

Educator's Guide to
The Academy of
Natural Sciences'
North American
Diorama Hall



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THE
ACADEMY
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An Educator's Guide to The Academy of Natural Sciences' *North American Hall*

Introduction

These materials were developed by The Academy of Natural Sciences in conjunction with Philadelphia school teachers. The subject matter was designed to complement the Academy's North American Hall Dioramas. Lessons are aligned with both Pennsylvania State and Philadelphia District standards and address multiple curriculum content areas, including Math, Science, Literacy, Geography, Visual Arts, and Technology Education.

How to Use This Guide

This guide contains 21 lessons, each with associated pre- and post-lesson exercises, designed for students in grades one through four and five through eight. General background information, a glossary of vocabulary terms, and content standards descriptors are also provided. The topic of each lesson falls under one of three major themes: Life Cycles, Habitats, or Adaptations. Each lesson is designed as an independent "stand-alone" and does not need to be taught in sequence with the other lessons. Teachers may choose to utilize the entire guide or only those lessons and activities that they consider most applicable to their students' needs.

Specific components of each lesson include:

1. Introductory Pieces:

- Journal Prompts (to build student background knowledge and access prior knowledge)
- Word Bank (with vocabulary linked to the accompanying glossary)
- Objectives (identifying goals that can be measured)

2. Procedure:

Step-by-step directions for the teacher on how to set up materials, conduct the lesson, and assess student performance successfully

3. Reflection Pieces:

Concluding activities providing opportunities for students to process new knowledge

4. Extension Activities:

Suggested for higher-level students, or for teachers who would like their class to follow-up and build on new concepts
Includes *Take-It-Back* strategies that encourage reciprocal teaching (students who participate in the lessons become "experts," turning the new knowledge around to other classes)

5. Parent-Links:

Home-based activities related to the lesson content

6. Multi-disciplinary Connections:

Exercises that target Pennsylvania State Standards and Philadelphia District Standards in areas other than just science

7. Museum Components (for some lessons only):

Linked activities to be done at the Academy's North American Hall exhibit

Credits

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Any views, findings, conclusions, or recommendations expressed in this publication do not necessarily represent those of the Institute of Museum and Library Services.

Curriculum designed by:

Geno Aloi - Geno is a teacher at Russell Byers School. He works with kindergarten, 3rd, and 4th grades. Geno graduated from Temple University with a Bachelor's degree in Special and Elementary Education, and he is currently pursuing a Master's degree and Reading Specialist Certification at Gwynedd Mercy College.

Rebecca Chase is a Special Education teacher for 3rd, 5th, and 6th grades at Russell Byers. Rebecca has a Bachelor's degree in Early Childhood, Special Education, and Elementary Education from Temple University. She is currently pursuing a Master's degree and Reading Specialist Certification at Gwynedd Mercy College.

Karen Elliott is a middle school science teacher for a Springside School in Philadelphia. Karen has a Bachelor's degree in Education from the University of Northern Colorado and a Master's degree in Secondary Education from University of Maryland.

Sarah R. Wing teaches 1st grade at Russell Byers. She has a Bachelor's degree in Psychology and a Master's degree in Education from the University of Massachusetts at Amherst. Sarah previously taught kindergarten and 1st grade in Massachusetts and Philadelphia.

Guide edited by:

Jacquie Genovesi, is the Sr. Director of Education at The Academy of Natural Sciences. She holds a B.S. in Biology and an M.A. in Environmental Education from the University of Pennsylvania and is currently working towards a doctorate in Educational Leadership at Drexel University.

Hollie Barattolo, is an Outreach Teacher/Naturalist at the Academy of Natural Sciences. She is a Pennsylvania state certified teacher and holds a B.S. in Elementary Education from Bucknell University.

The Academy of Natural Sciences' North American Hall Dioramas

The Academy's North American Hall contains dioramas that depict scenes from several habitats. These dioramas were created at a time when people had limited access to images from around the world. Dioramas provided an opportunity to view far away lands and habitats. Today, these dioramas provide a view of unspoiled landscapes. As you and your students explore each diorama, look for features that show something about the climate and the plants and animals that live there.

Biomes of North America: Expanded Teacher Background

From the tropical rainforests of Mexico to the Arctic tundra of Alaska and Canada, every type of habitat in the world is found in North America.



Source: Utah Education Network, http://www.uen.org/utahlink/tours/tourFames.cgi?tour_id=14051

Note to Teachers: You may want to provide this descriptive summary of the biomes to your students – or better yet, have student do a WebQuest or textbook research to learn about the characteristics of each biome.

There are two types of tundra: Arctic Tundra and Alpine Tundra. As you go up a mountain, you will travel through many biomes. In the North American Rocky Mountains you begin in a desert biome. As you climb you go through a deciduous forest biome, grassland biome, steppe biome, and taiga biome before you reach the cold Alpine biome.)

Arctic Tundra –The arctic tundra rims the northern regions of Canada and Alaska. It is very cold and desert-like. The word “tundra” comes from the Finnish word “tunturia” which means “treeless plain or barren land”. There is little precipitation (snow or rain), and plants grow close to the ground, living on the few inches of the soil that thaws in the short summer months. Average temperatures are 3-12° C (37-54°F) in the summer and -34° C (-30°F) in the winter. The short growing summer season ranges from 50 to 60 days. Annual precipitation, which includes rain and snow, averages 15 to 25 cm (6-10 inches). Below the top layer of soil is permanently frozen subsoil called “permafrost” which is composed of gravel and smaller earthen materials. Plants in the arctic tundra have very shallow root systems due to the frozen subsoil. Rain and warmer temperatures cause bogs and ponds to form, providing water and moisture for plants and animals. Common plants include sedges, lichen, mosses, liverworts, grasses, low shrubs, and a number of flowering plants. Plants grow close to the ground and clump together to protect against the cold temperatures and winds. Animals include polar bears, wolves, arctic foxes, caribou, arctic hares, lemmings, squirrels, and an assortment of migrating birds and insects. In order to avoid the very bothersome mosquitoes and flies, the caribou move to colder, higher ground during the summer.

Alpine Tundra – The alpine tundra is found on mountains in areas where trees cannot grow, usually considered to be at elevations above 10,000 feet. The word “alpine” comes from the Latin word “alpes” meaning high mountain. The alpine tundra is noted for high winds of over 150 miles an hour, snow, ice, and very “wintry” conditions. Temperatures can change from warm to cold in one day. This is why when you are hiking in the mountains above timberline you need to be prepared for any type of weather! Winter temperatures range from -34°C to 0°C (-30°F to 30°F) with summer temperatures ranging between 3°C to 12°C (37°F to 54°F). Summers last about 180 days, from June to September. Due to the higher elevation, there is less atmosphere to filter UV rays from the sun. Alpine tundra plants grow in well-drained, but poor rocky and sandy soils and include sedges, grasses, herbs, flowers and dwarf shrubs. Alpine animals include elk, grizzly bears, marmots, mountain goats, pikas (small relative of the rabbit), and sheep. Birds such as the white-tailed ptarmigan and the grouse and summertime insects including beetles, butterflies, springtails, and grasshoppers also can be found in the alpine tundra. Most alpine animals migrate to lower elevations in the winter to find food and escape the high winds and cold temperatures.

Coniferous Forests – Coniferous forests cover much of Canada and extend southward in higher elevations. Annual temperatures range from -40°C to 20 °C (-40°F to 68°F). Precipitation in the form of rain ranges from 30 to 90 cm per year. Winters are long, cold, and snowy. Summers are short, warm, and humid. Plants include the soft-wooded, coniferous evergreen trees – firs, hemlocks, pines and spruces – which have needles and cones instead of leaves and flowers. The forest floor has thread-like fungi which provide nutrients and help decompose the fallen

needles. Soils in coniferous forests have a tendency to be acidic and shallow. Animals include brown and black bears, bobcats, caribou, Dall sheep, deer, foxes, lynx, moose, musk ox, wolves, badgers, beavers, ermine, lemmings, muskrats, rabbits, bald eagles, owls, Canada geese, red-tailed hawks, and insects like the mosquito. Berries, nuts, worms, small rodents, fish, and insects provide food for the animals of the coniferous forest. The northern coniferous forest is also called a “taiga” or boreal forest.

Deciduous Forests – Most of eastern North America was once deciduous forest.

There are four distinct seasons: spring, summer, autumn, and winter. In autumn, the leaves of the deciduous trees display dramatic fall colors with the same trees losing their leaves in the winter. Temperatures range from a low of -30°C (-22°F) in the winter, to a high of 30°C (86°F) in the summer. Rainfall ranges from (75 cm to 150 cm) 30 to 60 inches per year. Broadleaf trees, which need a 180-day growing period, include basswood, beech, chestnut, elm, hickory, linden, maple, sweet gum, and walnut. Smaller trees and shrubs include azaleas, huckleberries, mountain laurel, rhododendrons, and perennial herbs and mosses. Ground plants include club mosses, ferns, lichen, true mosses and wild flowers, as well as bacteria and fungi. Plants face toward the sun to get as much energy as possible. Animals include brown and black bears, cougars, deer, foxes, raccoons, chipmunks, squirrels, and wood mice. There are also many insects, amphibians (frogs, snakes, salamanders), and birds (many of which migrate south). Many of the animals hibernate during the winter. Most of the original forest has given way to cities, towns, and farmland.

Grasslands (or Prairie) – The grasslands were called “prairies” which means “cattle grazing fields” by early French trappers and explorers. Prairies are found in the central areas of the U.S. and Canada and were once dominated by grasslands characterized by rich, fertile soils, and grass up to 10 feet (3 meters) tall. Each of the different species of grasslands needs a particular temperature, rainfall, and soil condition environment. There are two types of grasslands: the over 10 ft. tall grass which was/is found just east of the Mississippi River in humid and very wet soils, and the short grass which grew/grows to the west of the Rocky Mountains which has dry, hot summers and cold winters. Winter grassland temperatures can be as low as -40° and high as over 90°F in the summer. Rainfall is moderate and the seasonal periods without rain (drought) allow for occasional fires which prevent trees from growing – the grasses survive the fires because they grow from their roots and their stems will grow again. A few trees, such as the cottonwood, oaks and willows grow in the river valleys – such as the Platte River in Colorado and Nebraska. Grass species include bluestem, bunch grass, buffalo grass, grama grass. Many animals, birds and plants live in the grasslands. Animals include bison, cattle, elk, foxes, pronghorn, mule deer, wild horses, and wolves. The prairie-pothole region of the Northern Plains is an important migratory stop-over for cranes and snow geese. There are many species of flowers and some non-woody plants which grow in the grasslands. Flowers include asters, blazing stars, clovers, coneflowers, goldenrods, sunflowers, psoraleas, wild indigos and an assortment of “thorny” plants including prickly pear cactus, milkweed, and thistles. The suppression of fires and loss of the bison in the late 1800s, along with the development of extensive agriculture (i.e. corn, wheat, etc.) and rangeland -- has resulted in only small patches of grasslands remaining. Many grasslands have been overcome by succession to oak-hickory forests or aspen

woodland. A number of organizations are leading efforts to purchase, set-aside, protect and restore grasslands.

Deserts – North American deserts extend from the American Southwest to Northern Mexico and include 3 “Hot” deserts – the Chihuahuan, the Sonoran, and the Mojave, and the “Cold” Great Basin Desert. Each of these deserts has its own characteristic temperature, elevation, and rainfall pattern. The Sonoran is a subtropical desert, encompassing nearly 100,000 square miles of Southwestern Arizona and Northern Mexico. The hottest of North American deserts, the Sonoran has a rainy summer “Monsoon” season as well as winter rains – with annual rainfall between 10-30 cm. The Giant Saguaro Cactus can live over 100 years and reach heights of over 50 feet. The symbol of the American Southwest, the Saguaro is the center of the desert ecosystem, providing juicy fruit, habitat, and shade for a variety of desert plants and animals. Many desert animals remain in burrows during the midday heat and are only active at night or cool mornings. Desert animals include the tiger salamander (world’s largest), In addition to the saguaro, other cacti include the Cholla, organ pipe, silver dollar, and jojoba. Wildlife species include Bailey’s pocket mouse, black-tailed jackrabbits, California leaf-nosed bat, coyotes, desert bighorn sheep, mountain lions, pronghorn antelopes, ring-tailed cat, and round-tailed ground squirrels. Birds include black-tailed gnatcatcher, cactus wren, five-striped sparrow, Gila woodpecker, hummingbirds, rufous-winged sparrow, and the noted roadrunner. Reptiles and amphibians include desert tortoise, lizards, rattlesnakes, tiger salamander, ... In addition to the cacti, the Sonoran has a brilliant show of flowers when the rains come – including owl’s clover,

Lesson 1

Topic: What is a Mammal?

Target: 1st grade

Duration: One 45 minute lesson with extension options and parent links

Discipline Connections: reading, writing, science

Materials:

- Student Handouts:
 - 1.1: Mammals
 - 1.2: Mammals at the Academy
 - 1.3: Mammal Book
- Literature:
 - About Mammals: A Guide For Children* by Cathryn Sill and John Sill
- KWL Chart (draw three columns, label each column with: I Think I Know, What I Want to Know, and What I Learned)
- Rubric 1

Word Bank: mammal, animal, hair, warm-blooded, birth, babies, feed, milk

Objective: Students will demonstrate their ability to identify a mammal and its characteristics.

Background Knowledge: During this activity students will identify the characteristics of a mammal. Students will identify that mammals are animals that have hair, are warm blooded, give birth to babies, and produce and feed milk to their babies.

Focusing Question: What is a mammal? Describe the characteristics of a mammal.

Procedure:

1. Display KWL chart on board. Write the word mammal at the top of the chart. Ask students to share all they think they know about the word mammal. Record all student comments in the “What I think I know” column of chart. Students will then fill out the first column of Student Handout 1.1.
2. Ask students if they have any questions about mammals. Fill in the “What I want to know” column with questions students have about mammals.
3. Read Aloud: *About Mammals: A Guide for Children*.
4. Return to KWL Chart and look back at the “What I think I know” column. Reread information, and cross out any ideas that have been proven false by the read aloud.
5. Look at the “What I want to know” column and fill in any information from the book that answers any of the questions.
6. Look at the last column of “What I learned.” Fill in additional information from the book about mammals that students identify as new information.
7. Students will complete the Student Handout 1.1 section for “What I know.”

Lesson 1 (continued)

Topic: What is a Mammal?

Museum Activities:

1. Distribute Student Handout 1.2.
2. Students will search for and record information on two mammals on Student Handout 1.2 as they observe the North American Hall dioramas.

Reflection: The students will use the information from their completed Student Handouts 1.1 and 1.2 to create the “Mammal Book.” Once the students have completed their books, allow students to share their books.

Assessment: KWL Chart participation, completed Student Handout 1.1, 1.2 and 1.3.

Extension Options:

- Literature for read alouds, independent reading or peer reading:
 - *Eye Wonder: Mammals (Eye Wonder)* by DK Publishing
 - *What Is a Mammal? (Animal Kingdom)* by Lola M. Schaefer
 - *Eyewitness Explorers: Mammals* by David Burnie
 - *What is a Mammal? (Science of Living Things)* by Bobbie Kalman
 - *Mammals (Blue Zoo Guides)* by Dee Phillips
- Students create a diorama in a shoe box displaying one of the mammals they observed at the museum.
- Students design posters with realistic illustrations and information about mammals.
- Students prepare written reports on a mammal about which they have learned. The report can be shared at a parents’ night or used for an informational bulletin board.
- Students work together to create a mural of mammals to display in their classroom or hallway.

Parent Links:

- Visit the following websites, and explore information on mammals.
 - www.enchantedlearning.com
 - <http://animal.discovery.com/>
 - <http://kids.nationalgeographic.com/>
 - www.zoobooks.com
- Plan a visit to a zoo, aquarium, or a pet store. Locate and observe mammals.
- Observe a pet at home. Identify the characteristics of a mammal, and determine if your pet is a mammal.

Resources:

- www.enchantedlearning.com
- <http://animal.discovery.com/>
- <http://kids.nationalgeographic.com/>
- www.zoobooks.com
- www.amazon.com

Pennsylvania State Standards: Science and Technology 3.1.4A, 3.1.4.E, 3.2.4.A, 3.2.4.B, 3.2.4.C, 3.3.4.A, 3.3.4.B, 3.3.4.C, 4.6.4.A

Student Handout #1.1

Mammals

Name: _____

Date: _____

Mammals

What I think I know	What I know
I think a mammal is...	I know a mammal is...

Name: _____

Date: _____

Mammals at the Academy

Write the name of the mammal.	Draw a picture of the mammal.	How do you know this animal is a mammal?

My Mammal Book

This is a _____.
(name of animal)

By _____

It is a mammal.

This is a _____.
(name of animal)

This is a _____.
(name of animal)

It is a mammal.

It is a mammal.

