LESSON: It's A Matter Of Life And Death!! – Awesome Animals and Pleasing Plants.

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DISTRICT: Weber
GRADE LEVEL: 4

CORE CURRICULUM

Science Standard 5: Students will understand the physical characteristics of Utah's wetlands, forests, and deserts and identify common organisms for each environment.

Objective 2: Describe the common plants and animals found in Utah environments and how these organisms have adapted to the environment in which they live.

Intended Learning Outcomes:
1. Students will be able to use science process and thinking skills.
2. Students will be able to understand important science concepts and principles.
3. Students will be able to communicate effectively using science language and reasoning.

Lesson Objective: The students will be able to describe the common plants and animals in deserts and wetlands. Students will be able to identify how organisms have adapted to the environment in which they live.

Content Connections: Language arts, Art.

INTRODUCTION

The purpose of hands-on inquiry activities in science is to introduce the students to concepts by making observations and comparisons. If students are exposed to new science concepts through an inquiry-based approach with activities they are directly involved in, their interest and attitudes are positive toward the subject. They are able to use science processes and thinking skills in a setting where they are reasoning and gaining understanding.

INVITATION TO LEARN

Discuss with students the changes (adaptations) we make for different situations and different temperatures. Animals have to make adaptations to survive as well. Have two students come up and imitate adaptations for survival.

Desert Adaptations:
1. Tan felt- show camouflage and light colored skin.
2. Fat tail – stores water.
3. Long limbs – enable the creature to keep itself off the hot surface (wooden spoons...
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<tr>
<td>4.</td>
<td>Claws – many desert animals burrow underground to get away from the heat (paper clips attached to felt paws.)</td>
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<td>5.</td>
<td>Large eyes-most desert creatures are nocturnal (modified sun visor with large felt eyes glued to the brim.)</td>
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<td>6.</td>
<td>Many desert creatures have modified structures to keep sand out of nose, mouth and ears (swimmer’s nose plug, ear plugs.)</td>
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<tr>
<td>7.</td>
<td>Water conservation (sponges pinned to student.)</td>
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<tr>
<td>8.</td>
<td>Nocturnal (sunglasses.)</td>
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</tbody>
</table>

**Wetlands Adaptations:**

1. Eyes on top of head so the animal can stay submerged (straw hat with styrofoam eyeballs attached.)
2. Nostrils (film canisters attached to brim of hat)
3. Goggles
4. Feet adapted to swimming (scuba flippers)
5. Preen gland (vegetable oil bottle attached)
6. Feeding method (hand strainer)
7. Salt gland (salt shaker)

Have the refrain of song “I Will Survive” playing in the background.

**INSTRUCTIONAL PROCEDURES**

When you hear the word “adapt”, you think of fitting in. Humans and animals are always changing to fit in different situations and places. If animals don’t adapt, they won’t survive. An adaptation is a characteristic that makes an organism more suited to its environment. There are two kinds of adaptations: behavioral adaptations (activities or behavior of the animal), and physical adaptations (body parts of the animal). Write ADAPTS on the board. ADAPTS means: Animals Depend on their Activities and Parts to Survive. Discuss behavioral adaptations and physical adaptations and brainstorm with the class.

Behavioral – migration, raise tail or stomp foot to signal danger, chatter to warn, hibernation, etc.

Physical – beaks shape and size, feet shape and size, eye size, shape and size of ear, teeth shape and size, color of skin or fur.
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Animals adapt for specific purposes:
1. To obtain food (carnivores, birds)
2. To build homes (beaver)
3. To withstand the weather (fat layer, hibernation)
4. To attract a mate (smell, color etc).

All animals live in habitats. Habitats provide food, water and shelter which animals need to survive. We are going to discuss the desert habitat and the animals and plants that live there. Display map of Utah habitats.

Desert
Two common characteristics of deserts are that they are dry and have a high rate of evaporation. Deserts generally receive less than 10 inches of rainfall per year. Portions of two deserts are located in Utah, The Great Basin (cold desert) and Mojave (hot desert.) Dry rock or sand soil and scarcity of surface water are characteristics of the desert. Days are hot and nights tend to be very cold.

ANIMALS AND THEIR ADAPTATIONS:

SNAKES – coloration
1. Rattlesnakes– venom to immobilize prey
2. Sidewinder – throws its head in front of its body as an anchor and pulls itself along.

LIZARDS – coloration, nocturnal, long legs and throws to lift body off ground, fast moving
1. Chuckwalla – vegetarian; when threatened, swallows air and fills its body like a balloon so it can’t be pulled from a crack
2. Zebra tailed lizard – waves tail when predator grabs it the tail falls off
3. Longnosed leopard lizard – spots change color to attract the opposite sex, fringe toes act like snow shoes to run across sad; valves in nostrils, overlapping eyelids; flaps over ears.

