Name _____

Pre- and Post-Field Trip Activities for your field trip to the Chihuahuan Desert Nature Park

3rd – 5th grade

The Chihuahuan Desert is a spectacular place, filled with incredible plants and animals. Use this workbook to learn more about this special place before and after your field trip to the Chihuahuan Desert Nature Park.

Where Did the Water Go?

Questions: Have you ever noticed that even after a big rain in the desert, the sidewalks and streets are usually all dry again by the next day? Where does the water go?

Materials:
- Sponges or inexpensive paintbrushes
- Bucket of water

My Hypothesis: _____

_____

Procedures:
1. Go outside to a large area with cement or blacktop.

2. Following your teacher's instructions, "write" your name with water on the cement, either in the shade or in the sun.

3. Time how long it takes for your name to disappear.

Results:
It took my name _____ minutes and _____ seconds to disappear.

Discussion:
Which disappeared faster, the names in the **sun** or in the **shade**?_____

Why did the water disappear? _____

Can you think of other experiments you could try using these procedures? _____

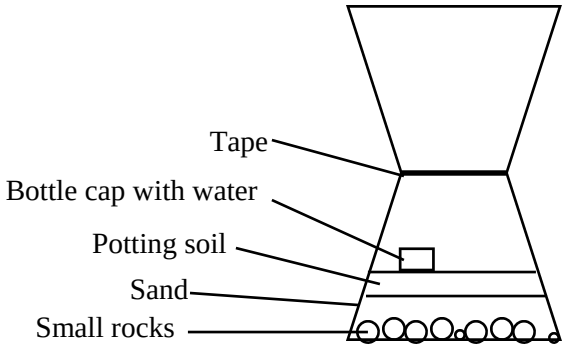
_____

Water Cycle Model

Introduction: This demonstration will allow you to see parts of the water cycle (evaporation, condensation, and precipitation) in a simple model inside a jar.

Materials:

- 2 glass jars (baby food jars work well)
- bottle cap
- potting soil
- sand
- small rocks



Procedures:

1. Add a thin layer of small rocks (at bottom), a layer of sand (middle), and a layer of potting soil (top) to fill about half of one jar (as shown). Add a bottle cap filled with water.

2. Invert another jar on top of the first one and tape them together.

3. Place the jar model in the sun.

4. Observe the model and figure out where each part of the water cycle (evaporation, condensation, precipitation) is occurring.

Discussion:

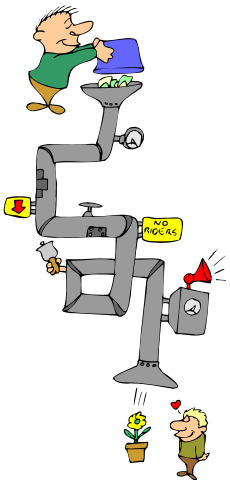
Where is evaporation occurring? _____

Where is condensation occurring? _____

Where is precipitation occurring? _____

How does this simple model relate to the water cycle on Earth?

Is there anything special about the water cycle in the Chihuahuan Desert?



Graphing Precipitation Around the World

Question: Does every city on Earth get the same amount of precipitation (rain, snow, sleet, and hail)?

Materials:
- World map

Procedures:
1. Look at the list of precipitation averages in cities around the world.