Student Name: _____

Category	4- Above Standards	3- Meets Standards	2- Approaching Standards	1- Below Standards	Score
<u>Animal Choice</u>	All animals named are mammals, and at least one is a mammal not discussed or seen at Academy.	All animals named are mammals.	Only 2 of the animals named are mammals.	Only 1 or none of the animals named are mammals.	
<u>Characteristics of Mammals</u>	All drawings show distinct mammalian features: hair, babies drinking milk, etc.	Some of the drawings show distinct mammalian features.	Drawings show features assigned to other types of animals: feathers, scales, etc.	There are no drawings or drawings are incomplete.	
<u>Neatness/Relevance</u>	The overall appearance is very neat, easily understandable, and all drawings relate to the animal named.	The overall appearance is neat and at least three of the drawings are easily connected to the animal named.	The book is difficult to read, and the drawings do not match the animal named.	The drawings and the animals named are incomprehensible.	

Lesson 2

Topic: Mammals

Target: 2nd grade

Duration: One 30 minute lesson with extension options and parent links

Discipline Connections: science, literacy, visual arts

Materials:

- pictures of mammals or animal magazines
- one twig or stick for each child (mobile base)
- cardboard
- scissors
- glue
- yarn or string
- markers or crayons
- Rubric 2

Word Bank: mammal, warm blooded, characteristics

Objective: Students will recognize the difference between mammals and non-mammals through discussion in this creative project.

Background Knowledge: The students should have some basic background knowledge of mammals and their characteristics.

Focusing Question: What makes mammals different from other animals?

Procedure:

1. Write the focusing question on the board and have students respond to the question in writing. Then, have students share their responses aloud.
2. State and write the lesson objective on the board.
3. Discuss characteristics of mammals. Discuss with the whole class what makes mammals different from other animals.
4. Using the books listed in the resource section of this lesson and/or pictures of mammals, have students identify which animals are mammals and which are not. In a classroom discussion format, have them provide a reason for each answer they give.
5. Once students can confidently distinguish mammals from other animals, they will create a mobile. They should only include mammals in their mobiles. Make animal magazines with pictures of mammals available to the students.
6. They will begin by gluing animal pictures from the magazines onto cardboard and punching a hole at the top.
7. Have them string each of the pictures onto colored yarn and hang these from the twig. They can hang information about the animals on the mobile as well.

Lesson 2 (continued)

Topic: Mammals

Museum Activities:

1. While at the museum, the students will record mammals they see in the North American Hall dioramas.
2. The students will determine what the mammals in the dioramas eat based on their teeth or identify other animals found in the diorama.

Reflection: The students will reflect on their original answer to their focusing question and add what they have learned from this lesson.

Assessment: mobile completion, reflection response

Extension Options:

- Students will play a reinforcement game to see what they know about mammals. The teacher will toss a soft ball (preferably made of foam or yarn) to a student. The student will have 10-20 seconds to name a mammal and then toss it back. Go around the room and name as many mammals as you can without repetition.
- The students will choose a mammal and write a factual report. They will include characteristics, food, habitat, etc. The students will be asked to include a scientific drawing of their mammal.

Parent Links:

- Let your child learn about a small mammal known as the meerkat on Animal Planet at <http://animal.discovery.com/fansites/meerkat/meet/meet.html>
- Have your child test their mammal skills by playing Mammal Match at: <http://www.apples4theteacher.com/mammals.html>

Resources:

- *Eyewitness Books: Mammals* by Steven Parker
- *Mammals: How to Watch and Understand the Captivating World of Mammals* by David Burnie
- *Mammals of North America* by Roland W. Kays and Din E. Wilson
- <http://www.thewebsiteofeverything.com>
- <http://www.nhm.org/mammals/page006.html>
- <http://school.discovery.com/lessonplans/programs/whatsamammal>

Pennsylvania State Standards:

Reading, Writing, Speaking, Listening 1.1, 1.2, 1.3, 1.4, 1.6, 1.8

Science and Technology 3.1 A, 3.2 A-B, 3.3 A-B, 3.6 B, 3.7 D-E

Family and Consumer Sciences 11.2 H

Geography 7.4 A-B

Art 9.1 B, I

Student Name: _____

Category	4- Above Standards	3- Meets Standards	2- Approaching Standards	1- Below Standards	Score
<u>Animal Choice</u>	All animals included in mobile are mammals, and there is no repetition of species.	At least 90% of animals included are mammals.	75-89% of the animals included are mammals.	Less than 75% of animals included are mammals.	
<u>Information about Mammals</u>	Student includes 5 or more pieces of information about mammals on mobile.	Student includes 3-4 pieces of information about mammals on mobile.	Student includes 1-2 pieces of information about mammals on mobile.	Student does not include any information about mammals on mobile.	
<u>Neatness</u>	The overall appearance is very neat and collage is coherent with all pieces adhered firmly.	The overall appearance is fairly neat with most pieces of collage adhered firmly.	The mobile is lacking in neatness to the point of distracting the observer and pieces of the collage fall off.	The mobile includes too many or too few pictures to be coherent, and is messy to the point of incomprehensible.	

Lesson 3

Topic: What is a Carnivore?

Target: 1st grade

Duration: One 45 minute lesson with extension options and parent links

Discipline Connections: science, reading, writing, math

Materials:

- Student Handouts:
 - 3.1: What is a Carnivore?
 - 3.2: Carnivores at the Academy
 - 3.3: Carnivore Book
- Literature:
 - What Is a Carnivore? (Big Science Ideas)* by Bobbie Kalman
- Class Idea Web on chart paper
- Rubric 3

Word Bank: carnivore, meat, animal, diet, characteristics, teeth, claws, prey, predator, herbivore, omnivore

Objective: Students will demonstrate their ability to identify a carnivore and its characteristics.

Background Knowledge: A carnivore – which means meat eater – is an animal with a diet consisting only of meat. This meat may come from animals living or dead. Characteristics commonly associated with carnivores include organs for capturing and disarticulating prey (usually teeth and claws). Some carnivores include: domestic cats, lions, tigers, polar bears, snakes, sharks, and spiders.

Focusing Question: What is a carnivore? Describe the characteristics of a carnivore.

Procedure:

1. Distribute Student Handout 3.1 and allow students to fill in the first column “What I think I know.”
2. Write the word carnivore on the board. Have the students write and/or draw what they think a carnivore is. Select a few students to share their responses.
3. Read aloud: *What Is a Carnivore? (Big Science Ideas)* by Bobbie Kalman
4. Create a class web of ideas. On a piece of chart paper write the word “carnivore” in the middle of a small circle. Ask the students to share all the information they have learned from the read-aloud. As students share, organize the information by drawing lines out from the small circle and writing the information at the end of the line.
5. Students will then complete Student Handout 3.1. Have the students write and/or draw the new information they have learned about carnivores. Select a few students to share their responses.

Museum Activities:

1. In North American Hall, students will locate, observe and describe the carnivores in the dioramas. (polar bear, puma, seal)
2. Distribute Student Handout 3.2, and have the students complete the handout.

Lesson 3 (continued)

Topic: What is a Carnivore?

Reflection: The students will use the information from their completed Student Handouts 3.1 and 3.2 to create a “Carnivore Book” on Student Handout 3.3. Once the students have completed their books, allow students to share their books.

Assessment: Completed Student Handouts 3.1, 3.2, and 3.3.

Extension Options:

- Literature for read-alouds, independent reading, or peer reading:
 - *A Bold Carnivore: An Alphabet of Predators* by Consie Powell
 - *Meat-Eating Animals (Early Nature Picture Books)* by Nathan Aaseng and Alcuin Dornisch
 - *The Magic School Bus Gets Eaten: A Book About Food Chains (Magic School Bus)* by Pat Relf and Carolyn Bracken
 - *Carnivores (Nature's Food Chain)* by Heather C. Hudak
 - *Killer Carnivores (Wild Predators)* by Andrew Solway
- Create a chart to record the food eaten by students during lunch. Organize the data into a graph. Analyze the data to determine how the class is split between carnivores, herbivores, and omnivores.
- Students can create and act out a short play based on a carnivore.
- Students can create a diorama in a shoe box displaying one of the carnivores they observed at the museum.

Parent Links:

- Visit the following websites, and explore information on carnivores.
 - www.enchantedlearning.com
 - <http://animal.discovery.com/>
 - <http://kids.nationalgeographic.com/>
- Observe a pet at home. Identify the characteristics of a carnivore, and determine if your pet is a carnivore.
- Create a habitat for a pet carnivore using the following book as a guide.
Kids' Easy-to-Create Wildlife Habitats: For Small Spaces in City-Suburbs-Countryside (Quick Starts for Kids!) by Emily Stetson, J. Susan Cole Stone, and J. Susan Cole-Stone
- Use the library or the internet to find information on carnivorous plants.

Resources:

- www.qrg.northwestern.edu/projects/marssim/simhtml/info/whats-a-carnivore.html
- <http://animal.discovery.com/>
- <http://kids.nationalgeographic.com/>
- <http://www.nhptv.org/NatureWorks/nwep10a.htm>

Pennsylvania State Standards:

Science and Technology 3.1.4A, 3.1.4.E, 3.2.4.A, 3.2.4.B, 3.2.4.C, 3.3.4.A, 3.3.4.B, 3.3.4.C, 4.6.4.A

Student Handout 3.1

What is a Carnivore?

Name: _____

Date: _____

Carnivore

What I think I know	What I know
I think a carnivore is...	I know a carnivore is...

Student Handout 3.2

Carnivores at the Academy

Name: _____

Date: _____

Carnivores at the Academy

Write the name of the carnivore.	Draw a picture of the carnivore.	How do you know this animal is a carnivore?

My Carnivore Book

This is a _____.
(name of animal)

By _____

It is a carnivore.

This is a _____.
(name of animal)

It is a carnivore.

This is a _____.
(name of animal)

It is a carnivore.

A carnivore is an animal that eats

A carnivore is an animal with

A carnivore is an animal with

A carnivore is an animal with

Rubric 3

My Carnivore Book

Student Name: _____

Category	4- Above Standards	3- Meets Standards	2- Approaching Standards	1- Below Standards	Score
<u>Animal Choice</u>	All animals named are carnivores, and at least one is a carnivore not discussed or seen at Academy.	All animals named are carnivores.	Only two of the animals named are carnivores.	Only 1 or none of the animals named are carnivores.	
<u>Characteristics of Carnivores- Drawings</u>	All drawings show distinct carnivore features: teeth, eating of meat, etc.	Some of the drawings show distinct carnivore features.	Drawings show features assigned to other types of animals: herbivorous animals, eating grass, etc.	There are no drawings or drawings are incomplete.	
<u>Characteristics of Carnivores- Writing</u>	All four included facts are correct and are specific to carnivores.	All four facts included are technically correct, but may also relate to other animals (i.e “They live in the desert.”)	Only 2 of the facts included are correct.	Only 1 or none of the facts included are correct.	
<u>Neatness/ Relevance</u>	The overall appearance is very neat, easily understandable, and all drawings relate to the animal named or information given.	The overall appearance is neat and at least three of the drawings are easily connected to the animal named or info given.	The book is difficult to read, and the drawings do not match the animal named or the information given.	The drawings, the animals named, and the facts given are incomprehensible.	

Lesson 4

Topic: What is an Herbivore?

Target: 1st grade

Duration: One 45 minute lesson with extension options and parent links

Discipline Connections: science, reading, writing, math

Materials:

- Student Handouts:
 - 4.1: What is an Herbivore?
 - 4.2: Herbivores at the Academy
 - 4.3: Herbivore Book
- Literature:
 - What Is an Herbivore? (Big Science Ideas)* by Bobbie Kalman
- Class Idea Web on chart paper
- Rubric 4

Word Bank: herbivore, plant, vegetarian, carnivore, omnivore

Objective: Students will demonstrate their ability to identify an herbivore and its characteristics.

Background Knowledge: An herbivore is an animal that eats plant matter rather than meat. Such animals are sometimes referred to as being vegetarian, however, this term is reserved more for humans because they choose not to eat meat. Some herbivores include: rabbits, deer, zebras, and elephants.

Focusing Question: What is an herbivore? Describe the characteristics of an herbivore.

Procedure:

1. Distribute Student Handout 4.1 and allow students to fill in the first column “What I think I know.”
2. Write the word herbivore on the board. Have the students write and/or draw what they think an herbivore is. Select a few students to share their responses.
3. Read aloud: *What Is an Herbivore? (Big Science Ideas)* by Bobbie Kalman
4. Create a class idea web. On a piece of chart paper write the word “herbivore” in the middle of a small circle. Ask the students to share all the information they have learned from the read-aloud. As students share, organize the information by drawing lines out from the small circle and writing the information at the end of the line.
5. Students will then complete Student Handout 4.1. Have the students write and/or draw the new information they have learned about herbivores. Select a few students to share their responses.

Museum Activities:

1. In North American Hall, students will locate, observe, and describe the herbivores in the dioramas. (Dall Sheep, Pronghorn, Caribou, Musk Ox, Bison, Big Horn Sheep, Moose, Deer)
2. Distribute Student Handout 4.2 and have the students complete the handout.

Lesson 4 (continued)

Topic: What is an Herbivore?

Reflection: The students will use the information from Student Handouts 4.1 and 4.2 to create an “Herbivore Book” with key information about their animal, characteristics of herbivores, and an illustration showing the animal in its habitat on Student Handout 4.3. Once the students have completed their books select a few students to share their books.

Assessment: Completed Student Handouts 4.1, 4.2, and 4.3.

Extension Options:

- Literature for read-alouds, independent reading, or peer reading:
 - *Herbivores in the Food Chain (The Library of Food Chains and Food Webs)* by Alice B. McGinty and Dwight Kuhn
 - *Herbivores (Nature's Food Chain)* by Jill Foran
 - *Pleased to Eat You* by Sydnie Meltzer Kleinhenz
 - *I Eat Leaves (Read Me First Series)* by JoAnn Vandine and Cynthia A. Belcher
- Create a chart to record the food eaten by students during lunch. Organize the data into a graph. Analyze the data to determine how the class is split between carnivores, herbivores, and omnivores.
- Students create a mural of herbivores of North America.
- Students pick an herbivore, and write a story about their life as an herbivore.

Parent Links:

- Visit your local library or book store, and select books about herbivores
- Visit the following websites and explore information on herbivores.
 - <http://animal.discovery.com/>
 - <http://kids.nationalgeographic.com/>
- Observe a pet at home. Identify the characteristics of an herbivore, and determine if your pet is an herbivore.
- Create a habitat for a pet herbivore using the following book as a guide.
Kids' Easy-to-Create Wildlife Habitats: For Small Spaces in City-Suburbs-Countryside (Quick Starts for Kids!) by Emily Stetson, J. Susan Cole Stone, and J. Susan Cole-Stone

Resources:

- www.qrg.northwestern.edu/projects/marssim/simhtml/info/whats-a-carnivore.html
- <http://animal.discovery.com/>
- <http://kids.nationalgeographic.com/>
- <http://www.nhptv.org/NatureWorks/nwep10a.htm>

Pennsylvania State Standards:

Science and Technology 3.1.4A, 3.1.4.E, 3.2.4.A, 3.2.4.B, 3.2.4.C, 3.3.4.A, 3.3.4.B, 3.3.4.C, 4.6.4.A

Student Handout 4.1

What is an Herbivore?

Name: _____

Date: _____

Herbivore

What I think I know	What I know
I think an herbivore is...	I know an herbivore is...

Student Handout 4.2

Herbivores at the Academy

Name: _____

Date: _____

Herbivores at the Academy

Write the name of the herbivore.	Draw a picture of the herbivore.	How do you know this animal is an herbivore?

My Herbivore Book

This is a _____.
(name of animal)

By _____

It is an herbivore.

This is a _____.
(name of animal)

It is an herbivore.

This is a _____.
(name of animal)

It is an herbivore.

An herbivore is an animal that eats

An herbivore is an animal with

An herbivore is an animal with

An herbivore is an animal with

Student Name: _____

Category	4- Above Standards	3- Meets Standards	2- Approaching Standards	1- Below Standards	Score
<u>Animal Choice</u>	All animals named are herbivores, and at least one is an herbivore not discussed or seen at Academy.	All animals named are herbivores.	Only two of the animals named are herbivores.	Only 1 or none of the animals named are herbivores.	
<u>Characteristics of Herbivores- Drawings</u>	All drawings show distinct herbivore features: teeth, eating of plants, etc.	Some of the drawings show distinct herbivore features.	Drawings show features assigned to other types of animals: carnivorous animals, eating meat, etc.	There are no drawings or drawings are incomplete.	
<u>Characteristics of Herbivores- Writing</u>	All four included facts are correct and are specific to herbivores.	All four facts included are technically correct, but may also relate to other animals (i.e “They live in the desert.”)	Only 2 of the facts included are correct.	Only 1 or none of the facts included are correct.	
<u>Neatness/ Relevance</u>	The overall appearance is very neat, easily understandable, and all drawings relate to the animal named or information given.	The overall appearance is neat and at least three of the drawings are easily connected to the animal named or info given.	The book is difficult to read, and the drawings do not match the animal named or the information given.	The drawings, the animals named, and the facts given are incomprehensible.	

