Unit 3- Space: Sky Patterns

Content Area: **Science**
Course(s): **Science 1**
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Open Sci Ed

Lesson 1: Anchoring Phenomenon- Where is the Sun in the sky today?

- Phenomenon- The Sun appears in the sky in a location that we can observe and record.
    - Read a book and share noticings and wonders about sky-related phenomena.
    - Begin Our Experiences chart to connect to our experiences with these sky-related phenomena.
    - Make and record observations of the Sun's location in the sky.
    - Compare our observations on our Sun Observations chart and decide we need a common reference point on the ground.

Lesson 2: Investigation- Where is the Sun in the sky throughout the day?

- Phenomenon- The Sun appears in different locations in the sky throughout the day.
    - Make and record observations of the Sun's location in the sky in the morning, at midday, and in the afternoon.
    - Place sticky notes on our Sun Observations chart each time and use these many observations to record one consensus observation.
    - Compare consensus observations and record what we figure out on Our Growing Ideas chart.

Lesson 3: Investigation- Do the Sun's different locations in the sky repeat?

- Phenomenon- Each morning, the Sun appears in a different location in the sky than each afternoon.
    - Make observations of the Sun's location in the sky (morning, afternoon) and add consensus observations to our Sun Observations chart.
    - Read a book about how scientists make claims and support them with evidence.
    - Use voting to notice our changing claims about the lesson question as we gather more evidence.

Lesson 4: Investigation- What happens to the Sun in the sky between morning and afternoon?

- Phenomenon- The Sun appears to move across the sky.
    - Make and compare observations of the Sun in the sky using photographs.
    - Use observations to describe the pattern of the Sun's changing locations and how it seems to move across the sky in an ongoing path.

- Read a book to find out how patterns can help us know what will happen next.

Lesson 6: Investigation- Does the Moon appear to change locations in the sky and, if so, how?

- Phenomenon- The Moon appears in different locations in the sky.
    - Make, compare, and record observations of the Moon in the sky. Compare patterns of the Moon and Sun.
    - Use observations to describe the pattern of the Moon's changing locations and how it seems to move across the sky in an ongoing path.
    - Read a book to connect to how a photographer observes the Moon.

Lesson 7: Putting Pieces Together- What makes it daytime or nighttime?

- Phenomenon- Daytime and nighttime skies are different.
    - Use observations of images to identify different types of evidence related to daytime and nighttime, and co-construct a Daytime and Nighttime Evidence chart.
    - Return to our book about how scientists use the best evidence to support claims.
    - Individually support claims about nighttime using the best evidence.

Lesson 8: Investigation- How long are daytime and nighttime, and are they always the same?

- Phenomenon- Some days have longer (more hours of) daytimes than others.
    - Count the number of daytime and nighttime hours on a specific day and compare these across 2 different days.
    - Make and use a class graph to compare and analyze daytime lengths on these 2 days.
    - Read a newspaper article about other students' observations and add sunrise and sunset to our graph.

Lesson 9: Investigation- When are daytimes shorter and longer?

- Phenomenon- Daytimes can be shorter and longer.
    - Count and color the hours of daytime for a day in 1 month.
    - Make and use a class graph (Monthly Daytime Graph) to compare and analyze daytime lengths across all 12 months.
    - Use an infographic to relate our data to seasonal patterns in daytime length.

Essential Questions

- What is the pattern of the sun's movement?

- How does the Sun make shadows change?
- In which directions does the Sun move?
- Does the Sun always move the same way every day?
- Why do we only see stars at night?
- Can stars help us if we don't know where to go at night?
- How do patterns of the sun, moon and stars affect what we see in the sky and our everyday events?
- What are the patterns of the moon?
- Where do the stars go during the day?

