Introduction to the Solar System: Patterns of the Sun, Moon, and Stars

Experience

Grade Range: Elementary

Lesson Time: 40 minutes

Key Terms Defined	
Crescent	Orbit
Eclipse	Phases
Full Moon	Planet
Gibbous	Solar eclipse
Lunar eclipse	Waning
New Moon	Waxing

Materials and Resources
Masking tape (optional)
Day and night signs (optional)
Introduction to the Solar System: Patterns of the Sun, Moon, and Stars Worksheet
Colored pencils, crayons, or markers (optional)

Activity Overview

Every day, the Sun shines. Every night, the stars twinkle. But the Moon's appearance in the sky is much harder to predict. Sometimes you see the Moon during the day, and other times you see it at night. On top of that, the Moon's shape seems to constantly be changing. You may see a full Moon, a thin crescent, or something in between. And a few times a year, you may even see a lunar or solar eclipse. What causes this to happen? In this activity, students will observe the motion of the Sun, Moon, and stars. Students will identify their patterns of motion and make predictions about the future appearances of these objects in the sky.

Essential Questions

1. What is the universe, and what is Earth's place in it?
2. What are the predictable patterns caused by Earth's movement in the solar system?

Objectives

- Observe the motion of the Sun, Moon, and stars in the sky
- Use graphical displays to organize and record data from those observations
- Identify and describe patterns in the data
- Use the identified patterns to provide evidence that future appearances of those objects can be predicted

Introduction

To begin, have students participate in a quick, interactive learning activity, called "Pick a Side." To prepare, divide the classroom in half by placing a long piece of masking tape on the floor and post "Day" and "Night" signs on opposite sides of the room. Have students line up along the front wall. Explain to the students that you are going to ask a few questions. After each question, they should move to the side of the room that represents their answer: day or night. Then ask the following questions:

- When do you see the Sun? (All students should move to the day side.)
- When do you see the stars? (All students should move to the night side.)
- When do you see the Moon? (Students may split up between the two sides, or they may all move to the night side—which is a misconception.)

Use the students' responses to the third question to start a discussion about the differences in the Moon's appearance and shape. Tell students that they are going to investigate the motion of the Sun, Moon, and stars to see if they can figure out why this happens.

Teacher Note: The Solar System experience utilizes advanced vocabulary targeted for middle and high school students. Feel free to make adjustments as necessary so that elementary students can benefit from the experience as well. For example, elementary students can use the text to speech function for the notebook or observe the models and animations only.

Activity

1. Open the Introduction to the Solar System experience.
2. Complete the Introduction to the Solar System: Patterns of the Sun, Moon, and Stars Worksheet as you work through the activity.
3. Observe the Sun and stars.
    a. Select Sun on the opening screen.
        i. Select Sun again.
            1. Observe the Sun, our closest star.
            2. Compare the size and brightness of the Sun and the other stars.
4. Observe Earth and its movement.
    a. Select Sun on the opening screen.
        i. Select Orbit.
            1. Locate Earth, the third planet from the Sun.
            2. Observe how the Earth moves around the Sun.
    b. Select Earth on the opening screen.
        i. Select Day and Night.
            1. Spin the Earth to observe what causes day and night.
            2. Observe which side of the Earth is experiencing day and which side is experiencing night.
5. Observe the Moon and its phases.
    a. Select Moon on the opening screen.
        i. Select Moon again.
            1. Observe the Moon.
            2. Notice the craters and other surface features of the Moon.
        ii. Select Moon Phases.
            1. Select the Play button to observe what causes the Moon's phases.
            2. Move the Moon around the Earth.
            3. Observe the Moon's eight phases as seen from Earth (bottom corner).
6. Observe lunar and solar eclipses.
    a. Select Moon on the opening screen.

i. Select Eclipses.
    1. Select the Play button to observe what causes lunar and solar eclipses.
    2. Move the Moon around the Earth.
    3. Notice the location of the Moon during lunar and solar eclipses.
    4. Observe the lunar and solar eclipses as seen from Earth (bottom corner).

Teaching Tips

While students are engaged in the experience,

1. Circulate to see if they need any help with the vocabulary or interactive features.
2. Encourage them to talk with their partners about their observations and discoveries.
3. Remind them to record their observations and answer questions on the provided worksheet.

Closing

Questions for Discussion:

1. Why can we see the Sun only during the day and the stars only at night?
2. Why can we see the Moon sometimes during the day and other times at night?
3. What causes the phases of the Moon?
4. What causes lunar and solar eclipses?

Extension Activities:

- Students can observe the Moon and stars through a telescope
- Students can observe and record the shape of the Moon on a monthly calendar
- Students can replicate Moon phases and eclipses using a globe (earth), golfball (Moon), and flashlight (Sun)

Related zSpace Activities:

- *Idea Sheet: Moon* - StudioA3
- *Lunar and Solar Eclipse* - StudioA3
- *Moon Exploration* - StudioA3
- *Sun Exploration* - StudioA3

Differentiation

- Group students heterogeneously to allow students with a strong command of the English language to assist in reading or interpreting questions
- Provide paper copies of diagrams for students to use as a reference
- Provide a handout with a list of vocabulary terms and definitions that will appear in the experience
- Allow students to provide answers that are handwritten, typed, or verbal
- Allow students to use text to speech to move through the experience
- Give students a variety of presentation styles to choose from (using charts/graphs, creating slideshows, making 3D presentations, creating videos/movies, making posters)
- Have students work as partners or in small groups (younger children could partner with older buddies)
- Enrichment: Students could learn about famous astronomers or constellations
- Enrichment: Students could research NASA expeditions to the Moon
- Enrichment: Students could build a model of the Earth, Sun, and Moon that shows their patterns of movement