Cross-Curricular
Second-Grade Unit

VIRGINIA ANIMALS
&
THEIR HABITATS

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**Insects student sheet*

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**A Look Outside DVD*
**Compare Yourself to a Black Bear student sheet*
**Virginia map with no labels*
**Tundra Swan 888 Migration Path*
**Tundra Swan 893 Migration Path*
**Tundra Swan 894 Migration Path*

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Insect Identification Lab

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**Tent Caterpillar*
**Green-striped Mapleworm*
**Gypsy Moth Caterpillar (E.A. Roberts, Senior Research Associate, Department of Entomology; Virginia Tech)*
**Hickory-Horned Devil*
**Saddleback Caterpillar*
**Fall Webworm Caterpillars*

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Virginia Animals and their Habitats Unit Introduction

Unit Overview Statement

Virginia Animals and their Habitats is a second-grade cross-curricular unit that is aligned to the Virginia Standards of Learning (SOL). The following SOL were used for alignment of unit activities: 2008 *History and Social Science SOL*, 2009 *Mathematics SOL*, 2010 *English SOL*, and 2010 *Science SOL*. The unit integrates the second-grade content areas of science, language arts, mathematics, and social studies. Students will develop an understanding of Virginia animals and their habitats through active research, and will observe and collect data to communicate their understanding. They will investigate life cycles of animals within the animal's habitat and the interdependence of animals with their environment. Students will utilize reading and writing skills to research new information about their animals and their habitats. Students will use mathematical concepts such as measurement, data collection, and computation as research tools. Students will develop the geography skills necessary to compare and contrast Virginia's ecosystems.

During this unit, students will work in small groups to demonstrate their learning of a specific animal and its habitat. Each student group will present their findings in a variety of oral, written, and visual formats. The unit will culminate with the development of higher order thinking skills as the class synthesizes each group's data related to its specific animal. The class will draw conclusions about the interdependency of organisms within Virginia's ecosystems. This will enable students to gain an appreciation of wildlife in Virginia and the ways to conserve animals and habitats for future generations.

Virginia Animals and their Habitats was created and written by a group of six Virginia second-grade teachers in partnership with the Virginia Department of Education's Office of Elementary Instructional Services and the Virginia Department of Game and Inland Fisheries' Wildlife Education Office. The unit was pilot tested by 36 Virginia second-grade teachers.

Unit Instructional Pedagogy

The *Virginia Animals and their Habitats* unit is a cross-curricular unit. The unit integrates the content and skills of science, mathematics, social studies, language arts, and the arts. Through the use of a cross-curricular approach to the unit, students will see their school subjects as connected and interrelated, rather than isolated and divided. This approach allows students to build on their current knowledge base and connect what they know with what they are learning; and it promotes the higher level thinking and collaborative skills needed for lifelong success.

Inquiry-based teaching puts the emphasis on the students seeking answers for themselves and helps them become creative problem solvers. Students will have opportunities to make observations, collect, analyze, and synthesize information, draw conclusions, develop problem-solving skills, and report about and display the information they have learned. Throughout the unit, the teacher will guide the students to think critically, to ask difficult questions and to seek answers to those questions. Students will learn to think, explore and research.

There is a project-based learning component to the unit. During the instruction in the classroom of the *Virginia Animals and their Habitats* unit, students will participate in small, cooperative learning groups to research and complete a group project about a "student-group-selected" Virginia animal. At the culmination of their project, they will present what they have learned to the class using multiple presentation modes.

The cross-curricular design of the *Virginia Animals and their Habitats* unit has strategies imbedded for differentiation so that all students in the class can be successful learners. This unit uses children's natural curiosity and interests to engage them in learning, and provides the connections to their world that provides relevance to their learning.

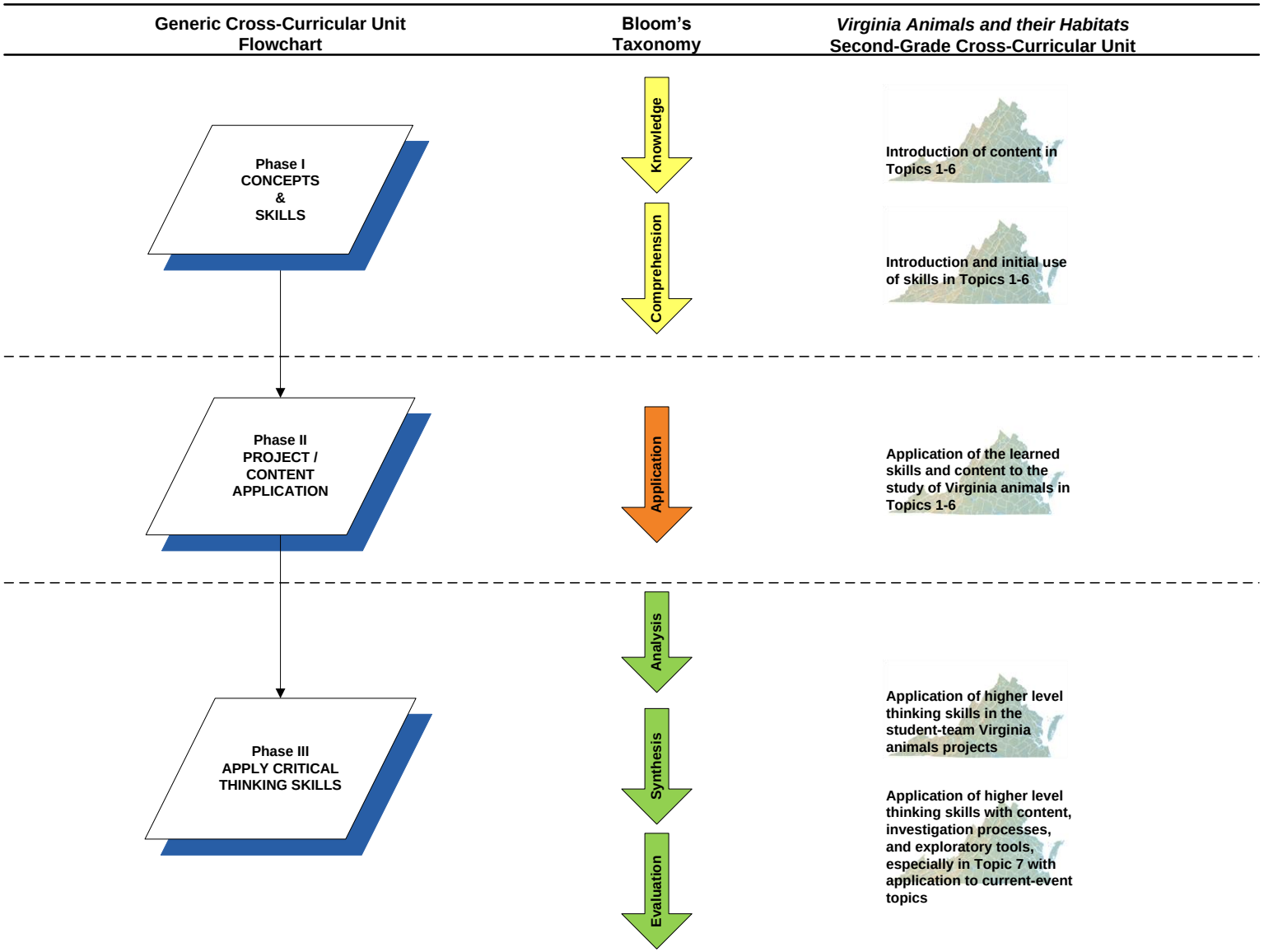
A summary of the *Virginia Animals and their Habitats* unit's topics and sessions can be found on page iii.

A visual view of the overall flow of the *Virginia Animals and their Habitats* unit aligned to the flow of generic cross-curricular units and Bloom's Taxonomy is on page iv.

Summary of the Unit Topics and Sessions

Topic #	Topic	Session #	Session
1	What Makes Something Alive?	1.1	Unit Introduction
		1.2	Living vs. Nonliving
		1.3	Real and Imaginary
2	How Do Scientists Classify Animals?	2.1	Animal Sorting
		2.2	Insects!
		2.3	Insect Math
		2.4	Animal Poetry Introduction
		2.5	Animal Poetry Work Session
		2.6	Animal Poetry Completion Session
		2.7	Student Team Project Introduction
3	What is a Habitat?	3.1	Introduction to Animal Habitats
		3.2	Animal Habitats Components
		3.3	Sensory Observations
		3.4	Talking with a Habitat Scientist
		3.5	Measurement Preparation
		3.6	Writing for the Student Team Project
		3.7	Measuring Tree Heights
		3.8	Square Meter Habitats – Observation One
		3.9	Student Project Work Time – Visual Project Product
		3.10	Square Meter Habitats – Observation Two, Three, and Four (will take a minimum of three session times to complete)
4	What is a Life Cycle?	4.1	Introduction to Animal Life Cycles
		4.2	Butterflies and Moths
		4.3	Frogs
		4.4	Life Cycle Models
		4.5	Student Project Work Time – Life Cycles
5	What is a Food Chain?	5.1	Animals and their Food
		5.2	Black Bears
		5.3	Food Chains
		5.4	Food Chains and Food Webs
		5.5	Student Project Work Time – Food Chains and Food Webs
6	How Do Animals Adapt to Survive?	6.1	Introduction to Animal Adaptations
		6.2	No Water Off a Duck's Back
		6.3	Designer Animals
		6.4	Student Project Work Time – Introduction to the Project Presentation Guidelines
		6.5	Adaptations – Migration
		6.6	Migration Math
		6.7	Tundra Swan Migration
		6.8	Other Animals Migrate, too!
		6.9	Caterpillar Adaptations
		6.10	Yum Yum Caterpillars
		6.11	Hidden Lizards
		6.12	Student Project Work Time – General
7	Unit Culmination	7.1	Student Project Presentation Preparations
		7.2	Student Project Presentations (may take several sessions)
		7.3	Interdependence – Animals with their Living and Nonliving Surroundings
		7.4	Classifying our Virginia Animals
		7.5	Virginia Animal Food Chains and Food Webs
		7.6	Protecting Virginia's Habitats

Overall Flow of *Virginia Animals and their Habitats* Unit



Student Journals

As part of the *Virginia Animals and their Habitats* unit, students will make and use on a regular basis a journal. The student journals are a very important part of the unit.

Student journals provide your students with the opportunity to read, write, describe and think about the science they are learning. The student journals will make nature the subject, and use observation, data collection and analysis, reflection, drawing, and writing as the processes for learning. A student journal that includes drawings and narratives, as well as a written record of a student's thoughts and feelings, can help to tie together science, mathematics, reading, history and social science, and art and provide opportunities for creativity and reflection.

During the unit, the student journals will have multiple educational purposes.

1. The journals will model the real-life data collection tool that scientists use when they do field studies. You can indicate to your students that journals have been kept by historic scientists as a means of documenting their work, their discoveries, and their thoughts. *(A good example of a historic journal is the work of Lewis and Clark who were commissioned to find a water route to the Pacific and explore the uncharted West. We know details about their journey and the discoveries they made during their travels because they documented everything in their journey log.) (http://www.nationalgeographic.com/lewisandclark/journey_intro.html)*

2. The journals will be an excellent tool to improve student writing and reading skills.

3. The journals will become a reference and resource for your students to use throughout the unit. Their journals will be a means for them to record information they learn, things they observe, thoughts and feelings about things they learn, and will be a place for data collection and analysis. Students will be able to refer back to the information they have collected.

4. The journals will provide a tool for you as the teacher to help make each student more successful. Journaling can help your students see that their own observations and feelings about the world are important.

5. The journals can be used as a periodic assessment tool for you to monitor your students' understanding of the unit content and the unit processes; and to periodically check your students' progress in strengthening their writing and reading skills.

The actual physical journals can be made in several different ways. You will want to select the format that your students will use before beginning the unit. Some of the different journal formats are (but are not limited to):

a. Each student uses a loose-leaf notebook.
b. Each student uses a spiral notebook.

c. Each student keeps a folder of journal pages that will then be put into a book at the end of the unit.

Give students an opportunity to decorate their journal covers. The decorations can be as elaborate or as simple as you would like.

Suggested journal sections:

a. Journal Table of Contents (TOC) – be sure to leave several pages at the beginning of the journal to add items to the TOC as students make new journal entries. You may want to define with your students some of the sections of their TOC at the beginning of the unit (e.g., vocabulary section, experiments and activities section, daily diary section).
b. Vocabulary/glossary list – as students learn new vocabulary for the unit, add them to a vocabulary/glossary list. Pages will need to be reserved for this.
c. There are specific references throughout the unit that describe journal entries that are to be made. Some of these entries can be completed on unit student sheets which can be attached in the journal or they can be written directly into the journal. Additional journal entries can be added beyond what are suggested in the unit lessons.
d. The journal can be used for periodic (e.g., daily, every other day) student "diary" entries. These entries can be put on the "next page" of the journal each time or a specific section of the journal can be designated for "diary" entries. The "diary" entries give the students the opportunity to describe in their own words what they have done or how they feel about information they have learned. The journal "diary" entries can be entered in many different formats such as poems, stories, lists, etc.
e. Student drawings, photographs, etc., can be added to the journal.
f. You can determine any other entries you would like for your students to include in their journals.

Project WILD and the *Virginia Animals and their Habitats* Unit

The Virginia Department of Game and Inland Fisheries' mission in part is to provide education about our wildlife resources to all citizens in the Commonwealth. The Department's main K-12 effort is the implementation and distribution of Project WILD, a national wildlife education program made available through teacher inservice workshops. Project WILD links students and wildlife through wildlife-based conservation and environmental education that fosters responsible actions toward wildlife and related natural resources. It is based on the premise that young people and educators have a vital interest in learning about our natural world.

Each Project WILD activity contains information needed to conduct that activity including objectives, method, background information, a list of materials needed, procedures, evaluation suggestions, recommended grade levels, subject areas, duration, group size, setting, and key terms. A glossary is provided, as well as a cross-reference by topics and skills. Many of the activities support Virginia's Standards of Learning objectives.

The Department of Game and Inland Fisheries will offer the Project WILD activity guides through workshops designed to supplement the *Virginia Animals and their Habitats* cross-curricular unit. Background information from Project WILD activities will provide additional content information on each topic.

Teachers who attend the workshops will receive both of the Project WILD activity guides.

- *K-12 Curriculum and Activity Guide* is the original guide featuring 122 activities emphasizing terrestrial species and their habitats. A wide range of ecological concepts are covered including: food webs or energy flow, adaptations, interdependence, carrying capacity and habitats.
- *Aquatic K-12 Curriculum and Activity Guide* provides a look at aquatic wildlife and their ecosystems. This guide with 49 activities supports the watershed and Chesapeake Bay related SOLs as well as the wildlife concepts mentioned above.

From the tiny minnow to the majestic eagle, wildlife and humans are integrally connected. Earth is Home to us all, share it responsibly.

To schedule a local Project WILD workshop for 15 or more teachers contact: Suzie Gilley, Project WILD State Coordinator, 804/367-0188 or suzie.gilley@dgif.virginia.gov
Additional information about Project WILD and wildlife in Virginia can be found at www.dgif.virginia.gov

Virginia Animals and their Habitats

Topic 1

What Makes Something Alive?

TOPIC 1 - What Makes Something Alive?

Topic 1: Overall Information

Overview

In this group of lessons students will define what it means to be alive and what organisms need to survive.

Topic 1 Virginia SOL

Science	English	Mathematics	History & Social Science
2.1a, b, c, d, g, h, i, j, k, m 2.4 a 2.5 a, b	2.1 c, d 2.2 2.3 a, b, c, d 2.7 c 2.8 c, e 2.9 2.11 2.12 a, b 2.13 a, b, c, d, e, f, g, h, j		2.5 b 2.6

Teacher Background Knowledge

- The purpose of this topic is to help students understand what it means to be alive and to identify the characteristics of living organisms.
- Living organisms are made of cells, obtain and use energy (eat), grow and develop (life cycle), have offspring, respond and adapt to their environment, and respire (breathe).
- Basic needs of living organisms are shelter, food, water, air, and living space.
- Living organisms live in a habitat that meets all of its needs.
- Students will identify simple map parts.
- Students will use a map to locate the home of several Virginia animals.
- Students will make a student journal which will then be used throughout the unit.

Student Learning Expectations

- Identify the parts of a map.
- Use a map to locate geographic features.
- Compare and contrast living and nonliving things.
- Identify the characteristics of living organisms include eating, breathing, reproducing, growing, responding and adapting to the surroundings.
- Recognize that for survival, living organisms need shelter, food, water, air and living space.
- Sort and classify data.

Procedure

NOTE: The procedures in the topic sessions may be divided into several different lesson periods. Each session may take more than one lesson period to complete.

Topic 1: Session 1.1 – Unit Introduction

Session Supplies:

- Map of Virginia – can be a road map, a classroom map, or any other type of map
- List of various familiar Virginia animals or pictures of the animals (e.g., gray squirrel, black bear, bluegill fish, eagle, blue crab, black snake) to use to play a game of "Who am I?" *(A good source for lists of Virginia animals is the Virginia Department of Game and Inland Fisheries Web site (http://www.dgif.virginia.gov/). Click on the "Wildlife Information" link found on the left-hand side of the screen.)*
- Student journals (See the *Student Journals* information at the beginning of the unit – Unit Introduction page v)
- Materials for students to decorate their personal journals

Session Virginia SOL

Science	English	Mathematics	History & Social Science
2.1 a, c, d, g, h, i, j, k	2.2 a, b, c, e 2.3 a 2.12 a, b 2.13 a, h, j		2.5 b 2.6

An excellent resource about making observations and using a field journal can be found on the New Hampshire Fish and Game Department (NHFGD) Web site at http://www.wildnh.com/Kids/kids.htm, *Wanted: Biologists!* Vol. 9, Issue 2 and *Exploring the Outdoor World* Vol. 2, Issue 2. *Wild Times for Kids* is published twice a year by the NHFGD. The magazine can be downloaded.

Session 1.1 – Unit Introduction

Teacher Questions & Notes	Procedures
	To prepare for this introductory lesson to the entire unit, do the following: *a. Read the information at the beginning of the unit for overall unit pedagogy and organization (pg. i-vii).* *b. Read the information found in Appendix A (pg. 234-242) at the end of the unit regarding the student projects.* *c. For use during the entire Virginia Animals and their Habitats unit, students will make and use a journal. Information about the purpose, use, setup, etc., of the journals can be found in "Student Journals" (pg. v) at the beginning of the unit.* *d. Determine which format for the student journals your students will use. Gather the materials needed for the format you select.*

Session 1.1 – Unit Introduction

Teacher Questions & Notes	Procedures
	e. Gather materials that your students can use to decorate the cover of their journals. *f. Locate and display a large map of Virginia.* *g. Gather the names and/or pictures of several familiar Virginia animals.*
-What is this? (map) -What do we use maps for? -What are some of the parts of the map? (e.g., title, map legend, compass rose) -What kind of a map is this particular map? (e.g., road map) -Describe some of the particular features we can find on this kind of map. (e.g., roads on a road map, mountains on a relief map, bodies of water, cities)	1. Display the Virginia map. Ask the students to describe what they see. Encourage them to discuss that it is a map, that it is a map of Virginia, and have them describe some of the features on the map. (It will depend on the kind of map you have as to what those features might be.) 2. Have students locate on the map the general area where the school is located. 3. Discuss some of the other locations on the map (e.g., other cities, bodies of water)
-Name each of the animals. -Where in Virginia would each animal live?	4. Tell students that they are going to play a game called "Who Am I and Where do I Live?" Tell students that you are going to name a Virginia animal (or are going to show them a picture of a Virginia animal.) They need to help determine where they think the animal might live in Virginia. Let them know that the animal may live in only one part of Virginia or may live in many locations within the state.
-If the animal does not live in every part of Virginia, explain why you think it doesn't.	5. Talk about why each animal lives where it does. (A good resource for this information is the Wildlife section of the Virginia Department of Game and Inland Fisheries' Web site http://www.dgif.virginia.gov/wildlife/. With the description of each animal at the Web site is a Virginia Distribution map.)
	6. Explain to your students that you will be spending the next several weeks as a class studying many Virginia animals, where they live, what they eat, etc. 7. Explain to your students that they will study how to classify animals, what an animal's habitat is, animal life cycles, animal food chains, and how animals adapt to survive.

Session 1.1 – Unit Introduction

Teacher Questions & Notes	Procedures
	8. Explain to your students that each student will be part of a "research team" that will select one Virginia animal to study in depth. 9. Explain that each research team will gather information about their animal and will then give a class presentation, write a report, and make a display about their animals. 10. Explain that during the unit, each student will keep a journal where they will be able keep information about what they learn during the unit.
	11. Use the information you found in the Unit Introduction at the beginning of the unit titled *Student Journals* on page v to tell students about the journal and the different parts of the journal.
	12. Help students to set up their journals initially based on the format and sections you have determined for them to use.
	13. Give students time to decorate the front of their journals.
	14. Explain that they will be using their journal daily during the unit.
	15. Have students write the title "Preparing for the Unit: Virginia Animals and their Habitats" on a page in their journals. 16. Have them write the date on their page. 17. Have them write at least three things that they hope to learn during the unit.
	18. As a class, have students share some of the items that they recorded.

Topic 1: Session 1.2 – Living vs. Nonliving

Session Supplies:

- Collection of pictures/examples of living and nonliving things
- *Observation Walk* sorting sheet (pg. 8)
- Pencils
- Student scissors
- Glue
- Chart paper
- Markers
- Student journal

Session Virginia SOL

Science	English	Mathematics	History & Social Science
2.1a, b, d, h, i, j, k, m	2.1 c, d 2.2 a, b, c, e 2.7 c 2.11 2.13 a, b, c, d, e, f, g, h, j		

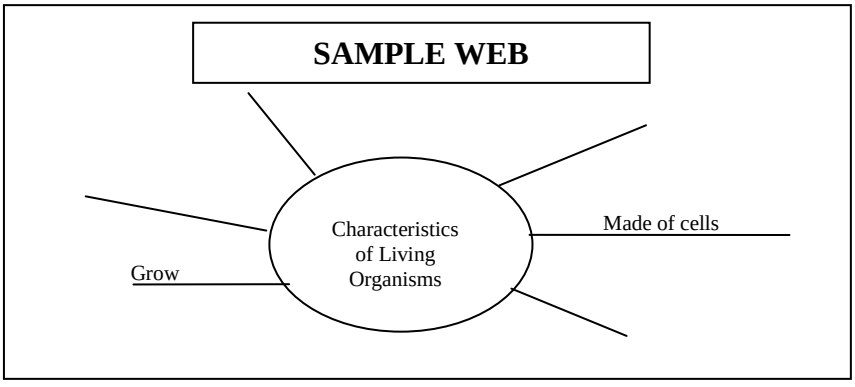
Project WILD activity *"Learning to Look, Looking to See"* (pg. 278) is a good activity for developing observation skills.

Session 1.2 – Living vs. Nonliving

Teacher Questions & Notes	Procedures
-What do you use to observe?	1. Have students take an *Observation Walk* student sorting sheet (pg. 8) and pencils with them on a short indoor/outdoor walk (~10 min). Ask them to draw and/or write down the things that they observe. Make sure that they put each item they observe in a separate box on the *Observation Walk* student sorting sheet. 2. You also need to record your observations so that you have items for #6 of this session.
	3. When you return to the classroom, have students cut apart their *Observation Walk* student sorting sheet and work with a partner to sort the items they observed into different categories. Allow students to come up with their own categories for sorting and classification.

