4th Grade Lessons Table of Contents

Unit I: Herbivores, Carnivores, Omnivores

Unit II: Food Chains

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Science Activity 1: What's for Dinner?

Strand II: Content of Science
Standard II: Life Science: Understand the properties, structures, and processes of living things and their environments.
K-4 Benchmark I: Know that living things have diverse forms, structures, functions, and habitats.
Performance Standards: Grade 4
4. Describe the components of and relationships among organisms in a food chain.

Objective: The students will place picture cards of Chihuahuan Desert animals under the correct diet category.

Materials:
"What's for Dinner?" PowerPoint
Chihuahuan Desert Food Chain packets that contain pictures of Chihuahuan Desert plants and animals, a "Plants and Animals of the Chihuahuan Desert" booklet, and arrows.
1 blank sheet of 8 ½ by 11" paper (folded into three columns)
Procedure:
Show and discuss the "What's for Dinner?" Power Point.

Have students work in pairs.

Have students write Herbivores on the first column, Carnivores on the second column, and Omnivores.

Place these animals' names on the board:

black bear	**great horned owl**
coyotes	**kit fox**
desert cottontail rabbit	**porcupine**
desert tarantula	**mountain lion**
frog	**snake**

Have students use the "Plants and Animals of the Chihuahuan Desert" booklets to determine which category each of these animals belong to. They should write the names of the animals under the proper column heading and then draw pictures of those animals.

Continued on the next page.

Science Activity 1: What's for Dinner? Continued

Answers:

Herbivores	Omnivores	Carnivores
desert cottontail rabbit	black bear	desert tarantula
porcupine	coyote	frogs
	kit foxes	great horned owl
		mountain lion
		snakes

Note: Students will need the papers they prepared for Unit 1, Math 1.

Math Activity 1: Venn Diagram

Strand: Data Analysis and Probability
Standard: Students will understand how to formulate questions, analyze data, and determine probabilities.
K-4 Benchmark D.2: Select and use appropriate statistical methods to analyze data.
Performance Standard: Grade 4

4.D.2.3 Use data analysis to make reasonable inferences/predictions and to develop convincing arguments from data described in a variety of formats (e.g., bar graphs, Venn diagrams, charts, tables, line graphs, and pictographs).

Objective: The students will use a Venn diagram to correctly place animals in one of three categories - Herbivores, Omnivores, Carnivores.

Materials:
Venn diagram (p. 4) - Herbivores, Omnivores, and Carnivores
The completed "What's for Dinner?" science activity .

