



Desert Sponge

Adaptations

Time Frame: 1 full class day

Grade: 4

Overview

A collection of physical and behavioral adaptations help species survive. In this activity, students will model adaptations by using natural materials to prevent a sponge from drying out when exposed to the sun for an entire day.

This lesson is a modification of an activity originally written for NatureWorks from New Hampshire Public Television (<http://www.nhptv.org/natureworks/nwep8tg.htm>).

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Essential Questions

- What factors contribute to the survival of wildlife species?
- What are some common adaptations found in Arizona wildlife species?

Objectives

- Define adaptation.
- Identify one behavioral and one physical adaptation that animals may have to help survive in a desert environment.
- Create a model of desert adaptations using common materials.

Arizona Department of Education Standards

Science

- | | |
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| ○ S1.C2.PO2 | ○ S1.C3.PO1 |
| ○ S1.C2.PO3 | ○ S1.C3.PO2 |
| ○ S1.C2.PO4 | ○ S1.C4.PO1 |
| ○ S1.C2.PO5 | ○ S1.C4.PO3 |
| | ○ S4.C4.PO2 |

College and Career Ready – ELA

- 4.W.4 (including AZ 4.W.4)
- 4.W.7

National Standards

Next Generation Science

- 4-LS1-1

Association of Fish and Wildlife Agencies

- 1.7.1

Materials and Resources

- Small sponges (one per group)
- *Desert Sponge Journal* (one per student)
- Paper towels
- Scale
- Water
- Variety of natural materials

Teacher Preparation

- Make a copy of the *Desert Sponge Journal* worksheet for each student.
- Give the students some time to gather natural materials to use in the project.
- Establish a secure outdoor area where the sponges can be placed without being disturbed.

Background Information

Adaptations help animals survive in their environment. They can be behavioral or physical.

Most adaptations are a result of natural selection that occurs over a long period of time. When an animal has a trait that is more successful in a population, it may produce more offspring. As a result, that trait is passed down

through generations. Over time, that trait becomes more common in the population.

In this lesson, students will pretend they are scientists who have recently discovered a new desert creature – the **Desert Sponge**. This unusual, sponge-like animal was found living in the driest and hottest parts of the Arizona deserts. Scientists have closely examined the available specimens and are still baffled. They are uncertain how it has adapted to this harsh environment.

It is now up to the students, as scientists, to discover what adaptations the Desert Sponge has that help it retain water and survive in the dry desert heat. They will use natural materials to see what works best to retain water. Research seems to indicate that the Desert Sponge does completely expose itself to the elements for approximately two hours to feed. Students must allow for this time in their experiment.

Procedures

1. Divide the class into small groups of three or four students.
2. Explain the setup of the activity as outlined in the Background Information.
3. Ask students to write a short research plan in their journals that includes
 - a. Physical adaptations their sponge will have to help it retain water.
 - b. Natural materials they will use to simulate those adaptations.
 - c. Behavioral adaptations their sponge will have to help it retain water.
 - d. Actions they will take to simulate those adaptations (e.g., keep the sponge in the shade during the hottest parts of the day).
 - e. Identify the location where the sponge will spend the majority of its day.

- f. Identify the location where the sponge will “feed.”
4. Review the plan with the students.
5. Give each group a sponge.
6. Have them soak their sponge in water so that it is completely saturated.
7. Ask the students to weigh their saturated sponge and record the value in their journals.
8. Provide time for the students to use their natural materials to model adaptations for the sponge. Some examples include covering the sponge in leaf litter or using sticks to keep the sponge off the ground. Encourage the students to be creative.
9. When all groups have finished their designs, have them take their sponges with their adaptations outside. Have them identify a location to place their sponge. Remind them that it should be secure. The sponge would not want to get “eaten” by a predator.
10. Allow the students to check on their sponge periodically throughout the day. Remind them that the sponge must be fully exposed to the elements for at least two hours.
11. At the end of the day, have the groups bring in their sponges and remove any adaptations.
12. Have them weigh their sponges and record the final values in their journals.
13. Ask groups to share their results. Have them explain the adaptations they used and how successful they thought they were.
14. Record the water loss from each group on the board. Ask the class to identify which groups (and which adaptations) seemed to have the most success.

15. Ask students to identify adaptations of real desert animals and compare them to the successful adaptations they created.
16. Ask the students to write a short summary of their findings in their journal that includes
 - a. Weight of the sponge at the beginning and at the end of the activity.

- b. Whether they made any changes to their original plan and why.
- c. What changes they would make to the experiment based on their results.

Differentiated Instruction

Extensions:

- Simulate the “cost” of adaptations by integrating energy tokens into the simulation. Use poker chips or similar game tokens. Each adaptation will require a specific amount of energy (represented by a certain number of tokens). For example, one stick or the ability to move the sponge five feet in any direction may cost the group one token. At the end of the day, any tokens remaining can be used to improve the survival of the sponge.

Modifications:

- Rather than collecting natural materials, have the students use common household materials such as tongue depressors or similar wooden sticks, waxed paper, bags, straws, string, and tape.



Reflection

Use the space below to reflect on the success of the lesson. What worked? What didn't? What changes would you make? These notes can be used to help the next time you teach the lesson. In addition, the Department would appreciate any feedback. Please send your comments to focuswild@azgfd.gov. We'd love to see pictures and samples of the student journals as well!



Desert Sponge Journal

Student Name: _____

Group Name: _____

Research Plan: Describe what you will do to test the desert adaptations of your sponge. Include the physical and behavioral adaptations you think your sponge has to help it retain water, what materials and actions you will use to simulate those adaptations, and the locations where the sponge will feed and spend the majority of its day.

Wet Sponge Weight (don't forget units):

At beginning: _____

At end: _____

Difference: _____

Summary: Describe what you discovered and learned from your simulation. Include a description of any changes you made to your original research plan and an explanation for why you made those changes, as well as any changes you would make in the future based on what you have learned.

Application: Think about a common desert animal. List one physical and one behavioral adaptation the animal has that helps it survive in the desert.

Animal: _____

Physical Adaptation: _____

Behavioral Adaptation: _____