

Activity Flow for the 3rd/4th Grade Desert Tortoise Education Trunk



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Teacher Note

For this week, students will keep a journal in which they will record their thoughts and responses to outlined activities. Teachers can have the students create their own journals. Journals can be made by binding pieces of paper together and having the student illustrate a title/cover page.

Before students come in, take out the map of the Mojave Desert and place it over the trunk - covering it!

Desert Tortoise Round Table - Opening Activity

Theme/Concept:

During this activity, students will create a record of background, ongoing, and future knowledge they hope to gain regarding the desert tortoise.

Goals:

Student goals during this activity are to generate an understanding of student knowledge regarding tortoises by drawing out what students know about tortoises, what they want to know about tortoises, and to help assess what students have learned about tortoises.

Objectives:

Upon successful completion of this activity, students will be able to list what they know and what they want to know about tortoises.

THIRD GRADE STANDARDS:

Next Generation Science Standards

3-LS4-3: Construct an argument with evidence that in a particular habitat, some organisms can survive well, some survive less well, and some cannot survive at all.

3-LS4-4: Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change..

Language Arts: 1.0 Listening and Speaking Strategies

Students listen critically and respond appropriately to oral communication. They speak in a manner that guides the listener to understand important ideas by using proper phrasing, pitch and modulation.

Comprehension

1.2 Connect and relate prior experiences, insights, and ideas to those of a speaker.

1.3 Respond to questions with appropriate elaboration.

Organization and Delivery of Oral Communication

1.5 Organize ideas chronologically or around major points of information.

FOURTH GRADE STANDARDS:

Next Generation Science Standards

4-LS1-1: Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.

Language Arts: 1.0 Listening and Speaking Strategies

Comprehension

1.1 Ask thoughtful questions and respond to relevant questions with appropriate elaboration in oral settings.

1.2 Summarize major ideas and supporting evidence presented in spoken messages and formal presentations.

Organization and Delivery of Oral Communication

1.8 Use details, examples, anecdotes, or experiences to explain or clarify information.

Desert Tortoise Round Table

Teacher Materials Needed:

- Poster board or paper
- Pens or other writing utensil

- Using poster board, make a KWL chart with columns labeled: What I Know, What I Want to Know, What I Learned.

K (What I Know)	W (What I Want to Know)	L (What I Learned)

Materials in kit:

- None

Activity

- The class (with teacher directive) will create a KWL chart that can be added to, and referred to, over the week as the students are learning about the desert tortoise.
 - The chart can be a rubric to informally assess what students are learning. This brainstorming activity can help to determine what students know, what they want to know, and what they have learned about desert tortoises.
- Explain to students that they will be learning about the desert tortoise during the week.
- Ask students what they know about the desert tortoise.
- Write responses on the chart under column **K**.
 - Responses can be correct or incorrect, and then be verified as correct, or proved incorrect from the knowledge/facts they gain throughout the week.
 - The teacher may want to make a symbol next to the statements that need to be revisited and verified (or use a different color marker to designate these statements)
- Ask students what they want to know about the desert tortoise.
- Write responses on the chart under column **W**.
- Leave the third column blank for knowledge and facts the students gain about the desert tortoise throughout the week.
- Designate certain times of the day to reflect on and record knowledge gained about the desert tortoise.

Definitions:

- **Turtle** - an aquatic *or* a terrestrial reptile whose trunk is enclosed by a shell
- **Tortoise** - a terrestrial turtle having club-like limbs and a thick rounded shell
- **Desert** - an extremely dry region receiving very little rain (less than 10 inches per year) and vegetative growth

Desert Tortoise Round Table

Extensions:

- Students can make their own Desert Tortoise Vocabulary Book to keep and add vocabulary words to as the desert tortoise unit progresses. The book can be made using construction paper as the cover and white blank paper as the pages.

The Lorax

Theme/Concept:

During this activity, students will learn about ecosystems and cause and effect relationships.

Goals:

Student goals during this activity are to:

- Make connections between the story/characters, and real life situations.
- Listen to the story, reflect upon concepts that arise in the story, and make connections with the story.
- Use these connections in the framework of how the desert tortoise habitat is impacted by human activity.

Objectives:

Upon successful completion of this activity, students will be able to:

- Identify a cause and effect relationship in the book.
- Identify a cause and effect relationship in the world.
- Relate the story's cause and effect theme to how desert tortoises are presently impacted.

THIRD GRADE STANDARDS:

Next Generation Science Standards:

3-LS4-3: Construct an argument with evidence that in a particular habitat, some organisms can survive well, some survive less well, and some cannot survive at all.

3-LS4-4: Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change.

Language Arts:

1.0 Word Analysis, Fluency, and Systematic Vocabulary Development

Students understand the basic features of reading. They select letter patterns and know how to translate them into spoken language by using phonics, syllabication, and word parts. They apply this knowledge to achieve fluent oral and silent reading.

Decoding and Word Recognition

1.1 Know and use complex word families when reading (e.g., *-ight*) to decode unfamiliar words.

1.2 Decode regular multi-syllabic words.

Vocabulary and Concept Development

1.4 Use knowledge of antonyms, synonyms, homophones, and homographs to determine the meanings of words.

1.5 Demonstrate knowledge of levels of specificity among grade-appropriate words and explain the importance of these relations (e.g., *dog/mammal/animal/living things*).

1.6 Use sentence and word context to find the meaning of unknown words.

1.7 Use a dictionary to learn the meaning and other features of unknown words.

1.8 Use knowledge of prefixes (e.g., *un-*, *re-*, *pre-*, *bi-*, *mis-*, *dis-*) and suffixes (e.g., *-er*, *-est*, *-ful*) to determine the meaning of words.

The Lorax

2.0 Reading Comprehension

Students read and understand grade-level-appropriate material. They draw upon a variety of comprehension strategies as needed (e.g., generating and responding to essential questions, making predictions, comparing information from several sources). The selections in *Recommended Readings in Literature, Kindergarten Through Grade Eight* illustrate the quality and complexity of the materials to be read by students. In addition to their regular school reading, by grade four, students read one-half million words annually, including a good representation of grade-level-appropriate narrative and expository text (e.g., classic and contemporary literature, magazines, newspapers, online information). In grade three, students make substantial progress toward this goal.

2.0 Reading Comprehension (continued)

Comprehension and Analysis of Grade-Level-Appropriate Text

2.3 Demonstrate comprehension by identifying answers in the text.

2.4 Recall major points in the text and make and modify predictions about forthcoming information.

2.5 Distinguish the main idea and supporting details in expository text.

2.6 Extract appropriate and significant information from the text, including problems and solutions.

3.0 Literary Response and Analysis

Students read and respond to a wide variety of significant works of children's literature. They distinguish between the structural features of the text and literary terms or elements (e.g., theme, plot, setting, characters). The selections in *Recommended Readings in Literature, Kindergarten Through Grade Eight* illustrate the quality and complexity of the materials to be read by students.