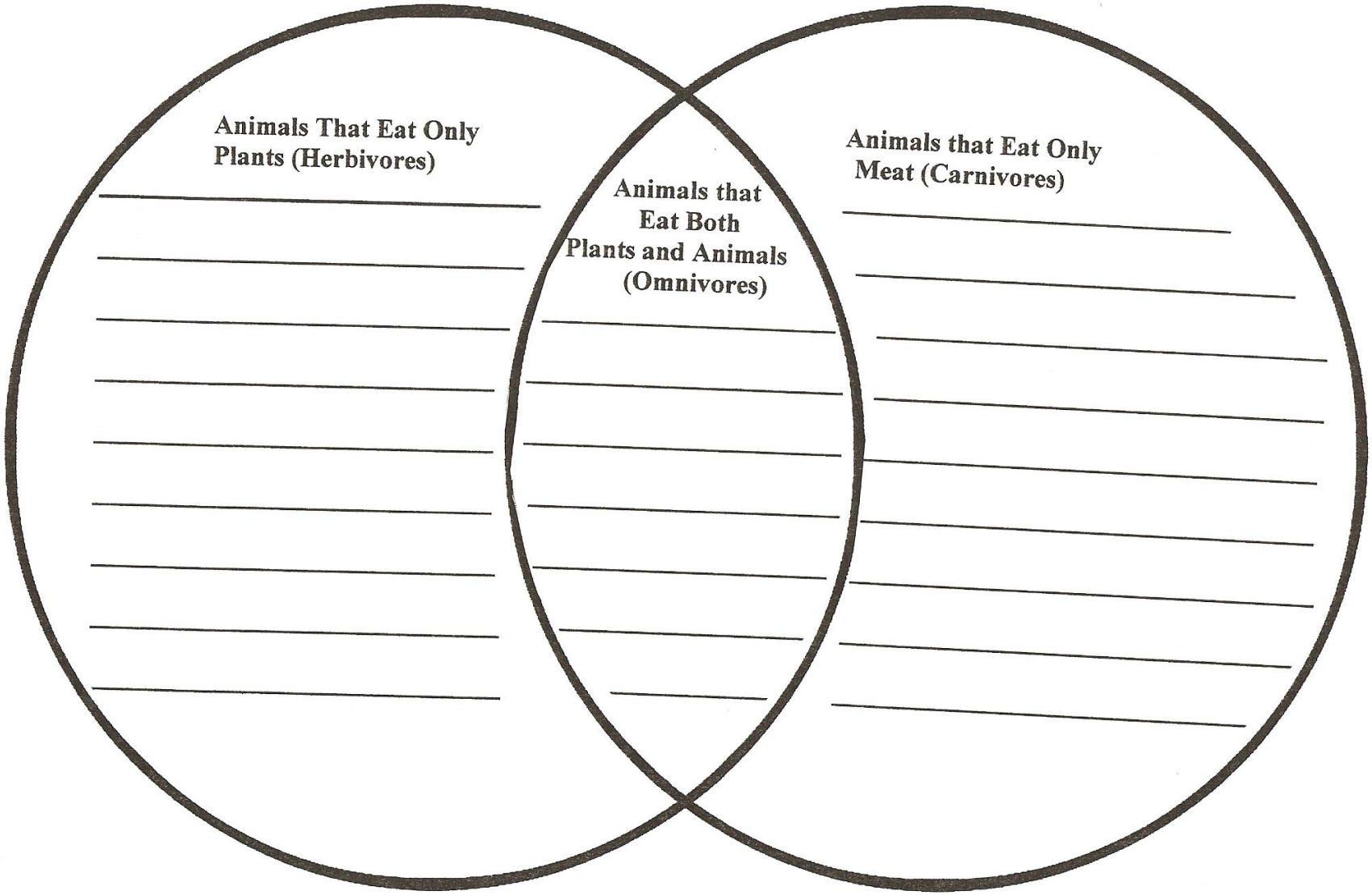
Procedure:
Give each student a blank Venn diagram form and instruct him or her to label the sections with:
Herbivores Omnivores Carnivores

Let the students use their answer sheets to fill in the Venn diagram.

Note: The students will need their Venn diagrams to complete Unit I, Math lesson 2.

Venn Diagram- Animals' Diets

Name_____



Math Activity 2 - Writing Fractions

Strand: NUMBER AND OPERATIONS
Standard: Students will understand numerical concepts.
K-4 Benchmark N.1: Grade 4
Performance Standards
4.N.1.3 Add and subtract fractions with common and uncommon denominators using a variety of strategies:

- **a. Recognize and generate equivalent decimal forms of commonly used fractions (e.g., halves, quarters, tenths, fifths)**

Objective:

Using the information from their Venn diagram, the students will write the fraction and equivalent decimal of the animals that are herbivores, omnivores, or carnivores.

Materials:

Completed Venn diagram from Unit I, Math Activity 1

Procedure:

Have students write the fraction for each of the three categories from their Venn diagrams. Once they have written the fractions have them write the equivalent decimal for each fraction.

Answers

Herbivores - 2/10; .20 Omnivores - 3/10; .30 Carnivores - 5/10; .50

Science Activity 1: Food Chains

Strand II: Content of Science
Standard II: Life Science: Understand the properties, structures, and processes of living things and the interdependence of living things and their environments.
K-4 Benchmark I: Know that living things have diverse forms, structures, functions, and habitats.
Performance Standards: Grade 4
4. Describe the components of and relationships among organisms in a food chain.

