Unit 1 Energy (Sunlight)

Content Area: **Science**
Course(s): **Science K**
Time Period: **Marking Period 1**
Length: **MP 1**
Status: **Published**

Open Sci Ed

Lesson 1: Anchoring Phenomenon- How Do Things Feel Outside?

- Phenomenon- Some surfaces around our schoolyard feel hot and others feel less hot.
    - Make observations of how surfaces feel outside.
    - Gather what we notice and wonder about how things feel outside.
    - Read an infographic about surfaces.
    - Identify what we could investigate to help us answer our questions.

Lesson 2: Investigation- What is different about surfaces in sunny and shady places?

- Phenomenon- Surfaces in sunny places feel hot and surfaces in shady places feel less hot.
    - Read a book about how scientists make, record, and use observations.
    - Make observations outside of surfaces in sunny and shady places.
    - Analyze and interpret data to look for patterns in how surfaces feel in different places.

Lesson 3: Investigation- What patterns do we observe in how surfaces feel in sunny and shady places?

- Phenomenon- Dirt and sand in sunny places feel hotter than they do in shady places.
    - Read part of a book about other surfaces in sunny and shady places.
    - Make observations of how dirt and sand feel in sunny and shady places.
    - Share our observations with a partner.

Lesson 4: Investigation- Why do surfaces in sunny and shady places feel hot and less hot?

- Phenomenon- We can use patterns to figure out the cause of surfaces feeling hot or less hot.
    - Organize our class observations.
    - Analyze and interpret our class observations.
    - Read the rest of a book about other surfaces in sunny and shady places.
    - Revisit our questions to see what we have figured out.

Lesson 6: Anchoring Phenomenon- What problems can we solve about hot surfaces on the schoolyard?

- Phenomenon- Sunlight causes the blacktop to get hot, which makes it uncomfortable to play on.
    - Read a newspaper article about a community playground's problems.
    - Consider what kinds of problems can be solved with engineering.
    - Identify a problem to solve: sunlight causes the blacktop to get hot, which makes it uncomfortable to play on.
    - Brainstorm possible solutions and ask questions about our problem.

Lesson 7: Investigation- How can we plan to make the blacktop less hot?

- Phenomenon- We can create designs to block the sun from shining on the blacktop.
    - Read part of a book about how a designer plans a new playground.
    - Create a design plan to solve our hot blacktop problem.

- Compare and improve our design plans with a partner.

Lesson 8: Investigation- How can we build a design to make the blacktop less hot?

- Phenomenon- We can build designs to make the blacktop less hot.
  - Read part of a book about engineers planning and building their designs.
  - Use our design plans to build our designs.

Lesson 9: Investigation- How can we test our designs to see how they can make the blacktop less hot?

- Phenomenon- We can test designs that block the sun from shining on the blacktop.
  - Read part of a book about how engineers test their designs.
  - Recall how we tested dirt and sand to help us figure out how to test our designs.
  - Test our designs to see if they make the blacktop less hot.
  - Make observations about what worked and didn't work for designs and materials.

Essential Questions

- What are characteristics of the sun?
- Can structures reduce the warming effect of sunlight on Earth's surface?
- How does the sun make things hot?
- How does shade keep you cool?
- Why does it get cold in winter?
- Why do some surfaces get hot and how can we make them less hot?

Big Ideas

In this unit, students make observations to explore how sunlight warms the Earth's surface. The Sun's energy heats up pavement, keeps us warm, and can even melt marshmallows. Using what they learn, students think about ways shade and structures can reduce the warming effect of the Sun.

Science and Society

Horace-Bénédict de Saussure

A physicist and environmentalist from Switzerland who invented the first successful solar cooker, though at

the time he called it a "solar collector. "

Diversity Integration

Objective: Students will be able to relate how snowflakes are unique to how people are unique.

Activity: The students will listen to Snowflake Bentley on Bookflix. The teacher will lead a discussion about how people, like snowflakes, are all different but special in their own way. The students will create their own paper snowflakes and share them with the class.

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.

- With guidance, plan and conduct an investigation in collaboration with peers (for K). (INV-P1)
- Make observations (firsthand or from media) and/or measurements to collect data that can be used to make comparisons. (INV-P4)
- Make observations (firsthand or from media) and/or measurements of a proposed object, tool, or solution to determine if it solves a problem or meets a goal. (INV-P5)
- Make predictions based on prior experiences. (INV-P6)

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.

