1st Grade - Thematic Model - Bundle 1
Seeing Objects

This is the first bundle of the 1st Grade Thematic Model. Each bundle has connections to the other bundles in the course, as shown in the Course Flowchart.

Bundle 1 Question: This bundle is assembled to address the question of "Can patterns of the sun, moon, and stars be used to make predictions of future observations?"

Summary

The bundle organizes performance expectations around the theme of *seeing objects.* Instruction developed from this bundle should always maintain the three-dimensional nature of the standards, but recognize that instruction is not limited to the practices and concepts directly linked with any of the bundle performance expectations.

Connections between bundle DCIs

The idea that seasonal patterns of sunrise and sunset can be observed, described, and predicted (ESS1.B as in 1-ESS1-2) connects to the concept that the patterns of the motion of the sun, moon, and stars in the sky can be observed, described, and predicted (ESS1.A as in 1-ESS1-1). These ideas also connect to the concept that objects can be seen if light is available to illuminate them or if they give off their own light (PS4.B as in 1-PS4-2).

Bundle Science and Engineering Practices

Instruction leading to this bundle of PEs will help students build toward proficiency in elements of the practices of planning and carrying out investigations (1-ESS1-2), analyzing and interpreting data (1-ESS1-1), and constructing explanations and designing solutions (1-PS4-2). Many other practice elements can be used in instruction.

Bundle Crosscutting Concepts

Instruction leading to this bundle of PEs will help students build toward proficiency in elements of the crosscutting concepts of Patterns (1-ESS1-1 and 1-ESS1-2) and Cause and Effect (1-PS4-2). Many other crosscutting concepts elements can be used in instruction.

All instruction should be three-dimensional.

Performance Expectations 1-ESS1-2 is partially assessable	1-PS4-2 **Make observations to construct an evidence-based account that objects in darkness can be seen only when illuminated.** **[Clarification Statement: Examples of observations could include those made in a completely dark room, a pinhole box, and a video of a cave explorer with a flashlight. Illumination could be from an external light source or by an object giving off its own light.]** 1-ESS1-1 **Use observations of the sun, moon, and stars to describe patterns that can be predicted.** **[Clarification Statement: Examples of patterns could include that the sun and moon appear to rise in one part of the sky, move across the sky, and set; and stars other than our sun are visible at night but not during the day.] [*Assessment Boundary: Assessment of star patterns is limited to stars being seen at night and not during the day.*]** 1-ESS1-2 **Make observations at different times of year to relate the amount of daylight to the time of year.** **[Clarification Statement: Emphasis is on relative comparisons of the amount of daylight in the winter to the amount in the spring or fall.] [*Assessment Boundary: Assessment is limited to relative amounts of daylight, not quantifying the hours or time of daylight.*]**

Example Phenomena	We cannot see anything in a completely darkened space. The sun moves in a particular direction during the day.
Additional Practices Building to the PEs	**Asking Questions and Defining Problems** • Ask and/or identify questions that can be answered by an investigation. Students could *identify questions* [related to] ***seasonal patterns of sunrise and sunset*** *that can be answered by an investigation*. 1-ESS1-2 **Developing and Using Models** • Compare models to identify common features and differences. Students could *compare models* [(e.g., pictures, diagrams, or storyboards of the sky during day and night) of the sky at different times] *to identify common features and differences* [of the different models]. 1-ESS1-1 **Planning and Carrying Out Investigations** • Make predictions based on prior experiences Students could *make predictions* [of the] ***patterns of the motion of the sun, moon, and stars in the sky*** *based on prior experiences.* 1-ESS1-1 **Analyzing and Interpreting Data** • Record information (observations, thoughts, and ideas). Students could *record information* [about what] ***objects can be seen*** [without a separate light available] ***to illuminate them***. 1-PS4-2 **Using Mathematical and Computational Thinking** • Decide when to use qualitative versus quantitative data. Students could *decide when to use qualitative or quantitative data* [when recording observations about the] ***patterns of the motion of the sun, moon, and stars in the sky***. 1-ESS1-2 **Constructing Explanations and Designing Solutions** • Use tools and/or materials to design and/or build a device that solves a specific problem or a solution to a specific problem. Students could *use materials to design and build a device that solves a problem* [related to the fact that] ***objects can*** [only] ***be seen if light is available to illuminate them or if they give off their own light***. 1-PS4-2 **Engaging in Argument From Evidence** • Listen actively to arguments to indicate agreement or disagreement based on evidence, and/or to retell the main points of the argument. Students could *listen actively to arguments* [about why] ***objects can be seen if light is available to illuminate them or if they give off their own light*** *to retell the main points of the argument.* 1-PS4-2