Session 1.2 – Living vs. Nonliving

Teacher Questions & Notes	Procedures
	JOURNAL: 4. On a blank page in their journal, have students put the title "My Observation Walk" and put the date. On the page, students need to complete the following prompt: "We sorted our items by _____ because _____."
-How did you sort your items? -Why did you sort them that way? -What was the same/different about your items? -What is a characteristic?	5. As a class, discuss the way they sorted their objects. List some of the ideas on the board. Review the definition of a characteristic.
-What do these items have in common? -How are the objects in the first category different from those in the second category?	6. You will sort your own objects by living and nonliving things. (Do not tell the students what you used as your categories.) Ask the students if they can identify how your items were sorted.
-If students are unable to come up with the words "living" and "nonliving," ask "What is the difference between the classmate sitting next to them and a desk?"	7. When the students identify the categories as living and nonliving things, have students sort their own items by living and nonliving things.
	JOURNAL: 8. On the next blank page in the student journals, write the title "Living and Nonliving" and put the date. Create a "sorting page" and have the students glue their items in their journal. Have them write about the differences between living and nonliving.
-What makes something alive? -Why did you classify these things as alive? -Do living things depend on nonliving things in their environment to survive? How?	9. As a class, make a web of the characteristics of living organisms on chart paper. Put the title "Characteristics of Living Organisms" on the top of the chart paper. This web will be displayed in the classroom throughout the unit for student reference.



Name: _____

Observation Walk – Student Sorting Sheet			

Topic 1: Session 1.3 – Real or Imaginary?

Session Supplies:

- 'Characteristics of Living Organisms" web that was created for Topic 1, Session 1.2
- Project WILD, pg. 180: *"And the Wolf Wore Shoes"* (procedure steps 1-5 only)
- *Fiction vs. Nonfiction T-table* sheet (pg. 10)
- OPTIONAL: *Fiction vs. Nonfiction Venn Diagram* student sheet (pg. 11)
- At least one nonfiction book about animals and at least one fiction book about animals (a good source for these books would be your school library)
- One of the fiction books about animals selected to read aloud to class

Session Virginia SOL

Science	English	Mathematics	History & Social Science
2.1 a, b, c, d	2.1 c, d 2.2 a, b, c, e 2.3 a, b, c, d 2.8 c, e 2.9		

Session 1.3 – Real or Imaginary?

Teacher Questions & Notes	Procedures
-If we want more information about living organisms, what types of books would we use? (Direct the students toward nonfiction text.)	1. Refer to the "Characteristics of Living Organisms" that was created in the previous session.
	2. In Project WILD, pg. 180, complete the activity *"And the Wolf Wore Shoes"* steps 1-5 only.
-What do you notice about these books?	3. Have the groups examine one fiction and one nonfiction book. Have students use the *Fiction vs. Nonfiction T-table* sheet (pg. 10) and put it in their journal or have them draw a T-table in their journal and title it "Fiction vs. Nonfiction." On the T-table, list the characteristics of fiction and nonfiction selections.
	4. As a class, create a Venn diagram comparing the conventions of nonfiction and fiction selections. (You may choose to have students record answers on their own Venn diagram or make an overhead and do this as a class. A *Fiction vs. Nonfiction Venn Diagram* sheet is provided on pg. 11.)
-Is the book that you listened to fiction or nonfiction? -How do you know?	5. Select a fiction book about animals to read aloud to the class. Discuss where the book fits on the Venn diagram and why.

For additional content information, you can read the activity background in Project WILD *"Saturday Morning Wildlife Watching"* (pg. 184) and *"First Impressions"* (pg. 178)

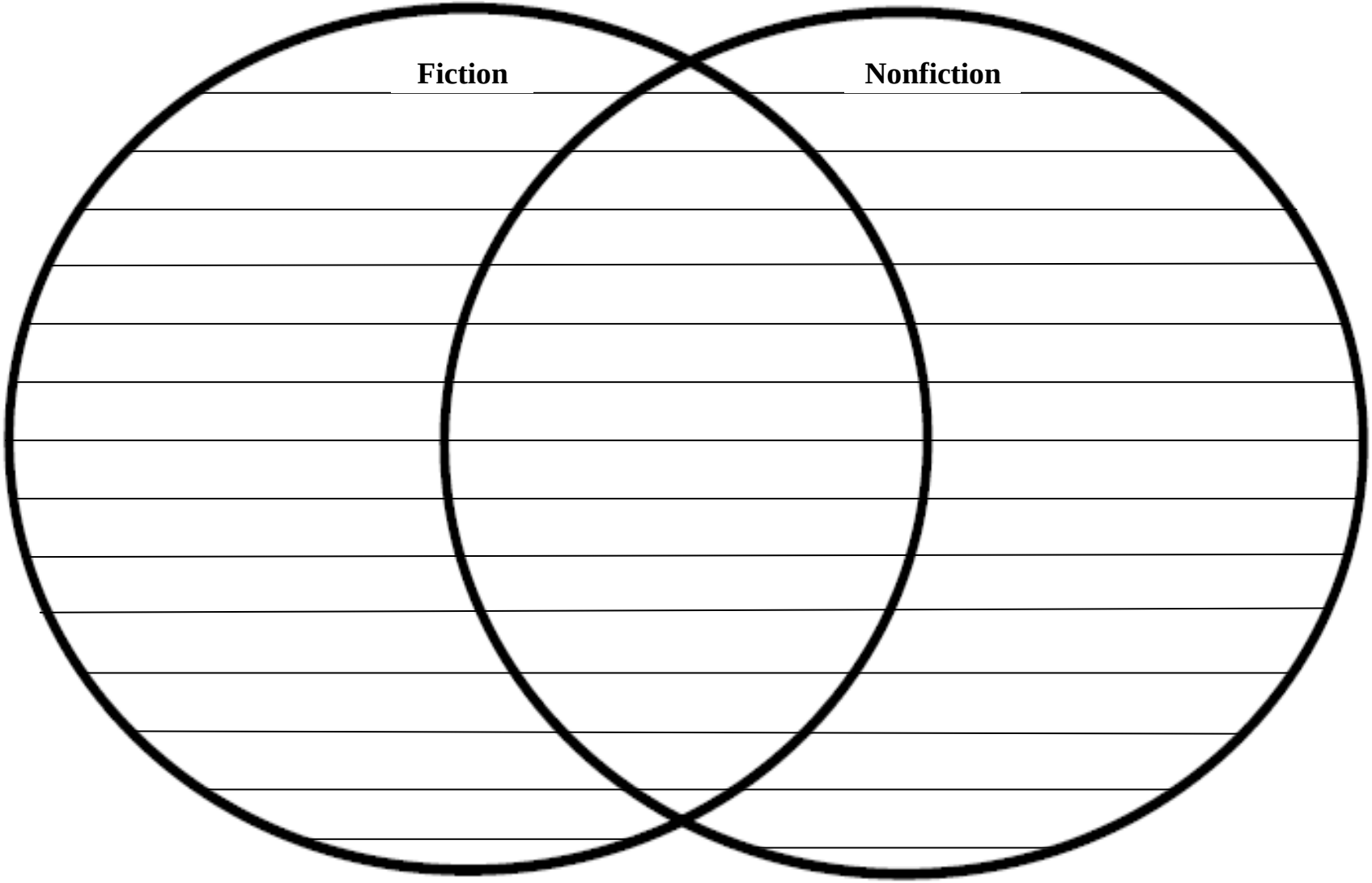
Name: _____

Fiction and Nonfiction T-Table – Student Sheet

Fiction	Nonfiction

Name: _____

Fiction / Nonfiction Venn Diagram – Student Sheet



Virginia Animals and their Habitats

Topic 2

How Do Scientists Classify Animals?

TOPIC 2 – How Do Scientists Classify Animals?

Topic 2: Overall Information

Overview

In this group of lessons students will explore the different characteristics scientists use to classify animals.

Topic 2 Virginia SOL

Science	English	Mathematics	History & Social Science
2.1 a, b, c, d, h, i, j, k, l, m 2.5 a, b	2.2 a, b, c, e 2.3 a, b, c 2.6 2.7 d, e 2.8 2.9 2.10 2.12 a, c, d 2.14	2.5 2.6 2.7 2.8 2.9 2.17 2.19	2.5 2.6

Teacher Background Knowledge

- Six different classifications of animals will be studied. They are mammal, reptile, amphibian, bird, fish, and insect. (These are not terms that second-grade students are expected to memorize.)
- Mammals are warm-blooded, have hair or fur, give birth to live young (except the platypus and echidna), and nurse their young.
- Reptiles are cold-blooded, have scales, and lay eggs or give birth to live young.
- Amphibians are cold-blooded, have skin, lay eggs, and go through metamorphosis.
- Birds are warm-blooded, have feathers, wings, beaks, and lay eggs.
- Fish live in the water and have gills instead of lungs.
- Insects have six legs and 3 body parts.
- Virginia is home to 85 species of mammals, 61 species of reptiles, 74 species of amphibians, 374 species of birds, 210 species of freshwater fish, and over 10,000 species of insects and other invertebrates. (Statistics from the Virginia Department of Game and Inland Fisheries, http://www.dgif.virginia.gov/wildlife/)
- The Appalachian Mountains, the James River, and the Atlantic Ocean are geographic features of Virginia. The location of each of these features will be identified on a Virginia map.
- A cinquain is a poem of five lines. There are variations to the specific format. The following cinquain format will be used with Topic 2 to help the students picture content material as a strategy for comprehension.
    - The first line is one word: the subject
    - The second line is two words: adjectives describing the subject

    - The third line is three words: -ing verbs describing actions of the subject
    - The fourth line is two words: adjectives or adverbs describing the subject
    - The final line is one word: a synonym for the subject
- Bar and picture graphs are tools that will be constructed using data collected during Topic 2. The data will then be interpreted by students.

Student Learning Expectations

- Use and understand the key science terms: mammal, reptile, amphibian, bird, fish, and insect. (These are not terms that second-grade students are expected to memorize.)
- Utilize observation skills to collect data and draw conclusions.
- Sort and classify animals by their characteristics into groups.
- Construct bar and picture graphs using a key and scale.
- Write a cinquain about an animal.
- Label a Virginia map that includes a title, a compass rose, a map key, and the features a) Appalachian Mountains, b) James River, and c) the Atlantic Ocean.
- Utilize a table of contents, glossary, and index when reading nonfiction selections.

Procedure

NOTE: The procedures in the topic sessions may be divided into several different lesson periods. Each session may take more than one lesson period to complete.

Topic 2: Session 2.1 – Animal Sorting

Session Supplies:

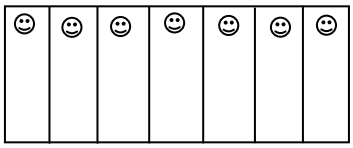
- *Animal Reading Response* sheet (pg. 18) – this page will be used again with Topic 2, Session 2.3
- Teacher-made seven-column chart prepared on chart or bulletin board paper (this chart will be used throughout the unit)
- *Animal Labels – With Pictures* (pg. 20-23) for each of the animal groups (i.e., mammal, reptile, amphibian, bird, fish, and insect)
- *Animal Labels – No Pictures* (pg. 24-27) for each of the animal groups (i.e., mammal, reptile, amphibian, bird, fish, and insect)
- A teacher-selected book that is a fiction book but also contains factual information about wetlands
- Minimum of two sticky notes per student
- *Virginia Animals Brainstorming Graphic Organizer* sheet (pg. 19) (This page will be used again in Topic 2, Session 2.7)

Session Virginia SOL

Science	English	Mathematics	History & Social Science
2.1 a, b, c, d, h, i, j, k, m	2.2 a, c, e 2.3 a, b, c 2.8 2.9 2.12 a		

An excellent resource for more information about wetlands can be found on the New Hampshire Fish and Game Department (NHFGD) Web site at http://www.wildnh.com/Kids/kids.htm, *Wetlands* Vol. 8, Issue 1. *Wild Times for Kids* is published twice a year by the NHFGD. The magazine can be downloaded.

Session 2.1 – Animal Sorting

Teacher Questions & Notes	Procedures
Sample Seven-Column Chart 	*Prior to the lesson, make a seven-column chart (using chart or bulletin board paper). You will also need a picture of each animal group (these will be added to the chart during the lesson). The "Animal Labels – with Pictures" and the "Animal Labels – No Pictures" sheets can be found at the end of this Session. You may decide which labels you wish to use based on your students.*
-Would you find factual information about Virginia animals in a fiction or nonfiction book? -Can you find factual information in a fiction book?	1. Explain to students that we have already discussed fiction and nonfiction books. Today we are going to explore information about animals that live in Virginia.
Prior to reading ask: -What is a wetland?	2. Show the students the teacher-selected book that is a fiction book but also contains factual information about wetlands. 3. Tell them that this is a fiction book that contains factual

Session 2.1 – Animal Sorting

Teacher Questions & Notes	Procedures
	information about a wetland. 4. Have students respond to the top two statements on the *Animal Reading Response* sheet that will be put into their journal or have students set up a page in their journal that looks like the *Reading Response* sheet.
After reading ask: -What did we find out about wetlands in this book? -Is the information about wetlands in the book fiction or nonfiction? -What is another name for a wetland? -What are some of the animals that the book described as living in a wetland? -Why is it important to save the marshy, soggy places in the wetlands?	5. Read aloud the first few pages of the teacher-selected book on wetlands.
-What other types of animals do you think might live in a wetland?	6. List student responses on the board.
	7. Finish reading the book. *8.* Have the students respond to the two remaining statements on the *Animal Reading Response* sheet (pg. 18). *(This sheet will be used again for Topic 2, Session 2.4.)* *9.* Discuss the changes in the student responses on the *Animal Reading Response* sheet before the book was read and after it was read.
-What other animals live in the wetlands?	10. After reading, add any additional animals to the list on the board.
	11. Have each student brainstorm a list of animals that live in Virginia using the *Virginia Animals Brainstorming Graphic Organizer* sheet (pg. 19). (This page will be used again in Topic 2, Session 2.7. In lieu of using the sheet, students can write their list in their journal.)
	12. Have students turn and talk with a partner to compare their lists.
	13. Have each student choose two animals and write them on separate sticky notes.

Session 2.1 – Animal Sorting

Teacher Questions & Notes	Procedures
	14. Put a picture of a mammal on the pre-made seven-column chart. 15. Ask the students, "Who thinks their animals are like this animal?" Have students place their sticky notes on the chart below the mammal picture. 16. Repeat for each of the remaining animal groups (i.e., fish, bird, reptile, amphibian, and insect) 17. If there are any animals that don't fit into the above categories after sorting, give students a chance to figure out where the animal may go.
-Let's look at the animals under each picture. What do these animals have in common? -What common name could we give to this group of animals? (repeat for each group)	18. Discuss common characteristics of each group. 19. Record characteristics on the chart. 20. Guide students to correct any sorting errors. For any animal that does not fit within the six groups, create an "other" column. (e.g., If a student chooses a spider or an earthworm, it would go into the "other" category.) 21. Label each animal group with its correct name. 22. Save the seven-column animal chart that you have made for use with Topic 2, Session 2.4.

Additional pictures of Virginia species may be found in the ***Virginia Wildlife*** magazine or calendar. Every Virginia public school library receives the ***Virginia Wildlife*** magazine each month.

Your school library and school librarian are great resources for identifying the books that will be used with your students.

For additional information about wetland wildlife and the importance of wetlands, read the background information in the Project WILD Aquatic activities *"Marsh Munchers"* (pg. 34) and " *Wetland Metaphors*" (pg. 39).

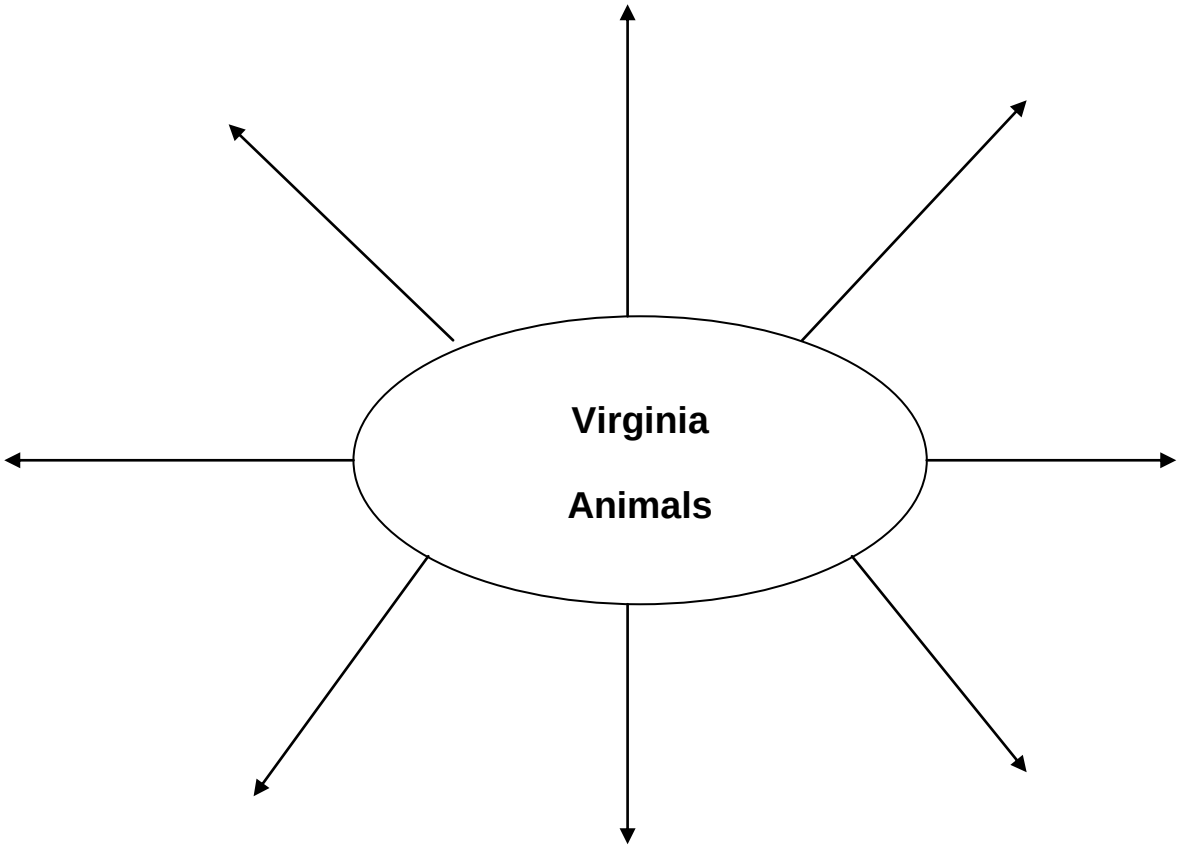
Animal Reading Response – Student Sheet **Name:** _____

I know . . .	**I expect to learn . . .**
I learned . . .	**What new questions I have . . .**

Name: _____

Virginia Animals Brainstorming Graphic Organizer – Student Sheet

Use the graphic organizer below to list Virginia animals. You may add as many arrows as you need.



Mammals

Gray Squirrel
(Jeff Trollinger, VA Dept. of Game & Inland Fisheries)
http://www.dgif.virginia.gov/wildlife/information/?s=050057

Reptiles

Eastern Box Turtle
(John White, VA Dept. of Game & Inland Fisheries)
http://www.dgif.virginia.gov/wildlife/information/?s=030068

Birds

Osprey
(VA Dept. of Game & Inland Fisheries)
http://www.dgif.virginia.gov/wildlife/birds/raptors/

Amphibians

American Toad
(John White, VA Dept. of Game & Inland Fisheries)
http://www.dgif.virginia.gov/wildlife/information/?s=020059

Fish

Largemouth Bass
(VA Dept. of Game & Inland Fisheries)
http://www.dgif.virginia.gov/wildlife/fish/details.asp?fish=010188

Insects

Prince Basket tail
(David Arbour, USDA Forest Service)
https://www.notes.fs.fed.us/wo/wfrp/find_a_photo.nsf/findphoto.nsf/photo/8582A1FAB0BBA64185257CED05F5E74?OpenDocument

Other Animals

Argiope Spider
(David Arbour, USDA Forest Service)
https://www.notes.fs.fed.us/wo/wfrp/find_a_photo.nsf/findphoto.nsf/photo/BD08DF386BAB223A852570CA006D2819?OpenDocument

Mammals

Reptiles

Birds

Amphibians

Fish

Insects

Other Animals...

Animal Labels – Just Pictures

Gray Squirrel
(Jeff Trollinger, VA Dept. of Game & Inland Fisheries)
http://www.dgif.virginia.gov/wildlife/information/?s=050057

Eastern Box Turtle
(John White, VA Dept. of Game & Inland Fisheries)
http://www.dgif.virginia.gov/wildlife/information/?s=030068

Osprey
(VA Dept. of Game & Inland Fisheries)
http://www.dgif.virginia.gov/wildlife/birds/raptors/

American Toad
(John White, VA Dept. of Game & Inland Fisheries)
http://www.dgif.virginia.gov/wildlife/information/?s=020059

Prince Baskettail
(David Arbour, USDA Forest Service)
https://www.notes.fs.fed.us/wo/wfrp/find_a_photo.nsf/findphoto.nsf/photo/8582A1FAB0BBA6418525670CE005F5E74?OpenDocument

Largemouth Bass
(VA Dept. of Game & Inland Fisheries)
http://www.dgif.virginia.gov/wildlife/fish/details.asp?fish=010188

Argiope Spider
(David Arbour, USDA Forest Service)
https://www.notes.fs.fed.us/wo/wfrp/find_a_photo.nsf/findphoto.nsf/photo/BD08DF386BAB223A852570CA006D2819?OpenDocument

Topic 2: Session 2.2 – Insects!

Session Supplies:

- Seven-column class animal chart from Topic 2, Session 2.1
- Insect Safari lesson plan (pg. 34) *[Used with permission from Ohio Department of Natural Resources, Ohio Division of Wildlife, 2045 Morse Rd., Bldg G, Columbus, OH 43229]* www.wildohio.com
- *Insect Safari* sheet (pg. 37) *[Used with permission from the Virginia Department of Game and Inland Fisheries, Headquarters, 4010 West Broad Street, P.O. Box 11104, Richmond, VA 23230]* www.dgif.virginia.gov (Students will use this sheet again in Session 3.)
- Small containers (e.g., empty pill bottles, plastic baby food jars) or bug boxes
- Small paint brushes
- Sweep net (directions for making a simple sweep net can be found on pg. 33)
- Magnifying glasses
- Optional: Insects of Great Sand Dunes Insect Workbook, (pg. 39-46) National Park Service, Great Sand Dunes National Park and Preserve, *"Out of the Blue"* Elementary Teacher Lesson Plans *[Used with permission from Great Sand Dunes National Park and Preserve , 11500 Hwy 150 Mosca, CO 81146]* http://www.nps.gov/archive/grsa/resources/curriculum/docs/insect_booklet_3_6.pdf
- Directions for putting together the Insects of Great Sand Dunes Insect Workbook can be found on pg. 38

Session Virginia SOL

Science	English	Mathematics	History & Social Science
2.1 a, b, c, d, h, i, j, k, m 2.5 a, b	(If students make and use the book Insects of Great Sand Dunes) 2.6 2.7 d, e 2.9 c, d, e, f 2.10 b	2.5 2.6 2.7 2.8 2.9 2.17 2.19	

An excellent resource about insects can be found on the New Hampshire Fish and Game Department (NHFGD) Web site at http://www.wildnh.com/Kids/kids.htm, *Amazing Insects* Vol. 5, Issue 1. *Wild Times for Kids* is published twice a year by the NHFGD. The magazine can be downloaded.

