LESSON 1: EXPLORING OUR SOLAR SYSTEM

Module 2: **Life in Space: Imagine, Explore, Discover!**

OVERVIEW	In this lesson, students will begin exploring the solar system and learning about the planets. They will use language skills to describe the planets and other objects in our solar system, practicing speaking and listening as they share their ideas with their peers. Through hands-on activities, students will explore the solar system by creating their own model of the planets and learning how they move around the Sun. Note that Activity 1 and 2 are not sequential; you can choose to do one or both activities as time allows. **Duration: 60-90 minutes.**
SUCCESS CRITERIA	• Students can describe the planets in our solar system. • Students will be able to recognize that our solar system is part of a larger group of stars and other solar systems called a galaxy (The Milky Way). • Students can share what they know about our solar system. • Students can name at least three planets in our solar system. • Students can explain that planets move around the Sun. • Students can describe key characteristics of other planets in the Solar System. • Students can explain one way scientists explore our solar system and beyond (e.g., telescopes, satellites, rovers).
NGSS STANDARDS	• 1-ESS1-1 Use observations of the Sun, Moon, and stars to describe patterns that can be predicted. • Crosscutting Concept: *Patterns*. Observed patterns of forms and events guide organization and classification, and they prompt questions about relationships and the factors that influence them. • Crosscutting Concept: *Scale, proportion, and quantity*. In considering phenomena, it is critical to recognize what is relevant at different measures of size, time, and energy and to recognize how changes in scale, proportion, or quantity affect a system's structure or performance.

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AZ STATE STANDARDS

Kindergarten:

- Core Ideas for Knowing Science: Earth and Space Science--E2: The Earth and our solar system are a very small part of one of many galaxies within the Universe.
- K.E2U1.5 Observe and ask questions about patterns of the motion of the sun, moon, and stars in the sky.

First Grade

- Core Ideas for Knowing Science: Earth and Space Science--P2: Objects can affect other objects at a distance.

Second Grade

- Core Ideas for Knowing Science: Earth and Space Science--E2: The Earth and our solar system are a very small part of one of many galaxies within the universe.

MATERIALS

- Books or videos about the Solar System and the Milky Way Galaxy
- Model of the Solar System
- Solar system pictures or posters
- Solar system songs (optional)
- Styrofoam balls or air dry clay (to create planets)
- Paint and paint brushes
- Paper
- Art materials (markers or crayons)
- Large space (indoors or outdoors)

VOCABULARY

- **Solar System** - A group of planets, moons, and other space objects that orbit around the Sun. Our Solar System includes eight planets, the Sun, and many moons and asteroids.
- **Planet** - A large, round object that moves around a star, like the Earth moving around the Sun.
- **Galaxy** - A huge group of stars, dust, and planets all spinning in space and held together by gravity. We live in a galaxy called the Milky Way, filled with billions of stars—including our own Sun!
- **The Milky Way Galaxy** - Our home in space! It's a giant group of stars, planets, and clouds of space dust all held together. Our solar system, which includes the Sun, Earth, and all the other planets, is located inside the Milky Way Galaxy.

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VOCABULARY

- **Orbit** – The path a planet or moon takes as it moves around the Sun or another space object.
- **Sun** – A giant, hot star at the center of our Solar System that gives us heat and light.
- **Moon** – A round object that moves around a planet. Earth has one moon, but other planets have many moons.
- **Earth** – The third planet from the Sun and the only planet known to support life. It has water, air, and land.
- **Mercury** – The closest planet to the Sun and the smallest in our Solar System. It has very hot days and freezing nights.
- **Venus** – The second planet from the Sun, covered in thick clouds. It is the hottest planet in our Solar System.
- **Mars** – The fourth planet from the Sun, known as the "Red Planet" because of its reddish color. Scientists think it might have had water long ago.
- **Jupiter** – The fifth planet from the Sun and the largest in our Solar System. It has a big storm called the Great Red Spot and many moons.
- **Saturn** – The sixth planet from the Sun, famous for its bright rings made of ice and rock.
- **Uranus** – The seventh planet from the Sun, which spins on its side and has a blue-green color.
- **Neptune** – The eighth and farthest planet from the Sun, known for its strong winds and deep blue color.