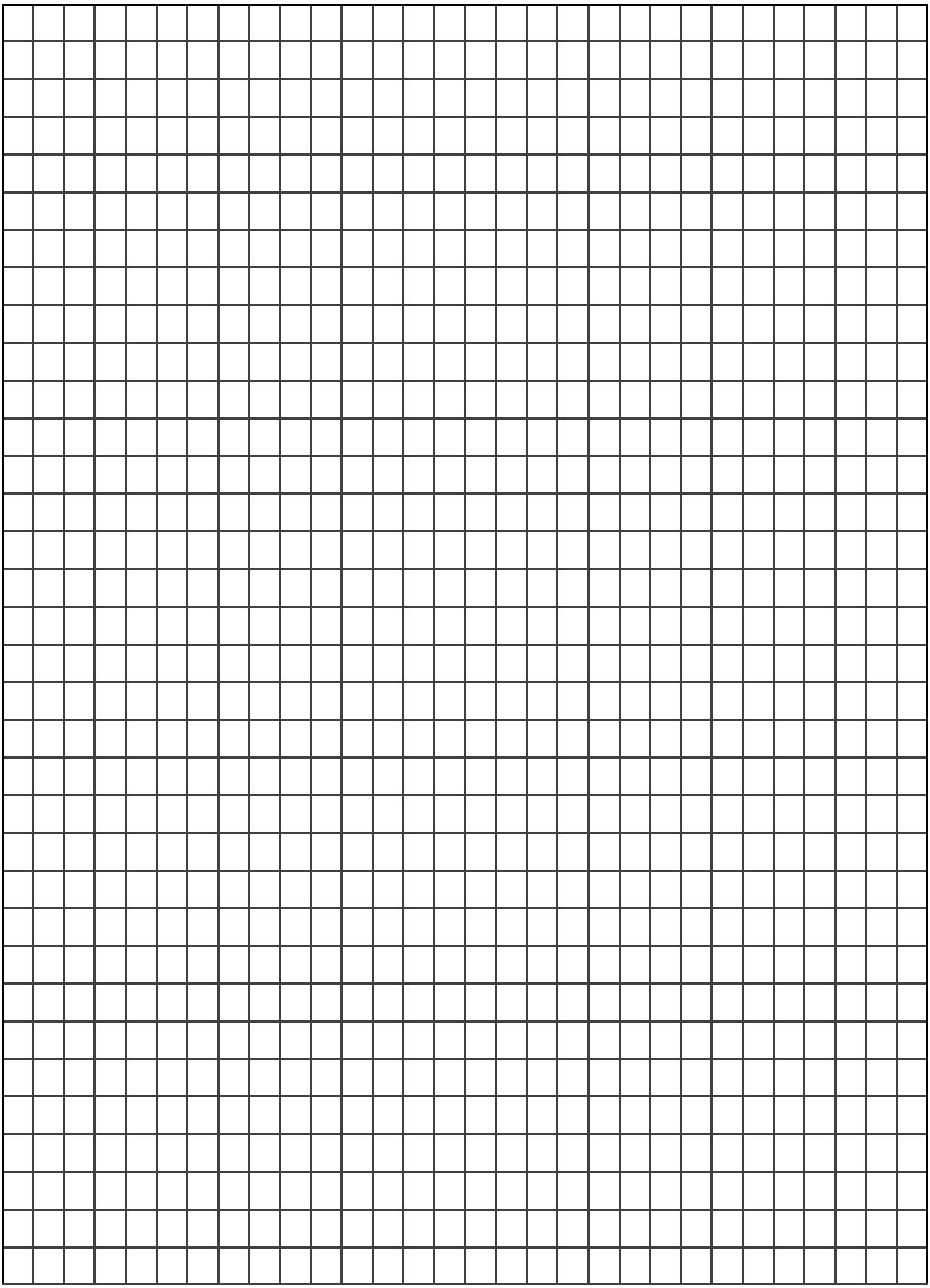
2. Use maps and other reference materials to locate each of these cities, and record the **continent** where each city is located.

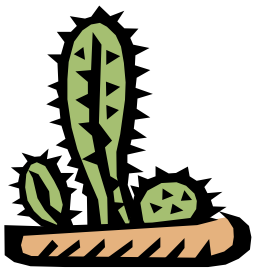
3. Based on the precipitation level given, mark the cities that are considered deserts (less than 254 millimeters or 10 inches of precipitation per year).

4. Create a graph showing the annual precipitation (in either millimeters or inches) in five of the cities from the list.

Average Annual Precipitation Table

City	Precipitation (mm)	Precipitation (inches)	Continent	Desert?
Alice Springs, Australia	274	10.8		
Sydney, Australia	1181.1	46.5		
Rio de Janeiro, Brazil	1102.4	43.4		
Antofagasta, Chile	2.5	0.1		
London, England	591.8	23.3		
Rome, Italy	792.5	31.2		
Mexico City, Mexico	635.0	25		
Wadi Halfa, Sudan	2.5	0.1		
Anchorage (Alaska), USA	370.8	14.6		
El Paso (Texas), USA	218.4	8.6		
Kauai (Hawaii), USA	11684.0	460		
Las Cruces (New Mexico), USA	215.9	8.5		
Las Vegas (Nevada), USA	104.9	4.1		
Miami (Florida), USA	1493.5	58.8		





Desert Plant Adaptations

Introduction: Desert plants are adapted to survive in the desert environment where water is usually scarce. Desert plant adaptations include long roots, shallow and extensive roots, small or no leaves, a waxy surface, and the ability to expand to store water. These activities introduce you to some of these adaptations and to some of the plants you will see during the field trip.