Session 2.2 – Insects!

Teacher Questions & Notes	Procedures
Prior to discussion ask: -What were the six classifications of animals that we discussed previously? -What were some of the characteristics of each group?	1. Review the seven-column animal chart from Topic 2, Session 2.1.
-What does this graph tell us? -Which group has the most examples? The least examples? -How many more _____ than _____? -How many amphibians and reptiles	2. Create a bar graph using the sticky notes from the animal chart. 3. Add a title, labels, and a key to the class bar graph.

Session 2.2 – Insects!

Teacher Questions & Notes	Procedures
do we have all together?	
	4. Refer to the insect category on the seven-column animal chart and review characteristics of insects. Tell students that the class will be looking for examples of the insect family. a. Complete the Insect Safari lesson plan (pg. 34). *NOTE: If you do not have access to long handled, fine mesh nets for sweeping insects that is mentioned on pg. 35, you can make sweep nets following the directions found on pg. 33.* b. After students collect their insects with a partner, each student will choose one insect to observe and record information about it on the *Insect Safari* sheet. Make sure that the students record information about the color of their insects. This information will be used for Topic 2, Session 2.3.
-What do you notice about our groups? -What color is your insect? -Does your insect have wings? -Does anyone else have an insect that is similar?	5. As a class, guide students to group their insects according to similar characteristics. 6. After students are finished, the insects should be released unharmed.
	7. Use the data gathered to pose informal problem-solving scenarios such as: a. If one insect has two antennae, then how many antennae do three of that type of insect have? How do you know? b. How many legs does each insect have? (six) If one insect has six legs, how many legs would four of the same species of insect have? (24) Show how you know.
	8. Refer to the questions in the Insect Safari lesson plan for closure. Have students place the *Insect Safari* sheet in their journals when they return to the classroom. Students will use the *Insect Safari* sheet again in Topic 2, Session 2.3.
	9. OPTIONAL: Have students make the Insects of the Great Sand

Session 2.2 – Insects!

Teacher Questions & Notes	Procedures
	Dunes Insect Workbook (pg. 39-46). Directions for assembly of the book are located on pg. 38. Completion of the booklet may take several work sessions. You may also read the selections from the book and have students complete selected sections of the book.

The Project WILD activity "*Color Crazy" (p.2) will* provide additional background on how animals such as insects use color.

Directions to Make a Sweep Net

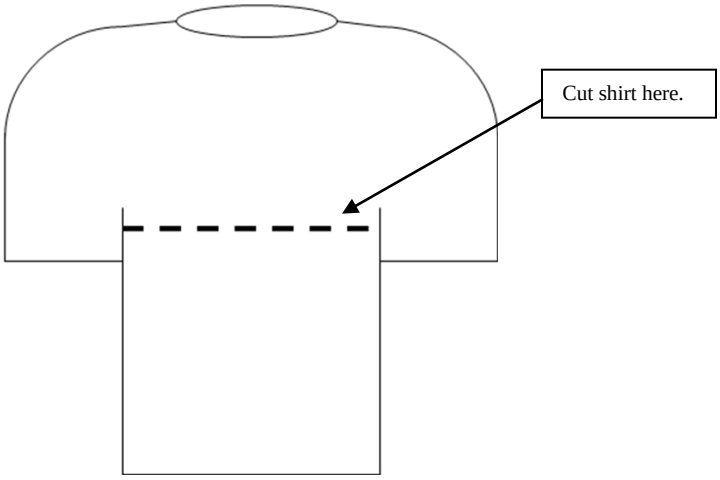
A sweep net can be used to collect insects. A sweep net can be made from an old, large, white, tee shirt and a coat hanger. You can make a few sweep nets for class use or you can have adult volunteers make them.

SUPPLIES NEEDED:
(for each sweep net)

1 old, large, white, tee shirt (shirt should not have any holes)
1 wire hanger
1 pair of pliers to bend the hanger
1 large sewing needle
Heavy duty thread for sewing
Duct tape

Directions:

1. Cut the tee shirt across just below the shirt armpits (see picture)



2. Make a small cut in the hem on the bottom of the shirt.
3. Unbend the hanger.
4. Thread the hanger through the hem.
5. When the hanger is threaded through the entire hem of the shirt, retwist the ends of the wire hanger. This will become the handle of your sweep net.
6. Cover the end of the wire hanger that is now the handle with duct tape to cover any sharp edges.
7. With the needle and thread, sew the other end of the shirt (the cut end) shut.
8. You now have a sweep net to use for specimen collections.

Insect Safari Lesson Plans

Insect Safari

Learning objectives: Students will be able to: 1) describe the relationship between insect structure and function and 2) recognize that wildlife includes both small and large animals in a variety of forms.

Method: Students will explore the school site for insects.

Background:
Wildlife is diverse. Wild animals occur in a variety of forms that help them exist in a wide variety of habitats. Many people only think of familiar birds and mammals as wildlife. Wildlife, however, includes fish, reptiles, and amphibians. Wildlife also includes insects, spiders, worms and invertebrates.

In a number of species and by actual count, insects far exceed all other groups of animals. Ants, grasshoppers, dragonflies, sow bugs and other crawling and flying "bugs' come in a tremendous variety of forms, and exist in almost every imaginable habitat, including every school site in the world.

From school building windows and cracks in the sidewalk, to grassy fields and the open air, insects are everywhere.

Wildlife diversity refers to the number of different kinds of wild animals living in an area. One way to assess the general environmental quality of an area is to evaluate its ability to support a variety of wildlife. The more diverse the habitat, the more likely different kinds of wildlife can live there. By examining the diversity of insects collected at different locations on the school site, some relationships between insect diversity, habitat diversity and how each depends on and interacts with the other can be inferred.

By collecting and examining insects from a variety of places on and around the school site, students begin to appreciate the concept of diversity and the variety of form and related functions among the insects.

Materials:
Students might begin by examining micro-habitats with the classroom or school building. Even in the cleanest building you can usually find evidence of living or dead insects. Look around baseboards, in corners, around light fixtures, and behind books and other items on shelves for moths, ants, flies and other insects.

Any living insects can be gently swept into a temporary container using a small paint brush.

Keep a record of where each insect was found.

Collecting insects out-of-doors can be as simple as a hands and knees inspection of any piece of lawn, a bush, or the bark of a tree. A plastic container can be used to scoop up and discovery for closer examination.

Catching flying insects with a butterfly net is more difficult then it appears. A sweep net is a much more efficient method of collecting a large number and wide variety of insects. Flies, moths, ladybugs, leaf hoppers, and gnats are some of the insects that can be easily collected using this equipment.

A long-handled, fine mesh net is swept back and forth just brushing the top of grass or weeds. The idea is to sweep any insects buzzing around and among the grass and weeds into the net. After 15 or 20 swipes, swing the net around swiftly above your head to concentrate the animals. Then grasp the top of the net to form a bag and to keep them from escaping.

Collected insects can be transferred for closer inspection into smaller plastic bags.

Larger insects like crickets and grasshoppers can be collected by hand and transferred to plastic bags or jars. A sheet of plastic pulled to the ground by two students usually traps grasshoppers safely.

While sweeping is a great way to catch many flying and hopping insects, small beetles, sow bugs and other low to the ground insects that are not usually captured in sweep nets can be added to your collection using pitfall traps.

Pill bottles, small juice cans or similar containers can be placed in holes in the ground the same size as the container. Small holes are punched or drilled into the bottom of the trap to let water drain.

Place a little bait such as candy crumbs, meat, or peanut butter at the bottom on the trap. Traps should be left for at least eight hours or overnight. Insects captured in the pitfall traps are then transferred to the containers for comparisons with insects captured earlier.

Once your collecting safari is complete, suggest to the students that they should describe and compare their collection as if these insects have been discovered for the first time.

The following questions can be used to help guide their inquiry:

- What are the most prominent features (body parts) of each insect? What do they appear to be used for?
- Does the insect have wings? How many? How are they attached to the body?
- Can you locate a mouth? What foods does the mouth seem suitable for?
- Where are the eyes located? How many? Are they like the eyes of mammals? How are they different?

- Does the insect have antennae? What do you think the antennae are used for?
- How many legs does the insect have? Does it hop, walk, run or climb?
- Describe the color of each insect. Do you think the color helps the insect survive?
- Where did you collect the insect? What form and function observations have you made that you can link to the place the insect was found?

Finally, talk about the diversity among the animals you've examined. How does the wide variety of forms help these animals survive and be successful?

NOTE: When you are through studying the insects, they should be released. Care should be taken to ensure survival. Temperature and moisture should be monitored.

Be prepared, however, for the few insects that will likely not survive. Deal with this dilemma on a case-by-case basis. Encourage the students to be careful with living organisms but not feel guilty if a few insects die.

Extension:
Larger flying insects like grasshoppers can be easily captured with a plastic sheet. A team of four each takes a corner of a 30-inch by 60-inch piece of clear plastic. The team walks through the grass and quickly pulls the sheet down trapping all the insects below. Larger insects will appear against the plastic as they try to escape.

Project WILD Connection:
The following Project WILD activities provide additional background information and enhance or supplement this activity
Ants on a Twig -- K-12 Guide, page 88
Grasshopper Gravity -- K-12 Guide, page 4

Activity reprinted with permission from *Twenty / Twenty; Projects and Activities for WILD School Sites,* Ohio Division of Wildlife.
For information about Virginia's WILD School Sites program visit
www.dgif.virginia.gov/education

Insect Safari – Student Sheet

Insects !

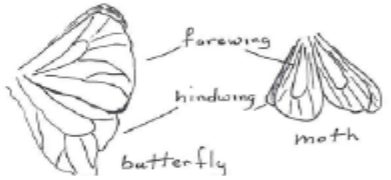
Name: _____

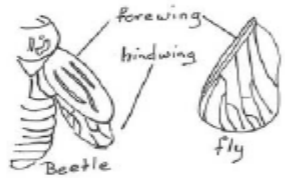
Mouth Parts

Draw your insect here

Leg Kinds

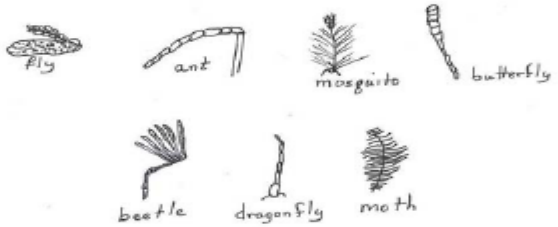
Wing Types





WORD BOX

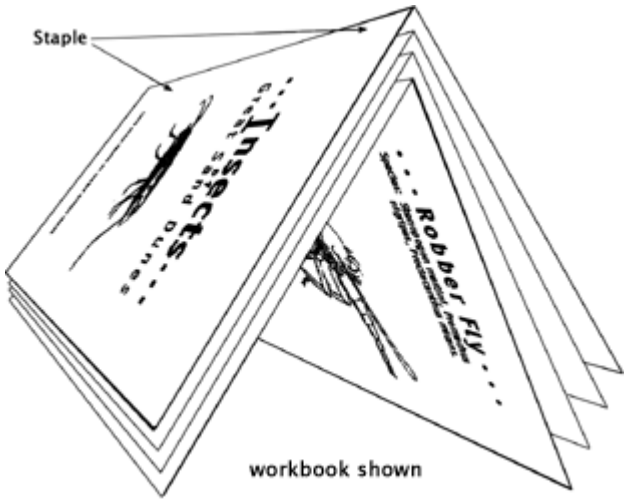
Antennae



Virginia Department of Game and Inland Fisheries 2008

Directions to Put Together the Insect Workbook

Step 1: For each student, prepare one copy of the Insect Workbook. This printable file is designed to be printed back-to-back, folded, and stapled in proper order; Page 2 is printed on the back of page 1, page 4 is printed on the back of page 3; etc. Use the diagram below to assist with production of Great Sand Dunes' insect booklets. You may wish to print each sheet out and then use a photocopier to collate the booklets.



Step 2: Provide each student one workbook. Older students will have the chance to invent their own insect. Provide students drawing and coloring materials.

Step 3: Once completed, post workbooks on a bulletin board so that students can see the variety of invented insects (booklet, page 14). Afterward, students who are interested may present their invented insect to the class. Be sure they describe how their insects' specialized parts are used in the way they live/eat.

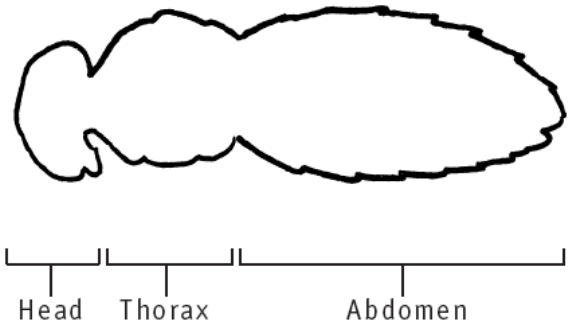
...Insects...
of
Great Sand Dunes

Great Sand Dunes...Insects...

• • • Insect Basics • • •

Over one thousand different kinds of insects live at Great Sand Dunes. Some live in the sand, some climb in the trees, some swim in the water, and some wander on the mountaintops in search of food.

Insects are closely related to shrimp, crabs, lobsters, spiders, and mites. All of these have segmented bodies. Scientists call these animals arthropods (arthro = jointed, pods = feet).



Insects have three main parts: head, thorax, and abdomen. The head contains the mouth, sensory organs, eyes, and brain. The thorax operates an insect's six legs and wings. The abdomen provides digestive, excretory, reproductive, and breathing abilities.

Convert this body into your favorite insect.

• • • _____ • • •

Insect Name

_____

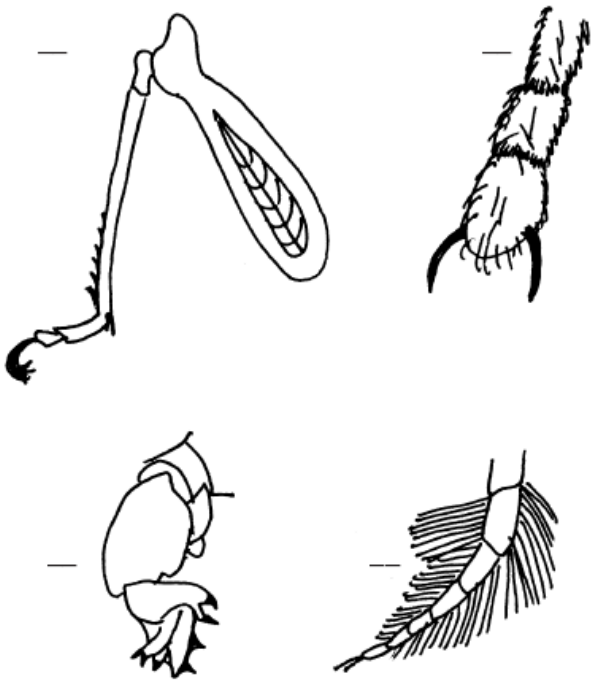
Scientific Name

Using the knowledge that you have gained through this workbook, create your own insect. It must have the following features: head, thorax, abdomen, six legs, one pair of antenna, a mouth, two eyes, two or four wings, and either camouflage or warning coloration.

Habitat: _____

Foods: _____

• • • Leg Kinds • • •



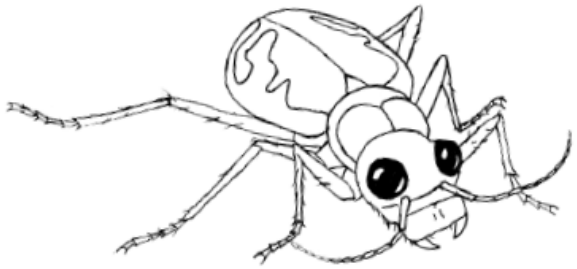
Leg Purposes:
A) climbing, B) jumping, C) swimming, D) digging

-13-

Match the leg with its purpose.

• • • Great Sand Dunes • • • Tiger Beetle

Cicindela theatina



Found only at Great Sand Dunes, this tiger beetle has an irridescent (sparklely and shiny) coloration. Color this insect's head and thorax greenish-blue. The middle part of this beetle's forewings should be colored greenish-brown (hint: see page 11).

-2-

• • • Great Sand Dunes • • •
Darkling

Eleodes hirtipennis

This scavenger beetle searches for fallen leaves and plant parts in the dunes. Draw a dune habitat around this insect.

-3-

• • • Mouth Parts • • •

__grasshopper or beetle

__fly

__mosquito

__butterfly

Feeding Types:
A) piercing and sucking, B) biting and chewing, C) siphoning, D) sponging

Match the feeding type with the insect.

-12-

• • • Wing Types • • •

Insects use wing coloration and pattern for camouflage and warning. Color examples of camouflage and warning above.

-11-

• • Giant Sand-treader • •
Camel Cricket

Daihinibaenetes giganteus

This special species of camel cricket has hind legs that are perfectly designed for digging and burrowing in the sand. Draw a night time dune scene around this nocturnal cricket.

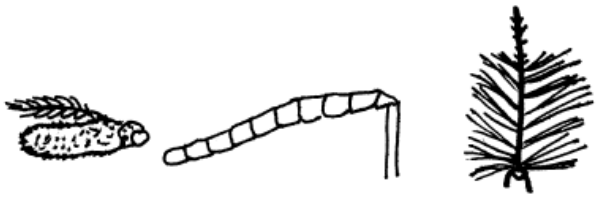
-4-

• • • Ten-lined • • •
June Beetle

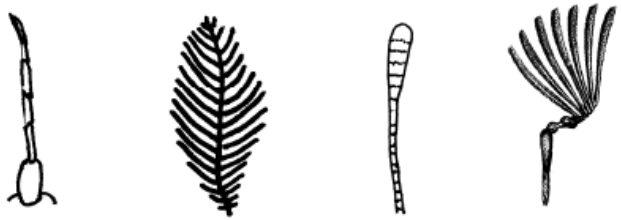
Polyphylla decimlineata

Draw this greenish June beetle feeding on plants within the dunes.

• • • Antennae • • •
Guess



fly ant mosquito



dragonfly moth butterfly beetle

Insect antennae differ greatly in size and shape, but they all perform simlarly. The antenna's main functions are to feel or touch and to smell. Some are even used to hear.

Think about why the antennae above are shaped the way they are, so that when you invent your own insect on page 14, your insect's antenna will be shaped in a way that helps it survive.

• • • Red Velvet-Ant • • •

Dasymutilla sp.

Velvet-ants are actually wasps. Females lack wings. Draw this velvet-ant seaching for nectar from a flower.

-6-

• • • Grasshoppers • • •

When in flight, the hind wings show a burst of color. While at rest, this grasshopper's coloration and pattern provide camouflage. Show this grasshopper escaping from a predator.

-9-

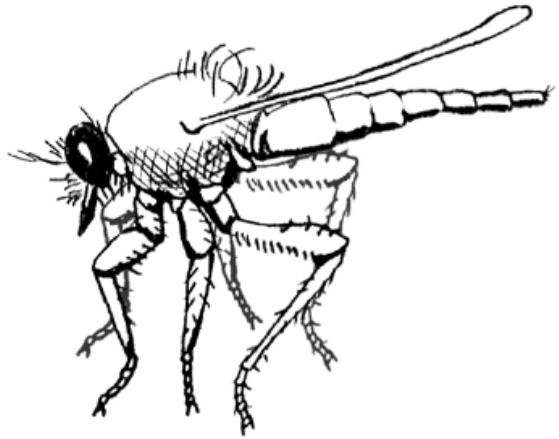
• • • Sand Wasp • • •

Species: *Bembix pruinosa, Bembix americana spinolae, Microbembix monodontaix*

Sand wasps lay their eggs in holes that they dig. Show this one digging a hole in the sand.

• • • Robber Fly • • •

Species: *Stenopogon martini, Promachus nigripes, Proctacanthus micans*



Robber flies are fierce predators. Draw a prey insect in its clutches.

Topic 2: Session 2.3 – Insect Math

Session Supplies:

- *Insect Safari* sheet from Topic 2, Session 2.2 (pg. 37)
- *Graphing Sheet* (pg. 49)
- Strips of paper cut ahead of time – approximately four strips per 8" X 11" piece of paper (Each team of two students will need four strips of paper.)

Session Virginia SOL

Science	English	Mathematics	History & Social Science
2.1 a, h, i	2.7 e	2.5 2.6 2.7 2.8 2.9 2.17 2.19	

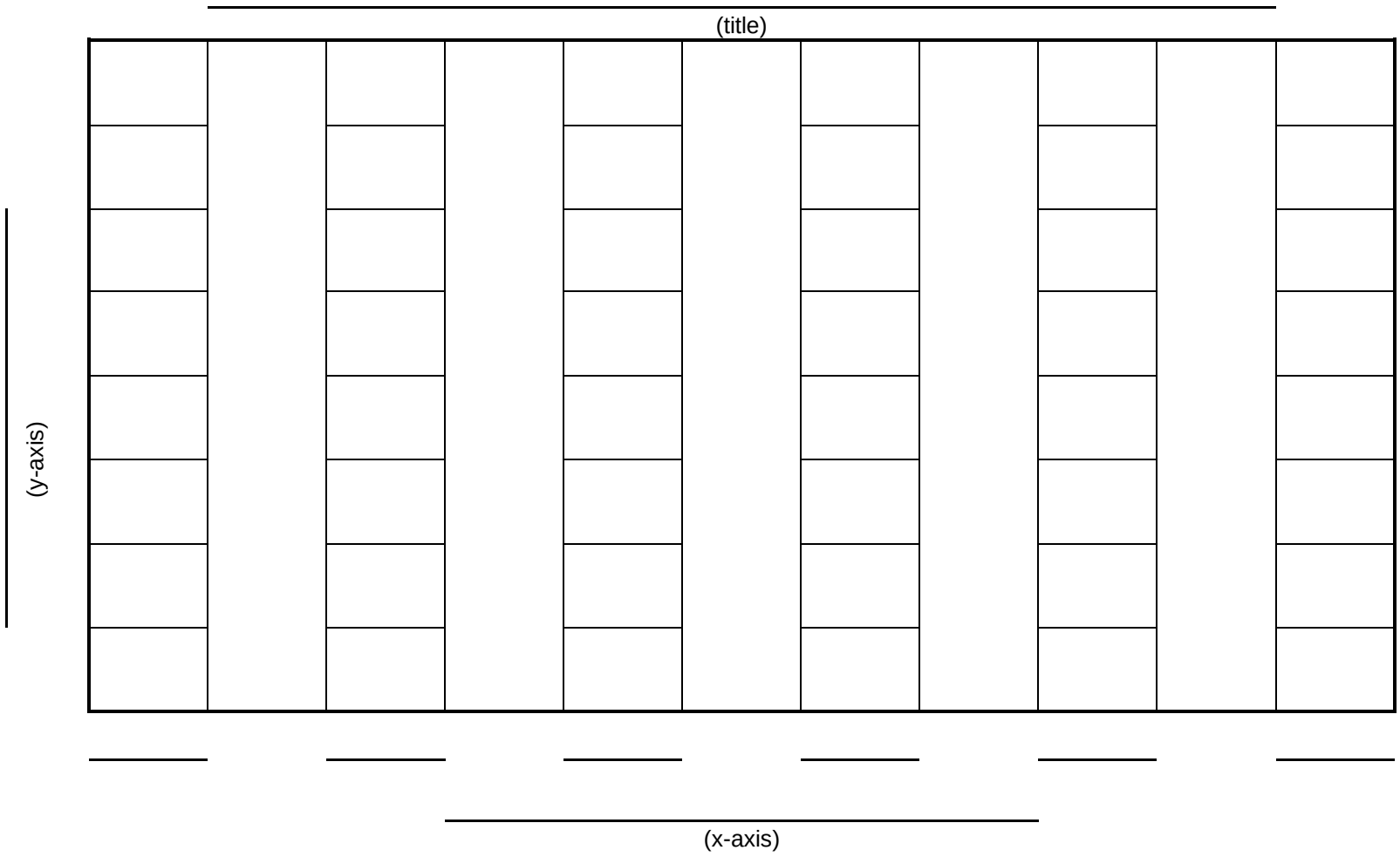
Session 2.3 – Insect Math

Teacher Questions & Notes	Procedures
	1. Refer back to the *Insect Safari* sheet (pg. 37) from Topic 2, Session 2.2.
	2. Use tallies to record class data on insect colors.
-What information do you need to include in your graph of insect colors?	3. Have each student use the data to create a bar graph of insect colors using the *Graphing Sheet* (pg. 49). Students can then put their graph in their journals.
	4. Together create a bar graph on the board or using an overhead projector. Have students compare their individual graphs to the class graph and make changes if necessary.
-What does your graph tell you?	5. Divide the students into two-person teams. 6. Give each team of students four precut strips of paper. 7. Have students write a word problem on each separate strip of paper using information for the word problems from the class graph. a. Students create addition and subtraction problems with a partner. b. Each team will share their problems with the class. c. Select a few problems to solve emphasizing problem solving

Session 2.3 – Insect Math	
Teacher Questions & Notes	**Procedures**
	strategies. d. Gather the problems to create a class word problem book.

