

OVERVIEW



Module 1: **Space Explorers: An Introduction to Astrobiology**

OVERVIEW	<p>In this module, students will learn about the fascinating world of astrobiology and explore the exciting question, 'Could life exist beyond Earth?' Students will use their imaginations, inspired by literature, to think about the possibilities of life beyond Earth and diverse environments. Lesson 1 is the launch of the unit and is followed by two engaging lessons about microorganisms that survive in places we never thought possible. Lessons 2 and 3 do not have to be taught sequentially and teachers can choose just one or do both as time allows.</p>
LESSON 1: UNIT LAUNCH	<p>This is an introduction to the field of astrobiology. Students will engage in a discussion of the definition of astrobiology, the questions that astrobiologists ask, and decorate "Astrobiologist in Training" stickers. Duration: 45 minutes.</p>
LESSON 2: HORTON HEARS A WHO	<p>This lesson uses the children's book <i>Horton Hears a Who</i> to explore fundamental astrobiological concepts. In this lesson, students will explore the possibility of life existing on scales and in environments different from our own. Students will consider the diverse forms life might take and how they could adapt to extreme conditions. Through questions inspired by the Whos' tiny world in <i>Horton Hears a Who</i>, students will think about the challenges of detecting and communicating with extraterrestrial life and explore the tools and methods scientists use to search for evidence beyond Earth. This unit fosters critical thinking about the definition of "life" and the importance of preserving potentially habitable environments, emphasizing that even the smallest forms of life hold significance in the vastness of the universe. Duration: 60 minutes.</p>
LESSON 3: WE GO WAY BACK	<p>During this lesson, inspired by the book <i>We Go Way Back</i>, students will embark on a journey to understand the building blocks of life and explore how elements combine to form everything around us, including living organisms. Students will learn that life begins at a cellular level, understanding that all living things are composed of tiny cells and that these cells have evolved over time. The concept of microorganisms is introduced, emphasizing that these tiny living organisms are everywhere, even on Earth, prompting students to consider the existence of life on other planets. Through discussions and activities, students will contemplate how life adapts to different environments and how scientists search for evidence of life beyond Earth. This lesson aims to spark curiosity about the origins of life and the possibility of its existence elsewhere in the universe, emphasizing that the same building blocks that make up life on Earth could also be the foundation for life elsewhere. Duration: 60 minutes.</p>

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SUCCESS CRITERIA: KEY POINTS TO EMPHASIZE

- Understanding of Life's Requirements (as we know them):
 - Students can identify basic needs of life (e.g., water, elements, a habitat).
 - Students can imagine and describe how life might adapt to different environments beyond Earth.
- Understanding of Scale and Diversity of Life:
 - Students can explain that life can exist at very small scales (microorganisms, "Whos").
 - Students can demonstrate that life can take on diverse forms and appearances.
- Understanding of Astrobiology as a Science:
 - Students can explain that astrobiologists search for life beyond Earth.
 - Students can describe basic tools and methods used in astrobiology (e.g., telescopes, robots).
- Creative and Critical Thinking:
 - Students can use their imaginations to create alien habitats, microorganisms, and communication methods.
 - Students can connect ideas from the books to the concepts of astrobiology.
- Communication and Collaboration:
 - Students can communicate their ideas effectively through drawings, models, and verbal explanations.
 - Students can work cooperatively in group activities.

MATERIALS

- Pluffle (Playfoam Pluffle is a soft, squishy material that doesn't dry out. It is ideal for sensory play, and fine motor skills.)
- Sensory bins
- Scientist tools, such as tweezers, beakers, petri dishes, spoons, magnifying glasses, and scissors
- Plastic organisms (plants, animals, microscopic life)
- Microscope camera
- "Life of the Past, Present, and Future" worksheet
- Pictures of Woolly Mammoth and Modern Day Elephant
- "Astrobiologist in Training" Stickers
- Parent letters (Planet in a Jar and Backyard Biologist)

This module was created by Terra Bennnett, a kindergarten educator at Pueblo Elementary in Tucson, AZ, in collaboration with the Arizona Astrobiology Center. These lessons are 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/>