Materials (per group):
Part A: Examples of desert plants and non-desert plants (pictures or plant cuttings)
Part B: Wax paper, water
Part C: Two paper towels, water
Part D: One piece of 8.5" x 11" paper, tape

Procedure and Results:
For each of these activities, you may do one demonstration for the whole class or work in a small group.

Part A: Observation
Examine samples or photos of desert plants and non-desert plants and list at least three differences you can see between the two groups.

Desert plants need to live in areas without much water. Form a hypothesis about why desert plants look so different from non-desert plants. For example, why do some desert plants have thick leaves?

Part B: Waxy Skin

1. Place a few drops of water onto a piece of wax paper.

2. Observe how the water rolls on the surface of the paper but doesn't soak through. This is how the waxy coating of plants keeps water from escaping the inside of the plant.

3. Look at a prickly pear cactus pad and see if you can find the waxy coating.

Part C: Low Surface Area

1. Wet two paper towels.

2. Crumble one towel into a ball and leave the other one flat.

3. Make a hypothesis about which one will dry out faster:_____

4. Lay both paper towels in the sun.

   Which paper towel dried out faster? _____

   Why do you think one dried out faster than the other one?

Part D: Accordion Pleating

1. Fold a 8.5" x 11' piece of paper into an accordion in approximately 1" sections.

2. Tape the two ends together to make a pleated circle.

3. Place your arm through the circle, making the pleats flatten out. This is similar to how the pleats in a cactus flatten, allowing the plant to expand and store water. Barrel cacti use this adaptation.

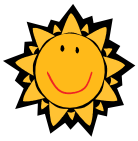
Discussion:

1. Adaptations are traits that improve a plant or animal's ability to survive. Can you name three adaptations that help desert plants survive?

2. Look at the plants from Part A again. Can you see any of the adaptations we discussed?

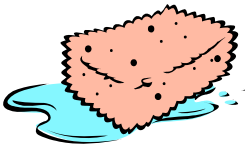
Sponge Creatures—How Dry I Am!

Introduction: Water is limited in the desert, so desert animals must find ways to conserve it in order to survive. Many animals are nocturnal, coming out only at night when temperatures are cooler. Other animals live in underground burrows or rest in the shade of plants where they keep out of the direct sun. In this activity, you will do your best to create a home that helps keep your own desert "creature" from drying out.



Materials:

- Sponges
- Water
- Scale
- Materials for protection



Procedures:

1. You will have a desert "sponge creature" that lives in an environment with very little water. Your job is to create a home for the creature that helps it keep as much water as possible inside its body.

2. Look at the materials you have to work with and design a plan for the home you will create for your sponge creature. Describe and/or draw your plan here.

3. Ask your teacher to approve your plan.

4. After your plan is approved, create the home using the materials provided.

5. Get a sponge creature and soak it in water.

6. Weigh the sponge creature and record the weight on the next page.

7. Place the sponge creature in its home (the homes can be placed anywhere in the classroom).

8. At the end of 24 - 48 hours, weigh your sponge creature and record the weight.

9. Calculate the amount of water lost during the experiment.

Weight of sponge creature at start of experiment: _____

Weight of sponge creature at end of experiment: _____

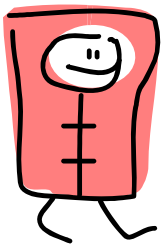
My sponge creature lost: _____

Discussion:

1. Compare the amount of water lost by your sponge creature with the amount of water lost by other students' sponge creatures. Did your sponge creature do better or worse than most of the other sponge creatures?

2. Compare the amount of water lost by your sponge creature with the amount of water lost by the "control" sponge creature. Did your home prevent your sponge creature from losing as much water as the control sponge creature?

3. Which strategies worked best for allowing the sponge creatures to not lose much water?



4. Do desert animals use any strategies similar to those listed in #3?

That's Not Just Dirt: What's in a Soil?

