

Activities that show how desert plants and animals are well-adapted to life in the desert and thrive with little moisture and high temperatures.

### ARIZONA SCIENCE

#### STANDARDS

SC00-S4C3-01,  
SC00-S1C1-02,  
SC01-S1C1-02,  
SC03-S4C4-01

#### OBJECTIVES

Students should:

- Recognize that all living things are adapted to their native surroundings in order to survive. Adaptations include behaviors or body characteristics.
- Understand the challenges heat and aridity pose to desert life.
- Examine how specific plant and animal strategies help them preserve moisture and stay cool.

### GETTING READY

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

### DOING THE ACTIVITY

#### SETTING THE STAGE

- 1) Ask the students, "Do you think it is hard for plants and animals to live in the desert? Why?" (Possible answers include that it is hot and dry, there is not much water, and that evaporation is high.)
- 2) Explain that the desert can be a hard place to live, but for animals and plants that know how to live here, it is not so challenging. They have **adaptations** - special things about their bodies or the way they behave - that help them survive the heat or dryness of the desert. Discuss some examples of adaptations of people and animals. (People have large brains to help them create things. Eagles have talons to help them grab their prey.) Tell the students they are going to do some activities that show how adaptations of desert dwellers help them save water and keep cool. We'll start with plants.

#### PLANT STRATEGIES FOR SAVING WATER AND KEEPING COOL

#### ACTIVITIES

##### ADAPTATION 1: SUCCULENCE

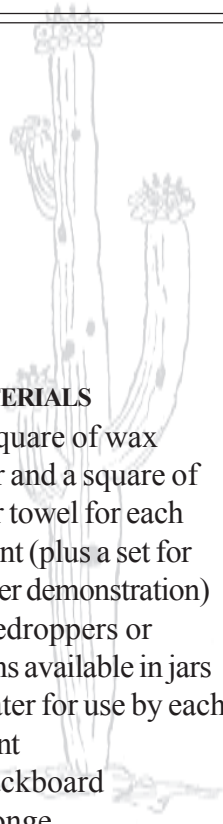
- 1) Pass out the squares of paper towel and wax paper and arrange the water jars with eyedroppers or spoons so they are available for each child. Give the students a few moments to put water on their different squares and observe the results. Ask: "What happens when you put water drops on the paper towel? On the wax paper?" (Possible answers: the towels absorb the water, while the wax paper repels it or keeps it from penetrating the

paper.)

- 2) Ask the students: "In the story *Seasons of Saguaro*, what did Saguaro do when it rained?" (She sucked up the water with her roots and stored it inside of her stem.) "Which do you think the inside of Saguaro's stem is more like, the paper towel or the wax paper?" (paper towel) Explain that many desert plants such as cacti are like the paper towel inside their stems and leaves. Having spongy, absorbent tissue is an adaptation to help desert plants save precious water to use when it is dry.
- 3) Tell the children, "Now watch this!" Perform the following demonstration.

##### DEMONSTRATION 1: SUCCULENCE

- 1) Dip the sponge in a bucket of water and dab it on the blackboard in two small splotches a few inches wide and a foot apart. Working quickly so the water splotches do not evaporate immediately, cover one with a square of paper towel and tape the edges down so little air enters from the edges. Repeat the process with a square of wax paper.
- 2) Let the samples begin to evaporate. Ask the students, "Which do you think will evaporate more quickly, the water under the wax paper or under the paper towel?" (The water under the paper towel.) Field their responses and watch as a group to determine which one evaporates more quickly.
- 3) Discuss their observations. Ask, "How do you think Saguaro keeps rainwater inside of her from evaporating?" "Hint: the trick is in the skin." (Saguaro has a waxy coating on its stem to trap the water inside.) Explain that many desert plants have waxy stems and leaves that keep water from evaporating easily. This is an adaptation to help save water.



## MATERIALS

- a square of wax paper and a square of paper towel for each student (plus a set for teacher demonstration)
- eyedroppers or spoons available in jars of water for use by each student
- blackboard
- sponge
- masking tape
- buckets of water
- hedgehog cactus card image (last page of this activity)
- prickly pear cactus card image (last page of this activity)
- copies of "Desert Adaptations" worksheet

## VOCABULARY

- **Adaptation** - a body part or behavior of an animal or plant that helps it live in its environment (example: an eagle has sharp talons that help it grab its prey.)
- **Nocturnal** - active at night.

- 4) (Optional) Make a model prickly pear pad (instructions below) and ask the students to explain how it represents a real prickly pear pad. (The wax paper "skin" covers the inner paper napkin "tissue," preventing water loss.)