Name: _____

Graphing Sheet – Student Sheet



Topic 2: Session 2.4 – Animal Poetry Introduction

Session Supplies:

- Teacher-selected book on wetlands that was read during Topic 2, Session 2.1
- *Cinquain Brainstorming* sheet (pg. 52) (This page will be used again for Topic 2, Session 2.5.)
- *Animal Reading Response* sheet from Topic 2, Session 2.1 (pg. 18)

Session Virginia SOL

Science	English	Mathematics	History & Social Science
2.1 k	2.2 a, b, c, e 2.3 a, b 2.7 d, e 2.12 a, c, d		

Session 2.4 – Animal Poetry Introduction

Teacher Questions & Notes	Procedures
	1. Refer students to the teacher-selected book on wetlands that was read during Topic 2, Session 2.1. 2. Review with the students their responses to the bottom two statements on the *Animal Reading Response* sheet (pg. 18). 3. Select a section in the book about one of the animals it describes. a. Ask students to close their eyes while you reread the page(s) about the animal you chose. b. Tell the students to picture the animal in its habitat, and listen for the describing words as you read the selected passage.
-What animal was described? -What words were used to describe the animal(s)?	4. List the animal and the describing words on the board. 5. If you have time, do the same thing with other selections in the book.
-What rhyming words could you use to describe the animal and its habitat? -What kind of writing uses rhyming words? -Does all poetry rhyme?	6. Introduce the cinquain poem. 7. Read an example of a cinquain. Hawk Large, Strong Soaring, Diving, Twisting Beautiful in the sky Bird

Session 2.4 – Animal Poetry Introduction

Teacher Questions & Notes	Procedures
	8. Model and write a class cinquain using the animal and describing words from the class book. 9. Have each student select an animal that they will write a cinquain about. Students can look at the seven-column chart that was made by the class during Topic 2, Session 2.1 to get an idea for an animal if they are unsure what animal to select.
	10. Begin to prepare students to write a cinquain in the next session. To prepare for writing the cinquain, have students brainstorm and organize their ideas in their journal. Use the *Cinquain Brainstorming* sheet (pg. 52). (This page will be used again in Topic 2, Session 2.5.)

"Animal Poetry" (pg. 282) is a Project WILD activity that use poetry as a method to learn about the environment. *"Water Wings"* (pg. 110) is another activity that uses poetry and can be found in Project WILD Aquatic.

Name: _____

Cinquain Brainstorming – Student Sheet

Adjectives that describe your animal:	Verbs ending in –ing that describe your animal:
A short phrase that describes your animal:	Other names for you animal:

_____
(Your Animal Name)

Topic 2: Session 2.5 – Animal Poetry Work Session

Session Supplies:

- *Cinquain Brainstorming* sheet (pg. 52) from Topic 2, Session 2.4
- *Cinquain Draft* sheet (pg. 54)

Session Virginia SOL

Science	English	Mathematics	History & Social Science
2.1 k	2.2 a, b, c, e 2.7 d, e 2.12 a, c, d		

Session 2.5 – Animal Poetry Work Session

Teacher Questions & Notes	Procedures
	1. Read the example below of a cinquain poem. Snake Long, Thin Slithering, Coiling, Sunbathing Hiding in the grass Reptile
	2. Have students refer to the *Cinquain Brainstorming* sheet (pg. 52) in their journal. 3. Have students write a draft of a cinquain using the *Cinquain Draft* sheet (pg. 54).

Name: _____

Cinquain Draft – Student Sheet

_____
(Subject)

_____ _____
(Adjective) (Adjective)

_____ _____ _____
(-ing Verb) (-ing Verb) (-ing Verb)

_____
(A short phrase that describes your subject)

_____
(Synonym for the Subject)

Topic 2: Session 2.6 – Animal Poetry Completion

Session Supplies:

- *Animal Cinquain Final Copy* sheet (pg. 56)

Session Virginia SOL

Science	English	Mathematics	History & Social Science
2.1 k	2.2 a, b, c, e 2.6 a, d 2.7 e 2.12 d		

Session 2.6 – Animal Poetry Completion

Teacher Questions & Notes	Procedures
	1. Pair students with a buddy to read and edit each other's cinquain and provide suggestions for improvement, if needed.
	2. Have students write and illustrate the final copy of their cinquain on the *Animal Cinquain Final Copy* sheet (pg. 56).
	Suggested Extensions 3. Make a class book using the student cinquains. The book may be placed in the classroom library for students to reread later. 4. Students may write cinquains about other familiar objects. 5. Students may write a different type of poem about the animal they chose for their cinquain.

Name: _____

Animal Cinquain Final Copy – Student Sheet

_____

_____ _____

_____ _____ _____

_____

_____

Topic 2: Session 2.7 – Student Team Project Introduction

Session Supplies:

- *Virginia Animals Brainstorming Graphic Organizer* sheet (pg. 19) from Topic 2, Session 2.1
- Large Virginia map with as few details on it as possible (source of possible map to use is http://www.dgif.virginia.gov/education/sol/va-watersheds-bw.pdf)
- *Student Virginia Map* (pg. 61) – one copy per student team *[Used with permission from the Virginia Department of Game and Inland Fisheries, Headquarters, 4010 West Broad Street, P.O. Box 11104, Richmond, VA 23230]* www.dgif.virginia.gov
- Teacher directions for the team project – found in the *Unit Project Information, Appendix A* (pg. 234), at the end of the unit
- *Virginia Native Animals List* – list of a sampling of Virginia animals – found in the *Unit Project Information, Appendix A* (pg. 237), at the end of the unit
- Team project notebooks *(notebooks can be actual 3-ring binders or can be student-made)*
- Materials to decorate team project notebooks
- *Group Reflection* sheet – can be used at the end of every Group Project work session – found in the *Unit Project Information, Appendix A* (pg. 239), at the end of the unit and at the end of this session's directions (pg. 62)
- A collection of books on various Virginia animals
- *Virginia Wildlife* magazines from the school's library
- If computers are available for research, bookmark several Web sites where information about Virginia animals might be found

Session Virginia SOL

Science	English	Mathematics	History & Social Science
2.1 k, l, m	2.7 e 2.9 f 2.10 2.14		2.5 2.6

A good source of several different Virginia maps is the Virginia Department of Game and Inland Fisheries Web site. (http://www.dgif.virginia.gov/education/sol/watersheds.asp)

Session 2.7 – Student Team Project Introduction

Teacher Questions & Notes	Procedures
-Do all animals live in every part of Virginia? -Why is it important to know where an animal lives?	1. Have students refer to their list of Virginia animals in their journals that they generated on the *Virginia Animals Brainstorming Graphic Organizer* sheet (pg. 19) (from Topic 2, Session 2.1) and share the names of some examples of Virginia animals. .
-What do we need to add to our map?	2. Display a large outline of Virginia. (If you do not have a map of Virginia that is just an outline of the state, the outline can be drawn on chart paper, on the board, or using an overhead.).

Session 2.7 – Student Team Project Introduction

Teacher Questions & Notes	Procedures
	a. Add a title and a compass rose to the map. b. Have a student point out where he/she thinks the school is located in Virginia on the outline. c. Have students who disagree with the location use cardinal directions to direct the student to a more appropriate location on the outline. d. Use an actual Virginia state map to confirm the location of the school. e. Label your school's location on the outline map of Virginia.
-Using cardinal directions, tell me where the Atlantic Ocean is in relation to Virginia? -Starting from where we live, which direction would you go to reach the Appalachian Mountains? -Where is the James River located?	f. Review and label the locations of the Appalachian Mountains, the James River, and the Atlantic Ocean.
	PROJECT WORK TIME: 3. Introduce the unit project. a. Describe the overall project. *(Refer to the "Teacher Directions for Project" (pg. 234) found in Appendix A at the back of the unit.)* Explain that each team will select a Virginia animal that they will study for the next few weeks. b. Explain that by the end of this particular project work time each team will select the animal that the team will study for their project. Each team should also find information about where in Virginia their animal lives. c. Briefly describe the three project product components *(written report, visual product, and class presentation).* *NOTE: Descriptions of the three project components can be found in Appendix A:* *1) Virginia Animals and their Habitats Design Brief (pg. 235)* *2) Written Report Rubric (pg. 240)* *3) Visual Product Rubric (pg. 241)*

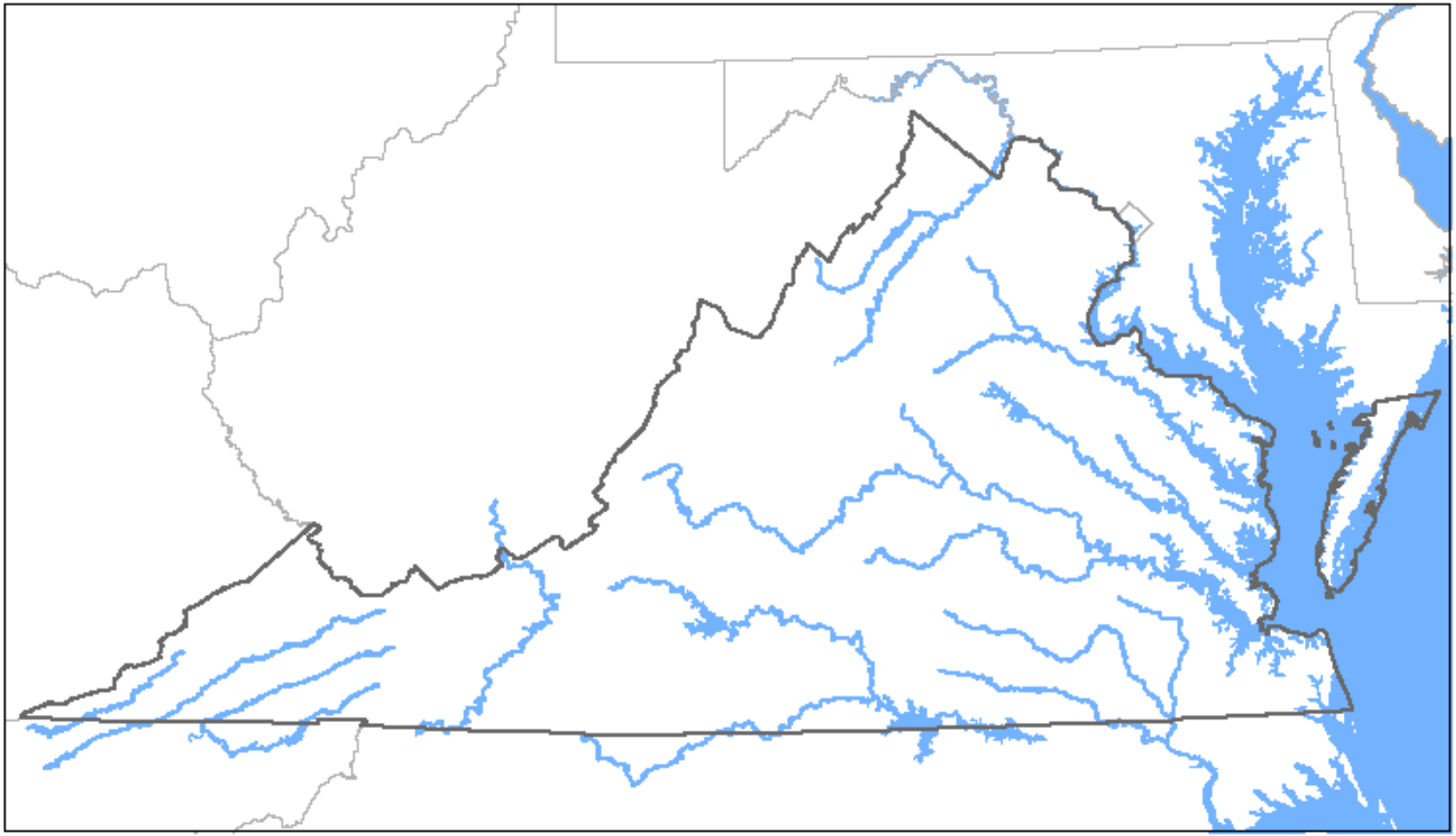
Session 2.7 – Student Team Project Introduction

Teacher Questions & Notes	Procedures
	4) Presentation Rubric (pg. 242) *DO NOT review the four documents above in detail with your students at this time. Each of the documents will be reviewed with the students at a later time in the unit.* d. Assign students to teams of three to four students per team. These groups are the student project teams. e. Give the project teams time to look at various books on different Virginia animals. Students can also look for animals at http://www.dgif.virginia.gov or other teacher preselected Web sites, or search through *Virginia Wildlife* magazines which can be found in the school library. f. Give the project teams time to discuss and come to a consensus about which animal their team will research for their project. g. Bring the class back together. List the selected animal for each team on a piece of chart paper. Display the chart in the classroom for the remainder of the unit. h. Using the Virginia map, help each group determine approximately where in Virginia their group's chosen animal lives. Discuss the fact that some animals can be found in every area of the state (e.g. whitetailed deer, bullfrogs). *(As student groups continue project work, they may narrow or expand the area in Virginia where their animal lives.)* i. Have students return to their teams. Each team needs to create a team notebook that will be used for organizing all project information and research results that will be gathered throughout their project. Help students organize their team project notebooks so that they have an introductory section for overall project documents (e.g., rubrics, design briefs), sections for each research topic (e.g., habitats, life cycles), sections for project products (e.g., report, presentation), and sections for any other items that relate to their project. j. Give teams time to decorate their team notebook. *(Decorating the team notebook can be an ongoing activity. Teams may want to "plan" how they will decorate their notebook and continue the decorating in future project times.)*

Session 2.7 – Student Team Project Introduction

Teacher Questions & Notes	Procedures
	k. Each team should be given a *Student Virginia Map* (pg. 61) to put in their team notebook. Have the teams note on their map where their selected animal can be found in Virginia. *(Notations on their team map should be made with pencil so that if during future research they need to expand or narrow the area where their animal is found, they can easily make the changes on their map.)* l. At the end of the discussion, have each student fill in a *Group Reflection* sheet (pg. 62 and pg. 239). *(The Group Reflection sheet can be used at the end of each project group worktime and can be kept in the team project notebook.)*

Virginia Map – Student Sheet



Group Reflection – Student Sheet

What did my group do?

What did I do?

Reflection Window

Date: _____

What questions do we still have?

How well did we work together?

We worked at a level: _____

3 – Everyone contributed and cooperated.

2 – Most of us contributed and cooperated.

1 – Some of us contributed and cooperated.

I think this because

Virginia Animals and their Habitats

Topic 3

What Is a Habitat?

TOPIC 3 – What is a Habitat?

Topic 3: Overall Information

Overview

In this group of lessons students will define the components of a habitat and the interrelationship of habitats and ecosystems.

Topic 3 Virginia SOL

Science	English	Mathematics	History & Social Science
2.1 a, b, c, d, e, g, h, i, j, k, l, m 2.5 a, b, c 2.7 a 2.8 b, c	2.2 a, b, c, e 2.3 a, b, c, d, e 2.7 d, e 2.8 c 2.9 2.10 2.12 2.13 2.14	2.1 a 2.4 a 2.5 2.6 2.7 2.8 2.9 2.11 a 2.12 2.16 2.17 2.18 2.19 2.21	2.12 b

Teacher Background Knowledge

- Animals need air, food, water, shelter, and space, all in a suitable arrangement. These items together are called a habitat.
- All living things are affected by and interact with their physical environment.
- An ecosystem is a combination of individual habitats where animals meet their life needs. Ecosystems are usually characterized by a dominant plant community (e.g., salt marsh, deciduous forest).
- Each organism has a niche within an ecosystem.
- All forms of life depend upon nonliving components (abiotic) of the environment – water, oxygen, nutrients, space, and/or sunlight in some combination for survival and growth.
- All plants and animals are adapted to survive within the framework of their habitats' non-living components.
- Ecosystems are comprised of living and nonliving components that interact and are dependent upon each other.
- Changes in the nonliving components of an ecosystem have an effect on the living components of that ecosystem (e.g., decline in water quality).
- Climatic conditions can affect living systems. (e.g., Drought can alter reproduction of waterfowl; spring rains can flood the shallow nests of rabbits, mice, and other prey species and can affect the survival of predator young.)

- Maps should include a title, map legend or key, and compass rose.
- Measurement is a comparison of an object to another object.
- Nonstandard measurement is using the same tools (e.g., paper clips, unifix cubes, Popsicle sticks) to compare to an object.
- Measurement of a unit is the distance between each unit.
- Linear measurement measures length and height.
- Area is covering a space with square units.
- Mathematics should be taught through inquiry and real-world applications. Students should construct mathematical ideas through classroom discourse. When appropriate, development of new concepts may be necessary.

Student Learning Expectations

- Identify the components of different habitats within the fresh water, salt water, forest/woodland, and wetland ecosystems.
- Measure length using nonstandard and standard units (meter, foot).
- Calculate the area of a given space using nonstandard and standard tools.
- Begin to understand why standard units of measurement are necessary.
- Collect data and construct a graph representing the data.
- Use a thermometer to record temperature.

Procedure

NOTE: The procedure in the topic sessions may be divided into several different lesson periods. Each session may take more than one lesson period to complete.

For additional content read *"A Guide to the Ecosystem Concept" (pg. 482)* at the back of the Project WILD guide.

Topic 3: Session 3.1 – Introduction to Animal Habitats

Session Supplies:

- *What Do We Know About Habitats* sheet (pg. 67)
- Teacher-selected nonfiction book about a specific habitat (e.g., forest, marsh, pond)

Session Virginia SOL

Science	English	Mathematics	History & Social Science
2.1 a, b, d, i, j, k, m	2.2 a, b, c, e 2.3 a, b, c, d 2.7 e 2.9 c, d, e, f 2.12 a, b, c		

Session 3.1 – Introduction to Animal Habitats

Teacher Questions & Notes	Procedures
	1. Hand out the *What Do We Know About Habitats* sheet (pg. 67). Each student will make predictions about what a habitat is by using this anticipation sheet. Have students put the current date in the first "Date" column. In the next column (A/D), have them record "A" if they agree with the statement or "D" if they disagree with the statement. (Remind students not to write in the second "Date" column or in the second A/D column. The second "Date" and A/D columns will be used later after the students have studied habitats.)
-What is a habitat? Turn to your partner and talk about it.	2. Have students turn to a partner and discuss their predictions about habitats. 3. Develop a class statement about the meaning of habitat. Write the statement on a chart and explain that we will revise the statement as we learn more about habitats.
-Show students the book you have selected on the specific habitat. -What kind of book is this (fiction/nonfiction)? -How do you know? -What do you think it is about? How do you know? What might we find out?	4. Introduce a book that you have selected about a specific habitat (e.g., a forest, a pond, a marsh). This book should be nonfiction. 5. Read and discuss the book. Have the students tell you things that are in the specific habitat described in the book. List them on the board. Ask students if they need to revise the class's habitat statement. If so, revise the statement written earlier.

Name: _____

What Do We Know About Habitats? – Student Sheet

Directions: Read each statement. If you **A**gree with the statement, write an **"A".** If you **D**isagree with the statement, write a **"D".** After we learn about habitats, we will look at these statements again to see if what we think has changed.

Statement	Date:	A/D	Date:	A/D
A habitat is just a place where you live.				
People are part of your habitat.				
Scientists can help save animals and plants.				
A habitat has the things that you need to live.				
My bedroom is my whole habitat.				
All habitats have water.				
Habitats have plants and animals.				
Habitats only have living things.				
Habitats have living and nonliving things.				
Habitats only have nonliving things.				
A habitat must provide shelter.				

Topic 3: Session 3.2 – Animal Habitat Components

Session Supplies:

- *Animal Task Card* sheet (pg. 70)
- Project WILD, *"Habitrekking"* activity (pg. 79-81)
- *Habitrekking Evidence Cards* (pg. 71)
- Class Habitat Statement begun in Topic 3, Session 3.1

Session Virginia SOL

Science	English	Mathematics	History & Social Science
2.1 a, c, g, h, i, j, k, m 2.5 a, b, c 2.7 a 2.8 c	2.2 a, b, c, e 2.3 a, b, c	2.5 2.6 2.7 2.8 2.9 2.17 2.18 2.19	

Session 3.2 – Animal Habitat Components

Teacher Questions & Notes	Procedures
	Prior to session: Copy enough Animal Task Card sheets (pg. 69) so that each student has ONE task card (There are six task cards on each sheet). If no water exists in your schoolyard, place a pan of water in the area. *For the Habitrekking activity, print enough Habitrekking Evidence Cards for each student group to have a card.*
	1. Review the Class Habitat Statement, and what students have learned about habitats.
-What does an animal need to survive?	2. Explain that the students will pretend they are animals and will find what they need to survive in their habitats. Reinforce the basic needs that animals have for food, water, shelter, and space.
	3. Give each student a task card and tell them that their task is to find the food, water, and shelter that their particular animal requires as they go for a walk around the school grounds. You may choose to group children with the same animal cards together. The children will be expected to put a check mark and write the specific name of the item (e.g., lake, pond, pan of water) on the task card as they locate each of them. 4. Back in the classroom, have the students draw a line between the food, water, and shelter on their cards, creating a circle.

