…What steps did we follow to make and record observations of the Sun in our other investigations that we could do again this time? What do we need to do differently using our images?… Affirm students' ideas and ensure they are recorded on the Sun Investigation Plan: we will continue to find the Sun, point to it, and compare it to the ground-based reference points in the image. We will no longer go outside or use Sun safety goggles…With students, review the plan to use the images on the Sun Location card sets to make and record observations: Use images: Put the cards in order based on time. Make and record observations: Observe the Sun in each image. Point to and circle the Sun's location. Share your enthusiasm about how this plan can help us figure out an answer to our lesson question: What happens to the Sun in the sky between morning and afternoon? Suggest to students that we work in pairs to carry out our investigation next." (Lesson 4, Teacher Guide)
- Lesson 6, Explore, Step 2: "It sounds like we are saying we need to make lots and lots of observations of the Moon in the sky. How could we do this? How have we made lots and lots of observations in our previous investigations?… Decide to use images. Connect to students' likely suggestions to use media (like with the Sun in Lesson 4) to make observations to figure out if the Moon changes locations in the sky. Use the next Think, Pair, Share to support students in collaboratively deciding to use media (photos and/or videos) to make observations to produce data that will answer our lesson question…How could it help us answer our question if we used _____'s suggestion of using photographs, images, or a video of the Moon?… Prepare a Moon Investigation Plan. In a way that works well for your class, prepare to make a Moon Investigation Plan. This could be by editing the Lesson 4 Sun Investigation Plan by crossing out and/or adding to its words and drawings, making a new row on the same chart, or by making a new Investigation Plan." (Lesson 6, Teacher Guide)

INV: Planning and Carrying Out Investigations

Claimed Element: INV-P4: Make observations (firsthand or from media) and/or measurements to collect data that can be used to make comparisons. Claimed in Lessons 1, 2, 3, 4, 6, and 7. Evidence was found in all claimed lessons, examples include

- Lesson 1, Explore, Step 3: "Go outside and make observations. Bring students outside to your pre-determined Sun observation location. To support students in making Sun observations safely, you could recommend that they turn around (so their back is to the Sun) anytime they are writing or drawing and therefore their Sun safety goggles are off. Remind students to record their own observations on their First Sun Observation handouts and then compare and discuss with their partner." (Lesson 1, Teacher Guide)
- Lesson 2, Explore, Step 2: "Invite students' ideas about how we can record the observations that we make of the Sun in the sky. Use this as an opportunity to review with students how scientists record their observations so that they can compare the details they notice during and after investigations and because recorded observations help scientists remember the information they observe later. (Lesson 2, Teacher Guide)
- Lesson 2, Explore, Step 2: "Go outside and make morning Sun observations. Bring students outside to the predetermined location (that was also used in Lesson 1) and have them work with their partners to make observations of the Sun's location in the sky. Remind them to record their own observations on their Three Sun Observations handouts and then compare and discuss with their partner; partners should notice and discuss similarities and differences in their recorded observations and work toward agreement." (Lesson 2, Teacher Guide)
- Lesson 3, Explore, Step 3: "Bring students outside to the same observation location used in Lessons 1 and 2 and have them work with a partner to make and record observations of the Sun's location in the sky. Encourage partnerships to compare and work toward agreement about their recorded observations and, additionally, to discuss with each other how this morning's observation compares with the observation they made of the Sun in the sky in Lesson 2." (Lesson 3, Teacher Guide)
- Lesson 3, Explore, Step 5: "Where do you observe the Sun in the sky this afternoon? How does that compare to your observation this morning?... How does this afternoon's observation compare to our other observations in the afternoon (e.g., in Lesson 2)?" (Lesson 3, Teacher Guide)
- Lesson 4, Explore, Step 3: "Prepare to carry out our Sun Investigation Plan. Ensure students can view their Sun Investigation Plan (refer to slide F) and, if needed, invite the class to review their plan. Organize students into pairs and distribute a Sun Location card set and dry-erase marker to each partnership. Ensure that all 4 sets are used by pairs for observations; comparing observations from all of the card sets will support students identifying patterns across data in the next Explore. In pairs, observe Sun Location cards. Have partnerships work together to organize their set of Sun Location cards, referring to the list of card labels on the Sun Investigation Plan as needed." (Lesson 4, Teacher Guide)
- Lesson 6, Explore, Step 2: "After pairs have put their cards in order, circulate and use the following prompts to support students in making and recording observations of the Moon to begin to make sense of the lesson question: Does the Moon appear to change locations in the sky and, if so, how?... Where are you observing the Moon in the sky using your Moon Location cards?.. What do you think your observations mean about our lesson question, Does the Moon appear to change locations in the sky, and if so how?.. Once pairs have recorded and discussed their observations of the Moon in the sky with their partners, remind the class that scientists record their observations so they can remember and compare them. Suggest that partnerships join another pair of students with the same card set (A, B, or C) to compare observations." (Lesson 6, Teacher Guide)

- Lesson 7, Explore, Step 3: "With students, review the prompt, 'Is it daytime or nighttime?' on slide H to support students in keeping in mind their purpose for making observations. Provide each student with one Sun/Star Sky card from the Sun/Star Sky Cards. Invite students to make individual observations as they think about whether their image shows a daytime or nighttime sky. As individual students make observations, prompt them with questions like: What do you observe about the sky? What object or objects (Sun, stars) do you observe in the sky?" (Lesson 7, Teacher Guide)

DATA: Analyzing and Interpreting Data

Claimed Element: DATA: P3 Use observations (firsthand or from media) to describe patterns and/or relationships in the natural and designed world(s) in order to answer scientific questions and solve problems. Claimed in Lessons 1, 3, 4, 5, 6, 7, 9, and 10. Evidence was found in all claimed lessons, examples include

- Lesson 1, Explore, Step 4: "Review the Sun Observations chart together. Use the discussion prompts below to invite students to share what they notice about our Sun Observations chart and where we have put our sticky notes to show where we observed the Sun in the sky. The purpose of this discussion is to notice differences in how we have recorded our observations on the chart and elevate this as a difficulty or challenge. Specifically, despite observing the Sun in the same location outside, we do not yet have an agreed-upon way of representing observations so that these will be useful." (Lesson 1, Teacher Guide)
- Lesson 3, Explore, Step 5: "Referencing the Sun Observations chart, invite students to compare the class's consensus observations of the Sun in the morning (blue) with those from the afternoon (green). The purpose of this discussion is to support students in noticing that the morning observations are in one area/location while the afternoon observations are in a different area/location. To support students in noticing such differences, use language such as "all of the morning observations" or "both afternoon Suns" and gestures to different sides of the Sun Observations chart. This can support students in thinking generally about where the Sun is in the morning versus the afternoon (preparing them to discuss patterns in the data in the next Synthesize) and not on possibly small differences between multiple morning (or afternoon) observations... What do you notice about where all of the morning observations (blue) are versus where all of the afternoon observations (green) are?... Affirm students' observations that all of the morning observations are on one side of our Sun Observations chart, while the afternoon observations are on the other side of our Sun Observations chart." (Lesson 3, Teacher Guide)
- Lesson 4, Explore, Step 4: "Use the following prompt to facilitate a discussion through which students identify the pattern of the Sun's repeated changing locations in the sky using their observations from all of the Sun Location card sets....What do we notice happens over and over again in the Sun's locations in the sky? What is the pattern?... Summarize that the Sun's location in the sky at each in-between time repeats across all of the Sun Photo card sets and that we have identified a pattern: the Sun's changing locations happen over and over again in the same way in every set of photographs; it is the same in every place!" (Lesson 4, Teacher Guide)
- Lesson 5, Synthesize, Step 4: "Use the Sun Observations chart to identify time of day and direction. Ensure students can see the Sun Observations chart (refer to slide N) and invite students to use the chart as they engage in a brief discussion about when (what time of day) the Sun is likely to be in our eyes. First, invite students to turn-and-talk with a partner about the question: What time of day is the Sun likely to be in our eyes? Why do you think that?" (Lesson 5, Teacher Guide)
- Lesson 6, Explore, Step 2: "Once students have returned all the way around the circle to their own Moon Observations handout, invite students to sit back down. Engage in a discussion with students using the following prompts. The purpose of this discussion is to support students in analyzing and interpreting data (students'

recorded observations) to figure out if the Moon's changing location is the same on different nights…What did you notice about the recorded observations on everyone's Moon Observations handouts?… Does the Moon's changing location happen the same way on different nights? (Remember, each Moon Location card set--A, B, C--shows the Moon in the sky on a different night.)…Use students' ideas--or suggest the word/idea, if students have not yet mentioned it--to recall with students that a pattern is something that happens over and over again and can help us know what will happen next. Invite students to turn and talk: Describe the pattern of the Moon's changing location in the sky. Celebrate that we figured out a pattern in our data; over and over again, we observed and recorded the Moon in the same changing locations across the sky! Summarize this pattern with students: early in the night, the Moon is lower in the east; in the middle of the night, it is higher up in the middle, and then late at night it is lower in the west. Our observations show this happening over and over again, on different nights."(Lesson 6, Teacher Guide)

- Lesson 7, Explore, Step 3: "Continue the discussion to notice patterns and update the Daytime and Nighttime Evidence chart. Continue the discussion with students by revisiting the definition of a pattern, something that happens over and over again, and can help us know what will happen next. Use the following prompts to make sense of the patterns of the objects in the sky in the daytime and nighttime: Over and over again, the Sun is visible in the sky in the cards in the daytime column, while over and over again the Sun is not visible (and stars are usually visible) in the sky in the cards in the nighttime column. During this discussion, update the Daytime and Nighttime Evidence chart (refer to slide J) once you establish the most relevant (best) evidence for what makes it daytime and what makes it nighttime; circle (or indicate in a way your class decides) the evidence in the "stars" and "Sun" rows to show that we have decided this is the best evidence for daytime and nighttime." (Lesson 7, Teacher Guide)
- Lesson 9, Explore, Step 4: "Share about daytime length across months. Then, invite students to share their noticings about how daytime length changes throughout the months. Prompts to use: What do you notice about how daytime length changes across our Monthly Daytime Graph? Ideas to look for: There are less hours of daytime at the beginning and the end (9 and 10), but more in the middle (14 and 15). The numbers go from small to big to small again. The ends of the yellow bars change. The yellow bar is short, then long, then short again. It gets bigger then smaller again. Students move hands from closer together to farther apart to closer together again. Students use their fingers to trace from narrow to wide to narrow again." (Lesson 9, Teacher Guide)
- Lesson 10, Explore, Step 2: "Make sense of evening using the Day A and Day B Graph. Use the following prompts to support students in analyzing data for the evening on Day A and Day B. The purpose of this discussion is for students to use evidence from the graph to figure out how evening can sometimes be in the daytime and sometimes in the nighttime…Prompts to use: What do you notice about evening on Day A compared to Day B? It's daytime on Day A, but not Day B. The bars are all yellow on Day A, but not Day B. On Day B, there are 2 star boxes. The Sun is in the sky during the evening on Day A, but not on Day B. What causes it to still be "daytime" during the evening on Day A? Remember, a cause explains why something happens…Celebrate how students have identified that evening can happen in the daytime and the nighttime on Day B. You might say something like. Wow! Evening happens in the daytime and nighttime because of sunset? That's cool!" (Lesson 10, Teacher Guide)

MATH: Using Mathematics and Computational Thinking

Claimed Element: MATH: P2 Use counting and numbers to identify and describe patterns in the natural and designed world(s). Claimed in Lessons 8 and 9. Evidence was found in all claimed lessons, examples include

- Lesson 8, Explore Section 4: "Use students' noticings that the graph does not yet include the number of hours of daytime and nighttime that students counted and recorded on their handouts to suggest that we quickly add that

information to our graph! In a way that works well for your class, ask students to share the number of daytime hours for their day (Day A or Day B). Possible options include counting in unison, having a student share the number out-loud and have others use a gesture to agree/disagree, inviting a student to come up to the class graph and point, or having a student with a Day A Data or a Day B Data handout share their findings." (Lesson 8, Teacher Guide)

- Lesson 9, Explore, Step 2: "Using the prompts below, count and color the December Data together to make shared decisions about what we will all do to analyze our data for each month next (refer to slide D). Have a red/pink/orange coloring utensil available to use for sunrise and sunset during that part of the discussion...How can we use counting to figure out how long daytime was on this day in December?... How could we show when daytime starts and ends, to help us notice how long it is? What did we do last time to show that on the Day A and Day B Graph?... Invite students to repeat the steps we just decided on as a class to make sense of the monthly sky observations data we have (refer to slide E): Count the number of boxes with suns and record this as the number of daytime hours; Color the boxes with suns in yellow; and Add a red/pink/orange line at sunrise and sunset. Tell students we are ready to analyze our own data using their data skills from math class!" (Lesson 9, Teacher Guide)

MATH: Using Mathematics and Computational Thinking

Claimed Element: MATH: P3 Describe, measure, and/or compare quantitative attributes of different objects and display the data using simple graphs. Claimed in Lessons 8 and 9. Evidence was found in all claimed lessons, examples include

- Lesson 8, Explore, Step 4: "Color daytime hours on the graph. Affirm students' noticings that the graph has the Suns and stars in the boxes, just like their handouts. Remind students that our goal in using this graph is to compare the lengths of daytime and nighttime and ask students, What can we do to make it easier to tell the difference between the Sun and stars on each day? Look for students to make suggestions color daytime and/or nighttime different colors. Suggest that if we color the boxes with suns bright yellow, they will stand out, and that we know the other boxes are stars. Gain students' agreement and color the box in the key with the sun yellow. It is OK (but not necessary) to color the nighttime boxes with a different color if students suggest it; just use a color that will allow the individual boxes with the stars to be visible in the background." (Lesson 8, Teacher Guide)
- Lesson 9, Explore, Step 2: "Introduce additional data. Display slide C and tell students that you were able to locate additional data collected by Sarah and Korey's first grade class in Laurel, Delaware. Show students just the December page (page 1) from the Monthly Data handout. Invite students to discuss how this data is similar to and different from the Day A Data and Day B Data handouts we used in our last lesson...How is this new December Data handout similar to the Day A Data and Day B Data handouts we used last time? I heard you say they both have boxes with suns or stars; what do the boxes represent? How many are there? The boxes are hours in the day. They both have 24. 24 - that's the number of hours in a day. Student points to Word Wall card for "day"... Summarize similarities/differences in sky observations data. Review students' noticings to ensure we all recognize that the new Monthly Data is similar to the Day A and B Data in that they both show observations of the sky over 24 hours (one day), a sky observation each hour, and whether it was daytime (Sun) or nighttime (no Sun, represented with a star). They are different because the December Data shows sky observations for one day during a specific month (example on slide C is December)." (Lesson 9, Teacher Guide)

ARG: Engaging in Argument from Evidence

Claimed Element: **ARG: P5 Listen actively to arguments to indicate agreement or disagreement based on evidence, and/or to retell the main points of the argument.** Claimed in Lessons 3, 5, and 10. Evidence was found in all claimed lessons, examples include

- Lesson 3, Connect, Step 4: "Students engage in discussion connecting their claims to the evidence in the book. They discuss agreement and disagreement in the class discussion through prompts such as "Page 8: A claim is an answer to a scientific question. What claims are we making as we answer our question about whether or not the different locations of the Sun in the sky repeat? (refer to the voting chart)... I voted yes! I think it repeats because we saw the Sun in the same place in the morning on two different days. I voted no! I think it does not repeat because the blue circles aren't on top of each other. Page 9: Do we think we have answered our scientific question? Why or why not? I think we have because the Suns are near each other. No, because we don't agree yet. No, because some of us are not sure (student points to voting chart)." (Lesson 3, Teacher Guide)
- Lesson 5, Synthesize, Step 2: "Suggest to students that we can share our ideas using sentence starters (refer to slide F), and read these with students. These are slightly modified versions from those available on students' Discussion Supports handouts. Remind students that when we agree and disagree in science, we agree or disagree with claims (not people) and we agree or disagree using evidence. "I agree with that because _____." "I disagree with that because _____." "I'm not sure yet about _____ because _____." Invite students' suggestions for how we can also represent agreement, disagreement, and uncertainty using hand signals or gestures (e.g., thumb up, down, or sideways; open/closed fists)." (Lesson 5, Teacher Guide)
- Lesson 5, Synthesize, Step 2: "If students need support agreeing, disagreeing, or expressing uncertainty, encourage them to use the sentence starters on their Discussion Supports handouts (refer to slide F) and remind them of our classroom agreements. Additionally, support students in referencing available records of class evidence--such as Our Growing Ideas chart gotta have it and our Sun Observations chart--to remind themselves of the patterns of the Sun's changing locations in the sky."
- Lesson 10, Synthesize, Step 4: "In pairs, share evidence supporting our claim of summer or winter. Suggest that, like in previous lessons, we use a sentence starter (refer to slide F) to support our sharing our claim and evidence: I think it will be _____ because _____ . Remind students, as we did when we played the Sun Game in Lesson 5, to listen to our partner's claim in order to agree or disagree using evidence. Remind students that when we agree and disagree in science, we agree or disagree with claims (not people). Elicit students' suggestions for representing agreement and disagreement using hand signals and provide sentence starters (refer to slide G) from the Discussion Supports handout that students are familiar with from playing the Sun Game in Lesson 5 ("I agree with that because _____.", "I disagree with that because _____."). Invite students to share the different kinds of classroom resources they could reference for evidence (likely Our Growing Ideas chart, the Word Wall, the Day A and Day B Graph, and the Monthly Daytime Graph) and ensure these are available to support students' sensemaking." (Lesson 10, Teacher Guide)

ARG: Engaging in Argument from Evidence

Claimed Element: **ARG: P6 Construct an argument with evidence to support a claim.** Claimed in Lessons 3, 5, 7, and 10. Evidence was found in all lessons, examples include

- Lesson 3, Synthesize, Step 6: "Ensure students can view the voting chart (refer to slide N), showing students' updated claims (represented by voting sticky notes) about the lesson question, Do the Sun's different locations in the sky repeat?... Invite students to pair up and use the sentence starter on slide N to share their current thinking: I think _____ because _____. This opportunity allows students to discuss their votes from the end

of the previous Explore and prepares students to engage in a whole-class discussion to (eventually) come to an agreement and record a claim and evidence on Our Growing Ideas chart." (Lesson 3, Teacher Guide)

- Lesson 5, Synthesize, Step 3: "Where will the Sun be in the sky in the early morning? Use patterns of the Sun's location in the sky to make your claim." (Lesson 5, Student Assessment)
- Lesson 7, Synthesize, Step 6: "Marco and Sonia are both claiming it's daytime in this photo. What is the evidence that Marco is using to make his claim?... What is the evidence that Sonia is using to make her claim?... Which claim about what makes it daytime do you think uses the best evidence? Why do you think that?... Why do you think the Sun is the best evidence for daytime?" (Lesson 7, Teacher Guide)
- Lesson 10, Synthesize, Step 4: "Display slide H, an image of the view while drinking tea with grandma in the evening... Daytime or Nighttime? Ask students: Is it daytime or nighttime? How do you know? Have students turn and talk to a partner, then invite them to share their evidence with the whole class and reach a consensus. This slide shows an evening activity (looking out the window while drinking tea with grandma); it is nighttime because we cannot see the Sun and we do see stars. Summer or Winter? Now ask students: Would this evening event likely happen in summer or winter? Why do you think that? Invite students to move to a Game Card (summer, winter) that reflects their claim. Discuss claims and evidence. Have students find a partner at their Game Card and share claims and evidence. Encourage students to refer to identified resources to support their use patterns of seasonal daytime length and sunset as evidence." (Lesson 10, Teacher Guide)

Criterion-Based Suggestions for Improvement: N/A

Rating for Criterion: DCI **EXTENSIVE**

ii. Provides opportunities to develop and use specific elements of the DCI(s).

The reviewers found **extensive** evidence that the materials provide opportunities to develop and use specific elements of the DCIs. Students have multiple opportunities to build the following science ideas:

- **ESS1.A. The Universe and Its Stars: Patterns of the motion of the Sun, Moon, and stars in the sky can be observed, described, and predicted.**
- **ESS1.B. Earth and the Solar System: Seasonal patterns of sunrise and sunset can be observed, described, and predicted.**

The materials explicitly support the development and use of these elements as students make sense of the sky-related phenomena in each lesson set.

ESS1.A: The Universe and Its Stars

Claimed Element: **DCI-1-ESS1.A. The Universe and Its Stars: Patterns of the motion of the sun, moon, and stars in the sky can be observed, described, and predicted.** Claimed in Lessons: 1, 2, 3, 4, 5, 6, and 7. Evidence was found in all claimed lessons, examples include

- Lesson 1, Explore, Step 2: "Affirm for students that we need to make observations of the Sun in the sky more than just one time during the day, in order to figure out where the Sun is in the sky throughout the day. With student input (using the prompt below), identify 3 times during the school day (roughly falling during morning, midday, and afternoon) when the class can make observations of the Sun's location in the sky. (Lesson 1, Teacher Guide)
- Lesson 2, Explore, Step 3: "Turn and talk about midday predictions. Remind students of their decision to make additional observations of the Sun in the sky at midday and reference the Word Wall card and/or activity on the class schedule that is near that time (lunch time, art, etc.) Invite students to predict where they think they will observe the Sun in the sky later today, at their second (midday) observation. If needed, remind students that a prediction is what we think will happen and why. Then invite students to turn and talk to a partner about their predictions: Where do you think you will observe the Sun in the sky at midday today? Why do you think that? Will you observe the Sun in the same location in the sky as this morning? Why or why not?" (Lesson 2, Teacher Guide)
- Lesson 2, Synthesize, Step 6: "Lead a discussion about students' claims. Invite students to remind the class what we were trying to figure out-- the lesson question we were investigating, Where is the Sun in the sky throughout the day? and ensure it is recorded using your students' language on Our Growing Ideas chart...What claim can we make to answer our lesson question, Where is the Sun in the sky throughout the day?... We see the Sun in different locations in the sky. It is in different places at different times today! Each time, it is somewhere different. It was in 3 places in the sky!" (Lesson 2, Teacher Guide)
- Lesson 3, Explore, Step 5: "Compare morning observations to afternoon observations. Referencing the Sun Observations chart, invite students to compare the class's consensus observations of the Sun in the morning (blue) with those from the afternoon (green). The purpose of this discussion is to support students in noticing that the morning observations are in one area/location while the afternoon observations are in a different area/location. To support students in noticing such differences, use language such as "all of the morning observations" or "both afternoon Suns" and gestures to different sides of the Sun Observations chart. This can support students in thinking generally about where the Sun is in the morning versus the afternoon (preparing them to discuss patterns in the data in the next Synthesize) and not on possibly small differences between multiple morning (or afternoon) observations." (Lesson 3, Teacher Guide)
- Lesson 3, Synthesize, Step 6: "The purpose of this discussion is to provide students an opportunity to share their claims with evidence, listen to each other, and move toward agreement on an answer to the lesson question. Consider providing students with the Discussion Supports handout and/or displaying a copy, which has sentence starters for students to use as needed throughout the discussion, particularly to respond to each other's ideas... What claim can you make if your sticky note is in the "yes" column? What is your evidence?.. What claim can you make if your sticky note is in the "no" column? What is your evidence?.. What if you are still "not sure"; what makes you think that?.. Following this discussion, summarize students' convergence on a consensus claim based on our evidence; this could sound something like, "It sounds like we are agreeing on 'Yes, the Sun's different locations in the sky repeat!'" Suggest that we record this claim on Our Growing Ideas chart and transition to that bolded step." (Lesson 3, Teacher Guide)
- Lesson 4, Explore Section Step 4: "Pause to confirm students' descriptions of what happens to the Sun in the sky over time: The Sun seems to move in an ongoing path, up on one side of the sky (east), through the middle and across the sky, and then back down on the other side of the sky (west). Students have now identified another part of the Sun's

pattern--not only does the Sun appear in the same locations in the sky at the same times of day (day after day and place after place), but it also appears to move through the sky in an ongoing path from one observed location to the next!" (Lesson 4, Teacher Guide)

- Lesson 5, Synthesize, Step 5: "Make connections to using patterns. Elevate for students how useful the patterns of the Sun's location in the sky were for us to figure out our Sun-in-our-eyes phenomenon. Because we have observed and described the patterns of the Sun's changing locations in the sky, we can use them as evidence to know where the Sun will be at different times of day and therefore know when the Sun might be shining in our eyes! Invite students to find a partner to share and listen about other ways people might find the patterns of the Sun's changing location in the sky useful." (Lesson 5, Teacher Guide)
- Lesson 6, Synthesize, Step 5: "Add to our Moon Observations handouts. Remind students that scientists always record their observations and invite students' ideas about how they could record the pattern of how the Moon seems to change locations in the sky on their Moon Observations handouts (refer to slide K). Then, connect their ideas to the steps on the handout (page 2) for drawing and writing about the pattern of the Moon's ongoing path across the sky. Explain how they can use arrows to show how the Moon might seem to move over time just like how we used arrows on our Sun Observations chart! While students draw and write, use the following prompt to discuss with individual students. How does the Moon seem to change locations in the sky? How are you drawing and writing about that? (Lesson 6, Teacher Guide)
- Lesson 7, Synthesize, Step 6: "Marco and Sonia are both claiming it's daytime in this photo. What is the evidence that Marco is using to make his claim?... What is the evidence that Sonia is using to make her claim?... Which claim about what makes it daytime do you think uses the best evidence? Why do you think that?... Why do you think the Sun is the best evidence for daytime?" (Lesson 7, Teacher Guide)

ESS1.B Earth and the Solar System

Claimed Element: **1-ESS1.B.1 ESS1.B Earth and the Solar System: Seasonal patterns of sunrise and sunset can be observed, described, and predicted.** Claimed in Lessons: 1, 8, 9, 10. Evidence was found in all claimed lessons, examples include

- Lesson 1, Connect, Step 1: "We made observations from the book and shared experiences about evening events and how it's sometimes light/bright and sometimes dark out. What ideas do you have about when it's light outside and when it's dark outside on an evening walk?" (Lesson 1, Teacher Guide)
- Lesson 8, Connect, Step 6: "Turn and talk about sunrise and sunset on Day A and Day B. Ensure students can see the class's Day A and Day B graph (refer to slide K) and invite them to turn and talk about sunrise and sunset on Day A and Day B. When do you think sunrise and sunset happened on Day A and Day B? Why do you think that? Discuss and add sunrise and sunset to the graph. Use the prompts below to engage students in noticing the places where the star and Sun boxes meet in the Day A and Day B and to identify these as sunrises and sunsets. Invite students' ideas for making and labeling sunrise and sunset on their graph. Based on their input, you may want to use red, pink, purple, or orange to signify or reflect what sunrises and sunsets look like in the sky to students; use an arrow pointing upwards for "sunrise" and an arrow pointing downward for "sunset", and/or add labels." (Lesson 8, Teacher Guide)
- Lesson 9, Connect, Step 5: "Remind students that one of the reasons we used the infographic was to help us figure out if our class Monthly Daytime Graph showed data that represented each month in any year; does it represent a pattern? Does it happen over and over again, and can it help us know what will happen next? Remind students that we were wondering about this before, and now, we have gathered information from our infographic and are ready to answer these questions. Invite students to think first and then turn and talk with a partner about the following

prompts. Then engage in a brief whole-class discussion about their ideas....Are daytimes always shortest in December and longest in June? How do you know?... Do daytimes always get longer between December and June? How do you know?" (Lesson 9, Teacher Guide)

- Lesson 10, Connect, Step 6: "Prepare to play the closing Seasons Game. Suggest to students that we can celebrate our work in this unit by using the patterns of daytime length that we have figured out as evidence for when these experiences, or events, would happen! We can play the Seasons Game with our own experiences--how exciting! Play the Seasons Game. Have students point to each Game Card to recall as a class where they are located and how to safely get there. Remind students of the instructions for the game (display slide N) to recall that we will: 1. Find out if the event happened in the daytime or the nighttime. 2. Individually move to a Game Card to make our claim (Summer or Winter). 3. In pairs, share evidence for why you think the event would happen in that season. Tell students that we will have the student who added the event on Our Experiences chart share before moving to play the game. Encourage students to continue to use classroom/unit resources to explain their thinking (Our Growing Ideas chart, Day A and Day B graph, Monthly Sky Observations graph). Daytime or Nighttime? Invite the student who experienced the event from Our Experiences chart to briefly share using the prompts below from the Out-of-School Sky Experiences community connections. What is the event that you do in the evening? What is the sky like? Is it daytime or nighttime? Summer or Winter? Now ask students: Would this morning event likely happen in summer or winter? Why do you think that? Invite students to move to a Game Card (summer, winter) that reflects their claim. Discuss claims and evidence. Have students find a partner at their Game Card and share claims and evidence. Encourage students to refer to identified resources to support their use patterns of seasonal daytime length and sunrise/sunset as evidence." (Lesson 10, Teacher Guide)

Criterion-Based Suggestions for Improvement: N/A

Rating for Criterion: CCC **EXTENSIVE**

iii. Provides opportunities to *develop and use* specific elements of the CCC(s).