- Use tools and/or materials to design and/or build a device that solves a specific problem or a solution to a specific problem. (CEDS-P2)
- Generate and/or compare multiple solutions to a problem. (CEDS-P3)

Asking Questions and Defining Problems-

Asking questions and defining problems in K–2 builds on prior experiences and progresses to simple descriptive questions

- Ask questions based on observations to find more information about the natural and/or designed

world(s).

- Define a simple problem that can be solved through the development of a new or improved object or tool.

Analyzing and Interpreting Data-

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

- Record information (observations, thoughts, and ideas). (DATA-P1)
- Use and share pictures, drawings, and/or writings of observations. (DATA-P2)
- 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. (DATA-P3)
- Analyze data from tests of an object or tool to determine if it works as intended. (DATA-P5)

STEAM Activity: An Engineering Challenge- A Place in the Shade

- Objective- Students will demonstrate knowledge of the engineering and design process by creating a structure that provides shade.

Enduring Understandings

Next Generation Science Standards

K-PS3-Energy (Climate Change Standards)

- K-PS3-1: Make observations to determine the effect of sunlight on Earth's surface.

- K-PS3-2: Use tools and materials to design and build a structure that will reduce the warming effect of sunlight on an area.

K-2-ETS-1- Engineering Design

- K-2-ETS1-1: Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.

- K-2-ETS1-2: Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.

- Disciplinary Core Ideas (Climate Change Core Ideas)

  PS3.B- Conservation of Energy and Energy Transfer

- Sunlight warms Earth's surface. (K-PS3-1), (K-PS3-2)

ETS1.A: Defining and Delimiting an Engineering Problem

- A situation that people want to change or create can be approached as a problem to be solved through engineering.
- Asking questions, making observations, and gathering information are helpful in thinking about problems.
- Before beginning to design a solution, it is important to clearly understand the problem.

Cross-Cutting Concepts

Cause and Effect

- Events have causes that generate observable patterns. (CE-P1)

Patterns

- Patterns in the natural and human designed world can be observed, used to describe phenomena, and used as evidence. (PAT-P1)

Focus Areas

Knowledge

- How sunlight affects different surfaces on Earth. Use the terms warm, cool, and hot.

Skills

- Describe the sun’s characteristics
- Use tools and materials to design and build a structure that will reduce the warming effect of sunlight on an area. They will choose materials for their design that will create shade.
- Experiment with different types of materials (opaque, transparent, and reflective) to figure out how to reflect light.
- Compare the warmth of Earth materials placed in sunlight and the same Earth materials placed in shade.
- Observe the sun’s path in the summer and winter.

Understandings

- Make observations to determine the effect of sunlight on Earth’s surface.
- Understand that people use shade to keep cool.
- Realizing light from the sun keeps the earth warm.

- Determine the effect of sunlight on Earth materials by identifying patterns of relative warmth of materials in sunlight and shade (i.e, qualitative measures of temperature: e.g., hotter, warmer, colder).

CSDT Technology Integration

8.2.2.C.1: Brainstorm ideas on how to solve a problem or build a product.

8.2.2.D.1: Collaborate and apply a design process to solve a simple problem from everyday experiences.

8.2.2.ITH.3: Identify how technology impacts or improves life.

Resources

Primary Resources

- BrainPop, Jr.
- Mystery Science
- Open Sci Ed

Core Instructional Materials

- Mystery Science Anchor Phenomenon: Solar Sizzle
- Mystery Science "How Can You Warm Up a Frozen Playground?"
- Mystery Science "How Can You Walk Barefoot Across Hot Pavement Without Burning Your Feet?"
- Mystery Science “Why Does it Get Cold in Winter?”
- Mystery Science “Can You Use the Sun to Cook Food?”

Supplemental Instructional Materials

- Open SciEd Lessons 1-10
- Make Solar S’Mores Lab (Mystery Science)
- Where is it Warmer? Activity (Mystery Science)
- Can Animals Get a Sunburn Mini Lesson (Mystery Science)
- Black, White or Silver Activity (Mystery Science)

Climate Change

K-PS3-1: Make observations to determine the effect of sunlight on Earth's surface.

K-PS3-2: Use tools and materials to design and build a structure that will reduce the warming effect of sunlight on an area

- Activity: In this unit, students make observations to explore how sunlight warms the Earth's surface. The Sun's energy heats up pavement, keeps us warm, and can even melt marshmallows. Using what they learn, students think about ways shade and structures can reduce the warming effect of the Sun.