LESSON PROCEDURE

Introduction to Space (10 minutes)

- Say to the students, “Today, we are going to learn about where we live! Can anyone tell me where we live?
- Have a short discussion about a galaxy, suns (stars), planets, and the moons.
- Show the class a picture of the Milky Way Galaxy, which pinpoints our sun and solar system.
- Say to the students: "Can anyone tell me what the solar system is?"
- Briefly explain that the solar system is made up of the Sun and all the planets that travel around it. Show a poster or images of the solar system.
- Show the class the model of the solar system and point to the different planets. Demonstrate how the planets move in orbits, which are like paths they follow around the Sun.
- Ask questions like,
  - “What do you know about these planets?”
  - “What do you think is on the planets?”
  - “Is there anything in space besides the planets?” (Stars/Suns, asteroids, etc.)
  - Where do we live?

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LESSON PROCEDURE

- For older students, explain that this model of the solar system is not to scale.
  - In reality, the sun is much bigger than any of the planets - if the sun is the size of a basketball, Jupiter would be the size of a marble, and Earth would be the size of a pebble.
  - The planets are also much farther apart - at the scale of the sun being a basketball, the Earth would be 85 feet away (about the length of a bowling lane, or two buses back-to-back)

Learning About Planets (15 minutes)

- Say to the students: "There are many planets in our solar system. Some planets are really big, and some are small. Some are really hot, and others are very cold."
- Watch videos or read books about the planets of the solar system.
- After introducing each planet, ask students to describe it. For example:
- "What color is Mars?"
- "Is Venus a hot planet or a cold planet?"
- Use descriptive vocabulary words (e.g., big, small, red, cold, etc.) to help students describe the planets.

Activity: Create a Solar System Model and Planet Race (35 minutes)

- Say to the students: "Let's make our own solar system! We will make planets and see how they move around the Sun."
- Paint a Planet:
  - Step 1: Give each student a Styrofoam ball and let them choose a planet to recreate.
  - Step 2: Have them paint their planet and describe their planet as they are painting it. (e.g., "Saturn has rings!" or "Earth is blue and green because of the oceans and land!"). For students who have chosen a planet with rings, you might use a piece of paper or pipe cleaner to represent the rings.
- Say to the students: "Now lets have our planets orbit around the Sun! See how they move in a circle, and remember, they all follow their own special paths."
- Planet Race:
  - When students finish painting their planet, discuss the planets' order and help students arrange their planets in the correct sequence around the Sun. For example: "Mercury is closest to the Sun, then Venus, then Earth..." Note that you will have multiple students with the same planet that will be grouped together.
  - Have students stand in a circle around the "Sun." This can be the teacher, a student, or a piece of paper.

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LESSON PROCEDURE	◦ Each student will hold their planet (the Styrofoam ball or playdough) ◦ Say to the students: "Let's race! Move your planet in a circle around the Sun, just like how they do in space!" ◦ Play some fun music while the students move around in circles, simulating the planets orbiting the Sun. **Sharing - Describing Planets (10 minutes):** • After students have finished creating, ask them to share their planets with the class. • Say to the students: "Now, let's share our planets! Can you tell us what your planet is like?" • Use sentence starters to help guide their descriptions: ◦ "My planet is ___. It is a ___ planet." ◦ "My planet has ___. It is ___." • Encourage students to listen to each other's descriptions and ask questions (e.g., "What is the weather like on your planet?"). **Reflection and Wrap-Up (5 minutes):** • Ask students to reflect on what they learned today. • Say to the students: "What is one thing you learned about space today?" • Ask students to give a thumbs-up or raise their hands to share what they remember. • Reinforce the key learning points, such as the different types of planets and the idea that space is vast and full of amazing things to discover.
EXTENSION AND TAKE-HOME ACTIVITIES	• Introduce a writing prompt where students can describe one planet in detail (e.g., "I think Jupiter is cool because it's really big and has a Great Red Spot."). • Print some NASA planet coloring pages (https://spaceplace.nasa.gov/coloring-pages/en/). Have them color and read the facts aloud with their parents' or teacher's help. • Check out more Solar System resources and facts on NASA Space Place (https://spaceplace.nasa.gov/menu/solar-system/). • **Take-Home Activity:** Ask students to draw or color their favorite planet at home and share what makes it special.

This module was created by Angela Cisnero, a kindergarten educator at Pueblo Elementary in Tucson, AZ, in collaboration with the Arizona Astrobiology Center. It is supported and distributed by the University of Arizona's Astrobiology Center with funding from the Marshall Foundation, Tucson, AZ. For more information, contact Lauren James at laurenjames@arizona.edu. Lesson kits are available for checkout from the Arizona Astrobiology Center - https://astrobiology.arizona.edu/