The reviewers found **extensive** evidence that the materials provide opportunities to develop and use specific elements of the CCCs.

Students have multiple opportunities to build the following crosscutting concept: **PAT-P1: Patterns in the natural and human designed world can be observed, used to describe phenomena, and used as evidence.** The materials explicitly support the development and use of these elements as students make sense of the sky-related phenomena in each lesson set. Students are supported in developing deep competence in these specific elements, such that they can be applied to more than one context. Students also use the crosscutting elements: **CE-P1: Events have causes that generate observable patterns** and **SPQ-P: Relative scales allow objects and events to be compared and described (e.g., bigger and smaller; hotter and colder; faster and slower)**; however, the Front Matter does not label these elements as intentionally developed.

PAT: Patterns

Claimed Element: **PAT-P1: Patterns in the natural and human designed world can be observed, used to describe phenomena, and used as evidence.** Claimed in Lessons 1, 2, 3, 4, 5, 6, 9, and 10. Evidence was found in all claimed lessons, examples include

- Lesson 1, Explore, Step 4: "Remind students how scientists use their recorded observations to return to and compare with other observations they may make later. Suggest that we add a label to this observation so that we can remember when we went outside to make it. Note that the next lessons use time-of-day labels (morning, midday, or afternoon), though your class may also use activity-based (after lunch) or clock-based (2:00) time, like in their math lessons." Students use this activity to set up later learning using patterns. Here they establish that they need information to recognize a pattern once the data set is more complete." (Lesson 1, Teacher Guide)
- Lesson 2, Explore, Step 2: "Decide when to make observations. Affirm for students that we need to make observations of the Sun in the sky more than just one time during the day, in order to figure out where the Sun is in the sky throughout the day. With student input (using the prompt below), identify 3 times during the school day (roughly falling during morning, midday, and afternoon) when the class can make observations of the Sun's location in the sky...Add observation times to the Sun Investigation Plan. To support all students' access and engagement, use these shared "time of day" words as well as students' language and corresponding images to add the 3 agreed-upon observation times to the class's Sun Investigation Plan. This is particularly important in this unit because students' figuring out the patterns of objects in the sky requires them to make sense of relative time. In this lesson set, that includes morning, midday, and afternoon." (Lesson 2, Teacher Guide)
- Lesson 2, Explore, Step 2: Review three consensus Sun observations. Engage students in a brief discussion to review and compare the location of the Sun in the sky at each of the times they made observations (morning, midday, afternoon), the purpose of which is to ensure students notice how their observations were of the Sun in different locations in the sky at morning, midday, and afternoon." (Lesson 2, Teacher Guide)
- Lesson 3, Synthesize, Step 6: "Connect "repeat" to "patterns." Pause to connect students' claims that answer the lesson question through use of the word "repeat" to the science word, "pattern." Tell students that scientists call something that happens over and over again (something that repeats) a pattern. Using the consensus observations on the Sun Observations chart (refer to slide O), ask students to think about the pattern of the Sun's morning and afternoon locations across multiple days: Over and over again in the morning, we observed the Sun in the east and over and over again in the afternoon, we observed the Sun in the west. Use the following prompt to facilitate a discussion and add or update a claim on Our Growing Ideas chart to include patterns...How are our observations of the Sun in the sky a pattern?" (Lesson 3, Teacher Guide)
- Lesson 4, Explore, Step 2: "Identify a pattern. Use the following prompt to facilitate a discussion through which students identify the pattern of the Sun's repeated changing locations in the sky using their observations from all of the Sun Location card sets...What do we notice happens over and over again in the Sun's locations in the sky? What is the pattern?... Summarize that the Sun's location in the sky at each in-between time repeats across all of the Sun Photo card sets and that we have identified a pattern: the Sun's changing locations happen over and over again in the same way in every set of photographs; it is the same in every place!" (Lesson 4, Teacher Guide)
- Lesson 5, Synthesize, Step 5: "Make connections to using patterns. Elevate for students how useful the patterns of the Sun's location in the sky were for us to figure out our Sun-in-our-eyes phenomenon. Because we have observed and described the patterns of the Sun's changing locations in the sky, we can use them as evidence to know where the Sun will be at different times of day and therefore know when the Sun might be shining in our eyes! Invite students to find a partner to share and listen about other ways people might find the patterns of the Sun's changing location in the sky useful. How else do you think people might use patterns of the Sun's changing location in the sky? What examples do you have?" (Lesson 5, Teacher Guide)

- Lesson 6, Synthesize, Step 5: "Compare to the Sun. Display the class Sun Observations chart (refer to slide J) and have students turn and talk with a partner to describe the pattern of the Sun's ongoing path in the sky. Then, engage in a brief discussion to support students in making comparisons between their observations of the Moon and the Sun. How do the patterns of the Moon's changing locations in the sky compare to the Sun's? The Moon and Sun both change locations. They're the same! They both move from east to west! They both start lower and then go higher and then go lower again. They are the highest in the middle. The arrows go the same way. They both move in an ongoing path. Students gesture (point) to show how the Moon and Sun both appear to move in the sky. (Lesson 6, Teacher Guide)
- Lesson 7, Explore, Step 3: "Facilitate a discussion about daytime and nighttime columns. Point out to students that now we have just two columns of cards on the floor (or, draw students' attention to most of the cards, which are in just two columns). Use the following prompts to briefly discuss what objects in the sky are common to the image cards in the "daytime" and "nighttime" columns. What do we observe about all of the cards in the "daytime" column? What do we observe about all of the cards in the "nighttime" column? Continue the discussion to notice patterns and update the Daytime and Nighttime Evidence chart. Continue the discussion with students by revisiting the definition of a pattern, something that happens over and over again, and can help us know what will happen next. Use the following prompts to make sense of the patterns of the objects in the sky in the daytime and nighttime: Over and over again, the Sun is visible in the sky in the cards in the daytime column, while over and over again the Sun is not visible (and stars are usually visible) in the sky in the cards in the nighttime column." (Lesson 7, Teacher Guide)
- Lesson 9, Explore, Step 4: "Conclude with students by celebrating their careful work analyzing, interpreting, and discussing their data using the class Monthly Daytime Graph. Ask students if they think the observations they made from their class Monthly Daytime Graph would be true for each month in any year. In other words, is there a pattern? Does it happen over and over again, and can it help us know what will happen next? Invite students to turn and talk about these ideas: Do you think the daytimes are always shortest in December and longest in June? Why or why not? Do you think daytimes always get longer between December and June? Why or why not? Tell students that scientists have asked this question, too, and we have a text we can use next to help us figure this out!" (Lesson 9, Teacher Guide)
- Lesson 10, Synthesize, Step 4: "Using an image from the Seasons Game, invite students' ideas to co-create a new 'Lesson 10 Gotta-Have-It Checklist' about how to make a seasons claim and use the patterns we have figured out about the length of daytime in different seasons as evidence for our claims. If helpful, direct students' attention to the "What did we figure out?" column of the Lessons 8-10 rows on Our Growing Ideas chart." (Lesson 10, Teacher Guide)

CE: Cause and Effect

Claimed Element: **CE-P1: Events have causes that generate observable patterns.** Claimed in Lessons 8 and 9. Evidence includes:

- Lesson 8, Connect, Step 6: "Discuss cause and effect. Explain to students that we can talk about how sunrise and sunset can make daytime for Day A longer than Day B using cause-and-effect. A cause explains why something happens. An effect explains what happens. Building from the ideas students shared, provide a specific example. You might say something like, The Sun rising earlier and setting later on Day A causes Day A to have a longer daytime. Longer daytimes are the effect of earlier sunrises and later sunsets. Then use the prompt below to invite students to discuss how daytime in Day B is shorter than Day A through the lens of cause and effect. What causes Day B to have a shorter daytime than Day A? The daytime starts later! The yellow boxes start later and end earlier than in Day A. The

Sun rises later in Day B! The red lines are closer together. Students gesturing with hands/pointing to show daytime in Day B is shorter between sunrise and sunset. What is the effect of Day B's sunrise and sunset times? Day B has a short daytime! Daytime is the effect - it's what happens in-between sunrise and sunset. The yellow daytime bar is shorter" (Lesson 8, Teacher Guide)

- Lesson 9, Explore, Step 4: "Reconnect to cause and effect. Remind students that they used sunrise and sunset to explain how daytimes were different lengths in the last lesson (Lesson 8); we figured out that sunrise and sunset cause daytime length to be shorter or longer. As needed, remind students that a cause explains why something happens; the effect explains what happens." (Lesson 8, Teacher Guide)

SQP: Scale, Quantity, and Proportion

Claimed Element: SPQ-P: Relative scales allow objects and events to be compared and described (e.g., bigger and smaller; hotter and colder; faster and slower). Claimed in Lessons 4, 5, 6, 8, and 9. Evidence was found in all claimed lessons, examples include:

- Lesson 6, Explore, Step 3: "Introduce the Moon Location card sets. Share with students that you were able to get three different sets of images of the Moon in the sky with a house as a ground-based reference point (A, B, and C; refer to slide E). Explain that each set has 3 images from one night, as students suggested. Show just the first card (the one with the Moon in the east) from Moon Location card set B in order to avoid "giving away" that the Moons in the image sets are (indeed) in different locations. Explain that these cards are labeled, just like the Sun Locations cards (from Lesson 4). Point out the label, "1 early" and share that this card is from early in the night, and that there are two other labels on the other cards: "2 middle" for the middle of the night and "3 late" for late in the night." (Lesson 6, Teacher Guide)
- Lesson 8, Explore, Step 4: "How does daytime on Day A compare to daytime on Day B?... It's longer! Day A has 13 hours (student points to sticky note) and Day B has only 9. 13 hours is more than 9 hours of daytime. There are more hours of daytime on Day A! Daytime is shorter for Day B. A student moves their hands apart and then closer together to show that daytime is longer in Day A and shorter in Day B." (Lesson 8, Teacher Guide)

Criterion-Based Suggestions for Improvement:

- "There are sufficient SEP, CCC, and DCI elements and time that students are engaged in the elements for the length of the materials." (Detailed Guidance, p.10)
  - Only 1 CCC element is identified as intentionally developed for the unit. Consider intentionally developing the claimed Scale, Quantity, and Proportion, as well as the Cause and Effect elements.

I.C. Integrating the Three Dimensions

EXTENSIVE

Student sense-making of phenomena and/or designing of solutions requires student performances that integrate elements of the SEPs, CCCs, and DCIs.

The reviewers found **extensive** evidence that student sensemaking of phenomena requires student performances that integrate elements of the SEPs, CCCs, and DCIs. In the unit, students are expected to make and use observations to describe daily and seasonal patterns of the objects in the sky, which requires them to use grade-appropriate elements of the three dimensions simultaneously. All three dimensions are necessary for making sense of the unit phenomena. In most activities in the unit, students are expected to figure out something that requires the use of three dimensions working together at the grade level.

Learning is integrated

Throughout the unit, students engage in three-dimensional tasks to help explain phenomena.

- Lesson 1, Explore, Step 3: Students integrate the use of the elements when they make and record observations in pairs about where the Sun appears in the sky. They compare their observations to those from the other pairs in the class in order to identify patterns in where they observed the Sun and reach consensus about where the Sun appears and the best method for recording their observations in the three dimensions: **CCC PAT-P1: Patterns in the natural and human designed world can be observed, used to describe phenomena, and used as evidence. DCI-1-ESS1.A. The Universe and Its Stars: Patterns of the motion of the sun, moon, and stars in the sky can be observed, described, and predicted,** and **INV-P4: Make observations (firsthand or from media) and/or measurements to collect data that can be used to make comparisons.**
- Lesson 2, Explore, Steps 3, 4, and 5, students integrate the use of the elements when they make observations of the Sun at different times of day in the three dimensions: **CCC PAT-P1: Patterns in the natural and human designed world can be observed, used to describe phenomena, and used as evidence. DCI-1-ESS1.A. The Universe and Its Stars: Patterns of the motion of the sun, moon, and stars in the sky can be observed, described, and predicted,** and **INV-P4: Make observations (firsthand or from media) and/or measurements to collect data that can be used to make comparisons.**
- Lesson 4, Synthesize, Step 5, students integrate the use of the elements when they use observations to describe the pattern of the sun's apparent motion in the sky throughout the day: **CCC PAT-P1: Patterns in the natural and human designed world can be observed, used to describe phenomena, and used as evidence. DCI-1-ESS1.A.1 ESS1.A The Universe and Its Stars: Patterns of the motion of the sun, moon, and stars in the sky can be observed, described, and predicted, and DATA: P3 Use observations (firsthand or from media) to describe patterns and/or relationships in the natural and designed world(s) in order to answer scientific questions and solve problems.**
- Lesson 5, Synthesize, Step 2 students integrate the use of the elements when they construct arguments about where the sun will be at different times of day using patterns of the motion of the sun as evidence in the three dimensions: **CCC PAT-P1: Patterns in the natural and human designed world can be observed, used to describe phenomena, and used as evidence. DCI-1-ESS1.A. The Universe and Its Stars: Patterns of the motion of the sun, moon, and stars in the sky can be observed, described, and predicted. ARG: P6 Construct an argument with evidence to support a claim.**

- Lesson 6, Explore, Step 3, students integrate the use of the elements when they make observations about where the Moon will be located at different times of night in the three dimensions: **CCC PAT-P1 Patterns in the natural and human designed world can be observed, used to describe phenomena, and used as evidence. DCI ESS1.A The Universe and Its Stars: Patterns of the motion of the Sun, Moon, and stars in the sky can be observed, described, and predicted (1-ESS1-1). INV-P4 Make observations (firsthand or from media) to collect data that can be used to make comparisons.**
- Lesson 8, Explore, Step 4 students integrate the use of the elements when they compare the total length and length of daytime for two different days in the three dimensions **MATH: P3 Describe, measure, and/or compare quantitative attributes of different objects and display the data using simple graph. ESS1.B Earth and the Solar System: Seasonal patterns of sunrise and sunset can be observed, described, and predicted. SQP-P1 Relative scales allow objects and events to be compared and described (e.g., bigger and smaller; hotter and colder; faster and slower).**
- Lesson 9, Explore, Step 4 students integrate the use of the elements when they use a graph to determine that changes in sunrise and sunset times throughout the year cause changes in the daylength in the three dimensions **MATH: P3 Describe, measure, and/or compare quantitative attributes of different objects and display the data using simple graph. ESS1.B Earth and the Solar System: Seasonal patterns of sunrise and sunset can be observed, described, and predicted. CCC: CE.P1: Events have causes that generate observable patterns.**
- Lesson 10, Synthesize, Step 5, students integrate the use of the elements when they use patterns as evidence to support claims about the season in which events will occur in the three dimensions: **CCC PAT-P1 Patterns in the natural and human designed world can be observed, used to describe phenomena, and used as evidence. DCI ESS1.B Seasonal patterns of sunrise and sunset can be observed, described, and predicted. (ESS1.B-P1). ARG-P6 Construct an argument with evidence to support a claim.**

Integration to support student sense-making over time

- Lesson 3, Synthesize, Step 6: Students integrate the use of the elements when they engage in argument using evidence about whether the Sun's location follows a pattern in the three dimensions: **CCC PAT-P1: Patterns in the natural and human designed world can be observed, used to describe phenomena, and used as evidence. DCI-1-ESS1.A. The Universe and Its Stars: Patterns of the motion of the sun, moon, and stars in the sky can be observed, described, and predicted. ARG: P6 Construct an argument with evidence to support a claim.**
- Lesson 7, Synthesize, Step 6: Students integrate the use of the elements when they construct an argument using patterns of the sun and stars in the sky about whether an event occurs in daytime or nighttime in the three dimensions **CCC PAT-P1: Patterns in the natural and human designed world can be observed, used to describe phenomena, and used as evidence. DCI-1-ESS1.A.1 ESS1.A The Universe and Its Stars: Patterns of the motion of the sun, moon, and stars in the sky can be observed, described, and predicted. ARG: P6 Construct an argument with evidence to support a claim.**

Criterion-Based Suggestions for Improvement: N/A

I.D. Unit Coherence

EXTENSIVE

Lessons fit together to target a set of performance expectations.

i. Each lesson builds on prior lessons by addressing questions raised in those lessons, cultivating new questions that build on what students figured out, or cultivating new questions from related phenomena, problems, and prior student experiences.

ii. The lessons help students develop toward proficiency in a targeted set of performance expectations.

The reviewers found **extensive** evidence that the lessons fit together coherently to target a set of performance expectations, as each lesson builds upon the next, resulting in an evolving understanding of the science ideas and concepts needed to explain the observations of the Sun, Moon, and stars in the sky. Progress toward making sense of these phenomena is motivated by students' questions and experiences. Investigations are focused on collecting evidence to answer students' questions. The lessons help students develop toward proficiency in this targeted set of performance expectations.

- 1-ESS1-1: Use observations of the Sun, Moon, and stars to describe patterns that can be predicted.
- 1-ESS1-2: Make observations at different times of the year to relate the amount of daylight to the time of year.

i. Each lesson builds on prior lessons by addressing questions raised in those lessons, cultivating new questions that build on what students figured out, or cultivating new questions from related phenomena, problems, and prior student experiences.

- Elementary Teacher Handbook: "Navigation Component: What is the instructional purpose of this component? The Navigate component directly supports coherence for students from lesson to lesson. This component generally happens at the beginning and end of each lesson and provides opportunities for the class to take stock of where they are in finding answers to their questions, to remind themselves what they figured out last time, and to decide where they want to go next. Often this navigation will come naturally from questions generated by students, but occasionally the teacher will "problematize" an idea or investigation result by asking a salient question or pushing the class to consider other situations or new directions. What are the potential outcomes of this component? During the Navigate component, students ask questions, define problems, and make predictions. The class builds their sense of shared purpose, sees progress toward answering their questions, and takes ownership of their science work" (Elementary Teacher Handbook)
- Lesson 1, Navigate, Step 5: "Wow! It sounds like we have a lot of different ideas--what could we do next time to figure out more about the Sun's location in the sky?... Elevate students' ideas and suggestions to make more observations of the Sun in the sky, and suggest we can do this next time!" (Lesson 1, Teacher Guide)
- Lesson 3, Navigate, Part 1: Return to our Sun Observations chart. Gather students in a Scientists Circle so they can view the class's Sun Observations chart (refer to slide A). Use the prompt to engage students in a brief discussion to review how, in the last lesson, we figured out that the Sun is in different locations in the sky throughout the day... Prompts to Use: What did we figure out last time after going outside and making 3 observations at different times throughout the day? ...Remind students that our predictions are what we think will happen and why and how, at the end of the last lesson, we each put a sticky note on the Sun Observations chart to show where we predict the Sun will be in the sky this morning. Use the following prompt to invite students to turn and talk with a partner about their predictions. Where do you predict the Sun will be in the sky this morning? Why do you think that?" (Lesson 3, Teacher Guide)

- Lesson 5, Navigate, Step 7: "Support students in recognizing how spending time generating questions based on our observations and experiences allows us to use our own wonderings to drive our next investigations. Suggest to students that we have a lot of questions about the Moon that we could investigate next!" (Lesson 5, Teacher Guide)
- Lesson 7, Navigate, Part 1: "Revisit our Notice and Wonder chart and co-construct the lesson question. Gather students in a Scientists Circle and ensure they can all see our Notice and Wonder chart (refer to slide A). Using the Notice and Wonder chart and questions from the end of last lesson, review with students how many of us had questions about the Moon and when we can see it, about what objects are in the sky in the daytime and nighttime, and about what makes it daytime and nighttime, anyway! Use these connections to co-construct the lesson question: What makes it daytime or nighttime?" (Lesson 7, Teacher Guide)
- Lesson 8, Navigate, Part 1: "Make connections and review questions. Use the following prompts to support students in making connections to their ideas and questions about the Delaware community where Sarah and Korey's evening walks sometimes happen in the daytime (bright) and sometimes in the nighttime (dark), that helped us co-construct our lesson set question, How can evening events (evening walks) sometimes happen in the daytime and sometimes in the nighttime?, as well as to other questions on our Notice and Wonder chart related to daytime and nighttime... Prompts to use: What questions did we have about Sarah and Korey in their Delaware community and their evening family walks that sometimes happen in the daytime and sometimes happen in the nighttime?" (Lesson 8, Teacher Guide)
- Lesson 8, Navigate, Step 7: "Highlight student questions about when longer/shorter daytimes happen; when (time of year) Day A and Day B happened; and when sunrises/sunsets happen earlier or later to emphasize how we have questions about "when!" Suggest that this is what we can explore next time!" (Lesson 8, Teacher Guide)
- Lesson 10, Navigate, Part 1: "Recall our questions. Display slide A and our Notice and Wonder chart. Recall with students where we left off: we have figured out a lot about our Lesson Set Question, How can evening events (evening walks) sometimes happen in the daytime and sometimes in the nighttime?, but we still have some things we aren't sure about. Point out students' questions on our Notice and Wonder chart and read aloud a few students' questions--likely related to Sarah and Korey's experiences in Delaware--such as "When are their evening walks?", "Are they walking in the summer or the winter?", or "Do they walk before or after sunrise or sunset?"...Point out to students that our questions are mostly about "when" these evening walks happen; to answer our lesson set question, we need to figure out when evening happens." (Lesson 10, Teacher Guide)

ii. The lessons help students develop toward proficiency in a targeted set of performance expectations.

The lessons help students develop toward proficiency in a targeted set of performance expectations. The target Performance Expectations are:

1-ESS1-1: Use observations of the sun, moon, and stars to describe patterns that can be predicted.