Additional Practices Building to the PEs (Continued)	**Obtaining, Evaluating, and Communicating Information** • Communicate information with others in oral and/or written forms using models, drawings, writing, or numbers that provide detail about scientific ideas and/or practices. Students could *communicate information with others* [about their observations and predictions of] ***patterns of the motion of the sun, moon, and stars in the sky*** *in written forms that provide detail about scientific ideas and practices*. 1-ESS1-1
Additional Crosscutting Concepts Building to the PEs	**Patterns** • Patterns in the natural and human designed world can be observed, used to describe phenomena, and used as evidence. Students could describe *patterns observed* [related to the] *phenomenon* [that] ***objects can be seen if light is available to illuminate them or if they give off their own light*** [and] *use* [those patterns] *as evidence* [in explanations]. 1-PS4-2 **Scale, proportion, and quantity** • Relative scales allow objects and events to be compared and described (e.g., bigger and smaller; hotter and colder; faster and slower). Students could *compare and describe events* [such as] ***seasonal patterns of sunrise and sunset*** [using] *relative scales (e.g., more and less)*. 1-ESS1-2 **Stability and Change** • Some things stay the same while other things change. Students could describe how *some things stay the same*—***the sun, moon, and stars*** [appear] ***in the sky*** [each calendar day]—*while other things change*—***the sun, moon, and stars*** [cannot be seen all day due to their] ***patterns of motion***. 1-ESS1-1
Additional Connections to Nature of Science	**Scientific Investigations Use a Variety of Methods** • Scientists use different ways to study the world. Students could describe [how they] *use different ways to study* ***patterns of the motion of the sun, moon, and stars in the sky*** [and] *how scientists* [also] *use different ways to study the world*. 1-ESS1-1 **Scientific Knowledge Assumes an Order and Consistency in Natural Systems** • Many events are repeated. Students could describe that *many events*, [including those related to] ***the motion of the sun, moon, and stars in the sky****, are repeated.* 1-ESS1-1

1-PS4-2 Waves and Their Applications in Technologies for Information Transfer

Students who demonstrate understanding can:

1-PS4-2. **Make observations to construct an evidence-based account that objects in darkness can be seen only when illuminated.** [Clarification Statement: Examples of observations could include those made in a completely dark room, a pinhole box, and a video of a cave explorer with a flashlight. Illumination could be from an external light source or by an object giving off its own light.]

The performance expectation above was developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Science and Engineering Practices

Constructing Explanations and Designing Solutions
Constructing explanations and designing solutions in K–2 builds on prior experiences and progresses to the use of evidence and ideas in constructing evidence-based accounts of natural phenomena and designing solutions.

- Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena.

Disciplinary Core Ideas

PS4.B: Electromagnetic Radiation

- Objects can be seen if light is available to illuminate them or if they give off their own light.

Crosscutting Concepts

Cause and Effect

- Simple tests can be designed to gather evidence to support or refute student ideas about causes.

Observable features of the student performance by the end of the grade:		
1	Articulating the explanation of phenomena	
	a	Students articulate a statement that relates the given phenomenon to a scientific idea, including that when an object in the dark is lit (e.g., turning on a light in the dark space or from light the object itself gives off), it can be seen.
	b	Students use evidence and reasoning to construct an evidence-based account of the phenomenon.
2	Evidence	
	a	Students make observations (firsthand or from media) to serve as the basis for evidence, including:
		i. The appearance (e.g., visible, not visible, somewhat visible but difficult to see) of objects in a space with no light.
		ii. The appearance (e.g., visible, not visible, somewhat visible but difficult to see) of objects in a space with light.
		iii. The appearance (e.g., visible, not visible, somewhat visible but difficult to see) of objects (e.g., light bulbs, glow sticks) that give off light in a space with no other light.
	b	Students describe* how their observations provide evidence to support their explanation.
3	Reasoning	
	a	Students logically connect the evidence to support the evidence-based account of the phenomenon. Students describe* lines of reasoning that include:
		i. The presence of light in a space causes objects to be able to be seen in that space.
		ii. Objects cannot be seen if there is no light to illuminate them, but the same object in the same space can be seen if a light source is introduced.
		iii. The ability of an object to give off its own light causes the object to be seen in a space where there is no other light.