## PRICKLY PEAR PAD MODEL

### MATERIALS:

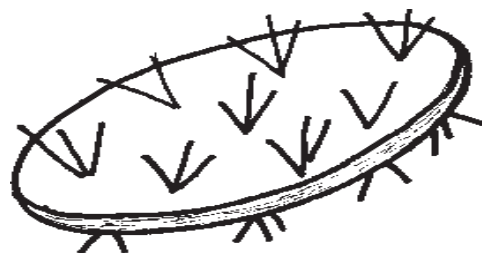
- two 12" sheets of wax paper
- green paper towels or napkins (6 x 6 inches) (5 to 10)
- toothpicks
- scotch tape

### INSTRUCTIONS:

- 1) Assemble the above materials.
- 2) Cut the wax paper into paired circles about 7 inches in diameter.
- 3) Stack the wax paper circles and tape the edges about half way around, forming a pocket.



- 4) Stack the green paper napkins or paper towels and fold them into the wax paper pocket.
- 5) Seal the rest of the edge with more scotch tape, leaving an inch or two open to show the napkins inside.
- 6) Stick toothpicks into both sides of the pad in clusters of two or three spaced at two inch intervals.



- 5) If you have a prickly pear cactus in your home garden or on school grounds, cut a cross section of a pad to show the students. Ask them to describe what they see and relate it to the activity.

## ADAPTATION 2: SHADE AND LEAF ANGLE

- 1) Bring the buckets of water, card of a hedgehog cactus, and the children outside and gather in a spot in direct sunlight. Ask, "Can you think of a way that desert plants keep cool?" Tell them one way was in the *Seasons of Saguaro* story. (See if they remember that Saguaro first grew in the shade of an ironwood tree and also shaded herself with her own spines.) Show them the hedgehog cactus card and point out how the spines cover up the cactus underneath, shading it.
- 2) Now have them hold their palms out flat in the sunlight for a few seconds. Then have them tilt their hands vertical to the ground. Ask, "Which way do your hands feel hotter, flat out or up and down?" (Holding your palms flat out absorbs more sunlight than holding them up and down, if you do this activity when the sun is overhead.) Explain that to keep from getting too hot, some desert plants such as jojoba and prickly pear orient their leaves or pads up and down (hold them with the surface vertical and parallel to the sun's rays) instead of flat out.
- 3) Show them the prickly pear copy card to illustrate the pad orientation.

## EXTENSION

If you have desert plants on your school grounds, have the students observe some of these adaptations. Have them draw the plants and describe the adaptations (orally or written) in a science journal.

## ANIMAL STRATEGIES FOR SAVING WATER AND KEEPING COOL

### ACTIVITIES

#### ADAPTATION 1: PANTING OR SWEATING

- 1) Ask the children: "What happens to us when we get hot and our body tries to cool us down?" (We sweat.) "How does sweating cool us off?" (Our sweat evaporates and cools us.)
- 2) To illustrate this, have the students roll up their sleeves and dip one arm in the bucket of water, leaving the other arm dry. Have them wave both arms in the air. Ask: "Which arm is cooler? Why?" (Evaporation on the wet arm cools the air down around the arm, making it feel cooler.) "Do you think very many desert animals sweat?" (no) "Why?" (Possible answer: few desert animals sweat because there is so little water to drink to replace the water lost.)
- 3) But there are other ways to keep cool. Ask, "What do dogs do to keep cool?" (pant) Explain that when they pant, dogs' blood is cooled as it passes through their tongue because water evaporates from dogs' tongues and cools them down. Coyotes, mountain lions, birds, and many other desert animals pant to cool down.

#### ADAPTATION 2: ACTIVE AT NIGHT, RESTING IN SHADE, OR SLEEPING IN A BURROW

- 1) Ask: "Can you think of any other ways desert animals might keep cool?" Bring up examples from *Seasons of Saguaro*, asking: "What did Javelina do to survive the summer heat?" (lay down in the shade of a mesquite tree) "What did Kangaroo Rat do?" (sleep in her underground burrow)
- 2) Explain that many desert animals are active either at night or in the cooler hours of the day. They pass the heat of the day resting in deep shade or down in burrows out of the sun. Animals that come out at night are called **nocturnal** animals.
- 3) Briefly discuss these strategies with the students, then return to the classroom and pass out the Desert Adaptations Handout.

### ANSWERS TO THE DESERT ADAPTATIONS HAND-OUT:

There are six adaptations, covered in the activities above, depicted in the handout.