- Lesson 2, Explore, Step 2: "Go outside and make morning Sun observations. Bring students outside to the predetermined location (that was also used in Lesson 1) and have them work with their partners to make observations of the Sun's location in the sky. Remind them to record their own observations on their Three Sun Observations handouts and then compare and discuss with their partner; partners should notice and discuss similarities and differences in their recorded observations and work toward agreement." (Lesson 2, Teacher Guide)
- Lesson 3, Explore, Step 3: "Bring students outside to the same observation location used in Lessons 1 and 2 and have them work with a partner to make and record observations of the Sun's location in the sky. Encourage partnerships to compare and work toward agreement about their recorded observations and, additionally, to discuss with each other how this morning's observation compares with the observation they made of the Sun in the sky in Lesson 2." (Lesson 3, Teacher Guide)

- Lesson 5, Explore, Step 4 "Use our bodies to experience time of day and direction. Point to locations of the Sun using the Sun Observations chart (and/or coordinating sides of the room, possibly labeled with "east" or "west") and have students turn their bodies and shield their eyes to show where they would be facing for the Sun to be in our eyes at that time of day. Have students think first and then turn and talk with a partner about why that would be happening and what direction they are facing. Locations to point to: (pointing to a location on the Sun Observations chart low in the sky in the east): Imagine it is early morning. Which way would we be facing to experience the Sun in our eyes? (pointing to a location on the Sun Observations chart low in the sky in the west) Imagine it is late in the afternoon. Which way would we be facing to experience the Sun in our eyes? Next, have students repeat each time of day, but this time turning their bodies (and talking with a partner) about where they would be facing for the Sun to not be in their eyes at that time of day (e.g., in the morning, the Sun is low in the sky in the east, so students would need to face away from east for the Sun to not be in their eyes)." (Lesson 5, Teacher Guide)
- Lesson 6, Explore, Step 2 "After pairs have put their cards in order, circulate and use the following prompts to support students in making and recording observations of the Moon to begin to make sense of the lesson question: Does the Moon appear to change locations in the sky and, if so, how?... Where are you observing the Moon in the sky using your Moon Location cards?.. What do you think your observations mean about our lesson question, Does the Moon appear to change locations in the sky, and if so how?.. Once pairs have recorded and discussed their observations of the Moon in the sky with their partners, remind the class that scientists record their observations so they can remember and compare them. Suggest that partnerships join another pair of students with the same card set (A, B, or C) to compare observations." (Lesson 6, Teacher Guide)
- Lesson 7, Explore, Step 3: "With students, review the prompt, 'Is it daytime or nighttime?' on slide H to support students in keeping in mind their purpose for making observations. Provide each student with one Sun/Star Sky card from the Sun/Star Sky Cards. Invite students to make individual observations as they think about whether their image shows a daytime or nighttime sky. As individual students make observations, prompt them with questions like: What do you observe about the sky? What object or objects (Sun, stars) do you observe in the sky?" (Lesson 7, Teacher Guide)

1-ESS1-2: Make observations at different times of year to relate the amount of daylight to the time of year.

- Lesson 9, Explore, Step 4: "You will use a Think, Pair, Share discussion to engage students in using the Monthly Daytime Graph to describe and compare the length of daytime in different months. You may suggest that students use sentence starters (refer to slide G) to support their responses, including "Daytime is the shortest/longest in _____. My evidence is _____." Provide students with a quiet moment to observe the graph and consider each question before discussing with a partner. In which month is daytime the shortest? How do you know? In which month is daytime the longest? How do you know?" (Lesson 9, Teacher Guide)
- Lesson 9, Explore, Step 4: "Next, invite students to share and discuss their and their partner's ideas using the prompts below. The purpose of this discussion is to support students in interpreting the graph to identify which month has the shortest and longest daytime. Students may make sense of this using numbers (fewer/more hours of daytime) and using the relative length of the yellow bars. Encourage students to express their understanding of daytime length using numbers and relative length through a variety of means, including through words in languages they may use, pointing to the graph, gesturing with their fingers/hands closer together or farther apart, and holding up fingers to represent a number..In which month is the daytime the shortest?... How do you know that daytime is shortest in December? What is your evidence?... In which month is the daytime the longest?... How do we know that June has the longest daytime? What is our evidence?... Celebrate that students have figured out that June has the longest (most hours of) daytime and December has the shortest (fewest hours of) daytime. Consider writing "longest" next to June and "shortest" next to December to record what students have figured out and ensure these ideas are available to students as they continue to compare data across multiple months." (Lesson 9, Teacher Edition)

- Lesson 9, Explore, Step 4: "Organize the class Monthly Daytime Graph. Organize the graph using only 1 handout per month, starting with December at the top, to ensure that students will notice (by the end of this lesson) that a year has 12 months and each season contains 3 months. Moving one month at a time, invite one student from each month to bring their handout to the board/chart in chronological order, from December to November…Add daytime hours to the Monthly Daytime graph…The purpose of creating this year-long (sequenced) graph is for students to be able to analyze monthly data in a way that supports them in noticing how daytime length changes throughout the year." (Lesson 9, Teacher Guide)
- Lesson 9, Synthesize, Step 6: "Turn and talk about Day A and Day B. Invite students to turn and talk with a partner about when they think Day A and Day B happened. Encourage students to use evidence from the class' Monthly Daytime Graph to support their claim about when Day A and Day B took place. When does Day A happen? What is your evidence? When does Day B happen? What is your evidence?… Make a claim about when Day A and Day B occurred. Invite students to share their claims for which season and/or month each day takes place. As students come to an agreement on which seasons Day A and Day B take place, add these additional labels (summer and winter) to the Day A and Day B Graph, since students will reference these in the next lesson." (Lesson 9, Teacher Guide)

Criterion-Based Suggestions for Improvement: N/A

I.E. Multiple Science Domains

EXTENSIVE

When appropriate, links are made across the science domains of life science, physical science, and Earth and space science.

i. Disciplinary core ideas from different disciplines are used together to explain phenomena.

ii. The usefulness of crosscutting concepts to make sense of phenomena or design solutions to problems across science domains is highlighted.

The reviewers found **extensive** evidence that links are made across the science domains when appropriate because the sky-related phenomena in the unit can be fully addressed within the Earth and Space Science domain.

i. Disciplinary core ideas from different disciplines are used together to explain phenomena.

- Making sense of the three sky-related experiences only requires the development and use of Disciplinary core ideas from ESS1.A The Universe and Its Stars and ESS1.B Earth and the Solar System. Disciplinary core ideas from different disciplines are not required.
- The following DCI elements from the Earth and space science domain can explain the sky-related phenomena:
  - How the Sun is sometimes in our eyes and not other times: **ESS1.A The Universe and Its Stars: Patterns of the motion of the sun, moon, and stars in the sky can be observed, described, and predicted.**
  - How sometimes the Moon and stars are in the sky, but not other times: **ESS1.A The Universe and Its Stars: Patterns of the motion of the sun, moon, and stars in the sky can be observed, described, and predicted.**
  - Why it is light out when people go for evening walks sometimes but not other times: **ESS1.B Earth and the Solar System: Seasonal patterns of sunrise and sunset can be observed, described, and predicted.**

ii. The usefulness of crosscutting concepts to make sense of phenomena or design solutions to problems across science domains is highlighted.

CCC links

- Lesson 4, Synthesis Question, Step 5 "Pause to confirm with students how their claims reflect patterns; they have noticed that some things--like where we see the Sun in the sky at different times of day and how the Sun seems to move in an ongoing path--happen over and over again. If relevant, remind students that they have also identified patterns in other science work they have done (e.g., vibrating materials cause sound in Unit 1.2: How can we communicate using objects that make sound?). Invite students to turn and talk with a partner about why our science work might focus on identifying patterns. Why do you think scientists care about patterns? Then invite a few students to share their ideas with the class. Share that you have a book about other first graders who have made many observations and identified patterns, and we can read to find out how they and other scientists use patterns next!" (Lesson 4, Teacher Guide)
- Lesson 9, Explore, Step 4: "Reconnect to cause and effect. Remind students that they used sunrise and sunset to explain how daytimes were different lengths in the last lesson (Lesson 8); we figured out that sunrise and sunset cause daytime length to be shorter or longer. As needed, remind students that a cause explains why something happens; the effect explains what happens." (Lesson 9, Teacher Guide)

Criterion-Based Suggestions for Improvement: N/A

I.F. Math and ELA

EXTENSIVE

Provides grade-appropriate connection(s) to the Common Core State Standards in Mathematics and/or English Language Arts & Literacy in History/Social Studies, Science and Technical Subjects.

The reviewers found **extensive** evidence that the materials provide grade-appropriate connections to the Common Core State Standards in Mathematics and/or English Language Arts & Literacy in History/Social Studies, Science and Technical Subjects because the materials explicitly state the mathematics and ELA standards that are used in the unit and support students to see the connections among content areas.

ELA

Reading: Informational Text: CCSS.ELA-LITERACY.RI.1.2 Identify the main topic and retell key details of a text. Claimed in Lesson 4:

- Lesson 4, Connect, Step 6: "Introduce and read Patterns All Around Us. Show students the Patterns All Around Us book and read the title with them (refer to slide K). Suggest to students that we can use our text to find out why scientists care about patterns. Use the following prompts as you read to support students in making claims about what will happen next, related to the text, and discussing how we use patterns to help us do this." (Lesson 4, Teacher Guide)

Reading: Informational Text: CCSS-ELA-LITERACY.RI.1.6 Distinguish between information provided by pictures or other illustrations and information provided by the words in a text. Claimed in Lesson 9.

- Lesson 9, Connect, Step 5 Literacy Supports: "Students will use a variety of sources of information to continue analyzing their graph data, including information provided by pictures and words in the text from the Seasons and the Sun infographic. Remind students that words and pictures provide important information for sensemaking. Encourage students to distinguish between specific images and words in the infographic as they answer questions and analyze their graph data. This connects with RI.1.6 as students distinguish between and use information from pictures and words in a text." (Lesson 9, Teacher Guide)

Reading: Informational Text: CCSS-ELA-LITERACY.RI.1.7 Use the illustrations and details in a text to describe its key ideas. Claimed in Lessons 6 and 8.

- Lesson 6, Connect, Step 6: "Make observations of Robyn's photographs. After reading the last sentence, "We can enjoy and learn from her photographs, too!", suggest revisiting some of Robyn's photographs to see which ones we enjoy and find beautiful. Go back to any page/s with images students find interesting and invite them to turn and talk with a partner about the prompt below to make additional observations of any of Robyn's photographs and to connect to the awe and beauty that Robyn hopes to convey through her images. What do you enjoy about this photograph? What is beautiful to you about it?" (Lesson 6, Teacher Guide)
- Lesson 8, Connect, Step 6 "While discussing the newspaper article, students use the illustrations and details in a text to describe its key ideas. Students will likely reference both the details in the text (what children said they observed) and details in the images (photos that represent student observations) (RI.1.7). Consider using the illustrations in the text to support students' understanding of the words "sunrise" and "sunset". Some students may already be familiar with these words and others may benefit from additional support in understanding these specific times/events." (Lesson 8, Teacher Guide)

Writing: CCSS-ELA-LITERACY.W.1.5 With guidance and support from adults, focus on a topic, respond to questions and suggestions from peers, and add details to strengthen writing as needed. Claimed in Lesson 5.

- Lesson 5, Synthesize, Step 3: "Support students as they revise their writing. Encourage students to stay focused on the topic and consider different ways to revise what has been written. Students can review their writing to ensure that they are on-topic by responding to prompts and reminders to circle their claim and support their decision using evidence. Encourage students to read their writing quietly or in their heads to check for clarity and accuracy. This work connects with W.1.5 as students focus on a topic, respond to questions, and add details to strengthen writing as needed." (Lesson 5, Teacher Guide)

Speaking and Listening: CCSS-ELA-LITERACY.SL.1.1A Follow agreed-upon rules for discussions (e.g., listening to others with care, speaking one at a time about the topics and texts under discussion). Claimed in Lesson 1.

- Lesson 1, Connect, Step 1, Literacy Supports box, "Support students as they engage in the Initial Ideas Discussion. Remind students about their classroom agreements to ensure that everyone listens to each other with care, speaks on topic, and takes respectful turns. This will support students in practicing SL.1.1A as they follow agreed-upon rules for discussions and further cultivate a safe community for learning science together." (Lesson 1, Teacher Guide)

Speaking and Listening: CCSS-ELA-LITERACY.SL.1.5 Add drawings or other visual displays to descriptions when appropriate to clarify ideas, thoughts, and feelings. Claimed in Lesson 2.

- Lesson 2, Explore, Step 5: "As students complete their Three Sun Observations handouts, they will use written words and drawings to record their afternoon Sun observations. Encourage students to use their drawings to clarify their ideas about what they observe. This work connects with SL.1.5 as students prepare to use these observations to support their thinking and future discussions." (Lesson 2, Teacher Guide)

Language: CCSS-ELA-LITERACY.L.1.1D Use personal, possessive, and indefinite pronouns (e.g., I, me, my; they, them, their; anyone, everything). Claimed in Lesson 5.

- Lesson 5, Synthesize, Step 4: "Students will use a variety of pronouns as they orally describe their bodies in relationship to the Sun. Support their oral language by modeling correct use of personal (e.g., I), possessive (e.g., my), and indefinite (e.g., none, any) pronouns. If students use these pronouns inaccurately, you can rephrase their words using the correct form to encourage correct usage in the future. L.1.1D" (Lesson 5, Teacher Guide)

Language: CCSS-ELA-LITERACY.L.1.1E Use verbs to convey a sense of past, present, and future (e.g., Yesterday I walked home; Today I walk home; Tomorrow I will walk home). Claimed in Lesson 1

- Lesson 1, Connect, Step 1: "As students share personal connections with their own experiences they will use verbs to explain actions from the past or the present. Reiterate that sharing information about past events requires the use of past tense verbs like "walked" or "saw" whereas describing present-day events requires the use of present tense verbs like "walk" or "see". Model how to use time-specific information to communicate about ideas and experiences." (Lesson 1, Teacher Guide).

Language: CCSS-ELA-LITERACY.L.1.1F Use frequently occurring adjectives. Claimed in Lesson 8:

- Lesson 8, Explore, Step 2: "Students use comparison words when comparing the number of daytime hours (more/less), length of daytime (longer/shorter) and--later in this lesson--sunrise and sunset times (earlier/later) between Day A and Day B. This supports L.1.1F as students use frequently occurring adjectives which helps students make sense of the daytime data." (Lesson 8, Teacher Guide)

Language: CCSS-ELA-LITERACY.1.1I Use frequently occurring prepositions (e.g., during, beyond, toward). Claimed in Lessons 2 and 3:

- Lesson 2, Navigate, Step 1 "Literacy support: As students discuss the Sun's location in the sky, they will use words that describe the Sun's location relative to other objects (e.g., *in* the sky, *above* the swing set, *between* the roof and the top of the tree). Explain that these location words are called prepositions and that we can use prepositions to describe locations. Model using a preposition or point out when students are using prepositions. (L.1.1I)" (Lesson 2, Teacher Guide)
- Lesson 3, Navigate, Step 1: "As students observe the Sun in the sky, they are noting the Sun's location. Explaining this information requires students to use frequently occurring prepositions such as on, above, next to, between, and near. Support students as they use these prepositions to note the Sun's location in the sky in relation to other objects. Using prepositions helps students expand the length of their oral response while also explaining the Sun's position in specific detail (L.1.1I)." (Lesson 2, Teacher Guide)

Language: CCSS-ELA-LITERACY.L.1.4B Use frequently occurring affixes as a clue to the meaning of a word. Claimed in Lessons 3 and 4:

- Lesson 3, Explore, Step 3: "To ensure that all students are prepared to participate in the discussion comparing their morning consensus observations, reinforce students' comprehension of the word 'repeat.' Remind students that some words can be broken up into smaller parts, and those smaller parts can be used as a clue to the meaning of the word. "Re-" can be a clue to the meaning of the word repeat. Other words, like restart, reread, and rewrite also use "re-," and they all mean something that happens again. Use the affix "re-" to emphasize that repeat means *something that happens again* (L.1.4B). This is also useful in connecting "repeat" to the science word "pattern" later in this lesson's Synthesize." (Lesson 3, Teacher Guide)
- Lesson 4 Explore, Step 4: "Reinforce the meaning of the word "ongoing" by encouraging students to use the root word "going" and affix "on" to figure out that "ongoing" means continuous action. This supports L.1.4B, L.1.4C, and supports students' understanding of the Sun's apparent motion in the sky throughout the unit." (Lesson 4, Teacher Guide)

Language: CCSS-ELA-LITERACY.L.1.4C Identify frequently occurring root words (e.g., look) and their inflectional forms (e.g., looks, looked, looking). Claimed in Lesson 4:

- Lesson 4, Explore, Step 4: "Reinforce the meaning of the word "ongoing" by encouraging students to use the root word "going" and affix "on" to figure out that "ongoing" means continuous action. This supports L.1.4B, L.1.4C, and supports students' understanding of the Sun's apparent motion in the sky throughout the unit." (Lesson 4, Teacher Guide)

Language: CCSS-ELA-LITERACY.L.1.5 With guidance and support from adults, demonstrate understanding of word relationships and nuances in word meanings. Claimed in Lessons 7 and 10:

- Lesson 7, Navigate, Step 1: "This lesson is an opportunity to support students in recognizing how everyday words, such as daytime and nighttime, can be used in slightly different and nuanced ways. This is related to L.1.5. Though we can use daytime and nighttime in everyday language meaningfully, as scientists, we will define daytime and nighttime by using evidence of specific objects (Sun, stars) that can be seen in the sky. This builds and refines students' prior understandings of these terms. Support students in understanding that words can have slightly different meanings in different contexts." (Lesson 7, Teacher Guide)
- Lesson 10, Navigate, Step 1: "In this unit, the words 'nighttime' and 'daytime' have a specific start and end— sunrise and sunset. "Time of day" words (e.g., morning, midday, afternoon, evening) are used colloquially in flexible and often highly variable and context-specific ways. Children may need guidance and support from you to understand the nuances in the meanings of these words. You may want to clarify how these words are being used in this lesson compared to how children might have heard them used before. Additionally, point out some of the word parts, such as mid<u></u>day, meaning the middle of the day or <u></u>afternoon, usually refer to the period of time that comes after 12:00 pm or noon (L.1.5)." (Lesson 10, Teacher Guide)

Mathematics

CCSS-MATH-Practice.MP2 Reason abstractly and quantitatively.Claimed in Lesson 8. Evidence was found in the claimed lessons. Examples include:

- Lesson 8 Explore, Step 3 "During the discussion, students will reason abstractly and quantitatively as they make sense of the number of the daytime and nighttime hours in Days A and B. (MP2) Students can use the data

representations on their handouts as tools for support in justifying their responses (MP5) and explaining how they figured out that Day A and Day B have different amounts of daytime hours." (Lesson 8, Teacher Guide)

CCSS-MATH-Practice.MP4 Model with mathematics. Claimed in Lessons 7 and 8. Examples include:

- Lesson 7, Explore, Step 3: "Students create a three-column chart, or picture graph, to organize which cards show 'daytime', 'nighttime', or 'not sure'. After their initial selections, use the teacher guide prompts to help students reorganize the data as they discuss what can be observed in the daytime sky (Sun) and the nighttime sky (stars). (MP4 and part of 1.MD.C.4)" (Lesson 7, Teacher Guide)
- Lesson 8, Explore, Step 4: "A graph visually represents numerical and/or categorical data to support comparisons. In this lesson, the graph shows the number of daytime and nighttime hours on two different days, allowing for both quantitative and relative comparisons. This visual representation will support students to ask and answer questions about the data. (MP4 and part of 1.MD.C.4)" (Lesson 8, Teacher Guide)

CCSS-MATH-Practice.MP5 Use appropriate tools strategically. Claimed in Lesson 8. Examples include:

- Lesson 8, Explore, Step 3: "As students count the number of suns and stars on their handouts, encourage the use of finger counting, Unit Class Graphs, and/or counters to help them keep track of the quantity. (MP5 and part of 1. NBT.A.1)" (Lesson 8, Teacher Guide)
- Lesson 8, Explore, Step 3: "Record daytime and nighttime hours on the graph. Use students' noticings that the graph does not yet include the number of hours of daytime and nighttime that students counted and recorded on their handouts to suggest that we quickly add that information to our graph! In a way that works well for your class, ask students to share the number of daytime hours for their day (Day A or Day B). Possible options include counting in unison, having a student share the number out-loud and have others use a gesture to agree/disagree, inviting a student to come up to the class graph and point, or having a student with a Day A Data or a Day B Data handout share their findings. As students share the number of daytime hours, write them down on a sticky note (one sticky for each day), post them to the graph, and use a yellow coloring utensil to color in the boxes with the Suns for that day. Day A has 13 hours of daytime and Day B has 9 hours of daytime. Then, repeat this with nighttime hours, adding these to the graph using a sticky note. Day A has 11 hours of nighttime and Day B has 15 hours of nighttime." (Lesson 8, Teacher Guide)

CCSS-MATH-Practice.MP7 Look for and make use of structure. Claimed in Lessons 6 and 9. Examples include:

- Lesson 6, Synthesize, Step 5: "Compare to the Sun. Display the class Sun Observations chart (refer to slide J) and have students turn and talk with a partner to describe the pattern of the Sun's ongoing path in the sky. Then, engage in a brief discussion to support students in making comparisons between their observations of the Moon and the Sun." (Lesson 6, Teacher Guide)
- Lesson 9, Explore, Step 4: "Add daytime hours to the Monthly Daytime graph. Either while sequencing and securing the handouts into the class graph, or afterward, invite students to share the number of daytime hours they counted and colored for their month. Record this number next to each handout. The purpose of creating this year-long (sequenced) graph is for students to be able to analyze monthly data in a way that supports them in noticing how daytime length changes throughout the year. This prepares them for identifying and labeling seasonal patterns by the end of this lesson. The following shows how your Monthly Daytime Graph will look." (Lesson 9, Teacher Guide)

CCSS-MATH-1.NBT.A.1 Count to 120, starting at any number less than 120. In this range, read and write numerals and represent a number of objects with a written numeral. Claimed in Lesson 8. Examples include:

- Lesson 8, Explore, Step 3: "Prepare to analyze data. Tell students that they are going to analyze data similar to what they have done in math class. Using slide E as a reference, invite students to remind the class of the investigation plans they made earlier. To find the number of daytime and nighttime hours, they will: 1. Count the boxes with the suns and record the total number of daytime hours. 2. Count the boxes with the stars and record the total number of nighttime hours." (Lesson 8, Teacher Guide)

CCSS-MATH-1.NBT.B.3 Compare two two-digit numbers based on meanings of the tens and ones digits, recording the results of comparisons with the symbols >, =, and <. Claimed in Lessons 8 and 9. Examples include:

- Lesson 8, Explore, Step 4: "Compare daytime and nighttime hours with our partners. Ensure that students have their completed Day A Data or Day B Data handouts and are with their partners from the previous Explore. Have students turn and talk with their partner to compare their day's daytime and nighttime hours. They should figure out if their day has more daytime hours or less daytime hours than nighttime hours. Does your day have more daytime hours than nighttime hours? Or less daytime hours than nighttime hours?" (Lesson 8, Teacher Guide)
- Lesson 9, Explore, Step 3: "Share about the shortest and longest daytime. Next, invite students to share and discuss their and their partner's ideas using the prompts below. The purpose of this discussion is to support students in interpreting the graph to identify which month has the shortest and longest daytime. Students may make sense of this using numbers (fewer/more hours of daytime) and using the relative length of the yellow bars. Encourage students to express their understanding of daytime length using numbers and relative length through a variety of means, including through words in languages they may use, pointing to the graph, gesturing with their fingers/hands closer together or farther apart, and holding up fingers to represent a number." (Lesson 9, Teacher Guide)

CCSS-MATH-1.NBT.C.4 Add within 100, including adding a two-digit number and a one-digit number, and adding a two-digit number and a multiple of 10, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used. Understand that in adding two-digit numbers, one adds tens and tens, ones and ones; and sometimes it is necessary to compose a ten. Claimed in Lesson 8. Evidence includes:

- Lesson 8, Explore, Step 4: "Record daytime and nighttime hours on the graph. Use students' noticings that the graph does not yet include the number of hours of daytime and nighttime that students counted and recorded on their handouts to suggest that we quickly add that information to our graph! In a way that works well for your class, ask students to share the number of daytime hours for their day (Day A or Day B). Possible options include counting in unison, having a student share the number out-loud and have others use a gesture to agree/disagree, inviting a student to come up to the class graph and point, or having a student with a Day A Data or a Day B Data handout share their findings. As students share the number of daytime hours, write them down on a sticky note (one sticky for each day), post them to the graph, and use a yellow coloring utensil to color in the boxes with the Suns for that day. Day A has 13 hours of daytime and Day B has 9 hours of daytime. Then, repeat this with nighttime hours, adding these to the graph using a sticky note. Day A has 11 hours of nighttime and Day B has 15 hours of nighttime." (Lesson 8, Teacher Guide)

CCSS-MATH-1.MD.C.4 Organize, represent, and interpret data with up to three categories; ask and answer questions about the total number of data points, how many in each category, and how many more or less are in one category than in another. Claimed in Lessons 3, 7, 8, and 9. Examples include:

- Lesson 3, Explore, Step 3: "Add Sun data (blue sticky notes) to our Sun Observations chart. Provide each student with a blue sticky note to place on the Sun Observations chart in the location that corresponds to where they drew the Sun on their own Sun Observations handout. Just like in Lesson 2, encourage students to place their sticky notes on top of one another if their observed location is the same. Remind students that the observation sticky notes allow us to notice each individual observation of the Sun's location in the sky." (Lesson 3, Teacher Guide)
- Lesson 7, Explore, Step 3: "Ensure (if possible) all cards are in 'daytime' or 'nighttime' columns. With students, discuss image cards in the 'not sure' column and place them into either the 'daytime' or 'nighttime' column as the class figures out where they belong. If students are still not sure about certain cards, consider comparing and contrasting those cards with similar ones in the daytime or nighttime column. It may be that your class cannot reach consensus now on all of the cards, and that is OK! In the following discussion, students will observe and describe the pattern across all of the daytime and nighttime cards. If needed, you can leave the cards in the "not sure" column and return to them at the end of this Explore." (Lesson 7, Teacher Guide)
- Lesson 8, Explore, Step 4, Math Supports Sidebar: "A graph visually represents numerical and/or categorical data to support comparisons. In this lesson, the graph shows the number of daytime and nighttime hours on two different days, allowing for both quantitative and relative comparisons. This visual representation will support students to ask and answer questions about the data. (MP4 and part of 1.MD.C.4)" (Lesson 8, Teacher Guide)
- Lesson 9, Explore, Step 4, Math Supports Sidebar: "Students organize each month's data into a graph to facilitate looking for and making use of the structure of the number of daytime hours and sunrise/sunset times. By analyzing the structure later in the lesson, they make sense of seasonal changes for when daytime lengths are shorter or longer. (MP7 and part of 1.MD.C.4)" (Lesson 9, Teacher Guide)

Criterion-Based Suggestions for Improvement: N/A

CATEGORY II

NGSS Instructional Supports

II.A. Relevance and Authenticity

EXTENSIVE

Engages students in authentic and meaningful scenarios that reflect the practice of science and engineering as experienced in the real world.

i. Students experience phenomena or design problems as directly as possible (firsthand or through media representations).

ii. Includes suggestions for how to connect instruction to the students' home, neighborhood, community and/or culture as appropriate.

iii. Provides opportunities for students to connect their explanation of a phenomenon and/or their design solution to a problem to questions from their own experience.

