SPACE SYSTEMS: PATTERNS AND CYCLES (1.ES.NGSS)

UNIT AT A GLANCE

ACTIVITY 1 - Sky Watchers

QUESTIONS: What patterns can we discover when we observe the position of the sun in the sky throughout the day? How can we find out if the sun rises and sets at the same time each day?

Time to Complete

Preparation: 15–20 min.
Activity:
- Lesson 1A: 45–50 min.
- Lesson 1B: 45–50 min.
- Lesson 1C: 45–50 min.
- Data collection will be ongoing throughout the unit and year if possible.

Phenomena

It was dark (or light) when I woke up this morning.
The position of the sun in the sky changes throughout the day.

Summary: Students Will...

- collect data on the position of the sun when they get up in the morning, during the day, and at bedtime.
- share initial ideas about the changes in amount of daylight.
- use text to introduce sunrise and sunset as regularly occurring events and gather information about day and night.
- make observations to track the position of the sun throughout the day.

Students Figure Out How To:

- make observations and collect data on sunrise and sunset over a period of time.
- plan and carry out an investigation to find out if the time the sun comes up changes over a period of time.
- relate observations using Stellarium or other app to real-life observations.
- use information from text to uncover a pattern.

Practices

Planning and Carrying Out Investigations

Analyzing and Interpreting Data

Obtaining, Evaluating, and Communicating Information

Patterns

Performance Expectations (PE) at Lesson Level and Assessment

PE at Lesson Level

Use observations and text to collect data and gain information about day and night.

Formative Assessment

Class Discussion
Journal Entries
Science Talk
Activity Pages
T-chart

ACTIVITY 2 - Day and Night

QUESTIONS: How can we develop a model that explains how we experience day and night?
How do shadows change throughout the day?

Time to Complete

Preparation: 15–20 min.
Activity:
Lesson 2A: 45–50 min.
Lesson 2B: 45–50 min., 2–3 class periods

Phenomena

The sun appears to move across the sky. The morning sun is low in the sky in the east. The sun at noon is high in the sky overhead. The late afternoon sun is low in the sky in the west.
The size and shape of shadows change based on the time of day.

Summary: Students Will...

- use the digital app Stellarium to observe the different positions of the sun in the sky throughout the day.
- develop a model to explain the pattern of day and night.
- trace and measure shadows in the morning, noon, and afternoon.
- collect data from shadow measurements.

Students Figure Out How To:

- make observations of the position of the sun using a digital display and recognize a regular pattern from day to day.
- develop a model using their bodies, a lamp, and an Earth sign that explains how we get a pattern of day and night.
- interpret data to determine the effect of the position of the sun on shadows.

Practices

Planning and Carrying Out Investigations

Analyzing and Interpreting Data

Patterns

Cause and Effect

Performance Expectations (PE) at Lesson Level and Assessment

PE at Lesson Level
Use information from text and observations to develop a model of how we get day and night.
Formative Assessment
Science Talk
Summative Assessment
Journal Entries
Engineering Project

ACTIVITY 3 - Observing the Moon

QUESTIONS: How does the shape of the moon seem to change over time?
How can we determine if the shape of the moon occurs in a pattern?

Time to Complete

Preparation: 20–30 min.
Activity:
Lesson 3A: 45–50 min., 2 class periods
Lesson 3B: 45–50 min., 2–3 class periods
Lesson 3C: 45–50 min., 2 class periods

Phenomena

The moon appears to change shape and position in the sky.

Summary: Students Will...

- raise questions about the changing appearance of the moon through text.
- make observations of the moon to determine patterns in the shape.
- determine that the moon is a sphere and the shape we see is the lit part of the moon.

Students Figure Out How To:

- develop a model that explains the pattern in the shape of the moon.
- compare two texts to gather information that explains why the moon appears to change shape.
- use what they know about the rotation of the earth to explain why the moon appears to move across the sky.

Practices

Obtaining, Evaluating, and Communicating Information

Analyzing and Interpreting Data

Developing and Using Models

Patterns

Performance Expectations (PE) at Lesson Level and Assessment

PE at Lesson Level
Use information from text to develop a model that demonstrates the regularly occurring pattern of the shapes of the moon.
Formative Assessment
Science Talk
Journal Entry
Summative Assessment
Student Models
Journal Entry

ACTIVITY 4 - A Look at the Stars

QUESTIONS: How do the stars appear to move across the sky?

Time to Complete

Preparation: 15–20 min.
Activity 4:
Lesson 4A: 50–55 min.
Lesson 4B: 50–55 min.

Phenomena

The stars appear to move across the sky. After sunrise the only star that is visible is the sun.

Summary: Students Will...

- use the digital app Stellarium to observe the different positions of the stars throughout the night.
- develop a model to explain the seasonal observations of stars.
- create their own constellation using a star chart.

Students Figure Out How To:

- use observations to collect information about the changing of position of the stars.
- use a model to explain how positions of the stars change throughout the seasons.
- create a constellation with a story.

Practices

Obtaining, Evaluating, and Communicating Information

Developing and Using Models

Patterns

Performance Expectations (PE) at Lesson Level and Assessment

PE at Lesson Level
Use observations and a model to explain how the stars appear to move across the sky.
Summative Assessment
Science Talk
Journal Entry

ACTIVITY 5 - Making Sense of Our Data

QUESTIONS: How do the sun, moon, and stars appear to move across the sky in a pattern?

Time to Complete

Preparation: 10 min.
Activity 5:
Lesson 5A: 50–55 min.,
2 class periods

Phenomena

The sun, moon, and stars appear to move across the sky in a pattern.

The amount of daylight hours changes with the seasons.

Summary: Students Will...

- use data from observation logs to recognize patterns and develop explanations.

Students Figure Out How To:

- analyze data from *Where Is the Sun?* data to explain how the amount of daylight hours changes with the seasons.
- Use the *Moon Observation Log* to recognize patterns in shapes and position in the sky.

Practices

Analyzing and Interpreting Data

Patterns

Cause and Effect

Performance Expectations (PE) at Lesson Level and Assessment

PE at Lesson Level
Analyze data to explain patterns in the position of the sun, moon, and stars and the changes in the amount of daylight hours through the seasons.
Summative Assessment
Science Talk
Journal Entry