Structural Features of Literature

3.1 Distinguish common forms of literature (e.g., poetry, drama, fiction, nonfiction).

3.2 Comprehend basic plots of classic fairy tales, myths, folktales, legends, and fables from around the world.

3.3 Determine what characters are like by what they say or do and by how the author or illustrator portrays them.

3.4 Determine the underlying theme or author's message in fiction and nonfiction text.

3.5 Recognize the similarities of sounds in words and rhythmic patterns (e.g., alliteration, onomatopoeia) in a selection.

3.6 Identify the speaker or narrator in a selection.

Writing

1.0 Writing Strategies

Students write clear and coherent sentences and paragraphs that develop a central idea. Their writing shows they consider the audience and purpose. Students progress through the stages of the writing process (e.g., prewriting, drafting, revising, editing successive versions).

Organization and Focus

1.1 Create a single paragraph:

- a. Develop a topic sentence.
- b. Include simple supporting facts and details.

Penmanship

The Lorax

1.2 Write legibly in cursive or joined italic, allowing margins and correct spacing between letters in a word and words in a sentence.

FOURTH GRADE STANDARDS:

Next Generation Science Standards:

4-LS1-1: Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.

Language Arts:

1.0 Word Analysis, Fluency, and Systematic Vocabulary Development

Students understand the basic features of reading. They select letter patterns and know how to translate them into spoken language by using phonics, syllabication, and word parts. They apply this knowledge to achieve fluent oral and silent reading.

Vocabulary and Concept Development

1.2 Apply knowledge of word origins, derivations, synonyms, antonyms, and idioms to determine the meaning of words and phrases.

1.3 Use knowledge of root words to determine the meaning of unknown words within a passage.

1.5 Use a thesaurus to determine related words and concepts.

2.0 Reading Comprehension

Students read and understand grade-level-appropriate material. They draw upon a variety of comprehension strategies as needed (e.g., generating and responding to essential questions, making predictions, comparing information from several sources). The selections in *Recommended Readings in Literature, Kindergarten Through Grade Eight* illustrate the quality and complexity of the materials to be read by students. In addition to their regular school reading, students read one-half million words annually, including a good representation of grade-level-appropriate narrative and expository text (e.g., classic and contemporary literature, magazines, newspapers, online information).

Comprehension and Analysis of Grade-Level-Appropriate Text

2.3 Make and confirm predictions about text by using prior knowledge and ideas presented in the text itself, including illustrations, titles, topic sentences, important words, and foreshadowing clues.

2.6 Distinguish between cause and effect and between fact and opinion in expository text.

3.0 Literary Response and Analysis

Students read and respond to a wide variety of significant works of children's literature. They distinguish between the structural features of the text and the literary terms or elements (e.g., theme, plot, setting, characters). The selections in *Recommended Readings in Literature, Kindergarten Through Grade Eight* illustrate the quality and complexity of the materials to be read by students.

Narrative Analysis of Grade-Level-Appropriate Text

3.2 Identify the main events of the plot, their causes, and the influence of each event on future actions.

3.3 Use knowledge of the situation and setting and of a character's traits and motivations to determine the causes for that character's actions.

The Lorax

Writing

1.0 Writing Strategies

Students write clear, coherent sentences and paragraphs that develop a central idea. Their writing shows they consider the audience and purpose. Students progress through the stages of the writing process (e.g., prewriting, drafting, revising, editing successive versions).

Organization and Focus

1.1 Select a focus, an organizational structure, and a point of view based upon purpose, audience, length, and format requirements.

Teacher Materials Needed:

- None

Materials in kit:

- Book: *The Lorax* by Dr. Seuss
- 5 Kaleidoscopes

Activity:

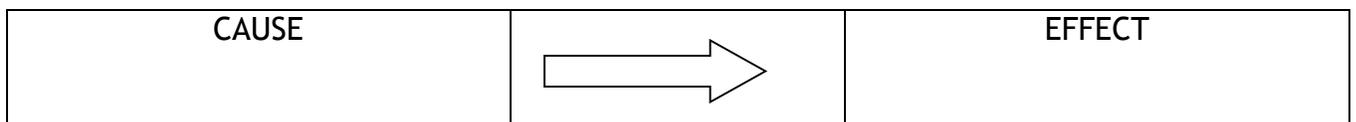
- Explain to students that they will be reading the story *The Lorax*. What do they think a Lorax is? Have students write down their answers/predictions in their journals.
- Read *The Lorax* to the students and stop at different points to ask questions. At each spot, stop and have students write responses as to what is going on in the story. Guided questions may encourage students to write and/or draw responses. Give students a few moments at each of the suggested points.

Suggested points of interest and questions:

- **Pg 10**, (the whisper-ma-phone). Have the students write a prediction about what the whisper-ma-phone is used for, who is using it, and what secrets will be told, etc.
 - **Pg 23**, (where the Lorax comes out of the stump). Students write about how they think the Lorax feels and/or predict what happens next.
 - **Pg 39**, (the Bar-ba-loots and Swomee-Swans leave). How do you think the Bar-ba-loots feel? How do you feel about what has happened? What do you think will happen next? Will the Lorax return?
 - **Pg 45**, How do you think the Humming-Fish feel? How do you feel about what has happened? What do you think will happen next? Will the Lorax return?
 - **Pg 51**, How do you think the Once-ler felt when everyone left him? Why did everyone leave?
 - **End**, Ask the students what “UNLESS” means. Ask students if the ending surprises them. Ask students what they would do if they were the Once-ler. Ask students what they would do if they were the Lorax?
- Introduce Vocabulary and Definitions:
 - **Ecology** - the relationship between organisms and their environment
 - **Ecosystem** - The combined habitats and communities, as well as their relationship with the air, water, soil, and energy, make up an ecosystem
 - **Habitat** - an area that provides organisms with what they need to survive—air, water, food, and space/shelter

The Lorax

- **Organism** - a living thing that has the ability to act and function independently
 - **Population** - all the organisms that constitute a specific group or occur in a specified habitat
 - **Species Community** - a group of plants and animals living and interacting with one another in a specific region under relatively similar environmental conditions, OR, the region occupied by a group of interacting organisms.
 - **Environment** - the area in which something exists or lives
 - **Pollution** - to contaminate an environment with man-made waste
 - **Habitat fragmentation** - When native vegetation is cleared for agriculture, habitats, which were once continuous, becomes divided into separate fragments. After intensive clearing, the separate fragments tend to be very small islands, isolated from each other by crop, land and pasture. Small fragments of habitat can only support small populations of fauna and these are more vulnerable to extinction. Fragments of habitat that are separated from each other are unlikely to be re-colonized
 - **Stewardship** - the careful and responsible management of something entrusted to one's care
- Relate these words back to the story of *The Lorax* and list examples.
 - Show a kaleidoscope: As a kaleidoscope is turned, it shows the same objects moving and changing into different images. Have students use the kaleidoscopes as an example to show how each of us may see the same things differently - similar to how the Once-ler and Lorax had different perspectives on their environment. The Lorax saw the Truffula Trees as something that should be preserved, whereas the Once-ler saw the trees as something to use for his own personal gain.
 - Discuss how each act in the book caused something else to happen. Create a cause and effect chart.



