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

6th - 8th 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.
Biome Climate Comparison

Questions
How do temperature and precipitation differ between biomes? How do these differences in temperature and precipitation affect the types of plants and animals that are found in each biome?

Materials
- Map of North America
- Climate data from the LTER Climate Data web site
- Colored pencils

My Hypothesis
__________________________________________________________________

Procedures
1. Find the location of each LTER site on the map of North America. Determine the biome for each site. You can find links to each site from the following web site: http://www.ltemet.edu/sites/

<table>
<thead>
<tr>
<th>LTER SITE</th>
<th>BIOME</th>
<th>LOCATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coweeta</td>
<td></td>
<td>Otto, NC</td>
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<tr>
<td>Jornada</td>
<td></td>
<td>Las Cruces, NM</td>
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<tr>
<td>Konza</td>
<td></td>
<td>Manhattan, KS</td>
</tr>
<tr>
<td>Bonanza Creek</td>
<td></td>
<td>Fairbanks, AK</td>
</tr>
<tr>
<td>Niwot Ridge</td>
<td></td>
<td>Boulder, CO</td>
</tr>
</tbody>
</table>

2. Your teacher will help you choose one or more of the sites from the chart. Use data from the Climatic Analysis of Biomes sheet to graph the average temperature and precipitation for your biome(s) on the graph templates.

3. Complete the Biome Organism Data Sheet for your biome(s).

Results: See the completed graphs and Biome Organism Data Sheet.

Conclusions:
Biome Climate Comparison - Temperature
Biome Organism Data Sheet

Long Term Ecological Research Site: _________________________________

Which Biome is it in? _____________________________________________

What is the yearly average temperature range? _______________________

What is the yearly average precipitation range? _______________________

List 5 native plants found there:

1. 
2. 
3. 
4. 
5. 

List 5 native animals found there:

1. Arthropod:
2. Amphibian:
3. Reptile:
4. Bird:
5. Mammal:

Other information about this biome:
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 and let you see how much of each particle type is in your soil. Sand particles are the biggest, silt particles are medium, and clay particles are the smallest.

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______________
Seeds To Go

Question
What is the most effective way for a seed to disperse?

Materials
• Various seed types representing different types of dispersement
• Bean seeds
• Velcro
• Tissue paper
• Film canisters
• Pipe cleaners
• Other materials found in the classroom or at home

Hypothesis
_________________________________________________________________
_________________________________________________________________

Procedures
1. With the sample seeds, examine and discuss how the seeds are dispersed.

2. You will have several bean seeds to use as the "seed" part of your seed.

3. Design the best seed transportation system using the materials provided. The transportation system should not only be able to move the seed some distance but protect the seed as well.

4. Demonstrate how your seed works to the rest of the class.

Results
Compare the effectiveness of seed works with the seeds built by the rest of the class.

Conclusion
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?
Chihuahuan Desert Name Tags

Introduction
In this activity, you will create your own name tag 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 name tag that you can wear during the field trip. **Please, no saguaro cacti** - they do not live in our desert! Use crayons, colored pencils, or other art materials to decorate their tag. Do not forget to write your name in large letters.

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

3. String the ribbon through the hole and make a necklace long enough to go over your head.

4. Scramble the name tags and have an adult put an unseen tag on each student's back.

5. Try to identify the animal or plant on their back by asking questions of other students.

6. If you chose your own plant or animal, you can categorize the class's choices (e.g., count how many students chose mammals, birds, reptiles, insects, plants, etc.). Use these numbers to create a graph. Compare this graph to the true number of mammal, bird, reptile, insect, and plant species in the Chihuahuan Desert (you can look this data up in reference books or on the internet).

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

While saguaro cacti are amazing plants, they do not naturally live in our desert. If you want cacti on your name tag, draw native cacti like prickly pear or barrel cactus.

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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 __________. 

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

Soil is made up of three sizes of particles: __________, __________, and __________. 

A spider is an __________ not an __________. 

This covers an arthropod’s body: __________. 

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

This animal’s name means a thousand legs __________. 

