



July 2010 – Deserts & Cacti

What does the word "desert" make you think of? Heat, sand, and cacti? Many deserts do have those things, but did you know some deserts are cold and even get snow? Keep reading to learn more!

Desert Science Projects

How a Cactus Stores Water

What You Will Need:

- 3 wet paper towels
- cookie sheet
- 2 paper clips
- sheet of waxed paper slightly bigger than a paper towel

What To Do:

1. Lay one wet paper towel flat on the cookie sheet.
2. Roll the second wet paper towel up into a log shape. Clip it in the center of the roll with a paper clip to keep in rolled. Set the roll on the cookie sheet.
3. Lay the sheet of waxed paper down flat, then lay the last wet paper towel on top of it. Roll both layers up into a log and hold in place with another paper clip. Put this roll on the cookie sheet with the others.
4. Leave the cookie sheet in a place where it won't be disturbed. At the same time the next day (after 24 hours), check out the paper towels. Unroll the rolled ones. Which one is driest? Are any of them still damp?

What's Happening?

The flat paper towel was probably completely dry, the one that you rolled up may have still been slightly damp inside the roll, and the one rolled with waxed paper was probably still fairly damp all over. Rolling up the paper towel kept some parts of it from being exposed to the air, so less water could evaporate and it didn't dry out as much as the one that was completely exposed to the air. The waxed paper protected the last paper towel from the air very well, so hardly any water evaporated from that one.



Many desert plants, like cacti and other succulents (read more about them in the Teacher Tidbits section), have a waxy coating on the outside of their stems and leaves. It helps them store water and protects them from losing water in the hot sun and dry air of the desert.

Sun and Shade

Which do you think is hottest, a spot in the sun or a spot nearby that's in the shade? You'll discover the answer and learn why it's true in this experiment.

What You Will Need:

- two indoor/outdoor [thermometers](#)
- a bucket or box about 12 inches tall
- enough sand to fill the bucket
- a hot, sunny day

What To Do - Part 1:

1. Place one thermometer on the ground in a sunny spot. Put the other one on the ground in a place that is shaded by a tree or large rock.
2. Make sure your spots will stay sunny and shady for the next 30 minutes.
3. After about 30 minutes, read the temperature on each thermometer. Which spot was hotter, the sunny spot, or the shady one?

What To Do - Part 2:

1. In the morning, fill the bucket with sand. The sand should be at least 10 inches deep.
2. Put the bucket of sand in a spot that will not get any shade all day. Leave it in that spot.
3. Late in the afternoon, go to the bucket and stick one thermometer into the sand. The bulb at the bottom of the thermometer should be barely covered by sand. Leave it there for a minute, then take it out and read the temperature.
4. Push the thermometer into the sand again, but this time push it down as far as you can without losing it. After two minutes, pull it out and read the temperature.
5. What did you learn? Was the sand cooler near the top or farther down?

What's Happening?

In the first part of the experiment, you found that a spot in the shade is quite a bit cooler than a spot in the sun. The thermometer in the sun may have read a temperature that was hotter than the actual temperature of the air. That's because the sun was shining on the thermometer all the time and heating it up, so the thermometer was measuring the temperature of the heat from the sun's rays instead of just the temperature of the air around it. The thermometer in the shady spot was cooler because not as much heat from the sunlight could reach it.

Thermometers at weather stations are always protected from direct sunlight so they can give a correct reading of the air temperature.

You could also try this experiment again using your body instead of thermometers. First, sit or stand in the sun for about 5 or 10 minutes, or until you start to feel pretty hot. Then, move into the shade for the same amount of time. You should feel a lot cooler when the time is up. That's

because when the sun shines directly onto your body, you heat up faster, because your body soaks up, or absorbs, the heat from the rays of sunlight. One way animals in the desert keep cool is to rest in the shade during the day to protect their bodies from the extra heat of the sun.