The reviewers found **extensive** evidence that the materials engage students in authentic and meaningful scenarios that reflect the practice of science and engineering as experienced in the real world because students are guided to make and use observations to describe patterns in the apparent motion of objects they see in the sky over the course of a day and in different seasons. Students experience the phenomena as directly as possible when they read a book in Lesson 1, use images to make observations, and make firsthand observations of the sky throughout the unit. The materials include suggestions for how to connect instruction to the students lives' by recording student connections to the phenomena on an Our Experiences chart and observations in the community on an Out-of-School Sky Experiences page. The materials provide opportunities for students to connect their explanation of a phenomena to questions from their own experiences when they are prompted to think about where objects are in the sky when they engage in activities at different times of day.

i. Students experience phenomena or design problems as directly as possible (firsthand or through media representations)

- Space Sky Patterns Unit Front Matter: "It is developmentally appropriate for young children who experience the world around them through direct firsthand observations. Students are able to make their own firsthand observations of the Sun in the sky in their own schoolyard in Lesson Set 1 in ways that allow for sharing their ideas and wonderings about the world around them. Additionally, students are able to use media to make observations of the Sun and other objects in the sky throughout the unit." (Space Sky Patterns Unit Front Matter)
- Lesson 1, Connect, Step 1: The class reads a book that describes students taking a walk outside in the evening. Sometimes, it is sunny, so they stop and play on the playground, but other times, it is too dark to play. It also describes how sometimes a student sees the moon when they take out the trash at night, but other times they do not see the moon in the sky when they take out the trash. The book describes that when students leave the library, the Sun is in their eyes, but at other times, when they leave the library, the Sun is not in their eyes. (Lesson 1, Observing the Sky in our Communities Book)
- Lesson 3, Explore, Step 3: Engages students in two different observations to determine the location of the Sun in the sky at different times of day. "Go outside and make morning observations. Bring students outside to the same observation location used in Lessons 1 and 2 and have them work with a partner to make and record observations of the Sun's location in the sky. Encourage partnerships to compare and work toward agreement about their recorded observations and, additionally, to discuss with each other how this morning's observation compares with the observation they made of the Sun in the sky in Lesson 2. To support students in making Sun observations safely, you could suggest (as in Lessons 1 and 2) that they turn around (so their back is to the Sun) anytime they are writing or drawing and therefore their Sun safety goggles are off." (Lesson 3, Teacher Guide)

- Lesson 6, Explore, Step 4: "Show a Moon time-lapse video. Tell students that you have a time-lapse video, like the one we used in Lesson 4 to view the Sun's changing location in the sky, but with the Moon in it (refer to slide H). Remind students that a time-lapse video is a recording that shows what happens over a long time, in a shorter amount of time. In this way, it can show us what we would see between each Moon Location card as if we had images from every single minute! Show students the Moon Timelapse video....After viewing the video, use the following prompt to engage students in a brief discussion with the goal of supporting students in describing their observations of the Moon's apparent motion across the sky in an ongoing path." (Lesson 6, Teacher Guide)

ii. Includes suggestions for how to connect instruction to the students' home, neighborhood, community, and/or culture as appropriate.

- Lesson 1, Connect, Step 1: "The book's images/text and students' observations provide opportunities for students to make connections to their own and others' experiences. As students make connections, record these on Our Experiences chart. Connecting to their own experiences with similar situations is important for student relevance and interest. To support students' sharing, consider suggesting sentence starters, such as "From my experience, _____." Inviting students to use gestures ("me, too") or hand-signs (thumb up) to indicate a similar experience may be one way to acknowledge many students' experiences while keeping the discussion moving. Note that, since we cannot make shared observations about others' previous experiences, these connections should not be documented on the Notice and Wonder chart." (Lesson 1, Teacher Guide)
- Lesson 1, Connect, Step 1: "Show students an Out-of-School Sky Experiences community connection page (refer to slide D), reading the directions aloud and pointing out where they can draw and write about their experiences with the Sun in their eyes, with the Moon and/or stars in the sky, and with different skies during evening events. Encourage students to return their Out-of-School Sky Experiences community connection page so that we can use their outside-of-school experiences to connect and relate to our science classroom work...The Out-of-School Sky Experiences community connection is a way for students to share experiences and ideas from their homes and communities with their classmates. Encourage students to notice and share experiences with the sky, Sun, Moon, and/or stars in their community that may be unique to where they are from. Celebrate that there may be similarities and differences in everyone's home and/or community, and those differences are what make each home and community special and important." (Lesson 1, Teacher Guide)
- Lesson 5, Community Connections Sidebar: "Through popular media (e.g., movies), students may have heard wayfinding described as how people use the Sun (and other objects, like stars) in the sky to navigate. If your classroom community has connections to individuals or communities engaged in wayfinding, consider inviting people to your classroom to share their stories or share with you media they have produced (e.g., a video). It is important to welcome all students' outside-of-school experiences in ways that allow communities to tell their own stories. However, this is different from retelling *others*' stories or consuming stories retold by outsiders. If students share stories that are not their own (e.g., discuss wayfinding as seen or told by popular media), acknowledge the connection they are making while also helping them understand the community to which that story belongs." (Lesson 5, Teacher Guide)

iii. Provides opportunities for students to connect their explanation of a phenomenon and/or their design solution to a problem to questions from their own experience.

- Lesson 1, Connect, Step 1: "Discuss similar experiences. Invite students to first think and then turn and talk with a partner about when they or someone they know may have had a similar experience of the Sun in their eyes. The purpose of this turn-and-talk discussion is to support students in generating initial connections with this common phenomenon and to motivate engaging with others' experiences using a text next. It is OK if not all of your students immediately share similar Sun-in-our-eyes experiences; in fact, it may be helpful in problematizing

that this does not "always" happen. Note that the book used in the following read-a-loud will provide additional examples and images to further support all students' connections, observations, and questions about this phenomenon. Have you had an experience like this, when the Sun was shining in your eyes (when you were in the car, when you were at recess)? What was that like? Does that always happen? Invite some students to share their own or their partner's experiences of a time when the Sun was shining in their eyes. Welcome students' varied ways of communicating about their and others' experiences, including gesturing or miming actions. Consider inviting students to use gestures ("me, too") or hand-signs (thumb up) to indicate a similar experience." (Lesson 1, Teacher Guide)

- Lesson 4, Explore, Step 2: "Invite students to make connections to these times of day by sharing things they do and/or things that happen during each time of day. As students share, add words or images that support students' connections to each "time of day" label recorded on the Sun Investigation Plan. The purpose of this introduction and connection opportunity is to ensure that--later, during their investigation--students can engage with these times of day sequentially and with meaning as they make observations." (Lesson 4, Teacher Guide)
- Lesson 5, Connect Section: "Using the final page of the text (page 12) as a connector, invite students to turn and talk with a partner about how they, their families, and/or people in their communities use the patterns of the Sun's changing locations in the sky to figure out where they are or where they are going. Then, use the following prompt to invite students to share their ideas out loud...What are some ways you or someone you know have used the Sun in the sky to figure out where you are or where you are going?.. Acknowledge students' input and sharing and celebrate their important work so far in this unit to figure out these patterns of the Sun's changing locations in the sky and how people and animals can use these patterns! Suggest that we return to our Notice and Wonder chart from Lesson 1 to identify the many questions we can now answer and find ones that we would like to figure out next!" (Lesson 5, Teacher Guide)

Criterion-Based Suggestions for Improvement: N/A

II.B. Student Ideas

EXTENSIVE

Student Ideas: Provides opportunities for students to express, clarify, justify, interpret, and represent their ideas and respond to peer and teacher feedback orally and/or in written form as appropriate.

The reviewers found **extensive** evidence that the materials provide students with opportunities to share ideas directly with peers, elicit ideas from others, and use others' ideas to improve or change their own thinking. The materials provide support for the teacher to facilitate drawing out student ideas and eliciting multiple perspectives during discussions. The unit includes artifacts that show evidence of the class's reasoning and changes in their thinking over time; however, there are no artifacts that explicitly illustrate how individual student thinking changes over the course of the unit. There are teacher-to-student and peer-to-peer feedback loops to help students make accurate observations of the Sun's location in the sky at different times of the day and to use observations of day length to make claims about which season events occur.

Student ideas are clarified, justified, and built upon

- Lesson 2, Synthesize, Step 6: "Invite students to use a thumb up or thumb down to show their current thinking: thumb up: I think the Sun is in these same locations at these times every day. thumb down: I do not think the Sun

is in the same locations at these times every day. Have students find a partner who thinks something different. For example, a student with their thumb up finds a partner with their thumb down. Invite students to move to a new part of the room and briefly share their ideas with their partner. Then reconvene as a whole class in a shared meeting space for the final Navigate of this lesson. The class will be able to use students' varied ideas and reasons as motivation for considering where to go next." (Lesson 2, Teacher Guide)

- Lesson 4, Explore, Step 3: "After students have circled the Sun on the cards in their set and discussed their observations of the Sun's changing locations with their partners, suggest that partnerships join another pair of students with the same card set (A, B, C, or D) to compare observations. This provides an additional opportunity for all students to communicate their growing understanding of the Sun's changing locations in the sky, from east to west and from lower to higher to lower in the sky, throughout the day, allowing all students to be prepared for whole-class sharing in the next Explore. In small groups, compare our observations. Instruct two student partnerships with the same card sets to join together in a group of four (set A with set A, set B with set B, etc.) by moving to one partnership's set of organized cards. Invite that partnership to describe their observations of what happens to the Sun in the sky in between morning and afternoon using the images in their card set, using the prompt below. Encourage and welcome students to demonstrate their understanding of their observations through pointing, gesturing, and/or moving their bodies. In your card set, what happens to the Sun in the sky in between morning and afternoon? Then, have the small group move to the other partnership's card set so that those students can describe their observations of what happens to the Sun in the sky in-between the morning and afternoon. Support small group sharing. As students discuss in small groups, circulate and encourage students to notice similarities between their observations; this will further prepare them for identifying patterns in the next Explore when they will compare all 4 Sun Location card sets. If disagreement or uncertainty about observations between partnerships with the same card set arises, encourage partnerships to describe and compare the Sun's location across the cards/over time using descriptive words and in relation to the ground-based reference points." (Lesson 4, Teacher Guide)
- Lesson 5, Synthesize, Step 2: "Provide a moment for students to make their own claim by manipulating the Sun cutout on their Sun Game Placemat handout and encourage students to point, gesture, or move their bodies to support their sensemaking. Then, have students in each small group share their ideas with their groupmates. Suggest that students use the sentence starter (refer to slide D) to support them in expressing their claim about the Sun's location in the sky at midday and their evidence: I think the Sun will be _____ because _____ ." (Lesson 5, Teacher Guide)

Artifacts show evidence of students' reasoning and changes in their thinking over time.

- In Lesson 2, the teacher is guided in creating a class "Our Growing Ideas" chart where they record "what we figured out about the Sun's location in the sky at different times throughout the day." They update the chart throughout the unit, including in lessons 3, 4, 5, 6, 7, 8, 9, and 10. This artifact effectively captures how the class's thinking about patterns in the movement of objects in the sky have changed over the course of the unit, but does not capture the changes in thinking of individual students.
- In Lessons 1-3, students use Sun Observation handouts to draw where they see the Sun in the sky each time they go outside and write a description of their observation; however, this artifact does not show evidence of change in how students think about patterns in the Sun's movement throughout the day.
- Lesson 3, Explore, Step 3: "The voting chart serves as a tool to represent the class's changing ideas across this lesson. Encouraging students to remember their vote (in which column they place their sticky note) is helpful for revisiting the voting chart at the end of the next Explore, when they will have an opportunity to change their vote. It is not necessary for students to write their name on their sticky note since it is OK if students move a different sticky note

later, and this is not intended as an individual opportunity for assessment." Students vote yes, no, or unsure on the question "Do the Sun's different locations in the sky repeat?" (Lesson 3, Teacher Guide)

- Lesson 3, Explore, Step 5: "Revisit our voting chart. Now that the class has made sense of their morning and afternoon Sun observations, invite students to return to the lesson question, Do the Sun's different locations in the sky repeat? to reconsider their initial claims (refer to slide M)." (Lesson 3, Teacher Guide)

Students receive feedback and revise their thinking accordingly.

- Lesson 2, Explore, Step 5: "Collect students' handouts. In a way that works well for your class, gather students' completed Three Sun Observations handouts in order to review and be able to provide feedback and support before or during the next lesson." (Lesson 2, Teacher Guide)
- Lesson 3, Explore, Step 3: "Prepare to provide feedback and support. While outside, be prepared to provide feedback and use strategies to provide support for students who may not yet be making and recording accurate observations of the Sun's location in the sky and/or conveyed that they needed continued support via the self-reflection moment in Lesson 2; instructional guidance suggestions are available in the Lesson 2 Instructional Guidance 1 tool." (Lesson 3, Teacher Guide)
- Lesson 5, Synthesize, Step 3: "Continue drawing and writing. Provide students with additional time to follow through with the next steps in making claims and supporting them with evidence while you continue to interact with individuals to discuss and provide feedback and support." (Lesson 5, Teacher Guide)
- Lesson 10, Synthesize, Step 5: "Give peer feedback. Pair students together and provide a few minutes for them to engage in peer feedback about their Season Claim student assessments. Ensure students can use the class's Gotta-Have-It Checklist (refer to slide K) to review each other's progress so far and provide feedback. Encourage students to share their claim (what they circled) and their evidence (what they wrote). Encourage students to explain their thinking using their bodies, gestures, and classroom resources, including the Day A and Day B Graph and/or Our Growing Ideas chart. Use feedback to continue working. Have students return to their Season Claim student assessments and continue working, now improving or completing their claim and evidence using feedback from their partner." (Lesson 10, Teacher Guide)

Criterion-Based Suggestions for Improvement:

- Ensure "[s]tudent artifacts include elaborations, reasoning, and reflection and show how students' reflective thinking has changed over time. Descriptions of student thinking may be written, oral, pictorial, kinesthetic, or models. Students receive feedback and revise their thinking accordingly." [Detailed Guidance, p. 23]
    - Consider including artifacts that show how individual students' thinking and reasoning about the changing positions of objects in the sky and the changing length of day evolve as they gather more evidence.

II.C. Building Progressions

EXTENSIVE

Identifies and builds on students' prior learning in all three dimensions, including providing the following support to teachers:

i. Explicitly identifying prior student learning expected for all three dimensions

ii. Clearly explaining how the prior learning will be built upon.

The reviewers found **extensive** evidence that the materials identify and build upon students' prior learning in all three dimensions because the materials explicitly identify prior learning expected for all three dimensions; however, the materials do not specify which element this prior learning is aligned with. The learning in all three dimensions progresses logically throughout the materials. The support for teachers clearly explains how the prior learning will be built upon. The materials provide explicit support to teachers in clarifying their understanding of potential alternate conceptions that they or their students may hold during the unit.

i. Explicitly identifying prior student learning expected for all three dimensions

Disciplinary Core Ideas:

- Unit Overview: "Students will come to school with everyday ideas about daytime and nighttime. Some of these ideas may be connected to everyday events such as waking up when it is daytime or going to bed at nighttime. Ideas about daytime and nighttime may also be related to ideas about light and dark. Students may say it is daytime when it is light out and nighttime when it is dark out. Young children may also associate daytime and nighttime with different objects visible in the sky. For example, that is daytime when the Sun is out or night when the stars are out or the Moon is out. First graders who have participated in the OpenSciEd *Unit 1.1: How can we read under covers when it's dark?* may be able to connect the presence of the Sun in the sky as what causes it to be lighter during the daytime. Students will build on their initial ideas in this unit to develop the understanding that the Sun is visible during the daytime and not at nighttime, stars can be visible in the nighttime but not the daytime, while the Moon can be visible during the daytime or nighttime. In addition to ideas about the presence of objects like the Sun, Moon, and stars in the sky, students will also enter first grade with ideas about why these different objects are sometimes absent from the sky. For instance, from everyday experiences students may have ideas that they do not see the Sun at nighttime because it is behind clouds, behind the Moon, or under the Earth. They may also think that the Sun is with other stars or simply stops shining at nighttime." (Unit Overview) While this describes what prior learning teachers can expect students to leverage in the unit, it does not link the learning to individual DCI elements.
- Unit Overview: "Students will enter first grade with ideas about the Moon from observing it in their everyday lives. Although the Moon can be visible during either the daytime or nighttime, it can be harder to notice in the daytime because it is less contrasted against the daytime sky. For this reason, and because of the way popular media conveys the Moon as a "nighttime" object, students may have ideas that the Moon is only visible at nighttime. In this unit, ideas about the Moon are important for recognizing it as an object visible in the sky during the daytime or nighttime. Students may also notice that the Moon does not always appear in the same place in the sky. This unit builds on students' experiences of the Moon's changing location in the sky to help them figure out its apparent motion across the sky in an ongoing path (like the Sun). Students may have also noticed that the Moon is not always the same shape; sometimes it is round and sometimes it appears to be a crescent. Ideas about phases of the Moon and its revolution around the Earth are further developed in later elementary grades." (Unit Overview) While this describes what prior learning teachers can expect students to leverage in the unit, it does not link the learning to individual DCI elements.

- Unit Overview: "Through everyday experiences and observations of the sky, students may enter first grade with ideas about the apparent motion of the Sun in the sky, including ideas about sunrise and sunset. Some of these early ideas include that the Sun rises and sets each day. Students may have different ideas about what that means. Some students may have ideas that the Sun rises and sets by going straight up and down in the same or different parts of the sky, while others may have noticed the pattern of the Sun seeming to move in an ongoing path across the sky--rising in one part of the sky, seeming to move across the sky, and setting in a different part of the sky. Additionally, some students may bring ideas about the position of the Sun in the daytime sky, such as it getting higher as it approaches the middle of the day and lower when it is near the beginning or end of the daytime. Children also may hold the idea that the Sun is directly overhead, even though this only happens at certain latitudes and/or times of year. This relates to students' ideas that the Sun's light may come from only above them. Other students may have ideas that sunlight is all around them. These incoming ideas are important for supporting students in observing, describing, and using the pattern of the Sun's apparent motion across the sky in an ongoing path in this unit. In later grades students figure out that the daytime/nighttime cycle is due to the Earth's rotation on its axis in a single day." (Unit Overview) While this describes what prior learning teachers can expect students to leverage in the unit, it does not link the learning to individual DCI elements.
- Unit Overview: "Through observations of the world around them, first graders may have ideas about seasonal changes in weather and plant and animal life. They are likely to have many ideas and connections through their everyday experiences to seasonal changes in activities and special events. Some ideas and experiences may include noticing that it is light out longer during some parts of the year when compared with others (e.g., it's still light out and/or the Sun is still visible at bedtime in the summer, but it is already dark out in the winter). Though students have likely experienced these changes in daytime length (when the Sun is in the sky), they may or may not have yet connected these experiences to seasonal patterns or to the amount of time the Sun is in the sky (daytime length) during different seasons. The unit leverages students' many experiences to help them figure out that the amount of daylight varies across a year (during different seasons)." (Unit Overview) While this describes what prior learning teachers can expect students to leverage in the unit, it does not link the learning to individual DCI elements.
- Lesson 7, Explore, Step 3: "Teaching Tip: Students who completed Unit 1.1: How can we read under covers when it's dark? will be familiar with the idea that light sources are objects that make light and will recognize how light sources can make spaces brighter. They are likely familiar with the Sun as a light source from experiences such as their Light Scavenger Hunt and Light in Our Communities book, and implicit ideas that it is brighter in the daytime." (Lesson 3, Teacher Guide)
- While these describe what prior learning teachers can expect students to leverage in the unit, it does not link the learning to individual DCI elements.

Science and Engineering Practices:

- Unit Overview: "Though young children regularly make observations and comparisons anecdotally during their everyday lives, they do not typically do so in a way that is accurate and consistent, which is important when recording and comparing observations in science. For this reason, it is important to leverage students' everyday experiences with observing the natural world in order to help them make sense of phenomena. Students have had experiences making, recording, and comparing accurate observations (e.g., drawing exactly what you see) in Unit K.1: Why do some surfaces get hot and how can we make them less hot? and Unit 1.2: How can we communicate using objects that make sound?. In this unit, students extend this practice by making and recording observations of objects in the sky. Through their experiences, they realize that ground-based reference points can improve the accuracy of their recorded observations and support them in comparing these observations to others." (Unit Overview) While this describes what prior learning teachers can expect students to leverage in the unit, it does not link the learning to individual SEP elements.

- Unit Overview: "Children enter school with experiences noticing things in the world and asking questions about what they experience. In Unit K.3: How can we move things to where we want them to go?, students built on their everyday experiences answering questions and making things move by planning and carrying out investigations of how to change the motion of different objects. In first grade, students build on this work by learning that scientists make careful observations about the world around them to answer scientific questions. In Unit 1.1: How can we read under covers when it's dark? students had experiences with planning and carrying out investigations where they engaged in collaborative work determining what materials can be used in an investigation, how to set up materials in ways that provide for shared data collection, and sequencing investigation steps. They will have built on those experiences in Unit 1.2: How can we communicate using objects that make sound? when considering how to make observations in ways that provide for shared data collection that serves as evidence to answer a scientific question." (Unit Overview) While this describes what prior learning teachers can expect students to leverage in the unit, it does not link the learning to individual SEP elements.
- Unit Overview: "Across the early elementary grades, students gain experiences with recording information using words and drawings. In previous OpenSciEd units students have had many opportunities to record information as part of investigations and engineering design. They also had opportunities to use and share written and drawn observations with partners and small groups, in whole class sensemaking discussions, when updating Our Growing Ideas chart. Also, in many previous OpenSciEd units, including Unit 1.1: How can we read under covers when it's dark? and Unit 1.2: How can we communicate using objects that make sound?, students have had experiences using observations to describe patterns in the natural and designed worlds. In this unit, students will continue this work by using observations (firsthand and from media) to describe patterns of the Sun, Moon, and stars." (Unit Overview) While this describes what prior learning teachers can expect students to leverage in the unit, it does not link the learning to individual SEP elements.
- Unit Overview: "In everyday experiences and other subjects in school, students have experiences counting and comparing objects, which can be leveraged in science to support their scientific sensemaking of the world around them. Building on those experiences, in Unit K.2: How can we be prepared for the weather? students used numbers and counting to identify temperature and other measurements, used tally charts and counting to support their identification of patterns, and used a picture graph to discuss and identify patterns in local weather conditions over time. In other OpenSciEd units, students have used counting and tally charts to support their sensemaking in science. As in those kindergarten units, math-specific tools, such as 100-charts and number lines, can support students in counting and cardinality. This unit uses graphs as a way of representing data so that it can be counted, compared, and discussed concretely, and these are particularly important in identifying seasonal patterns in daytime length and figuring out the Lesson Set 3 phenomenon. In this unit, students also use multiple ways of making sense of mathematical data, reasoning about daytime length by considering quantitative (hours of daytime) and relative (length of yellow bars) information." (Unit Overview) While this describes what prior learning teachers can expect students to leverage in the unit, it does not link the learning to individual SEP elements.
- Unit Overview: "Students enter school with many experiences supporting their arguments with others, however, they may have less experiences with making and supporting scientific arguments with evidence. Supporting scientific arguments with evidence is different from engaging in arguments in everyday life, due to the importance of supporting claims in science with evidence from observations and other data sources. Students' first experiences engaging in arguments from evidence in science occur in Unit K.4: Do birds, other animals, and plants need people to help take care of them?, where students had experiences constructing arguments about what birds need to survive (food, water, homes, air) and how birds get what they need to survive (changing their environments to meet their needs). Students have also had experiences engaging in argumentation in Unit 1.1: How can we read under covers when it's dark?, when they used evidence to support claims about whether or not light is needed to see and

distinguished among possible explanations that did or did not account for all gathered evidence." Unit Overview) While this describes what prior learning teachers can expect students to leverage in the unit, it does not link the learning to individual SEP elements.

- Lesson 1, Explore, Step 2: "Broadening Access You can provide scaffolding tools to support students while planning their Sun investigation. Students who completed Unit K.3: How can we move things to where we want them to go? will be familiar with using the "Planning and Carrying Out an Investigation Sorting Cards" to collaboratively plan an investigation. These cards can help support planning and can be used again in subsequent Lessons 2-4 and Lesson 6, as students continue to plan investigations. They can be removed when students more independently engage in the investigative process." (Lesson 1, Teacher Guide) While this describes what prior learning teachers can expect students to leverage in the unit, it does not link the learning to individual SEP elements.

Crosscutting Concepts:

- Unit Overview: "Students bring with them everyday experiences with patterns - something that happens over and over again. Students are familiar with recurring visual patterns in nature, on clothing, and/or with math manipulatives and toys. If you taught Unit K.1: Why do some surfaces get hot and how can we make them less hot?, students have experiences using many observations to identify a pattern that surfaces in shady places are less hot compared with surfaces in sunny places. And if you taught Unit K.2: How can we be prepared for the weather?, students used patterns they identify in their observations of daily weather to find consensus observations to record, and they find patterns over time to describe what their local weather is usually like. In this unit, students work extensively with patterns, using many observations to describe patterns of the Sun, Moon, stars, and seasons and using these patterns as evidence to support claims, including claims about future events." (Unit Overview) While this describes what prior learning teachers can expect students to leverage in the unit, it does not link the learning to individual CCC elements.

ii. Clearly explaining how the prior learning will be built upon.