Lesson 5

Topic: What is an Omnivore?

Target: 1st grade

Duration: One 45 minute lesson with extension options and parent links

Discipline Connections: science, reading, writing, math

Materials:

- Student Handouts:
 - 5.1: What is an Omnivore?
 - 5.2: Omnivores at the Academy
 - 5.3: The Story of an Omnivore
- Literature:
 - What Is an Omnivore? (Big Science Ideas)* by Bobbie Kalman
- Class Idea Web on chart paper
- Rubric 5

Word Bank: omnivore, plant, meat, animal, human

Objective: Students will demonstrate their ability to identify an omnivore and its characteristics.

Background Knowledge: An omnivore is an animal that eats both plants and animals. Humans are considered omnivores; many humans eat a balanced diet of plant and animal products. Some omnivores include: pigs, brown bears, some birds, raccoons, mice, rats, and humans.

Focusing Question: What is an omnivore? Describe the characteristics of an omnivore.

Procedure:

1. Distribute Student Handout 5.1 and allow students to fill in the first column “What I think I know.”
2. Write the word omnivore on the board. Have the students write and/or draw what they think an omnivore is. Select a few students to share their responses.
3. Read aloud: *What Is an Omnivore? (Big Science Ideas)* by Bobbie Kalman
4. Create a class idea web. On a piece of chart paper, write the word “omnivore” in the middle of a small circle. Ask the students to share all the information they have learned from the read-aloud. As students share, organize the information by drawing lines out from the small circle and writing the information at the end of the line.
5. Students will then complete their Student Handout 5.1. Have the students write and/or draw what the new information they have learned about omnivores. Select a few students to share their responses.

Museum Activities:

1. In North American Hall, students will locate, observe and describe the omnivores in the dioramas. (Brown Bear, Collared Peccary) Then, discuss that humans are omnivores like the animals in the dioramas.
2. Distribute Student Handout 5.2 and have the students complete the handout using humans as the third animal.

Lesson 5 (continued)

Topic: What is an Omnivore?

Reflection:

The students will use the information from Student Handouts 5.1 and 5.2 to write a short nonfiction story about an omnivore. Students should include key vocabulary words and the characteristics of omnivores and create a realistic illustration of the omnivore.

Assessment: Completed Student Handouts 5.1, 5.2, and 5.3.

Extension Options:

- Literature for read-alouds, independent reading, or peer reading:
 - *Omnivores in the Food Chain (The Library of Food Chains and Food Webs)* by Alice B. McGinty and Dwight Kuhn
 - *Pleased to Eat You* by Sydnie Meltzer Kleinhenz
 - *Omnivores (Nature's Food Chain)* by Heather C. Hudak
- Compare and contrast humans with other omnivores.
- Create a chart to record the food eaten by students during lunch. Organize the data into a graph. Analyze the data to determine how the class is split between carnivores, herbivores, and omnivores.
- Students create and act out a short play based on an omnivore. Advise students to use key vocabulary words and information they have learned about omnivores.
- Students create a diorama in a shoe box displaying one of the omnivores they observed at the Academy of Natural Sciences.
- Students create a mural of omnivores of North America.

Parent Links:

- Visit your local library or book store, and select books about omnivores.
- Visit the following websites to explore information on omnivores.
 - <http://animal.discovery.com/>
 - <http://kids.nationalgeographic.com/>
- Plan a visit to a zoo or a pet store. Locate and observe omnivores.
- Observe a pet at home. Identify the characteristics of omnivores and determine if your pet is an omnivore.
- Create a habitat for a pet omnivore using the following book as a guide.
Kids' Easy-to-Create Wildlife Habitats: For Small Spaces in City-Suburbs-Countryside (Quick Starts for Kids!) by Emily Stetson, J. Susan Cole Stone, and J. Susan Cole-Stone

Resources:

- <http://animal.discovery.com/>
- <http://kids.nationalgeographic.com/>
- www.amazon.com
- <http://www.nhptv.org/natureworks/nwep10b.htm>

Pennsylvania State Standards:

Science and Technology 3.1.4A, 3.1.4.E, 3.2.4.A, 3.2.4.B, 3.2.4.C, 3.3.4.A, 3.3.4.B, 3.3.4.C, 4.6.4.A

Student Handout 5.1

What is an Omnivore?

Name: _____

Date: _____

Omnivore

What I think I know	What I know
I think an omnivore is...	I know an omnivore is...

Student Handout 5.2

Omnivores at the Academy

Name: _____

Date: _____

Omnivores at the Academy

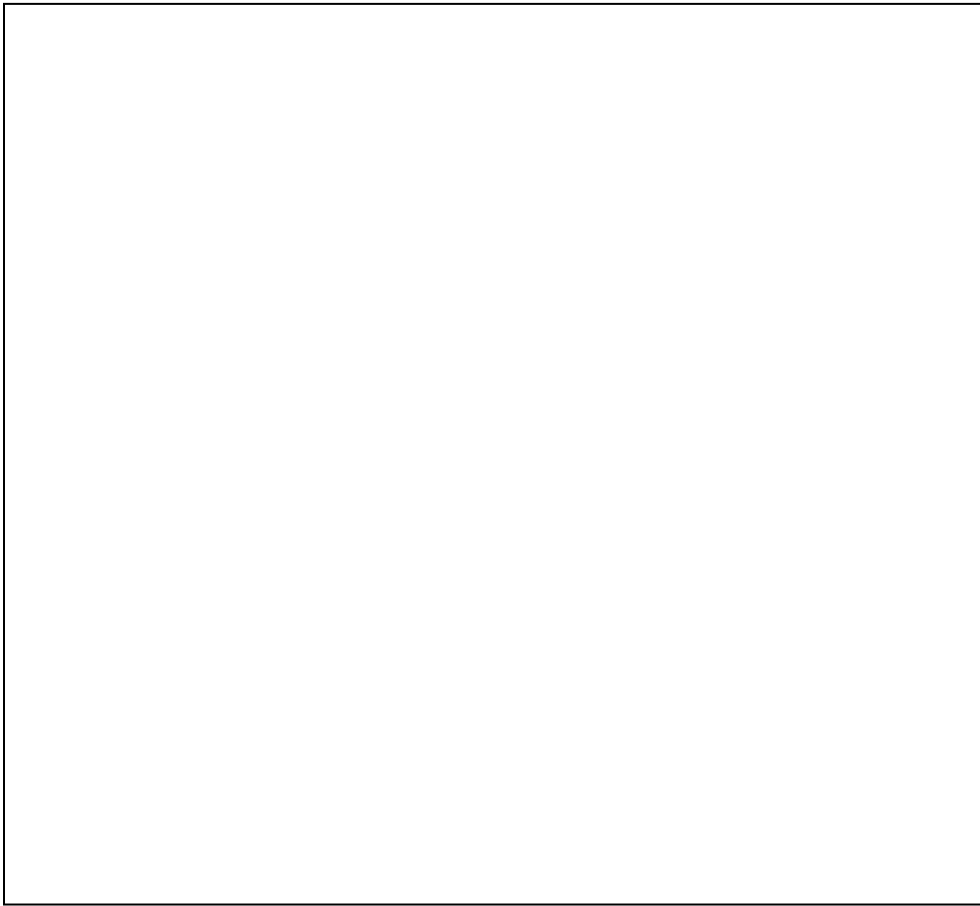
Write the name of the omnivore.	Draw a picture of the omnivore.	How do you know this animal is an omnivore?
Human		

Student Handout 5.3

The Story of an Omnivore

Title: _____

Author: _____



Rubric 5

The Story of an Omnivore

Student Name: _____

Category	4- Above Standards	3- Meets Standards	2- Approaching Standards	1- Below Standards	Score
<u>Omnivore Information</u>	The student gave 4 or more facts about the chosen omnivore and all facts were correct.	The student gave 2-3 facts about the chosen animal and all facts were correct.	The student gave only 1 fact or some of facts given were incorrect.	The student gave no factual information about the animal or the animal chosen is not an omnivore.	
<u>Story Elements</u>	The story had a clear beginning, middle, and end as well as a logical chain of events.	The story had a beginning, middle, and end.	The story was missing either a clear beginning or a clear end.	The story lacks any organization.	
<u>Vocabulary usage</u>	All 5 word bank words are used correctly.	3-4 of the word bank words are used correctly.	Only 1-2 of the word bank words are used, or some of the word bank words are used incorrectly.	No word bank words were used or all of the word bank words were used incorrectly.	
<u>Omnivore Drawing</u>	The drawing clearly highlights omnivore characteristics (i.e. teeth, diet) and relates to the story.	The drawing highlights omnivore characteristics.	The drawing clearly represents the animal, but omnivore characteristics are not highlighted.	The drawing does not relate to story or to omnivore chosen.	

Lesson 6

Topic: Carnivores, Herbivores, & Omnivores

Target: 2nd grade

Duration: One 30 minute lesson with extension options and parent links

Discipline Connections: science, literacy, visual arts, technology

Materials:

- Student Handouts:
6.1: What do Animals Eat?
- Literature:
Animals That Eat Other Animals by Selsam and Hunt
- chart paper
- teacher-made collage model
- glue
- scissors
- animal magazines (i.e. National Geographic Kids, Ranger Rick, etc.)
- animal journal
- Rubric 6

Word Bank: carnivore, herbivore, omnivore, characteristics

Objective: Students will demonstrate their ability to identify a carnivore, herbivore, and omnivore and name their characteristics.

Background Knowledge: During this activity students will learn about the characteristics of carnivores, herbivores, and omnivores.

Focusing Question: What are carnivores, omnivores, and herbivores? Describe the characteristics of each.

Procedure:

1. Write the focusing question on the board and have students respond to the question in writing. Then, allow students to share their responses aloud.
2. Read-aloud: *Animals That Eat Other Animals* by Selsam and Hunt.
3. State and write the lesson objective on the board.
4. Distribute Student Handout 6.1.
5. Explain the different characteristics of each type of animal. The students will fill in their graphic organizer while the teacher fills the information in on chart paper or an overhead.
6. Break students into small groups. Show students a teacher-made collage model representing animals that are herbivores, carnivores, or omnivores.
7. Distribute magazines, chart paper, markers, scissors, and glue. Have students create their own collage of the three types of eaters.

Museum Activities:

1. As the students walk through North American Hall, ask them to categorize the animals from the dioramas as carnivores, herbivores, or omnivores. They can keep track of this on a graphic organizer or in an “animal journal.”

Lesson 6 (continued)

Topic: Carnivores, Herbivores, & Omnivores

Reflection: Ask the students to write 3-4 sentences about the characteristics of each type of animal eater. Have them list an example of each that they used either in their collage or saw in the diorama.

Assessment: Group collage activity, reflection paragraph

Extension Options:

- Ask the students, “If you could choose to be an animal that was an omnivore, herbivore, or carnivore, which one would you choose?” Students then write three sentences that explain which animals they chose and why. Then, draw an illustration of their animals.
- Using the library, students find a book about carnivores, omnivores, or herbivores. Then, they complete a factual book report on their findings.
- Using library sources and the internet, students create posters that give information about three animals that each fit into one of the categories of eaters.
- Students create acrostic poems using the words omnivore, herbivore, and carnivore. The poems should incorporate facts that they have learned about each type of eater.

Parent Links:

- Allow students to observe and keep records of one of their pets or other animals in the community. They can keep track of the characteristics of the animal in their animal journals. They should observe what the animal eats for one week and decide which category it fits into.

Resources:

- *Animals That Eat Other Animals* by Millicent E. Selsam and Joyce Hunt
- <http://animaldiversity.ummz.edu>
- <http://www.qrg.northwestern.edu/projects/marssim/simhtml/info/whats-a-carnivore.html>

Pennsylvania State Standards:

Reading, Writing, Speaking, Listening 1.1, 1.2, 1.3, 1.4, 1.6, 1.8;

Science and Technology 3.1 A, 3.2 A-B, 3.3 A-B, 3.6 B, 3.7 D-E;

Family and Consumer Sciences 11.2 H;

Geography 7.4 A-B;

Art 9.1 B, I, J,

Name: _____

Date: _____

Record some characteristics of these different types of eaters.

Herbivores

Carnivores

Omnivores

Student Name: _____

Category	4- Above Standards	3- Meets Standards	2- Approaching Standards	1- Below Standards	Score
<u>Herbivore Information</u>	Student gives 4 characteristics of herbivores, and all information is correct.	Student gives 3 characteristics of herbivores and all information is correct.	Student gives only 1-2 characteristics of herbivores or some given information is incorrect.	Student gives only incorrect information about herbivores.	
<u>Carnivore Information</u>	Student gives 4 characteristics of carnivores, and all information is correct.	Student gives 3 characteristics of carnivores and all information is correct.	Student gives only 1-2 characteristics of carnivores or some given information is incorrect.	Student gives only incorrect information about carnivores.	
<u>Omnivore Information</u>	Student gives 4 characteristics of omnivores, and all information is correct.	Student gives 3 characteristics of omnivores and all information is correct.	Student gives only 1-2 characteristics of omnivores or some given information is incorrect.	Student gives only incorrect information about omnivores.	
<u>Examples</u>	All three categories (herbivore, carnivore, and omnivore) have at least 2 correct examples of animals.	All three categories have 1 correct animal example.	1 -2 categories do not have any examples, or some examples are incorrect.	All examples are completely missing or incorrect.	
<u>Spelling/ Grammar</u>	There are no spelling or grammar mistakes.	There are 1-5 spelling or grammar mistakes.	There are 6-10 spelling or grammar mistakes.	There are more than 10 spelling or grammar mistakes.	

Lesson 7

Topic: Food Webs

Target: 3rd Grade

Duration: One 45 minutes class in classroom followed by one 45 minute class at the Academy of Natural Sciences. One 40 minutes class concludes in the classroom.

Discipline Connections: science

Materials:

- student notebooks
- poster board
- pens
- pencils
- rulers
- crayons
- Rubric 7

Word Bank: food chain, habitat, niche, producers, consumers, decomposers

Objectives: The students will be able to differentiate the levels of the food chain by giving examples of each level. The students will work in groups to create food chain pyramids based upon the dioramas they observed in North American Hall at the Academy of Natural Sciences.

Background: This lesson will take place over the course of three days. One day will be devoted to teaching the students about the food chain, the second will be spent at the Academy of Natural Sciences, and the third will take place back in the classroom.

Focusing Questions: What is a food chain? What are the three levels of a food chain? What would happen if one of the three levels of the food chain was missing?

Procedure:

1. Facilitate a discussion on the food chain explaining how a food chain consists of three distinct levels (producers, consumers, and decomposers) During the discussion, introduce the term niche to the class and explain how it relates to the food chain.
2. Students then collaborate in small groups to identify examples of animals that exist on each level of the food chain
3. Compile a large list of all the animals on the board. The students will be required to study this list for homework.

Museum Activities:

1. Students will work with their group members from the previous day's lesson to gather information from the dioramas in North American Hall at the Academy of Natural Sciences.
2. The groups will identify the animals in each of the three levels of the food chain in at least two of the dioramas in the North American Hall
3. After organizing the animals into the three distinct levels, students will record the animals and their levels.

Lesson 7 (continued)

Topic: Food Webs

Reflection: In the classroom, the students will create posters with food chains for one of the dioramas they observed on their trip to the Academy of Natural Sciences.

Assessment: posters, list of animal eaters

Extension Options:

- Create food chains focusing on the contents of students' lunches.
- Students will give step by step descriptions of an event to illustrate a chain of events. (Ex: brushing your teeth, getting dressed for school, etc.)
- The students will write a fictional story in response to the following question: What would happen if one of the levels of the food chain ceased to exist?

Parent Links:

- Children and parents can learn together about the food chains that exist in the ocean and on land.
<http://www.kidport.com/RefLib/Science/FoodChain/FoodChain.htm>
- Learn more about animal food chains. Study them in depth.
http://www.arcytech.org/java/population/facts_foodchain.html
- Study links to hundreds of mammals.
<http://www.nature.ca/notebooks/English/mammpg.htm>

Pennsylvania State Standards:
Science and Technology 3.3.4 A

Student Name: _____

Category	4- Above Standards	3- Meets Standards	2- Approaching Standards	1- Below Standards	Score
<u>Food Chain Components</u>	Poster correctly identifies producers, consumers, and decomposers and shows connections between all groups of organisms.	Poster correctly identifies producers, consumers, and decomposers.	Poster correctly identifies 1-2 of the three levels of the food chain.	None of the levels of the food chain are correctly identified.	
<u>Organism Examples</u>	Poster lists/shows at least 2 correct Academy examples of organisms at each level (producers, consumers, decomposers)	Poster lists/shows 1 correct Academy example of organisms at each level.	Poster lists/show 1 correct example at 1-2 levels or includes some organisms incorrectly.	Examples are either completely missing or completely incorrect.	
<u>Organization/ Neatness</u>	The overall appearance is very neat. The poster is easily understandable, well organized, and all drawings and writing relate to food chain.	The overall appearance is fairly neat. The poster is understandable, has defined organization, and most of the drawings and writing relate to the food chain.	The poster is lacking in neatness to the point of distracting the observer. Organization is inconsistent, and some drawing or writing is unrelated to food chains.	The poster is messy, lacks any organization, and is missing proper writing or illustration, or writing or illustration is incoherent.	