Introduction: This demonstration will show you the three general types of particles that make up soil (sand, silt, and clay) and let you see how much of each particle type is in your soil.

Materials:
- One mayonnaise jar or one baby food jar with lid
- Water
- Soil collected from schoolyard or your yard

Procedures:
1. Fill a jar about 2/3 with water. Add soil until the jar is nearly full, leaving about 1 cm space at the top. Screw on the top of the jar tightly, and take turns shaking it vigorously for one to two minutes.

2. Allow the soil to settle for one minute and then place a mark on the side of the jar at the top of the layer that has settled.

3. Gently set the jar aside.

4. In one hour, mark the next layer.

5. After 24 hours, mark the last layer.

Results:
1. Which particles (sand, silt, or clay) settled to the bottom first?

2. Which particles settled to the bottom second?

3. Which particles settled to the bottom last?

4. Estimate what percentage of the soil in your jar is sand, what percentage is silt, and what percentage is clay.

   Sand _____

   Silt _____

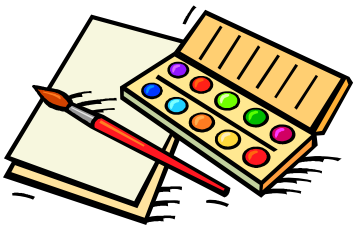
   Clay _____

Chihuahuan Desert Nametags

Introduction: In this activity, you will create your own nametag to wear during the field trip.

Materials:

- Construction paper or tag board
- Crayons, colored pencils, etc.
- Large markers
- Hole punch
- Tape
- Ribbon or string



Procedures:

1. Pick a plant or animal from the Chihuahuan Desert and make a nametag shaped like that plant or animal. **Please, no saguaro cacti**—they do not live in our desert!

2. Use crayons, colored pencils, or other art materials to decorate your tag. Don't forget to write your name in large letters.

3. Place a piece of tape near the top of the nametag and punch a hole through the tape (to keep the paper from tearing).

4. String a piece of string or ribbon through the hole and make a necklace long enough to go over your head.

5. Save the nametags for the day of the field trip, and be ready to show off your nametags and your knowledge of desert plants and animals to the scientists!

Chihuahuan Desert Word Find

Use the clues below to figure out which words are hidden in the puzzle.

Las Cruces and El Paso are located in the __ __ __ __ __ __ __ __ __ __ Desert.

The process of water turning from liquid to gas is called __ __ __ __ __ __ __ __ __ __ __.

This Chihuahuan Desert plant can store water by expanding its body like an accordion
__ __ __ __ __ __ __ __ __ __ __ __.

An __ __ __ __ __ __ __ __ __ __ is a trait that helps a plant or animal survive and reproduce.

This plant loses its leaves and becomes dormant when water is not available
__ __ __ __ __ __ __ __

This plant's roots can be 80 m long: __ __ __ __ __ __ __ __.

This desert animal is known for its very long ears: __ __ __ __ __ __ __ __ __ __.

Animals that come out only at night are called __ __ __ __ __ __ __ __ __.

The smallest particles in soil are called __ __ __ __.

Deserts are characterized by a lack of __ __ __ __ __.

Chihuahuan Desert Word Find

C P J Q N O G X G A O B B G V S R N D A
N H P X V A M F G E E L A I U R T F G D
L X I S D X Q P O T C K L T S X V R R A
U A X H X Q F M Z G E D C I O C C K W P
F Y N Y U Z A N O O A A M G T C Z E L T
R W X E X A C O Q S C K V J A O C A L A
H H R X S S H T U L Y J N Y W E C H J T
E Z O X P R U U E V A P O R A T I O N I
C L A Y L N V R A C X R T U L I Y F N O
C S V D Z A R M K N V H L L O U J H W N
T W Y Q J A F R M O B F R N V Q F Z D Q
B A Q Q B S A E W C Z N Q L H S A I I A
S R K A O B V V D H V N F M Y E I N Y U
K V M B B R G L P F M X V U G M L Z I S
E X M I E S Z G H Y L S V C Y H W N F F
F T T T B K U T E A J B M P H J N V R F
F J A Q B S Y X O S W Q Z U Q M D G T B
G W Y W F G O L A N R U T C O N I F K A
Q O W F J M Y Z M I D F L Q V L B B Y K
J Q A E Q N J C X T V O N I F K C L P D

A Desert Story – Fact or Fantasy?