Session 3.2 – Animal Habitat Components

Teacher Questions & Notes	Procedures
-How did you feel when you were sitting close together? -If your pencil had been dropped on the floor, would you have been able to easily pick it up? -Why not?	5. Next, have the students come to the front of the room and sit as close together as possible. They should be packed closely together, so that they are safe, but uncomfortable. Have them sit like this for one minute. Then have them return to their seats and explain how that felt.
-Did you feel you needed more space? -Why would you need more space? -Do animals and plants need space to survive, too? Why?	6. Tell students that they have already drawn a circle connecting the food, water, and shelter on their task cards to represent the space the animal needs. Have them write the word "SPACE" in the middle of their card.
-How much space do you think your animal needs? Why? -Do all plants and animals need the same amount of space? Why or why not?	7. Have a discussion about the amount of space animals may need. After the discussion, tell them that the number of plants and animals that can fit in one environment is called that environment's carrying capacity. For animals, there is only so much food, water, and shelter in any environment. When the number of animals increases beyond the carrying capacity, they will begin to cause damage to their habitat. *Carrying capacity refers to the dynamic balance between the availability of habitat components and the number of animals the habitat can support. (Project WILD, pg. 9, pg. 36, and pg. 46) Carrying capacity is thus the number of individuals an environment can support without significant negative impacts to the given organism and its environment.*
-What would happen to an animal in its habitat if there was a severe lack of water available?	8. Take the students outside, or in a large open space indoors to gather evidence about habitats using "Habitrekking" (Project WILD pg. 79-81). 9. Divide the class into small groups of two to three students. Give each group a *Habitrekking Evidence Card* (pg. 71). (There are eight different evidence cards on the *Habitrekking Evidence Cards* sheet.) 10. Back in the classroom, discuss what evidence each group discovered. 11. Review with the students the components of a habitat and what they have learned about animals and their habitats.

The Project WILD activity *"Graphananimal"* (pg. 49) introduces different species in different habitats and activity *"Habitracks"* (pg. 53) identifies the basic components of a habitat.

Name: _____

Animal Task Card – Student Sheet

 WATER FOOD   SHELTER  What a Bird Needs to Survive	 WATER FOOD   SHELTER  What a Deer Needs to Survive
 WATER FOOD   SHELTER  What a Squirrel Needs to Survive	 WATER FOOD  SHELTER   What a Bee Needs to Survive
 WATER FOOD   SHELTER  What a Lady Bug Needs to Survive	 WATER  FOOD  SHELTER  What a Frog Needs to Survive

Habitrekking Evidence Cards

(only need one card per group)

Find evidence that: People and wildlife share the schoolyard. *Example: people and trees both on the schoolyard*	**Find evidence that:** There is a water source for wildlife in the schoolyard. *Example: a mud puddle*
Find evidence that: Wildlife come and go from the schoolyard. *Example: birds landing in the schoolyard and then flying away*	**Find evidence that:** Wildlife depend on plants in the schoolyard. *Example: a leaf that has been chewed*
Find evidence that: Food such as leaves and nuts are available for wildlife. *Example: acorns or leaves*	**Find evidence that:** Wildlife living on the schoolyard comes in all sizes. *Example: an insect*
Find evidence that: Wildlife can find a place to hide in the schoolyard. *Example: grass*	**Find evidence that:** Wildlife can be found everywhere on the schoolyard. *Example: ants*

Topic 3: Session 3.3 – Sensory Observations

Session Supplies:

- *Sensory Paragraph* sheet (pg. 73)

Session Virginia SOL

Science	English	Mathematics	History & Social Science
2.1 a, h, k	2.2 b, e 2.12		

Session 3.3 – Sensory Observations

Teacher Questions & Notes	Procedures
-How do scientists observe? -How do they use their senses?	1. Discuss how scientists observe things in our world. Discuss how we use our senses to find out about the things around us.
	2. Model for students how to complete the top section of the *Sensory Paragraph* sheet (pg. 73) by using an object selected in the classroom.
-In order to stay safe today, which one of our senses will we NOT use? (taste)	3. Give each student a copy of the *Sensory Paragraph* sheet (pg. 73). Explain that they will be going outside to make observations. As good scientists, they will use most of their senses to explore something outside. Have the students select one item (e.g., a tree, a patch of grass, a bush, a flower, a puddle, a leaf, an ant) to observe. Direct students to write words or phrases in each of the blocks on the *Sensory Paragraph* sheet.
	4. Model writing a sensory paragraph using information that you have collected. Make sure to generate ideas to be included before you begin your paragraph. Also make sure that the paragraph has a definite beginning, middle, and end.
	5. Have the students write a sensory paragraph using the *Sensory Paragraph* sheet.

To build observation skills see the Project WILD activities: *"Learning to Look, Looking to See"* (pg. 278) and "*Wild Words" (pg. 41).*

Name: _____

Sensory Paragraph – Student Sheet

What I see:	What I hear:
What I smell:	What I feel:

Write a paragraph describing what you observed. Use the information you wrote in the boxes above.

_____

_____

_____

_____

_____

_____

_____

Topic 3: Session 3.4 – Talking with a Habitat Scientist

Session Supplies:

- Class Habitat Statement – from Topic 3, Session 3.1
- Teacher-selected book about a scientist who studies animals and their habitats (nonfiction)
- *Talking with a Habitat Scientist* sheet (pg. 76)
- *What Do We Know About Habitats* sheet – from Topic 3, Session 3.1 (pg. 67)
- *Virginia Animals and their Habitats Project Design Brief* (pg. 77-78 or pg. 235-236)
- *Habitat Research Planning* sheet (pg. 79 or pg. 238)
- Team notebooks – can be actual three-ring binders or can be student-made binders

Session Virginia SOL

Science	English	Mathematics	History & Social Science
2.1 a, b, c, i, j, k 2.5 a, b, c 2.8 b, c	2.7 d, e 2.9 2.10 2.12		2.12 b

Session 3.4 – Talking with a Habitat Scientist

Teacher Questions & Notes	Procedures
	1. Review the Class Habitat Statement written previously with the students. Review the previous activity where students were scientists observing a habitat.
Prior to reading: - What kind of book is this? (fiction or nonfiction) -How do you know? -What do you think we will learn from it? After reading: -What is a habitat? (Be sure the students have included that it is where animals have the food, water, shelter and space that is needed to survive, or where a plant has the proper soil conditions, sunlight, temperature and water to thrive.)	2. Read the teacher-selected book about a scientist who studies animals and their habitats. Discuss any new vocabulary as you read, especially the words that directly pertain to habitats and animals. 3. Review the Class Habitat Statement again. Ask if it needs to be revised. Make any necessary revisions.
	4. Have the students copy the Class Habitat Statement in their journals. Then have them write at least three questions that they would like to ask a habitat scientist on the *Talking with a Habitat Scientist* sheet (pg. 76). *NOTE: You may consider inviting someone from the Virginia Department of Game and Inland Fisheries, or someone from your local Forestry Department to visit your classroom and speak to your students.*

Session 3.4 – Talking with a Habitat Scientist

Teacher Questions & Notes	Procedures
	5. Complete the second half of *What Do We Know about Habitats?*(pg. 67) (This was begun during Topic 3, Session 3.1) 6. Compare answers from the first date to those given on the second date. Discuss with the students why answers may have changed.
	PROJECT WORK TIME: 7. At this point, students should have a strong understanding of habitats. The student teams have also now chosen their animals for their project. Provide the students with the *Virginia Animals and their Habitats Project Design Brief* (pg. 77-78 or pg. 235-236) for the project. Review the *Design Brief* with the students and make sure that they understand the project they will complete. The *Virginia Animals and their Habitats Project Design Brief* should be kept in their team project notebook so they can refer back to it when needed. 8. Once the student teams understand the full project, explain that they will begin research on their animal's habitat using the *Habitat Research Planning* sheet (pg. 79 or pg. 238). 9. Remind the student teams that all research gathered should be put in their team project notebook.

Name: _____

Talking with a Habitat Scientist – Student Sheet

Class Habitat Statement:

_____

_____

_____

List three questions you would like to ask a habitat scientist.

1. _____

   _____

   _____

2. _____

   _____

   _____

3. _____

   _____

   _____

Team Members' Names:_____

Virginia Animals and their Habitats Project Design Brief

You have learned about animals and their habitats. Now you need to use this knowledge to complete a team project.

Design Challenge:

Your team must choose one Virginia animal to research. You will create a project that will be presented to the class. The project will include a written report with information about the animal, its habitat, life cycle, adaptations, and its place within the food chain. Your team will also create a visual product such as a poster, a diorama, a PowerPoint presentation, or a play.

Criteria:

- ☐ The written report must include:
  - description of your animal;
  - description of your animal's habitat;
  - picture of your animal's life cycle;
  - description of your animal's adaptations; and
  - description of your animal's food chain including your animal's place in the chain.

- ☐ The visual product must include:
  - map of Virginia showing where your animal lives;
  - a graph; and
  - your animal and its habitat.

- The presentation must include:
  - description of your animal;
  - description of your animal's habitat;
  - picture of your animal's life cycle;
  - description of your animal's adaptations; and
  - description of your animal's food chain including your animal's place in the chain.

- Team rules for the presentation:
  - Everyone on your team must have a role in the presentation.
  - Your team will answer at least three questions from the class.

Team Members' Names:_____

Habitat Research Planning Sheet – Student Sheet

Where in Virginia is your animal's habitat located? _____ _____ _____ _____	Describe how your animal's habitat looks? _____ _____ _____ _____
What types of plants/flowers grow in your animal's habitat? _____ _____ _____ _____	What other animals live in your animal's habitat? _____ _____ _____ _____
Is there a water source in your animal's habitat? What is it? _____ _____ _____ _____	What are your animal's sources of food? _____ _____ _____ _____

On the back, list any other interesting facts you learn during your research.

Topic 3: Session 3.5 – Measurement Preparation

Session Supplies:

- Variety of items to use as units of measurement (e.g., unifix cubes, paper clips, Popsicle sticks, yarn, pencils, feet)
- Predetermined list of items in the classroom for the students to measure (e.g., the stapler, an eraser, door width, table)
- How Big is a Foot?, Myller & McCrath, or a teacher-selected book about measuring (can be fiction or nonfiction)
- Paper large enough to trace and cut out the outline of two different students' feet
- A standard ruler (inches and feet)
- One-inch colored paper squares cut out of two different colors of construction paper (you will need about a total of 20 squares)

Session Virginia SOL

Science	English	Mathematics	History & Social Science
2.1 a, c, e, g, h, i, j, k, l	2.2 a, b, c, e	2.11 a	

Session 3.5 – Measurement Preparation

Teacher Questions & Notes	Procedures
-What is measurement? -Why do we measure things?	1. Explain to students that when scientists study animals' habitats, they collect data using a variety of measurement tools. Have them discuss with a partner the following questions: a. What is measurement? b. Why do we measure things? 2. Have several students share their responses with the class. *Measurement is a way to compare items by length, mass, capacity, or temperature.*
	3. Students and their partners will select and use a nonstandard measurement tool to measure the length of each of the items you have selected for them to measure. As a class, students will then compare the various measurements made of each object. a. Each student group will use a different measurement tool. Provide a variety of items such as unifix cubes, paper clips, Popsicle sticks, yarn, pencils, feet, etc., for students to use as measurement tools. b. Provide a list of items on the board that each team will measure with their selected tool (e.g., the stapler, an eraser, the classroom door width, a specific table).

Session 3.5 – Measurement Preparation

Teacher Questions & Notes	Procedures
	c. Have each group choose a tool. (Each student group will use their selected tool to measure the items listed.)
	d. Before the groups begin their measurements, as a class, create a chart on the board that has each item to be measured and the tools that each group has chosen. **Sample Chart** **Team Tools** / **Items to Measure**: Chalkboard Eraser; Stapler; Length of Teacher's Desk; Width of Classroom Door Paper clips Popsicle sticks Pennies Unifix cubes Pencils Three-inch yarn pieces e. Have student groups measure each of the items listed on the board. As they complete each measurement, have them record it in the chart on the board.
-Why are there so many different numbers for the same item? -Why do you think they are so different even though the same item is being measured?	4. Once all data have been recorded, have a discussion about the numbers and what the students notice about them.
In appropriate places in the book, ask: -What is an apprentice? -What is the apprentice's task? -Why is the bed too short?	5. Read the book titled <u>How Big is a Foot?</u> by Myller & McCrath or a teacher-selected book about measuring. 6. If you are using the book <u>How Big is a Foot?</u>, read the book to the part where the apprentice is thrown in jail. At this point, have the students write a letter to the apprentice telling him why the bed is too small and how to fix the problem. 7. Ask the students what they think the apprentice should do? Finish reading the book. At the end, discuss what happened.

Session 3.5 – Measurement Preparation

Teacher Questions & Notes	Procedures
	8. Select two students and trace the left foot of each student on a piece of paper. Cut out the traced feet. (Make sure to select two students with significantly different sized feet.) 9. Using the cut-outs of their feet as their measuring tool, have the two students measure some of the same items listed on the board that were previously measured. 10. Discuss what happened when the students measured using their cut-out feet. 11. If you are using the book <u>How Big is a Foot?</u>, discuss the similarities between the measurements with the students' cut-out feet and what happened in the book. Use this discussion to develop an understanding of the need for standard measurement.
-Why is it important to have a consistent unit of measurement?	12. Discuss the fact that scientists share data with other scientists and they need to be able to communicate data accurately and consistently. 13. Look at a standard ruler. Discuss with the students that they are measuring the distance between marks on a ruler, not the actual numbers on a ruler. A way to demonstrate this is to: a. Cut out two different colors of 1-inch squares ahead of time. b. Measure something (e.g., pencil, book) with the squares. When measuring the object, lay down one square of the first color, then one square of the second color, next one square of the first color, etc. Continue alternating the colors until you have measured the length of the object. Ask the students how long the object is in square units. c. Leave the squares beside the object and measure the object with a standard ruler. Be sure to start the measurement of the object at the beginning of the ruler the first time. Ask the students how long the object is in inches. d. Again, leaving the colored squares beside the object being measured, start the measurement with the ruler in the middle of the ruler. Ask the students how many squares long the object is and how many inches long the object is? *Make sure that the students understand that they are counting the number of inch*

Session 3.5 – Measurement Preparation

Teacher Questions & Notes	Procedures
	spaces, not just looking at just the numbers on the ruler.
-Can you name a measurement tool to measure the length of an object?	14. Have the students look at the ruler and explain that it is a standard measurement tool using the units of inches. Explain that 12 inches is called a foot.

Topic 3: Session 3.6 – Writing for the Student Team Project

Session Supplies:

- One of the books you previously read to the class dealing with habitats
- Books, computer, etc., for research
- Student journals
- *Written Report Rubric* (pg. 86 or pg. 240)

Session Virginia SOL

Science	English	Mathematics	History & Social Science
2.1 m 2.5 a, b, c 2.7 a 2.8 b, c	2.10 2.12 2.13 2.14		

Session 3.6 – Writing for the Student Team Project

Teacher Questions & Notes	Procedures
-What is the main idea of these pages? -What would be a good topic sentence for this paragraph? -What details should we include? -How can we summarize these ideas (concluding sentence)?	1. Teach a mini-lesson on writing an informational paragraph. 2. Review the components of a paragraph. Remind students that a paragraph should include a beginning sentence (topic), middle sentences (detail), and an end (concluding) sentence. 3. Reread a few paragraphs from one of the books on habitats that you previously used for a whole class activity. Have the students identify the topic sentence, the details, and the concluding sentence in each paragraph. 4. Model writing a paragraph with the class. 5. Display the paragraph in the classroom so the students have an example of an informational paragraph as they begin to work with their project team on the team's written report.
	PROJECT WORK TIME: 6. Meet with each student team to monitor the progress of their information gathering. 7. As a team, have the students write at least three questions in their journals about their team's animal that they do not know yet. Make sure that the team has defined the animal's habitat. 8. Introduce the *Written Report Rubric* (pg. 86 or pg. 240) for their project. Have the student teams look at the *Project Design Brief* introduced in Topic 3, Session 3.4 (pg. 77 or pg. 235) again and

Session 3.6 – Writing for the Student Team Project

Teacher Questions & Notes	Procedures
	discuss the parts of a report. When reviewing the *Written Report Rubric* with each team, review only the three-point column with them since it describes what is expected from the team for their written report. 9. Have the student teams create an outline for the report. Remind the teams to make sure they include all the parts for their report that are listed in the *Project Design Brief*. 10. Be sure to discuss with each team that when they write their report, they will want to follow the same steps for writing each paragraph similar to what was modeled at the beginning of the lesson today. 11. Have the student teams continue their research about their animal. 12. Have each team keep a copy of the *Written Report Rubric* in their project notebook for future reference.

The Project WILD activity "*Forest in a Jar" (pg. 137)* will provide background information on how a forest develops over time. See the topic index at the back of the Project WILD guide for more activities on habitats.

Team Members' Names: _____

Written Report Rubric

REQUIRED VOCABULARY WORDS:					
Animal Words (Choose a minimum of five.)					
habitat	**life cycle**	**adaptation**	**food chain**	**interdependence**	
migration	**hibernation**	**camouflage**	**organism**	**survival**	
Verbs (Choose a minimum of three.)					
observe	**identify**	**describe**	**compare**	**contrast**	**investigate**
predict	**data**	**conclude**	**explore**	**measure**	**summarize**

	3 POINTS	2 POINTS	1 POINT
CONTENT	The report contains all the criteria from the design brief.	The report contains most of the criteria from the design brief.	The report contains some of the criteria from the design brief.
VOCABULARY	The report includes all of the required animal words (5) and required verbs (3).	The report includes most of the required animal words (4) and required verbs (2).	The report includes some of the required animal words (<4) and required verbs (<2).
SPELLING	All words are spelled correctly.	Most of the words are spelled correctly.	Some of the words are spelled correctly.
GRAMMAR: PUNCTUATION & CAPITALIZATION	Every sentence begins with a capital letter and ends with the appropriate punctuation.	Most sentences begin with a capital letter and end with the appropriate punctuation.	Some sentences begin with a capital letter and end with the appropriate punctuation.
APPEARANCE	The product is written neatly. There is good organization. The title page includes the name of project, team member names, date, name of teacher, grade level, school, a colorful border, and the paper is either stapled or placed in a folder.	The product is written neatly. The organization is somewhat clear. The title page includes most of the required components (name of project, team member names, date, name of teacher, grade level, school, a colorful border, and the paper either is stapled or placed in a folder).	The product is difficult to read and unorganized. The title page is missing or has only some of the required components (name of project, names in team, date, name of teacher, grade level, school, a colorful border, and the paper either is stapled or placed in a folder).

Topic 3: Session 3.7 – Measuring Tree Heights

Session Supplies:

- Book about measurement from Topic 3, Session 3.5
- Teacher-selected book about trees as habitats
- Directions – Measuring Tree Height (pg. 91) *[Used with permission from the Virginia Department of Forestry, 900 Natural Resources Drive, Suite 800, Charlottesville, VA 22903]* www.dof.virginia.gov
- a 100-foot tape measure (possibly borrow from the P.E. teacher)
- a one-foot ruler for each student group

Session Virginia SOL

Science	English	Mathematics	History & Social Science
2.5 a, b, c 2.8 c	2.2 e	2.1 a 2.4 a 2.11 a 2.21	

An excellent resource about animal homes and specifically about birds' nests can be found on the New Hampshire Fish and Game Department (NHFGD) Web site at http://www.wildnh.com/Kids/kids.htm, *Amazing Animal Builders,* Vol. 6, Issue 1.
Wild Times for Kids is published twice a year by NHFGD. The magazine can be downloaded.

Session 3.7 – Measuring Tree Heights

Teacher Questions & Notes	Procedures
-Why is it important to have standard measurement?	1. Refer back to the book you read to the class about measurement in Topic 3, Session 3.5.
-Which tree is tallest in the book? -What are some of the visual clues that help us figure out which is the tallest tree? -What animals would use the tallest tree as part of their habitat? -What animals would use a shorter tree as part of their habitat? -How high does a bird (or a squirrel) need to go to reach its nest? -Is the nest 1/3 (1/2, etc.) the way up the tree?	2. Read a teacher-selected book about trees as habitats and discuss the differences between the types of trees. 3. Discuss with the class different kinds of animal homes that could be in the trees in your area of Virginia. 4. Focus on the fact that some birds build their nests in trees. Ask if students have ever seen a bird's nest in a tree. How high in the tree was the nest? Explain that in order to really study a nest, you would need to know how high in the tree the nest was, and with that information, you could figure out how you could reach the nest to study it. (Would you need a six-foot ladder, a twenty-foot ladder, etc.?) The height of the nest in the tree sometimes can also help with the identification of the type of bird that uses the nest. *(Some species of birds will build within a range of heights. Robins typically build at about 15 feet up and cardinals at about five feet. Eagles usually select the tallest tree in the area, but will not build in an area if the trees are only 20 feet.)*

Session 3.7 – Measuring Tree Heights

Teacher Questions & Notes	Procedures
-How do you think scientists measure things that are very tall? -What other objects could we measure using this method?	5. Explain that scientists need to measure things too tall to measure by hand. Tell students they are going to be measuring the height of a tree (or the height of the building if no trees are available to measure). *(Directions for this activity – Measuring Tree Height - are found at the end of this session's procedures (pg. 91). Use the second method on the directions which is the Triangle Method.)* 6. Complete the following class activity first to prepare the students for measuring a tree using the directions in *Measuring Tree Height*: a. Ask the students if they have ever held their hand up to block the sun from their eyes on a sunny day. b. Ask them if their hand is the same size as the sun. (No) c. Ask them why they can block the sun with their hand if the sun is much bigger than their hand. Guide them to understand that the reason they can block the sun is because the sun is very far away. d. Explain to them that they are going to learn how to measure the height of a tree like scientists would. They will be able to do it because they will be some distance from the tree. It will be like being able to block the sun with their hand because they are some distance away.
-How could this method be helpful to scientists? -Why would a scientist need to know the height of a tree?	7. Examine the tape measure to be used for measuring. Have two students hold the tape measure with it stretched out at least 30 feet. Have students notice the markings on the ruler. Determine what mark designates a foot. Determine what the marks in between two foot marks represent (e.g., inches, ½ inch). Have the class count the foot increments on the tape measure to twenty by ones. Next have them count the foot increments to 30 by ones. Ask them what might be a quicker way to count to 30 (counting by 10's). Count to 30 feet this time by 10's. 8. Have the students count by tens to 50 feet. Discuss how many 10's are in 50. Now have students practice counting to numbers not divisible by 10's (i.e., 38, 29, 47, etc.). Count by tens and ones. For each number, determine how many 10's and how many 1's would be needed to count to the number.

Session 3.7 – Measuring Tree Heights

Teacher Questions & Notes	Procedures
	9. Go outside with the class. Tell them that before they measure the height of a tree (or the corner of the school building if a tree is not readily available) that they are going to practice as a class using the tape measure to measure the height of an object too tall to measure in the standard way. To do this, do the following: a. Pick one student to sit on the ground. b. Line up the rest of the class in a straight line with all the students side by side and the line of students facing the student who is sitting. c. Have the students in the line hold up one thumb and slowly move backward until the student who is sitting is the same height as their thumb. When they reach that point, they should stop. d. Have all the students stand very still where they stopped and have them point their thumb sideways to the right. e. Have the student who is sitting remain sitting and hold the beginning of the tape measure. f. Take the other end of the tape measure and tell the class that you are going to move to their right from the sitting student until they tell you that you have reached the end of their thumb that they are holding sideways. Let the tape measure out as you move to the right. g. Stop when the class says that you have reached the end of their thumbs. h. The length of the tape measure that you let out should be the height (sitting height) of the sitting student who was measured. Hold the rope next to the sitting student to see if that is correct. (It is much easier to do this activity if the student is sitting so that you can easily measure them with the tape measure.) i. Explain to the students that they are now going to measure the height of a tree using the same method.