Lesson 8

Topic: Fitting into the Food Chain

Target: 2nd grade

Duration: One 30 minute lesson with extension options and parent links

Discipline Connections: science, literacy, visual arts, technology

Materials:

- Student Handouts:
8.1: Identify the Food Chains
- animal journals
- poster board or large paper
- crayons
- markers
- rulers
- pencils
- Rubric 8

Word Bank: food chain, carnivore, herbivore, omnivore, producers, consumers, predator, prey

Objective: Students will be able to categorize different North American animals in their places on the food chain.

Background Knowledge: The students will build off of what they have already learned about carnivores, herbivores, and omnivores.

Focusing Question: Where do humans fit on the food chain? If you could be any animal on the food chain which one would you choose and why?

Procedure:

1. Write the focusing question on the board and have students respond to the question in writing. Then, have some students share their responses aloud.
2. State and write the lesson objective on the board.
3. Discuss what food chains are with the students. Talk about key terms in the word bank.
4. Give out Student Handout 8.1. Have the students work with a partner to identify various types of animals such as producers, consumers, etc.
5. Have the students work with a partner (or independently) to create their own food web using the animals found on their handout. The students will write down the chains they see.
6. The students will work with their partner to draw their own food web poster.

Museum Activities:

1. Ask the students to examine the dioramas in North American Hall.
2. Have the students work independently or with a partner to create their own food chain using the animals found in the dioramas.

Reflection:

Have the students write a paragraph that explains their food web poster.

Assessment: food web poster, reflection paragraph

Extension Options:

- Have students watch a short Brain Pop movie on the food chain on the following site:
<http://magma.nationalgeographic.com/ngexplorer/0309/quickflicks/>
- Follow up this short film with a quiz on the same site.
- Go to this site to read more about the food chain:
<http://magma.nationalgeographic.com/ngexplorer/0309/quickflicks/>
- This site allows students to create a food chain by testing their knowledge on this food chain puzzle: <http://www.zephyrus.co.uk/foodpuzzlechain.html>

Parent Links:

- Have your child go onto Ecokids and create their own food chain on line.
http://www.ecokidsonline.com/pub/eco_info/topics/frogs/chain_reaction/index.cfm
- Play this interactive game called “Fish Food” on the Ranger Rick site:
<http://www.nwf.org/kidzone/kzPage.cfm?siteId=3&departmentId=77>

Resources:

- http://www.picadome.fcps.net/lab/currl/food_chain/default.htm
- www.rangerrick.com
- <http://www.zephyrus.co.uk/index.html>
- www.brainpop.com
- <http://library.thinkquest.org/11353/food.htm>

Pennsylvania State Standards:

Reading, Writing, Speaking, Listening 1.1, 1.2, 1.3, 1.4, 1.6, 1.8;

Science and Technology 3.1 A, 3.2 A-B, 3.3 A,B,D 3.6 B, 3.7 D-E;

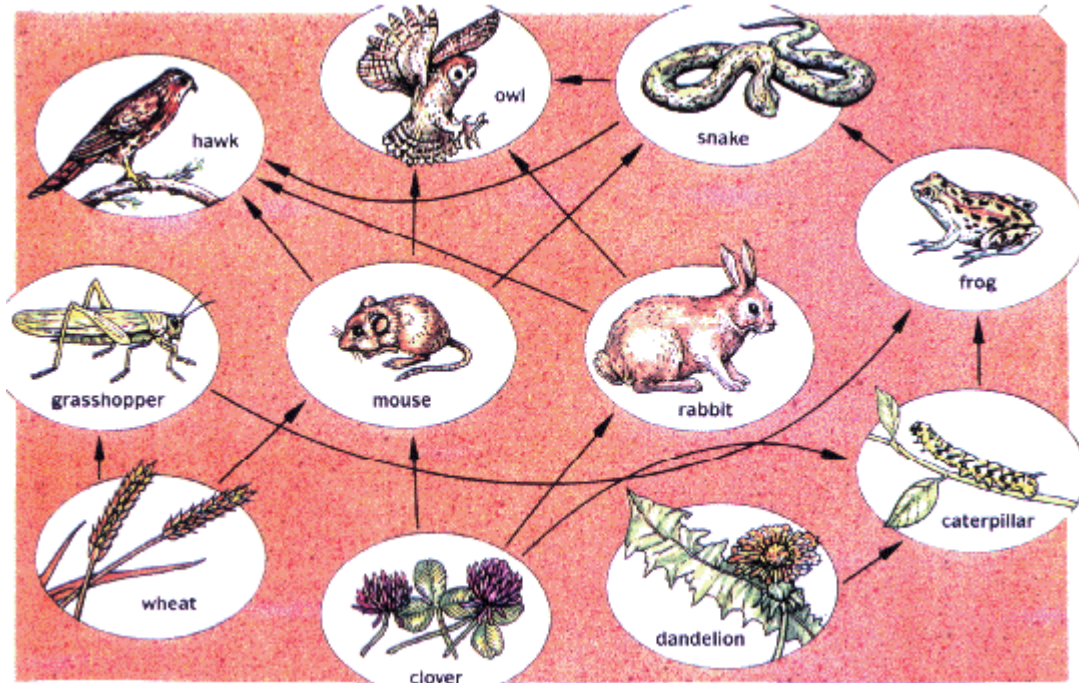
Family and Consumer Sciences 11.2 H;

Geography 7.4 A-B;

Art 9.1 B, I,

Name: _____

Date: _____



Use the picture above to answer the following questions. Please write your answers in the space provided.

1. Identify the organism(s) that are producers.

2. Identify the organism(s) that are consumers.

3. List some of the food chains by writing the organism's name and drawing a line that points to the next organism in the food chain.

4. How many food chains can you find in the above food web?

Student Name: _____

Category	4- Above Standards	3- Meets Standards	2- Approaching Standards	1- Below Standards	Score
<u>Food Chain Components-Poster</u>	Poster correctly identifies producers, consumers, and decomposers and shows connections between all groups of organisms.	Poster correctly identifies producers, consumers, and decomposers.	Poster correctly identifies 1-2 of the three levels of the food chain.	None of the levels of the food chain are correctly identified.	
<u>Organism Examples-Poster</u>	Poster lists/shows at least 2 correct Academy examples of organisms at each level (producers, consumers, decomposers)	Poster lists/shows 1 correct Academy example of organisms at each level.	Poster lists/shows 1 correct example at 1-2 levels or includes some organisms incorrectly.	Examples are either completely missing or completely incorrect.	
<u>Reflection Paragraph</u>	Paragraph thoroughly explains poster and provides additional information about food chain.	Paragraph explains poster.	Paragraph is related to poster, but does not clarify very well. Some facts of paragraph are wrong.	Paragraph is unrelated to poster or most of the information provided is wrong.	
<u>Organization/ Neatness</u>	The overall appearance is very neat. The poster is easily understandable, well organized, and all drawings and writing relates to food chain. The paragraph is clear and readable.	The overall appearance is fairly neat. The poster is understandable, has defined organization, and most of the drawings and writing relate to the food chain. The paragraph is readable.	The poster is lacking in neatness to the point of distracting the observer. Organization is inconsistent, and some drawing or writing is unrelated to food chains. The paragraph is difficult to read or has many grammatical mistakes.	The poster is messy, lacks any organization, and is missing proper writing or illustration or writing or illustration is incoherent. The paragraph is unreadable.	

Lesson 9

Topic: Habitats

Target: 2nd grade

Duration: One 30 minute lesson with extension options and parent links

Discipline Connections: science, literacy, visual arts, technology, geography

Materials:

- animal journals
- chart paper
- animal photos
- glue
- Rubric 9

Word Bank: habitat, arctic tundra, grasslands/plains, desert, forest

Objective: Students will learn about four different types of habitats. They will know the characteristics of each habitat and the animals that can be found in each.

Background Knowledge: This lesson will be a follow-up/extension to learning about four different types of animal habitats.

Focusing Question: What is a habitat? Are there different kinds of habitats? Draw a picture of what you think your habitat looks like.

Procedure:

1. Write the focusing question on the board and have students respond to the question in writing. Then, have some students share their responses aloud.
2. State and write the lesson objective on the board.
3. Discuss the characteristics of the four habitats in the word bank.
4. Put students into small groups or have them work with a partner.
5. Each student group will be given a piece of chart paper that is separated into four columns. The columns will be labeled with the headings: Tundra, Grasslands, Desert, and Forest. They will also be given an envelope containing animal photos. The number of photos will vary according to activity time and student level of understanding.
6. Based on what the students have learned, ask them to sort the photos and place them in the habitat to which they belong. They will glue them to the paper to create a poster.

Museum Activities:

1. The students will focus on one diorama/ habitat and sketch the animals that they see at the museum.
2. Students will write down as many animals in their animal journals as they can see in each diorama. They will label each diorama with a habitat name.

Reflection: In their animal journals, students will choose one habitat to write about. They will also include an illustration of what can be found in the habitat they have chosen.

Lesson 9 (continued)

Topic: Habitats

Assessment: Participation in classroom and museum activities, reflection paragraph

Extension Options:

- Students will work in small groups to create their own habitat biomes.
- Students will work with a partner or small group and research one biome. They will create a brochure that includes factual information about the animals in that habitat and pictures.
- Find a wildlife refuge near you: <http://www.fws.gov/refuges/refugeLocator.html>

Parent- Links:

- Have your child read more about animals and their habitats by subscribing to National Geographic Kids.
<http://www.nationalgeographic.com/geographyaction/habitats/explore.html>
- Find a park near you to look at different animal habitats.
<http://www.enature.com/home/>
- Have your child join the Magic School Bus crew and explore the relationship between habitats and endangered species at: <http://www.scholastic.com/magicschoolbus/games/habitat/>

Resources:

- <http://www.nationalgeographic.com/geographyaction/habitats/explore.html>
- <http://www.scholastic.com/magicschoolbus/games/habitat>
- <http://www.enature.com/home>
- <http://www.fws.gov/refuges/refugeLocator.html>

Pennsylvania State Standards:

Reading, Writing, Speaking, Listening 1.1, 1.2, 1.3, 1.4, 1.6, 1.8;

Science and Technology 3.1 A, 3.2 A-B, 3.3 A-B, 3.5 A, 3.6 B, 3.7 D-E;

Family and Consumer Sciences 11.2 H;

Geography 7.4 A-B;

Art 9.1 B, I,

Student Name: _____

Category	4- Above Standards	3- Meets Standards	2- Approaching Standards	1- Below Standards	Score
<u>Habitat Information</u>	Student gives at least 4 characteristics of chosen habitat and all information is correct.	Student gives 3 characteristics of habitat and all information is correct.	Student gives only 1-2 characteristics of habitat or some given information is incorrect.	Student gives only incorrect information about habitat.	
<u>Animal/Plant Information</u>	Student gives at least 4 correct examples of organisms in habitat, and at least one example is a plant species.	Student gives 3-4 correct examples of organisms that live in habitat.	Student gives only 1-2 correct examples of organisms, or some given examples are incorrect.	Student gives only incorrect examples of organisms in habitat.	
<u>Illustration</u>	Drawing directly relates to paragraph and highlights features specific to the habitat and the organisms living there. It is very neat.	Drawing relates to the paragraph and is neat.	Drawing mostly relates to paragraph but is either missing important elements or includes incorrect or unnecessary details. Drawing is messy.	Drawing is insufficient or completely irrelevant.	
<u>Spelling/ Grammar</u>	There are no spelling or grammar mistakes.	There are 1-5 spelling or grammar mistakes.	There are 6-10 spelling or grammar mistakes.	There are more than 10 spelling or grammar mistakes.	

Lesson 10

Topic: Habitats Across North America

Target: 1st grade

Duration: One 30 minute lesson with extension options and parent links

Discipline Connections: reading, writing, science, geography

Materials:

- Student Handouts:
 - 6.1: North American Habitats
- Literature:
 - All Kinds of Habitats (It's Science)* by Sally Hewitt
- globe
- map of North America
- poster paper
- Rubric 10

Word Bank: arctic tundra, grassland, plains, desert, forest

Objective: Students will demonstrate their ability to identify the habitats of North America. (Arctic Tundra, Grasslands/Plains, Desert, Forest)

Background Knowledge: During this activity students will identify and describe the characteristics of habitats.

Focusing Question: What is a habitat? Describe the characteristics of a habitat.

Procedure:

1. Read-aloud: *All Kinds of Habitats (It's Science)* by Sally Hewitt
2. Organize students into four groups. Each group will focus on an assigned habitat (arctic tundra, grassland, desert, forest)
3. Students will design a poster that provides information about the habitat. The poster should include illustrations showing the climate of the area and the animals that live there as well as key vocabulary describing the habitat.
4. Each group will share their posters on each of the four habitats.

Museum Activities:

1. Distribute Student Handout 10.1.
2. Students will observe all of the dioramas in North America Hall
3. Student will draw and label four habitats within North American Hall.

Reflection: Students will share their completed Student Handout 10.1. Display the posters and Student Handout pages on habitats in the classroom or as an informational bulletin board.

Assessment:

Completed group posters, Student Handout 10.1

Lesson 10 (continued)

Topic: Habitats Across North America

Extension Options:

- Literature for read-alouds, independent reading, or peer reading:
 - *All Kinds of Habitats (It's Science)* by Sally Hewitt
 - *Animal Habitats! (Williamson Little Hands Series)* by Judy Press and Betsy Day
 - *A Forest Habitat (Introducing Habitats)* by Bobbie Kalman
 - *The Arctic Habitat (Introducing Habitats)* by Molly Aloian and Bobbie Kalman
 - *The Magic School Bus Hops Home: A Book About Animal Habitats (Magic School Bus)* by Pat Relf and Nancy Stevenson
 - *Habitats* by Jo Ellen Moore and Robinson
 - *Kids' Easy-to-Create Wildlife Habitats: For Small Spaces in City-Suburbs-Countryside (Quick Starts for Kids!)* by Emily Stetson, J. Susan Cole Stone, and J. Susan Cole-Stone
- Have students create habitat murals. Include key characteristics and animals of each habitat.
- Have students write stories that take place in a specific habitat.
- Create a class book about North American habitats.
- Use a globe and map of North America to locate habitats

Parent Links:

- Use the following book to create and study habitats at home. *Kids' Easy-to-Create Wildlife Habitats: For Small Spaces in City-Suburbs-Countryside (Quick Starts for Kids!)* by Emily Stetson, J. Susan Cole Stone, and J. Susan Cole-Stone
- Plan a visit to a zoo or aquarium. Locate and observe various habitats.
- Visit the following websites and explore information on habitats.
 - www.enchantedlearning.com
 - <http://animal.discovery.com/>
 - <http://kids.nationalgeographic.com/>

Resources:

- <http://animal.discovery.com/>
- <http://kids.nationalgeographic.com/>
- www.amazon.com
- www.scholastic.com

Pennsylvania State Standards:

Geography 7.4.3 A, 7.4.3.B, 7.1.3 A, 7.1.3B, 7.2.3 A

Science and Technology 3.1.4A, 3.1.4.E, 3.2.4.A, 3.2.4.B, 3.2.4.C, 3.3.4.A, 3.3.4.B, 3.3.4.C, 4.6.4.A

Name: _____ Date: _____

Student Names/Group Habitat: _____

Category	4- Above Standards	3- Meets Standards	2- Approaching Standards	1- Below Standards	Score
<u>Habitat Information</u>	Group gives at least 4 characteristics of chosen habitat and all information is correct. Correct climate information is included.	Group gives 3 characteristics of habitat and all information is correct. Correct climate information is included.	Group gives only 1-2 characteristics of habitat, some given information is incorrect, or climate information is missing or incorrect.	Group gives only incorrect information about habitat.	
<u>Animal/Plant Information</u>	Group gives at least 4 correct examples of organisms in habitat, and at least one example is a plant species.	Group gives 3-4 correct examples of organisms that live in habitat.	Group gives only 1-2 correct examples of organisms, or some given examples are incorrect.	Group gives only incorrect examples of organisms in habitat.	
<u>Illustrations</u>	The illustrations clearly highlight habitat characteristics (climate, animals, etc.) and relate to all written aspects of poster.	The drawing highlights habitat characteristics.	The drawing is of the habitat, but does not highlight habitat characteristics.	The drawing does not relate to given habitat.	
<u>Vocabulary</u>	Group correctly uses all provided vocabulary.	Group correctly uses most of vocabulary provided.	Group correctly uses about half of the vocabulary provided or incorrectly uses some vocabulary.	Group uses few or none of vocabulary provided or uses most of the vocabulary incorrectly.	

