

Surviving on the Moon

Subject: Biomimicry

Grade Level: 5-8

Topic: Engineering Design Process

Time: 60 minutes

Learning Objectives

Students will:

- identify the extreme conditions on the moon.
- explore biomimicry techniques.
- construct a shelter from extreme temperatures using a biomimicry technique.

Materials

[biomimicry techniques article](#), each group needs the same bag of supplies (you could include straws, bottle caps, a chip board box (cereal box, cracker box, frozen items), scissors, string, yogurt container, or an other supplies available)

Procedure

Engage: To promote student curiosity, tell students the they should imagine they are astronauts headed to the moon. The trip has been successful right up to the end. The space craft had to land 100 km from the intended landing sight at Moon Colony. You have contacted the colony, but they can't send out a rescue team for 2 days! You have food, but you need to build a shelter to help you survive. Luckily, you have a biologist with you who is an expert on biomimicry and has lots of ideas and supplies to use what they know to make a safe shelter.

Explore: Help students build an understanding of conditions on the moon by showing the following video. [Does Our Moon Have Weather? | Star Gazers](#) Additionally, explain the concept of biomimicry. Use the

lesson What is Biomimicry prior to this lesson if time permits. Have students read the following article that explains techniques animals use to protect themselves from extreme weather.

<https://www.acs.org/content/dam/acsorg/education/resources/highschool/chemmatters/documents/how-animals-survive-in-extreme-temperatures.pdf>

🌐 Extreme Habitats Around the Globe

🌐 17 Animals Amazingly Adapted to Thrive in Deserts

🌐 How Animals Cope With Extreme Cold: Weird Winter Adaptations

Explain: Have students begin to show what they have learned by having students suggest important factors when creating a shelter based on what they just learned. *Ask: How would you protect astronauts from extreme weather? How would you protect astronauts from the lack of air and all the dust on the moon? What ways do animals use to protect themselves from extreme temperatures could be used for humans?*

Elaborate: Have students use their new knowledge to sketch a shelter using at least one biomimicry technique they have learned about. Students should label their drawings.

Assessment

Evaluate: Evaluate student learning by having students present their sketches to the class or within a small group. Have students write a brief paragraph explaining the features of their shelter and, in particular, what biomimicry feature does the shelter have.

Extension Activities

- Using recycled materials, have students construct models of their shelters.
- Have students do research about the development of lunar landers.
- Have students do research about the development of space suits.

NGSS Alignment

Middle School

MS-ETS1-1 - Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution.

MS-ETS1-2 - Evaluate competing design solutions using a systematic process to determine how well they meet criteria and constraints.

MS-ETS1-3 - Analyze data from tests to determine similarities and differences among several design solutions.

MS-ETS1-4 - Develop a model to generate data for iterative testing and modification of a proposed object.



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