Objective: The students will place picture cards of Chihuahuan Desert plants and animals in proper order to complete food chains.

Materials:
"Chihuahuan Desert Food Chain" Power Point
Chihuahuan Desert Food Chain packets that contain pictures of Chihuahuan Desert plants and animals, a "Plants and Animals of the Chihuahuan Desert" booklet, and arrows. (We have included the pictures and booklet pages, so you can prepare your own materials.

Procedure:
Show and discuss the "Chihuahuan Desert Food Chain" Power Point.

Let students work with partners. Give each pair a packet containing pictures of the Chihuahuan Desert plants and animals, arrows, and a booklet. Help the students look at the booklet, so they can use the table of contents and so they understand what the animals eat and what eats them. Instruct the students to use the "Plants and Animals of the Chihuahuan Desert" booklet to help them create food chains. Remind them that the arrow's point should be pointed to the animal that is doing the eating.

(You can request a docent from the Zoo to come to your class to present this activity. We have the packets and booklets already prepared. You may call 575-887-5516 to ask for a docent program.)

Science Activity 2: Food Chains -Vertical Accordion Books

Strand II: Content of Science
Standard II: Life Science: Understand the properties, structures, and processes of living things and their environments.
K-4 Benchmark I Know that living things have diverse forms, structures, functions, and habitats.
Performance Standards: Grade 4
4. Describe the components of and relationships among organisms in a food chain.

Objective: The students will create "vertical accordion books" using Chihuahuan Desert plants and animals in proper food chain order.

Materials:
Large white construction paper that has been cut into long strips that are 4" wide

Procedure:
Have each student create a food chains that you approve. Have students make "vertical accordion books" using the long length of a large sheet of construction paper that has been cut four inches wide. Have the students fold the length in half. They should continue folding until they have 8 sections. Have them label each section using p. 8 as a guide. When they have completed labeling, the pages, have them draw an appropriate picture for each page and label each of their pictures.

Vertical Accordion Book Example

A Chihuahuan Desert Food Chain by

Sun

Producer

Gamma grass

First Consumer

Prairie Dog

Secondary Consumer

Bobcat

Tertiary Consumer

Mountain Lion

Scavenger

Turkey Vulture

Decomposers

Bacteria

Language Arts Activity 1: What Would Happen? Paragraph Writing

Strand II: Writing and speaking for expression.
Content Standard II: Students will communicate effectively through speaking and writing.
K-4 Benchmark II-B Apply grammatical and language conventions to communicate.
Performance Standards: Grade 4

1. **Use simple and compound sentences in writing and speaking.**
2. **Combine short, related sentences with appositives, participial phrases, adjectives, adverbs and prepositional phrases.**
3. **Identify and use regular and irregular verbs, adverbs, prepositions and coordinating conjunctions in writing and speaking.**
4. **Use parentheses, commas in direct quotations and apostrophes in the possessive case of nouns and in contractions.**
5. **When appropriate, capitalize names of magazines, newspapers, works of art, musical compositions, organizations, proper nouns and the first word in quotations.**
7. **Spell correctly roots, inflections, affixes and syllable constructions.**

Strand II: Writing and speaking for expression.
Content Standard II: Students will communicate effectively through speaking and writing.
K-4 Benchmark II-C Demonstrate competence in the skills and strategies of the writing process.
Performance Standards: Grade 4

1. **Produce a variety of written compositions using:**
   c. expository writing (e.g., identifying and staying on the topic; developing the topic with simple facts, details, examples and explanations).
2. **Use planning strategies that generate topics and organize ideas.**
3. **Focus revision on sequence of events and ideas, transitional words and sentence patterns.**

Objective: Students will write a paragraph using grade appropriate writing skills.