TORTOISE threatened animal rough skin to protect against water loss; sharp claws and strong legs to dig burrows; stores water in bladder.

BIRDS – active at dawn and within a few hours of sunset
1. Kingbird – active in day but perches in shade often
2. Turkey vultures – excrete waste on their legs and feet; waste evaporates and carries
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away body heat

Other Adaptations
1. Burrowing – kit foxes, rodents (plug entrance of burros) tarantulas
2. Pant – owls, poorwills and nighthawks
3. Large Ears – jackrabbits – aim to Polaris

PLANTS – ¼ are endemic not found anywhere else in the world. Desert plants include: Creosote bus, Mojave sage, chollas, barrel cacti, prickly pear, beavertail mesquite, shadscale, brittlebrush, desert holly, white burrobush, yuccas, wild flowers, and the Joshua tree.

Desert plants have to have the ability to collect and store water. They need features that reduce water loss. Plants do this by hoarding water, storing water or staying wet.
1. Plants that store water (succulents) have shallow roots – (ie cacti).
2. Have a different form of photosynthesis crassulacean acid metabolism (CAM) that allows plants to make food in the day without wasting water.
3. Drought dormancy allows a plant to conserve water through reduced metabolism.
4. During extreme heat some plants drop their leaves and remain dormant until they grow new leaves (i.e., mesquite, acacia, palo verde, ironwood, creosote, ocotillo)
5. Plants that grow only in spring (desert paintbrush, sand verbena) store moisture, oil, fat, sugar and protein in seeds that have a thick coating.
6. Some plants have long tap roots (mesquite, phreatophytes).
7. Some plants have waxy or oily coatings on leaves (creosote, jojoba) that acts like a plastic wrapper.
8. Some plants create Own shade through hairlike projectile (trichomes) or leaves (cacti spines provide shade).

LESSON MATERIALS
- Maps of Utah habitats
- Tan felt, clothespins, 2 wooden spoons, sun visor with large felt eyes, swimmer’s nose plug, ear plugs, sponges, sunglasses, athletic sock stuffed with cotton.
- Straw hat with styrofoam eyeballs attached, 2 film canisters, scuba flippers, vegetable oil, hand strainer, salt shaker
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ASSESSMENT SUGGESTIONS
1. Student writing in journal, using a rubric checking for understanding of core concepts
2. What’s My Adaptation review game
3. Matching activity of animals and plants with their environments and with their adaptations.

POSSIBLE EXTENTIONS/ADAPTATIONS/INTEGRATION
Have students create a new plant or animal of the desert. Have them design specific adaptations that this new plant or creature would have for the environment in which it lives. Students will illustrate their plant or animal and write a paragraph about the adaptations in their journal.

RESOURCES: BOOKS, MEDIA, ARTICLES, WEB SITES, AND ORGANIZATIONS

BOOKS
Creatures of the Desert World, A National Geographic Action Book; ISBN# 0-87044-687-8


What are Camouflage and Mimicry? by Bobbie Kalman; ISBN# 978-0-865050962-7


What Color is Camouflage? by Carolyn Otto; ISBN# 978-0-06-556160-4

How Do Animals Adapt?, by Bobbie Kalman; ISBN#978-0-86505-957-3


How Do Animals Find Food?, by Bobbie Kalman; ISBN#0-86505-963-2
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A Wetland Habitat, by Bobbie Kalman: ISBN#10: 0-7787-2983-4

Teeth, by Sneed B. Collard III; ISBN#13:978-0-545-11875-0


Incredible Animals, by playback; ISBN#10:054501383307

MEDIA

- Eyewitness: Desert (video). DK Vision, BBC Worldwide America
- Fresh Water Animals (video). Kodak Video Programs, Sierra Club Series, CAT 815 0682
- 7. Desert Animals and Plants (video). Kodak Video Programs, Children’s Series – Animals in Action CAT 807 0047

ARTICLES

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WEB SITES
Retrieved from the World Wide Web on 11/09:
http://scifiles.larc.nasa.gov/text/educators/activities
www.accessexcellence.orgAE/ATG/datareleased
http://harcourtschool.com/activity/exploring_ecosystems/desert.html
http://teacher.scholastic.com/dirtrep/animal/tguide.htm
http://www.coff.edu/ete/modules/msese/earthsyrfr/adapt.html
http://www/k12.nf.ca/shag/animls-home.htm

ORGANIZATIONS

FAMILY CONNECTIONS
Have students talk about adaptations they make when they move to a new place, go somewhere on vacation, etc.