(or other cause/effect chart or graphic organizer of your choosing)

- What did we learn from the story of *The Lorax*? Tie to the idea that we must be good stewards of our environment and/or world.
- Have students either write a sequel to the story or persuasive paper on the importance of good stewardship.

Extensions:

1. Have a “desert natural resources manager” visit and talk to the class about his/her job and about how he/she manages public desert areas. Have him/her discuss the difference between allowing and not allowing OHV use. Have him/her discuss all of the different creatures that depend on “un-fragmented” open desert expanses.

The Lorax

2. Discuss how each step of the Once-ler's developing business removed a piece of the ecosystem until the entire ecosystem ceased to function. Discuss what a healthy ecosystem needs to survive.
3. Have students discuss why the Super Axe Hacker was invented, why the Once-ler ignored the Lorax's warning, what happened to the Lorax, and why the Once-ler was called the "Once-ler."
4. Discuss what happened to the Once-ler when there were no more Truffula trees. Ask students to write a story about what the Once-ler could have done so that his factory would still function and the environment would remain healthy. Research companies that implement sustainable practices into their management plans. What kinds of practices are various companies using, and are they effective?
5. Have students write a rhyming paragraph about the Lorax's message. Base the paragraph on the meaning of the word, "UNLESS," then discuss, as a class, how all generations must care for the Earth, now and into the future. Or, have students write a new conclusion for *The Lorax* starting from where the word "Unless..." leaves off.
6. Discuss the idea of "thneeds" (the needs), and how advertising can sometimes make you think you need a product. Discuss what types of products the class thinks are essential (e.g. food, water, shelter, learning/educational items, etc.) and what products are luxury items (e.g. new car every year, latest fashion trend or toy, etc.). Design an ad campaign for the needs of the environment and share it with the school and community.

Tinfoil Tortoise

Themes/Concepts:

During this activity, students will learn about adaptations with an emphasis on how temperature and other environmental factors (i.e. direct radiation, ambient air temperature) impact animals, especially the desert tortoise and other reptiles.

Goals:

The student's goal during this activity is to understand (and appreciate) that the desert tortoise must adapt to its environment in a timely manner (minute by minute), so it does not experience harm in the form of physiological stress.

Objectives:

Upon successful completion of this activity, students will be able to identify at least one adaptation of the desert tortoise, and how temperature affects animals.

THIRD GRADE STANDARDS:

Next Generation Science Standards:

3-LS4-3: Construct an argument with evidence that in a particular habitat, some organisms can survive well, some survive less well, and some cannot survive at all.

3-LS4-4: Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change.

Language Arts: 1.0 Written and Oral English Language Conventions

Students write and speak with a command of standard English conventions appropriate to this grade level.

Sentence Structure

1.1 Understand and be able to use complete and correct declarative, interrogative, imperative, and exclamatory sentences in writing and speaking.

Math:

1.0 Students understand the place value of whole numbers

1.1 Count, read, and write whole numbers to 10,000.

1.2 Compare and order whole numbers to 10,000.

1.4 Round off numbers to 10,000 to the nearest ten, hundred, and thousand.

FOURTH GRADE STANDARDS:

Next Generation Science Standards:

4-LS1-1: Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.

4-LS1-2: Use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways.

Language Arts: 1.0 Written and Oral English Language Conventions

Students write and speak with a command of standard English conventions appropriate to this grade level.

Sentence Structure

Tinfoil Tortoise

1.1 Use simple and compound sentences in writing and speaking.

Math:

1.0 Students understand the place value of whole numbers and decimals to two decimal places and how whole numbers and decimals relate to simple fractions. Students use the concepts of negative numbers:

1.1 Read and write whole numbers in the millions.

1.2 Order and compare whole numbers and decimals to two decimal places.

1.3 Round whole numbers through the millions to the nearest ten, hundred, thousand, ten thousand, or hundred thousand.

1.4 Decide when a rounded solution is called for and explain why such a solution may be appropriate

Teacher Materials Needed:

- Tape

Materials in kit:

- 4 Aluminum Pie Plates with thermometers
- *(A 5th thermometer shaded inside of Styrofoam coffee cup (to measure air temperature) to be used as a control to be placed by teacher).*
- Chart (in the shape of a thermometer)
- Laminated numbers 1-5

Activity

This activity needs to be completed outdoors in an area with varied sections: blacktop, grass, shade, mulched area, water, etc.

- Divide the class into four groups.
- Give each group a pie plate. Explain that each plate represents a tortoise and that they are going to look at how location affects the temperature of tortoises.
- Give students time to place their pie plate in a pre-selected area. *For example: Pie Pan #1- Blacktop, Pie Pan #2- Grass Area, Pie Pan #3- Shaded Area, Pie Pan #4 - Close to a Bush/Shrub*
- Gather students back up and have students predict which area will be the coolest and which will be the hottest. Students can write down their predictions. Explain to students that they will collect the pie plate tortoises in 20 minutes.

(Scute activity can be done while temperature activity is going on, then return to temperature activity - see lesson entitled "Scutes to Boot").

- Have the students retrieve their pie plates after a time lapse of 20 minutes from placement of the pie plates.
- Have students record the location and temperature of each pie plate.
- Explain that tortoises function best between 68°F and the upper 90's. Use a chart (in the shape of a thermometer) to show the temperatures for the tortoise as well as the temperatures of other animals and/or other items.
 - The green zone shows the temperature zone where tortoises function best
 - The blue zone shows temperatures too cold for desert tortoises
 - The red zone shows temperatures too hot for desert tortoises

Tinfoil Tortoise

- Mark the temperatures of the five pie plates. Which location worked best for the tortoise, today? What if it was a hot day? What if it was a cold day? Discuss the varying behavior of the tortoise in regard to temperature.
- Discuss how tortoises use burrows and why they need them to stay cool or warm. Discuss the concept that tortoises are ectothermic. Discuss adaptations of the tortoise: water usage, and how they obtain water. Discuss that tortoises “lose” their water if they get frightened.