1-ESS1-1 Earth's Place in the Universe

Students who demonstrate understanding can:

1-ESS1-1. **Use observations of the sun, moon, and stars to describe patterns that can be predicted.** [Clarification Statement: Examples of patterns could include that the sun and moon appear to rise in one part of the sky, move across the sky, and set; and stars other than our sun are visible at night but not during the day.] [*Assessment Boundary: Assessment of star patterns is limited to stars being seen at night and not during the day.*]

The performance expectation above was developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Science and Engineering Practices

Analyzing and Interpreting Data
Analyzing data in K–2 builds on prior experiences and progresses to collecting, recording, and sharing observations.

- Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions.

Disciplinary Core 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.

Crosscutting Concepts

Patterns

- Patterns in the natural world can be observed, used to describe phenomena, and used as evidence.

Connections to Nature of Science

Scientific Knowledge Assumes an Order and Consistency in Natural Systems

- Science assumes natural events happen today as they happened in the past.
- Many events are repeated.

Observable features of the student performance by the end of the grade:		
1	Organizing data	
	a	With guidance, students use graphical displays (e.g., picture, chart) to organize data from given observations (firsthand or from media), including:
		i. Objects (i.e., sun, moon, stars) visible in the sky during the day.
		ii. Objects (i.e., sun, moon, stars) visible in the sky during the night.
		iii. The position of the sun in the sky at various times during the day.
		iv. The position of the moon in the sky at various times during the day or night.
2	Identifying relationships	
	a	Students identify and describe* patterns in the organized data, including:
		i. Stars are not seen in the sky during the day, but they are seen in the sky during the night.
		ii. The sun is at different positions in the sky at different times of the day, appearing to rise in one part of the sky in the morning and appearing to set in another part of the sky in the evening.
		iii. The moon can be seen during the day and at night, but the sun can only be seen during the day.
		iv. The moon is at different positions in the sky at different times of the day or night, appearing to rise in one part of the sky and appearing to set in another part of the sky.
3	Interpreting data	
	a	Students use the identified patterns of the motions of objects in the sky to provide evidence that future appearances of those objects can be predicted (e.g., if the moon is observed to rise in one part of the sky, a prediction can be made that the moon will move across the sky and appear to set in a different portion of the sky; if the sun is observed to rise in one part of the sky, a prediction can be made about approximately where the sun will be at different times of day).
	b	Students use patterns related to the appearance of objects in the sky to provide evidence that future appearances of those objects can be predicted (e.g., when the sun sets and can no longer be seen, a prediction can be made that the sun will rise again in the morning; a prediction can be made that stars will only be seen at night).

1-ESS1-2 Earth's Place in the Universe

Students who demonstrate understanding can:

1-ESS1-2. **Make observations at different times of year to relate the amount of daylight to the time of year.** [Clarification Statement: Emphasis is on relative comparisons of the amount of daylight in the winter to the amount in the spring or fall.] [*Assessment Boundary: Assessment is limited to relative amounts of daylight, not quantifying the hours or time of daylight.*]

The performance expectation above was developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Science and Engineering Practices

Planning and Carrying Out Investigations

Planning and carrying out investigations to answer questions or test solutions to problems in K–2 builds on prior experiences and progresses to simple investigations, based on fair tests, which provide data to support explanations or design solutions.

- Make observations (firsthand or from media) to collect data that can be used to make comparisons.

Disciplinary Core Ideas

ESS1.B: Earth and the Solar System

- Seasonal patterns of sunrise and sunset can be observed, described, and predicted.

Crosscutting Concepts

Patterns

- Patterns in the natural world can be observed, used to describe phenomena, and used as evidence.

Observable features of the student performance by the end of the grade:		
1	Identifying the phenomenon under investigation	
	a	Students identify and describe* the phenomenon and purpose of the investigation, which include the following idea: the relationship between the amount of daylight and the time of year.
2	Identifying evidence to address the purpose of the investigation	
	a	Based on the given plan for the investigation, students (with support) describe* the data and evidence that will result from the investigation, including observations (firsthand or from media) of relative length of the day (sunrise to sunset) throughout the year.
	b	Students individually describe* how these observations could reveal the pattern between the amount of daylight and the time of year (i.e., relative lightness and darkness at different relative times of the day and throughout the year).
3	Planning the investigation	
	a	Based on the given investigation plan, students describe* (with support):
		i. How the relative length of the day will be determined (e.g., whether it will be light or dark when waking in the morning, at breakfast, when having dinner, or going to bed at night).
		ii. When observations will be made and how they will be recorded, both within a day and across the year.
4	Collecting the data	
	a	According to the given investigation plan, students collaboratively make and record observations about the relative length of the day in different seasons to make relative comparisons between the amount of daylight at different times of the year (e.g., summer, winter, fall, spring).