



GRADE 3



COAST TO CACTUS

IN SOUTHERN CALIFORNIA

Curriculum and Lesson Plan Resource Guide



theNAT
SAN DIEGO NATURAL HISTORY MUSEUM



Grade 3 Desert Plants

Essential Question:

How can a cactus survive with so little water?

All plants need water to survive—but a southern California desert might get just a few inches of rain each year. Desert plants are adapted to take advantage of water when it is available. A cactus can store enough water in its thick stem to survive years of drought. Other plants have leaves and stems with a waxy outer layer that acts like a sealant, holding in precious moisture.



Activity: Paper-towel Evaporation Model

In this activity, students model how desert plants hold onto water while other types of plants dry out.

Materials

- Paper towels
- Trays
- Rubber bands or string
- Wax paper or plastic wrap
- Water
- A tropical houseplant
- A cactus or aloe plant
- Student instruction sheet

This activity takes one class period during two consecutive days to complete. It can be done by students working in groups, either pre- or post-visit to the Museum. (See Page 2 for instructions.)

Paper-towel Evaporation Model

Before the activity

- Gather materials. Each group will need:
 - 13 paper towels
 - 1 tray
 - 6 rubber bands or string
 - 1 sheet of wax paper or plastic wrap
 - Container of water
- Make photocopies of the student sheets (Page 4 and Page 5) for each group.
- Familiarize yourself with the activity directions on the student sheet.
- Determine a location where trays from the activity can be placed overnight undisturbed.



Activity Directions

Day 1

1. Explain to students that models are not perfect examples of events—they are imitations that help us understand science concepts and how things relate to each other.
2. Hand out materials and student sheets.
3. Allow students time to observe, touch, and explore two different types of plants: a tropical houseplant (such as an orchid or a bromeliad) and a cactus (or substitute an aloe plant).
4. Have students record their observations of the differences and similarities between the two plants on their student sheet.
What color are the plants? Which one has leaves? Which one seems tougher?
5. Ask students to draw and label the stem from each of the plants.
6. Hand out materials and student sheets.

NGSS Alignment for Grade 3

Performance expectation: 3-LS4-3

Science & Engineering Practices

Developing and using models
Using evidence to construct explanations

Disciplinary Core Ideas

LS4.C: Adaptation

Crosscutting Concepts

Cause and Effect

Interdisciplinary Common Core Connections: W.3.2, SL.3.4

- Lead students through the directions for Day 1 on their student sheets.
- Which stem do you think will be the driest tomorrow? Which stem do you think will be the wettest?** Have your students write their answers in their notebooks or on a separate piece of paper.
- Place trays with students' stem models where they will not be disturbed overnight.

Day 2

- Have students collect their trays and lead them through the directions for Day 2 on their student sheets. Ask students to examine each stem, discuss their findings, and write their answers to questions 1–5 on in their notebooks or on a separate piece of paper.
- Lead a class discussion about questions 1–5. Questions for discussion:

Why did the model with just one paper towel dry out?

Because the thin shape had fewer layers to hold onto moisture.

Why did the model with six paper towels remain moist?

Because the thick shape and many layers helped keep moisture inside.

Why did the model covered with waxed paper remain the moistest?

Because the wax sealed in the moisture and prevented it from evaporating into the air.

Extension

Ask students to research and compare a desert plant to a plant from a different southern California region. Students can use the *Explore the Region from Coast to Cactus* website to find different plants. How are the plants the same? How are they different? Does the new plant they found have any special adaptations? Visit coasttocactus.sdnhm.org.

What will they learn?

Plants and animals have features that make it possible for them to survive in their surroundings. Desert plants are adapted to beat the heat and drought during summer when temperatures soar. In this activity, students learn two ways that some desert plants are adapted to live in a dry environment where most plants would die: a thick stem that holds more water, and a waxy coating that keeps moisture from evaporating.

Key Words

Adaptation

A change in a plant or animal that makes it better able to live in a particular place or situation.

Arid

Very dry; having very little rain or water.

Cactus

A plant that lives in the desert and has needles or spines.

Desert

An area of very dry land that receives little rain.

Dry

Having no or very little water or liquid.

Evaporate

To change from a liquid into a gas.

Habitat

The place or type of place where a plant or animal naturally or normally lives or grows.



Key Words

Moisture

A small amount of a liquid (such as water) that makes something wet or moist.

Stem

The main long part of a plant that rises above the soil and supports the leaves and flowers.

Survive

To remain alive; to continue to live.

Temperature

A measurement that indicates how hot or cold something is.

Additional Resources

- Visit the *Explore the Region from Coast to Cactus* website to learn more about the different habitats in the southern California region. You can find more information about desert plant adaptations by searching for the California Barrel Cactus, Desert Agave, Teddy-bear Cholla, Beavertail Cactus, Smoke Tree, or Orcutt's Woody Aster. Visit coasttocactus.sdnhm.org.
- Check out a specimen from our Nature to You Loan Library. For more information visit sdnat.org/specimensearch or contact the Loan Library at loanprogram@sdnhm.org or 619.255.0236.
- Visit the San Diego Natural History Museum and explore our *Coast to Cactus in Southern California* exhibition. San Diego is known for its incredibly diverse terrain, ranging from the beaches and chaparral near the coast, to the mountains and the desert farther afield. Using specimens from the Museum's scientific collections alongside immersive environments (hands-on exhibits, live animals, and innovative media), *Coast to Cactus in Southern California* illustrates that richness by taking visitors on a journey through these habitats to explore the plants and animals that live in them.

What features does a cactus have that helps it to save water?

Name: _____

Day 1 Directions:

1. Make a model of a narrow plant stem:
 1. Roll one paper towel tightly into a tube. This is your plant stem.
 2. Put the stem in water.
 3. Squeeze out the extra water.
 4. Wrap a rubber band around each end.
 5. Place the stem on your tray.
2. Make a model of a cactus plant's thick stem:
 1. Neatly stack six paper towels.
 2. Roll the stack tightly into a tube. This is your cactus stem.
 3. Put the stem in water.
 4. Squeeze out the extra water.
 5. Wrap a rubber band around each end.
 6. Place the stem on your tray. Make sure it doesn't touch your other stem.
3. Make a model of a cactus plant stem with a waxy outer coating:
 1. Neatly stack six paper towels.
 2. Roll the stack tightly into a tube. This is your cactus stem.
 3. Put the stem in water.
 4. Squeeze out the extra water.
 5. Wrap the stem with waxed paper or plastic wrap.
 6. Wrap a rubber band around each end.
 7. Place the stem on your tray. Make sure it doesn't touch your other stems.
4. **Which stem do you think will be the driest tomorrow? Which stem do you think will be the wettest?**
Write your answers on the back of this page.
5. Leave the tray in a warm, dry spot overnight.

Day 2 Directions:

1. Unroll the narrow plant stem. **How does it feel? Is it still wet?**
2. Unroll the cactus stem with no waxed paper. **How does it feel? Is it still wet? Is it more or less wet than the narrow stem?**
3. Unroll the cactus stem rolled in waxed paper. **How does it feel? Is it still wet? Is it more or less wet than the other two stems?**
4. Discuss with your group: **What helps a cactus save water?** Write your answers.
5. Make a drawing of the three different plant stems on the back of this page or in your science notebook. Label the parts of the drawing.