Definitions:

- **Ectothermic** - generally refers to cold-blooded animals or animals whose internal body temperature is determined by the surrounding temperature of their environment; ectothermic animals heat or cool their bodies through behaviors (such as basking in the sun or going into a burrow)
- **Adaptation** - to adjust to different conditions, environment or circumstances
- **Temperature** - a measure of warmth or coldness of an object in reference to a standard value
- **Cold Blooded** - animals (fishes and reptiles) whose body temperature are dictated by the surrounding temperature of their environment
- **Radiation** - energy emitted as particles or waves
- **Ambient Air Temperature** - the surrounding air temperature

Extensions:

1. Use colored pans (spray painted with flat or gloss primer paint) in silver, black, medium brown, and green to see the difference color makes.
2. Compare and contrast the desert tortoise shell shape and structure with a that of other tortoise species found in North America

Scutes to Boot

Theme/Concept:

During this activity, students will learn how to identify a desert tortoise.

Goals:

The students' goal during this activity is to learn that all desert tortoises have 13 scutes no matter its age or size.

Objectives:

Upon successful completion of this activity, students will be able to:

- Identify a desert tortoise by the number of scutes it has, and know that scutes do not determine the age of a desert tortoise.
- Find evidence of how tortoise shell scutes grow using a magnifying glass.

THIRD GRADE STANDARDS:

Next Generation Science Standards:

3-LS3-1: Analyze and interpret data to provide evidence that plants and animals have traits inherited from parents and that variation of these traits exists in a group of similar organisms.

3-LS3-2: Use evidence to support the explanation that traits can be influenced by the environment.

Math:

1.0 Students understand the place value of whole numbers.

1.1 Count, read, and write whole numbers to 10,000.

1.2 Compare and order whole numbers to 10,000.

1.4 Round off numbers to 10,000 to the nearest ten, hundred, and thousand.

FOURTH GRADE STANDARDS:

Next Generation Science Standards:

4-LS1-1: Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.

Math:

1.0 Students understand the place value of whole numbers and decimals to two decimal places and how whole numbers and decimals relate to simple fractions. Students use the concepts of negative numbers:

1.1 Read and write whole numbers in the millions.

1.2 Order and compare whole numbers and decimals to two decimal places.

1.3 Round whole numbers through the millions to the nearest ten, hundred, thousand, ten thousand, or hundred thousand.

1.4 Decide when a rounded solution is called for and explain why such a solution may be appropriate.

Scutes to Boot

For Teacher Reference:

How old is my tortoise?

Unfortunately, unless the tortoise was very small when acquired, or has a known date of birth, it is almost impossible to tell its age accurately. Counting "growth rings" around the scutes (scute rings or annuli number) may be useful in small tortoises. These rings are formed because the scutes (or shields) are a modified form of skin that is continually renewed. The new scute material grows under the old, and being larger shows at the edges of the scute as a "ring". Unlike trees, however, tortoises (especially well-nourished captives) don't get a new "growth ring" every year. On the contrary, several "growth rings" may appear in a single season! In bad years, some wild tortoises may not show any growth at all. When a tortoise reaches adult size (at 10-20 years) growth continues, although new scute rings are almost imperceptible. In fact, in a recent attempted study of the age range of wild tortoises at the Desert Tortoise Natural Area, one biologist resorted to using an electron microscope to count the minuscule scute layers found in mature animals!

Once a tortoise reaches adulthood its appearance continues to slowly change. The often beautiful scute-sculpturing of the youngster becomes progressively less distinct. The scutes become flattened, take on a dull sheen and eventually become a more uniform gray color. In extreme old age the scutes may appear sunken in, as calcium becomes depleted from the bony shell that lies underneath them.

Adapted from: <http://www.tortoise.org/archives/agasques.html>

For a picture of a typical desert tortoise shell, go to:

- <http://www.enchantedlearning.com/subjects/turtle/Desortprintout.shtml>
- <http://www.tortoise.org/archives/gophdiff.html>
- http://www.infovisual.info/02/019_en.html

Concerning fish scale growth:

- https://tpwd.texas.gov/kids/wild_things/fish/fishscales.phtml
- <http://www.dnrec.delaware.gov/fw/Fisheries/Documents/agegrowth.pdf>
<http://www.ncaquariums.com/ask-the-aquarium/how-is-the-age-of-a-fish-determined>

Teacher Materials Needed:

- None

Materials in kit:

- Picture of a desert tortoise
- Various sized tortoise shells
- Magnifying glasses
- Rulers

Activity:

- Set up four stations with one tortoise shell or the poster at each station.
- Group students into four groups and have them gather at stations.

Scutes to Boot

- Ask students, “How do you think we tell how old a tortoise is?” “What are the parts of the shell?”
- Explain to students that they will be moving from station to station, counting scutes on the different tortoise shells. Go over the parts of a tortoise shell with students: carapace, plastron, scutes, gular horn, and shell edge.
- Have students make a chart at the first station, and then record the number of scutes they count on the paper.
- Students move from one station to another counting the scutes on each tortoise shell or picture and record the results on their chart. Students need to take their charts from station to station. Have students inspect scute plates with a magnifying glass, looking for evidence of growth patterns to suggest a hypothesis for how scutes form?
- Discuss findings - 13 scutes on each plate.
- Explain that a desert tortoise always has 13 scutes, as do several other tortoise species (different type of tortoises). Some may have more or less scutes, indicating it is not a desert tortoise. *(FYI: the sum of vertebral and costal scutes = 13 on most turtles and tortoises, while other scute patterns on the margin and plastron vary between species and genera. If there are more or less scutes, then it is not a desert tortoise. This is not true for the scutes being counted in this lesson.)*
- How can we tell the age of a tortoise? Only by size. *(Note: captive raised desert tortoises can be aged from date of hatch).* Explain the age and size of tortoises using the shells: the large one is over 15 years, the medium size is 7-15 years, and the little one is under 7. The only way we know how old a tortoise is, is by observing the tortoise over time. Counting scute rings only provides a relative age within about the first 10-14 years after hatching. After that, the newborn rings at the apex, or center of each scute, can wear off. How can we tell the age of a non-captive raised desert tortoise? What evidence did the students find that might show growth patterns?

Extensions:

1. Compare and contrast the desert tortoise shell shape and structure with that of other tortoise or turtle species found in North America.
2. Have students use a magnifying glass to closely examine scute rings.