Session 3.7 – Measuring Tree Heights

Teacher Questions & Notes	Procedures
	10. Divide the class into groups of three to four students. Each group will measure the height of a tree(s) and/or the building using this method. To do this activity, each group will need a foot ruler and the use of the class tape measure when they are ready. 11. Before each group measures their tree, have them examine the tree to see if there are any nests (squirrels, birds, etc.) or any food sources (branches with leaves, acorns, etc.) If the group does not see nests or food, have them decide where the group would put an "imaginary nest or food" in the tree. 12. Have groups measure their trees following the directions for the Triangle Method on the *Measuring Tree Height* directions. Have them note how high up their "nests or food sources" are located in their trees. 13. Discuss how this method would be helpful to scientists.
	14. Create some math problems with your students using the information about the tree or building that each group has measured. Sample Problems: *You have three ladders. One is 10 feet tall, one is 20 feet tall, and one is 30 feet tall. You found that the height of your tree is 18 feet. Which ladder would be the best to use to see a bird's nest at the top of the tree? Why?* *CHALLENGE: You measured a bird's nest to be 10 feet up in a tree. You measured the tree to be 40 feet tall. What fraction of the tree is below the bird's nest? What fraction of the tree is above the bird's nest?*

Measuring Tree Height – Lesson Plan

Used with permission from the Virginia Department of Forestry, 900 Natural Resources Drive, Suite 800, Charlottesville, VA 22903
www.dof.virginia.gov

There are many methods for determining the height of a tree. Foresters often use a tool called a clinometer to measure trees, but you can get a good estimate of tree height without expensive equipment.

The shadow and triangle methods work well when measuring trees in a large, open area. To use these methods, you only need a ruler, a long measuring tape, a pencil, and a place to write down some numbers. You can also use a calculator, or you can do the math on paper.

Try measuring the same tree using both methods. Which method was easier to use? Were your answers the same? If your answers were different, how could you find out which is closest to the tree's actual height?

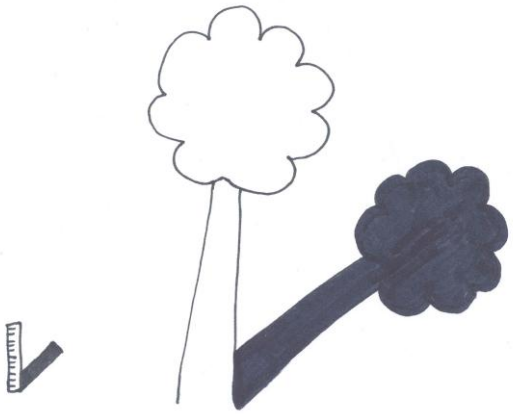
Shadow Method

You can use this method anytime the sun is shining. Stand the ruler on the ground and measure the length of its shadow. Now measure the shadow of the tree you wish to measure. The ratio between the length of an object and its shadow will be the same for any object measured at the same time of day:

$$\frac{\text{Ruler's length}}{\text{Ruler's shadow length}} = \frac{\text{Tree height}}{\text{Tree's shadow length}}$$

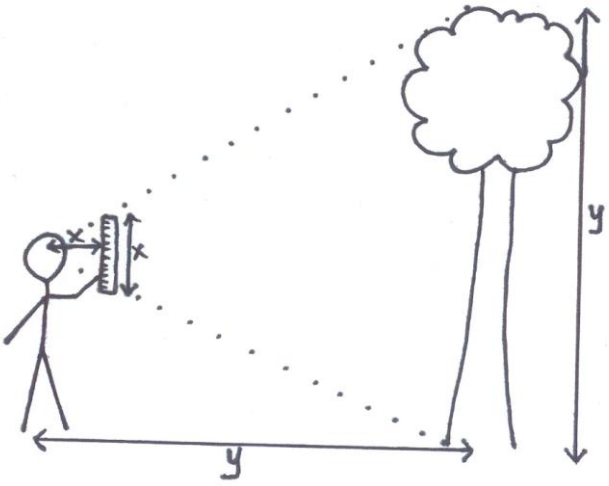
Convert all the measurements to the same units, such as meters or feet. Calculate the tree's height using this equation:

$$\text{Tree height} = \frac{\text{Tree's shadow length X ruler's length}}{\text{Ruler's shadow length}}$$



Triangle Method

Hold the ruler out in front of you, perpendicular to the ground, at the same distance from your eye that the ruler is long (usually, 12 inches). Holding the ruler in this position, walk backward or forward until the bottom of the ruler appears level with the bottom of the tree and the top appears level with the top of the tree. Measure the distance to the tree from where you are standing. That distance should equal the height of the tree.



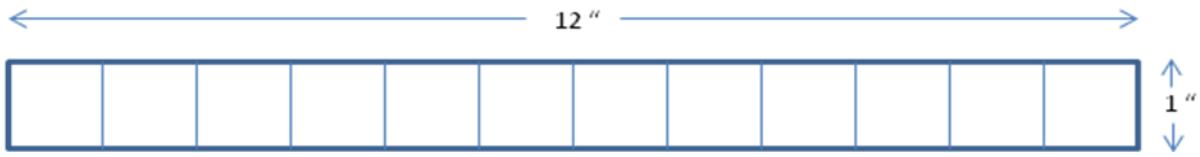
This method works by geometry. The ruler and its distance from your eye create the equal sides of an isosceles right triangle (marked "x" in the diagram). By making the ruler equivalent to the tree's height, we can find the two equal sides of a much larger isosceles right triangle: the height of the tree and its distance from you (marked "y" in the diagram).

Virginia Department of Forestry:
www.dof.virginia.gov

Topic 3: Session 3.8 – Square-Meter Habitats: Observation 1

Session Supplies:

- *What is Area?* sheet (pg. 98)
- one-inch by one-inch color tiles or squares of colored paper
- twelve twelve-inch strips of paper, with a line at each inch



- Meter sticks – enough for teams to mark off square meter areas in the schoolyard (each student team will need four meter sticks)
- Enough string to be cut into 1 meter lengths –18 pieces of string for each team's square meter. (Each string segment should be cut slightly longer than one meter. When taping the string to the meter sticks, if you have cut it long enough, students should be able to wrap the end of the string around the meter sticks and then tape it. The class will be divided into small groups of students. Each group will need four meter sticks and 18 one-meter lengths of string.)
- Scissors, tape, pencils
- *First Square-Meter Habitat Observation Record* sheet (pg. 99)
- *Square-Meter Habitat Group Record* sheet (pg. 100)
- Thermometers for taking temperature outside
- Magnifying glasses
- Items to mark student square area site on schoolyard (e.g., colored toothpicks, Popsicle sticks, chalk powder that is used by physical education teachers to mark activity areas)

Session Virginia SOL

Science	English	Mathematics	History & Social Science
2.1 a, b, c, d, e, g, h, i, j, k, l, m	2.2 a, b, c, e 2.3 a, b, c, e	2.1 a 2.4 a 2.11 a 2.12 2.16	

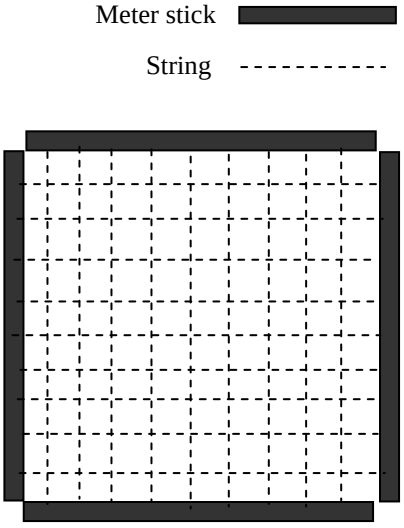
Session 3.8 – Square-Meter Habitats: Observation 1

Teacher Questions & Notes	Procedures
-Why do scientists study the area of a habitat?	1. Tell students that scientists study the area of a habitat so that they know how much space an animal needs in its habitat to survive.
-What is area? -What do you notice about each shape on this sheet? -How are they alike or different?	2. Provide students with the *What is Area?* sheet (pg. 98). Tell them that they are going to cover each shape with one-inch squares.

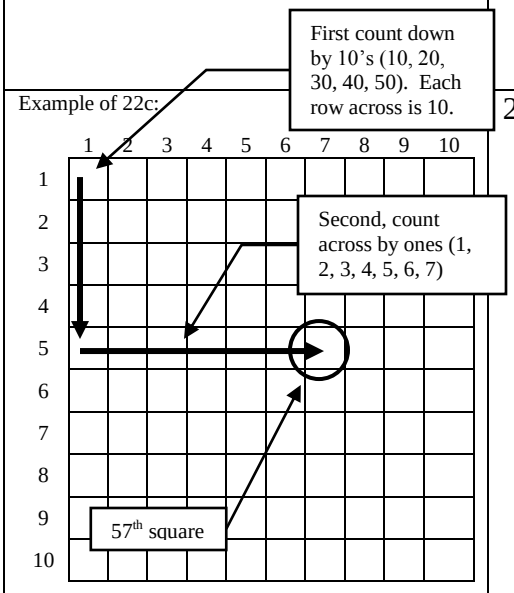
Session 3.8 – Square-Meter Habitats: Observation 1

Teacher Questions & Notes	Procedures
	3. Have students cover each shape with the one-inch squares and record the number of squares needed. 4. Discuss the shapes and have students identify them by the correct name. Have them compare and contrast each of the shapes. During the discussion be sure students understand that each shape is made up of smaller squares. This is the unit of measurement for area. The unit is called square units.
	5. Show the class a one-foot ruler. Discuss how many inches are in a foot. Lay a row of one-inch squares beside the ruler. How many one-inch squares did you need? 6. Using four one-foot rulers, create a square on the floor. Explain that what they are looking at is one square foot. 7. Using the twelve twelve-inch strips you made, show how each is like a one-foot ruler by measuring one with a one-foot ruler. 8. Next to the square foot made with the rulers, lay the twelve strips side by side. Discuss the fact that this is one square foot also. 9. Ask how many one-inch squares are in one square foot. How could we find out? (count the one-inch squares) Ask students to discuss with a partner possible strategies for determining the answer (e.g., count the one-inch squares, count by tens, twelve times and then by twos, twelve times and add the totals of both.) Students should determine that there are 144 one-inch squares in a square foot.
	10. We have been measuring with feet and inches which is standard measurement. What is another measuring system? (metric system) 11. Tell the students that for the next activity, we are going to use the metric system to measure. Using a meter stick, review the metric units of measurement (centimeter, meter). 12. Remind students that generally scientists use the metric system to measure. Since they are going to do habitat observations like scientists do, they are going to use metric measurements.

Session 3.8 – Square-Meter Habitats: Observation 1

Teacher Questions & Notes	Procedures
-Why would we observe the exact same place over and over? -Why would we make more than one observation?	13. Tell the students that they will be divided into small working groups and each working group will study a square-meter habitat. To do this, once they are in their group, they will build what is called a square-meter grid to define the area they are going to observe. 14. The working group will observe and write down what they see in their square-meter grid. 15. The working group will then make three more observations of the same square-meter grid area at later times.
	16. Hold up a meter stick and talk with the class about how a meter stick is marked off in centimeters. 17. Have the class count by tens on the meter stick to the end of the stick. 18. Ask the class to calculate ten groups of ten to find how many centimeters are in a meter.
	19. First build a demonstration square-meter grid to show how a grid is made. a. To build a demonstration square-meter grid, go outside with your students and take the following items: (1) four meter sticks for each group and four more for building the demonstration grid; (2) the string that has been cut in lengths of one meter each; (3) tape; (4) *First Square-Meter Habitat Observation Record* sheet (pg. 99); (5) pencil for each student; (6) copy of the *Square-Meter Habitat Group Record* sheet (pg. 100) to show to the students; and (7) thermometers. b. With the class observing, set the four meter sticks corner to corner to create a square. c. Find the mark on the top meter stick that shows the first 10

Session 3.8 – Square-Meter Habitats: Observation 1

Teacher Questions & Notes	Procedures
	centimeters. Also find the mark on the bottom meter stick that shows the first 10 centimeters. Point out to students that every 10 centimeters is called a decimeter. d. Select two student volunteers to lay a piece of the precut string from the top meter stick's 10 centimeter mark to the bottom meter stick's 10 centimeter mark. Tape the piece of string to both the top stick and the bottom stick. e. Have student volunteers lay eight more pieces of precut string vertically from the top meter stick to the bottom meter stick, one at each 10-centimeter mark (20, 30, 40, etc.). Tape the strings to the top and bottom meter sticks. f. Have student volunteers lay the other pieces across horizontally to create 10 rows. Be sure to tape each piece of string on the meter sticks. g. Use the terms vertical and horizontal as well as columns and rows, and explain their meaning. 20. Have students count each created square by ones to see that there are 100 squares in the square meter. 21. Ask the students if there is a quicker way to determine how many squares there are in the square meter. Guide the students to see that counting by tens is quicker.
Example of 22c:  	22. Pass out the *First Square-Meter Habitat Observation Record* sheet and the pencils. a. Relate the squares in the grids on the *First Square-Meter Habitat Observation Record* sheet to the squares on the square meter grid you just made. b. Students may want to number each column from one to ten and each row from one to ten. c. Practice with the class on how to locate specific squares in the grid. Talk with the students about counting down by tens and then across by ones. (e.g., To find the 57th square in the square meter (5 tens and 7 ones), count down the grid

Session 3.8 – Square-Meter Habitats: Observation 1

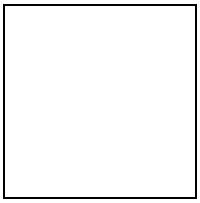
Teacher Questions & Notes	Procedures
	five squares and then across the grid seven squares.) d. Explain that as groups they will set up their own square meters using four meter sticks, string, and tape. Each group will then observe the area in the square meter, and draw and describe what is in the area on the *First Square-Meter Habitat Observation Record* sheet. They will use the method that was described in number 22c to determine in which square (or squares) an item is located. e. The students will also collect data on how many plants, insects, and other animals there are, as well as record the air temperature. f. Show the students a copy of the *Square-Meter Habitat Group Record* sheet. Explain that when the students return to the classroom, group members will work together to transfer the information they recorded on their individual sheets (*First Square-Meter Habitat Observation Record* sheet) onto the group *Square-Meter Habitat Group Record* sheet. g. Groups will make three more observations of the same habitat area during the next few days and will record each observation on the *Square-Meter Habitat Group Record* sheet. h. Students will need to be able to return to the same site for each observation. Sites can be marked with colored toothpicks, Popsicle sticks, etc., at each corner, or you may want to borrow the powdered chalk that is used by your physical education teacher to mark activity areas. i. Each time the students make an observation of their square meters, they will need to set up their grids first with the meter sticks and strings.
-Why did you choose this area of the schoolyard? -Do you think the contents of your habitat will be any different the next time we make an observation of our square-meter habitat?	23. In groups of three to four students, have each group select a site and construct their square meter. Have each student record the data the group collects on the *First Square-Meter Habitat Observation Record* sheet. Give the groups a set amount of time to compete their observations and recordings.

Session 3.8 – Square-Meter Habitats: Observation 1

Teacher Questions & Notes	Procedures
	24. Remind groups that they will be returning to their site at least three more times in the next few days. Have each group identify a minimum of four location clues about their location (e.g., five feet from the big tree, on the right side of the school building) that will help them return to the same site. 25. When the designated time is over, have each group mark the four corners of their square meter with the markers (e.g., toothpicks, Popsicle sticks, chalk powder borrowed from the physical education teacher) you have selected. (If you use Popsicle sticks, the students can put their names on their sticks before they mark their square meter with them.) Then have the groups gather up their string and meter sticks. Unless the meter sticks are needed for something else before the remaining three observations are made, have students leave the string taped to their meter sticks. They will need their string and meter sticks for each of the remaining three observations. *Determine three more times that the groups can set up their square meters and make their observations. If possible, try to schedule the observations at different times during the day, and on different days. Topic 3, Session 10 will be the second observation.*

Name: _____

What is Area? – Student Sheet



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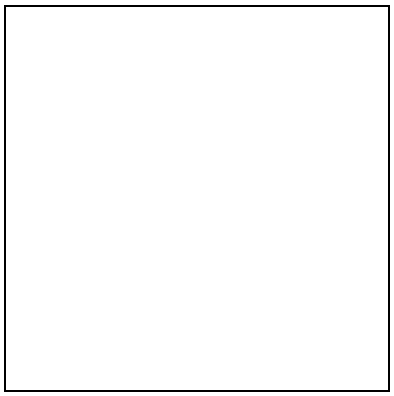

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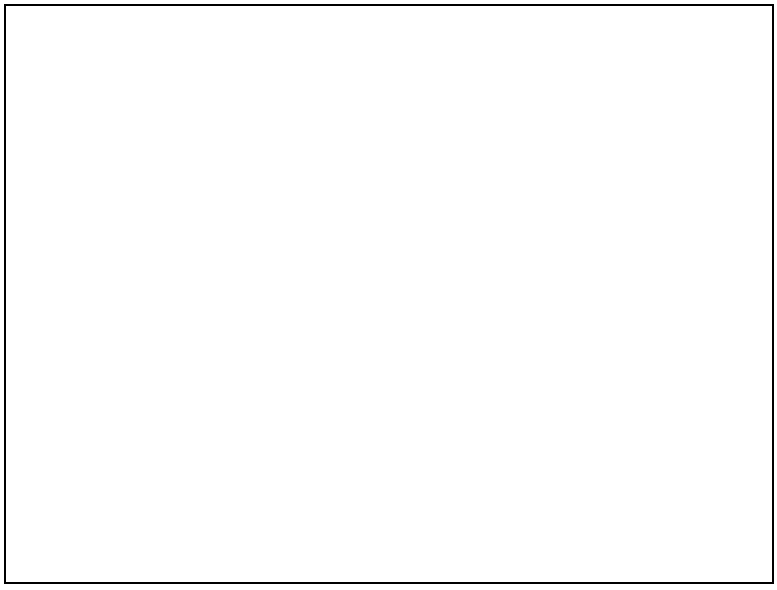


_____

Name: _____

First Square-Meter Habitat Observation Record – Student Sheet

Date: _____ Time: _____

Number of types of plants: _____ Number of Animals: _____

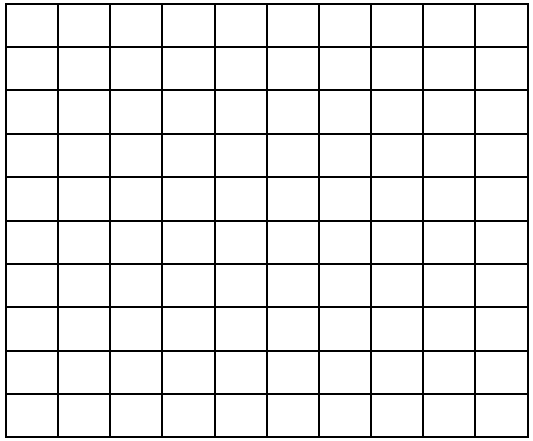
Number of insects: _____ Air temperature: _____

Description of where our habitat is located: _____

_____

Square-Meter Habitat Group Record – Student Sheet

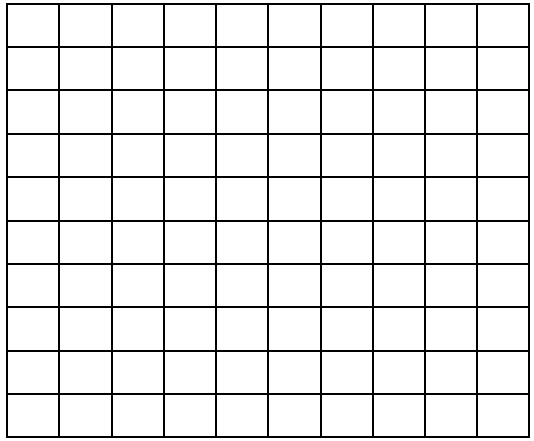
Group Members' Names: _____



Date:_____ Time:_____

Number of types of plants: _____ Number of Animals:_____

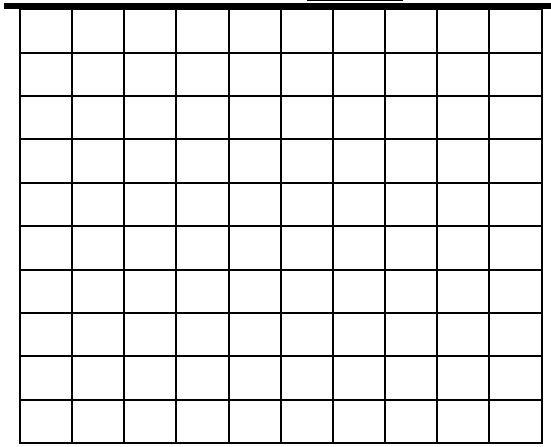
Number of Insects: _____ Air Temperature:_____



Date:_____ Time:_____

Number of types of plants: _____ Number of Animals:_____

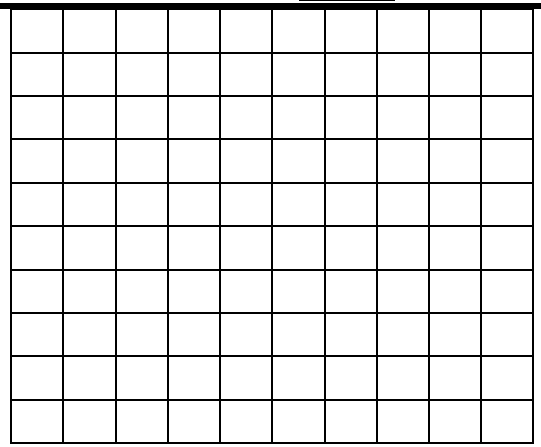
Number of Insects: _____ Air Temperature: _____



Date:_____ Time:_____

Number of types of plants: _____ Number of Animals:_____

Number of Insects: _____ Air Temperature:_____



Date:_____ Time:_____

Number of types of plants: _____ Number of Animals:_____

Number of Insects: _____ Air Temperature:_____

Topic 3: Session 3.9 – Project Work Time: Visual Project Product

Session Supplies:

- *Visual Product Rubric* (pg. 102 or pg. 241)

Session Virginia SOL

Science	English	Mathematics	History & Social Science
2.5 a, b, c 2.7 a 2.8 b, c	2.12 2.14		

Session 3.9 – Project Work Time: Visual Project Product

Teacher Questions & Notes	Procedures
	PROJECT WORK TIME: 1. Brainstorm with the class on the different kinds of visual products that could be produced about their Virginia animals (e.g., poster, diorama, play written and produced by the team, PowerPoint presentation). 2. Have students work with their project teams. 3. Have the student teams look again at their design briefs. 4. Have the teams review all the components of their written reports and verify the progress on their written reports. 5. Introduce the *Visual Product Rubric* (pg. 102 or pg. 241). Review with the students concrete examples of different kinds of products (e.g., poster, diorama, dramatic representation, PowerPoint). 6. Give the teams time to discuss and decide what they want to do for their visual product. Have the teams record their plans in their team notebooks.