- Unit Overview: "Students will build on their initial ideas in this unit to develop the understanding that the Sun is visible during the daytime and not at nighttime, stars can be visible in the nighttime but not the daytime, while the Moon can be visible during the daytime or nighttime. In addition to ideas about the presence of objects like the Sun, Moon, and stars in the sky, students will also enter first grade with ideas about why these different objects are sometimes absent from the sky. For instance, from everyday experiences students may have ideas that they do not see the Sun at nighttime because it is behind clouds, behind the Moon, or under the Earth. They may also think that the Sun is with other stars or simply stops shining at nighttime." (Unit Overview)
- Unit Overview, "This unit uses graphs as a way of representing data so that it can be counted, compared, and discussed concretely, and these are particularly important in identifying seasonal patterns in daytime length and figuring out the Lesson Set 3 phenomenon. In this unit, students also use multiple ways of making sense of mathematical data, reasoning about daytime length by considering quantitative (hours of daytime) and relative (length of yellow bars) information." (Unit Overview)
- Lesson 6, Explore, Step 2: "Students' use of their Sun Investigation Plan from Lessons 3 and 4 enables them to take increasing responsibility for planning an investigation to make observations using images, now in the new context of the Moon. Their previous investigation plan provides a protocol that can be leveraged for students' decision-making. For a class or group of students who may need less support, consider having students work with a partner to plan their investigation using previous lessons' Sun Investigation Plans as scaffolding." (Lesson 6, Teacher Guide)

- Lesson 7, Explore, Step 3: "Students continue to use many observations to describe patterns, this time with additional complexity in the new context of answering their lesson question about daytime and nighttime. In this lesson, students use multiple types of observations (evidence), compared to one type of observation (the Sun's/Moon's location in the sky) in previous lessons. Students' sensemaking is supported through their discussions and active reorganization of Sun/Star Sky cards in their class floor chart as they work to use observations of the Sun and stars to describe the patterns of visible objects in daytime and nighttime skies. For a class who may need less support, consider having the class work in two groups (ensuring each card is available in each group) to discuss and organize the Sun/Star Sky cards and compare the two resulting floor charts." (Lesson 7, Teacher Guide)

The "About the Science" document provides explicit support for teachers to clarify their understanding of potential alternate conceptions that they or their students may hold during the unit.

- About the Science, "The Moon makes a 27.3-day revolution around the Earth, which is generally related to the number of days in a month. The Moon reflects sunlight and the same side of the Moon always faces Earth. At times, the part of the Moon that is illuminated by the Sun is facing away from the Earth. This is what causes us to see different parts of the Moon at different times, referred to as Moon phases. For example, during a new moon, the side of the Moon reflecting sunlight is not visible to the Earth. As the Moon continues revolving around the Earth, we can see more of the side of the Moon that is reflecting sunlight (e.g., waxing crescent). A full moon means we can see the entire side of the Moon that is reflecting sunlight." (About the Science)
- About the Science, "The Earth moves around the Sun in an elliptical path called its orbit. Moving all the way around this path takes one year; this is Earth's revolution around the Sun. The Earth's revolution around the Sun and the tilt of the Earth's axis cause seasonal patterns. Earth's axis is tilted toward the North Star. As the Earth moves around the Sun, the tilt of the Earth's axis causes the different hemispheres to receive more or less direct sunlight, depending on the location of the Earth in its revolution around the Sun; these different locations align with different seasons. For example, at one point in the Earth's revolution around the Sun, the Earth's tilt toward the North Star means the northern hemisphere receives more direct sunlight and the most hours of sunlight in a day (summer; winter in the southern hemisphere)." (About the Science)

Criterion-Based Suggestions for Improvement:

- Ensure that "the materials explicitly state the expected level of prior proficiency students should have with individual elements of all three dimensions for the core learning of the materials." [Detailed Guidance, p. 25]

II.D. Scientific Accuracy

EXTENSIVE

Scientific Accuracy: Uses scientifically accurate and grade-appropriate scientific information, phenomena, and representations to support students' three-dimensional learning.

The reviewers found **extensive** evidence that students use scientifically accurate and grade-appropriate scientific information, phenomena, and representations to support students' three-dimensional learning. All science ideas and representations included in the materials are accurate. The unit includes Teaching Tips to ensure teachers are speaking about the apparent motion of the Sun in the sky in a scientifically accurate way.

- Lesson 2, Synthesize, Step 6: "Teaching Tip You will notice teacher language in this and other lessons uses words about the Sun's observed locations in the sky and (in future lessons) includes the word *appears/seems* to. It is important to value student contributions while also maintaining scientific accuracy. If your students use words like "move" to describe the Sun, it is not suggested that student language be corrected. Instead, you can respond using accurate language (*appears/seems*) while still acknowledging students' ideas and observations. The goals of this unit do not address the scientific explanations for why the Sun *appears* to move across the sky, only that it does appear to do so." (Lesson 2, Teacher Guide)
- Lesson 2, Synthesize, Step 6: "Teaching Tip side bar: In this lesson, students begin interacting with the Sun, Moon, and stars through the *Observing the Sky in Our Communities* book and Word Wall cards with only an image and label. A traditional "definition" using words is currently not provided because students will build and refine their understandings of these objects in the sky through unit experiences. Additionally, typical definitions include details outside of this unit's scope (ex: the Moon is a satellite; the Sun is a star). More information is available in the Unit Front Matter. Throughout this lesson and future lessons you can encourage students to make real-life connections–in their own words–between Word Wall words, their meanings, and their uses (L.1.5C)." (Lesson 2, Teacher Guide)
- Lesson 3, Navigate, Step 7 "Teaching Tip Suggested teacher language uses words about the Sun's observed locations in the sky and (beginning at this point in the unit) how the Sun *appears* or seems to change locations or move. This is intentional; the Sun does not actually move across the sky. However, it is not suggested that you correct student language. Instead, you can respond using accurate language while still acknowledging students' ideas and observations. At this point in the unit, students may be using location-specific (the Sun is over the tree; pointing to the Sun) as well as beginning to use "motion" descriptions (i.e., the Sun moves through the middle; gesturing from one side to another). Students will continue to build on what they figure out about patterns of the Sun's apparent motion in the sky in later grades." (Lesson 3, Teacher Guide)

Criterion-Based Suggestions for Improvement:

- Consider adding Teacher Tips, such as those used to support accurate descriptions of the Sun's apparent motion, to help avoid misrepresenting seasons in different hemispheres and day lengths at various latitudes.

II.E. Differentiated Instruction

EXTENSIVE

Provides guidance for teachers to support differentiated instruction by including:

i. Supportive ways to access instruction, including appropriate linguistic, visual, and kinesthetic engagement opportunities that are essential for effective science and engineering learning and particularly beneficial for multilingual learners and students with disabilities.

ii. Extra support (e.g., phenomena, representations, tasks) for students who are struggling to meet the targeted expectations.

iii. Extensions for students with high interest or who have already met the performance expectations to develop deeper understanding of the practices, disciplinary core ideas, and crosscutting concepts.

The reviewers found **extensive** evidence to support teachers in providing differentiated instruction, suggesting explicit additional supports to communicate using different languages and modalities for emerging multilingual learners and students with visual impairments. Additionally, the materials provide extensions for students who have a high interest in the subject matter or who are already proficient in the learning target.

i. Supportive ways to access instruction, including appropriate linguistic, visual, and kinesthetic engagement opportunities are essential for effective science and engineering learning and particularly beneficial for multilingual learners and students with disabilities.

- Unit Front Matter: "Consider ways to support all students in making sense of spatial relationships relevant to making and recording observations of objects in the sky. In this unit, students make observations of the Sun in the sky outside their school (three-dimensional space) and record these as two-dimensional representations (on student handouts and class charts). Lessons provide suggestions for supporting students through pointing/gesturing, tactile interactions (tracing, manipulating cutouts), and using oral language and writing. Further, recognizing the repeating pattern of the Sun rising in one part of the sky (east) and setting in the other (west) requires orienting oneself in space (in this unit, teacher- and student-facing materials are oriented south), as does addressing the Lesson Set 1 question and unit phenomenon of the Sun being in our eyes sometimes, but not all the time." (Unit Front Matter)
- Lesson 3, Navigate, Step 1, Broadening Access sidebar, "Offering students an opportunity to work with peers by engaging in a turn and talk before the whole class discussion gives them a chance to use their linguistic and multimodal resources to express their ideas (and learn from other students' uses of these resources, too) before sharing in a larger discussion. This can be especially beneficial for multilingual learners, but also provides an opportunity for all learners to review their developing thoughts and ideas. This activity structure can promote confidence, which ultimately optimizes motivation to engage in whole class discussions." (Lesson 3, Teacher Guide)
- Lesson 9, Explore, Step 3: "While students work, use the following prompts to engage them in discussion. Encourage students to express their understanding by using numbers, pointing, gesturing (fingers/hands apart), as well as words in named languages (e.g., English, Spanish, Mandarin) that they might know and use." (Lesson 9, Teacher Guide)

Differentiation strategies address the needs of students when an obvious need arises, such as emerging multilingual students learning English.

- Lesson 1, Connect, Step 1: "Broadening Access. This Initial Ideas Discussion provides an authentic opportunity for you to enhance students' language learning and language use for sensemaking work. You might find it helpful to use the Discussion Type Prompts reference during the discussion. This handout provides teacher prompts that you could use to elicit and elevate students' observations, experiences and questions around unit phenomena, which include evening walks when it is sometimes light out; how we sometimes notice the Moon and stars in the sky; and how the Sun is sometimes in our eyes." (Lesson 1, Teacher Guide)
- Lesson 3, Navigate, Step 1 "Offering students an opportunity to work with peers by engaging in a turn and talk before the whole class discussion gives them a chance to use their linguistic and multimodal resources to express their ideas (and learn from other students' uses of these resources, too) before sharing in a larger discussion. This can be especially beneficial for multilingual learners, but also provides an opportunity for all learners to review their developing thoughts and ideas. This activity structure can promote confidence, which ultimately optimizes motivation to engage in whole class discussions." Note that the turn-and-talk strategy is used repeatedly throughout the unit." (Lesson 3, Teacher Guide)
- Lesson 10, Explore, Step 2 "Encourage students to share their thinking in a variety of linguistic and nonlinguistic ways, such as with gestures or body movements, approaching the class Day A and Day B Graph to touch and point to it, as well as by using words from any named languages (e.g., Spanish, English, Mandarin) students in your class might know and use." (Lesson 10, Teacher Guide)

Learners with special needs (visual impairments, tactile engagement, etc.)

- Unit Front Matter: "Consider ways of supporting all students in making observations of the focal phenomenon across the unit. To support equitable participation for students with light sensitivities, consider having students observe the Sun in the sky in Lessons 1-3 using the Sun safety goggles and then record their observations in lower-light environments, such as indoors or in a well-shaded outdoor area. For any students with visual impairments, provide multiple means of engagement by inviting students to use their sense of touch (i.e., in Lessons 1-3, feel which direction the Sun's warmth is coming from; in Lessons 4 and 6-7, feel the location of objects in the sky on modified card sets). For students with color vision deficiencies, use suggested colors or alternative shapes/sizes for sticky notes in Lessons 2-3 and ensure that you use multiple descriptors for these on the Sun Observations chart in Lessons 2-5. To enhance the learning experience for students with sensory processing differences that make extended time outside difficult, consider having students make visual observations from protected spaces or from inside in Lessons 1-3." (Unit Front Matter)
- Lesson 1, Explore, Step 3, Broadening Access sidebar: "To support all learners in engaging in firsthand observations of the Sun's apparent location in the sky and remove barriers for students with visual impairments, encourage students to also use their sense of touch (feeling warmth) to identify the Sun's location in the sky. Additionally, to remove barriers for students with sensory processing differences, encourage students to make visual observations from protected spaces or from inside, if extended time outside is difficult. As needed, reference an individual student's accommodations on their IEP or 504 plan and work with their case manager." (Lesson 1, Teacher Guide)
- Lesson 6, Explore, Step 3, Broadening Access sidebar: "To support equitable participation and remove barriers for any student with visual impairments, consider enhancing the Moon Location card sets by using puffy paint to outline the Moon in each card (as you may have done in Lesson 4 with the Sun Location card sets). Doing so will enable students to use their sense of touch to observe and compare the Moon's location in the sky across images. Continue, as needed, to reference individual students' accommodations on their IEP or 504 plan and work with their case manager to address them." (Lesson 6, Teacher Guide)

Learners reading below grade level

- Teachers are instructed to read aloud all of the text in the unit.
- Lesson 6, Connect, Step 6: "Engage students in an interactive read aloud. Remind students that they made observations and noticed patterns of the Sun's changing locations in the sky. Other people have noticed these patterns, too and have used and still use these patterns, and so do animals! We can connect these ideas by reading the Following the Sun book (refer to slide P). To support students in visualizing some of the ideas in the text, have the Sun Observations chart available for students to reference/point to." (Lesson 6, Teacher Guide)
- Lesson 8, Connect, Step 6: "Facilitate an interactive read-aloud. Read the First Grade Sun Seekers Newspaper article, pausing to ask the discussion questions shown here when you notice the lightbulb icon in the article; discussion questions are in the article's footnotes. Also, remind students that, as they listen, they can ask questions to be sure they understand what is going on in the article." (Lesson 8, Teacher Guide)
- Lesson 8, Connect, Step 6 "While discussing the newspaper article, students use the illustrations and details in a text to describe its key ideas. Students will likely reference both the details in the text (what children said they observed) and details in the images (photos that represent student observations) (RI.1.7). Consider using the illustrations in the text to support students' understanding of the words "sunrise" and "sunset". Some students may already be familiar with these words and others may benefit from additional support in understanding these specific times/events." (Lesson 8, Teacher Guide)
- Lesson 9, Connect, Step 5: "Tour the structure of this infographic…Summarize students' noticings by telling students that infographics give us information using pictures and very few words, so we want to pay attention to both." (Lesson 9, Teacher Guide)

ii. Extra support (e.g., phenomena, representations, tasks) for students who are struggling to meet the targeted expectations.

- Lesson 2, Explore, Step 2: "If students are not making accurate observations of the Sun's location in the sky, have them point to the Sun in the sky (with their Sun safety goggles on) and then drop their arm straight down toward the ground. Have students remove their Sun safety goggles with their other hand and then name the ground-based reference point/s that they are pointing toward." (Lesson 2, Teacher Guide)
- Lesson 5, Navigate, Step 1 "If students need or request additional support for their sensemaking, consider providing a picture and/or "student-sized" copy of the class's chart and a *Sun Cutout* so that students may personally manipulate the Sun in relation to the patterns represented on the chart." (Lesson 5, Teacher Guide)
- Lesson 9, Explore, Step 3 Sidebar: "Consider differentiating for students that need additional support counting and coloring the data on their page of the *Monthly Data* handout. One way to do this is by having students with the same months pair up after completing their handouts to count each other's number of daytime hours and check each other's work for accuracy. Pairing students in this manner offers students the opportunity to provide their peers with feedback and learn with and from one another, a practice that furthers the important message that they are a community of learners." (Lesson 9, Teacher Guide)

iii. Extensions for students with high interest or who have already met the performance expectations to develop deeper understanding of the practices, disciplinary core ideas, and crosscutting concepts.

- Lesson 3, Synthesize, Step 6: "Extension opportunity: If your students are not able to come to consensus about the lesson question and find this unsatisfying, they may want to gather more observations as evidence. Additionally, your students may show high interest in extending their observations to include even more mornings and afternoons. In

these cases, consider making additional outside observations in the morning and/or afternoon on future days, using students' current *Sun Observations* handouts or new copies." (Lesson 3, Teacher Guide)

- Lesson 6, Explore, Step 2: "Extension opportunity: If students are interested in further exploration of the Moon's location in the sky, you may want to use (or share) Stellarium, which is an online planetarium resource. This would provide students an opportunity to make observations of the Moon in the sky more than 3 times, and/or from different places, therefore further supporting their sensemaking of the Moon's apparent motion in the sky. More information is available in the Source Information/Extension Moon Location Cards reference. Additionally, if students are learning time in ways that go beyond first grade math standards, the AM/PM timestamps on the Source Information/Extension Moon Location Cards reference may serve as additional extension/support for their science sensemaking." (Lesson 6, Teacher Guide)
- Lesson 7, Explore, Step 3, Teaching Tip, "Extension opportunity: Students may want to return to their Moon Location cards and/or images from the *Meet the Expert* book in Lesson 6 to discuss and/or sort these into daytime and nighttime categories. If this is the case, extend the learning by providing time for students to make observations, categorize, and discuss their claims using evidence. Support students in recognizing that some of the Moon Sky cards do not include images of the Sun or stars; therefore, we cannot observe the "best" evidence for determining if the image is of a daytime or a nighttime sky. In these cases, we can use other evidence (the color and/or brightness of the sky) to support a claim about daytime or nighttime." (Lesson 7, Teacher Guide)

Criterion-Based Suggestions for Improvement: N/A

II.F. Teacher Support for Unit Coherence

EXTENSIVE

Supports teachers in facilitating coherent student learning experiences over time by:

i. Providing strategies for linking student engagement across lessons [e.g. cultivating new student questions at the end of a lesson in a way that leads to future lessons, helping students connect related problems and phenomena across lessons, etc.].

ii. Providing strategies for ensuring student sense-making and/or problem-solving is linked to learning in all three dimensions.

The reviewers found **extensive** evidence of teacher support for unit coherence. The materials support teachers in facilitating coherent learning experiences over time by providing questioning techniques for teachers to surface student ideas and questions and use them to transition between lessons in the Navigate Sections and providing guidance to create a Notice and Wonder chart.

i. Providing strategies for linking student engagement across lessons (e.g. cultivating new student questions at the end of a lesson in a way that leads to future lessons, helping students connect related problems and phenomena across lessons, etc.).

Each lesson includes a Navigate Section at the beginning and end. These sections provide support for teachers in using student ideas and questions to guide the learning for the lesson.

- Elementary Teacher Handbook, "What is the instructional purpose of this component? The Navigate component directly supports coherence for students from lesson to lesson. This component generally happens at the beginning and end of each lesson and provides opportunities for the class to take stock of where they are in finding answers to their questions, remind themselves what they figured out last time, and decide where they want to go next. Often this navigation will come naturally from questions generated by students, but occasionally the teacher will "problematize" an idea or investigation result by asking a salient question or pushing the class to consider other situations or new directions. What are the potential outcomes of this component? During the Navigate component, students ask questions, define problems, and make predictions. The class builds their sense of shared purpose, sees progress toward answering their questions, and takes ownership of their science work." (Elementary Teacher Handbook)
- Lesson 3, Navigate, Part 1: Return to our Sun Observations chart. Gather students in a Scientists Circle so they can view the class's Sun Observations chart (refer to slide A). Use the prompt to engage students in a brief discussion to review how, in the last lesson, we figured out that the Sun is in different locations in the sky throughout the day... Prompts to Use: What did we figure out last time after going outside and making 3 observations at different times throughout the day? ...Remind students that our predictions are *what we think will happen and why* and how, at the end of the last lesson, we each put a sticky note on the Sun Observations chart to show where we predict the Sun will be in the sky this morning. Use the following prompt to invite students to turn and talk with a partner about their predictions. Where do you predict the Sun will be in the sky this morning? Why do you think that?" (Lesson 3, Teacher Guide)
- Lesson 5, Navigate, Step 7: "Support students in recognizing how spending time generating questions based on our observations and experiences allows us to use our own wonderings to drive our next investigations. Suggest to students that we have a lot of questions about the Moon that we could investigate next!" (Lesson 5, Teacher Guide)
- Lesson 9, Navigate, Step 7: "Prompts to use...What are you still wondering about how evening walks can sometimes happen in the daytime and sometimes in the nighttime?... Ideas to look and listen for...*When are their evening walks? Are they walking in the summer or the winter? Are they before or after sunrise/sunset? Are they happening when daytimes are shorter or longer?*... After recording these new questions, indicate that we can focus on figuring these things out next time. Consider circling or bubbling around these student questions on the Notice and Wonder chart. You will want these questions to navigate into the next lesson." (Lesson 10)

A Notice and Wonder Chart is created in lesson 1 to capture student questions. This tool is revisited throughout the unit to take stock of what student questions have been answered and what new questions students may have.

- Lesson 1, Connect, Step 1: "Introduce the Notice and Wonder and Our Experiences charts. Display the blank Notice and Wonder chart so all students can see it (refer to slide C). Explain that, as we read and discuss the book, we will make observations using the images and text. Our Notice and Wonder chart is a place where we can record these observations so we can return to them. We will also ask questions about what we notice, and we can record and return to these using the "wonder" side of the chart. Remind students that our ideas may change over time; one of our classroom agreements is that "we let our ideas change and grow." Today's noticings and wonders are just our first or early ideas and questions and we can add more questions throughout the unit!" (Lesson 1, Teacher Guide)
- Lesson 5, Navigate, Step 1: "Revisit Our Experiences Chart. Remind students that after we answered our Lesson Set 1 question about how the Sun can be in our eyes sometimes, but not all the time, we used ideas and questions on our Notice and Wonder chart and experiences on Our Experiences chart to make a new lesson set question, *When and where do we see the Moon and stars in the sky?* (refer to slide A) We also decided to start exploring the Moon next!" (Lesson 5, Teacher Guide)

- Lesson 8, Navigate, Step 7: "Generate ideas and/or questions. Invite students to share ideas and/or questions they may now have, recording these on the Notice and Wonder chart or on teacher sticky notes that you can add to the class' Notice and Wonder chart at a later time. See parenthetical questions for examples of how to record students' ideas as questions." (Lesson 8, Teacher Guide)

In Lesson Set 2, the materials provide guidance for teachers to use student observations that the Moon appears in different locations in the sky to focus student sensemaking. Because students will contribute a variety of observations, teachers need more support in identifying which observations will coherently navigate to the next lesson.

- Lesson 5, Navigate, Step 7: "Add new wonders. Build on students' in-school and out-of-school experiences and observations to generate new questions we can add to the Wonder side of the Notice and Wonder chart, using the suggested prompts below. As at other times we have generated questions, it may be helpful to problematize students' observations and experiences into questions. For example, if some students have noticed the Moon before bedtime, but not others, you can identify for students, *Some of us have observed the Moon before we go to* bed but not all of us, that makes us wonder, Where is the Moon before we go to bed? Where can we see the Moon in the sky? Or When can we see the Moon in the sky?" (Lesson 5, Teacher Guide) Teachers are guided in problematizing some possible student observations; however, students will contribute a wide variety of observations about the Moon. Some of those observations can be problematized to coherently navigate to the next lesson, while others can not. Teachers need additional guidance to determine which of those observations and experiences will coherently navigate to the next lesson.
- Lesson 6, Navigate, Step 1: "Use the variety of experiences with the Moon to motivate further exploration. Point out to students that many of us have experiences noticing the Moon, and we seem to be describing it in different locations in the sky. You might say something like, *Wait! Am I hearing that we have seen the Moon in different spots in the sky?* Invite students to turn and talk about their ideas related to the Moon appearing in different locations in the sky. Do you think that the Moon changes locations in the sky? Why do you think that? Then, engage in a brief whole-class discussion, the goal of which is to elevate the different ideas in the room about whether or not the Moon changes locations in the sky and why we think that...Do you think that the Moon changes locations in the sky? Why do you think that?... Co-construct the lesson question. Use students' ideas about the Moon in the sky to co-construct the lesson question with students, *Does the Moon appear to change location in the sky and, if so, how?* (refer to slide B; be sure to update the lesson question on the slide to reflect the question the class co-constructs.) Explain that we will think about ways to figure out an answer to this question next." (Lesson 6, Teacher Guide) This does not support teachers in coherently transitioning to the next lesson because students will provide a variety of observations. Teachers need additional guidance in identifying which student observations can be used for the intended navigation.

ii. Providing strategies for ensuring student sense-making and/or problem-solving is linked to learning in all three dimensions.

- Lesson 4, Connect, Step 6: "Motivate using the Sun's patterns to know where it will be next. Summarize that we have identified patterns as something that happens over and over again, and now we also know that they can help us know what will happen next. Now that we have observed and described the patterns of how the Sun seems to move in the sky, do we think we can use them to know where the Sun will be "next"? Invite students to think first and then turn and talk with a partner about this idea: Can we use the patterns of the Sun's changing locations in the sky to know where it will be next? Why do you think that? Navigate to the next lesson. Anticipate students will share that we can use patterns of the Sun to know where it will be in the sky, and build on these ideas to suggest that we can do this in the next lesson!" (Lesson 4, Teacher Guide)

- Lesson 6, Explore, Step 2: "Once students have returned all the way around the circle to their own Moon Observations handout, invite students to sit back down. Engage in a discussion with students using the following prompts. The purpose of this discussion is to support students in analyzing and interpreting data (students' recorded observations) to figure out if the Moon's changing location is the same on different nights…What did you notice about the recorded observations on everyone's Moon Observations handouts?… Does the Moon's changing location happen the same way on different nights? (Remember, each Moon Location card set--A, B, C--shows the Moon in the sky on a different night.)…Use students' ideas--or suggest the word/idea, if students have not yet mentioned it--to recall with students that a pattern is something that happens over and over again and can help us know what will happen next. Invite students to turn and talk: Describe the pattern of the Moon's changing location in the sky. Celebrate that we figured out a pattern in our data; over and over again, we observed and recorded the Moon in the same changing locations across the sky! Summarize this pattern with students: early in the night, the Moon is lower in the east; in the middle of the night, it is higher up in the middle, and then late at night it is lower in the west. Our observations show this happening over and over again, on different nights."(Lesson 6, Teacher Guide)
- Lesson 9, Connect, Step 5: "Remind students that one of the reasons we used the infographic was to help us figure out if our class Monthly Daytime Graph showed data that represented each month in any year; does it represent a pattern? Does it happen over and over again, and can it help us know what will happen next? Remind students that we were wondering about this before, and now, we have gathered information from our infographic and are ready to answer these questions. Invite students to think first and then turn and talk with a partner about the following prompts. Then engage in a brief whole-class discussion about their ideas….Are daytimes always shortest in December and longest in June? How do you know?… Do daytimes always get longer between December and June? How do you know?" (Lesson 9, Teacher Guide)

Criterion-Based Suggestions for Improvement:

- Toward *NGSS* Design: EQuIP Rubric for Science Detailed Guidance "Strategies are provided to support the teacher as they help students connect phenomena across lessons." [p. 31]
  - Consider guiding teachers in Lesson 5 to explicitly remind students of the original phenomenon from Lesson 1 before connecting to class observations, and include more specific examples in the materials that show how different sky observations students might make connect with the original phenomenon from Lesson 1.