In the second part, you probably read a pretty hot temperature from the first thermometer in the bucket of sand. That's because the sand absorbed the heat from the sun shining on it all day. You probably found that the temperature deeper into the sand was cooler. That's because the sun's light couldn't reach down into the sand. The very top surface was the hottest part because the sunlight could reach it. The farther down you went, the cooler the sand got, because the light and heat coming from the sun's rays were blocked by the grains of sand at the top. Heat doesn't spread very quickly in sand, so even on a very hot sunny day, the farther down into the ground (or bucket of sand) you go, the cooler it will be! Some desert animals use this to help them stay cool. They dig down, or burrow, into the ground during the day and come out at night after the sun goes down and it starts to cool down.

Fun Facts

- The Sahara Desert in Africa is the world's largest hot desert. It covers about as much land as all of the United States!
- The Atacama Desert in Chile, South America, is the driest place on earth. Some parts of it have gone hundreds of years without getting any rain!
- Other than the Arctic and Antarctica, the Gobi Desert in China and Mongolia is the coldest desert in the world. Temperatures can drop to -40° in the winter, but can still get hot in the summer.

Silly Science

- What do you get when you cross a pig and cactus?
 - A "porky-pine"!
- What did the porcupine say to the cactus?
 - Is that you, Mama?

Way Cool Websites

- Find out about plants and animals in the [Sonoran desert](#) and compare them with similar ones from an Australian desert.
- Learn more about desert plants in [this short video](#).
- Check out [these photos](#) of a few desert animals, such as goats and lizards.

Teacher Tidbits

All About Deserts

There are two main kinds of deserts - hot deserts and cold deserts. All deserts are very dry and only get 10 inches or less of rain (or snow, in some deserts) each year. Deserts are located all around the world and most of them cover a large area of land. Because of their large size, some deserts can be a lot different in different areas. For example, the largest hot desert, the Sahara, has areas with mountains. Most deserts have sandy or rocky soil. Some

have large piles of sand that have been formed and hardened by the wind, called sand dunes. Other deserts have large rocks. Some deserts even have flat plains with grass and small shrubs.

The hottest deserts are called *arid*, which just means they are extremely dry. Hot temperatures and lack of water make arid deserts too harsh of a place for most plants or animals to survive. Even though they are very hot, usually around 100° Fahrenheit during the day (but can get higher than 120° at times!), they cool down a lot when the sun goes down. Night temperatures in hot deserts can sometimes fall all the way down to 0° F during the coldest part of the year! The reason it gets cold at night is that the dry air can't hold the heat from the day, so it rises back up into the sky, cooling the earth down. (If you live in a humid place, you may know that it doesn't cool off very much even at night after a hot summer day. That's because the moisture in the air from the humidity blocks the heat and keeps it from rising.)

Some hot deserts are slightly cooler and get more rain. They are called *semi-arid* and can support many more kinds of plants and animals. Semi-arid deserts are similar to arid deserts, but are a little less extreme, although they still get pretty hot because of the dry air. Semi-arid deserts also tend to get dew and sometimes fog that brings moisture even when it doesn't rain.



Did you know that Antarctica and the Arctic are considered deserts? They are covered by snow and ice, but most of it has been there for a very long time without ever melting! It might seem like a place that is covered in frozen water could not be a desert. Well, for most of the year, it is too cold for the snow and ice to melt, which means plants and animals can't use it as water. Most animals that live in these frozen deserts live on the coast near the ocean, where there is water that isn't completely frozen. However, some animals, like polar bears, can survive on land by burrowing underground to stay warm

and hibernating during the coldest times of year. Cold deserts mostly get snow instead of rain during the winter. They are very dry because cold air holds less water vapor (tiny droplets of water) than warm air!

There are also some cold deserts that are not as extreme as the ones at the north and south poles. Even though they get quite cold in the winter, the summers are usually warm, long, and dry. The driest place on earth, the Atacama Desert in South America, is an example.

Desert Animals

Even though it is hot and water is hard to find, the desert is a habitat for many plants and animals, just like the forest or the ocean. Living in a desert can be difficult, but desert plants and animals have special ways to survive lots of heat (or cold, in the cold deserts) and not much water.