Mario and Beth are students at Saharan Desert Elementary, the only elementary school in Las Cruces, New Mexico named for the desert where they live. One weekend, they decide to go explore the desert near their home. Although it has been raining a little bit every day in April, they are lucky that the day they pick for their trip is nice and sunny. They decide to enjoy the sunny day by wearing shorts, t-shirts, and sandals. Since Mario and Beth's parents are still asleep, they tiptoe downstairs to avoid waking them. They put sandwiches, apples, and cookies into their backpacks and head out for their trip.

They begin walking at 9:00 in the morning, and they almost immediately see a kangaroo rat leaving its burrow for a long day of hunting small animals. Since the kangaroo rat is away from its burrow, they decide to look inside. Beth puts her hand deep inside one of the burrow entrances and tells Mario that it is much hotter down in the hole than it is above ground. Mario doesn't believe her, but he agrees once he places his hand in the hole.

They continue their walk through the desert, and Mario finds a set of tracks in the sand. Following the tracks, they discover hundreds of frog eggs under a mesquite bush. "Feel the stem of this mesquite," Mario says. "It is so smooth. I bet animals like to rub up against it."

The sun becomes hotter and hotter as the morning goes on, and they guess that it is over 100 degrees by 11:00am. Beth and Mario start to get tired and thirsty, so they decide to head for home. But when they look up, they realize that they don't know which way their house is located. They walk quickly in one direction, but nothing looks familiar. They run up a hill and look in every direction, but they can't find their house anywhere. Beth and Mario are now getting worried. "I think our house is over there," says Beth. Mario points the opposite direction and says, "I think it is that way."

Mario and Beth discuss a few options. They could split up, each walking in one direction until one person finds their home. Or they could find some shade under a bush, like many desert animals do, and wait until someone finds them. Because they are so hot and tired, they decide to find some shade. As they sit in the shade, they spot a rattlesnake resting in the sunshine. They congratulate themselves on seeing the snake, and feel relieved that it didn't slither after them to attack as they had heard most rattlesnakes like to do.

Suddenly, Beth hears a faint sound, way off in the distance. "Beth, Mario, can you hear us?" It is their mom.

"Mom, we're over here!" shouts Mario, as loud as he can.

"Stay where you are. We're coming," answers his mom.

Beth and Mario let out huge sighs of relief. They realized a few of their mistakes, and they promise each other to be smarter the next time they go for a hike in the desert.

List at least 10 things that are incorrect (or that Mario and Beth did wrong) in the story.

1.

2.

3.

4.

5.

6.

7.

8.

9.

10.

GROW WHERE YOU'RE PLANTED:
The Effects of Soil on Plant Growth

Introduction: When you are out in the desert, notice where different plants are located, what types of plants grow where, and what the soil is like in those locations. Does soil affect which plants can grow where? This experiment is designed to help you answer that question. You will use seeds planted in three types of soil to determine if soil type has an effect on the germination and growth of seeds.

Materials:

- One pair of empty film canisters (one with a small hole drilled in the bottom).
- 3 different soil types
- 1 type of seed
- 1 wick
- Masking tape to label canister
- Water

Hypothesis:

Write at least two hypotheses for what you think will happen in this experiment. Your hypotheses might address some of these questions:

1. Which soil do you think will produce the highest plants?
2. Which soil will produce the shortest plants?
3. Which soil will help seeds germinate fastest? (You'll need to record when the seeds germinate.)

Write your hypotheses here:

1. _____

2. _____

Methods;

1. Your teacher will help you choose a soil type (soil 1, soil 2, or soil 3).

2. Gather all of your materials.

3. Use masking tape to label your canister with the soil type and your name. .

4. Thread a wick through the hole in the bottom of one canister, leaving about 1cm inside the canister and 3cm hanging out the bottom.

5. Remove rocks and other debris, and fill this canister (the one with the hole in the bottom) almost to the top, surrounding the wick with soil.

6. Count out 3 seeds (2 if you are using corn, peas, or other large seeds). Place these seeds 5mm under the surface of the soil in each canister. Make sure each seed is covered.