II.G. Scaffolded differentiation over time

EXTENSIVE

Provides supports to help students engage in the practices as needed and gradually adjusts supports over time so that students are increasingly responsible for making sense of phenomena and/or designing solutions to problems.

The reviewers found **extensive** evidence that supports are provided to help students engage in the practices as needed and for teachers to gradually adjust supports over time so that students are increasingly responsible for making sense of phenomena and/or designing solutions to problems for all of the intentionally developed SEP elements. Scaffolding is gradually reduced over time to support the use of the SEP elements, which are stated as targeted learning objectives, enabling students to become more independent in their use of the SEP elements over the course of the learning experience.

INV: Planning and Carrying Out Investigations

INV-P2: Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence to answer a question.

In Lesson 1, the class collaborates to plan how to investigate the location of the Sun. In Lesson 2, the class collaborates to revise their prior investigation, developing a more complex study of the Sun's position at different times of the day. In Lesson 3, the class revisits their previous investigations to explore a more complex question: whether the Sun's changing position forms a pattern. In Lesson 4, students shift from making firsthand observations to planning investigations using images. In Lesson 6, students revise their investigation to explore the Moon once again.

- Lesson 1, Explore, Step 3: "Invite students to turn and talk with a partner about what they could do to begin to answer our lesson question, Where is the Sun in the sky today? How do you think we can answer our lesson question, Where is the Sun in the sky today? Then, facilitate a discussion the whole class to gather students' input on planning our investigation...What ideas do you have about how we can answer our lesson question, Where is the Sun in the sky today?.. Summarize students' ideas for going outside and finding the Sun in the sky and ensure students' decisions are recorded on the Sun Investigation Plan. Revoice students' use of the word observations or--if students did not use this word--connect their ideas for noticing the Sun in the sky with making observations, which are details we notice using our senses." (Lesson 1, Teacher Guide)
- Lesson 1, Explore, Step 4 "What could we add to the chart to help us show the location where we noticed the Sun in the sky?... We could draw (the swing set; the tree) on the ground so then we could show the Sun above it. We could show the school and how we pointed at the Sun....Add the class-determined reference point/s. Using students' input, draw/add the common ground-based reference point/s that the class decides on to the Sun Observations chart." (Lesson 1, Teacher Guide)
- Lesson 2, Explore, Step 2: "Engage students in a discussion to collaboratively plan an investigation that will help us answer our new lesson question, Where is the Sun in the sky throughout the day? Using the Sun Investigation Plan from Lesson 1 as a reference for how to make and record observations in the same and different ways provides a scaffold that can support routinizing students' decisions, allowing them to build on past experiences and positioning them to successfully plan additional investigations in the next lessons... Affirm for students that we need to make observations of the Sun in the sky more than just one time during the day, in order to figure out where the Sun is in the sky throughout the day. With student input (using the prompt below), identify 3 times during the school day (roughly falling during morning, midday, and afternoon) when the class can make observations of the Sun's location in the sky... Invite students' ideas about how we can record the observations that we make of the Sun in the sky....

Summarize and synthesize students' ideas into suggestions for recording the Sun's location in the sky through drawing, labeling, and possibly writing each time we go outside to make observations and ensure these ideas are recorded on the Sun Investigation Plan." (Lesson 2, Teacher Guide)

- Lesson 3, Explore, Step 2: "Ensure students can view the Sun Investigation Plan (refer to slide C) and invite students to turn and talk with a partner about how we made and recorded observations of the Sun in the sky in Lesson 2. After students have reacquainted themselves with their Sun Investigation Plan, invite students' ideas about what we should do the same or differently in this lesson, to address our lesson question: Do the Sun's different locations in the sky repeat? Use the suggested follow-up responses to make connections to the purpose of making and recording accurate observations of the Sun's location in the sky; in order to figure out whether or not the Sun's location in the morning repeats, we need to be able to make and compare new observations to past observations." (Lesson 3, Teacher Guide)
- Lesson 4, Explore, Step 2: "Prepare to use a Think, Pair, Share to collaboratively plan an investigation. You will use brief Think, Pair, Share discussions to support students in considering and deciding on how to make and record observations of the Sun in the sky from the images on the Sun Location card sets. If students are unfamiliar with "Think, Pair, Share," explain that they will have the chance to: (1) think quietly about how they would answer the question, (2) discuss their ideas with a partner, and (3) share something their partner said with the class." (Lesson 4, Teacher Guide)
- Lesson 6, Explore, Step 2: "Suggest a similar investigation plan. After a few volunteers have shared, suggest with students that we can investigate the Moon in the sky in a way that is similar to the Sun! Just like with the Sun, we can collaboratively make decisions on how to make and record our observations to figure out if the Moon appears to change locations in the sky, and if so, how...What observations do we need to make of the Moon in the sky to figure out if it changes locations?... Connect to students' likely suggestions to use media (like with the Sun in Lesson 4) to make observations to figure out if the Moon changes locations in the sky. Use the next Think, Pair, Share to support students in collaboratively deciding to use media (photos and/or videos) to make observations to produce data that will answer our lesson question...How could it help us answer our question if we used _____'s suggestion of using photographs, images, or a video of the Moon?... Prepare a Moon Investigation Plan. In a way that works well for your class, prepare to make a Moon Investigation Plan. This could be by editing the Lesson 4 Sun Investigation Plan by crossing out and/or adding to its words and drawings, making a new row on the same chart, or by making a new Investigation Plan." (Lesson 6, Teacher Guide)

INV: Planning and Carrying Out Investigations

INV-P4: Make observations (firsthand or from media) and/or measurements to collect data that can be used to make comparisons.

In Lesson 1, students make a single round of direct observations. They make and record their observations with a partner and review for class consensus. In Lesson 2, students make direct observations with a partner at multiple times of day and compare their data across different sets. In lesson 3, students move towards making independent observations. In Lesson 4, students transition from making firsthand observations of a phenomenon to making observations from images and time-lapse videos. In lesson 6, students combine observations from multiple images and a time-lapse video. In Lesson 7, students individually make observations from multiple images and then share their findings with partners and in small groups.

- Lesson 1, Explore, Step 3: "Summarize students' ideas for going outside and finding the Sun in the sky and ensure students' decisions are recorded on the Sun Investigation Plan. Revoice students' use of the word observations or--if students did not use this word--connect their ideas for noticing the Sun in the sky with making observations, which are details we notice using our senses...Invite students to turn and talk to share ideas with a partner about how they

could remember their observations and/or share their observations with other students in the class…Summarize students' ideas for recording observations by drawing, writing, and discussing with a partner and ensure these are recorded on the Sun Investigation Plan. Use this as an opportunity to review with students how scientists record their observations so that they can compare the details they notice during and after investigations and because recorded observations help scientists remember the information they observe later…Show students a copy of the First Sun Observation handout (refer to slide I) and review the directions together, pointing out where students can draw their observations, label drawings with letters or words, and write letters or words about the Sun and where they notice its location in the sky. As much as possible, make connections to ideas students shared about recording their observations." (Lesson 1, Teacher Guide)

- Lesson 1, Explore, Step 3: "Go outside and make observations. Bring students outside to your pre-determined Sun observation location. To support students in making Sun observations safely, you could recommend that they turn around (so their back is to the Sun) anytime they are writing or drawing and therefore their Sun safety goggles are off. Remind students to record their own observations on their First Sun Observation handouts and then compare and discuss with their partner." (Lesson 1, Teacher Guide)
- Lesson 2, Explore, Step 2: "Invite students' ideas about how we can record the observations that we make of the Sun in the sky. Use this as an opportunity to review with students how scientists record their observations so that they can compare the details they notice during and after investigations and because recorded observations help scientists remember the information they observe later." (Lesson 2, Teacher Guide)
- Lesson 2, Explore, Step 3: "1. Draw where you observe the Sun in the sky each time you go outside. Label each Sun with morning, midday, or afternoon. 2. Where is the Sun in the sky each time you go outside? First, in the morning, the Sun is… Next, at midday, the Sun is…, Last, in the afternoon, the Sun is…" (Student Handout, Three Sun Observations)
- Lesson 3, Explore, Step 2: "Go outside and make morning observations. Bring students outside to the same observation location used in Lessons 1 and 2 and have them work with a partner to make and record observations of the Sun's location in the sky. Encourage partnerships to compare and work toward agreement about their recorded observations and, additionally, to discuss with each other how this morning's observation compares with the observation they made of the Sun in the sky in Lesson 2. Compare morning consensus observations. Invite students to notice the new morning consensus observation we just recorded on the Sun Observations chart and the other morning observation we recorded in Lesson 2. Engage in a brief discussion comparing these consensus observations." (Lesson 3, Teacher Guide)
- Lesson 4, Explore, Step 3: "Prepare to carry out our Sun Investigation Plan. Ensure students can view their Sun Investigation Plan (refer to slide F) and, if needed, invite the class to review their plan. Organize students into pairs and distribute a Sun Location card set and dry-erase marker to each partnership. Ensure that all 4 sets are used by pairs for observations; comparing observations from all of the card sets will support students identifying patterns across data in the next Explore." (Lesson 4, Teacher Guide)
- Lesson 6, Explore, Step 2: "Think, Pair, Share about making and recording observations. Draw students' attention to the "Make and record observations" column on the Investigation Plan. Engage students in another brief Think, Pair, Share using the following prompts to generate ideas about how to make and record observations of the Moon in the sky using images. If needed, remind them that they will be observing multiple images in order to figure out if the Moon appears to change locations in the sky…How can we make observations of the Moon in the sky from images? How did we observe the Sun in images before that we could do again this time?… Decide to record observations on a handout. Connect to students' ideas to use a handout (or make that suggestion) and let students know you will make a handout to record their observations of the Moon in the sky, just like we've done before with the Sun. Remind students that using a handout was really helpful for us with our first observations of the Sun, so it might help us in this lesson, since this is our first time observing the Moon!" (Lesson 6, Teacher Guide)

- Lesson 6, Explore, Step 4: Show students the Moon Timelapse video....After viewing the video, use the following prompt to engage students in a brief discussion with the goal of supporting students in describing their observations of the Moon's apparent motion across the sky in an ongoing path." (Lesson 6, Teacher Guide)
- Lesson 7, Explore, Part 2: Make individual Moon Sky card observations. Provide each student with one Moon Sky card from the Moon Sky Cards and ensure that slide D is available for reference. As students make their individual observations, circulate and prompt students with questions like: What do you observe about the sky? What object or objects (Moon, stars) do you observe in the sky? Discuss with a partner. After a few minutes for individual observations, invite students to find a partner with a different card to share and discuss with. To facilitate conversations, suggest partners can use sentence starters on slide E: I think it is daytime/nighttime because _____. Or I am not sure because _____. As partners share and discuss their observations, circulate and ask questions such as: Do you think it is daytime or nighttime? What is your evidence? Can you show your partner that on your card?" (Lesson 7, Teacher Guide)

DATA: Analyzing and Interpreting Data

DATA: P3 Use observations (firsthand or from media) to describe patterns and/or relationships in the natural and designed world(s) in order to answer scientific questions and solve problems.

In Lesson 1, students analyze the different observations on a class Sun Observation chart, which shows the Sun's location at a specific time. In Lesson 3, students use the class Sun Observation chart to analyze the Sun's location at three different times, identifying patterns in its changing positions. In Lesson 4, students use observations from images of the Sun at five different times to describe patterns in its apparent motion. In Lesson 6, students identify patterns in the Moon's location in the sky at different times by completing individual Moon Observations handouts. In Lessons 8, 9, and 10, students use observations from graphs to describe the more complex pattern of changes in day length in different seasons.

- Lesson 1, Explore, Step 4: "With students, affirm the consensus (agreed-upon) location to record our Sun observation. If it is difficult to come to an 'exact' agreement, you may be able to agree to a general area of our Sun Observations chart. For example, you could say, "I hear that we are not all agreeing that the Sun was right 'here,' but we are agreeing that we did not see all the way over 'here'."..Add the consensus Sun observation to the chart. Add the class's agreed-upon (consensus) Sun observation to the Sun Observations chart and remove all of the individual sticky notes. This is a concrete way of helping students notice they now have one agreed-upon data point for the Sun's location in the sky today." (Lesson 1, Teacher Guide)
- Lesson 3, Explore, Step 5: "Referencing the Sun Observations chart, invite students to compare the class's consensus observations of the Sun in the morning (blue) with those from the afternoon (green). The purpose of this discussion is to support students in noticing that the morning observations are in one area/location while the afternoon observations are in a different area/location. To support students in noticing such differences, use language such as "all of the morning observations" or "both afternoon Suns" and gestures to different sides of the Sun Observations chart. This can support students in thinking generally about where the Sun is in the morning versus the afternoon (preparing them to discuss patterns in the data in the next Synthesize) and not on possibly small differences between multiple morning (or afternoon) observations... What do you notice about where all of the morning observations (blue) are versus where all of the afternoon observations (green) are?... Affirm students' observations that all of the morning observations are on one side of our Sun Observations chart, while the afternoon observations are on the other side of our Sun Observations chart." (Lesson 3, Teacher Guide)
- Lesson 4, Explore, Step 4: "Share Sun Location observations. After students individually notice the cards, remind students of the lesson question we are trying to figure out: *What happens to the Sun in the sky between morning and afternoon?* Invite students who had each card set to share their observations with the class, starting with students

who observed Sun Location card set A. There are many ways to do this; you might consider inviting one student who used the card set to share first, and then invite others who used the same card set to add on to and/or clarify what their classmate shared. Use the following prompts to support students in describing their observations of the Sun's location in the sky between morning and afternoon. Encourage students who used other card sets to listen and look for similarities or differences between the Sun's locations in the sky in the card set being described and the card set they observed. Tell students we will discuss all of the Sun's locations after everyone shares. In your card set, where is the Sun in the sky in the morning? Late morning? Midday? Early afternoon? Afternoon? In your card set, how did the Sun's location in the sky change between morning and afternoon? Continue to encourage and welcome students demonstrating their understandings through language-based descriptions as well as pointing, gesturing, and/or moving their bodies." (Lesson 4, Teacher Guide)

- Lesson 6, Explore, Step 2: "Once students have returned all the way around the circle to their own *Moon Observations* handout, invite students to sit back down. Engage in a discussion with students using the following prompts. The purpose of this discussion is to support students in analyzing and interpreting data (students' recorded observations) to figure out if the Moon's changing location is the same on different nights...What did you notice about the recorded observations on everyone's *Moon Observations* handouts?... Does the Moon's changing location happen the same way on different nights? (Remember, each Moon Location card set--A, B, C--shows the Moon in the sky on a different night.)...Use students' ideas--or suggest the word/idea, if students have not yet mentioned it--to recall with students that a pattern is *something that happens over and over again and can help us know what will happen next*. Invite students to turn and talk: Describe the pattern of the Moon's changing location in the sky. Celebrate that we figured out a pattern in our data; over and over again, we observed and recorded the Moon in the same changing locations across the sky! Summarize this pattern with students: early in the night, the Moon is lower in the east; in the middle of the night, it is higher up in the middle, and then late at night, it is lower in the west. Our observations show this happening over and over again, on different nights."(Lesson 6, Teacher Guide)
- Lesson 9, Synthesize, Step 6: "Turn and talk about Day A and Day B. Invite students to turn and talk with a partner about when they think Day A and Day B happened. Encourage students to use evidence from the class' Monthly Daytime Graph to support their claim about when Day A and Day B took place. When does Day A happen? What is your evidence? When does Day B happen? What is your evidence?... Make a claim about when Day A and Day B occurred. Invite students to share their claims for which season and/or month each day takes place. As students come to an agreement on which seasons Day A and Day B take place, add these additional labels (summer and winter) to the Day A and Day B Graph, since students will reference these in the next lesson." (Lesson 9, Teacher Guide)

MATH: Using Mathematics and Computational Thinking

MATH: P2 Use counting and numbers to identify and describe patterns in the natural and designed world(s).

In Lesson 8, students count hours of daylight in pairs. In Lesson 9, they count hours of daylight individually.

- Lesson 8, Explore, Step 4: "Use students' noticings that the graph does not yet include the number of hours of daytime and nighttime that students counted and recorded on their handouts to suggest that we quickly add that information to our graph! In a way that works well for your class, ask students to share the number of daytime hours for their day (Day A or Day B). Possible options include counting in unison, having a student share the number out-loud and have others use a gesture to agree/disagree, inviting a student to come up to the class graph and point, or having a student with a *Day A Data* or a *Day B Data* handout share their findings." (Lesson 8, Teacher Guide)

- Lesson 9, Explore, Step 2: "Using the prompts below, count and color the December Data together to make shared decisions about what we will all do to analyze our data for each month next (refer to slide D). Have a red/pink/orange coloring utensil available to use for sunrise and sunset during that part of the discussion...How can we use counting to figure out how long daytime was on this day in December?... How could we show when daytime starts and ends, to help us notice how long it is? What did we do last time to show that on the Day A and Day B Graph?... Invite students to repeat the steps we just decided on as a class to make sense of the monthly sky observations data we have (refer to slide E): Count the number of boxes with suns and record this as the number of daytime hours; Color the boxes with suns in yellow; and Add a red/pink/orange line at sunrise and sunset. Tell students we are ready to analyze our own data using their data skills from math class!" (Lesson 9, Teacher Guide)

MATH: P3 Describe, measure, and/or compare quantitative attributes of different objects and display the data using simple graphs.

In Lesson 8, students use graphs to compare day length on two different days in pairs. In Lesson 9, students use graphs to compare day length in different months individually.

- Lesson 8, Explore, Step 3: "Engage pairs in discussions. While students work with their partners to count and record the number of daytime and nighttime hours, use the following prompts to engage them in discussions. Use these discussions to help partnerships come to agreement on their counted and recorded numbers of hours on their handouts...How many hours of daytime are there on Day A (Day B)?... How many hours of nighttime are there on Day A (Day B)? How do you know?" (Lesson 8, Teacher Guide)
- Lesson 9, Explore, Step 3: "Discuss with individual students. While students work, use the following prompts to engage them in discussion. Encourage students to express their understanding by using numbers, pointing, gesturing (fingers/hands apart), as well as words in named languages (e.g., English, Spanish, Mandarin) that they might know and use. As you check in with students, support them in making connections between the amount (number) of daytime hours and the length of the yellow daytime "bar" in between sunrise and sunset...Which month's data are you using? How many yellow boxes are between sunrise and sunset?... How long is daytime in (month)?" (Lesson 9, Teacher Guide)

ARG: Engaging in Argument from Evidence

ARG: P5 Listen actively to arguments to indicate agreement or disagreement based on evidence, and/or to retell the main points of the argument.

In Lesson 3, the class listens to the claims of their classmates. Students are provided with Discussion Supports to enhance their active listening skills. In Lesson 5, students listen to the arguments of their classmates in small groups. They are given sentence starters to support their communication of agreement or disagreement with the arguments. In Lesson 10, students once again listen to their classmates' arguments and indicate whether they agree or disagree. They are provided sentence starters to support communicating agreement or disagreement.

- Lesson 3, Synthesize, Step 6: "The purpose of this discussion is to provide students an opportunity to share their claims with evidence, listen to each other, and move toward agreement on an answer to the lesson question. Consider providing students with the Discussion Supports handout and/or displaying a copy, which has sentence starters for students to use as needed throughout the discussion, particularly to respond to each other's ideas... What claim can you make if your sticky note is in the "yes" column? What is your evidence?.. What claim can you make if your sticky note is in the "no" column? What is your evidence?.. What if you are still "not sure"; what makes you think that?.. Following this discussion, summarize students' convergence on a consensus claim based on our evidence; this could sound something like, "It sounds like we are agreeing on 'Yes, the Sun's different locations in

the sky repeat!'" Suggest that we record this claim on Our Growing Ideas chart and transition to that bolded step." (Lesson 3, Teacher Guide)

- Lesson 5, Explore, Step 2: "Prepare to continue the Sun Game in small groups. Suggest to students that, now that we have practiced as a whole class making claims about "midday," we can work with our small groups to make individual claims, share them with each other, and actively listen and compare claims, with the goal of coming to agreement. Review the steps of the Sun Game with the class: 1) Make my claim. 2) Share my claim and evidence: I think the Sun will be _____ because _____. 3) Agree and/or disagree. Play the Sun Game in small groups. Have students continue using their Sun Game Placemat handouts and Sun cutouts in their small groups to play the Sun Game. Encourage students to point, gesture, or move their bodies to support their sensemaking." (Lesson 5, Teacher Guide)

ARG: Engaging in Argument from Evidence

ARG: P6 Construct an argument with evidence to support a claim.

In Lesson 3, students construct an argument as a class. In Lesson 5, students construct arguments in small groups and then individually. In Lesson 7, students determine what the "best" evidence is and select a claim individually. In Lesson 10, students construct an argument individually.

- Lesson 3, Synthesize, Step 6: "Ensure students can view the voting chart (refer to slide N), showing students' updated claims (represented by voting sticky notes) about the lesson question, Do the Sun's different locations in the sky repeat?... Invite students to pair up and use the sentence starter on slide N to share their current thinking: I think ___ because _____. This opportunity allows students to discuss their votes from the end of the previous Explore and prepares students to engage in a whole-class discussion to (eventually) come to an agreement and record a claim and evidence on Our Growing Ideas chart." (Lesson 3, Teacher Guide)
- Lesson 5, Explore, Step 2: "Provide a moment for students to make their own claim by manipulating the Sun cutout on their Sun Game Placemat handout and encourage students to point, gesture, or move their bodies to support their sensemaking. Then, have students in each small group share their ideas with their groupmates. Suggest that students use the sentence starter (refer to slide D) to support them in expressing their claim about the Sun's location in the sky at midday and their evidence: I think the Sun will be _____ because _____ ." (Lesson 5, Teacher Guide)
- Lesson 7, Synthesize, Step 6: "Marco and Sonia are both claiming it's daytime in this photo. What is the evidence that Marco is using to make his claim?... What is the evidence that Sonia is using to make her claim?... Which claim about what makes it daytime do you think uses the best evidence? Why do you think that?... Why do you think the Sun is the best evidence for daytime?" (Lesson 7, Teacher Guide)
- Lesson 10, Synthesize, Step 5: "Show the Season Claim student assessment. Display a copy of the Season Claim student assessment and point out the image (refer to slide K). Read the directions with students to ensure we all understand that the image shows Sasha walking her dog, Luna, in the evening and it is nighttime because the Sun is not in the sky. Then, show students where to make a claim about the season in which Sasha will likely go for a walk with her dog, Luna, by circling summer or winter. Finally, show students where they can write their evidence to support their claim." (Lesson 10, Teacher Guide)

Criterion-Based Suggestions for Improvement: N/A

CATEGORY III

Monitoring NGSS Student Progress

III.A. Monitoring 3D Student Performance

EXTENSIVE

Elicits direct, observable evidence of three-dimensional learning; students are using practices with core ideas and crosscutting concepts to make sense of phenomena and/or to design solutions.

The reviewers found **extensive** evidence that materials elicit direct, observable evidence of three-dimensional learning and that students are using practices with core ideas and crosscutting concepts to make sense of phenomena and/or to design solutions. In Lessons 5, 7, and 10, teachers are prompted to assess student performance by having students use patterns of the apparent motion of the Sun in the sky to determine where the Sun will be in the early morning or late afternoon, determine the best evidence to support the claim that it is nighttime, and determine the season when the Sun is not in the sky at nighttime.

Well-crafted phenomena drive formal tasks in the materials- and problem-based scenarios that can elicit rich student performances.

- Lesson 5, Synthesize, Step 3: "Where will the Sun be in the sky in the early morning? Use patterns of the Sun's location in the sky to make your claim, Where will the Sun be in the sky in the late afternoon? Use patterns of the Sun's location in the sky to make your claim." (Lesson 5, Student Assessment)
- Lesson 7, Synthesize, Step 6: "Tell students that they now have the opportunity to consider claims two first graders, Calia and Trudy, made about the nighttime sky. Remind students that we met Calia and Trudy in the Observing the Sky in Our Communities book while they were taking out the trash and recycling. Show students the Nighttime Claims student assessment (refer to slide N) and briefly help students recognize that the image on the handout is representative of the one shown in color on the slide. Point out the two bulleted claims, show students how to circle the claim that uses the best evidence for nighttime, and where to write down why they circled that claim." (Lesson 7, Teacher Guide)
- Lesson 7, Synthesize, Step 6 "Calia and Trudy take out the trash and recycling every Friday. This is what the sky looks like one Friday when they go outside…Circle the claim that uses the best evidence." (Lesson 7, Student Assessment)
- Lesson 10, Synthesize, Step 5: "Sasha likes to take Luna the dog on evening walks. She likes walks in the nighttime, when the Sun is not in the sky. Use patterns of daytime length to make your claim. Will this happen in the summer or the winter? Circle your claim." (Lesson 10, Teacher Guide)

Student performances produce artifacts of integrating the three dimensions in service of sense-making or problem-solving.