Animals that are active at night are called __________. 

An __________ is a large type of spider. 

This mammal is a member of the canid family __________. 

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

This animal sprays a bad smelling liquid from its abdomen for defense __________. 

Insects, arachnids, millipedes, centipedes, and crustaceans are all types of __________. 

In the desert, there is very little __________ and very little __________. 

This plant’s root can be 80 feet long: __________. 

When water vapor turns to liquid on a solid object it is called __________. 

This is New Mexico’s state flower: __________. 

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

This plant makes the air smell sweet after a rain storm: __________. 

This is the hard layer in the soil that is white in color: __________.
Chihuahuan Desert Word Find

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

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Temperature and Evaporation

**Question**
How is the evaporation rate affected by temperature?

**Materials**
- Pan with screen lid
- Ruler
- 100 ml graduated cylinder
- Water bottle
- Fine-point permanent marker
- Colored pencils

**My Hypothesis**


**Procedures**

1. Use a fine-point permanent marker to make a line 5 cm from the bottom of the pan; this will be used to indicate the fill depth of the water in the pan.

2. Place the lid on the pan and place the pan in a sunny area in the schoolyard.

3. Slowly add water to the pan until the water level reaches the mark on the pan. View the pan from the same position each time water is added.

4. After 48 hours, use the 100 ml graduated cylinder to add water to the pan until it reaches the original mark. Use a plastic water bottle to refill the graduated cylinder when more than 100 ml are needed. Record the date and the volume of water added on the My Observations of Temperature and Evaporation Data Sheet.

5. Find the high temperatures for the days of the experiment, either on the internet or in the newspaper. Average the high temperatures and record the average on the My Observations of Temperature and Evaporation Data Sheet.

6. If it rains during this experiment, stop the experiment and restart the following day.

7. On the My Observations of Temperature and Evaporation Data Sheet, calculate the surface area of the pan in square centimeters (length x width).
8. Divide the total evaporation by the surface area of the pan. This will give you the evaporation per unit area of pan and allow comparisons with others that have different sized pans.

9. Gather results from other groups, and record these data on the Class Average Data Table. Calculate the class average, and record this average on the Class Temperature and Evaporation Data Sheet.

10. Graph the class averages each month to help develop conclusions.

**Results**

See your graph.

**Conclusions**
My Observations of Temperature & Evaporation Data Sheet

Date experiment started: ______________    Date experiment ended: ______________
Location of experiment: __________________
Time: ____________      My group number: ______________

Volume of water added (in ml): __________________

High temperature on day experiment started (in °C)       ________
High temperature on second day of experiment (in °C)   ________
Average High Temperature (in °C)                       ________

Surface Area of Pan (length in cm x width in cm) _______________ (1 inch = 2.54 cm)
Evaporation per unit of surface area (water added divided by surface area) __________
(ml/cm²)

Class Average Data Sheet

<table>
<thead>
<tr>
<th>Group</th>
<th>Volume of water added (ml)</th>
<th>Evaporation/surface area (ml/cm²)</th>
<th>Average temperature (°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
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<tr>
<td>Class Average</td>
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</tbody>
</table>
# Class Temperature & Evaporation Data Sheet

**Time:** ______________  **Location of experiment:** ______________

<table>
<thead>
<tr>
<th>Dates</th>
<th>Evaporation/surface area (ml/cm²)</th>
<th>Average high temperature (°C)</th>
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</table>
Soil Erosion

Question
Does vegetation affect the rate of soil erosion?

Materials
• Metric measuring tape or rulers
• Rebar segments
• Permanent marker
• Colored pencils

My Hypothesis
_________________________________________________________________

Procedures
1. Measure the length of the rebar and put a mark around the rebar at the middle.

2. Locate six areas with a slope around your schoolyard (3 bare soil and 3 vegetated). This activity is best done where there is little traffic to avoid students tripping over the rebar stakes.

3. Hammer the rebar into the ground until the halfway mark is at ground level. This mark is used only as guide.

4. Measure from the top of the rebar to ground surface. Record this on the My Observation of Soil Erosion Data Sheet (this is the "Start Measurement").