Procedure:

Have the students think about what would happen to all the animals in a food chain if the sun stopped shining. Have them write a paragraph about the importance of the sun to all the animals, even the ones that are carnivores.

Science Activity 1: Cacti Adaptations - Photosynthesis

Strand II: Content of Science
Standard II: Life Science: Understand the properties, structures, and processes of living things and the interdependence of living things and their environments.
K-4 Benchmark I: Know that living things have diverse forms, structures, functions, and habitats.
Performance Standards: Grade 4

1. **Explain that different living organisms have distinctive structures and body systems that serve specific functions (e.g., walking, flying, swimming).**
3. **Describe how roots are associated with the intake of water and soil nutrients and green leaves are associated with making food from sunlight (photosynthesis).**
4. **Describe the components of and relationships among organisms in a food chain (e.g., plants are the primary source of energy for living systems).**

Objective: The students will describe the three major components necessary for photosynthesis to occur and the importance of the process for maintaining life.

Materials:
PowerPoint "Plant Adaptation 1- Photosynthesis"
Worksheet - "Photosynthesis Notes" (p. 11)
Worksheet - "Photosynthesis Experiments" (pp.12, 13)

Procedure:
Pass out the "Photosynthesis Notes" paper before showing the PowerPoint. Tell the students that they should answer the questions as they watch the PowerPoint.
Show and discuss the PowerPoint "Plant Adaptation 1- Photosynthesis."
Discuss the answers the students have completed on their "Photosynthesis Notes" paper.
Hand out the materials needed (see the worksheet) and the worksheet for the "Photosynthesis Experiments."

"Photosynthesis Notes" answers

1. a. light
b. water
c. carbon dioxide
2. a. oxygen
b. water vapor
c. food
3. light
4. put together
5. glucose
6. carbon dioxide
7. a. oxygen
b. water vapor
8. transpiration

Photosynthesis Notes

Name_____

1. List the three things a plant needs to make its food.

a._____

b._____

c._____

2. What three things are produced by the process of photosynthesis?

a._____

b._____

c._____

3. What does "photo" mean?_____

4. What does "synthesis" mean?_____

5. Another name for sugar is_____

6. What gas <u>goes into</u> the leaves when the stomata are open?_____

7. What two things <u>pass out</u> of the leaves when the stomata are open?

a. _____

b. _____

8. When water vapor is lost through the stomata it is called_____.

Cacti Adaptations Experiments - Photosynthesis

Name_____

Experiment 1: Where Did all the Water Go?

Materials:
1 small broad leaf plant
1 small cactus
2 large zip lock plastic bags

Procedure:
Place each of the plants in a bag and zip the bags shut.
Place both of the bags in the sun for an hour.

Compare the bags and tell what you observe has happened in the bags.

Broad leaf plant_____

Cactus_____

Think about it: If a cactus lost as much water in an hour as a broad leaf plant, would it be able to survive very long in the dry desert?_____

Tell why._____

_____

_____

Cactus Adaptation Experiment: Photosynthesis- Continued
Experiment 2: Open Wide!

Materials:
2 soda or water bottles (the same size)
one bottle with tiny holes in the bottom made by a pin or small nail
the other bottle with larger holes in the bottom made by a pencil
2 - 1 cup measuring cups
2 containers large enough to catch the water that will run out of the bottles

Procedure:
Place each bottle in the large separate containers.
Pour 1 cup of water in each bottle at the same time.
Observe how fast the water leaks out of both bottles.

1. Circle the bottle lost its water the fastest?

Bottle with small holes **Bottle with large holes**

Think About It: The bottle with the small holes represents the stomata of cacti, and the bottle with the large holes represents the stomata of broad-leafed plants. How do the cacti stomata help the cacti to survive in the desert?

