

1. Essential Element

Activity/Lesson Title: Seasonal Patterns of Daylight

EE.5.ESS1-2: Represent and interpret data on a picture, line, or bar graph to show seasonal patterns in the length of daylight hours

Teacher: Sam

Grade Level: 5

Student: Jason

Level: Precursor



2. Science and Engineering Practice

SEP 4: Analyzing and Interpreting Data

SEP description: Supports students as they represent data in graphical displays (bar graphs, pictographs and/or pie charts) to reveal patterns that indicate relationships in the natural world.

3. Disciplinary Core Idea

Earth and the Solar System

Core Idea description: The orbits of Earth around the sun and of the moon around Earth, together with the rotation of Earth about an axis between its North and South poles, cause observable patterns. These patterns include day and night, daily and seasonal changes in the length and direction of shadows, phases of the moon, and different positions of the Sun, Moon, and stars at different times of the day, month, and year.

4. Crosscutting Concept

Patterns

Concept Description: Similarities and differences in patterns can be used to sort, classify, communicate, and analyze simple rates of change for natural phenomena.

5. Linkage Level Descriptors

Initial: Order events in daily routines including sunrise and sunset.

Precursor: Recognize patterns about the length of daylight hours over time (e.g., week to week, month to month).

Target: Represent and interpret data on a picture, line, or bar graph to show seasonal patterns in the length of daylight hours.

6. Student's Typical Accessibility Supports

- Checklist of lesson activities
- Picture cards
- Written instructions
- Graphic organizers and data tables
- Oral directions

7. Student Prior Experiences, Prior Knowledge

- The student has previously identified patterns in how the moon, sun, and stars move through the sky.
- The student has learned about patterns in math class.
- The student loves to interact with his peers during lesson activities.
- The student is very engaged if a lesson takes place outside.

8. Phenomenon to Explore

Question: How does your shadow change throughout the day and why?

9. Possible Alternative Conceptions

Some students may think (incorrectly) that

- The Sun moves across the sky.
- The size of the shadow is based on the size of the object.
- Shadows aren't connected to a light source.
- The stronger the source of light the bigger the shadow, and the bigger the source of light, the smaller the shadow.
- The Sun goes behind the Earth once a day.
- The Earth spins on its axis once a day.
- Earth is closer to the Sun during summer and farther away during winter.
- Seasonal characteristics and change are the same everywhere on Earth.

10. UDL Options and Solutions to Potential Barriers

- Use interests and prior experiences to recruit interest in seasonal patterns.
- Display students' shadow measurements using media such as videos, pictures, text, and interactive whiteboards.
- Vary the ways that students can collect and display data.
- Use an appropriate number of observations (i.e., measurements) the student will be required to conduct.
- Use a first/then structure to establish goals for the lesson.
- Use an appropriate amount of class time to allow students to respond to each other.
- Use appropriately complex phenomena and questions.
- Use an appropriate amount of time for the student to adjust to the new materials or surroundings, especially if activities happen outdoors.
- Use the appropriate academic language and model less complex vocabulary using the students' communication system.

11. Engage

Think

- How can I make sure to access students' prior learning?
- How can I use the CCC to connect everyday language with the scientific language of the phenomenon?
- How can I support student participation by scaffolding the SEP?

Teacher Will

- Do shared reading with students using a book about shadows.
- Prepare word cards related to the text (sun, shadow, day).
- Ask students to associate word cards with the story.

Students Will

- Participate in shared reading.
- Use word cards (e.g., length, direction, color, shape, weight) to show an understanding of how shadows change during the day.

12. Explore

Think

- What is difficult or inaccessible about the phenomenon and how can I make it more accessible in the Explore phase?
- How can students collect data in a way that helps answer a scientific question?
- How can I stress students' careful observation and asking good questions vs. looking for only the "right answer"?

Teacher Will

- Assist students in investigating how shadows change indoors using objects and a light source.
- Support students outdoors as they trace their own shadows at different times during the day and measure the lengths of those shadows.
- Help students think about how the sun's position impacts how their shadows change.

Students Will

- Investigate shadows indoors using a light source and different objects placed at different lengths from the light source.
- Measure their own shadow lengths at different times during the day.
- Think about how the measurements changed based on where the sun is in the sky.

13. Explain

Think

- How can I help students connect science topics, phenomena, data, and everyday experiences? How can I help my students differentiate everyday language from scientific language? What reasoning helps students see or explain the invisible?

Teacher Will

- Ask students to describe what is occurring with their shadows throughout the day as the sun changes position in the sky.
- Support students with needed vocabulary.
- Assist students in measuring shadow lengths to describe patterns in how daylight hours are changing.

Students Will

- Complete a CER statement

Claim: My shadow length changes during the day because the Earth moves around the sun.

Evidence:

- » My shadow length changed based on where the sun was in the sky.
- » I read about how the Earth traveling around the sun changes how shadow lengths over the course of a day.

Reasoning: Shadows changing help me see that the Earth moves around the sun, causing sunrise and sunset to happen.

14. Elaborate

Think

- How can I enrich or extend student ideas? Are there related science concepts or processes that would support student learning?

Teacher Will

- Extend student understanding by having students measure their shadows in different locations outside to see if there are any changes in shadows at the same time of day in different locations.

Students Will

- Measure shadows in different locations during the same time of day to see how they are different or the same from their first measurements.

15. Evaluate

Think

- What do I need to see or hear from my students that assures that they have learned the science content? What information do I need to gather to inform my teaching as I move through the lesson?

Teacher Will

- Monitor students' responses to questions during the lesson; adapt the lesson as needed to address student ideas; administer a summative assessment.

Students Will

- Respond to questions posed by teacher, make measurements and observations, organize data they gather (measurement and comparison of shadows over time in a table), use word cards to label how shadows change during the day in a graphic organizer (changed, not changed, length, shape).
- Complete a CER statement using data as evidence, complete required assessments.