Students can do any of the activities we did in class with their family.

LESSON AND ACTIVITY [TIME SCHEDULE]
- Each lesson is 55 minutes
- Each activity is 30 minutes
- Total lesson and activity time is 90 minutes

ACTIVITY CONNECTED TO LESSON

Activity Centers (Small Groups):
1. Bird Beak Activity - A bird’s beak and feet are the best indicator of where it lives or its habitat. Students will learn which beak adaptation is best for different types of food. Use spoons, tweezers, chopsticks, pliers and clothespins for beaks. Give each student one plastic cup to serve as the bird’s stomach. Participants will try out each type of “beak,” picking up the “food” with the beak only. “Food” will be marbles, pipe cleaners, pennies, dry beans, sunflower seeds, rice (inside stumps), etc.

2. Animal Feet Relay Race - (A) pair of socks with batting in the end – wear these on
back feet and hop like a rabbit. (B) 2 pairs of socks with batting sewn under the ball of the foot --wear on all fours like paws. (C) A set of 3 foot 1' x 4' planks with two straps on each---two people wear this with one plank attached to each foot to walk like a caterpillar. (D) 1 pair of quart-sized paint cans with ropes attached as handles. Walk like an animal with hooves. Introduce the various "feet" and predict what animal might have similar feet. Let them try out kinds of feet. Divide the group and race with each different set of feet. Discuss the advantages and disadvantages of the different feet. What coping mechanisms did they discover to move quickly with their new feet? Have them record in their journals.

3. Sponge Adaptation Activity – distribute 4 sponges, a plastic bag and an experiment sheet to participants. The sponges will represent desert-dwelling animals. The students will simulate three adaptations/behaviors that some desert animals have to retain water and reduce overheating. (1) Avoid heat, being active at dusk and dawn (shaded sponge – place in shady area) (2) Avoiding heat by burrowing (burrow sponge – fill disposable turkey pan with sand, dig hole cover sponge with 1 inch of sand) (3) Retaining water by having waterproof skin that retains moisture (waterproof skin sponge – put in ziplock bag). (4) Control sponge, Students will weigh their sponges at the beginning and every 24 hours. Discuss which adaptation retained the most water and why.

4. Plant Adaptation Activity - Discuss what plants need to survive (water, soil or other nutrients, and sunlight.) The desert makes it difficult for plants to grow because it is dry, windy and hot in the day and cold at night. Adaptation objects- garden hose-tap root that can be 15 ft. long (Yucca), stocking cap with pipe cleaners sticking through – like the spines on cactus. Spines break up the wind and lessen evaporation as well keeping animals from eating the plant (prickly pear cactus), fuzzy cloth -less water is lost when the wind is broken up[sage brush], white cloth – light leaves absorb less heat (rabbitbrush), narrow-mouthed water bottle and broad-mouthed water bottle- stomata allow water and air to escape from the plant, if the opening is small, less water escapes (single leaf ash), bag of crayons – waxy coating (juniper). After using objects to describe adaptations, use adaptation cards to review- giving one clue at a time.

5. Desert Plants Activity – Dampen 3 paper towels with water (make them wet but not dripping). Lay one towel out flat on cookie sheet, then roll up second paper towel and put it next to flat one on pan. Roll up the last towel, but cover the outside with waxed paper and put paper clips to secure the waxed paper roll. Put on pan. Put
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the pan where it will receive direct sunlight. Unroll paper roll after 24 hrs. Discuss why the flat towel is dry, the rolled towel is dry on the end and the waxed paper towel is damp all over. The more surface area that is exposed to air, the faster water evaporates. Desert plants have thick and/or round leaves to help prevent water loss. The surface of the leaves is waxy to help prevent water loss.

6. Duck Feather Activity – Cut out ducks from cardstock. Cover one duck with vegetable oil. Do nothing to the other duck. Spray both ducks with a water bottle. What did you observe?

7. Turtle’s Shell Activity – Give students two pieces of clay to make two turtles. Cover one turtle with a plastic punch cup. Then have students pretend to be a predator. Try smashing each turtle. What did they learn about the adaptation of hard protective coverings or shells? Have them write about it in their journals.

8. Feet/Claws Activity – Have tight-fitting gloves, bulky ski mittens, tongs, and socks. Have students experiment with each hand covering acting as a foot or claw. Try picking up a small plastic mouse, a marble, a pipe cleaner, etc. Which kind of foot/claw worked best for each item? Which foot/claw is similar to which bird or animal? What did you learn? Have them write about it in their journals.