Big Ideas

In this unit, students explore the Moon and stars. They observe and record the appearance of the Moon to determine its cyclical pattern. They also determine why stars are only visible at night. Students will also make observations of the Sun and shadows throughout the day and across the seasons. They use their observations to understand patterns that occur throughout the day. Students begin by noticing and wondering about these phenomena. They make observations of the Sun in the sky to identify patterns in its changing locations and use these to support claims about the Sun's predicted location in the sky. Students use images and video of the Moon and describe the same pattern of apparent motion as the Sun. Students make observations of the sky and objects in it to describe patterns of what makes it daytime or nighttime. Finally, students describe patterns in the length of daytime and nighttime on different days, figuring out that daytimes are shorter or longer in different seasons because of changing sunrises and sunsets. They use these patterns to support claims about the season in which specific morning/evening events occur.

Cross-Curricuar Integration

Integration Area: Mathematics

- MP.2- Reason abstractly and quantitatively. (1-ESS1-2)
- MP.4-Model with mathematics. (1-ESS1-2)
- MP.5- Use appropriate tools strategically. (1-ESS1-2)
- 1.OA.A.1- Use addition and subtraction within 20 to solve word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using objects, drawings, and equations to represent the problem. (1-ESS1-2)
- 1.MD.C.4- Organize, represent, and interpret data with up to three categories; ask and answer questions about the total number of data points, how many in each category, and how many more or less are in one category than in another. (1-ESS1-2)

Activity:

Students will complete a graph of their favorite seasons

Integration Area: English Language Arts

• W.1.7 Participate in shared research and writing projects (e.g., explore a number of “how-to” books on a given topic and use them to write a sequence of instructions). (1-ESS1-1), (1-ESS1-2)

• W.1.8 With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question. (1-ESS1-1), (1-ESS1-2)

CSDT Technology Integration

8.1.2.IC.1: Compare how individuals live and work before and after the implementation of new computing technology

Activity: Students will watch the first moon landing video.

Climate Change

Social Studies: Cross-Curricular
6.1.2.Geo.HE.1: Explain how seasonal weather changes, climate, and other environmental characteristics affect people's lives in a place or region.
6.1.2.Geo.HE.2: Describe how human activities affect the culture and environmental characteristics of places or regions (e.g., transportation, housing, dietary needs).
6.1.2.Geo.HE3: Identify cultural and environmental characteristics of different regions in New Jersey and the United States.
6.1.2.Geo.HE.4: Investigate the relationship between the physical environment of a place and the economic activities found there.

- Activity: In this unit, students will learn about why the sun sets later in the summer time. The students will listen to the Mystery Science guided story and then they will complete the interactive worksheet.

Science and Engineering

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.

Analyzing and Interpreting Data

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

Science and Society

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NASA's Chief Engineer for the Propulsion Test Directorate at Stennis Space Center.

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NASA design engineer for hardware and software automated systems who reviews, designs, builds, tests and implements engineering designs used in the Space Shuttle and Payload Operations Development Laboratories.

STEM/STEAM

PROBLEM-BASED LEARNING: (Day Patterns Unit) - Students develop a model of the sun's daily path across the sky, then use this model to help someone who's lost. Students create a mobile paper model of the sun and earth to illustrate the position of the sun throughout the day.

PROMOTING EMPATHY: Students develop a model of the sun's daily path across the sky, then use this model to help someone who's lost.

SUPPORT EDI: Students discuss how the moon is in the same phase no matter where you are in the world. Students also discuss how the sun always rises and sets in the same direction every day all over the world. Mystery science discusses

INTERDISCIPLINARY PROJECT:

In this unit, students make observations of the Sun and shadows throughout the day and across the seasons. They use their observations to understand patterns that occur throughout the day.
Students will also explore the Moon and stars. They observe and record the appearance of the Moon to determine its cyclical pattern. They also determine why stars are only visible at night. Students will apply what

they learned over the course of this unit to predict when the Sun, Moon, and stars will be visible in the sky. Students will be able to move the source of light to create different shadows given to them. They will then determine where the sun needs to be in the sky to create certain types of shadows ie: longer, shorter, left, right, etc. Students relate these observations to shadows changing throughout the day and the Sun's position moving across the sky. Students will trace their shadows in the morning and watch how they change throughout the day. Students will gather observations of the Sun from that single location. They will see that the Sun follows a repeating pattern in its apparent motion, and then use that pattern to predict the location of the Sun at various times of day in the future. Afterwards, they will use what they learned about the sun's movement during different times of the day to develop a model of the sun's daily path across the sky, then use this model to help someone who's lost. Students create a mobile paper model of the sun and earth to illustrate the position of the sun throughout the day.

