KINDERGARTEN: SUN AND ENERGY

Standards Bundle

Standards are listed within the bundle. Bundles are created with potential instructional use in mind, based upon potential for related phenomena that can be used throughout a unit.

K-PS3-1 Make observations to determine the effect of sunlight on Earth's surface. (SEP: 3; DCI: PS3.B; CCC: Cause/Effect) [Clarification Statement: Examples of Earth's surface could include sand, soil, rocks, and water.] [*Assessment Boundary: Assessment of temperature is limited to relative measures such as warmer/cooler.*]

K-PS3-2 Design and build a structure that will reduce the warming effect of sunlight on an area.* (SEP: 6; DCI: PS3.B; CCC: Cause/Effect) [Clarification Statement: Examples of structures could include umbrellas, canopies, and tents that minimize the warming effect of the sun.]

Content Overview'

This section provides a generic overview of the content or disciplinary core ideas as an entry point to the standards.

Through observations, students can see examples of sunlight heating different surfaces on Earth. Students then have opportunities to see how different materials can block the sun and reduce the warming of different surfaces.

Phenomena

Phenomena can be used at varying levels of instruction. One could be used to anchor an entire unit, while another might be more supplemental for anchoring just a unit. Please remember that phenomena should allow students to engage in the SEP and use the CCC/DCI to understand and explain the phenomenon.

- Sometimes the playground slide gets too hot to play on but the swings don't seem to get so hot.
- My grandma brings an umbrella to the beach and summer soccer games.
- I feel hot when playing on the blacktop but feel cool under the tree.

Storyline

This section aims to decode not only the DCI connections, but also the SEP and CCC in a detailed account of how they possibly fit together in a progression for student learning, including both rationale and context for the bundle.

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Planning and Carrying Out Investigations ● Make observations (firsthand or from media) to collect data that can be used to make comparisons. **Constructing Explanations and Designing Solutions** ● Use tools and materials provided to design and build a device that solves a specific problem or a solution to a specific problem.	**PS3.B: Conservation of Energy and Energy Transfer** ● Sunlight warms Earth's surface	**Cause and Effect** ● Events have causes that generate observable patterns.

Students are able to make observations of the sunlight's impact on different surfaces on Earth and then think about materials for designing a structure that would reduce this impact. In making observations, students can begin to explain phenomena like, "Why the ground is cooler in the shade than in the sun?"

In order for students to make a claim that sunlight warms the surface of the Earth, students must first be given opportunities to observe sunlight on a variety of surfaces (sidewalk, grass, T-shirts, playground toys). Students can then begin to identify patterns that might suggest a cause and effect relationship between the light and the temperature of the surface of objects. At this age, the crosscutting concept of cause and effect has students examining and analyzing patterns found in everyday life, and beginning to consider what might be causing these patterns. In order to do this students should be given experiences through simple investigations that allow them to gather evidence to support or refute their ideas about causes and ultimately lead them to identifying the pattern, "sunlight warms the earth's surfaces."

With an understanding that sunlight warms the Earth's surfaces, students can be given an opportunity to think about materials or structures, like umbrellas, that might reduce this warming effect. Students should be thinking about and/or discussing why they think a certain material or structure reduces the warming effect (i.e. It blocks the sun).

Formative Assessment

Formative assessment is crucial because all learners benefit from timely and focused feedback from others. It promotes self-reflection, self-explanation, and social learning. It can also make learning more relevant. Each of the questions below might be used throughout the formative assessment process. Specific prompts may focus on individual practices, core ideas, or crosscutting concepts, but, together, the components need to support inferences about students' three-dimensional science learning as described in a given bundle, standard or lesson-level performance expectation.

Resources to inform your formative assessment.

http://stemteachingtools.org/brief/30
http://stemteachingtools.org/brief/41
http://stemteachingtools.org/pd/sessionb

SEP Planning and Carrying Out Investigations

- Observe the temperature of a variety of surfaces after being in the sun for 30 minutes.

SEP Constructing Explanations and Designing Solutions

- Design a structure to keep your dog cool in the summer.

CCC Cause and Effect

- What makes the slide warmer than the bench under the tree?
- Where is it cooler, out on the baseball field or in the picnic shelter?

Performance Outcomes

These are statements of how students use knowledge and are similar to the standards in how they blend DCI, SEP, and CCC, but at a smaller grain-size. These are potential outcomes for instruction as it plays out in lessons and activities in the classroom. It is important to also think of these as smaller outcomes that build toward the larger goal of mastering the standards.

- **Make observations** and collect data to compare the *effect* of sunlight on different surfaces.
- **Communicate from observations** the *effect* of sunlight warming surfaces on Earth.
- **Design a structure** that will reduce the warming *effect* of sunlight on a surface. .