Tortoise Mobile of Needs

Theme/Concept:

During this activity, students will learn the needs of the desert tortoise.

Goals:

The students' goal during this activity is to understand what animals need in order to survive in their natural surroundings and/or native habitat.

Objectives:

Upon successful completion of this activity, students will be able to identify the difference between a need and a want, and be able to list some of the needs of the desert tortoise.

THIRD GRADE STANDARDS:

Next Generation Science Standards:

3-LS1-1: Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death.

3-LS4-3: Construct an argument with evidence that in a particular habitat, some organisms can survive well, some survive less well, and some cannot survive at all.

3-LS4-4: Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change.

FOURTH GRADE STANDARDS:

Next Generation Science Standards:

4-LS1-1: Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.

Teacher Materials Needed:

- Metal clothes hanger
- Construction Paper
- Plain Paper
- String
- Scissors
- Tape
- Single hole punch
- Pliers
- Wire cutters

Materials in kit:

- Example of activity

Activity:

- Explain the difference between a need and a want.
- Have students brainstorm the needs of a desert tortoise.
 - Taking the concept further, have students brainstorm the needs of a desert tortoise as an individual and as a species.

Tortoise Mobile of Needs

- Divide the needs into the following categories: food, water, shelter, space, social interaction. *(Access to a community of nearby desert tortoises is vital to the survival of the species -- remembering no desert tortoise is an island. Tortoises indicate the health of an ecosystem. If the desert tortoise disappears, then this will affect the survival of other species within that ecosystem.)*
- Ask students how they can find out if their ideas are correct or not. What research do they need to do?
- Use different color paper to separate food, water, and shelter.
- Create a tortoise out of construction paper to serve as the top of the mobile.
- Use metal coat hangers and yarn to create the mobile.

Example:

Tortoise

Food	Water	Shelter	Space	Community
flowers cacti	puddles, rain plants	burrows shell	territory safe travel	Mating diversity (gene pool)

Extensions:

1. Hypothesize the cause and effect relationship between reducing the availability of, or “taking away a need resource,” to the health and well-being of an individual desert tortoise or that of a community of desert tortoises in a given area.
2. Identify places in your desert community where human activity is reducing or removing components necessary for maintaining a healthy desert tortoise community. What can your community do to change its present actions in favor of desert tortoise survival?

Breaking up the Desert - Map History of the Mojave Desert and Fragmentation

Theme/Concept:

During this activity, student will learn how human activities directly and indirectly impact desert animals and their habitats.

Goals:

The students' goal during this activity is to understand how development and other human activities impact the habitats of native desert inhabitants and the environment.

Objectives:

Upon successful completion of this activity, students will be able to identify at least one way a habitat could be fragmented, and to identify at least one way fragmentation affects animals.

THIRD GRADE STANDARDS:

Next Generation Science Standards:

3-LS4-4: Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change.

Social Science:

3.1 Students describe the physical and human geography and use maps, tables, graphs, photographs, and charts to organize information about people, places, and environments in a spatial context by: 1. identifying geographical features found in their local region (e.g., deserts, mountains, valleys, hills, coastal areas, oceans, lakes) 2. Tracing the ways in which people have used the resources of the local region and modified the physical environment (e.g., a dam constructed upstream changed a river or coastline).

Language Arts:

1.0 Listening and Speaking Strategies

Students listen critically and respond appropriately to oral communication. They speak in a manner that guides the listener to understand important ideas by using proper phrasing, pitch, and modulation.

Comprehension

1.1 Retell, paraphrase, and explain what has been said by a speaker.

1.2 Connect and relate prior experiences, insights, and ideas to those of a speaker.

1.3 Respond to questions with appropriate elaboration.

FOURTH GRADE STANDARDS:

Next Generation Science Standards:

This activity does not specifically meet any of the Fourth Grade Next Generation Science Standards, however it does meet Common Core State Standards as listed.

Social Science:

4.1 Students demonstrate an understanding of the physical and human geographic features that define places and regions in California by:

Breaking up the Desert

1. Explain and use the coordinate grid system of latitude and longitude to determine the absolute locations of places in California and on Earth.
2. Distinguish between the North and South Poles; the equator and the prime meridian; the tropics; and the hemispheres, using coordinates to plot locations.
3. Identify the state capital and describe the various regions of California, including how their characteristics and physical environments (e.g., water, landforms, vegetation, climate) affect human activity.
4. Identify the locations of the Pacific Ocean, rivers, valleys, and mountain passes and explain their effects on the growth of towns.
5. Use maps, charts, and pictures to describe how communities in California vary in land use, vegetation, wildlife, climate, population density, architecture, services, and transportation.

Language Arts: Written and Oral English Language Conventions 1.0

Students write and speak with a command of standard English conventions appropriate to this grade level.

Sentence Structure

- 1.1 Use simple and compound sentences in writing and speaking.

Listening and Speaking Strategies 1.0

Students listen critically and respond appropriately to oral communication. They speak in a manner that guides the listener to understand important ideas by using proper phrasing, pitch, and modulation.

Comprehension

- 1.1 Ask thoughtful questions and respond to relevant questions with appropriate elaboration in oral settings.

Teacher Materials Needed:

- None

Materials in kit:

- Fabric habitat map
- Laminated: Houses (20), Roads (10), Restaurants (10)

Activity

Part 1:

Explain fragmentation to students.

- **Fragmentation:** (in the sense of habitat) is dividing an area into sections; or cutting off access to an area for one or more species

Ask students to list examples of direct habitat fragmentation (homes, roads, aqueducts, power lines) and indirect habitat fragmentation (ravens, pets, invasive plants).

Create a Yes/No Chart and place the listed items, below the "Yes" or "No" column, each time saying "This is an example of habitat fragmentation." or "This is not an example of habitat fragmentation." Eventually, the students should attain the concept and be able to place the words and pictures in the correct columns.

Breaking up the Desert

Once the students have an understanding of the concept of habitat fragmentation they should brainstorm a definition.

Part 2:

Hang the large cloth habitat map on the board at the front of the room.

Ask students to identify some of the things that might fragment a habitat. When a student lists something, the teacher or the student will place the pre-drawn, laminated object on the map.