Total Group Activities:

1. Eagle Eye (skittles activity) – Put pictures of different birds of prey around students’ neck. Ask, “What is one type of prey that each raptor might hunt for?” Hand out one skittle to represent that prey. Use a variety of Skittle colors. Have students place Skittles on a line on the ground and then start backing away. When individual students can no longer see their Skittles, they stop. Measure the distance from where the first student stopped to the Skittles. Multiply the distance by ten – that would be the distance from which an eagle could see the Skittle. Discuss which colors would be easier to see. Would a moving Skittle be easier to see? Have them write about the activity in their journals.

2. Win, Lose or Adapt Activity – After discussing adaptations, divide into two teams. Draw a game card. While the student is drawing the animal and its adaptation on the blackboard (one minute limit), the rest of the team guesses the animal and its adaptation. If Team One can’t guess within one minute, Team Two has a chance to draw and guess the same card. When the correct answer is given, a student will read the back of the card and tell how the adaptation helps the animal to survive.
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3. What's My Adaptation Review Game – Hang a picture around each student's neck, with the picture on his/her back. Tell students that the picture is either a plant or animal we have discussed. Tell them to walk around the room and ask other students yes/no questions to help them figure out what plant or animal is on their back. Review examples of good questions. When they figure out their creature, they sit down.

ACTIVITY MATERIALS

- 12 small sponges (each class)
- scale
- disposable turkey pan (1 per session)
- sandwich ziplock baggies (2 per person)
- bag of sand
- Vaseline (1 per session)
- skittles (1 large bag each class)
- narrow-mouthed water bottle
- wide mouth water bottle
- white cloth
- large sponge (6 x 8) 1 per session
- stocking cap
- pipe cleaners
- garden hose
- fuzzy wash cloth
- set of swim fins
- 2 quart-size paint cans with ropes attached
- 3 foot 1 x 4 with two straps attached
- 6 pair of athletic socks
- batting (1 roll as for a quilt)
- 6 tweezers
- 6 clothespins
- 6 pair of chopsticks
- 6 pliers
- 6 tongs
- plastic cups- 3 per participant
- rubber bands
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- marbles
- pinto beans (1 bag per class)
- pennies (2 rolls per class)
- paper towels (1 roll per class)
- wax paper (1 roll per session)
- baking sheet (1 per session)
- cut outs of butterfly – one per student
- clay (a small piece 2” x 2” per participant)
- Hard, small punch plastic cups (1 per participant)
- cooking oil (1 per session)
- cutouts of ducks
- bulky ski mittens (6)
- gloves (6 sets)
- tongs (6 sets)
- Spray bottles (2)
- sunflower seeds (1 package per class)
- rice (1 large bag per session)
- popcorn (1 large bag per session)
**Plant Puzzlers Student Worksheet**

**Directions:**

One team member will take a square from each bag. The other will write the words on different squares in the correct column of this activity page. Take turns.

Continue until each member has filled in two rows across.

<table>
<thead>
<tr>
<th>Where it Lives</th>
<th>How it Looks</th>
<th>How it Survives</th>
<th>Name of Plant</th>
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<tbody>
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### Plant Puzzler Cards

Cut this page into squares along the lines. Put the squares into the correct bag.

<table>
<thead>
<tr>
<th>forest</th>
<th>desert</th>
<th>wetland</th>
<th>woody stems</th>
</tr>
</thead>
<tbody>
<tr>
<td>spiny skin</td>
<td>lives near water</td>
<td>loses leaves in Autumn</td>
<td>waxy coating</td>
</tr>
<tr>
<td>furry leaves</td>
<td>light color</td>
<td>leaves go dormant</td>
<td>seeds float and flutter</td>
</tr>
<tr>
<td>two-sided needles</td>
<td>looks dead in dry spells</td>
<td>grows acorns which are food for rodents, birds, or deer</td>
<td>long slender green stalks with brown growth on top</td>
</tr>
<tr>
<td>yellow flowers</td>
<td>roots are shallow</td>
<td>broad leaves</td>
<td>tall stalks with triangular stems</td>
</tr>
<tr>
<td>attracts pollinators</td>
<td>desert</td>
<td>forest</td>
<td>wetland</td>
</tr>
</tbody>
</table>
### Animal Survival

How do animals survive in their environments?

<table>
<thead>
<tr>
<th>Wetland</th>
<th>Forest</th>
<th>Desert</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Common Animals:</strong></td>
<td><strong>Common Animals:</strong></td>
<td><strong>Common Animals:</strong></td>
</tr>
<tr>
<td><strong>How they survive:</strong></td>
<td><strong>How they survive:</strong></td>
<td><strong>How they survive:</strong></td>
</tr>
</tbody>
</table>
Utah Environments

1- Mountain Forest
2- Mountain Forest/Desert Transition
3- Desert
4- Wetland