

LESSON 3: FROM DESERT TO SPACE: CREATE A LIFE FORM!



Module 3: Exploring Extreme Life

OVERVIEW	Students explore their existing knowledge of organisms that live in the Sonoran Desert. They then apply what they've learned about extreme life to life in the desert. Finally, students will use their knowledge of extreme life and the desert to design an extraterrestrial that could survive on a world with similar conditions. Duration: 45-90 minutes.
SUCCESS CRITERIA	- Students can explain what extreme life is. - Students can give examples of extreme life that lives in the Sonoran Desert and how their adaptations help them survive. - Students can create extreme life able to survive in Arizona.
NGSS STANDARDS	- K-LS1-1 Use observations to describe patterns of what plants and animals (including humans) need to survive. - K-ESS3-1 Use a model to represent the relationship between the needs of different plants or animals and the places they live. 2-LS4-1. Make observations of plants and animals to compare the diversity of life in different habitats. - Crosscutting Concept: <i>Stability and change</i>. For natural and built systems alike, conditions of stability and determinants of rates of change or evolution of a system are critical elements of study. - Crosscutting Concept: <i>Structure and function</i>. The way in which an object or living thing is shaped and its substructure determine many of its properties and functions.
K-2 AZ STATE STANDARDS	Kindergarten: - Science K.L2U1.8 – There is a wide variety of living things, including plants and animals. - Science K.L1U1.6 – Obtain, evaluate, and communicate information about how organisms use different body parts for survival. First Grade - Science 1.E1U1.5 – Living things need water, air, and resources from the land, and they live in places that have the things they need. - Science 1.L2U1.8 – Different plants survive better in different settings because they have varied needs for water, minerals, and sunlight. - Science 1.L4.U3.11 – Living things can survive only where their needs are met. If some places are too hot or too cold or have too little water or food, plants and animals may not be able to live there. Second Grade - Science 2.L2U1.9 – Obtain, analyze, and communicate evidence that organisms need a source of energy, air, water, and certain temperature conditions to survive. - Science 2.L2U1.10 – All living things need food as their source of energy as well as air, water, and certain temperature conditions.

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MATERIALS	• Air dry clay (optional – can use paper and markers instead) • PowerPoint: Extreme Life in the Desert (available on AABC website) • “My Extreme Life Form” worksheets (optional, on AABC website) • “Desert Animals and Plants Scavenger Hunt” (optional, on AABC website)
VOCABULARY	• Astrobiology: The science of exploring how life began, how it grows, and where we can find it on Earth or beyond Earth. • Astrobiologist: All different kinds of scientists who study how life works on Earth and beyond Earth. • Adaptation: A special feature that helps a living thing survive in its environment – like thick fur for animals that live in cold places.
SET UP	• Set up PowerPoint “Extreme Life in the Desert”
LESSON PROCEDURE	Warm-up (20 minutes) • Review the term “extreme life” and have the students share some examples from Lessons 1 and 2. • Ask the students, “Do you think the Sonoran Desert is an extreme environment? What kinds of extreme conditions do living things have to survive here?” (Hot, dry, sunny) • Ask the students, “Do you know of any ways that living things have adapted to survive in the hot, dry, sunny desert?” • Pull up the PowerPoint, “Extreme Life in the Desert.” Use the slides to facilitate a discussion about ways that animals and plants adapt to a desert environment. Activity 1 (Optional, 15-30 minutes) • If you have access to any natural desert space with native plants/animals, have the students explore the area, looking for desert adaptations. Even a small area can be used for this activity. • Challenge the students to identify features of the plants/animals they see, and whether those features might help them to survive in the Sonoran Desert. • If time, you might choose to use the “Desert Animals and Plants Scavenger Hunt” worksheet to facilitate learning. Activity 2 (15-30 minutes) • Tell the students, “Now imagine another world that is just like the Sonoran Desert.” Choose some of these follow-up questions: ◦ What would the weather be like? The seasons? The temperatures? ◦ How much water would they have? ◦ What challenges would life have on this planet? ◦ What would living things have to do to survive?

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LESSON PROCEDURE

- Challenge the students to create a creature living in such a world. Students may create a “weird-looking” animal or plant with specific body parts to survive the extreme heat or lack of water. Some students may adapt an existing animal.
- If time allows, you can use one or both of the “My Extreme Life Form” worksheets to facilitate brainstorming and writing skills. (Or you can just dive right into creating the aliens with clay!)
- If students are stuck, encourage them to review the real-life animals and plants of the Sonoran Desert and their adaptations. Then, ask them to brainstorm an extraterrestrial with similar adaptations for their planet.
- If time allows, have students share their creations with the class or in small groups.

Note for Teachers

If you are also teaching Module 4 (where students design a mission to visit another planet), save all of the creatures your students have created. This will enhance imaginative learning in Module 4, as students “explore” that planet and “discover” life on it.

EXTENSIONS AND TAKE HOME ACTIVITIES

- Use the "Desert Animals and Plants Scavenger Hunt" activity at home or school. Have students head outside to find desert animals and plants nearby. If they don't know the organism's name, they can describe what it looks like!
- Read Alouds about the Sonoran Desert
 - Extreme Animals by Kathie Lester Read Aloud - YouTube (<https://www.youtube.com/watch?v=-SiMauRlpjg>)
 - Saguaro's Gifts by Kyros Kurt (<https://www.youtube.com/watch?v=w69EIASCzt0>)
 - Cactus Hotel by Brenda Guiberson (<https://www.youtube.com/watch?v=uSdU2B0tIFg>)
- Study another extreme environment on Earth at home, as a class, or as a group project. Discuss the adaptations animals and plants need to survive in different environments. Here are some extreme places you might explore: Arctic/Antarctic, Yellowstone National Park, The Himalayas (high altitudes), Salt Flats, Hydrothermal Vents, Rio Tinto (an acidic river), Caves

This lesson was created by Adria Avila Castro, 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. Lesson kits are available for checkout from the Arizona Astrobiology Center - <https://astrobiology.arizona.edu/>