- a fox in its den in the heat of the day
- spines on the saguaro to help shade it
- a kangaroo rat coming out at night
- a plant with leaves held vertically
- a baby cactus growing in the tree's shade
- succulent stems and waxy skin

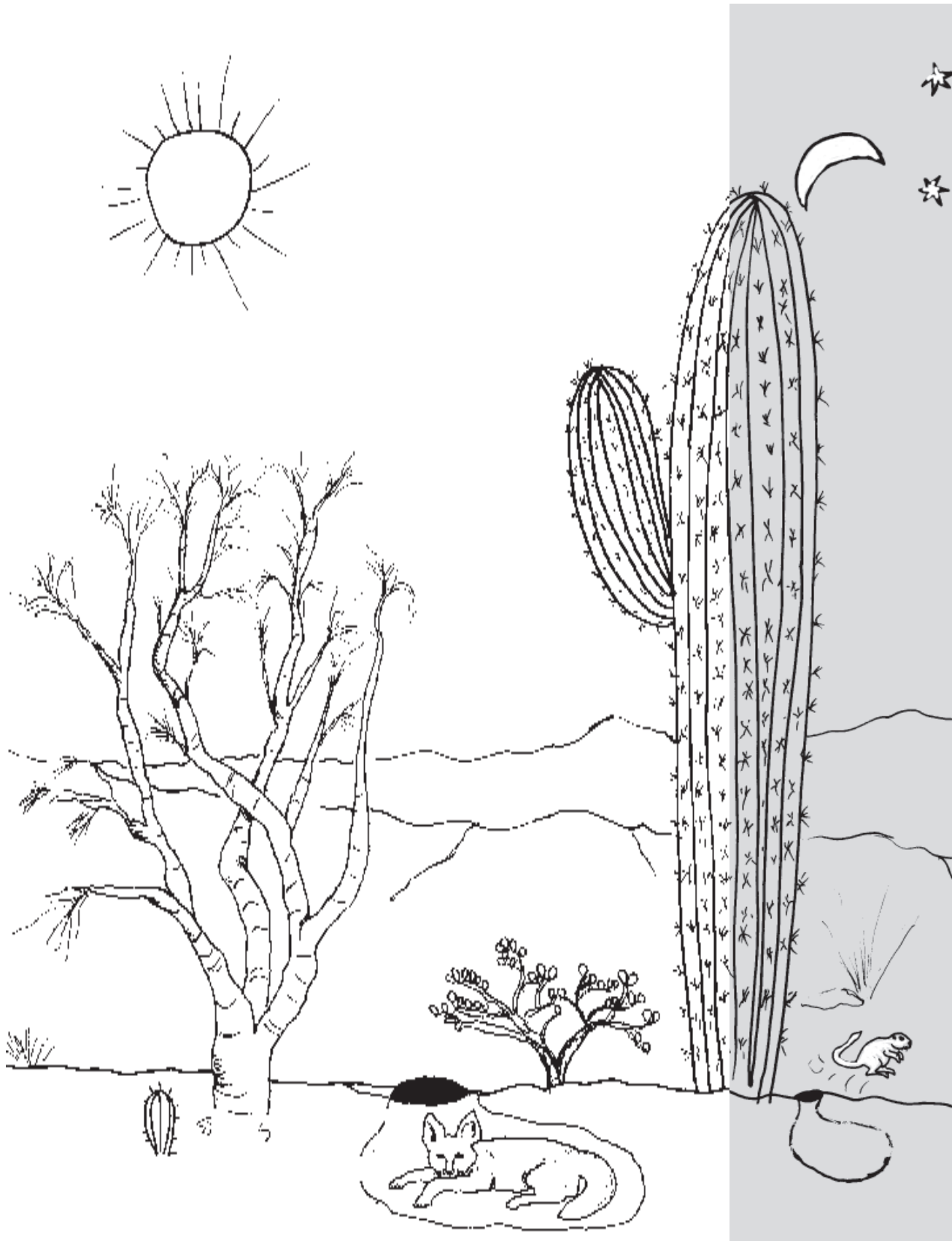
### EXTENSION

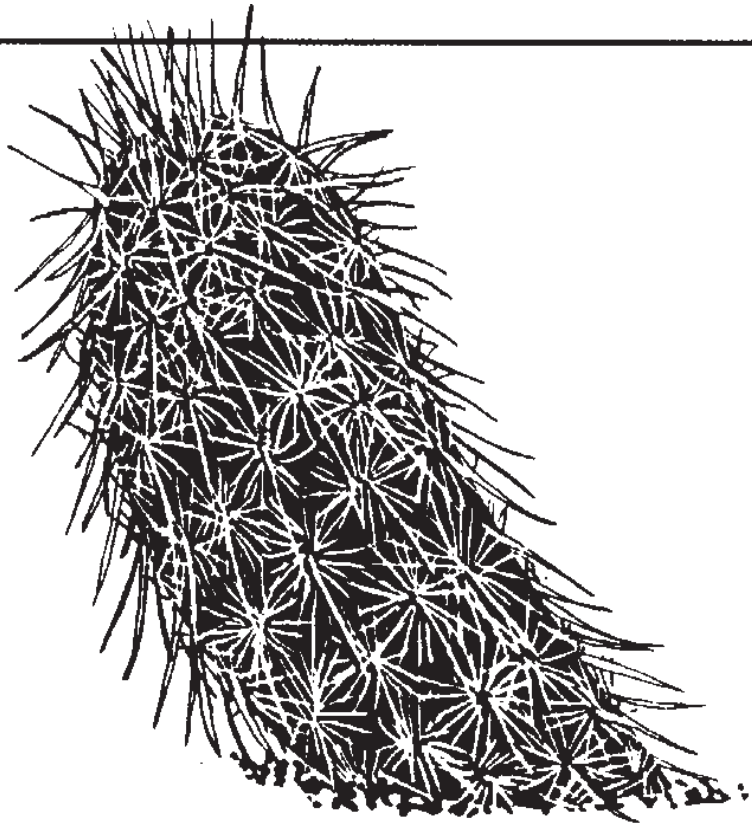
#### CREATE A DESERT CREATURE!

The students can create and draw their own animal or plant with its own adaptations for