Team Member Names: _____

Visual Product Rubric

	3 POINTS	2 POINTS	1 POINT
ANIMAL AND HABITAT	The product clearly shows the animal in its appropriate habitat.	The product shows the animal in its habitat, but some mistakes may be present.	The animal and/or habitat is not clearly shown.
MAP	The map includes all of the required elements: a title, compass rose, map key, and date. The James River, Appalachian Mountains, and Atlantic Ocean are accurately labeled. Symbols are used to show where the animal lives.	The map includes most of the required elements.	The map includes some of the required elements.
GRAPH	The graph includes a title, headings, key, and scale with equal increments. The graph accurately reflects the data and is made correctly.	The graph includes most of the required elements (a title, heading, key, and scale with equal increments). For the most part, the graph accurately reflects the data and is made correctly.	The graph includes some of the required elements (a title, heading, key, and scale with equal increments). The graph somewhat accurately reflects the data and is partially correct.
APPEARANCE	The product is well-planned, neatly presented, and done to the best of the team's ability.	Most of the product is well-planned, neatly presented, and done to the best of the team's ability.	Very little of the product is well-planned, neatly presented, and done to the best of the team's ability.

Teacher Comments:

Topic 3: Session 3.10 – Square-Meter Habitats: Observations 2, 3, & 4

Session Supplies:

- *Schoolyard Map* (pg. 106)
- *Graphic Organizer for Square-Meter Habitat Data Collections* (pg. 107)
- *Looking at the Square-Meter Habitat Data* (pg. 108-109)
- Equipment to make observations of the groups' square-meter habitats
  - *Square-Meter Habitat Group Record* sheet – group record sheet from Topic 3, Session 8 (pg. 100)
  - Meter sticks with string taped to them to define again the groups' square-meter habitats
  - Thermometers
  - Magnifying glasses
  - Pencils for recording data

Session Virginia SOL

Science	English	Mathematics	History & Social Science
2.1 2.5 a, b, c 2.7 a 2.8 b, c	2.3 a, b, c, d, e	2.1 a 2.4 a 2.17 2.18 2.19	2.6

Session 3.10 – Square-Meter Habitats: Observations 2, 3, & 4

Teacher Questions & Notes	Procedures
	NOTE: This session will take a minimum of three session times to complete. 1. Review the lesson (Topic 3, Session 3.8) about square meters and the first observation that each group made in their square meter on the schoolyard. 2. Discuss the differences between the observation sites each group selected and observed.
-What elements need to be on a map? -What symbols should we use for each item on our schoolyard (e.g., playground, grassy areas, blacktop)?	3. Tell the students that they will make a simple map of the schoolyard to show where each of the square-meter habitat sites is located. Hand out a *Schoolyard Map* sheet (pg. 106) to each student. a. As a class, complete the map title, compass rose, and legend. b. As a class, identify several landmarks on the schoolyard that all students will add to their map (e.g., specific trees, playground equipment, storage sheds). As a class, determine a symbol for each of the landmarks. Remind them that the

Session 3.10 – Square-Meter Habitats: Observations 2, 3, & 4

Teacher Questions & Notes	Procedures
	symbols should be fairly small and simple so that they will have room to add other items to their map. Have each student add the landmark symbols to their map, both on the map and in the map legend. c. Have the students assemble into the same group of students with whom they conducted the first square-meter observation. d. Have each group decide on a symbol for the group's square meter and add it to their map legend. Again, remind the students to keep the symbols fairly simple and small. e. Have each group add their own square-meter symbol to their maps. f. Give each group an opportunity to share with the class the symbol and the location of their square meter. Have all students add each group's square-meter symbol to their *Schoolyard Map,* both at the location of the square meter on the map and in the map legend.
-What differences did you notice? -Why do you think these differences happened? -What didn't change? -Why didn't it change?	4. Take the class outside with their *Square-Meter Habitat Group Record* sheets and their equipment (meter sticks, string, pencils, thermometers, and magnifying glasses) to conduct their second observation of their square-meter habitats. 5. On the *Square-Meter Habitat Group Record* sheet have the students draw observation #2 in another grid and record the data. 6. When the class returns to the classroom, have students list any differences between observation #1 and observation #2 on the *Schoolyard Map* sheet. 7. Gather as a class to discuss differences they noticed.
	8. Choose two other observation times. These may be done on the same day but at different times. Discuss how the time of day may cause changes to their habitat sites.
-What are the elements of a bar graph? -What scale should we use? -What title should we use?	9. After all four observations have been made, create a class bar graph on chart paper or on an overhead transparency to represent

Session 3.10 – Square-Meter Habitats: Observations 2, 3, & 4

Teacher Questions & Notes	Procedures
	the class's data from observation #4 only. 10. Decide on a scale, title, and labels for the graph. Add the title, scale, and labels of the animals, insects, and plants on the graph.
-What category is represented the most? -Why do you think there were more _____ than anything else? -What is the least amount in a category? -Why do you think it is the least? -What other information can you find in the graph? -In what other way could we display this information?	11. Collect the data from each group and display the data on the graph. 12. Discuss the graph and what the data tells us about the square-meter habitats.
--What was the same each day? --What was different?	13. Distribute the *Graphic Organizer for the Square-Meter Habitat Data Collections* (pg. 107) sheet to each student. Have the students record the data their groups have collected during their four observations. (To represent collected data, students can put an X in each cell on their graphic organizer or they can color in each cell.) 14. After completing the graphic organizers, give each student a *Looking at the Square-Meter Habitat Data* sheet and have them answer the questions based on the data they have recorded on their graphic organizer. 15. At the end of the *Looking at the Square-Meter Habitat Data* sheet have them write at least three statements and one question about things the data are showing on the graphic organizer (e.g., there are lots of insects in the square-meter habitat, there are more insects than animals).
	16. As an extension, a large class graph could be created to include data from each group for each of their observations. If this is done, spend some time with the class planning how the data will be presented (e.g., each count of data – animals, plants, etc. - will be presented on a separate graph, each observation will be on a separate graph) and how data will be presented so that data from the different groups can be distinguished easily (e.g., each group's data a different color). Discuss as a class what the data show.

Name: _____

Schoolyard Map – Student Sheet

Title: _____

Map Legend

Describe your area: _____

Changes after 2nd observation: _____

Changes after 3rd observation: _____

Changes after 4th observation: _____

Name: _____

Graphic Organizer for Square-Meter Habitat Data Collections – Student Sheet

Number of Items															
	25															
	24															
	23															
	22															
	21															
	20															
	19															
	18															
	17															
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	5															
	4															
	3															
	2															
	1															
Collection #			**1**	**2**	**3**	**4**		**1**	**2**	**3**	**4**		**1**	**2**	**3**	**4**
			Plants					**Animals**					**Insects**			
			Items per Collection Number													

Name: _____

Looking at the Square-Meter Habitat Data – Student Sheet

DIRECTIONS: As a scientist, you are going to study your data that you have recorded on the *Graphic Organizer for Square-Meter Habitat Collections* sheet. Use your data to answer the questions.

1. Look at the data you recorded about the plants you found in your square-meter habitat.
    a. Did you find the same number of plants each time you studied your square meter-habitat? _____
    b. Why or why not? _____
    _____
    _____
    c. If you studied your square-meter habitat six months from now, how do you think your plants might change? _____
    _____
    _____

2. Look at the data you recorded about the animals you found in your square-meter habitat.
    a. During which collection did you find the most animals? _____
    b. Why do you think there were more animals during that collection?
    _____
    _____
    _____
    c. Suppose the temperature tonight drops to 20 degrees (F)? What do you think might happen to the animals in your square-meter habitat?
    _____
    _____
    _____

3. Look at the data you recorded about the insects you found in your square-meter habitat.
    a. During which collection time did you find the smallest number of insects? _____
    b. Why do you think that observation had the smallest number of insects?
    _____
    _____
    _____
    c. If it rained very hard tonight, do you think there would be more insects tomorrow? _____
    Why or why not? _____
    _____
    _____

4. Look at your data that you have recorded. Write three sentences about your data.
    a. _____
    _____
    _____
    b. _____
    _____
    _____
    c. _____
    _____
    _____

5. Write one question you have about your data.
    _____
    _____
    _____

Virginia Animals and their Habitats

Topic 4

What Is a Life Cycle?

TOPIC 4 – What is a Life Cycle?

Topic 4: Overall Information

Overview

In this group of lessons students will define what a life cycle is and compare different types of life cycles. They will utilize measurement skills and data analysis, and create visual representations of various life cycles throughout the sessions.

Topic 4 Virginia SOL

Science	English	Mathematics	History & Social Science
2.1 a, b, c, d, e, h, i, j, k, l 2.4 a 2.7 a	2.1 c, d, e 2.2 a, b, c, e 2.3 a, b, c, d. e 2.7 d, e 2.9 a, b, c, d, e, f, g 2.10 b, d 2.12 2.14	2.11 a 2.15	

Teacher Background Knowledge

- A life cycle is a defined sequence of changes from birth to maturity to death of a living organism. During an animal's life cycle it goes through a series of orderly and identifiable changes.
- The word metamorphosis means "change of form."
- The butterfly goes through a metamorphosis. The stages of the butterfly life cycle are egg, larva (caterpillar), pupa (casting is called a chrysalis), and adult butterfly. When a butterfly emerges from the chrysalis, its wings are wet and need to dry before it can fly.
- At rest, butterflies hold their wings vertically over the back.
- Butterflies are usually brightly colored or strikingly patterned, have club-tipped antennae, and are active during the day.
- Moths also go through a metamorphosis. The stages of the moth life cycle are egg, larva (caterpillar), pupa (called a cocoon), and the adult moth.
- At rest, moths fold their wings tentlike over their body, wrap them around their body, or hold them extended at their sides.
- Moths have stouter bodies than butterflies, their coloring is duller, and they have distinctive feathery or thick antennae.
- The stages of a frog life cycle are egg, tadpole, froglet, and frog. Some sources may mention a polliwog stage between tadpole and froglet.
- Some animals like frogs and butterflies go through a complete metamorphosis as they mature to adults. The baby and adult look nothing alike; whereas, other animals like bears and turtles resemble their parents from birth to maturity and do not have distinct stages.
- Grasshoppers undergo a simple metamorphosis. They resemble their parents but do not have all

the body parts of an adult such as wings.
- A symmetrical object is an identical mirror image.
- Measurement of a unit is the distance between each unit. A millimeter is a smaller unit of a centimeter and even smaller unit of a meter.
- See Topic 3, the Habitat topic - for more teacher background information on measurement.
- A picture walk is when the teacher previews the text and illustrations in a book with the students, identifying the key components to set the purpose for reading.

Student Learning Expectations

- Describe the stages in the life cycle of a frog (egg, tadpole, froglet, frog), a butterfly (egg, larva, pupa, butterfly), and a moth (egg, larva, pupa, moth).
- Compare and contrast life cycles using a Venn diagram.
- Identify animals that go through a complete metamorphosis and those that do not go through distinct stages.
- Identify examples of symmetry in nature.
- Collect and analyze data.
- Measure length using the millimeter.

Procedure

NOTE: The procedures in the topic sessions may be divided into several different lesson periods. Each session may take more than one lesson period to complete.

Topic 4: Session 4.1 – Introduction to Animal Life Cycles

Session Supplies:

- Teacher-selected book on animal life cycles
- Teacher-selected book about the butterfly life cycle

Session Virginia SOL

Science	English	Mathematics	History & Social Science
2.1 a, b, c, d, k 2.4 a	2.2 a, b, c, e 2.3 a, b, c, d 2.9 a, b, c, d, e, f, g		

Excellent resources about reptiles and amphibians can be found on the New Hampshire Fish and Game Department (NHFGD) Web site at http://www.wildnh.com/Kids/kids.htm, *Turtles and Snakes* Vol. 4, Issue 1 and *Frogs, Toads, and Salamanders,* Vol. 4, Issue 2.
Wild Times for Kids is published twice a year by the NHFGD. The magazine can be downloaded.

Session 4.1 – Introduction to Animal Life Cycles

Teacher Questions & Notes	Procedures
	PROJECT WORK TIME: Give project teams time to work. During their project work time, meet with each team to monitor their progress and clarify directions.
	1. Explain to students that they will learn specifically about the life cycles of individual species that can be found within Virginia. In the students' journals have them answer the question, "What is a life cycle?" Have students share responses to determine their prior knowledge. 2. Before reading a book on animal life cycles, take a picture walk of the book, making sure to identify key nonfiction text features such as the title, table of contents, headings, bolded vocabulary, glossary, and index.
-After reading the book, ask the students again, "What is a life cycle?" -Do people go through life cycles?	3. Read the book on animal life cycles.
	4. Develop a class statement such as "A life cycle is a series of stages that an animal goes through as it grows and matures." 5. As a group, create a T-table listing "Young animals that look like their parents" and "Young animals that don't look like their parents." Use examples of animals from all six classification groups (mammals, insects, reptiles, amphibians, birds, and fish). Students may want to refer back to the list of animals they made

Session 4.1 – Introduction to Animal Life Cycles

Teacher Questions & Notes	Procedures
	at the beginning of the unit. Discuss the results and clarify any misconceptions. 6. Instruct students to choose one animal from the chart and draw or write about that animal's life cycle in their journal. 7. Have students share with a partner their journal entry.
-Is there anything you want to add to our shared statement?	8. Revise the class statement about life cycles.
	9. During this unit, the student will learn about three specific life cycles (frogs, butterflies, and moths). Use the picture walk strategy before reading a nonfiction book about the butterfly life cycle. Tell the students to listen for the stages in the butterfly's life cycle as you read. 10. After reading, have students share with a partner the stages of the butterfly life cycle. Refer back to the shared statement and revise it based on students' suggestions. (This statement will be used again in future sessions.)

Read the background information in the Project WILD Aquatic activities "*Are You Me?*" (pg.2) and "*Turtle Hurdles*" (pg. 158) for additional life cycle information.

Topic 4: Session 4.2 – Butterflies and Moths

Session Supplies:

- Shared statement about animal life cycles written in Topic 4, Session 4.1
- *Butterfly and Moth* sheets (pg. 117-131)
- Pattern blocks or small 1 x 1 centimeter squares of colored paper
- *Butterfly Wing Template* sheet (pg. 132)

Session Virginia SOL

Science	English	Mathematics	History & Social Science
2.1 a, b, c, d, i, j, k 2.4 a 2.7 a		2.15	

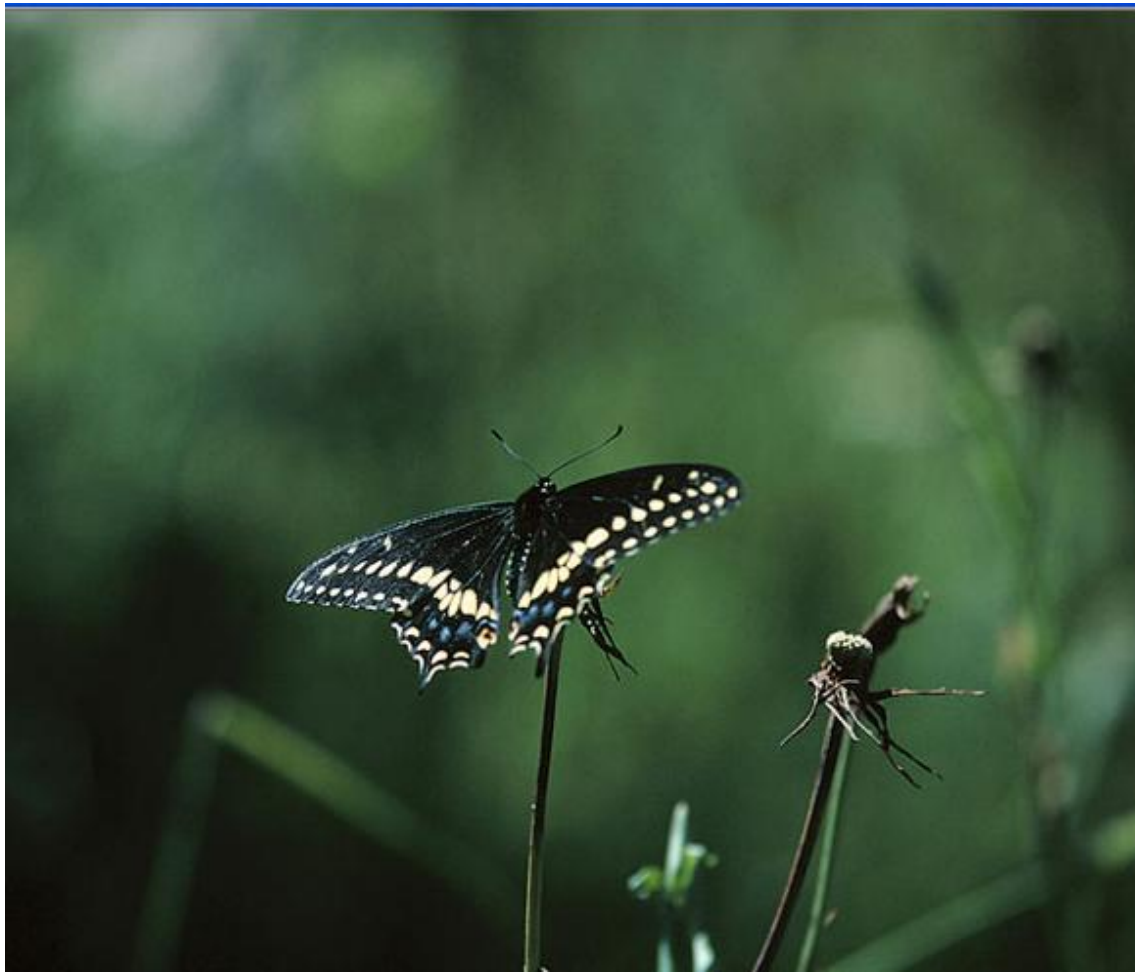
Session 4.2 – Butterflies and Moths

Teacher Questions & Notes	Procedures
-Do you think all butterflies have the same life cycle? -What are the stages of a moth's life cycle? (egg, larva-*caterpillar*, pupa-*cocoon*, moth) -How are the stages of the butterfly's life cycle and the stages of the moth's life cycle alike? Different? (pupa for a butterfly is a chrysalis, pupa for a moth is a cocoon)	1. Begin the lesson by reviewing the shared statement and stages in a butterfly life cycle discussed in Topic 4, Session 4.1. 2. Discuss the life cycle of a moth. 3. Compare how the life cycle of a butterfly and a moth are the same and how they are different.
	4. Show the pictures of a variety of different butterflies and moths found on the *Butterfly and Moth* sheets. *For other pictures, you can use the computer to project photographs up on the screen. "Google Images" is a great resource. If technology is not readily accessible, you can also use photographs from nonfiction books.*
	5. Guide students to understand that different species of butterflies go through the same life-cycle stages and the different species of moths go through the same life-cycle stages.
	6. As a class, review the photographs. Discuss similarities and differences between the different butterflies and moths. *(Refer to the "Teacher Background Knowledge" section of the "Topic 4 Overview" (pg. 111-112))* 7. Compare the differences between butterflies and moths.
-What is symmetry? -Why do you think we see symmetry in nature?	8. Allow students to brainstorm ideas, but guide them toward the symmetrical characteristics of the butterfly and moth wings.

Session 4.2 – Butterflies and Moths

Teacher Questions & Notes	Procedures
-Where else in nature do you see symmetry? -How do you think it helps animals to survive?	9. Choose one distinct photograph to use. Have students observe one wing and compare it to the other wing. Lead the students to define symmetry. 10. Discuss as a class where else in nature students have seen symmetry. 11. Tell students that they will be creating one side of a butterfly wing using pattern blocks. Pass out the pattern blocks and the *Butterfly Wing Template* sheet (pg. 132) and have students create their design. 12. When students are done, have them switch seats with a partner. They will recreate the other wing on the partner's design. Have students check each others' work. 13. Have them glue the butterfly wing template page directly in their journals. *If the students used the pattern blocks to build the symmetrical wings, have them draw the symmetrical wings on their butterflies before they cut out and paste them in their journals. If they used the colored 1 x 1 centimeter squares, have them glue the squares on their butterflies before they cut out and paste them in their journals.*

Butterflies and Moths



Black Swallowtail
Smithsonian National Zoological Park
http://nationalzoo.si.edu/Animals/BackyardBiology/UrbanNatureWatch/ButterflyWatch/

American / Painted Lady
Smithsonian National Zoological Park
http://nationalzoo.si.edu/Animals/BackyardBiology/UrbanNatureWatch/ButterflyWatch/

Great Spangled Fritillary
Smithsonian National Zoological Park
http://nationalzoo.si.edu/Animals/BackyardBiology/UrbanNatureWatch/ButterflyWatch/

Monarch

Smithsonian National Zoological Park

http://nationalzoo.si.edu/Animals/BackyardBiology/UrbanNatureWatch/ButterflyWatch/

Tiger Swallowtail
Smithsonian National Zoological Park
http://nationalzoo.si.edu/Animals/BackyardBiology/UrbanNatureWatch/ButterflyWatch/

Tailed Jay Butterfly
(Jon Lelito, PSU Entomology)
http://ento.psu.edu/extension/insect-image-gallery/all-images/tailed-jay.jpg/view

Postman Butterfly
(Jon Lelito, PSU Entomology)
http://ento.psu.edu/extension/insect-image-gallery/all-images/postman-butterfly.jpg/view

Julia Butterfly
(Jon Lelito, PSU Entomology)
http://ento.psu.edu/extension/insect-image-gallery/all-images/julia-butterfly.jpg/view

Isabella Butterfly
(Jon Lelito, PSU Entomology)
http://ento.psu.edu/extension/insect-image-gallery/all-images/isabella-butterfly.jpg/view

Waved Sphinx Moth

(B. Newton, 2002)

http://www.uky.edu/Ag/CritterFiles/casefile/insects/butterflies/butterflies.htm

Clearwing Sphinx Moth or Hummingbird Moth

(B. Newton, 2005)

http://www.uky.edu/Ag/CritterFiles/casefile/insects/butterflies/sphinx/sphinx.htm#carolina

Gypsy Moth (laying an egg mass)
http://www.ext.vt.edu/pubs/entomology/444-750/444-750.pdf

Leopard Moth
(Maryann Frazier, PSU Entomology)
http://ento.psu.edu/extension/insect-image-gallery/all-images/leopard-moth-adult.jpg/view

Imperial Moth
(Maryann Frazier, PSU Entomology)
http://ento.psu.edu/extension/insect-image-gallery/all-images/imperial-moth.jpg/view

Io Moth

(wings open)

(Maryann Frazier, PSU Entomology)

http://ento.psu.edu/extension/insect-image-gallery/all-images/io-moth-wings-open.jpg/view

Name: _____

Butterfly Wing Template – Student Sheet

Directions:

1. Partner 1 – use pattern blocks or colored squares to create the butterfly wing on the left side of the butterfly's body.
2. Partner 2 – use pattern blocks or colored squares to create the right side wing.

REMEMBER: The two wings should be symmetrical.