Science Activity 2: Cacti Adaptations - Stems

Strand II: Content of Science
Standard II: Life Science: Understand the properties, structures, and processes of living things and the interdependence of living things and their environments.
K-4 Benchmark I: Know that living things have diverse forms, structures, functions, and habitats.
Performance Standards: Grade 4

1. **Explain that different living organisms have distinctive structures and body systems that serve specific functions (e.g., walking, flying, swimming).**
3. **Describe how roots are associated with the intake of water and soil nutrients and green leaves are associated with making food from sunlight (photosynthesis).**
4. **Describe the components of and relationships among organisms in a food chain (e.g., plants are the primary source of energy for living systems).**

Strand II: Content of Science
Standard II: Life Science: Understand the properties, structures, and processes of living things and the interdependence of living things and their environments.
K-4 Benchmark II: Know that living things have similarities and differences and that things change over time.
Performance Standards- Grade 4

2. **Know that a change in physical structure or behavior can improve an organism's chance of survival (e.g., a chameleon changes color, a turtle pulls its head into its shell, a plant grows toward the light).**
3. **Describe how some living organisms have developed characteristics from generation to generation to improve chances of survival (e.g., spines on cacti, long beaks on hummingbirds, good eyesight on hawks).**

Objective: The students will know the functions of cacti stems and that they are adaptations that help them survive in their environment.

Materials:
PowerPoint "Plant Adaptations 2 - Cacti Stems"
"Stem Notes" paper (p. 16)
"Stem Experiments" (pp. 17, 18, 19)

Procedure:
Pass out the "Stem Notes" paper before showing the PowerPoint. Tell the students that they should answer the questions as they watch the PowerPoint.
Show and discuss the PowerPoint "Plant Adaptations 2- Stems."
Discuss the answers the students have completed on their "Stems Notes" paper.
Hand out the materials needed (see the worksheet) and the worksheet for the "Stems Experiments."

Answers are on the next page

Science Activity 2: Cacti Adaptations – Stems - Continued

"Stems Notes" Answers

1. loss of water
2. succulents
3. green and plump
4. shriveled and dried up
5. waxy waterproof coating
6. ribs or fluting
7. a. shade plant
b. provide channels for rainwater
8. a. less exposure to the sun
b. fewer stomata to lose water vapor
9. stem

Stems Notes

Name_____

1. What can be deadly for a cactus?_____

2. What type of plants can store their water in their leaves, stems, and/ or roots?

_____

3. How do cacti look after a rain?_____

4. How do cacti look during a drought?_____

5. What helps keep the moisture in a cactus' stem?_____

6. What allows some cacti to collect water after a rain without hurting the plant?

_____

7. What two jobs do the ribs of the stems do for the cacti?

a._____

b._____

8. What does having less surface area mean for the cacti?

a._____

b._____

9. Where does photosynthesis occur in cacti?_____

Cacti Adaptations Experiments - Stems

Name_____

Experiment 1: The Cover Up!

Materials:
2 sponges of equal sizes cut (the same) to resemble cacti
1 permanent black marker
1 spring scale
1 tablespoon
2 small plastic cups - one marked Sponge 1 and the other marked Sponge 2
water
1 medicine dropper
3 pieces of waxed paper that are larger than the sponges
1 small cactus or a prickly pear pad

Procedure:
Mark one of the sponges with a 1 on its top. Mark the other sponge with a 2 on its top.
Weigh Sponge 1 and Sponge 2 and record their weight while they are still dry.

Sponge 1_____

Sponge 2_____

Add 2 tablespoons of water to each cup.
Place each sponge in its appropriately marked cup.
Weigh Sponge 1 and Sponge 2 and record their weight now that they are wet.

Sponge 1_____

Sponge 2_____

How much more does Sponge 1 weigh now that it is wet?_____

How much more does Sponge 2 weigh now that it is wet?_____

Cacti Adaptations - Stem Experiments - Continued

Mark two of the pieces of waxed paper with Sponge 1.
Mark the 3rd piece of waxed paper with Sponge 2.

Put Sponge 1 on its labeled waxed paper and cover it with its other labeled waxed paper.
Put Sponge 2 on its labeled waxed paper, but do not cover it.
Set both of the papers and sponges in the sun, but away from the wind.
Leave them for 1 to 2 hours.
Weigh each of the sponges again and record their weights.