They will determine where the sun is at certain times of the day in order to have them follow the sun to get to their destination.

students explore all of the different shapes of the Moon that can appear on different nights.Students will keep track of the moon each night for an entire month. They will document what it looks like on day 3, 7, 11, 14, 17, 21, etc. They use these observations to discover patterns in how the Moon's shape changes and predict when the next full moon will appear. Students will also investigate why the stars are visible at night but disappear when the Sun comes out during the day by creating a Star Projector. Students will use paper cups to project stars onto a sky picture, and observe what happens to these stars when a flashlight acts as a model of the Sun.
Analyzing and Interpreting Data
Planning and Carrying Out Investigations
Developing and Using Models
Constructing Explanations and Designing Solutions
Obtaining, Evaluating, and Communicating Information
Engaging in Argument from Evidence
Real World Connections
Station Teaching
Project Based learning
Foster Design Thinking
Promoting Empathy
Support EDI
Students discuss how the moon is in the same phase no matter where you are in the world. Mystery science discusses how one person might be in New Jersey, but their friends in Australia and California are also looking at the same phase of the moon. Students also discuss how the sun always rises and sets in the same direction every day all over the world. Mystery science discusses how you can follow the sun if you are ever lost and uses different cities around the world to explore shadows of each city's tourist attraction.

Enduring Understandings

New Jersey State Learning Standards

Earth's Place in the Universe

1-ESS1-1 Use observations of the sun, moon, and stars to describe patterns that can be predicted.

- 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

1-ESS1-2 Make observations at different times of year to relate the amount of daylight to the time of year.

- ESS1.B: Earth and the Solar System Seasonal patterns of sunrise and sunset can be observed, described, and predicted.

Cross Cutting Concepts

- Patterns-Patterns in the natural world can be observed, used to describe phenomena, and used as evidence. (1-ESS1-1), (1-ESS1-2)

Connection to Nature of Science

Scientific Knowledge Assumes an Order & Consistency in Natural Systems

- Science assumes natural events happen today as they happened in the past. (1-ESS1-1)
- Many events are repeated. (1- ESS1-1)

Focus Areas

Knowledge

- How the Sun appears to travel across the sky and that this is due to the Earth's motion, not the Sun's.
- The Moon appears to grow and shrink in the sky based on how much reflected sunlight we can see.
- The four cardinal directions.
- Moons are objects that revolve around planets.
- The Moon shines because it is reflecting sunlight.
- Because the Sun is so close, its brightness keeps us from seeing other stars during the day.
- Seasons are caused by the Earth's tilt.
- The Sun appears to be higher in the sky during the summer and lower in the winter.

Skills

- Make predictions about the Sun's location at various times of the day.
- Label a compass rose.
- Explain how moons are different than planets.
- Make predictions about the Moon's phases.
- Explain how the Sun's presence during the day keeps other stars from being seen.
- Explain how the Earth's tilt causes the seasons.
- Compare and contrast the Sun's location in the sky during the summer and winter months.

Understandings

- Use observations of the sun, moon, and stars to describe patterns that can be predicted.
- Make observations at different times of year to relate the amount of daylight to the time of year.

Resources

Primary Resources

- Mystery Science
- OpenSci Ed

Scientific Inquiry

Core

- Could a Statue's Shadow Move
- What does your shadow do when you're not looking (Mystery Science)
- How Can The Sun Help You If You Are Lost? (Mystery Science)
- Why do you have to go to bed early in the summer
- Why do Stars Come Out at Night? (Mystery Science)
- How Can Stars Help You If You Are Lost? (Mystery Science)

Supplemental

- Four Seasons Activity
- Reasons for the Seasons Activity
- All About the Sun
- All About the Moon
- Moon Phases Activity
- All About Stars
- Space Fact Craft
- Neil Armstrong DBQ