Cause/Effect Technique

Discuss how fragmentation affects the desert tortoise as well as other wildlife

Cause:

- What “needs” of the desert tortoise is reduced, removed/taken away as their habitat is fragmented?
 - Access to food, mates, burrows, water
- What new challenges and hardships are they faced with?
 - Point out the ravens eating out of the trash can on the restaurant images

Effect:

- How is the desert tortoise affected by these changes in resource availability and increase in predators?
 - If desert tortoises cannot safely cross roads to access food, water, mates, burrows - what does that mean for the overall survival of the species?
 - Ravens prey on young tortoises when their shells are still soft - their numbers are growing due to human activity in the desert
 - Ravens are a major predator of young desert tortoise hatchlings
 - Ravens are highly intelligent birds who were rare in California’s deserts, but with the arrival and growth of human populations, ravens now number in the tens of thousands
 - Booming desert communities have introduced new sources of food and water for ravens in the form of unsecured trash, road-kill, and irrigation systems.
 - Ravens now present a significant threat to the survival of the desert tortoise

Extensions:

1. Brainstorm how the fragmentation of existing habitat can be reduced, and create posters that communicate these strategies and suggestions. Hang these posters around school, in school and (having received prior permission) in public places.
2. Provide the class/school community with an opportunity to reverse the effects of habitat fragmentation on public lands. Contact desert managers with the BLM, NPS, SPS for available opportunities (Some fleshing out of potential contact information would be needed here).

Tortoise Trails

Theme/Concept:

During this activity, students will learn that the survival of a species depends on how safely it can move around within its environment over time.

Goals:

The students' goal during this activity is to become aware of the limiting factors affecting the survival of desert tortoises.

Objectives:

Upon successful completion of this activity, students will be able to:

- Name something that can cause desert tortoises to die.
- Name something that can cause an accumulation of stressors that could lead to the death of a desert tortoise.

THIRD GRADE STANDARDS:

Next Generation Science Standards:

3-LS1-1: Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death.

3-LS4-4: Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change.

FOURTH GRADE STANDARDS:

Next Generation Science Standards:

This activity does not specifically meet any of the Fourth Grade Next Generation Science Standards.

For Teacher Reference:

<http://www.deserttortoise.org/answeringquestions/chapter1.html>

Liebig's Law of Minimum: *Put forth by German geochemist, Justus von Liebig, in 1840. It can be easy to conceive how a limiting resource (ie. food) controls a process (ie. growth) by running low or running out. However, some biological and ecological processes are controlled by too much of a factor (such as heat) rather than too little. Or, processes may be controlled by complex interactions of factors. A broad, restatement of the law of the minimum: The functioning of an organism is controlled or limited by that essential environmental factor or combination of factors present in the least favorable amount. The factors may not be continuously effective but only at some critical period during the year or perhaps only during some critical year in a climatic cycle.*

Definition:

- **Limiting Factor**
 - A factor whose **absence** exerts influence upon a population, and may be responsible for no growth, limited growth (decline), or rapid growth.

Tortoise Trails

- A factor present in an environment in such **short supply** that it limits growth or some other life process.
- A **requirement** such a food, cover or territory within a community of related species that is in shortest supply with respect to all resources necessary to sustain life and thus "limits" the size or retards production of an organism's population.
- One factor that **controls** a process, such as organism growth or species population size or distribution

Desert tortoise limiting factors include: (I- intrinsic, E- extrinsic)

Intrinsic - inherent or belonging to **Extrinsic** - not inherent or not belonging to

- E - Availability of and to suitable habitat (Space)
10 to 40 acre territories are common
- E - Availability of suitable food (Food)
- E - Suitable air temperature (spring-fall) limits activity
10 C (50 F) and 32 C (90 F)
- E - Suitable soil temperature (spring-fall) limits activity
18 C (64 F) to 48 C (118 F)
- E- Presence of soil suitable for digging burrows (Shelter)
Under bushes (summer shelters)
Banks of washes (winter shelters)
- E- Suitable wintering sites (Space & Shelter)
Low recruitment rate
- I - Health
Desert tortoises are sensual organisms (physical contact, face to face is common) within their populations; diseases spread quickly
- I -Clutch size
Low clutch size
- I -Time to maturity
Take 15-40 years to reach sexual maturity in the wild
- E - Predation (by burrowing and non-burrowing species)
- E - Predation (High mortality of eggs and hatchlings up until the age of 5 years)

Teacher Materials Needed:

- 4 Cones - to represent the year zones
- Hula-hoops - to represent the burrow/safe zones

Materials in kit:

- Laminated Identity Cards Limiting Factors
- Laminated Identity Cards for Tortoises
- Clothespins (to attach identity cards to students clothing)
- Ping Pong Balls
- Rope - divider between the First Five Year zone and the Desert zone
- 3 Bags of Poker Chips (white, blue, and red chips)

Activity: (see map of area to set up the game)

Tortoise Trails

- Review the term *habitat*, and what the desert tortoise needs in order to survive in a healthy habitat. Use the student-created Tortoise Mobile of Needs.
- Divide the class in half (groups will switch after first round)
 - One group will be the “Tortoises” and one group will be the “Limiting Factors”
 - The “Tortoise” students will receive:
 1. A laminated Tortoise # card and clothespin (to attach card to their shirt)
 2. The corresponding labeled Tortoise # bag with 10 ping pong balls in it
 - The “Limiting Factor” students will receive:
 1. A laminated Limiting Factor card and clothespin (to attach card to their shirt)
 2. An empty, unlabeled canvas bag for collecting ping pong balls
- Explain the rules
 - Tortoise Rules:**
 - 1. “Tortoises” (students with bags of ping pong balls) must “hatch” (cross into the field of play from the “Nesting Area”) and attempt to cross the “First Five Years” zone 5 times, while avoiding being tagged by “Limiting Factor” students.
 - Each time a Tortoise make it across the “First Five Years” zone, they collect one white poker chip.
 - 2. Once the “Tortoises” have accumulated 5 white poker chips, they may cross over to the “Desert” zone.
 - 3. Tortoises spend 5 years in the open “Desert” zone. During this time, “Tortoises” attempt to cross between the year zones on either side of the “Desert” zone, while avoiding being tagged by “Limiting Factor” students.
 - “Tortoises” will collect one blue poker chip each time they successfully cross the “Desert” from one year zone to the other year zone.
 - Burrow areas are safety zones, where “Limiting Factor” students cannot touch a “Tortoise”, but “Tortoises” cannot stay in the burrow for more than 2 minutes at a time.
 - 4. When/if a “Tortoise” is tagged by a “Limiting Factor” student (in either zone of the field of play), he/she must give up 1 ping pong ball to the “Limiting Factor” student.
 - 5. Any “Tortoise” that loses all 10 balls is dead, and becomes part of a housing development.
 - If a “Tortoise” becomes part of the housing development, then he/she must find a place in the playing area and stay there.
 - 6. After “Tortoises” have reach 10 years old (collected 5 white and 5 blue chips), they return to the nesting area to collect 5 more ping pong balls, and they will turn in their 10 chips and receive one red chip, indicating 10 years of life.
 - 7. “Tortoises” must then return to the “Desert” zone and continue to play, attempting to reach 20 years of age (1 red chip and 10 blue chips). When a “Tortoise” reaches 20 years of age, they return to the nesting area to once

Tortoise Trails

again collect 5 more ping pong balls and one red chip (by turning in 10 blue chips).