- Lesson 2, Explore, Step 3: "Display slide E and show students the prepared Three Sun Observations handout. Point out how their suggestions for making and recording observations of the Sun in the sky are represented in the handout, including the agreed-upon class reference point/s and the steps for making and recording observations at 3 different times throughout the day (morning, midday, and afternoon). Explain to students that they can also choose to write descriptions of their observations using the optional sentence starters on the second page; see additional information in the access callout." (Lesson 2, Teacher Edition) **INV-P3: Make observations (firsthand or from media) and/or measurements to collect data that can be used to make comparisons. ESS-1A: Patterns of the motion of the sun, moon, and stars in the sky can be observed, described, and predicted. PAT-P1: Patterns in the natural and human designed world can be observed, used to describe phenomena, and used as evidence.**

- Lesson 6, Explore, Step 4: "Once students have returned all the way around the circle to their own *Moon Observations* handout, invite students to sit back down. Engage in a discussion with students using the following prompts. The purpose of this discussion is to support students in analyzing and interpreting data (students' recorded observations) to figure out if the Moon's changing location is the same on different nights." (Lesson 6, Teacher Guide) **DATA: P3 Use observations (firsthand or from media) to describe patterns and/or relationships in the natural and designed world(s) in order to answer scientific questions and solve problems. ESS-1A: Patterns of the motion of the sun, moon, and stars in the sky can be observed, described, and predicted. PAT-P1: Patterns in the natural and human designed world can be observed, used to describe phenomena, and used as evidence.**
- Lesson 9, Explore, Step 2 "When students have completed counting and coloring their *Monthly Data* handout, invite students to consider how their month's data might be the same as or different from other months by responding to the following prompt with a thumb up (yes), thumb down (no), or a thumb to the side (not sure) hand signal. Do you think your data shows the same number of daytime hours as the data from another month? Why or why not? Use students' ideas and/or uncertainty to motivate comparing our *Monthly Data* handouts, just like we compared our Day A and Day B Data in the last lesson! Ask students how we could best share ideas and listen to each other to figure out how each month is the same or different, anticipating they will suggest sitting in a Scientists Circle or a class meeting space with their month of the *Monthly Data* handout." (Lesson 9, Teacher Guide) **MATH: P2 Use counting and numbers to identify and describe patterns in the natural and designed world(s). ESS1.B Earth and the Solar System: Seasonal patterns of sunrise and sunset can be observed, described, and predicted. PAT-P1: Patterns in the natural and human designed world can be observed, used to describe phenomena, and used as evidence.**

Students routinely produce artifacts that demonstrate the use of grade-appropriate elements of SEPs, CCCs, and DCIs, which are targeted as learning objectives.

- Lesson 2, the three-dimensional learning goal states, "**Make observations of the Sun in the sky throughout a day** and **use a pattern across many students' data to compare locations of the Sun at different times of day."** The students' Three Sun Observations handout serves as an artifact with evidence for part of this learning goal.
  - Lesson 2, Explore, Step 2: "Go outside and make morning Sun observations. Bring students outside to the predetermined location (that was also used in Lesson 1) and have them work with their partners to make observations of the Sun's location in the sky. Remind them to record their own observations on their Three Sun Observations handouts and then compare and discuss with their partner; partners should notice and discuss similarities and differences in their recorded observations and work toward agreement." (Lesson 2, Teacher Guide)
- Lesson 6, the three-dimensional learning goal states, "**Use observations to describe the pattern** of **the Moon's apparent motion across the sky in an ongoing path**." The students' "Moon Observations" handout serves as an artifact that provides evidence for this learning goal.
  - Lesson 6, Explore, Step 4: "Draw where you see the Moon in each card. Label each Moon with early, middle, or late...Use arrows in the box to show the Moon's ongoing path across the sky...Describe how the Moon seems to move across the sky." (Lesson 6, Moon Observations Handout)
- Lesson 9, the three-dimensional learning goal states, "**Use counting and a graph to describe the pattern of more daytime hours in summer and fewer daytime hours in winter."** The students' "Monthly Data" handout serves as an artifact with evidence for part of this learning goal.

- Lesson 9, Explore, Step 2: "Using the prompts below, count and color the December Data together to make shared decisions about what we will all do to analyze our data for each month next (refer to slide D). Have a red/pink/orange coloring utensil available to use for sunrise and sunset during that part of the discussion... How can we use counting to figure out how long daytime was on this day in December?... How could we show when daytime starts and ends, to help us notice how long it is? What did we do last time to show that on the Day A and Day B Graph?... Invite students to repeat the steps we just decided on as a class to make sense of the monthly sky observations data we have (refer to slide E): Count the number of boxes with suns and record this as the number of daytime hours; Color the boxes with suns in yellow; and Add a red/pink/orange line at sunrise and sunset. Tell students we are ready to analyze our own data using their data skills from math class!" (Lesson 9, Teacher Guide)

Criterion-Based Suggestions for Improvement: N/A

III.B. Formative

EXTENSIVE

Embeds formative assessment processes throughout that evaluate student learning to inform instruction.

The reviewers found **extensive** evidence that formative assessment processes evaluate student learning to inform instruction. There are opportunities in every lesson for formative assessment information to be gathered, recorded, and used to inform future instruction.

Materials include explicit, frequent, and varied supports for formative assessment processes.

Each lesson has at least one formative assessment opportunity that is explicitly called out. Many lessons have more than one formative assessment opportunity called out. The materials describe different types of formative assessments in the yellow callout boxes: pre-assessment, formative assessment, self-reflection, and key formative assessments. Teachers can find instructional next steps using the formative assessments in both the formative assessment call-out boxes and the "How can I use this information" section of the Lesson Assessment Guidance at the beginning of each lesson.

- Lesson 2, Explore, Step 3: "Formative assessment: Partner discussions and students' Three Sun Observations handouts during the morning observation provide an opportunity to gather evidence about Learning Goal 2 (aligned to Assessment Statement 1), to support students in making and recording observations of the Sun's location in the sky. If students are not making accurate observations of the Sun's location in the sky, have them point to the Sun in the sky (with their Sun safety goggles on) and then drop their arm straight down toward the ground. Have students remove their Sun safety goggles with their other hand and then name the ground-based reference point/s that they are pointing toward. Additional suggestions are available in the Formative Assessment callout in the second Explore (midday observations). Use that opportunity to check in with and support different students." (Lesson 2, Teacher Guide)
- Lesson 4, Explore, Step 4 "Key formative: Discussions with the class using the Sun Timelapse video provide an opportunity to gather evidence about Learning Goal 4b (aligned to Assessment Statement 1), with the purpose of providing feedback to students and guiding instruction. Encourage students to gesture, act out, and describe the pattern of the Sun's ongoing path across the sky. Refer to the Following Students' Sensemaking 1 tool (recording evidence of students' sensemaking for those whom you may not yet have evidence), the Instructional Guidance 2 tool, and the Assessment Guidance at the beginning of the lesson" (Lesson 4, Teacher Guide)

- Lesson 8, Explore, Step 4 "Formative assessment: The whole-class discussion comparing Day A and Day B data provides an opportunity to gather evidence about Learning Goal 8 (aligned to Assessment Statement 2), to support students in using a graph (the Day A and Day B Graph) to compare length of daytime and nighttime between Day A and Day B. If students need support making comparisons, invite students to turn and talk with a partner to use the graph to describe each attribute first (e.g., Day A has 13 hours of daytime and Day B has 9 hours). Consider encouraging students to make different kinds of comparisons separately (e.g., How do the hours of daytime in Day A compare with Day B? How does the length of the yellow daytime bar for Day A compare with Day B's?) Prompt students with comparative words or sentence starters: *The number of hours of daytime on Day A is _____ than the number on Day B (more, less). This means that Day A has a _____ daytime (longer, shorter) than Day B.* Refer to the Following Students' Sensemaking 2 tool and the Assessment Guidance at the beginning of this lesson." (Lesson 8, Teacher Guide)

Formative assessment processes routinely provide varied support for student thinking across all three dimensions.

Support for student thinking across all three dimensions can be found in the yellow formative assessment call-out boxes and the Instructional Guidance documents. Examples include:

- Lesson 3, Explore, Step 5: "Formative assessment: ...If students need support making and comparing observations of the Sun in the sky to describe its repeating (morning, afternoon) locations, **have them point to and describe** where the **Sun was in the sky** when we made observations in the afternoon in Lesson 2 and **then point to and describe their new recorded afternoon observation** on their Sun Observations handout to **notice similarities in the location of the afternoon observations**. If students need support comparing morning and afternoon observations to notice differences, have students point on their Sun Observations handouts with **one finger/hand to their recorded morning observation and one finger/hand to their afternoon observation to notice the different locations/sides of the handout.**" (Lesson 3, Teacher Guide)

- Lesson 4 Assessment tool: Instructional Guidance 2: "If you notice students are not yet **using observations** to describe the **pattern** of the **Sun's apparent motion across the sky in an ongoing path**...If this applies to a few students in your class: Before Lesson 5, meet with students in a small group. You will use 1 set of printed Lesson 4 Sun Location cards, 1 sheet protector, 1 dry erase marker, and 1 blank sheet of white paper. As they did in the Lesson 4 Explore, invite students to sequence the cards. Place the "1-morning" card inside the sheet protector and **have one student find and circle the Sun. Then, remove that card from the sheet protector and place the "2-late morning" card inside the same sheet protector. Invite another student to find and circle the Sun. Repeat these steps with the other 3 cards,** then remove the final card from the sheet protector and slide in the blank sheet of white paper. Now, engage students in a discussion of the 5 circled Suns that are visible, using prompts such as: '**What do you notice about the Sun's ongoing path? How does it seem to move across the sky? Can you show us that?**' Use prompts that help students recognize that this pattern is something that happens over and over: "**Does the Sun always seem to move like this? How do you know? Where else do you see that? (i.e., Sun Observations chart, other Sun Location card set).**" (Lesson 4, Assessment Tool)

- Lesson 8, Explore, Step 4: "Formative assessment: ...If students need support making comparisons, invite students to turn and talk with a partner to use the graph to describe each attribute first (e.g., Day A has 13 hours of daytime and Day B has 9 hours). Consider encouraging students to make different kinds of comparisons separately (e.g., How do the hours of daytime in Day A compare with Day B? How does the length of the yellow daytime bar for Day A compare with Day B's?) Prompt students with comparative words or sentence starters: **The number of hours of daytime on Day A is _____ than the number on Day B (more, less). This means that Day A has a _____ daytime (longer, shorter) than Day B.** Refer to the Following Students' Sensemaking 2 tool and the Assessment Guidance at the beginning of this lesson." (Lesson 8, Teacher Guide)

Formative assessment processes routinely attend to multiple aspects of student equity.

- Lesson 2, Explore, Step 5: "Key formative assessment: ...Encourage students to use spoken words and gestures as they observe and record (draw, write on their Three Sun Observations handouts) the Sun's location in the sky relative to the ground-based reference point/s and their morning and midday recordings. Refer to the Instructional Guidance 1 tool and the Assessment Guidance at the beginning of this lesson." (Lesson 2, Teacher Guide)
- Lesson 9, Explore, Step 3: "To support equitable sensemaking, consider different ways to encourage students to engage with the data. Using finger pointing or circling sunrise and/or sunset lines on their *Monthly Data* handouts can support some students in noticing these specific times and enhances their sensemaking since these steps break down the connections students need to make around the data. In particular, the action of counting the number of hours and noticing how long the yellow bar is can support students in recognizing daytime as occurring in-between sunrise and sunset lines, which then positions them to engage in related cause-and-effect sensemaking." (Lesson 9, Teacher Guide)

Criterion-Based Suggestions for Improvement: N/A

III.C. Scoring Guidance

EXTENSIVE

Includes aligned rubrics and scoring guidelines that provide guidance for interpreting student performance along the three dimensions to support teachers in (a) planning instruction and (b) providing ongoing feedback to students.

The reviewers found **extensive** evidence that the materials include scoring guidelines that provide guidance for interpreting student performance along the three dimensions to support teachers in (a) planning instruction and (b) providing ongoing feedback to students.

The Lesson 2, 4, 6, and 9 Assessment Tools provide teachers with the connection between the Key Formative assessments in the unit and the targeted three-dimensional learning objectives. These documents describe what evidence for student learning teachers should look for in their students' responses.

- "By the end of Lesson 2, students should be **making and recording observations of the Sun** and **using these data to make comparisons of the Sun's different locations in the sky (morning, midday, afternoon)**. It is important to ensure that students are able to accurately make, record, and compare these observations so they can build on their work and, by the end of Lesson 3, be able to **use their observations to describe patterns of the Sun's repeated appearance in different locations of the sky at different times of day** (morning, afternoon).... Look-for's reflecting students accurately **making and recording observations** of **the Sun's locations in the sky at different times of day**: There are 3 recorded locations of the Sun in the sky (morning--blue, midday--yellow, and afternoon--green). The recorded Suns should be similar in size. Each recorded location should be progressively further west. The midday observation should be highest in the sky. Each recorded observation accurately reflects the Sun's location in the sky relative to your local ground-based reference point/s. They are therefore similar to the class's consensus recordings on the class's Sun Observations chart." (Lesson 2 Assessment Tool)
- "By the end of Lesson 6, students should be **making, comparing, and using observations of the Moon** to **describe patterns of its changing locations and apparent motion across the sky in an ongoing path**.

Specifically, students should be able to describe the Moon's repeated appearance in different locations of the sky at different times, as well as how the Moon appears to move in an ongoing path across the sky through these locations, like the Sun. This will further support students in **using patterns as evidence to support claims related to the Sun, Moon, and stars** in Lesson 7 (next), including using evidence to support claims about events occurring in the daytime (when the Sun is in the sky) and the nighttime (when the Sun is not in the sky, and stars can be seen in the sky)...Look-for's on students' Moon Observations handouts reflecting students **making, comparing, and using observations of the Moon** to **describe patterns of its changing locations and apparent motion across the sky in an ongoing path**: 3 recorded locations of the Moon in the sky (1-early, 2-middle, 3-late). All recorded Moons are similarly sized. Each recorded location is progressively further west. The middle observation is highest in the sky and above the house. Arrows are oriented from east to west, connecting the 3 Moons sequentially. Arrows connect from the ground to the '1-early' Moon and from the '3-late' Moon to the ground, forming an ongoing path in an arc--like an upside-down U or a rainbow. Students write: 'It goes from east to west'; 'It moves in the same direction'; 'East-west and low-high-low'; 'It's like a rainbow.'" (Lesson 6 Assessment Tool)

The Lesson 5, 7, and 10 Summative Guidance provides teachers with the connection between the summative assessments in the unit and the targeted three-dimensional learning objectives. These documents also describe a range of student responses, categorized as "Not Yet Secure," "Secure with Prompting," and "Secure." Examples include:

- Lesson 5 Assessment Tool "Assessment Statement 1: Students can **make, compare, and use observations of the Sun, Moon, and stars to describe patterns that can be predicted**. (aligned to 1-ESS1-1)...Look for's reflecting students **using patterns as evidence to support a claim about the Sun's predicted location in the sky**. For Early Morning Sun Claim student assessments: Drawing shows the early morning Sun "low" in the image, likely closer to the bottom of the drawing box than the top. Student circles "low." Drawing shows the early morning Sun in the east (left) in the box. Student circles "east." In their writing, the student uses patterns as evidence: The early morning Sun is always in the east and low in the sky." (Lesson 5 Assessment Tool)

The Lesson 3 and 8 Assessment Tool provides teachers with the connection between the formative assessments in the unit and the targeted three-dimensional learning objectives.

Support for planning instruction:

- The Lesson 4 Teacher Assessment Tool Instructional Guidance 2 document provides guidance on evaluating student understanding and adjusting instruction based on observations of student interactions in Lessons 3 and 4. It includes suggestions for students who "are not yet comparing observations at different times of day to observe patterns of the Sun's changing locations in the sky" "are not yet using observations to describe the pattern of the Sun's apparent motion across the sky in an ongoing path" or "are already comparing and using observations of the Sun to describe patterns of its changing locations and apparent motion in the sky". For example, the document suggests, "If you notice students are not yet comparing observations at different times of day to observe patterns of the Sun's changing locations in the sky...If this applies to a few students in your class: Before Lesson 5, return students' Lesson 2 Three Sun Observations handouts and their Lesson 3 Sun Observations handouts and support students in making comparisons across handouts of their 2 morning (blue) recorded observations and their 2 afternoon (green) recorded observations. Use prompts to support students in pointing to and describing the Sun's location at a certain time of day and noticing that it is in a similar location on different days; for example, "*Where is the Sun in the morning (blue circle) on your Lesson 2 Three Sun Observations handout? What about your Lesson 3 Sun Observations handout? How are those locations similar?*" Organize each students' handouts on a table or floor so that they are lined up with each other vertically. Encourage students to use each hand to point to the Sun observations

(morning, afternoon) in the top handout to notice how they are different (their fingers are in different places on the handouts). Then have students slide their fingers/hands down to the second handout to notice how these same locations repeat; their finger/hand is pointing to (or near) their recorded Sun observations (morning, afternoon) on a different day If this applies to most or all of your class: During Lesson 5, spend longer revisiting the class's Sun Observations chart in the first Navigate to provide additional time explicitly noticing and comparing the repeated morning and afternoon observations. Use and provide comparative location language with students, such as "*Are the blue morning Suns next to the tree or next to the swing set?" or "How are the blue morning Suns different from the green afternoon Suns?*" Emphasize the general locations of the morning and afternoon Suns (on this side; on that side). Invite students to approach the Sun Observations chart to point to, touch, and/or describe the different, repeating locations." (Lesson 4, Teacher Guide)

- Lesson 8, Lesson Assessment Guidance: "If students need additional support counting and using numbers, consider: Provide the Hundreds Chart and support students in using it. Provide manipulatives (counters, snap cubes) and encourage finger counting. If students need additional support using a graph to describe and compare daytime lengths, consider: Have students cut out a Day A and a Day B data representation from each handout and line these up vertically with each other to make a handout-sized graph to reference and manipulate during the whole-class discussion in the Explore (slide G)." (Lesson 8, Teacher Guide)
- Lesson 9 Assessment Tool "If you notice students…are not yet relating the length of daytime to sunrise and sunset…If this applies to a few students in your class: Before Lesson 10, provide students with an altered handout from Lesson 8 or Lesson 9 that has any number of daytime boxes filled in (with Suns), but has been modified to have blank boxes in place of star boxes. Have students locate the daytime (Sun) boxes and color these in yellow. Then, have students point to the line where the yellow bar begins in order to add a red (or other color) sunrise line while referencing and restating the Word Wall card (*when the Sun first appears in the sky*) and repeating these actions with sunset (*when the Sun disappears from view in the sky*). Encourage students to point to/touch the sunrise/sunset lines and ask them to show what would happen, using their fingers, if sunrise were earlier and sunset were later (and/or if sunrise were later and sunset were earlier). As students move their fingers, use prompts such as, *What happens to the length of the daytime bar when sunrise is earlier and sunset is later? What about when sunrise is later and sunset is earlier?* If this applies to most or all of your class: During Lesson 10, at the beginning of the Explore, allocate additional time as the class reviews the Day A and Day B Graph from Lesson 8. Invite students to repeat the gestures they used in the Lesson 8 Connect, using their parallel hands to represent sunrise and sunset (and therefore the start and end of daytime) and the space between their hands representing daytime. Have students move their hands closer together (Day B, winter) and farther apart (Day A, summer) while talking with a partner. During Lesson 10, at the end of the first Navigate, allocate time to additionally revisit the class's Monthly Daytime Graph to provide an opportunity to return to the ideas relating daytime length to sunrise and sunset. Invite students to point with their pointer fingers to the red sunrise/sunset lines, starting at the top of the graph (December), "tracing" the lines moving down to January. Then, discuss the pattern of closer together fingers, farther apart fingers, closer together fingers to relate the later/earlier sunrise/sunset lines in winter to shorter daytimes and the earlier/later sunrise/sunset lines in the middle (summer) to longer daytimes." (Lesson 9 Assessment Tool)

Support for ongoing feedback

- Lesson 3 Assessment Tool "Possible feedback: Tell me about where you observed the morning (blue) Sun. Can you point to that outside? How is that similar to/different from the location on your *Sun Observations* handout? How does your morning (blue) Sun observation compare to the consensus observations on our Sun Observations chart? Can you point to that? I see you wrote an "A" next to your green circle. What does "A" stand for? Let's sound it out and

write it down together. Tell me more about your afternoon (green) circle. How does it compare to the blue circle you drew this morning? Is the Sun always there in the afternoon? Why do you think that?" (Lesson 3 Assessment Tool)

- Lesson 6 Formative Assessment (Moon Observations handout): The Lesson 3 Assessment Tool "Following Students' Sensemaking 1 Lessons 3-7" document provides examples of possible student responses on the Moon Observations handout and corresponding possible feedback. For example, if students provide written descriptions of the motion of the Moon that need clarification, the document suggests asking, "Let's look at your writing together. Tell me about 'that way' and 'up'. How does that describe how the Moon seems to move across the sky? How could we add that idea to your writing?" It also suggests prompts to dig deeper into student thinking about their models and written explanations, such as "I see your arrows. What do they mean to you? Does it always happen like that? How do you know?" (Lesson 6, Teacher Guide)

Criterion-Based Suggestions for Improvement: N/A

III.D. Unbiased Tasks/Items

EXTENSIVE

Assesses student proficiency using methods, vocabulary, representations, and examples that are accessible and unbiased for all students.

The reviewers found **extensive** evidence that tasks/items assess student proficiency using methods, vocabulary, representations, and examples that are accessible and unbiased for all students.

Multiple modes of communication

- Lesson 5, Student Assessment "Draw the Sun in the sky in the box below...In the early morning, the Sun will be (low/high) in the sky in the (east/middle/west)...I think this because _____" (Lesson 5, Student Assessment)
- Lesson 6, Moon Observations Handout: "Draw where you see the Moon in each card. Label each Moon with early, middle, or late...Use arrows in the box to show the Moon's ongoing path across the sky...Describe how the Moon seems to move across the sky." (Lesson 6, Student Handout)

Supports success for all students

- Lesson 6, Explore, Step 3: "This small-group comparison encourages partners to support each other's sensemaking and provides an additional opportunity for students to check the accuracy of their recorded observations and communicate their growing understanding of the Moon's changing locations in the sky. To support students' oral language use, consider suggesting sentence starters that might help students fully express their ideas and engage with their peers' ideas. For instance, students sharing might say, "I drew the early Moon _____, the middle Moon _____, and the late Moon _____." Meanwhile, those listening could be encouraged to respond with sentence starters such as "Can you tell me more about _____?" or "What did you mean by _____?" If possible, develop these sentence starters with students so that they feel more ownership over using them." (Lesson 6, Teacher Guide)
- Lesson 8, Explore, Step 3: "Offering students an opportunity to work with peers gives them a chance to use their linguistic and nonlinguistic resources to express their ideas (and learn from other students' uses of these resources too) before sharing their ideas in a larger discussion. Allowing students to use their hands and other gestures

provides opportunities for all students, especially multilingual learners as they build their understanding of differing daytime and nighttime hours between days in ways beyond verbal communication." (Lesson 8, Teacher Guide)

Multiple modalities and student choice

- Lesson 2, Explore, Step 3: "To support differentiation and access, the option to write descriptions of their 3 Sun observations is provided on the second page of the *Three Sun Observations* handout. This provides students with multiple modes of expression while also supporting students' ongoing investment in their investigation by having individual choice and autonomy in deciding on varied ways to record their observations. Some students may feel drawing and writing allows them to best express their ideas." (Lesson 2, Teacher Guide)
- Lesson 5, Explore, Step 4 Sidebar: "To optimize each individual student's choice and autonomy, two different versions of the student assessment are provided (*Early Morning Sun Claim and Late Afternoon Sun Claim*). Each of these versions is likely to reflect a time of day of interest to some of your students. You might also consider further differentiating the student assessment by removing the "late afternoon" and "early morning" times and providing a blank for students to fill in their own time of day." (Lesson 5, Teacher Guide)

Criterion-Based Suggestions for Improvement: N/A

III.E. Coherent Assessment System

EXTENSIVE

Includes pre-, formative, summative, and self-assessment measures that assess three-dimensional learning.

The reviewers found **extensive** evidence that the materials include pre-, formative, summative, and self-assessment measures that assess three-dimensional learning. There is an assessment system that supports teachers in understanding how students' three-dimensional performances in each assessment fit together to reflect student learning related to the assessment statements across the unit.

