

BUILT FOR THE DESERT

Students identify saguaro adaptations for desert life and transform an average potted plant into a desert-adapted saguaro.



**ARIZONA SCIENCE
STANDARDS**
SC03-S4C4-01

OBJECTIVES

Students should:

- Identify adaptations of the saguaro that allow it to live in the desert.

BACKGROUND

Saguaro cacti, like other plants, have an assortment of general parts that help them to survive and reproduce. Saguaros with their many structural modifications are well-adapted to the Sonoran Desert. The stem and arms are succulent, comprised of spongy tissue for water storage. A woody skeleton of vertical ribs runs through them, providing structural support. The outer skin of the saguaro is waxy to prevent water loss through evaporation. It also contains chlorophyll and is the site of photosynthesis – by eliminating leaves, cacti are able to reduce water loss even further. Saguaros are covered with rows of spines that serve to help protect the cactus from predation by food- or moisture-seeking animals, as well as to protect its sensitive growing tip from extreme heat or cold. Saguaros have shallow, extensive roots that absorb rainfall near the surface of the ground. As the cactus takes in water, the stem and arms are able to expand along a series of accordion-like pleats. During dry periods, the cactus shrinks again as the cactus gradually uses its stored water.

GETTING READY

Prepare the materials as listed in the margin of the next page.

DOING THE ACTIVITY

SETTING THE STAGE

- 1) Show the students the potted plant. Point out the leaves, stems, and flowers, and ask them to identify these parts. Unearth a bit of the plant and show them the roots. As you look at the different parts, ask the students to explain the purpose of each. Reiterate these functions as you demonstrate the parts:
 - Leaves – food factories for the plant (make food with sunlight, water, and air)

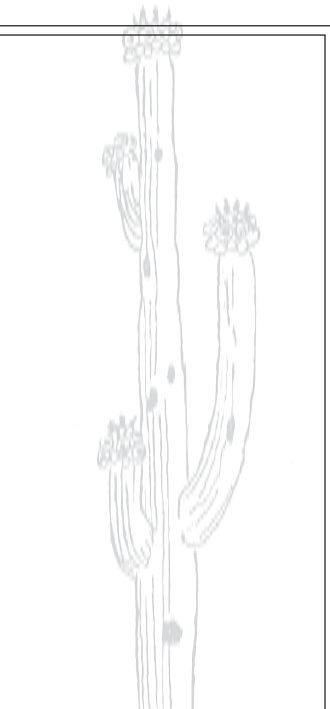
- Stems – hold up the plant so it can reach for the sunlight
- Flowers – attract pollinators to help produce fruits and seeds
- Fruits – attract animals to eat them and spread the seeds they contain
- Roots – take in water and dissolved minerals for the plant

- 2) Ask the students if they would expect to see a plant like this growing in the desert? Why or why not? (Those who have been out in the desert will realize that plants like the potted plant are pretty unusual there. They may comment that it is too green and leafy, or that it needs too much water to live well.)
- 3) Ask, “What about the desert makes it challenging for plants to grow?” (It is hot and dry, with a high rate of evaporation.) Have the students think back to what they learned in the *Saguaro Tales Discovery Class*. What do saguaros have that help them face these challenges and live well in the desert? (Saguaros have many of the parts that other plants do, but theirs have special features or **adaptations** that help them survive in the desert.)

COMPARING PARTS

- 1) Provide a copy of *Student Handout - Built for the Desert*, scissors, markers/crayons, and glue for each student. Have the students cut out the picture of the leafy plant and paste it in the middle of the construction paper. Ask, “How can we change this leafy plant into a saguaro?”
- 2) Have the students cut out the saguaro parts along the dotted lines and lay them on the table. Point out the leaves, stems, and roots of the leafy plant and discuss how each corresponding part is modified and adapted for desert life on

BUILT FOR THE DESERT



MATERIALS

- Chalkboard
- A potted non-desert plant with leaves, stems, and flowers (like marigolds, tulips, or geraniums)
- A copy of *Student Handout - Built for the Desert* for each student
- A piece of construction paper for each student
- Markers or crayons
- A piece of black or brown yarn (about 2' long) for each student
- Scissors
- Glue

VOCABULARY

Adapt
Adaptation
Pollination
Pollinator
Spines

the saguaro (as outlined in steps A-D below.) As you discuss each part, the students can overlay and glue the saguaro parts over the leafy plant parts on the construction paper.

- A. Begin with the leaves. Ask, “What are the leaves for on the plant?” (They are where the plant makes its food.) “What happened to the leaves on the saguaro?” (It got rid of leaves to save water. Leaves have many tiny holes that lose much water to evaporation. The saguaro stem, in contrast, has few holes and is covered with a waxy coating to help keep water inside.) “How does the saguaro make its food now?” (With its stem.) Have the students color the saguaro stem green, then overlay the image onto the plant leaves and stem.
- B. Ask, “What else does the stem of the saguaro do?” (It stores water.) “How does it do this?” (It has pleats that expand and let it take up lots of water, then shrink back down as it uses the water.) Have the students cut the yarn into pieces about the height of the saguaro cactus and glue them vertically along its stem to represent pleats.
- C. Ask, “What things might be a threat to all that water stored inside the saguaro?” (Animals looking for water.) “How does the saguaro protect these?” (It is covered with spines to keep animals away. The spines also block the sun’s rays from directly hitting the cactus. And the water is stored in the stem in a toxic form.) Have the students draw spines around the edges of the cutout saguaro stem.
- D. Ask, “What are the leafy plant’s roots for?” (taking in water and dissolved minerals) “How are the saguaro’s roots different?” (They are shallow

and widespread instead of deep and narrow.) “Why?” (The rains that fall on the desert are often quick and their water does not soak deeply into the soil. The saguaro has shallow, widespread roots to absorb the rainwater before it evaporates or runs off.) Paste the saguaro root overlay over the leafy plant’s roots. With a marker, draw the extension of the roots to the edges of the construction paper.

DISCUSSION

- 1) Ask the children to compare the saguaro and the leafy plant. Ask, “How are saguaros and the leafy plant the same?” (They both have stems, they are both green, and they both have roots.) “How are they different?” (The saguaro is spiny, it has no leaves, and it stores water in its stem, while the leafy, potted plant does not.)
- 2) Ask, “How do these differences help the saguaro cactus live in the desert?” (They can store water in their stems and live without frequent rainfall, they can protect the stored water with their spines, and they can help prevent evaporation of the water by having no leaves and having a tough, waxy skin.)
- 3) Reiterate that these are adaptations of the saguaro that help it survive the high heat, low water, and high evaporation of the desert.

EXTENSION

Have the students illustrate and write/dictate a story from the point of view of a saguaro. Have them explain how the saguaro survives in the desert. What adaptations does it have? How does it get and store water? What are some of the animals that visit it?