8. This is repeated a third time when a “Tortoise” reaches 30 years of age (2 red chips and 10 blue chips).
9. After collecting 3 red chips, the “Tortoise” has reached maturity and does not return to the nesting area.
10. The game ends when all “Tortoises” are either dead (run out of ping pong balls), or reach maturity at 40 years (3 red chips and 10 blue chips).

Limiting Factor Rules:

11. “Limiting Factor” students will move about the playing field tagging “Tortoises” (students).
12. When a “Limiting Factor” student tags a “Tortoise,” the “Tortoise” will give them one ping pong ball. “Limiting Factor” students can carry their collected ping pong balls in their collection bag.
13. “Limiting Factor” students cannot tag the same tortoise twice in a row.
14. “Limiting Factor” students cannot tag tortoises handing a ping pong ball to another “Limiting Factor” student.
15. “Limiting Factor” students must stay at least 4 steps away from one another.

Limiting Factors

Human Factors

Vehicles on Roadways (2)
Dogs (1)
Disease (2)
Off-road vehicles (1)
Making Pets of Wild Tortoise (1)
Raven from landfill (1)
Trash/Balloons (1)

Natural Factors

Ravens (2)
Coyotes (2)
Birds of Prey (1)
Red Harvester Ants (1)
Poachers (1)

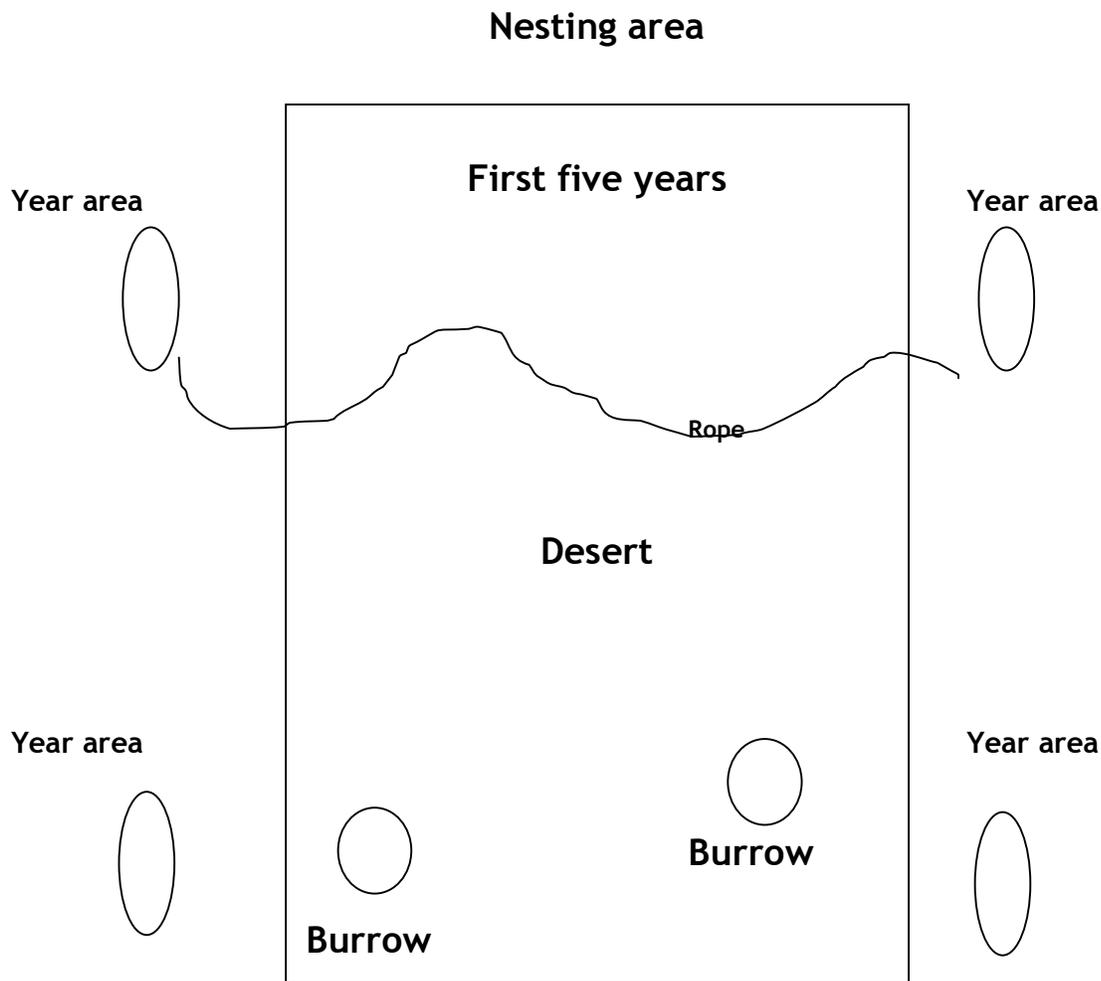
- Have students switch roles after one round

Discussion

1. What did students notice was happening?
2. What would happen if all the tortoises survived? (overpopulation and loss of habitat)
3. Why do tortoises lay so many eggs? (increases odds of species survival)
4. What is the difference between human factors and natural factors?
5. Why do we want to reduce some factors? (to help the species survive)

Tortoise Trails

Map of Play Area Set-up



Extensions:

Have students research more information on-line about tortoise and other animals. Have students create a shoebox habitat of a desert animal.

Learn more about Deserts and Desert Animals at:

- <http://www.nps.gov/jotr/learn/nature/reptiles.htm>
- <http://www.joshuatreevillage.com/229/kidst.htm>
- <http://www.creec.org/>
- <http://www.lewiscenter.org/Local-Programs/Tortoise-Terrace/index.php>
- <http://www.uen.org/Lessonplan/preview.cgi?LPid=618>
- <http://ecos.fws.gov/speciesProfile/profile/speciesProfile?spcode=C04L>
- <http://teachers.net/lessons/posts/277.html>

Eco-Blocks - Understanding the Importance of a Healthy, Cohesive Ecosystem

Theme/Concept:

During this activity, students will learn that for everything taken out of an ecosystem there is an effect on the system as a whole.

Goals:

Students' goal during this activity is to understand that for an ecosystem to be healthy and cohesive, the organisms within the ecosystem must be present and healthy.