7. Place water in the canister without a hole. Fill the canister about ¾ of the way to the top.

8. Place the soil canister on top of the water canister; make sure the wick is in the water.

9. Place your canister with your classmates' canisters.

10. Add a consistent amount of water to all of the bottom canisters when needed.

Measuring Your Seedlings (Collect Data):

Measure the highest of the seedlings in your canister. If none of the seeds in your canister germinated, the height should be recorded as "0."

Write the height of your seedling here _____(measure in centimeters).

We will use the entire class's data to make our graph and our conclusions about the experiment. Copy the table your teacher makes on the board.

Plant Number	Soil 1	Soil 2	Soil 3
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
AVERAGE			

Graphing Your Results:

Use the averages from your class to create a graph of the data in the space below. Your teacher will help you decide how to set up your graph.

Conclusions:

1. Go back to your hypotheses. Did the results support your Hypothesis #1? Why or why not?

2. Did the results support your Hypothesis #2? Why or why not?

3. Are there any other explanations (besides differences in soil type) that may explain the results?

4. If you conclude that soil type IS important for the growth of seeds, why do you think this is so (in other words, what might make one soil better than another for the growth of seeds)? Can you think of an experiment to test your ideas?

SLEEPING BEAUTIES:
Life in the Playa

Introduction: Playas are low-lying, shallow areas that are intermittently flooded, forming temporary wetlands. Flooding may last from a few days to weeks. In the desert where water is such a scarce commodity, many animals have developed amazing methods to deal with the unpredictable nature of their aquatic world. One of the most interesting is *anhydrobiosis* (life without water).

Organisms that exhibit anhydrobiosis rest in an egg or dormant (sleeping) stage in the soil, with metabolic rates so low that they appear lifeless. When water is added, they rapidly become active and play out their life cycles in the brief time allowed by their temporary water supply. Decaying organic matter in the soil provides a constant food source for some of the organisms, while some eat other organisms in the soil. Playa soils hold a wide variety of invertebrates, and the composition of the invertebrate community changes dramatically as the time the playa is flooded increases. The life history of most of these playa invertebrates is unknown. In this activity, you will add water to playa soil and observe the organisms that inhabit this microcosm after only a few days.

Materials:

- Local playa soil
- Plastic basins (2-L soda bottles with the tops cup off will work)
- Distilled water
- Small fish net
- One 75-watt light bulb for every two basins
- Small dishes for observing organisms

Procedures:

1. Add a thin layer of soil to the bottom of two plastic basins and add distilled water until the basins are about half full.

2. Place the basins under a 75-watt light bulb so that the temperature is about 26 ºC. Add tap water that has been left out for 24 hours when needed.

3. After one week to one month has passed, observe the organisms in the water. The water may be murky, so transfer organisms to a clean jar of distilled water for observation if necessary.

Questions:

1. Draw all of the different types of animals you find in your playa microcosm and try to identify them.

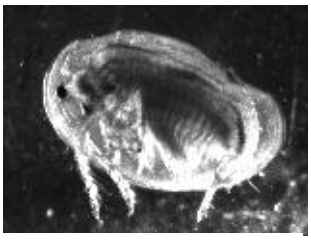
2. What are two important adaptations of the life forms in the playa soil?

SLEEPING BEAUTIES
A GUIDE TO WHAT YOU MIGHT FIND

Tadpole Shrimp (*Triops* spp.)
These members of the phylum Arthropoda, order Crustacea have a shield-like carapace and 35-70 pairs of legs. They will likely begin hatching within 18-24 hours (depending on the water temperature) and grow rapidly. Adults can reach 2.5-5 cm (1-2 inches) in length. They are omnivores and are often seen feeding upside down at the water's surface.

Photo from SASI web site.

Clam Shrimp (*Eulimnadia texana*)
These small (generally 5mm long) crustaceans have a rare mating system called androdioecy. Individuals are either hermaphrodites or males; no females exist. Hermaphrodites often have white eggs visible in their brood chamber. They grow rapidly and reach reproductive size within 4-7 days.