Sponge 1:_____

Sponge 2:_____

Which sponge weighs more?_____

Why do you think it weighs more?_____

Which sponge dried out faster?_____

Think About It: Look at a cactus' covering. Which sponge is most like the covering? Circle your answer.

Sponge 1 with the waxed paper covering
or
Sponge 2 without the waxed paper covering

Tell why you think so._____

Cactus Adaptations: Stem Experiments- Continued

Experiment 2: Where's the Shade?

Materials:
1 flashlight
1 - 8 x 10" piece of construction paper that has been folded length-wise like an many times until it looks like an accordion
1 stapler
1 desk

Procedure:
Staple the ends of the accordion-folded construction paper (cactus) and stand it upright on a desk (ground).
Turn off the lights.
Stand about 1 ½ to 2 feet away and shine the flashlight (sun) on the paper cactus.
Don't move the paper cactus, but slowly move the flashlight (sun) around the paper cactus.
Observe where the shadows are on the cactus paper as you keep moving the sun around it.

Did the folds provide any shadows on the cactus?_____

Did the cactus provide any shadows on the desk (ground)?_____

Think About It: Why would it be important for a cactus to have shade throughout the day?

Science Activity 3: Cacti Adaptations - Roots and Spines

Strand II: Content of Science
Standard II: Life Science: Understand the properties, structures, and processes of living things and the interdependence of living things and their environments.
K-4 Benchmark I: Know that living things have diverse forms, structures, functions, and habitats.
Performance Standards: Grade 4

1. **Explain that different living organisms have distinctive structures and body systems that serve specific functions (e.g., walking, flying, swimming).**
3. **Describe how roots are associated with the intake of water and soil nutrients and green leaves are associated with making food from sunlight (photosynthesis).**
4. **Describe the components of and relationships among organisms in a food chain (e.g., plants are the primary source of energy for living systems).**

Strand II: Content of Science
Standard II: Life Science: Understand the properties, structures, and processes of living things and the interdependence of living things and their environments.
K-4 Benchmark II: Know that living things have similarities and differences and that things change over time.
Performance Standards- Grade 4

2. **Know that a change in physical structure or behavior can improve an organism's chance of survival (e.g., a chameleon changes color, a turtle pulls its head into its shell, a plant grows toward the light).**
3. **Describe how some living organisms have developed characteristics from generation to generation to improve chances of survival (e.g., spines on cacti, long beaks on hummingbirds, good eyesight on hawks).**

Objective: The students will know the functions of cacti roots and leaves (spines) and that they are adaptations that help them survive in their environment.

Materials:
PowerPoint "Plant Adaptations 3- Cacti Roots and Leaves (Spines)"
"Roots and Spines Notes" paper (p. 22)
"Roots Experiments" paper (p. 23)
"Spines Experiments" paper (p. 24)

Procedure:
Pass out the "Roots and Leaves (Spines) Notes" paper before showing the PowerPoint. Tell the students that they should answer the questions as they watch the PowerPoint.
Show and discuss the PowerPoint "Plant Adaptations 3- Roots and Spines."
Discuss the answers that the students have completed on their "Roots and Spines Notes" paper.

Continued on the next page.

Science Activity 3: Cacti Adaptations - Roots and Spines- Continued

Hand out the materials needed (see the worksheet) and the worksheets for the "Roots Experiments" and the "Spines Experiments."

