YOUR MISSION IN SPACE

Lesson 2: Plan and Explore!

OVERVIEW	Students will be able to "take off" on their mission! They will work together to discover aliens and planetary features. They will share their mission findings with their other class astronauts. This lesson has two options: a "Sensory Option" with more setup/materials, or a "Storytelling Option" wit no setup needed, where students corroborate to write a mission report. You can choose either option. **Duration: 45-60 minutes.**
SUCCESS CRITERIA	• Students can clearly explain how their discovery aligns with their mission's original goal. • Students can explain how the discoveries they made on their mission might impact life on Earth or help us better understand our planet or other planets. • Students can analyze how their discoveries could be important for future space exploration.
ARIZONA STANDARDS	**Career Development K-5 (Standard 5.0)** • Identify future aspirations and discuss how they fit their wants and needs. • Identify career interests, abilities, and skills. • Engage in activities to learn about career clusters and the future of work trends. • Explore jobs, occupations, and careers to understand the value of all careers to society **Core Ideas for Using Science** • U1: Scientists explain phenomena using evidence obtained from observations and or scientific investigations. Evidence may lead to developing models and or theories to make sense of phenomena. As new evidence is discovered, models and theories can be revised.
NGSS STANDARDS	• **Science and Engineering Practices - Asking Questions and Defining Problems** (Students explore scientific questions related to space missions and the search for extraterrestrial life) • **Science and Engineering Practices - Obtaining, Evaluating, and Communicating Information** (Students analyze how different scientific careers contribute to astrobiology and space exploration and reflect on how their own skills align with different scientific fields) • **Nature of Science (NOS) Connections - Science is a Human Endeavor** (Scientific discoveries result from collaboration between people of different backgrounds, disciplines, and expertise)

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ARIZONA ASTRO BIOLOGY CENTER
aabc.arizona.edu

MATERIALS

Sensory option: (available from AABC if you are in Pima County)
- Kinetic sand or damp sand - approximately 2 pounds per group.
- Aluminum tray or sensory bin for sand (1 per group)
- Astronaut figurines (or other small figurines)
- Extraterrestrials created in "Extreme Life" lessons (optional)
- Paper and pencils for note-taking

Storytelling option:
- Extraterrestrials created in "Extreme Life" lessons (optional)
- Paper and pencils for note-taking

VOCABULARY

- **Environment**: The surroundings or conditions in which a living thing exists, including the air, water, and temperature.
- **Observation**: Watching something carefully and paying attention to details in order to learn more about it.
- **Extreme Life**: An organism that lives in extreme environments, such as very hot, cold, salty, or acidic places, where most living things cannot survive or thrive.
- **Tool**: An object used to help perform a task, such as a brush, magnifying glass, or tweezers.

SET UP

Sensory Option:
- Put the sand into trays for each group.
- If you taught the "Extreme Life" lessons, you can use the extraterrestrials you created to enhance this lesson.

LESSON PROCEDURE

Introduction (10 minutes)
- Tell the students that today they are going to land on their planet!
- First, have each group review their chosen planet from Lesson 1 and discuss how the conditions on the planet might challenge their landing or their mission goals.
- Next, have each group review the mission goals they developed in Lesson 1 so that they will be prepared to carry out their mission when they land.
- Finally, have each student review their chosen Space Job from Lesson 1 and discuss with their group what duties they will carry out after landing.

Activity 1: Studying the planet's surface (10-15 minutes)
- Explain that scientists study the planet from a distance before landing on a new planet or moon.
- Ask the students, "What features does Earth's surface have?" (Mountains, valleys, rivers, lakes, canyons, icebergs, volcanoes, oceans, etc.)
- Ask them to discuss in their groups what features their planet will have and write them down.

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LESSON PROCEDURE

- If you have completed the Extreme Life lesson (where students create aliens), pass out the extraterrestrials and tell the students that these are the aliens they discover living on the planet.
- If you're doing the **Sensory Option**, pass out the trays of sand and have students use their fingers to shape the sand into the features they discussed.

Activity 2: Landing on the Planet (20-25 minutes)

- Tell the students they need to identify a good landing site. You should discuss what makes a good landing site (flat, no visible life there).
- Tell the students, "After you land, you're going to role-play your job on the planet and study the planet. Like real space explorers, you should study and discover new things about your planet. After you're done, you'll be reporting on your findings."
- Allow the students time to pretend to explore the planet, make discoveries, and study the extraterrestrial life they find.
- For the **Sensory Option**, they will roleplay this using their astronaut figurines and sand tray. Walk around the room, prompting students to carry out their jobs and make discoveries.
- For the **Storytelling Option**, have students discuss some of the following questions as a group and write down their answers.
  - "What tools are you using to study the planet?"
  - "Are you taking samples? What samples are you collecting?"
  - "Is it hard for space explorers to get around on this planet? Do you need any special tools or protection?"
  - "What kind of atmosphere does this planet have? How does it affect your exploration?"
  - "How do the weather conditions on this planet compare to Earth? Are there any extreme weather events?"
  - "Have you encountered any unusual geological formations? What do they look like?"
  - "How are you communicating with your team? Are there any challenges?"
  - "What challenges have you faced during your exploration? How are you overcoming them?"
  - "What life are you discovering on the planet? How is it different than Earth life?"
  - "How have the alien life forms adapted to survive on this planet?"
  - "What special features do the alien creatures have that help them live in their environment?"
  - "Do different alien plants survive better in different parts of the planet? Why?"
  - "How do the alien creatures get air, water, and maintain the right temperature?"
  - "What do the alien life forms eat? How do they get their food?"

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LESSON PROCEDURE	**Mission Report (10-20 minutes)**
	• Have each group of students report on their mission. You may want to guide their presentation by having them answer the following questions:
	  ◦ What are the conditions on your planet? (Atmosphere, weather, surface)
	  ◦ Did you find any life on your planet?
	  ◦ How did life survive in your planet's environment?
	  ◦ Were there any challenges to your mission?
	  ◦ What did you do for your jobs? How did your job help fulfill your mission goals?

EXTENSIONS AND TAKE HOME ACTIVITIES	• Show students these NASA-created Space Tourism Posters (https://www.jpl.nasa.gov/galleries/visions-of-the-future/), then have students design a poster advertising their planet as a vacation destination. • Ask students to write a short story about the adventure of finding their alien or extreme life, including where it lives and what it does. • Have students do a "Gallery Walk" to tour the different planets, with one student in each group staying behind to present and ask questions while the others rotate through and see other worlds. Make sure each student in the group gets a chance to present and see the other planets.

This module was created by Lauren Bollinger, an elementary school educator at Bloom 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.