Lesson 11

Topic: Habitats and Mapping

Target: 2nd grade

Duration: One 30 minute lesson with extension options and parent links

Discipline Connections: science, literacy, visual arts, technology, geography

Materials:

- Student Handout
11.1 North American Hall Hunt
- animal journals
- blank U.S. maps
- one large blank class map (preferably on poster board or sturdy chart paper)
- crayons and markers
- Rubric 11

Word Bank: habitat, map key, cardinal directions

Objective: The students will create a map of different animal habitats as an extension to learning about the travels of Lewis and Clark.

Background Knowledge: The students will need to have some basic map skills and have been exposed to working with maps. The students will need to have some background about Lewis and Clark.

Focusing Question: Where can we find different animal habitats in America? What habitat would you like to visit?

Procedure:

1. Write the focusing question on the board and have students respond to the question in writing. Then, some students share their responses aloud.
2. State and write the lesson objective on the board.
3. The students will learn about map keys and their uses in creating a map.
4. The whole class will work together to create a map key. Each symbol and color will represent a different type of animal habitat.
5. The students will be broken up into four groups. Each group will be assigned a different habitat to research.
6. Each group will use books and the internet to find out exactly where that habitat exists in the United States. Each group will record it on their group maps.
7. After each group is done with their research, the whole class will compile their findings to create on large classroom habitat map.

Museum Activities:

1. The students will act like Lewis and Clark and explore the animals and habitats of North American by completing Student Handout 11.1.

Reflection: If you could choose to visit any animal habitat that we discussed, which one would it be and why?

Assessment: map completion, reflection journal

Extension Options:

- Students will work in small groups to create their own biomes.
- Go west across America and follow Lewis and Clark on your own adventure at the following link: <http://www.nationalgeographic.com/west/main.html>
- Have your students watch a movie and take a quiz on the arctic tundra at the following link: <http://magma.nationalgeographic.com/ngexplorer/0211/quickflicks/>

Parent- Links:

- Have your child go to Missouri Botanical Garden website and choose a habitat to explore: <http://www.mbgnet.net/>
- Let your child learn more about wild animals and their habitats at: <http://kidsgowild.com/>
- Have your child follow Michael Fay's Congo Walk through the African Rainforest. Get the entire lesson at: <http://www.nationalgeographic.com/xpeditions/lessons/14/gk2/fayforest.html>
- Go west across America and follow Lewis and Clark on your own adventure at the following link: <http://www.nationalgeographic.com/west/main.html>

Resources:

- <http://www.nationalgeographic.com/geographyaction/habitats/educators.html#k-2>
- <http://magma.nationalgeographic.com/ngexplorer/0211/quickflicks/>
- <http://www.mbgnet.net>
- <http://kidsgowild.com/>

Pennsylvania State Standards:

Reading, Writing, Speaking, Listening 1.1, 1.2, 1.3, 1.4, 1.6, 1.8;

Science and Technology 3.1 A, 3.2 A-B, 3.3 A-B, 3.6 B, 3.7 D-E;

Family and Consumer Sciences 11.2 H;

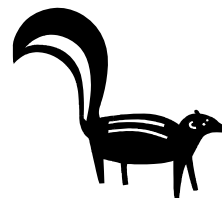
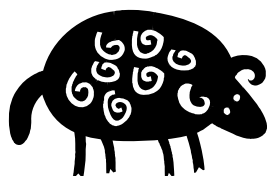
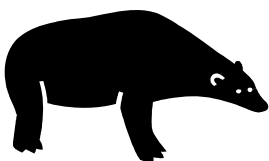
Geography 7.4 A-B;

Art 9.1 B, I,

Name: _____ Date: _____

1. How many different kinds of squirrels can you find? _____
2. What color are beavers' teeth? _____
3. Where in North American Hall can you find the Pennsylvania State Bird? _____
4. What diorama shows winter? _____
5. What diorama shows fall? _____
6. How many birds are there in the Sonoran Desert diorama? _____
7. What color are the black bears? _____
8. What other animals are with the black bears? _____
9. How many dioramas show cold places? _____
10. Which diorama has the most animals? _____
11. What is the name of the animal that looks like a pig? _____
12. What dioramas show the ocean? _____
13. Which diorama shows a roadrunner? _____
14. What is one place in the world where moose can be found? _____
15. Find a diorama that shows a predator/prey relationship? _____
16. What is your favorite animal or your favorite diorama in North American Hall? Why?

Use the back of this paper to draw a picture of your favorite animal.



Student Name: _____

Category	4- Above Standards	3- Meets Standards	2- Approaching Standards	1- Below Standards	Score
<u>Response Construction</u>	Student chose an appropriate habitat and gives at least 3 detailed reasons for the choice.	Student chose an appropriate habitat and gives 2 reasons for the choice.	Student chose a habitat and gave 1 reason for the choice.	Student either did not choose an appropriate habitat or provided no reasoning for choice.	
<u>Habitat Information</u>	Student gives at least 4 characteristics of chosen habitat and all information is correct.	Student gives 3 characteristics of habitat and all information is correct.	Student gives only 1-2 characteristics of habitat or some given information is incorrect.	Student gives only incorrect information about habitat.	
<u>Lewis and Clark Information</u>	Student directly links the entry to Lewis and Clark expeditions.	Student references Lewis and Clark expeditions.	Knowledge of Lewis and Clark expeditions is implied, but not directly noted.	There seems to be no knowledge or reference to Lewis and Clark expeditions.	

Lesson 12

Topic: Compare and Contrast a Moose and a Deer

Target: 2nd grade

Duration: One 30 minute lesson with extension options and parent links

Discipline Connections: science, literacy, visual arts

Materials:

- Student Handouts:
12.1: Hoofed Mammal Images
- Literature:
Deer, Moose, Elk and Caribou by Deborah Hodge
- additional pictures and scientific drawings of deer and moose from internet or books
- markers or crayons
- chart paper
- animal journals
- Rubric 12

Word Bank: deer, moose, mammal, compare, contrast

Objective: The students will study and use their knowledge of deer and moose to compare and contrast these two mammals.

Background Knowledge: This lesson will build upon the previous lesson that introduced mammals. The students should have had some background about these two animals before participating in this lesson. Students should have had some experience using a Venn diagram.

Focusing Question: What is the difference between a deer and a moose? What do these two animals have in common?

Procedure:

1. Write the focusing question on the board and have students respond to the question in writing. Then, some students share their responses aloud.
2. State and write the lesson objective on the board.
3. Read aloud the book *Deer, Moose, Elk and Caribou* by Deborah Hodge.
4. Distribute Student Handout 12.1 as well as any additional photos and scientific drawings of moose and deer.
5. Break the students up into small groups or partners and have them study the pictures for similarities and differences between the animals. The students will record their findings in their journals.
6. The students will fill in a Venn diagram that will compare and contrast a deer and a moose.
7. Each group or partnership will share their findings.

Museum Activities:

1. The students will create scientific drawings of both deer and moose while at the museum. This can be done before the lesson and be used as an additional aid when completing their Venn diagram or to help to build background knowledge.
2. In their animal journals, students will record visual similarities and differences that they notice while looking at the museum dioramas. This will help with the Venn diagram lesson.

Reflection:

The students will write their response to the focusing question upon completion of this lesson in their animal journals. The students will be asked to produce three similarities and three differences.

Assessment: completion of Venn diagram, journal reflection

Extension Options:

- The students will choose to research either a deer or moose. They will create an information box containing facts and characteristics that pertain to their animal.
- Students will use the information that they have learned about deer and moose during class and at the museum, in addition to outside research, to create a story book about the animal of their choice.

Parent Links:

- Read your child the book entitled *Deer, Moose, Elk and Caribou* by Deborah Hodge.
- Watch a short movie about how scientists classify different animals at Brain Pop:
<http://www.brainpop.com/science/diversityoflife/classification>

Resources:

- *North American Moose* by Lesley A. Du Temple
- *Deer, Moose, Elk and Caribou* by Deborah Hodge
- *All About Deer* by Jim Arnosky
- <http://www.brainpop.com/science/diversityoflife/classification>

Pennsylvania State Standards:

Reading, Writing, Speaking, Listening 1.1, 1.2, 1.3, 1.4, 1.6, 1.8;

Science and Technology 3.1 A, 3.2 A-B, 3.3 A-B, 3.6 B, 3.7 D-E;

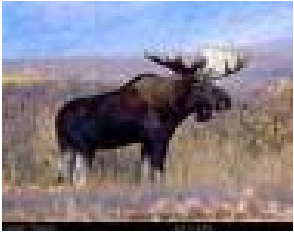









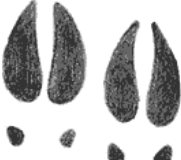
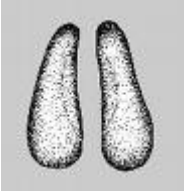



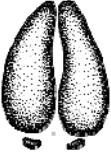


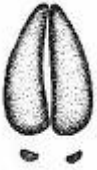

Family and Consumer Sciences 11.2 H;

Geography 7.4 A-B;

Art 9.1 B, I,

Student Handout 12.1

Hoofed Mammal Images

			
Alaskan Moose	American Bison	Caribou	Collared Peccary (aka javelina)
			
Desert Bighorn Sheep	Dall Sheep	Mule Deer	Musk Ox
			
Pronghorn Antelope	Dall Sheep Tracks	Bison Tracks	Bighorn Sheep Track
			
Collared Peccary Track	Caribou Tracks	Muskox Tracks	Mule Deer track
			
Pronghorn Antelope	Pronghorn Antelope	Moose Track	Moose Track

Picture and Track Source: [http://library.thinkquest.org/3500/Animals of the Arctic](http://library.thinkquest.org/3500/Animals%20of%20the%20Arctic)

Student Name: _____

Category	4- Above Standards	3- Meets Standards	2- Approaching Standards	1- Below Standards	Score
<u>Moose Information</u>	Student gives 4 characteristics specific to moose, and all information is correct.	Student gives 3 characteristics specific to moose and all information is correct.	Student gives only 1-2 characteristics specific to moose, some given information is incorrect, or some characteristics are also shared by deer.	Student gives only incorrect information about moose or only gives traits shared by moose and deer.	
<u>Deer Information</u>	Student gives at least 4 characteristics specific to deer, and all information is correct.	Student gives 3 characteristics specific to deer and all information is correct.	Student gives only 1-2 characteristics specific to deer, some given information is incorrect, or some characteristics are also shared by moose.	Student gives only incorrect information about deer or only gives traits shared by moose and deer.	
<u>Shared Characteristics</u>	Student gives at least 4 shared characteristics of moose and deer, and all information is correct.	Student gives 3 shared characteristics and all information is correct.	Student gives only 1-2 shared characteristics or some given information is incorrect.	Student gives only incorrect information or only traits that belong to either moose or deer, not both.	

Lesson 13

Topic: Descriptive Writing

Target: 3rd Grade

Duration: 45 minutes in class, 30 minutes at Academy, 45 minutes in class

Discipline Connections: language arts, science

Materials:

- Student Handouts:
13.1: Observation Notes
- Rubric 13

Word Bank: descriptive adjectives, action verbs, characteristics

Objective: The students will be able to create descriptive paragraphs using the dioramas in North American Hall at the Academy of Natural Sciences.

Background: In this lesson students will apply their knowledge of descriptive paragraphs to write the dioramas in the North American Hall of the Academy of Natural Sciences. The students will need to utilize descriptive adjectives and verbs in order to capture the essence of the dioramas. Therefore, teachers may wish to conduct a mini lesson on adjectives and verbs prior to this lesson.

Focusing Questions:

1. Why is it important to describe things in detail?
2. What parts of speech are used to create descriptive paragraphs?

Procedure:

1. Review language arts lesson on descriptive paragraphs.
2. State lesson objective and write the objective on the board.
3. Distribute Rubric 13.
4. Review the terms descriptive adjective, action verb, and characteristics with the class and ask the students to give multiple examples of each.
5. Present a variety of items to the class (ex: basketball, book, flower) and ask the class to make descriptive statements about each item.
6. The students will then write a descriptive paragraph about their classroom.

Museum Activities:

1. The students will use Student Handout 13.1 to take descriptive notes on one of the dioramas in North American Hall at the Academy of Natural Sciences.

Reflection: The students will write descriptive paragraphs using the notes they recorded on Student Handout 13.1. The students' paragraphs will then be graded using Rubric 13.

Assessment: Student Handout 13.1 and reflection paragraph.

Extension Options:

- Students will create surveys and then classify students in their class based on the results of the survey. (Ex: a survey of everyone's favorite ice cream or a survey of each student's eye color)
- Students will create bar, line, or pie graphs in order to analyze the results of their surveys
- The students will classify household items based on size, shape, color, usage, etc.

Parent-Links:

- http://www.indianchild.com/animal_kingdom.htm Read more about the classification and breakdown of animals.
- <http://www.kidport.com/RefLib/Science/Animals/Animals.htm> Study the vast and diverse animal kingdom.

Pennsylvania State Standards:

Science and Technology 3.3.4,

Reading, Writing, Speaking, Listening 1.4.3

Environment:

Student Name: _____

Category	4- Above Standards	3- Meets Standards	2- Approaching Standards	1- Below Standards	Score
<u>Characteristics of Diorama</u>	Paragraph includes at least 7 correct characteristics of the diorama and includes details of both plant and animal life.	Paragraph includes 5-7 correct characteristics of the diorama.	Paragraph includes only 2-4 characteristics of the diorama chosen or some of the details included are incorrect.	Paragraph only has one characteristic of the diorama, details are completely lacking, or all details are wrong.	
<u>Descriptive Language</u>	Student correctly uses only descriptive, interesting adjectives and adverbs, and more than 85% of all verbs are action verbs.	Student correctly uses mostly descriptive adjectives and adverbs, and 70-85% of all verbs are action verbs.	Student uses some descriptive adjectives and adverbs, and 50-69% of all verbs are action verbs.	Student does not use descriptive language or uses very little descriptive language.	
<u>Spelling/ Grammar</u>	There are no spelling or grammar mistakes.	There are only 1-5 spelling or grammar mistakes.	There are 6-10 spelling or grammar mistakes.	There are more than 10 spelling or grammar mistakes.	

Lesson 14

Topic: Classification

Target: 3rd Grade

Duration: 45 minutes in class, 40 minutes at Academy, 40 minutes in class

Discipline Connections: language arts, science

Materials:

- Student Handouts:
 - 14.1: Pattern Block Classification
 - 14.2: North American Animal Classification
- pattern blocks
- Rubric 14

Word Bank: classification, characteristics, and student-generated vocabulary from the lesson. (Ex: color, shape, size, texture, etc.)

Objective: The students will compare and contrast the animals in North American Hall at the Academy of Natural Sciences.

Background: In this lesson, students will display their ability to classify pattern blocks based on the characteristics of shape, color, and size. The students will then apply their ability to differentiate characteristics by comparing and contrasting animals in North American Hall at the Academy of Natural Sciences.

Focusing Questions:

1. How do we tell things apart?
2. Why do we compare things?

Procedure:

1. Distribute Rubric 14.
2. Lead a class discussion of characteristics. Use items from home or from the classroom to compare and contrast characteristics.
3. Distribute Student Handout 14.1 and a set of pattern blocks to each student.
4. Students classify pattern block based on size, shape, color, and other characteristics and record their work on Student Handout 14.1.

Museum Activities:

1. The students will use Student Handout 14.2 to compare and contrast two animals in North American Hall at the Academy of Natural Sciences.

Reflection: The instructor will facilitate a discussion on the characteristics of the animals in North American Hall by grouping students who compared the same animals while in the Academy. The students will then discuss their comparisons, notes, and findings and each group will share their results with the class.

Assessment: Completion of Student Handouts 14.1 and 14.2

Extension Options:

- The students will compare and contrast two friends or family members using a Venn diagram.
- The students will compare and contrast the recess activities chosen by boys, chosen by girls, and chosen by both and then analyze the results in a paragraph or line graph.
- The students will identify items in and outside of the classroom that are the same geometric shapes as the pattern blocks they used in this lesson.