Matches three-dimensional learning objectives

- Lesson 2, the three-dimensional learning objective is: **Make observations of the Sun in the sky throughout a day and use a pattern across many students' data to compare locations of the Sun at different times of day**.
  - Lesson 2, Explore, Step 3 "Formative assessment: Partner discussions and students' Three Sun Observations handouts during the morning observation"...Go outside and make morning Sun observations. Bring students outside to the predetermined location (that was also used in Lesson 1) and have them work with their partners to make observations of the Sun's location in the sky. Remind them to record their own observations on their *Three Sun Observations* handouts and then compare and discuss with their partner; partners should notice and discuss similarities and differences in their recorded observations and work toward agreement." (This process is repeated for midday and afternoon observations in Parts 4 and 5) (Lesson 2, Teacher Guide)
  - Lesson 2, Explore, Step 5: Review three consensus Sun observations. Engage students in a brief discussion to review and compare the location of the Sun in the sky at each of the times they made observations (morning, midday, afternoon), the purpose of which is to ensure students notice how their observations were of the Sun in different locations in the sky at morning, midday, and afternoon." (Lesson 2, Teacher Guide)

- Lesson 9, the three-dimensional learning objective is: "**Use counting and a graph to describe the pattern of more daytime hours in summer and fewer daytime hours in winter.**" and "**Analyze data to describe the pattern of longer daytimes in summer (more daytime hours; earlier sunrise/later sunset) and shorter daytimes in winter (fewer daytime hours; later sunrise/earlier sunset).**"
  - Lesson 9, Explore, Step 3: "Key formative: Students' completed page of the Monthly Data handout and the associated individual discussions... Motivate comparing data. When students have completed counting and coloring their *Monthly Data* handout, invite students to consider how their month's data might be the same as or different from other months by responding to the following prompt with a thumb up (yes), thumb down (no), or a thumb to the side (not sure) hand signal. Do you think your data shows the same number of daytime hours as the data from another month? Why or why not? Use students' ideas and/or uncertainty to motivate comparing our *Monthly Data* handouts, just like we compared our Day A and Day B Data in the last lesson! Ask students how we could best share ideas and listen to each other to figure out how each month is the same or different, anticipating they will suggest sitting in a Scientists Circle or a class meeting space with their month of the *Monthly Data* handout." (Lesson 9, Teacher Guide)
  - Lesson 9, Explore, Step 4: "Conclude with students by celebrating their careful work analyzing, interpreting, and discussing their data using the class Monthly Daytime Graph. Ask students if they think the observations they made from their class Monthly Daytime Graph would be true for each month in any year. In other words, is there a pattern? Does it *happen over and over again, and can it help us know what will happen next*? Invite students to turn and talk about these ideas: Do you think the daytimes are always shortest in December and longest in June? Why or why not? Do you think daytimes always get longer between December and June? Why or why not?" (Lesson 9, Teacher Guide)

Pre-, formative, summative, and self-assessment

Pre-Assessment

- Assessment Overview: "As students engage in this lesson, there are multiple opportunities to gather pre-assessment evidence. This evidence can be used to determine what incoming ideas, experiences, and sensemaking strategies students bring to the unit. All ideas and experiences should be invited into the classroom and be considered as resources to support students' ongoing sensemaking. These opportunities should not be used to assign a score or a grade. Lesson 1 begins the unit, and discussions as the class creates their Notice and Wonder chart and Our Experiences chart, as well as the initial ideas students share on their First Sun Observation handouts and can inform your plans about how to build and leverage student ideas across the unit." (Assessment Overview)
- Lesson 1, Explore, Step 3: "Pre-assessment: Students' drawing and writing on their First Sun Observation handouts and the coordinating discussions with individual students and partners while they make observations outside provide an opportunity to gather evidence about Learning Goal 1a (aligned to Assessment Statement 1), with the purpose of determining support students may need in upcoming lessons as they continue to make, record, and compare observations of objects in the sky. Over the course of Lesson Sets 1 and 2, students will make and compare observations of the Sun in the sky (firsthand and from media) and of the Moon and stars (from media) in order to answer their questions about unit phenomena. Accept all student ideas and representations and refer to the Assessment Guidance at the beginning of the lesson." (Lesson 1, Teacher Guide)

Formative Assessment

- Assessment Overview: "As students engage in these lessons, there are multiple opportunities to gather formative evidence of students' ongoing and developing sensemaking. This evidence can be used to support students by

providing individual and group feedback and/or making minor instructional modifications as suggested in unit materials. Ongoing formative assessment opportunities related to class discussions, handouts, and other student work are described in the front matter of each lesson and noted in the teacher guide with a yellow "Assessment Opportunity" box where they happen in the lesson." (Assessment Overview)

- Lesson 3, Explore, Step 5 Formative assessment: Individual discussions with students during the afternoon observation provide an opportunity to gather evidence about Learning Goal 3a (aligned to Assessment Statement 1), to support students in making and comparing observations to describe the pattern of the Sun's repeating locations in the afternoon sky as different from its locations in the morning sky. If students need support making and comparing observations of the Sun in the sky to describe its repeating (morning, afternoon) locations, have them point to and describe where the Sun was in the sky when we made observations in the afternoon in Lesson 2 and then point to and describe their new recorded afternoon observation on their Sun Observations handout to notice similarities in the location of the afternoon observations. If students need support comparing morning and afternoon observations to notice differences, have students point on their *Sun Observations* handouts with one finger/hand to their recorded morning observation and one finger/hand to their afternoon observation to notice the different locations/sides of the handout. Refer to the Following Students' Sensemaking 1 tool and the Assessment Guidance at the beginning of this lesson." (Lesson 3, Teacher Guide)
- Lesson 9, Explore, Step 3 "Key formative: Students' completed page of the Monthly Data handout and the associated individual discussions provide an opportunity to gather evidence about Learning Goal 9a (aligned to Assessment Statement 2), with the purpose of providing feedback to students and guiding instruction. Encourage students to use strategies (finger counting, using manipulatives) that reinforce their use of mathematical reasoning. Refer to the Following Students' Sensemaking 2 tool (recording evidence of students' sensemaking for those whom you may not yet have evidence), the Instructional Guidance 4 tool, and the Assessment Guidance at the beginning of the lesson." (Lesson 9, Teacher Guide)

Summative Assessment

- Lesson 5, Synthesize, Step 3 "Summative assessment: Students' Early Morning Sun Claim and Late Afternoon Sun Claim student assessments are an opportunity to gather evidence about learning goal 5 (aligned with Assessment Statement 1) with the purpose of summatively assessing students' use of patterns as evidence to make claims about about the Sun's predicted location in the sky. Continue to record students' progress on the Following Students' Sensemaking 1 tool. Refer to the Summative Guidance 1 tool and the Assessment Guidance at the beginning of this lesson for more information to support students." (Lesson 5, Teacher Guide)
- Lesson 7, Synthesize, Step 6 "Summative assessment: Students' Nighttime Claims student assessments are an opportunity to gather evidence about learning goal 7b (aligned with Assessment Statement 1) with the purpose of summatively assessing students' use of patterns of the Sun, Moon, and stars as evidence to support claims about daytime and nighttime. Continue to record students' progress on the Following Students' Sensemaking 1 tool. Refer to the Summative Guidance 2 tool and the Assessment Guidance at the beginning of this lesson for more information to support students." (Lesson 7, Teacher Guide)
- Lesson 10, Synthesize, Step 5 "Summative assessment: Students' Season Claim student assessments are an opportunity to gather evidence about learning goal 10 (aligned with Assessment Statement 2) with the purpose of summatively assessing students' use of patterns as evidence to make claims about the predicted season. Continue to record students' progress on the Following Students' Sensemaking 2 tool. Refer to the Summative Guidance 3 tool and the Assessment Guidance at the beginning of this lesson for more information to support students." (Lesson 10, Teacher Guide)

Self-Assessment

- Lesson 2, Explore, Step 5: "Self reflection: The discussion prompts related to the Sun Investigation Plan and students' *Three Sun Observations* handouts (refer to slide J) provide an opportunity for students to reflect on their progress toward Learning Goal 2 with the purpose of supporting students in making and recording observations of the Sun's location in the sky and considering improving that practice (in the next lesson). Refer to the Instructional Guidance 1 tool and the Assessment Guidance at the beginning of this lesson." (Lesson 2, Teacher Guide)
- Lesson 2, Explore, Step 5: "Use the Sun Investigation Plan to reflect. Ensure students can view their Sun Investigation Plan (refer to slide J). Remind students how they have made and recorded 3 observations of the Sun in the sky outside today; they did a lot of investigation work as scientists! Suggest that we take a moment to consider how we're doing and what we may need to keep working on. For each step on your class's Sun Investigation Plan, ask students to give a thumb up if they feel they are able to do that without help, and a hand up if they feel they still need help to do that....I can observe the Sun in the sky using my Sun safety goggles. I can record (draw and write) where I observe the Sun's location in the sky using my *Three Sun Observations* handout." (Lesson 2, Teacher Guide)
- Lesson 5, Explore, Step 3 "Self Reflection: These prompts offer an opportunity for students to use the Gotta-Have-It Checklist to reflect on their Early Morning Sun Claim or Late Afternoon Sun Claim student assessments with the purpose of supporting students in reflecting on their progress so far in using patterns (from their many observations) as evidence to support their claim about the Sun's predicted location in the sky and determining next steps for constructing their argument. Refer to the Assessment Guidance at the beginning of the lesson." (Lesson 5, Teacher Guide)
- Lesson 5, Explore, Step 3: "Use the Gotta Have-It Checklist to reflect. Once students have had an opportunity to engage in some drawing and writing, display slide K and the Gotta-Have-It Checklist. Gather students' attention and explain that we will be pausing to use the Gotta-Have-It Checklist to reflect on our progress so far. For each item on the checklist, ask students to give a thumb up if they have included that in their drawing and writing, and a hand up if they are still working on it or have things they would like to add or change. Explain that this is a way to help us figure out what we still need to work on...I made a claim (drawing Sun, circling low/high, circling east/middle/west). I used patterns of the Sun's location in the sky as evidence....Turn and talk about ideas for next steps. Once students have reflected on their progress, have them briefly turn and talk with a partner about what they will work on next to finish or update their *Early Morning Sun Claim* or *Late Afternoon Sun Claim* student assessments. Have a few students share with the class. Continue drawing and writing. Provide students with additional time to follow through with the next steps in making claims and supporting them with evidence while you continue to interact with individuals to discuss and provide feedback and support." (Lesson 5, Teacher Guide)

The rationale for the coherent three-dimensional assessment system is clearly described.

- The "Assessment System Overview" section of the Teacher Guide describes the organization and intent behind the assessment system. It includes a table outlining each assessment opportunity, including the type of assessment, location in the unit, and how to evaluate student thinking.
- Each assessment opportunity is noted with an "assessment opportunity" box in the Teacher Guide, inline with the relevant instruction.

Criterion-Based Suggestions for Improvement: N/A

III.F. Opportunity to Learn

EXTENSIVE

Provides multiple opportunities for students to demonstrate performance of practices connected with their understanding of disciplinary core ideas and crosscutting concepts and receive feedback

The reviewers found **extensive** evidence that the materials explicitly include both claimed Assessment Statements (learning objectives) in more than one activity and assessment, allowing students to develop and improve their performance over time. Students also have opportunities to apply peer and teacher feedback from prior activities to help them progress in their learning.

Multiple, interconnected opportunities over time

Assessment Statement 1: Students can **make, compare, and use observations of the Sun, Moon, and stars to describe patterns that can be predicted**. (aligned to 1-ESS1-1)

Evidence from the materials where the criterion was met,

- Lesson 2, the three-dimensional learning objective is: **Make observations of the Sun in the sky throughout a day and use a pattern across many students' data to compare locations of the Sun at different times of day**.
  - Lesson 2, Explore, Step 3: "Formative assessment: Partner discussions and students' Three Sun Observations handouts during the morning observation...Go outside and make morning Sun observations. Bring students outside to the predetermined location (that was also used in Lesson 1) and have them work with their partners to make observations of the Sun's location in the sky. Remind them to record their own observations on their *Three Sun Observations* handouts and then compare and discuss with their partner; partners should notice and discuss similarities and differences in their recorded observations and work toward agreement." (This process is repeated for midday and afternoon observations in Parts 4 and 5) (Lesson 2, Teacher Guide)
  - Lesson 2, Explore, Step 5: "Review three consensus Sun observations. Engage students in a brief discussion to review and compare the location of the Sun in the sky at each of the times they made observations (morning, midday, afternoon), the purpose of which is to ensure students notice how their observations were of the Sun in different locations in the sky at morning, midday, and afternoon." (Lesson 2, Teacher Guide)
- Lesson 3, the three-dimensional learning objectives are: "**Make and compare observations of the location of the Sun in the sky at different times of day to describe a daily pattern of morning (east) and afternoon (west) locations.**" and "**Construct an argument using evidence to support a claim that the Sun's different locations in the sky at different times of day (morning, afternoon) repeat."**
  - Lesson 3, Explore, Step 5: "Formative assessment: Individual discussions with students during the afternoon observation"... "Compare morning observations to afternoon observations. Referencing the Sun Observations chart, invite students to compare the class's consensus observations of the Sun in the morning (blue) with those from the afternoon (green). The purpose of this discussion is to support students in noticing that the morning observations are in one area/location while the afternoon observations are in a different area/location." (Lesson 3, Teacher Guide)
  - Lesson 3, Explore, Step 6: "Formative assessment: The whole-class discussions around the class's voting chart and recording a claim in response to our lesson question on Our Growing Ideas chart..."Return to the voting chart. Ensure students can view the voting chart (refer to slide N), showing students' updated

claims (represented by voting sticky notes) about the lesson question, *Do the Sun's different locations in the sky repeat?*... Invite students to pair up and use the sentence starter on slide N to share their current thinking: I think _____ because _____.This opportunity allows students to discuss their votes from the end of the previous Explore and prepares students to engage in a whole-class discussion to (eventually) come to an agreement and record a claim and evidence on Our Growing Ideas chart." (Lesson 3, Teacher Guide)

- Lesson 4, the three-dimensional learning objective is: "**Make and compare observations to describe the pattern of the Sun's changing locations in the sky,**" and "**Use observations to describe the pattern of the Sun's apparent motion across the sky in an ongoing path.**"
  - Lesson 4, Explore, Step 3: "Key formative: Discussions with student partnerships and their recorded observations of the Sun in the sky (dry-erase marker circles) on their Sun Location card sets ...Facilitate discussions of the Sun's location with pairs. After pairs have organized their cards by "time of day" and while they are making their observations, circulate and use the following prompts to support students in observing the Sun's location in the sky at each time and in beginning to make sense of the Sun's changing locations between morning and afternoon." (Lesson 4, Teacher Guide)
  - Lesson 4, Explore, Step 4: "Key formative: Discussions with the class using the Sun Timelapse video"... "Watch and discuss the Sun time-lapse video. Tell students that they should observe the Sun's location in the sky while watching the video. Show the Sun Timelapse video. After viewing the video, use the following prompts to engage students in a brief discussion to support them in describing the Sun's apparent motion in an ongoing path across the sky." (Lesson 4, Teacher Guide)
- Lesson 5, the three-dimensional learning objective is: **Use patterns as evidence to support a claim about the Sun's predicted location in the sky.**
  - Lesson 5, Explore, Part 3: "Show the Sun Claim student assessments. Share with students that, next, they have an opportunity to draw and write about where the Sun will be at a specific time of day. Display a copy of the Early Morning Sun Claim and/or Late Afternoon Sun Claim student assessment/s (refer to slide J) and read the directions with students while referencing the Gotta-Have-It Checklist (refer to slide I), so that students know they can draw a picture and circle the words to show their claim about the Sun's location. Show students where they can support their claim with evidence by using the patterns of the Sun's location in the sky" (Lesson 5, Teacher Guide)
- Lesson 6, the three-dimensional learning objective is: "**Make and compare observations to describe the pattern of the Moon's changing locations in the sky,**" and "**Use observations to describe the pattern of the Moon's apparent motion across the sky in an ongoing path.**"
  - Lesson 6, Explore, Step 3: "Key formative: Discussions with student partnerships as they make observations of the Moon in the sky using their Moon Location cards and record observations on their Moon Observations handouts ... "Pairs with the same Moon Location card sets compare observations. Instruct two student pairs with the same card sets to join together in a group of four (set A with set A, set B with set B, etc.) by moving to one partnership's set of organized cards with their completed *Moon Observations* handouts. Invite each partnership to describe the changing locations of the Moon in the sky using their recorded observations on their handouts. Suggest that groups check the accuracy of their recorded observations on their Moon Observations handouts and make adjustments, if needed. Continue to encourage and welcome students demonstrating their understanding through pointing, gesturing, and/or reading from their handout." (Lesson 6, Teacher Guide)
  - Lesson 6, Explore, Step 5: "Key formative: Discussions with students and their Moon Observations handouts" ... "Add to our Moon Observations handouts. Remind students that scientists always record their observations and invite students' ideas about how they could record the pattern of how the Moon seems to change

locations in the sky on their Moon Observations handouts (refer to slide K). Then, connect their ideas to the steps on the handout (page 2) for drawing and writing about the pattern of the Moon's ongoing path across the sky. Explain how they can use arrows to show how the Moon might seem to move over time just like how we used arrows on our Sun Observations chart!" (Lesson 6, Teacher Guide)

- Lesson 7, the three-dimensional learning objective is: "**Use observations of daytime and nighttime skies to describe the pattern of visible objects (Sun, stars) in the sky at each time,"** and "**Use patterns as evidence to support a claim about what makes it daytime or nighttime.**"
  - Lesson 7, Synthesize, Step 6: "Show the Nighttime Claims student assessment. Tell students that they now have the opportunity to consider claims two first graders, Calia and Trudy, made about the nighttime sky. Remind students that we met Calia and Trudy in the Observing the Sky in Our Communities book while they were taking out the trash and recycling. Show students the Nighttime Claims student assessment (refer to slide N) and briefly help students recognize that the image on the handout is representative of the one shown in color on the slide. Point out the two bulleted claims, show students how to circle the claim that uses the best evidence for nighttime, and where to write down why they circled that claim." (Lesson 7, Teacher Guide)

Assessment Statement 2: Students can **use observations to relate the length of daytime to the time of year (season)**. (aligned to 1-ESS1-2)

Evidence from the materials where the criterion was met,

- Lesson 8's three-dimensional learning objective is "Use counting **and a graph to identify and describe that some days have more daytime hours (longer daylight hours) than others."**
  - Lesson 8, Explore, Step 4: "Formative assessment: The whole-class discussion comparing Day A and Day B data"... "Facilitate a discussion comparing daytime. Invite students to first think, then talk with a partner, and then share with the class, using the following prompt to compare daytime on Day A with daytime on Day B. Providing time to think and talk first with a partner supports students' sensemaking and participation. As students share ideas, look and listen for their multiple ways of engaging in and expressing their mathematical sensemaking, including comparing quantitative attributes (numbers of hours recorded on sticky notes or handouts/number of suns/number of yellow boxes) and comparing the lengths of the yellow bars. For teacher convenience, and in alignment with this lesson's learning goals, the "Ideas to look and listen for" provide quantitative ideas first. Encourage students to participate in this discussion in the form(s) of their choosing (e.g., using words, gestures, acting out, pointing, etc.)." (Lesson 8, Teacher Guide)
- Lesson 9, the three-dimensional learning objective is: "**Use counting and a graph to describe the pattern of more daytime hours in summer and fewer daytime hours in winter.**" and "**Analyze data to describe the pattern of longer daytimes in summer (more daytime hours; earlier sunrise/later sunset) and shorter daytimes in winter (fewer daytime hours; later sunrise/earlier sunset)**."
  - Lesson 9, Explore, Step 3: "Key formative: Students' completed page of the Monthly Data handout and the associated individual discussions ... Motivate comparing data. When students have completed counting and coloring their Monthly Data handout, invite students to consider how their month's data might be the same as or different from other months by responding to the following prompt with a thumb up (yes), thumb down (no), or a thumb to the side (not sure) hand signal. Do you think your data shows the same number of daytime hours as the data from another month? Why or why not? Use students' ideas and/or uncertainty to motivate comparing our *Monthly Data* handouts, just like we compared our Day A and Day B Data in the last lesson! Ask students how we could best share ideas and listen to each other to figure out how each month is the same or different, anticipating they will suggest sitting in a Scientists Circle or a class meeting space with their month of the *Monthly Data* handout." (Lesson 9, Teacher Guide)

  - Lesson 9, Explore, Step 4: "Conclude with students by celebrating their careful work analyzing, interpreting, and discussing their data using the class Monthly Daytime Graph. Ask students if they think the observations they made from their class Monthly Daytime Graph would be true for each month in any year. In other words, is there a pattern? Does it *happen over and over again, and can it help us know what will happen next*? Invite students to turn and talk about these ideas: Do you think the daytimes are always shortest in December and longest in June? Why or why not? Do you think daytimes always get longer between December and June? Why or why not?" (Lesson 9, Teacher Guide)

- Lesson 10, the three-dimensional learning objective is: **Use patterns of daytime length as evidence to make and support a claim about the predicted season in which a morning or evening event occurs.**

  - Lesson 10, Synthesize, Step 5: "Show the Season Claim student assessment. Display a copy of the Season Claim student assessment and point out the image (refer to slide K). Read the directions with students to ensure we all understand that the image shows Sasha walking her dog, Luna, in the evening and it is nighttime because the Sun is not in the sky. Then, show students where to make a claim about the season in which Sasha will likely go for a walk with her dog, Luna, by circling summer or winter. Finally, show students where they can write their evidence to support their claim." (Lesson 10, Teacher Guide)

Multi-modal feedback loops

Opportunities to improve performance with feedback from peers include:

- Lesson 5, Explore, Step 3: "Use the Gotta Have-It Checklist to reflect. Once students have had an opportunity to engage in some drawing and writing, display slide K and the Gotta-Have-It Checklist. Gather students' attention and explain that we will be pausing to use the Gotta-Have-It Checklist to reflect on our progress so far. For each item on the checklist, ask students to give a thumb up if they have included that in their drawing and writing, and a hand up if they are still working on it or have things they would like to add or change. Explain that this is a way to help us figure out what we still need to work on...Prompts to Use: I made a claim (drawing Sun, circling low/high, circling east/middle/west). I used patterns of the Sun's location in the sky as evidence....Turn and talk about ideas for next steps. Once students have reflected on their progress, have them briefly turn and talk with a partner about what they will work on next to finish or update their Early Morning Sun Claim or Late Afternoon Sun Claim student assessments. Have a few students share with the class. Continue drawing and writing. Provide students with additional time to follow through with the next steps in making claims and supporting them with evidence while you continue to interact with individuals to discuss and provide feedback and support." (Lesson 5, Teacher Guide)

- Lesson 10, Explore, Step 5: Pause to introduce "One Star and One Wish" peer feedback. Gather students' attention and suggest that we pause our work to give each other feedback. Feedback is ideas offered by others to make something better. Briefly, invite students to share ideas out loud about how connecting with a partner could help us make our own claim and evidence on our Season Claim student assessment better. Anticipate students may share a variety of ideas, including how a partner could agree or disagree with their claim about what season Sasha's walk will happen in and/or what kind of evidence supports our claim. Acknowledge students' ideas and explain that they can use the "One Star and One Wish" strategy to give helpful feedback by sharing one thing they like (the star) and one thing they think could be improved (the wish)...Give peer feedback. Pair students together and provide a few minutes for them to engage in peer feedback about their Season Claim student assessments. Ensure students can use the class's Gotta-Have-It Checklist (refer to slide K) to review each other's progress so far and provide feedback. Encourage students to share their claim (what they circled) and their evidence (what they wrote). Encourage students to explain their thinking using their bodies, gestures, and classroom resources, including the Day A and Day B Graph and/or Our Growing Ideas chart. Use feedback to continue working. Have students return to their Season Claim student assessments and continue working, now improving or completing their claim and evidence using feedback from their partner." (Lesson 10, Teacher Guide)

Opportunities to improve performance with feedback from teachers include:

- Assessment System Overview: "In Lesson 2, use the evidence you have gathered on students' Lesson 2 Three Sun Observations handouts to evaluate students' progress toward specific aspects of Assessment Statement 1 (related to making, recording, and comparing observations of the Sun in the sky). Use the Instructional Guidance 1 tool to provide feedback to students and plan your upcoming instruction. When you get to Lesson 3, focus on supporting students who are not yet secure in their sensemaking." (Assessment System Overview)
- Lesson 2 Teacher Assessment Tool Instructional Guidance 1: "Use evidence on students' collected Lesson 2 Three Sun Observations handouts to assess their progress toward these goals and to provide feedback that students can use to improve their performances in Lesson 3." (Lesson 2 Assessment Tool)
- Lesson 3 Teacher Assessment Tool Following Students' Sensemaking Lessons 3 - 7: "Document provides possible feedback for student work on the Sun Observations handout (lesson 3) and the Moon Observations handout (lesson 6)." (Lesson 3 Assessment Tool)
- Assessment system overview: "In Lesson 6, use the evidence you have gathered on the Following Students' Sensemaking 1 tool in Lesson 6 as well as students' Lesson 6 Moon Observations handouts to evaluate students' progress toward other aspects of Assessment Statement 1. Use the Instructional Guidance 3 tool to provide feedback to students and plan your upcoming instruction. (Assessment System Overview)
- Assessment System Overview: "In Lesson 9, use the evidence you have gathered on the Following Students' Sensemaking 2 tool in Lessons 8-9, as well as students' Lesson 8 Day A Data or Day B Data handouts and Lesson 9 Monthly Data handouts to evaluate students' progress toward Assessment Statement 2. Use the Instructional Guidance 4 tool to provide feedback to students and plan your upcoming instruction." (Assessment System Overview)

Criterion-Based Suggestions for Improvement: N/A

Category Ratings

CATEGORY I	**NGSS 3D Design** *(Criteria A–F)*	0	1	2	(3)
CATEGORY II	**NGSS Instructional Supports** *(Criteria A–G)*	0	1	2	(3)
CATEGORY III	**Monitoring NGSS Student Progress** *(Criteria A–F)*	0	1	2	(3)
TOTAL SCORE			**9**		

Overall Ratings

Overall ratings:

The score total is an *approximate* guide for the rating. Reviewers should use the evidence of quality across categories to guide the final rating. In other words, the rating could differ from the total score recommendations if the reviewer has evidence to support this variation.

E: Example of high quality NGSS design—High quality design for the NGSS across all three categories of the rubric; a lesson or unit with this rating will still need adjustments for a specific classroom, but the support is there to make this possible; exemplifies most criteria across Categories I, II, & III of the rubric. (total score ~8–9)

E/I: Example of high quality NGSS design if Improved—Adequate design for the NGSS, but would benefit from some improvement in one or more categories; most criteria have at least adequate evidence (total score ~6–7)

R: Revision needed—Partially designed for the NGSS, but needs significant revision in one or more categories (total ~3–5)

N: Not ready to review—Not designed for the NGSS; does not meet criteria (total 0–2)

Overall rating below:

E