5. On the same day, every other week, measure from the top of the rebar to the ground surface, not to the mark. Deposition (soil build-up) may have occurred and therefore the mark may actually be below the soil surface. Calculate the difference between the starting measurement and that day's measurement. Record these differences on the My Observations of Soil Erosion Data Sheet.

6. Average these measurements (starting measurement minus the third measurement; 3 for bare soil and 3 for vegetated) and record the averages on the Class Average Table.

7. Graph your results.

Results
See your graph.

Conclusions
My Observations of Soil Erosion Data Sheet

**Bare Soil:** Location #1: _________ Location #2: _________ Location #3: _________

**Vegetated:** Location #1: _________ Location #2: _________ Location #3: _________

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**Class Average Table**

<table>
<thead>
<tr>
<th>Location</th>
<th>Bare Soil</th>
<th>Vegetated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loc. 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Loc. 2</td>
<td></td>
<td></td>
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<tr>
<td>Loc. 3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Length of Rebar Visible (cm)**

<table>
<thead>
<tr>
<th>Location</th>
<th>1st Measurement Date:</th>
<th>2nd Measurement Date:</th>
<th>3rd Measurement Date:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loc. 1</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Loc. 2</td>
<td></td>
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<tr>
<td>Loc. 3</td>
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</tbody>
</table>

**Difference (Start - 1st date)**

<table>
<thead>
<tr>
<th>Location</th>
<th>Bare Soil</th>
<th>Vegetated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loc. 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Loc. 2</td>
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<td></td>
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<tr>
<td>Loc. 3</td>
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</tbody>
</table>

**Difference (Start - 2nd date)**

<table>
<thead>
<tr>
<th>Location</th>
<th>Bare Soil</th>
<th>Vegetated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loc. 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Loc. 2</td>
<td></td>
<td></td>
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<tr>
<td>Loc. 3</td>
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<td></td>
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</tbody>
</table>

**Difference (Start - 3rd date)**

<table>
<thead>
<tr>
<th>Location</th>
<th>Bare Soil</th>
<th>Vegetated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loc. 1</td>
<td></td>
<td></td>
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<tr>
<td>Loc. 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Loc. 3</td>
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<td></td>
</tr>
</tbody>
</table>

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Soil Erosion

Measurement (Starting measurement minus ending measurement in length of visible rebar (cm))
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 tallest 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. ____________________________________________________________

Procedures
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 1 cm inside the canister and 3 cm 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 5 mm 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 3/4 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 tallest 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 cm).

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.

<table>
<thead>
<tr>
<th>Plant Number</th>
<th>Soil 1</th>
<th>Soil 2</th>
<th>Soil 3</th>
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<tbody>
<tr>
<td>1</td>
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</table>
**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?
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 (sandwich containers or 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 °C. 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 May 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.

Clam Shrimp (Eulimnadia texana)
These small (generally 5 mm 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.

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.
Desert Presentation

Bring a camera to the field trip and document what you see. When you return to the classroom, create a presentation from your photos (you can even set the presentation to music if you really creative!). Give the presentation to your parents, other classes, Asombro staff, etc. You are responsible for checking the accuracy of the information you present.

Desert Poetry

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. It may help to create a haiku as a class before you work on your own.

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

Diamante
A diamante is a poem in the shape of a diamond. It follows a pattern of parts of speech:

noun adjective seed
adjective participle round hairy
participle participle sprouting growing living
noun noun noun noun roots stem leaves flowers
participle participle participle photosynthesizing living producing
adjective adjective green smelly
noun

Cinquain
The cinquain is a form of poem that is comprised of five un-rhyming lines of two, four, six, eight, and two syllables. Each line has a purpose. Line 1 - title; line 2 - description; line 3 - a description of action; line 4 - a description of feeling; line 5 - another word for the title.

Spider
Many long legs
Crawling swiftly to eat
Interesting but strange looking
Arachnid

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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** - an 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 arthropod (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 a pronghorn, 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 reptiles