During the day, the sun quickly makes animals hot and *evaporates* (or dries up) water from their bodies. Many desert animals, like foxes, mice, snakes, and insects, are *nocturnal*, which means they are most active at night. When the sun goes down in the desert, it gets much cooler and many animals come out of their burrows

(holes in the ground away from the sun's heat) or out of the shade where they hide out during the day. Some desert foxes and mice have very large ears that help their bodies get rid of extra heat.

In a desert, water is very precious. Even when it's hot and dry and doesn't rain for months, animals and plants can still live, as long as they get some water. Plants can sometimes get water from deep underground using their roots. Animals can get enough water to stay alive by eating certain plants. Sometimes clouds moving through the desert can cause tiny droplets of water, called dew, to form on leaves, grasses, cactus spines, and other surfaces. This happens at night when it cools down. Early in the morning, animals can get a quick drink before the hot sun comes up and dries up the moisture. Dew is an important source of water for life in the desert - even if it doesn't rain for a long time, animals and plants can use the moisture from dew to stay alive.

All living things need water to live. Why is water so important? Water makes up about 70% of our bodies, so going long periods of time without drinking any water could make you very sick. That is also true for animals, except they don't need nearly as much water as humans do. Ones that live in the desert need even less water than animals that live other places. For example, camels are able to store water in their humps, so they can go a long time without a drink.

For a map of deserts around the world, excluding the polar deserts, visit [this site](#). Try [this one](#) to learn more about the climate and landscape of various deserts.

Cacti & Other Desert Plants

Have you ever seen a cactus? Cacti (more than one cactus) are plants that grow very well in dry places. They can gather water easily when it's available using their long roots and store it in their trunks and branches for when it isn't. These special plants are also good at making their water last a long time. A waxy coating on the outside of a cactus makes it harder for water to evaporate from the plant, even when the weather is very hot and dry. Because of these special features, cacti can live for a long time without rain or any other source of water.

Cacti are **succulent** plants. Because of all the water they store, they have fleshy and swollen-looking bodies. Their stems can swell up to hold extra water that they absorb when it rains. Other succulent plants besides cacti - such as yucca, jade, and aloe vera - have thick leaves that can store a lot more water than the leaves of most plants. Most plants that grow in deserts are succulents. These plants normally have shallow roots that spread out far from the plant to collect as much water as possible when it rains. Some of them also have a large taproot, which goes down several feet into the ground to reach water deep below the surface.

Most kinds of cacti have spines instead of leaves. Spines make it harder for animals to eat a cactus, keeping its water supply safe. Cacti grow flowers during the season with the most rainfall (usually springtime). They bloom for a short time and often open at night time when it's cooler. Cacti are hard for animals to eat, but birds and other animals like to live in holes in the trunks of tall cacti, just like they do in trees. One particular cactus, the Saguaro (say: su-WAR-oh) cactus, which only grows in the Sonoran desert (in Arizona and Mexico), can grow up to 50 feet tall. Certain kinds of woodpeckers make holes in Saguaros to nest in.

Even though cacti are a symbol of the desert for many people, they don't grow in all deserts! In fact, cacti are native to North and South America (before humans brought them into other parts of the world, they only grew on those continents).

Grasses, short bushes, and special types of trees also grow well in deserts. They grow far apart from each other though, because the soil doesn't have enough water for very many plants in one area. Grass and shrubs or bushes usually have roots that stretch out farther than the plant is tall to get as much water as possible when it rains.

Science Words

Arid - very dry, without enough water to keep trees and most types of plants alive and growing.

Evaporate - when water molecules warm up and change from a liquid into a gas.

Nocturnal - an animal that is most active at night and usually sleeps during the day.

Succulent - plants that store water in their stems, leaves, or roots. They are fleshy and full-looking.

Printable Worksheet

Use the following worksheet to encourage imagination as well as scientific thought about desert life.

Provide plain white paper and drawing utensils and let kids draw pictures of animals they think would live in a desert. Then help them cut and paste their artwork onto the printed worksheet to show which animals hide underground during the day and are active at night.

They may also want to include plants, sand dunes, rocks, the sun, moon, etc.

What Lives In The Desert?

Draw pictures of desert plants and animals on plain white paper, then cut and paste them into the spaces below. Remember, many desert animals are nocturnal!

Day

Night

underground

underground