Parent Links:

- Read more about the classification and breakdown of animals.
http://www.indianchild.com/animal_kingdom.htm
- Study the vast and diverse animal kingdom.
<http://www.kidport.com/RefLib/Science/Animals/Animals.htm>

Pennsylvania State Standards:

Science and Technology 3.3.4, 3.3.B,
Reading, Writing, Speaking, Listening 1.4.3

Name: _____ Date: _____

<p><u>COLOR</u></p>	<p><u>SIZE</u></p>
<p><u>SHAPE</u></p>	<p><u>OTHER</u></p>

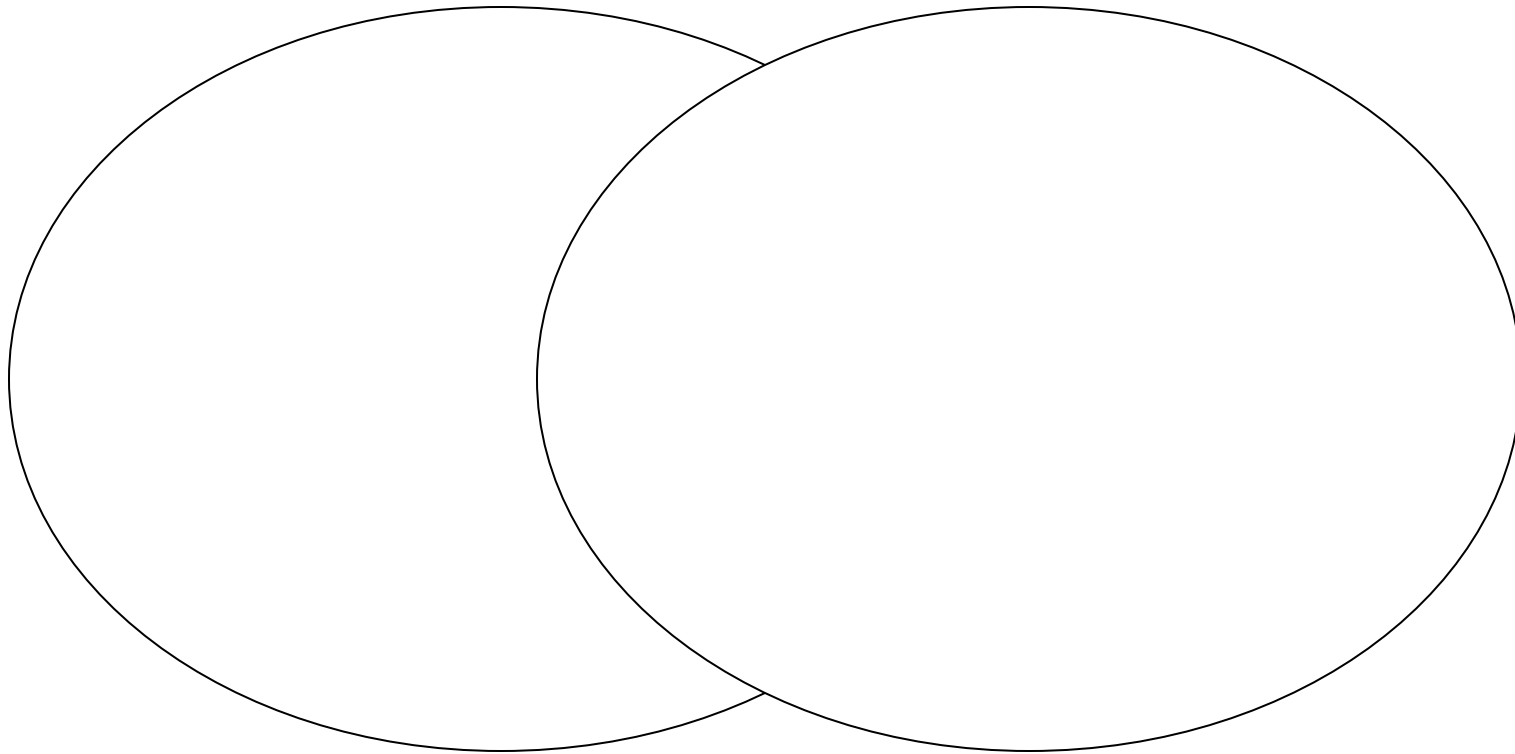
Student Handout 14.2

North American Animal Classification

Name: _____

Date: _____

Compare and Contrast Two North American Animals



Animal 1 _____

Animal 2 _____

Rubric 14

Venn Diagram

Student Name: _____

Category	4- Above Standards	3- Meets Standards	2- Approaching Standards	1- Below Standards	Score
<u>Animal Choice</u>	Student chose two appropriate animals from North American Hall, and the choices showed careful observation of diorama. Choices were not the largest or most prominent animal in diorama.	Student chose two appropriate animals.	Student chooses only one animal or does not specifically name animals.	Student chooses animals not present in North American Hall.	
<u>Similarities</u>	Student gives at least 4 correct characteristics that are shared by chosen animals.	Student gives 3 correct characteristics shared by chosen animals.	Student gives 1-2 correct characteristics shared by chosen animals or offers some incorrect characteristics.	Student gives only incorrect characteristics.	
<u>Differences</u>	Student gives at least 4 correct characteristics specific to each of the animals (8 different characteristics total.)	Student gives 3 correct characteristics specific to each of the animals (6 different characteristics total.)	Student gives 1-2 correct characteristics specific to each of the animals (2-4 different characteristics total) or some of the characteristics are incorrect.	Student gives no characteristics specific to each of the animals or all information is wrong.	

Lesson 15

Topic: Characteristics

Target: 3rd Grade

Duration: 45 minutes in class, 30 minutes in Academy, 40 minutes in class

Discipline Connections: language arts, art, science

Materials:

- pictures or models of familiar animals (dogs, cats, birds, etc.)
- Rubric 15

Word Bank: Student-generated. (Examples: characteristics, skin, hair, fur, teeth, claws, hands, hooves, eyes, horns, mammal, bird, legs, feet)

Objective: The students will be able to draw and label basic characteristics of at least one animal found in North American Hall at the Academy of Natural Sciences.

Background: In this lesson, students will be exposed to the animals of North American Hall at the Academy of Natural Sciences. By the end of this lesson, each student will have a chance to be an “expert” on one of the many animals in North American Hall by identifying the essential characteristics of that animal.

Focusing Questions:

1. What characteristics differentiate humans/primates and other animals?
2. What characteristics are essential/present in all animals?

Procedure:

1. Distribute Rubric 15.
2. Ask the class to describe you or another teacher that every student knows.
3. The class will compile a list of characteristics on the board and in their notebooks. (ex: hair, hands, legs, etc.)
4. Provide the class with pictures or models of familiar animals.
5. The students will then write a paragraph comparing and contrasting two animals of their choice, focusing on the animals’ characteristics.

Museum Activities:

1. The students will draw and label at least one animal from the North American Hall of the Academy of Natural Sciences using vocabulary they developed in the classroom.

Reflection: Students who labeled the same animal from North American Hall will be grouped together to create a poster of their animals compiling all of the characteristics discovered by the group. The groups will then share their animals and their characteristics with the rest of the class.

Lesson 15 (continued)

Topic: Characteristics

Assessment: labeled drawings in North American Hall

Extension Options:

- The class will create a giant poster or collage using all of the students' drawings from the Academy of Natural Sciences.
- The students will find newspaper or magazine articles that employ descriptive language and highlight descriptive words, phrases, or sentences.

Parent Links:

- Learn about which kind of exotic animals make good pets for children.
<http://exoticpets.about.com/od/choosinganexoticpet/tp/kidsandpets.htm>
- Study the animals of the great state of Pennsylvania.
http://www.mcsdk12.org/curr/animals_of_pennsylvania.htm
- See some of the animals from the Academy of Natural Sciences live at the Philadelphia Zoo. <http://www.philadelphiazoo.org/>

Pennsylvania State Standards:

Science and Technology 3.3.4, 3.3.B,

Reading, Writing, Speaking, Listening 1.4.3

Student Name: _____

Category	4- Above Standards	3- Meets Standards	2- Approaching Standards	1- Below Standards	Score
<u>Drawing</u>	The drawing very clearly portrays the animal chosen and illustration obviously shows characteristics of chosen animal. The drawing is very detailed.	The drawing clearly portrays the animal chosen. Characteristics are included, and the drawing is detailed.	The drawing does not clearly portray animal chosen, characteristics may not be included in drawing, or drawing is not very detailed.	The drawing cannot be recognized as any North American Animal or characteristics included are incorrect or inappropriate.	
<u>Labels</u>	Student labels at least 5 characteristics of the animal and each label corresponds clearly to details of the drawings.	Student labels 3-4 characteristics of the animal and each label corresponds to details of the drawings.	Student labels only 1-2 characteristics of the animal, some details are labeled incorrectly, or some labels may not correspond clearly to details of the drawings.	Student does not label characteristics or labels are wrong or misplaced.	
<u>Vocabulary</u>	Student correctly uses at least 4 vocabulary words.	Student correctly uses 3 vocabulary words.	Student uses only 1-2 vocabulary words or uses words incorrectly.	Student uses no vocabulary words or uses all words incorrectly.	
<u>Neatness</u>	Drawing is very neat and organized and all labels are spelled correctly.	Drawing is neat and organized and most labels are spelled correctly.	Drawing is lacking in neatness to the point of distracting the observer. Organization is inconsistent, and the misspellings in labels distract the observer.	Drawing is messy, lacks any organization, and spelling mistakes make the drawing incomprehensible.	

Lesson 16

Topic: Riddles

Target: 3rd Grade

Duration: 45 minutes in class, 30 minutes in Academy, 45 minutes in class

Discipline Connections: language arts, science

Materials:

- paper,
- pencils
- crayons
- construction paper
- chart paper
- Rubric 16

Word Bank: riddle, metaphor, animal, illustration, unique, characteristics

Objective: The students will be able to create a descriptive riddle that contains at least six details about one of the animals found in North American Hall at the Academy of Natural Sciences.

Background: The teacher will introduce the concept of riddles during a language arts lesson (including examples) and then ask students to apply their mastery of expository writing to create their own riddles.

Focusing Questions:

1. Do animals have unique characteristics?
2. How do characteristics set one animal apart from other animals?

Procedure:

1. Distribute Rubric 16.
2. Display an example riddle on chart paper for the class.
3. The students will then practice creating riddles about common items found at home or in the classroom. Ask students to include characteristics of the object in their riddles.
4. The students will then share and compare their riddles in small groups.
5. The teacher will then give each small group a set of animals to research. Each of the animals can be found in the dioramas in North American Hall at the Academy of Natural Sciences.

Museum Activities:

1. The students will take detailed descriptive notes and illustrations of the dioramas in North American Hall.
2. The students notes will be collected by the teacher at the museum.

Lesson 16 (continued)

Topic: Riddles

Reflection: The students will write descriptive riddles based on the notes they recorded at the Academy of Natural Sciences. The descriptive riddle must include at least 6 details or characteristics of the animal or its habitat. Riddles should be written in first person (i.e. “I have...”, “I look like...”, “I live...” etc.). The students will also create an illustration that goes with their animal riddles.

Assessment: animal riddles

Extension Options:

- Students can share their riddles with a partner or in small groups.
- The students can conduct further research on their animals by utilizing the search engine at www.nationalgeographic.com
- The students can pick any household object and create a riddle to share with their family members.

Parent Links:

- Study links to hundreds of mammals.
<http://www.nature.ca/notebooks/English/mammpg.htm>
- Read more animal riddles.<http://www.meddybemps.com/riddles/index.html>
- Write and submit riddles online.
<http://www.scholastic.com/ispay/make/riddle.asp>

Pennsylvania State Standards:

Reading, Writing, Speaking, Listening 1.4.3.A,
Science and Technology 3.3.4.A

Rubric 16

Animal Riddles

Student Name: _____

Category	4- Above Standards	3- Meets Standards	2- Approaching Standards	1- Below Standards	Score
<u>Details of Animal</u>	Riddle includes at least 7 correct details of the animal chosen.	Riddle includes 5-6 correct details of the animal chosen.	Riddle includes only 2-4 details of the animal chosen or some of the details included are incorrect.	Riddle only has one detail of animal, details are completely lacking, or all details are wrong.	
<u>Riddle Components</u>	Student uses only “first person” sentence structure, and riddle is particularly well thought out or clever.	Student uses “first person” sentence structure.	Student names the animal in the riddle or inconsistently uses “first person” sentence structure.	Student does not use “first person” sentence structure.	
<u>Illustration</u>	Illustration clearly represents the riddle and includes all of the details of the animal included in the riddle.	Illustration represents the riddle and includes most of the details of the animal included in the riddle.	Illustration is unclear and only includes some of the details of the animal included in the riddle.	Illustration is incorrect, incomprehensible, or includes none of the details present in riddle.	
<u>Neatness/ Spelling/ Grammar</u>	Drawing is very neat and there are no spelling or grammar mistakes in riddle.	Drawing is neat and there are only 1-5 spelling or grammar mistakes in riddle.	Drawing is lacking in neatness to the point of distracting the observer, or there are 6-10 spelling or grammar mistakes in riddle.	Drawing is messy or there are more than 10 spelling or grammar mistakes in riddle.	

Lesson 17

Topic: Bears of North American Hall

Target: 1st grade

Duration: One 45 minute lesson with extension options and parent links

Discipline Connections: reading, writing, science,

Materials:

- Student Handouts:
 - 17.1: What I Know about Bears
 - 17.2: Animal Illustration
- Literature
 - Polar Bears* by Ian Stirling
 - Brown Bears (Early Bird Nature Books)* by Lynn M. Stone
- Venn diagram on chart paper
- Rubric 17

Word Bank: polar bear, brown bear, fur, claws, nose, camouflage, habitat, size, height, weight, diet, predators, den

Objective: Students will demonstrate their ability to identify and describe the similarities and differences between a polar bear and a brown bear.

Background Knowledge:

The brown bear is a large mammal. Its habitat is in the forest. They sleep in dens. They do hibernate but can be easily awakened. They have thick brown fur. They are flat footed and have large claws. Brown bears are omnivores. The polar bear is a large mammal. It is a carnivore. Their habitat is in the frozen Arctic environment. A polar bear is a powerful swimmer. It hunts seals in the water. They have thick fur that appears white and provides them with camouflage in the snow and ice.

Focusing Question: What are the similarities and differences between polar bears and brown bears? Describe the characteristics of a polar bear and a brown bear.

Procedure:

1. Ask student to complete the first half Student Handout 17.1- “What I think I know.” Students can write or draw their knowledge.
2. Read-aloud: *Polar Bears* by Ian Stirling
3. Fill in information about polar bear on Student Handout 17.1 under “What I know.”
4. Read-aloud: *Brown Bears (Early Bird Nature Books)* by Lynn M. Stone
5. Fill in information about brown bear on Student Handout 17.1 under “What I know.”

Museum Activities:

1. Provide students with Student Handout 17.2.
2. Students will observe the dioramas of the polar bear and brown bear.
3. The students will illustrate a polar bear and a brown bear.
4. Advise students to label the parts of the animal (feet, head, teeth, eyes, fur, tail, etc.)

Lesson 17 (continued)

Topic: Bears of North American Hall

Reflection: Display a Venn diagram labeled “Polar Bear” and “Brown Bear” on the board. Complete Venn diagram highlighting similarities and differences between the two North American Bears.

Assessment: Completion of Student Handouts 17.1 and 17.2

Extension Options:

- Literature for read-alouds, independent reading, or peer reading:
 - Polar Bears:
 - *The World of the Polar Bear* by Norbert Rosing
 - *A Polar Bear Journey* by Debbie S. Miller and Jon Van Zyle
 - *Polar Bear, Polar Bear, What Do You Hear?* by Bill Martin Jr. and Eric Carle
 - *Little Polar Bear (a little polar bear story)* by Hans de Beer
 - *Polar Bears Past Bedtime (Magic Tree House 12, paper)* by Mary Pope Osborne and Sal Murdocca
 - Brown Bears:
 - *Brown Bear, Brown Bear, What Do You See?* by Bill Martin Jr. and Eric Carle
 - *The Bears of Katmai: Alaska's Famous Brown Bears* by Matthias Breiter
 - *The Grizzly Almanac: A Fully Illustrated Natural and Cultural History of America's Great Bear* by Robert H. Busch
 - *Grizzly Seasons: Life with the Brown Bears of Kamchatka* by Charlie Russell and Maureen Enns
- Students create a mural of a polar bear and a mural of a brown bear. Include key facts and vocabulary about the two types of bears. Display in the classroom or as an informational bulletin board.
- Students create a reader’s theater that conveys the similarities and difference between polar bears and brown bears.

Parent Links:

- Visit the following websites and explore information on bears.
 - www.enchantedlearning.com
 - <http://animal.discovery.com/>
 - <http://kids.nationalgeographic.com/>
- Visit the Philadelphia Zoo to see a variety of bears.

Resources:

- www.enchantedlearning.com
- <http://animal.discovery.com/>
- <http://kids.nationalgeographic.com/>

Pennsylvania State Standards:

Science and Technology 3.1.4A, 3.1.4.E, 3.2.4.A, 3.2.4.B, 3.2.4.C, 3.3.4.A, 3.3.4.B, 3.3.4.C, 4.6.4.A

Student Handout 17.1

What I Know about Bears

Name: _____

Date: _____

What I think I know	What I know
I think polar bears...	I know polar bears...
I think brown bears...	I know brown bears...