desert survival. Have them share their creations with each other to see if others can figure out the creatures' adaptations. Or have them write a description of the animal/plant with its name and adaptations.

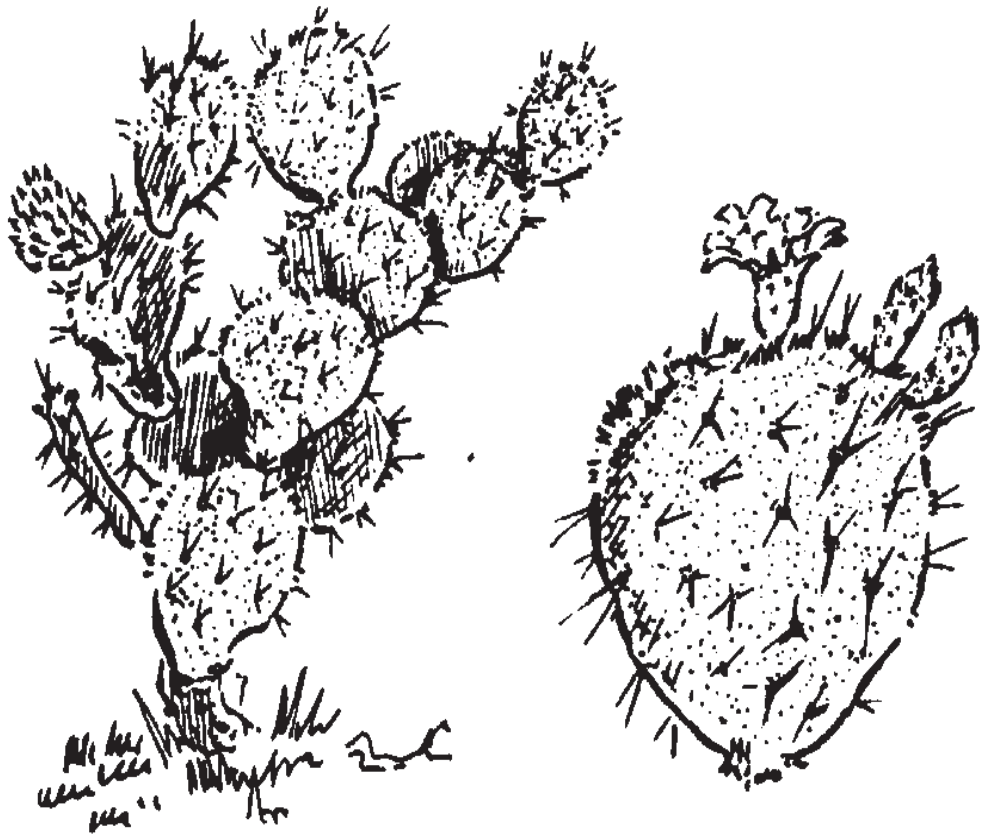


**Can you find examples of 2 plant and 2 animal adaptations that help them save water and keep cool? Circle them and tell what they are.**





**Boyce Thompson Hedgehog**



**Engelmann Prickly Pear**