Objectives:

Upon successful completion of this activity, students will be able to:

- Understand that everything has a place in an ecosystem.
- See that when we remove an organism from an ecosystem, it causes the system to try and balance out until it can no longer do so, eventually causing the ecosystem to collapse or fail in some way.

THIRD GRADE SCIENCE STANDARDS

Next Generation Science Standards:

3-LS4-4: Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change.

FOURTH GRADE SCIENCE STANDARDS

Next Generation Science Standards:

This activity does not specifically meet any of the Fourth Grade Next Generation Science Standards.

Teacher Materials Needed:

- None

Materials in kit:

- Jenga Blocks - set up in a tower, 3 by 3 going opposite ways
- Eco Cards

Activity

- Explain to students that they will be playing a game called Eco-Blocks, similar to the more popular game, *Jenga*. Set up the block tower.
- Pass out one card to each student. Explain to students that they will come up one at a time to pull a block from the tower labeled with whatever category is on their Eco-card (*Tortoise = animal, Rock = non plant/non animal, Leaf = plant*) and place it on top of the pile.
 - No one can take a block from above the top layer of the initial pile (you can mark this with a strip of paper, etc.

Eco-Blocks

- When removing a block, each student reads his/her individual card. This card represents something that is being removed from the desert ecosystem.
- Play the game until the tower falls. If all the students have not had a turn, ask them to read their cards out loud for the class.
- Ask students for reasons as to why the tower fell. Ask students how important each of the things were to the ecosystem. Did removing just one block cause the tower to fall, or was it caused by removing all the blocks? What did the remaining blocks have to do each time another block was removed?
 - The tower represents the ecosystem. The individual blocks represent parts of the ecosystem. Everything is connected. If we remove one component from an ecosystem, it impacts other pieces within the ecosystem. The ecosystem attempts to balance every time a piece is removed until it can no longer do so. Eventually the ecosystem becomes unhealthy, fails or collapses in some way.

Definitions:

- **ecosystem** - the combined habitats and communities, as well as their relationship with the air, water, soil, and energy, make up an ecosystem
- **organism** - a living thing that has the ability to act and function independently

Extensions:

Learn more about Ecosystems at:

- http://www.pbslearningmedia.org/search/?q=ecosystems&selected_facets=
- http://www.blm.gov/wo/st/en/res/Education_in_BLM/Learning_Landscapes/For_Teachers/science_and_children/mojave/index.html

Pet Tortoise Rock

Theme/Concept:

During this activity, students will learn the difference between the needs of a captive tortoise vs. that of a wild tortoise.

Goals:

Students' goal during this activity is to reflect on the knowledge they gained while studying the desert tortoise

Objectives:

Upon successful completion of this activity, students will be able to:

- List what a wild desert tortoise needs in its habitat.
- List what a captive desert tortoise needs in its habitat.
- Compare and contrast the lists of needs developed for the wild desert tortoise and the captive desert tortoise.

THIRD GRADE STANDARDS:

Next Generation Science Standards:

This activity does not specifically meet any of the Third Grade Next Generation Science Standards, however it does meet Common Core State Standards as listed below.

Language Arts: 1.0 Listening and Speaking Strategies

Students listen critically and respond appropriately to oral communication. They speak in a manner that guides the listener to understand important ideas by using proper phrasing, pitch, and modulation.

Comprehension

1.1 Retell, paraphrase, and explain what has been said by a speaker.

1.2 Connect and relate prior experiences, insights, and ideas to those of a speaker.

1.3 Respond to questions with appropriate elaboration.

Organization and Delivery of Oral Communication

1.5 Organize ideas chronologically or around major points of information.

FOURTH GRADE STANDARDS:

Next Generation Science Standards:

This activity does not specifically meet any of the Fourth Grade Next Generation Science Standards, however it does meet Common Core State Standards as listed below.

Language Arts: 1.0 Written and Oral English Language Conventions

Students write and speak with a command of standard English conventions appropriate to this grade level.

Sentence Structure

1.1 Use simple and compound sentences in writing and speaking.

1.0 Listening and Speaking Strategies Students listen critically and respond appropriately to oral communication. They speak in a manner that guides the listener to understand important ideas by using proper phrasing, pitch, and modulation.

Comprehension

Pet Tortoise Rock

1.1 Ask thoughtful questions and respond to relevant questions with appropriate elaboration in oral settings.

1.2 Summarize major ideas and supporting evidence presented in spoken messages and formal presentations.

Teacher Reference materials:

- <http://www.tortoise.org/general/permit.html>
- http://www.desertmuseum.org/programs/tap_tortcare.html
- <https://www.tortoisegroup.org/infosheets/>
- <http://www.tortoise.org/general/descare.html>
- http://www.azgfd.gov/w_c/captive_tortoise_care.shtml
- http://www.azgfd.gov/pdfs/w_c/tortoise/DTPacket%20Complete.pdf

Teacher Materials Needed:

- Rocks (palm-sized)
- Paint (needs to be thick, watercolors will not work)
- Brushes
- Cups of Water
- Paper Towels

Materials in kit:

- None

Activity:

- Each student should select a palm sized rock to work with.
- Students will paint the rock to resemble a tortoise.
- Discuss with students what they would need to take care of their captive desert tortoise if the tortoises were real. (visit LivingDesert.org/Education/Tortoise for information on fostering desert tortoises in California)
- Discuss the difference between pet and wild tortoises.
- Pets need us to take care of them; they need us to provide their food, water, and shelter. We take pets to the veterinarian when they get sick. Pets are used to being handled by humans.
- Wild animals can take care of themselves. They find their own food, water, and shelter. We can harm them by trying to help them. We have germs on our hands that don't harm us, but can harm them. They don't go to the veterinarian when they get sick. Handling or getting near a wild animal can scare it and cause it stress that might make it weak or ill.
- Pulling out the chart you created about what students know, what they want to know, and what they learned. Add to the final column - **What I Learned**. Ask students how each feels about tortoises from what they have learned. This can be a writing/sharing/reflection activity continued in students' journals.

Pet Tortoise Rock

Extensions:

1. To further assess students understanding on the desert tortoise, each can name their pet tortoise rock and write up Brief Facts on a large index card describing his/her tortoise's life in the desert prior to becoming a pet. For example: Weight, Length, Gender, Favorite Food, What desert region he or she lived, Likes/Dislikes of desert life, etc.

(OR -

Instead students can write up brief facts describing their pet tortoise's life in captivity. For example: Weight, Length, Gender, Favorite Food, Location, Likes/Dislikes of captive life, Favorite activities to do with owner, etc.)

The teacher can laminate index cards as a keepsake for students to take home with their pet rock tortoise.