Student Handout 17.2

Animal Illustrations

Name: _____

Date: _____

Polar Bear

Brown Bear

Rubric 17

Labeled Bear Drawings

Student Name: _____

Category	4- Above Standards	3- Meets Standards	2- Approaching Standards	1- Below Standards	Score
<u>Brown Bear Drawing</u>	The drawing very clearly portrays brown bears and illustration obviously shows characteristics of brown bears. The drawing is very detailed.	The drawing clearly portrays the brown bear. Characteristics are included, and the drawing is detailed.	The drawing does not clearly portray brown bears, characteristics may not be included in drawing, or drawing is not very detailed.	The drawing cannot be recognized as a brown bear or characteristics included are incorrect or inappropriate.	
<u>Polar Bear Drawing</u>	The drawing very clearly portrays polar bears and illustration obviously shows characteristics of polar bears. The drawing is very detailed.	The drawing clearly portrays polar bears. Characteristics are included, and the drawing is detailed.	The drawing does not clearly portray polar bears, characteristics may not be included in drawing, or drawing is not very detailed.	The drawing cannot be recognized as a polar bear or characteristics included are incorrect or inappropriate.	
<u>Labels</u>	Student labels at least 5 characteristics of each animal and each label corresponds clearly to details of the drawings.	Student labels 3-4 characteristics of each animal and each label corresponds to details of the drawings.	Student labels only 1-2 characteristics of the animal, some details are labeled incorrectly or some labels may not correspond clearly to details of the drawings.	Student does not label characteristics or labels are wrong or misplaced.	
<u>Neatness</u>	Drawing is very neat and organized and all labels are spelled correctly.	Drawing is neat and organized and most labels are spelled correctly.	Drawing is lacking in neatness to the point of distracting the observer. Organization is inconsistent, and the misspellings in labels distract the observer.	Drawing is messy, lacks any organization, and spelling mistakes make the drawing incomprehensible.	

Lesson 18

Topic: Lewis and Clark

Target: 3rd Grade

Duration: 45 minutes in class, 45 minutes in the Academy, 20 minutes in the class

Discipline Connections: language arts, social studies, science

Materials:

- Student Handouts:
18.1: Field Journal
- Literature:
Lewis and Clark Expedition: Join the Corps of Discovery to Explore Uncharted Territory (A Kaleidoscope Kids Book) by Carol A. Jomann
Lewis and Clark on the Trail of Discovery: The Journey that Shaped America by Rod Gragg
- Rubric 18

Word Bank: expedition, observation, discovery

Objective: The students will apply their knowledge of Lewis and Clark's expedition and create their own observation notes based on four of the dioramas in North American Hall at the Academy of Natural Sciences.

Background: The students will be provided with information about Lewis and Clark's famous expedition west. The students will then attempt to emulate Lewis and Clark's expedition at the Academy of Natural Sciences by taking notes on the dioramas in North American Hall.

Focusing Questions:

1. What was the purpose of the Lewis and Clark expedition?
2. Where did the expedition take place?
3. What animals did Lewis and Clark encounter on their expedition?

Procedure:

1. Distribute Rubric 18.
2. Allow the students to explore both of the books mentioned in the Materials section of this lesson.
Review the biographies of Lewis and Clark and the sections on animals encountered in *Lewis and Clark Expedition*. Examine the letters and journal notes in *Lewis and Clark on the Trail of Discovery*.
3. During the discussion of the reading, emphasize Lewis and Clark's use of observation notes. Also, ensure that the students are familiar with the animals Lewis and Clark encountered and help the students to identify the characteristics of those animals.
4. Discuss good observation skills with the class. Practice observing an object in the classroom. Ask the students to draw detailed and labeled diagrams of the object as well as take notes on size, location, etc. Advise them to take notes on the object as if it was an object no one had ever seen before. How might they describe it? Then, have them record any feelings about the object as well as any questions they might have about it.

Lesson 18 (continued)

Topic: Lewis and Clark

Museum Activities:

1. The teacher will distribute Student Handout 18.1. Fold Student Handout 18.1 so it forms a small pocket book. Then, give each student colored pencils.
2. Students are to make observations and fill out their field guides. Remind them of the types of things Lewis and Clark drew and recorded in their journals.

Reflection: In a whole class format or in small groups, students will compare the observations they recorded on Student Handout 18.1.

Assessment: Completed Student Handouts 18.1.

Extension Options:

- The students will create narrative stories about their experience at the Academy of Natural Sciences. The students will write as if they were explorers charting unmapped lands and finding new animals.
- The students will write a descriptive account of their journeys to and from school.
- The students will create a visual narrative using cut-out pictures from magazines and newspapers and present it to the class.

Parent Links:

- Study the types of animals that Lewis and Clark discovered on their expedition.
<http://www.carnegiemnh.org/exhibits/lc/index.html>
- Learn more about the Black Tailed Prairie Dog discovered by Lewis and Clark.
http://www.nationalgeographic.com/lewisandclark/record_species_075_3_1.html

Resources:

http://www.nps.gov/pub_aff/lewis_clark/overview.htm

Pennsylvania State Standards:

History 8.3.3.A,

Geography 7.4.3.B,

Reading, Writing, Speaking, Listening 1.1.3.H

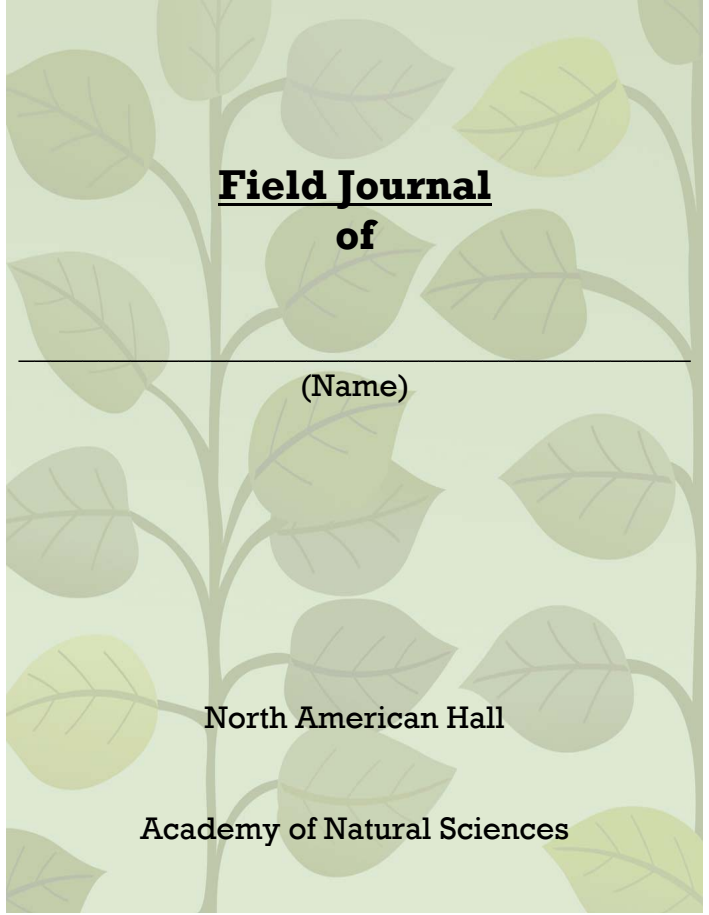
Student Handout 18.1

Blank rectangular area for student notes.

Blank rectangular area for student notes.

Field Journal

Blank rectangular area for field journal notes.



Field Journal
of

(Name)

North American Hall

Academy of Natural Sciences

Student Name: _____

Category	4- Above Standards	3- Meets Standards	2- Approaching Standards	1- Below Standards	Score
<u>Illustrations</u>	There are at least 7 drawings. The drawings in the field journal are detailed and colorful (when appropriate).	There are 5-6 drawings. Drawings show detail and make use of color where appropriate.	There are 2-4 drawings. The drawings show minimal details or make very little use of color.	There is 1 or no drawings. Drawings are completely lacking details, are incomprehensible, or are only black and white.	
<u>Labels</u>	Student labels every drawing in field journal. Labels are appropriate and correct. Labels greatly enhance understanding of drawing.	Student labels most of the drawings in field journal. Labels are appropriate and correct.	Student only labels some of the drawings in field journal. Some labels may be incorrect or misplaced.	Student includes no labels of drawings or most labels are incorrect or misplaced.	
<u>Field Journal Components</u>	Student includes <u>more than one</u> example of each of the following: questions about dioramas, personal reflection, and size and location references.	Student includes <u>one</u> example of each of the following: questions about dioramas, personal reflection, and size and location references.	Student includes any of the following (but not all): questions about dioramas, personal reflection, and size and location references.	Student does not include any of the following: questions about dioramas, personal reflection, and size and location references.	
<u>Neatness</u>	Field journal is very neat and organized and all labels are spelled correctly.	Field journal is neat and organized and most labels are spelled correctly.	Field journal is lacking in neatness to the point of distracting the observer. Organization is inconsistent, and the misspellings in labels distract the observer.	Field journal is messy, lacks any organization, and spelling mistakes make the field journal incomprehensible.	

Lesson 19

Topic: Biomes of North America

Target: 5th-8th Grade

Duration: Two 45 minute lessons- one in the classroom and the other at the Academy

Discipline Connections: English, geography, history, science, visual arts

Materials:

- Student Handouts:
 - 19.1: Climate Conditions and Animal Adaptations
 - 19.2: Observation Notes
- Video depicting biomes or teacher-prepared PowerPoint with pictures of various biomes (including North American biomes) (See **Resources** for possible videos.)
- Rubric 19

Objective: Students will investigate the key factors and characteristics of biomes.

Word Bank: ecosystems, biomes, organism, alpine tundra, arctic tundra, coniferous forest, deciduous forest, desert, grasslands, prairie

Focus Questions: What is a biome? (A biome is a group of ecosystems with similar climates and organisms.) How do climatic conditions determine an animal characteristics and adaptations?

Background: For information on the biomes of North American Hall at the Academy of Natural Sciences, please see the *Expanded Teacher Background* at the beginning of this guide.

Procedure:

1. Introduce the lesson's objective and write the objective on the board.
2. Define the term "biome" and write it on the board. Have students write the word "biomes" on the top line of a new piece of notebook paper. They should continue to take notes during the brainstorming and class discussion on biomes.
3. Compile a list of different types of "biomes" or locations where specific types of animals might live; suggest such animals and plants as the polar bear, a cactus plant, deer, fur seal, roadrunner, etc.
4. Find out what students have seen when they visited or seen on television any of the following: a desert, a coniferous or deciduous forest, and what they learned and observed.
5. Ask the students what type of climatic conditions they might expect to find in each of the biomes that were identified and discussed during the brainstorming activity. Be sure to discuss the differences in precipitation, latitude, and temperatures.
6. Distribute the Student Handout 19.1. Have students spend 5-10 minutes completing the tables; then go over as a class.
7. If available, show a video or prepare your own PowerPoint presentation on biomes – include images of the Academy of Natural Science's Hall of North America Dioramas. Be sure to include a map showing North American biomes.

Lesson 19 (continued)

Topic: Biomes of North America

Museum Activities:

1. At the Academy's North America Hall dioramas, students should select two dioramas (biomes) to closely examine and record their observations on Student Handout 19.2.

Reflection: Have students write a short story about being an animal living in one of the biomes they recently studied.

Assessment: Brainstorming notes, completed biome climatic chart, museum biome observation, and short story

Extension Options:

- Give students a blank map of North America. Have them outline, color, and label the location and types of biomes. They should also include a color-coded legend.
- Students could select a particular biome and make a poster about it with pictures, map section, labels, key animals and plants, and climate information.

Parent Links:

- NASA's Earth Observatory has "Mission: Biomes." Students can click on different types of biomes, learn about them, then test their knowledge.
<http://earthobservatory.nasa.gov/Laboratory/Biome/>
- The U.S. Department of Agriculture has an interesting biome map of the world based on a combination of soil moisture and temperature.
<http://soils.usda.gov/use/worldsoils/mapindex/biomes.html>
- A number of universities have excellent lecture notes and images of biomes, such as:
www.life.umd.edu/emeritus/reveal/pbio/biome/lec35.html
- An interesting interactive map for students to look up biomes by state:
www.mobot.org/education/02programsresources/mappingenvironment/mynaturalcommunity/biomes.htm

Resources:

- Delta Education has a number of well illustrated booklets and a video series about biomes.
www.delta-education.com/
- VideoLibrary and Schlessinger Media (in Wynnewood, PA) has an 8-volume video series entitled *Biomes of the World in Action*
www.libraryvideo.com

Pennsylvania State Standards:

Ecosystems and their Interactions. 4.6.7.A

Student Handout 19.1 Climatic Conditions and Animal Adaptations

Name: _____ Date: _____

A "biome" is a large area or region that has a specific type of climate. Write whether the climatic factor would be "high" or "low" for each of the biomes listed. Refer to your textbook, dictionary, or other provided resources as needed.

Biome/Climate Conditions	Temperature (High or Low)	Precipitation (High or Low)	Humidity (High or Low)	Winds (High or Low)	Latitude (High or Low)
Alpine Tundra					
Arctic Tundra					
Arctic Ice/Sea					
Coniferous Forest					
Deciduous Forest					
Desert					
Grasslands/Prairie					

The plants and animals that live in a particular biome have special physical structures and characteristics that help them survive. List some of these special characteristics that animals might need to survive in the following "climatic" zones:

Alpine Tundra	
Arctic Tundra	
Arctic Ice/Sea	
Coniferous Forest	
Deciduous Forest	
Desert	
Grasslands/Prairie	

Student Handout 19.2

Observation Notes

Name: _____ Date: _____

Now that you have learned the basics of ecosystems and biomes, it is time to apply your knowledge to the North American Hall Dioramas during our fieldtrip to the Academy of Natural Sciences.

Select and carefully observe two different "diorama biomes" and record as much information as you can about each diorama. When you return to school, research your classroom references or the internet for any missing information.

Diorama Biome #1: _____

Name and description of animals:

Name and description of plants:

Physical description of the "climatic" setting, i.e. temperature, latitude, elevation, precipitation:

Visible adaptations that permit the animals to survive in this biome:

OVER

Diorama Biome #2: _____

Name and description of animals:

Name and description of plants:

Physical description of the "climatic" setting, i.e. temperature, latitude, elevation, precipitation:

Visible adaptations that permit the animals to survive in this biome:

Rubric 19

Biome Short Story

Student Name: _____

Category	4- Above Standards	3- Meets Standards	2- Approaching Standards	1- Below Standards	Score
<u>Basic Biome Information</u> <u>(climate, latitude, etc.)</u>	Story includes at least 4 correct details about the biome.	Story includes 3 correct details about the biome.	Story includes only 1-2 details about the biome or some of the details included are incorrect.	Student does not include any basic details about the biome or all included details are incorrect.	
<u>Biome Organism Information</u> <u>(animals, plants, etc.)</u>	Story includes at least 5 correct details about the biome inhabitants, and at least one of the details included obviously came from research aside from looking at Academy diorama.	Story includes 4-5 correct details about the biome inhabitants.	Story includes only 1-3 details about biome inhabitants or some details included are incorrect.	Student does not include any basic details about the biome inhabitants or all included details are incorrect.	
<u>Vocabulary</u>	Student correctly uses at least 4 vocabulary words.	Student correctly uses 3 vocabulary words.	Student uses only 1-2 vocabulary words or uses words incorrectly.	Student uses no vocabulary words or uses all words incorrectly.	
<u>Spelling/ Grammar</u>	There are no spelling or grammar mistakes in story.	There are only 1-5 spelling or grammar mistakes in story.	There are 6-10 spelling or grammar mistakes in story.	There are more than 10 spelling or grammar mistakes in story.	

Lesson 20

Topic: Ungulate Classification

Target: 5th-8th Grade

Duration: Two 45-minute lessons with extension options

Discipline Connections: English, geography, history, science, visual arts

Materials:

- Student Handouts:
20.1: Hoofed Mammal Observations
- small plastic animals or pictures of animals
- large format images (from the dioramas) of the Alaskan Moose, American Bison, caribou, collared peccary, desert bighorn sheep, Dall sheep, mule deer, and musk ox, and pronghorn antelope
- Rubric 20

Word Bank: animal adaptations, classification, taxonomy, ungulate, hoofed mammals

Objective: Students will demonstrate their understanding of how animals are classified and the hoofs and tracks of the Academy's ungulate mammals.

Background Knowledge: Show large format images (from the dioramas) of animals listed in Materials. Ask questions and discuss with your class the differences and similarities of each of these animals.

Procedure:

1. State the lesson's objective and write the objective on the board.
2. Explain that there are many different ways to classify animals.
3. Break students into small groups and give each group a handful of plastic animals or a stack of pictures of animals. Ask them to group them according to traits that they can see. Ask each group to share their classification system.
4. Each group then mixes their animals back together and classifies them a completely different way. Discuss new systems. Discuss the differences between groups and any problems they had classifying their animals or explaining their system to the class.
5. Discuss taxonomy. Practice fitting the plastic animals into their taxonomic groups. Use the internet and books to help classify the animals.
6. Discuss different traits and adaptations that might be helpful in classifying animals.

Museum Activities:

1. At the Academy, students are to carefully observe the hoofs of mammals in four different biomes, completing and answering the questions in Student Handout 20.1. Then, as a class, practice classifying the animals according to their observed characteristics.

Lesson 20 (continued)

Topic: Ungulate Classification

Reflection: Students select one of the hoofed mammals they studied. Then, they write a story as if they were the hoofed mammals traveling across their biomes. They should include how their hoofs help them travel (walk, run, jump, climb, find food, fight, etc.) within their biome. Have students share their stories.

