DIVISION OF AGRICULTURE
RESEARCH & EXTENSION
University of Arkansas System

STEM: THE SOLAR SYSTEM

NEXT GENERATION SCIENCE STANDARDS

The Next Generation Science Standards (NGSS) are a comprehensive guide for K – 12 STEM science content standards. The Framework lays out the STEM skills young people should have as they move through the K – 12 school system. This STEM Activity Lesson is designed to integrate the Next Generation Science Standards. For more information and to find all of the standards visit: https://www.nextgenscience.org/

NGSS FOR THIS ACTIVITY LESSON

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Developing and Using Models	ES S2.A: Earth's Materials and Systems	Stability and Change
Developing and Using Models	ES S1.A: The Universe and Its Stars	Patterns Connections to Nature of Science
Developing and Using Models	ES S1.B: Earth and the Solar System	Patterns Connections to Nature of Science

*To see the full standard visit: https://www.nextgenscience.org/pe/ms-ess2-1-earths-systems and https://www.nextgenscience.org/pe/ms-ess2-1-earths-systems

BIG IDEAS

WHAT WILL STUDENTS LEARN ABOUT THE SOLAR SYSTEM?

- Define space and what the solar system is
- Learn the names of all of the planets
- Learn the basics of the rotating movement in the solar system
- Define orbit and how it works in the solar system
- Understand an axis and what happens when planets spin faster or slower

SUPPLIES & PREPARATION

SUPPLIES

- The Magic School Bus Lost In The Solar System by Joana Cole, Bruce Degen (you can also watch the episode of The Magic School Bus titled *The Magic School Bus Gets Lost in Space*, available on Netflix)
- There's No Place Like Space! By Tish Rabe (you can also access this book through this YouTube reading: https://youtu.be/WOiFF6xOwXg)
- Chart paper
- Planet cut-outs or pictures of the planets to show the youth, use these here: https://drive.google.com/drive/folders/17hem_TdITj6kedOoQnkHI6EtuXBuwQpZ?usp=sharing

ENGAGE THE STUDENTS

1. Begin by playing the "International Space Station Dinner" icebreaker game
    a. All students should sit in a circle
    b. First player begins by saying "On the Space Station, I like to eat…" and fills in their favorite food (example: hamburgers)
    c. the next player must repeat, "On the Space Station, I like to eat hamburgers and…" (example: salad)
    d. this continues all the way around the circle with each player reciting the dishes in the exact order they have been said and then adding their favorite dish to the end of the list
    e. if a player forgets a dish or gets them out of order, he or she must drop out of the circle and the game continues
    f. the last person in the circle must recite the full list of dishes

EXPLORE & EXPERIMENT

- Introduce this space themed lesson to students by reading the fun, rhyming book There's No Place Like Space! By Tish Rabe to the students
    - review the glossary terms with the students and the words to your Rocket Ship Word Bank chart
    - ask the students to write down (on a sticky note) the thing that they are most excited about learning about the solar system
    - have each student place the sticky note on a piece of chart paper (or on a white board, sectioned of piece of wall, etc.)
        - each time you cover a topic that a student was interested in you can have that student put a check mark over the sticky note or take the note off the wall
        - in this way, the students visually see what they are learning and when you're finished you can address any lingering sticky notes that were not covered; these can be looked up by you or have the students complete research on the topic
- Next, read The Magic School Bus Lost In The Solar System by Joanna Cole, Bruce Degen or watch the episode of the The Magic School Bus Gets Lost in Space (available on Netflix) – if reading the book, be sure to read all of the book reports and speech bubbles on the pages, these provide definitions of certain things and more facts about the solar system
    - Comprehension questions for the students:

        - **These are focused on the solar system information found within the book that the students will be learning more about in future lessons**
        - Define the solar system. (pg. 4)
        - What makes day and night? (pg. 7)
        - Did Arnold weigh more or less when he was on the moon? (pg. 12)
        - How hot is the sun? (pg. 15)
        - What broke Ms. Frizzle's tether line? (pg. 25)
        - Did Jupiter have any solid ground to land on? Why or why not? (pg. 27)
        - Which planet is famous for its rings? (pg. 28)
        - Which planet spins on a different axis than the other planets or spins on its side? (pg. 30)
        - Where did the class find Ms. Frizzle? (pg. 34)
    - Re-create the "Our Planet Chart" that is shown on page 36 of The Magic School Bus Lost In The Solar System to use throughout the rest of the lessons to compare the planets; you can find a picture of it here, if you do not use the book:
    - Add any new vocabulary words or terms to your Rocket Ship Word Bank Chart
- Ask the students to define the word orbit as best they can, shouting out answers, writing them down on sticky notes, etc.
    - In the solar system, everything is always moving – even you! Everything and person in the solar system is traveling up to 1,000 miles per hour right now That is how fast the planet's surface is spinning, or rotating, at the equator. Other planets and their moons spin too, even the sun spins.
    - While these objects spin or rotate, they also revolve around, or ORBIT, each other.
        - The Moon orbits Earth, Earth orbits the Sun, also the other planets, their moons, and asteroids.

EXPERIMENT TIME!

Orbit Try This!

- An object is in orbit, but the path of the orbit is not a circle, it's an ellipse or an oval
- Try it: Walk in a circle around a chair, then walk in an oval around a chair
    - What happens to you make your orbit long and skinny?
        - *You travel much farther away from the chair, and much closer to it. A comet's elliptical orbit takes it far from the Sun. It may spend centuries out in the space, frozen solid.*

Axis Try This!

- Planets, moons, and the Sun rotate or spin on an axis; some planets such as Jupiter spin faster than others
- Try it: Relax your arms and spin in circles, keeping your feet in the same spot
    - What happens to your arms when you spin faster and what happens when you slow down?
        - *They fly away from your sides. Jupiter, Saturn, and other planets that spin quickly bulge out at the middle for the same reason.*

CONNECT & EXTEND

- As a wrap up activity, use the planet cut-outs, printed pictures of the planets, or show pictures of the planets online to help the students learn each planet's name and what it looks like
    - Challenge students to remember some of the distinctive characteristics of the planet or a specific fact about each planet!

REFERENCES

A spin around the solar system. Kids Discover. Retrieved on May 15, 2018, from https://online.kidsdiscover.com/unit/solar-system/topic/a-spin-around-the-solar-system

Pollack, S. & Fusoni, M. (2005). Moving beyond icebreakers: An innovative approach to group facilitation, learning, and action. The Center for Teen Empowerment, Inc. Boston, MA.