Male (photo by Steve Weeks; University of Akron web site)

Hermaphrodite (photo by Steve Weeks; University of Akron web site)

Others
Part of the fun of this activity is that you never know what you might find in your playa soil! Use the internet or books to try to figure out what some of the other critters are. One good starting point is the High Plains Ecology web site on playas (www2.tltc.ttu.edu/msw/).

Understanding Desert Animals

Introduction: The desert is alive with animals that are highly specialized to survive in the dry desert environment. This activity allows you to use your knowledge of desert animals to categorize and study them in greater detail.

Materials:

- Desert animals list and pictures
- Large sheets of butcher paper

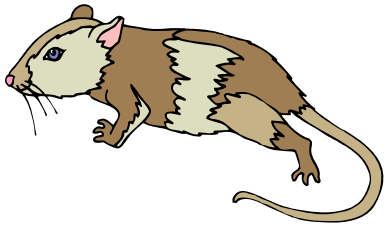
Procedures:

Part A: Categorizing

1. Fold the butcher paper to create 6 sections, following your teacher's instructions.

2. Title the sections of their paper with the following classifications: insects, arachnids, amphibians, reptiles, birds, mammals.

3. Get a list of desert animals and discuss the characteristics of each animal. Put them into the appropriate category on the paper. Draw the animals in the appropriate box or just write in the names.



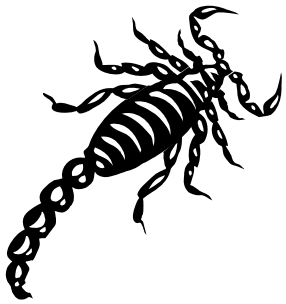
Part B: Form a Hypothesis and Library Research

1. Your teacher will choose an animal for your group.

2. Make a list of the physical characteristics of your group's animal and the possible uses of these characteristics. Form hypotheses about how each animal is adapted to survive in the desert.

3. Using the library or internet, do research on your animal to find out how this animal survives in the desert.

4. Present your findings to the class.



Desert Presentation

Bring a camera to the field trip and document what you see and learn. When you return to the classroom, create a presentation from the photos. Give the presentation to parents, other classes, Nature Park staff, etc.

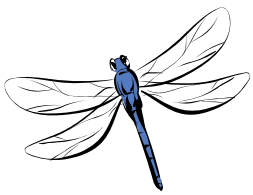
Desert Haiku

Haiku is a form of Japanese poetry with a particular structure of syllables in each line. Create a desert haiku about your field trip experience.

Line 1 (5 syllables)	Mesquite thorns protect
Line 2 (7 syllables)	clever, collecting packrats
Line 3 (5 syllables)	from hungry foxes.

Desert Diorama

Create a desert scene in a small, plastic wading pool using sand, rocks, cutouts of plants and animals, and other materials. Add labels, identifying each of the plants and animals in the diorama. Display this diorama for parents and other students.



Glossary

Adaptation – an anatomical, behavioral, or physiological trait that improves an organism's ability to survive and reproduce.

Condensation - the process of change from a gaseous to liquid state (e.g., change from water vapor to liquid water)

Desert - a place where more water would be lost through evaporation than is gained by precipitation (alternate definition: a place that receives less than 254 mm or 10 inches of precipitation per year)

Diurnal - ad adjective describing animals that are primarily active during the day

Dormant – an inactive state

Ephemerals – plants that live briefly and reproduce rapidly in response to water (often called annuals)

Evaporation - the process of change from a liquid or solid state to a gaseous state (e.g., change from liquid water to water vapor)

Exoskeleton – a hard covering on the surface of an animal (opposite of an endoskeleton)

Hypothesis - an educated guess that requires further investigation

Infiltration – the act of water entering the soil through the surface

Nocturnal - an adjective describing animals that are primarily active at night

Playa - in the desert, a low-lying, shallow area that floods intermittently

Precipitation - water vapor from the air that falls to the Earth as rain, snow, sleet, or hail

Rumen – one part of the digestive tract of a ruminant animal, such as a cow or an antelope, where most fermentation takes place

Runoff – water that reaches the upper layer of soil, but is not absorbed into deeper layers

Stoma (plural **stomata**) – a pore on the surface of leaves that allows plants to exchange oxygen and carbon dioxide with the environment

Transpiration – the loss of water vapor from a plant

Uric acid – a solid form of nitrogenous wastes excreted by insects, birds, and some retiles