Assessment: Completion of Student Handouts 20.1, reflection writing

Extension Options:

- Using the library or internet resources, have students complete a research project on an “ungulate” or hoofed animal and how it develops – from birth to old age.

Resources:

- The following websites provide information on Ungulates (Hoofed Mammals)
www.wikipedia.com

Pennsylvania State Standards:

Biological Sciences 3.3.7.A

Name: _____ Date: _____

Investigate how mammal hoofs are adapted to different types of biomes at the Academy of Natural Sciences. Look very carefully at the hoofs of four mammals in different biomes. When you return to school, research your classroom references or the internet for any missing information.

Hoofed Mammal 1 _____ **Diorama Biome:** _____

Description of mammal's hoof: _____

Description of biome ground/floor: _____

How does this mammal's hoof assist its walking (or climbing) on the biome ground/floor? _____

Hoofed Mammal 2 _____ **Diorama Biome:** _____

Description of mammal's hoof: _____

Description of biome ground/floor: _____

How does this mammal's hoof assist its walking (or climbing) on the biome ground/floor? _____

Hoofed Mammal 3 _____ Diorama Biome: _____

Description of mammal's hoof: _____

Description of biome ground/floor: _____

How does this mammal's hoof assist its walking (or climbing) on the biome ground/floor? _____

Hoofed Mammal 4 _____ Diorama Biome: _____

Description of mammal's hoof: _____

Description of biome ground/floor: _____

How does this mammal's hoof assist its walking (or climbing) on the biome ground/floor? _____

Student Name: _____

Category	4- Above Standards	3- Meets Standards	2- Approaching Standards	1- Below Standards	Score
<u>Animal Information</u>	Story includes at least 4 correct details about the animal, and discusses usefulness of hoofs in depth.	Story includes 3 correct details about the animal and discusses usefulness of hoofs.	Story includes only 1-2 details about the animal or some of the details included are incorrect. Purpose of hoofs is implied, but not detailed.	Student does not include any basic details about the animal or all included details are incorrect.	
<u>Biome Information</u>	Story includes at least 4 correct details about the biome.	Story includes 3 correct details about the biome.	Story includes only 1-2 details about the biome or some of the details included are incorrect.	Student does not include any basic details about the biome or all included details are incorrect.	
<u>Vocabulary</u>	Student correctly uses at least 4 vocabulary words.	Student correctly uses 3 vocabulary words.	Student uses only 1-2 vocabulary words or uses words incorrectly.	Student uses no vocabulary words or uses all words incorrectly.	
<u>Spelling/ Grammar</u>	There are no spelling or grammar mistakes in story.	There are only 1-5 spelling or grammar mistakes in story.	There are 6-10 spelling or grammar mistakes in story.	There are more than 10 spelling or grammar mistakes in story.	

Lesson 21

Topic: Sonoran Desert

Target: 5th-8th Grade

Duration: Two or more 45-minute lessons with extension options and parent links

Discipline Connections: English, geography, history, science, visual arts

Materials:

- Student Handouts:
21.1: Saguaro Cactus Poster
- Teacher Handouts:
21.1: Desert Background
- Video about American deserts or teacher-prepared PowerPoint with pictures of Sonoran desert (See **Resources** for possible videos.)
- Rubric 21

Word Bank: adaptations, cactus, desert, Saguaro, Sonoran Desert

Objective: Students will learn that a desert with its scorching heat and dryness has abundant plant life and provides habitat for animals with unique adaptations for surviving high daytime temperatures.

Focusing Questions: What is a desert? What are some adaptations that help organisms live in the desert?

Procedure:

1. Introduce the lesson's objective and write the objective on the board.
2. Brainstorm a list of characteristics, plants, animals, and other information students think they already know about deserts. Find out if any students have visited a desert and what they learned and observed. Discuss and correct any major misconceptions. Be sure to discuss the climate, precipitation, latitude, and temperatures of deserts, as well as animal adaptations.
3. Show a video or PowerPoint presentation about deserts, particularly the Sonoran Desert. Be sure to include a map showing North American deserts.
4. Discuss possible food web and ecosystem interconnections of the desert plants and animals.
5. Distribute Student Handout 21.1. Go over the assignment and its assessment/scoring rubric. Allow one to two classes for students to work on the project. You may want to go to the computer lab for a research day, followed by a design/drawing day.
6. Have students turn in posters, score them, then post in room and/or hallway.

Museum Activities:

1. Ask students to examine Sonoran desert diorama. Look for different types of organisms. Look for carnivores, omnivores, and herbivores. Look for producers and consumers. Look for predators and prey. What adaptations do you notice? Be sure to look at both animal and plant life. How do those adaptations differ from predator to prey? How do adaptations in the plant life affect the adaptations of the animal life and vice versa? Discuss these observations back in the classroom and research these organisms further.

Lesson 21 (continued)

Topic: Sonoran Desert

Reflection: Have students write a short story about being an animal living in the Sonoran Desert based on what they learned in class and/or at the Academy's North America Hall.

Assessment: Completed Saguaro Cactus Posters, reflection story

Extension Options:

- Grow a variety of desert cactus in the classroom. Students can observe the cactus with hand lenses, then draw and write about what they observe. They can also set up an experiment to determine how differing amounts of light, temperature, and water affect the growth of the cactus. Possibly cut a small piece from the tip of a cactus to examine its interior structure a compared to other types of plants.
- Have students research a specific desert animal or plant focusing on its special adaptations.

Resources:

- The National Park Service - Sonoran Desert at www.nps.gov/sagu/naturescience
- NASA's images and information:
<http://earthobservatory.nasa.gov/Laboratory/Biome/biodesert.html>
- The Center for Sonoran Desert Studies: Arizona-Sonora Desert Museum
http://www.desertmuseum.org/center/edu/faq_desert.php
- The Nature Conservancy has a web-section on deserts at www.tnc.org
- The Patuxent Bird Identification Center – images, sounds, data of North American Birds
<http://www.mbr-pwrc.usgs.gov/id/framlst/infocenter.html>
- **Video Resource:** *Saguaro, Sentinel of the Desert. (The Best of Nature)*

Pennsylvania State Standards:

Ecosystems and their Interactions. 4.7.7.b

Name: _____ Date: _____

Wanted Dead or Alive: The Giant Saguaro Cactus
Student Poster Project (50 Points)

Date assigned: _____

Date due: _____

PA Science Standards: Unifying Themes 3.1.7.A Explain the parts of a simple system and their relationship to each other; **Ecosystems and Their Interaction 4.6.7.A.** Explain the flows of energy and matter from organism to organism within an ecosystem. Explain the importance of the predator/prey relationship and how it maintains the balances within ecosystems. Identify niches for producers, consumers and decomposers within an ecosystem.

Poster Specifications: white or pastel colored poster board, use one-half poster sheet

After having discussed with your class the important role the Giant Saguaro Cactus plays in supporting the complex desert wildlife, illustrate this "desert web of life" by drawing and labeling the different kinds of animals that benefit from the Giant Saguaro cactus. Use arrows to connect and identify where or what part of the saguaro cactus is utilized by each of the following desert animals: the bighorn sheep, the collared peccary, owl, quail, woodpecker, lizards, snake, termites, stink bugs, as well as the desert soil. Be sure to include the saguaro cactus' discarded limbs and decaying trunks on the desert floor. Use colored pencils. Work neatly and erase carefully. Lightly pencil in your initial design and placement of organisms surrounding the Giant Saguaro cactus before you begin to add detail and color.

Desert Saguaro Animal Web Poster Project Rubric (could be adapted for other biomes)

Items to be Included:	Remarks	Points Possible	Points Received
Giant Saguaro Cactus - size appropriate	Show accordion folds	10	
Bird Varieties and Locations	Show where they roost	5	
Ground Animals around Saguaro	Show where typically found	5	
Insects - where found on Saguaro	Arrows to where found	5	
Dead Saguaro Parts - limbs and trunk	Should be withered	5	
Lines Connecting Organisms, Saguaro, and Each Other	Who Uses or Eats Who	5	
<u>Labeling</u> of Organisms and Lines	Who Uses or Eats Who	5	
Neatness and Coloring of Drawing	Do not scratch out	5	
Title, Student Name, Date, Class	No name -- no credit/points	5	
Total Points:		50	

PA Standards: Biological Sciences 3.3.7.A Describe the similarities and differences that characterize diverse living things. Describe how the structures of living things help them function in unique ways. Account for adaptations among organisms that live in a particular environment.

Background Information on the Sonoran Desert:
(for a map of this area: www.desertmuseum.org)

North America has four major deserts: the Great Basin, Mohave, Chihuahuan and Sonoran. They all differ in their temperature and precipitation patterns, and as a result have unique plant and animal communities.

The most prominent plant of the Sonoran desert is the Giant Saguaro Cactus which can reach a height of 50 feet. It is the symbol of the American Southwest and is often shown in travel magazines.

The Sonoran, like other deserts, gets less than 10 inches of rainfall each year. Summer temperatures can reach as high as 115 degrees Fahrenheit (46°C). The many different kinds of plants and animals have special adaptations to cope with the limited amounts of water and high daytime temperatures.

The Sonoran Desert covers nearly 100,000 square miles (260,000 sq. km.) and includes most of the southern half of Arizona, southeastern California, most of the Baja California peninsula, the islands of the Gulf of California, and much of the state of Sonora, Mexico. Lush compared to most other deserts, the Sonoran has some 2,000 species of plants which lie dormant during the dry season and flourish during the rainy season. The bi-seasonal rainfall pattern of summer monsoons – July to mid-September -- bring wet tropical air with frequent and violent localized thunderstorms. Frontal storms from North Pacific Ocean -- December to March -- bring occasional gentle, widespread rain to the northwestern area of the Sonoran. Unlike other North American deserts, the Sonoran desert has mild winters and rarely experiences frost. (Source: www.desertmuseum.org)

Desert Plant Adaptations:

- Waxy coating and smaller pores (open at night) to reduce loss of water
- Small or no leaves – many have spines
- Grow in shade
- Drop leaves in periods of drought
- Grow deep tap roots to absorb water in ground – up to 100 feet long
- Cactus have shallow roots which spread out and absorb rainfall
- May have pleats or folds that swell and store water after a rainstorm
- Hairs and spine help break the wind, provide shade, and protect plants from hungry animals

Desert Animal Adaptations:

- Carnivores/omnivores eat smaller animals to gain moisture
- Herbivores/omnivores eat juicy cactuses/plants to gain moisture
- Some animals “sleep” or “estivate” through the driest times
- Spadefoot toads are covered with a jellylike substance that keeps them moist while waiting for rain
- Most animals active only during the evening (nocturnal) or early morning
- Many animals will go underground, under rocks, or in shade during the day
- Some have big ears and long legs to radiate body heat
- Some insects and lizards straighten out their legs as they walk across the hot ground

The Saguaro Cactus:

- Can store water for a long time in its spongy flesh
- Can expand when filled with water and contract like an accordion when dry
- Supports the complex desert wildlife. It provides homes for birds and insects. Its discarded limbs provide shade and homes for nocturnal animals such as lizards and termites. The owl and snake feed on the night lizards that live there. Stinkbugs nibble on its decomposing fiber. Its nutrients and energy are transformed into other living organisms or released into the soil for use by other plants.

Desert Big Horn Sheep:

- also known as the Mexican Bighorn, scientific name *Ovis canadensis mexicana*
- very difficult to see in the desert as they are camouflaged with the sand
- eat such desert plants as Golden Glow or Brittle bush (looks like sunflower), Mountain Mahogany, Mexican Tea, Yellow Trumpet Flower, Mock Orange, Wild Onion, and other plants
- their geographical range is Chihuahua Mexico and Sonora Mexico, Arizona and New Mexico
- habitat is the “pavement desert”
- males form groups by themselves in the summer
- bands of ewes and younger sheep are led by an ewe
- mothers go to steepest, barren regions to give birth

Bighorn Sheep adaptations for desert survival:

- they rest in the shade during the day and forage at night
- they can go for a few days without water and will recover from dehydration after drinking water
- find water pools in rocks to drink from
- they get much of their needed moisture from plants
- they use their hoofs and horns to break off spines and open cactus to eat its juices
- their body temperature has the ability to fluctuate a few degrees
- they can cool themselves by panting and sweating
- they can lose one-third of their body weight and survive
- they are able to survive in areas too dry for their predators.
- their padded hooves allow them to quickly climb higher, rocky terrain
- their keen eyesight allows them to see predators such as mountain lions, coyotes, and bobcats

Sources:

- 1) Academy's background information on the Sonoran Desert Diorama bighorn
- 2) www.fws.gov/southwest/REFUGES/arizona/cabighrn.html
- 3) www.desertusa.com/big.html

Collared Peccary

- also known as the Javelina, scientific name *Tayassu tajacu*
- aggressive, fierce, and hog-like, although they are not in the family of pigs and boars
- more closely related to ruminants due to the structure of their stomachs, teeth and feet
- they like to wallow and are good swimmers
- have a fair sense of hearing, poor vision, but have a keen sense of smell
- defends itself from predators by biting back
- in summer they eat only in the evening and morning
- an omnivore – eats grass, herbs, fruits, grasshoppers, beetles, insect larvae, dead rodents, birds, reptiles, mushrooms, roots, bulbs, insects and worms
- they do not need water as long as plant life still contains water or juice

Collared Peccary (cont'd)

- most births occur during the period of maximum rainfall
- the “precocious” young and their mothers join the band one day after birth
- habitat – desert with dirt pavement
- geographic range: Arizona, New Mexico, Texas, Central America to Northern Argentina

Collared Peccary's adaptations for surviving in the desert:

- body temperatures can change a few degrees
- fur become lighter in the summer to reflect light and heat
- hair bristles less dense in hotter months
- little water requirements –
- can eat the flowers and fruit from cacti without getting hurt on the thorns or spines

BIRDS IN THE SONORAN DESERT

(Source: Wikipedia)

- 1) **Black-tailed Gnatcatcher:** a small insectivorous bird which breeds throughout the Sonoran. It is nonmigratory and found in arid desert areas year-round. It reaches about 4.5 to 6 inches in length, with much of it taken up by a long tail lined with white outer feathers. The male has a black cap. It forages for small insects and spiders in desert shrubs.
- 2) **Gila Woodpecker:** a medium-sized woodpecker in the desert regions of southwestern U.S. The wings of this bird are spotted and barred with a black and white zebra-like pattern. The neck, throat, belly and head are greyish tan. The male has a small red cap on the top of the head. Their dark tail has white, fork-like, dotted bars on its tail. Its habitat is the low desert scrub typical of the Sonoran desert. They build their nests in holes made in saguaro cacti or mesquite trees.
- 3) **Vermillion Flycatcher:** Males are bright red in color, with dark brown plumage. Females have a peach-colored belly with a dark grey top. They grow to about seven inches in length and feed mostly on insects such as flies, grasshoppers and beetles.
- 4) **Greater Roadrunner:** a large, long-legged bird in the cuckoo family. They breed in the desert and shrubby country in southwestern U.S. and northern Mexico. It nests on a platform of sticks low in a cactus or a bush. It walks rapidly about, running down prey or jumping up to catch insects or birds. It feeds mainly on insects, small reptiles, rodents, tarantulas, scorpions, and small birds.
- 5) **Gambel's Quail:** ground dwelling-bird, easily recognized by its top knots. Males have copper feathers on the top of their heads, black faces, and white stripes above their eyes. They can move quickly through the underbrush and are rarely seen in flight.
- 6) **Black-throated or Desert Sparrow:** a small sparrow primarily found in the southwestern U.S. and Mexico. Its preferred habitat is arid desert scrub. It reaches a length of 4.5-5.5 inches, and is pale gray above, with a distinctive black and white head pattern. It feeds primarily on insects and seeds and travels in small groups.

Rubric 21**Desert Short Story**

Student Name: _____

Category	4- Above Standards	3- Meets Standards	2- Approaching Standards	1- Below Standards	Score
<u>Animal Information</u>	Story includes at least 4 correct details about the animal, and discusses adaptations for living in the desert.	Story includes 3 correct details about the animal and discusses adaptations.	Story includes only 1-2 details about the animal or some of the details included are incorrect. Adaptations are implied, but not detailed.	Student does not include any basic details about the animal or all included details are incorrect.	
<u>Desert Information</u>	Story includes at least 4 correct details about the Sonoran desert.	Story includes 3 correct details about the Sonoran desert.	Story includes only 1-2 details about the Sonoran desert or some of the details included are incorrect.	Student does not include any basic details about the Sonoran desert or all included details are incorrect.	
<u>Vocabulary</u>	Student correctly uses at least 4 vocabulary words.	Student correctly uses 3 vocabulary words.	Student uses only 1-2 vocabulary words or uses words incorrectly.	Student uses no vocabulary words or uses all words incorrectly.	
<u>Spelling/ Grammar</u>	There are no spelling or grammar mistakes in story.	There are only 1-5 spelling or grammar mistakes in story.	There are 6-10 spelling or grammar mistakes in story.	There are more than 10 spelling or grammar mistakes in story.	