"Roots and Spines" Notes Answers

1. a. absorb water and minerals from soil
b. carry water and minerals to the stem
c. anchor plant
d. store food and/or water

2. a. fibrous
b. tap

3. absorb more rainwater

4. feeder roots

5. areoles

6. spines

7. they get attached to animals' fur

8. a. reflect sunlight
b. cast shade

Roots and Spines Notes

Name_____

1. Name the four jobs of roots.

a._____

b._____

c._____

d._____

2. What are the two main types of roots?

a._____

b._____

3. What do the fibrous roots of cacti let the plants do?

_____

4. What grows from the roots after a rain?

_____

5. What do cacti have that other succulents don't have?

_____

6. What do cacti grow instead of leaves?_____

7. What protects cacti from foraging animals?_____

8. How can barbed cacti segments get carried to new locations?

_____

9. What two ways can spines help keep cacti cooler?

a. _____

b._____

Cacti Adaptations Experiments - Roots

Name_____

Experiment 1: Soaking it Up!

Materials:
1 ordinary kitchen sponge
water
a container (deeper than the sponge) ¾ full of water

Procedure:
Place the sponge in the container of water.
Write what you observed happened to that sponge.

Think About It: How is the sponge like roots and the water like a rain shower?

Cacti Adaptations Experiments: Spines

Name_____

Experiment 1: The Light and Dark Side

Materials:
1 desk (or ground)
1 sponge cut to look like a cactus
about 20 toothpicks
1 piece of clay
1 flashlight

Procedure:
Poke the toothpicks (spines) into the cactus sponge.
Use the clay to make the cactus stand up.
Stand about 1 foot away from the cactus sponge and shine the flashlight (sun) on it.
Keep the cactus in the same place as you slowly move the flashlight (sun) around it.
Observe where the shadows are on the cactus and on the desk (ground.)

Did the toothpicks (spines) provide any shadows?_____

Did the cactus provide any shadows on the ground?_____

Shine the flashlight over the top of the cactus. Are there any shadows anywhere on the sponge cactus?

Think about it: Do you think spines are important to cacti?_____

Why?_____

_____

Language Arts Activity 1: Writing "Cacti Adaptations" Paragraphs

Strand II: Writing and speaking for expression.
Content Standard II: Students will communicate effectively through speaking and writing.
K-4 Benchmark II-B Apply grammatical and language conventions to communicate.
Performance Standards: Grade 4

6. **Use simple and compound sentences in writing and speaking.**
7. **Combine short, related sentences with appositives, participial phrases, adjectives, adverbs and prepositional phrases.**
8. **Identify and use regular and irregular verbs, adverbs, prepositions and coordinating conjunctions in writing and speaking.**
9. **Use parentheses, commas in direct quotations and apostrophes in the possessive case of nouns and in contractions.**
10. **When appropriate, capitalize names of magazines, newspapers, works of art, musical compositions, organizations, proper nouns and the first word in quotations.**
7. **Spell correctly roots, inflections, affixes and syllable constructions.**

Strand II: Writing and speaking for expression.
Content Standard II: Students will communicate effectively through speaking and writing.
K-4 Benchmark II-C Demonstrate competence in the skills and strategies of the writing process.
Performance Standards: Grade 4

3. **Produce a variety of written compositions using:**
   c. expository writing (e.g., identifying and staying on the topic; developing the topic with simple facts, details, examples and explanations).
4. **Use planning strategies that generate topics and organize ideas.**
3. **Focus revision on sequence of events and ideas, transitional words and sentence patterns.**

Objective: Students will write paragraphs using grade appropriate writing skills.

Procedure:

Have the students write five paragraphs in the following order:

1. **Explain that cacti have special adaptations that help them live**
2. **Explains cacti stem adaptations**
3. **Explains cacti root adaptations**
4. **Explains cacti stem (leaf) adaptations**
5. **Repeats the importance of cacti special adaptations**

Science Activity 4: Cacti Adaptation Field Trip
Living Desert Zoo and Gardens State Park Field Trip:

We have a special tour that the docents will conduct for students who have completed the Cacti Adaptations series. You class will be personally guided through the Succulents of the World Greenhouse and down the path from the greenhouse to the cat exhibits. Special features of the plants will be presented and students can ask questions they might have about cacti. Please call the park at (575) 887-5516 to set up the tour. Please note: These tours can only be set up for one class per docent.