Topic 4: Session 4.3 – Frogs

Session Supplies:

- Teacher-selected nonfiction book about the life cycle of frogs
- Photographs of a variety of different frogs
- Computer internet access (if possible)
- Fact pages on the pickerel frog, bullfrog, little grass frog, northern green frog, and mountain chorus frog (pg. 136-140) (or online at http://www.dgif.virginia.gov/wildlife/information/?t=1)
- *Sampling of Virginia Frog Length Data* sheet (pg. 141) (There are two data sheets on each page. Cut the page in half. Each student needs only one data sheet.)
- *Sampling of Virginia Frog Length Data* – teacher key (pg. 142)
- Meter stick
- *Female Frog Length Recording* sheets (pg. 143-144)
- *Male Frog Length Recording* sheets (pg. 145-146)

Session Virginia SOL

Science	English	Mathematics	History & Social Science
2.1 a, b, c, d, e, h, i, j, k, l 2.4 a	2.2 a, b, c, e 2.3 a, b, c, d, e 2.7 e 2.9 a, c, d, e, f 2.10 b, d 2.12 a, c, d 2.14	2.11 a	

Session 4.3 – Frogs

Teacher Questions & Notes	Procedures
-Do you think all frogs have the same life cycle?	1. Read and discuss the teacher-selected nonfiction book about the life cycle of frogs. 2. Show students photographs of a variety of frogs. Lead students to the understanding that different species still go through the same stages of a life cycle.
-What do you notice about the frogs?	3. Compare and contrast the photographs of the frogs. Guide students to notice the different sizes of the frogs.
	4. Tell students that they are going to look at one specific characteristic of frogs for several Virginia frog species. They will research information for each species, record it on a data table, and analyze what has been discovered. *NOTE: The specific Virginia frogs for which students will gather data are:* a. pickerel frog b. bullfrog

Session 4.3 – Frogs

Teacher Questions & Notes	Procedures
	c. little grass frog d. northern green frog e. mountain chorus frog 5. Give each group a blank *Sampling of Virginia Frog Length Data* sheet (pg. 141) and have them research the sizes of given species of frogs. (A teacher key is provided on pg. 142.) Have students read each fact sheet (pg. 136-140) and record their findings on the data sheet. Remind students that scientists and mathematicians always include the units of measurement. (For this activity the units are mm – milimeters.) *NOTE: Options for Getting Frog Data* a. Online Option: Show students how to access the Virginia Department of Game and Inland Fisheries (VDGIF) Web site and navigate to the page on frogs. They can find the information they need to complete the table at this Web site. *To access the VDGIF Web site:* (1) Type in http://www.dgif.virginia.gov . (2) On the left hand side, click on Wildlife Information. (3) Click on Amphibians. (You may want to bookmark this site ahead of time). (4) Scroll down and find each species listed on the data chart. b. Paper Option: Give each group a printout of fact pages (pg. 136-140) for pickerel frog, bullfrog, little grass frog, northern green frog, and mountain chorus frog.
	6. Have students examine the table they have filled in on the *Sampling of Virginia Frog Length Data* sheet. Have them ask themselves, "What does this table tell me?" Discuss their answers as a class. 7. Guide the students to identify the table elements - title, headings, and data.
-Do you know what the "mm" on the	8. Remind students that in the habitat sessions they used a meter

Session 4.3 – Frogs

Teacher Questions & Notes	Procedures
table stands for? -How do you think a meter stick relates to a millimeter? -Is a millimeter bigger or smaller than a meter? -Why do you think that? -What tool would you use to measure how long a mm is?	stick to measure an area. Discuss what they know about millimeters.
-Is a millimeter bigger or smaller than a centimeter? Than a meter? -Why would a scientist measure a frog's length in mm and not cm or m? -What else could you measure in mm?	9. Tell students that what they recorded on the table was scientific data. Scientists measure actual frogs to determine their length. 10. Pass out the *Female Frog Length Recording* sheets (pg. 143-144) and the *Male Frog Length Recording* sheets (pg. 145-146). Ask, "Who can tell me what they see?" When students have noticed the lines, tell students to put a finger on five and another finger on six. Ask them to count the number of lines from finger to finger. Ask them if it is true that there are nine lines and ten spaces between any two numbers on the strip? Mathematicians and scientists call the spaces between each line a millimeter.
	11. Have students use the data they collected to mark each frog's length on the *Male and Female Frog Length Recording sheets. The data they collected is a range. You will need to decide whether to have students mark the upper end of the range or the lower end of the range on their recording sheets. For consistency, all students should use the same value.*
-What do you notice about the length of the different species of frogs? -How is the length of the male frog different from the length of the female frog? -How does a bullfrog compare to a pickerel frog?	12. Have students record specific statements about the data in their journal using both the table and their visual representations of the frogs' lengths. Typically students will record statements such as: The pickerel frog is 46-64 mm. Although this is an important step, you will want to guide students to also make comparisons amongst the data. For example, the male Little Grass frog is shorter than the female Little Grass frog.
-Why do you think frogs are different sizes? - How do you think this helps them to survive within their own habitat?	13. Have students find a partner and share their statements. Then discuss them as a class.

A very good source of photographs of Virginia frogs is the Department of Game and Inland Fisheries Website – www.dgif.virginia.gov.

Address http://www.dgif.virginia.gov/wildlife/information/?s=020004 Go

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bullfrog (*Rana catesbeiana*)

Characteristics

This is the largest native frog with the males from 85-180 mm, and females from 89-200 mm. They are broad in body with the color greenish drab, and yellowish white below. This species breeds from May-August. The egg mass is a large floating mat up to a meter wide. Territories are established by croaking and defended by vocalizations, postures, and combat. The voice is a croak said to resemble the distant roaring of a bull.

Distribution

This species is aquatic and prefers larger bodies of water than most other frogs. This species is rather general in habitat selection, and may be found in a great variety of aquatic situations.

Foods

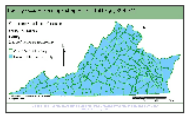
This species will eat almost anything living that it can at least partially swallow. Insects and crayfish the most important food item in this species' diet. The consumption of plant food is considered accidental.

More Information

For more information, please visit the Virginia Fish & Wildlife Information Service (direct link to species booklet).

Photos

Distribution Map



Address http://www.dgif.virginia.gov/wildlife/information/?s=020010 Go

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little grass frog (*Pseudacris ocularis*)

Characteristics

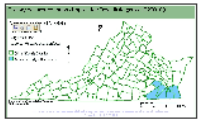
This species is very small with the males 11.5-15.5 mm and the females 12.0-17.5 mm. The general coloration is variable from tan, brown, greenish, pink, to reddish, with a dark line passing through the eye and onto the side of the body. There is usually a narrow dark mid-dorsal stripe starting as a triangle between the eyes and extending to the anal region. This species breeds from January to September in shallow grassy ponds. About 100 individual brown and cream eggs are laid on the bottom of ponds and in vegetation in shallow water. Climbing is restricted to low vegetation, and the voice is a tinkling insect-like call, *set-see, set-see*.

Photos

Distribution

This frog is found in southeastern Virginia. It is most often found in moist grassy areas near ponds, bogs, pools or streams in hardwood forests and wooded swamps. Breeding sites are largely restricted to flooded grassy areas including roadside ditches, logged areas, meadows, emergent shrub wetlands, flooded pastures.

Distribution Map



Foods

This frog climbs on low vegetation near shallow ponds in search of insects.

More Information

For more information, please visit the Virginia Fish & Wildlife Information Service (direct link to species booklet).

Address http://www.dgif.virginia.gov/wildlife/information/?s=020011 Go

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mountain chrous frog (*Pseudacris brachyphona*)

Characteristics

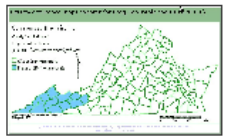
This species is gray or brown in color with 2 curved stripes on the back. The stripes may touch in the center of the back to form a crude dark 'X'. A dark triangle between eyes is usually present and there is a white line on the upper lip. The males are 24-32 mm, and the females are from 27-34 mm. This species breeds from March to July. There are 10-50 eggs that are attached to vegetation or trash. The egg complement is from 300-1500. They are often found long distances from the water. This species breeds in shallow woodland pools. The voice is a rasp, suggestive of a wagon wheel turning without benefit of lubrication.

Photos

Distribution

This species is found on forested hillsides often near springs and rivulets and may range upward to elevations of at least 3,500 feet. It breeds in shallow pools in woods or at its edge. Breeding habitat consists of virtually any small standing body of water including roadside ditches, seepages, and flooded pastures adjacent to streams.

Distribution Map



Foods

The chorus frogs climb little and only into weeds in pursuit of insects.

More Information

For more information, please visit the Virginia Fish & Wildlife Information Service (direct link to species booklet).

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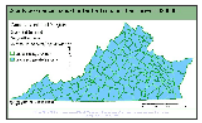
northern green frog (*Rana clamitans melanota*)

Characteristics

This species is brown or greenish with dorso-lateral folds that do not extend to the groin and with no light line along the upper jaw. The length of the male is 52-77 mm, and the female is 58-75 mm. The belly is white to gray and the throat is dusky or yellowish, or bright yellow. The tadpoles are olive green and large, up to 64 mm. It breeds from May through August. The eggs are black and white, 1.5 mm in diameter. This species is considered the most active of all native frogs, and is capable of enormous leaps. The voice is like a pluck of a banjo string.

Photos

Distribution Map



Distribution

This species can be found wherever there is shallow fresh water and are fairly widespread in Virginia.

Foods

This species will eat any living thing it can capture and swallow.

More Information

For more information, please visit the Virginia Fish & Wildlife Information Service (direct link to species booklet).

Address http://www.dgif.virginia.gov/wildlife/information/?s=020013 Go

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pickerel frog (*Rana palustris*)

Characteristics

This is a medium sized frog, males 46-64 mm, females 49-79 mm. They are gray or tan with a double row of squarish blotches between the complete dorsolateral folds. The belly is white or yellowish. The concealed surface of the hind legs yellow or orange. This species breeds from April to May and often gathers in large numbers in small areas. The brown and bright yellow eggs are submerged, attached to twigs or grass stems and number 2000-3000. The eggs are 1.6 mm in diameter. This species is quite active, often found far from water in the summer. The voice is a weak snore with a duration of 1 to 3 seconds and calls are given from above and below the water. Few snakes will eat pickerel frogs because of noxious skin secretions.

Distribution

The pickerel frog is found statewide except for extreme Southeastern Virginia and much of the Eastern Shore. This species is often found in sphagnum bogs, rocky ravines, and meadow streams.

Foods

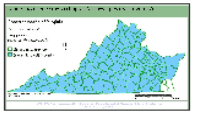
The pickerel frog is an insectivore.

More Information

For more information, please visit the Virginia Fish & Wildlife Information Service (direct link to species booklet).

Photos

Distribution Map



Name:_____

A Sampling of Virginia Frog Length Data – Student Sheet

Record the lengths of these frogs.

Type of Frog	Male	Female
Pickerel frog		
Bullfrog		
Little Grass frog		
Northern Green frog		
Mountain Chorus frog		

Name:_____

A Sampling of Virginia Frog Length Data – Student Sheet

Record the lengths of these frogs.

Type of Frog	Male	Female
Pickerel frog		
Bullfrog		
Little Grass frog		
Northern Green frog		
Mountain Chorus frog		

A Sampling of Virginia Frog Length Data - Teacher Key

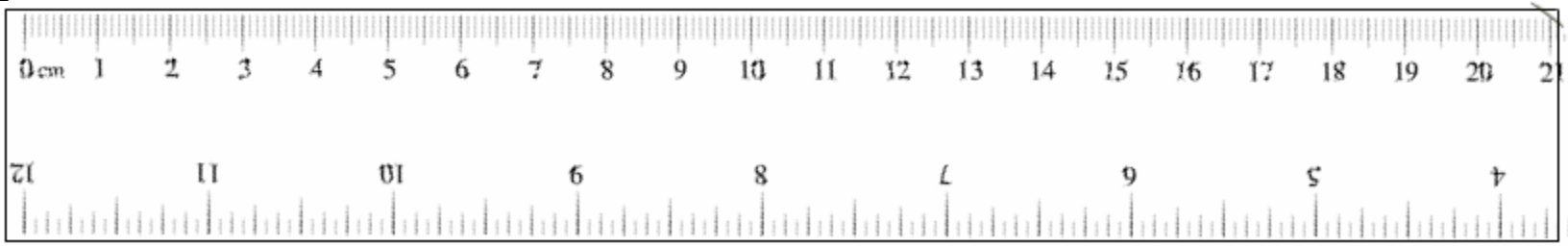
Type of Frog	Male	Female
Pickerel frog	46-64 mm	49-79 mm
Bullfrog	85-180 mm	89-200 mm
Little Grass frog	11.5-15.5 mm	12-17.5 mm
Northern Green frog	52-77 mm	58-75 mm
Mountain Chorus frog	24-32 mm	27-34 mm

Name: _____

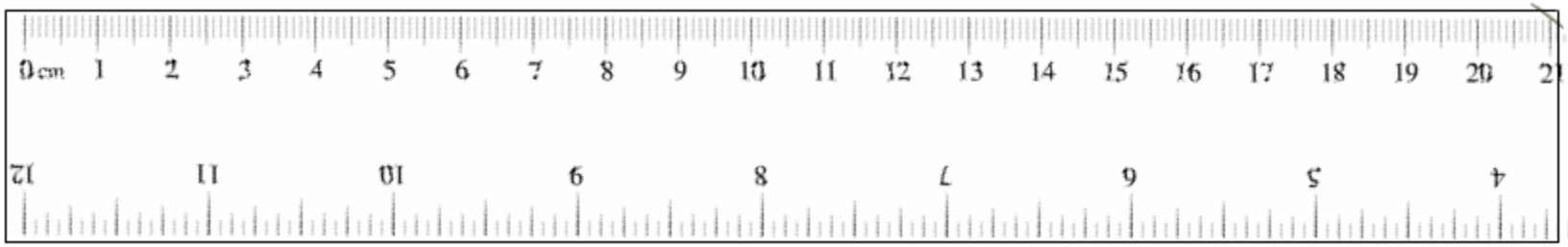
Female Frog Length Recording – Student Sheet

Use the Virginia frog length data to shade in the length of each species of frog on the rulers below. Color neatly!

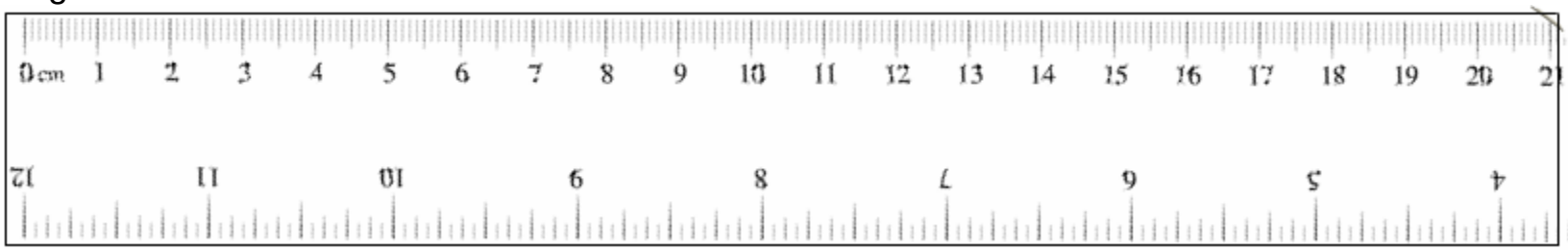
Pickerel frog



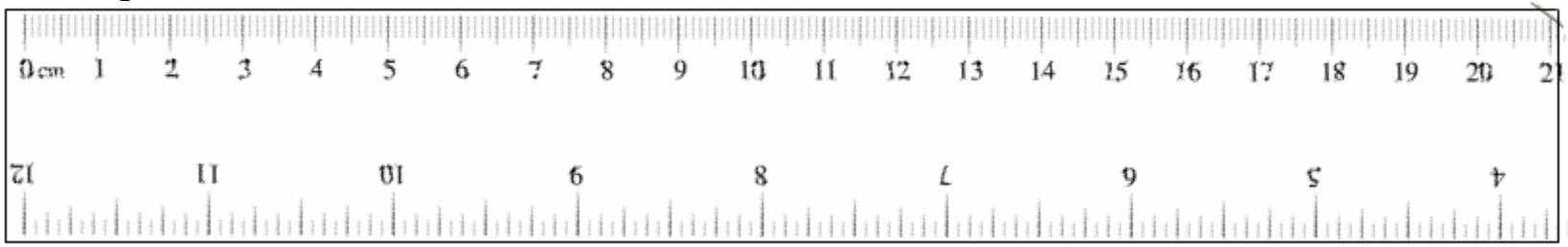
Bullfrog



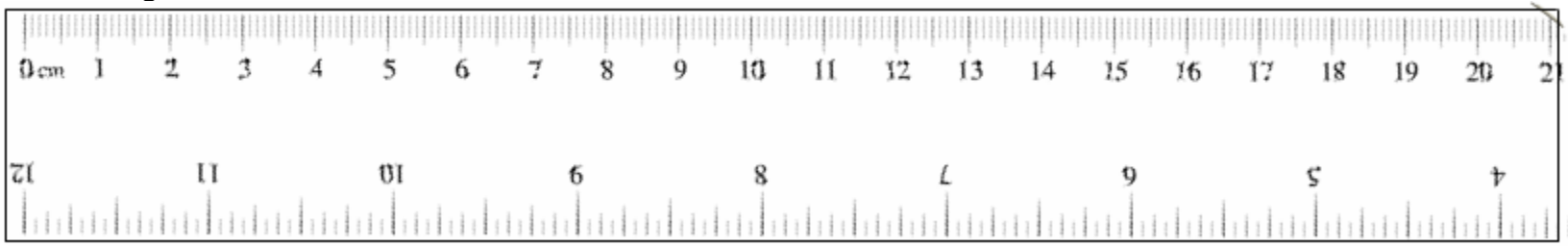
Little Grass frog



Northern Green frog



Mountain Chorus frog

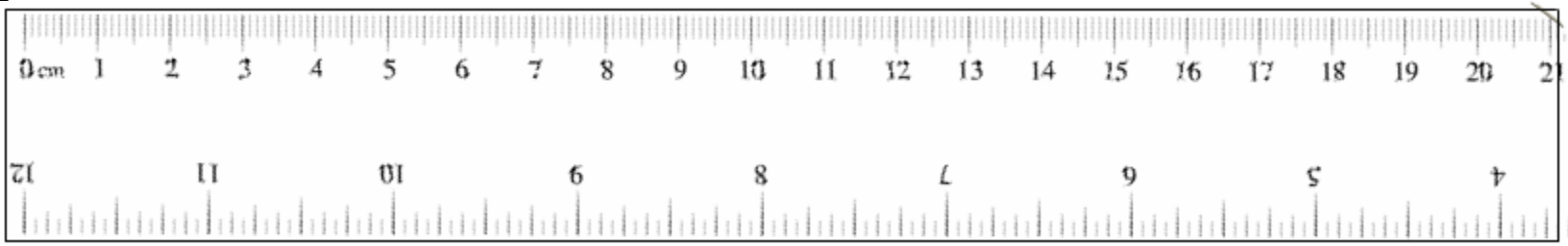


Name: _____

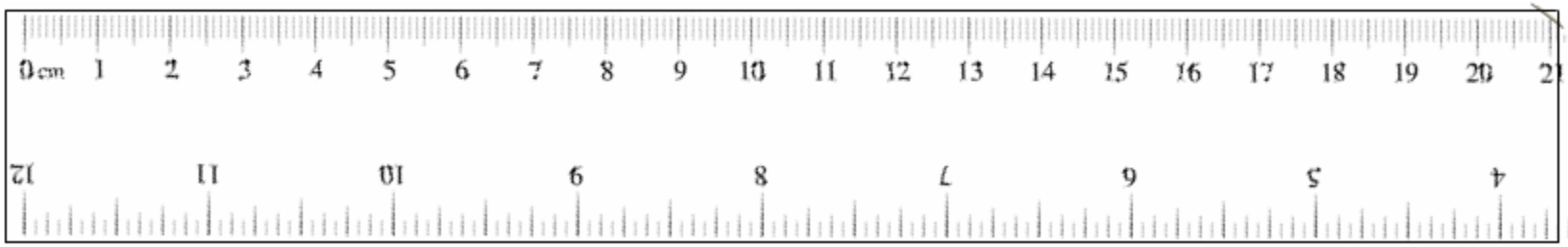
Male Frog Length Recording – Student Sheet

Use the Virginia frog length data to shade in the length of each species of frog on the rulers below. Color neatly!

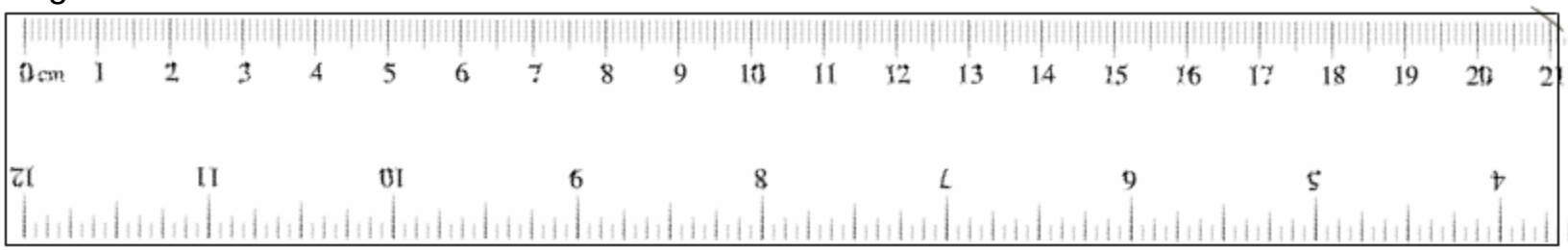
Pickerel frog



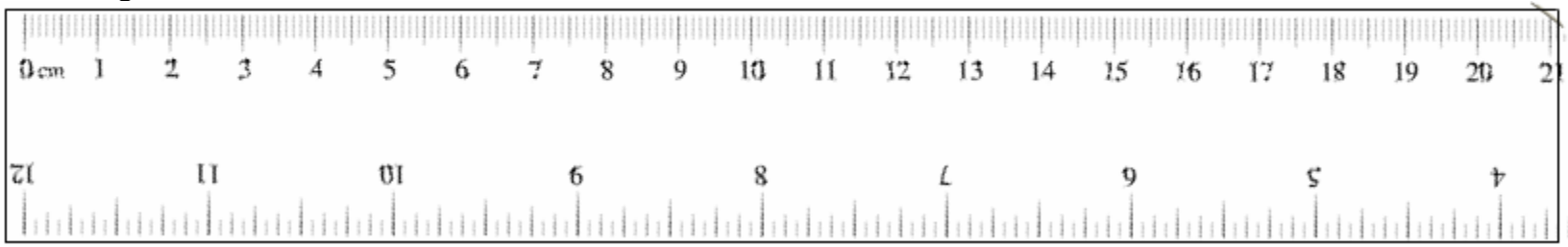
Bullfrog



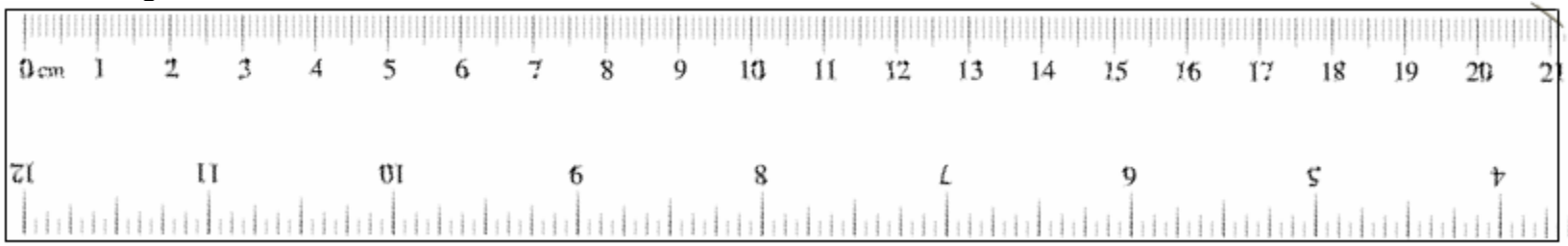
Little Grass frog



Northern Green frog



Mountain Chorus frog



Topic 4: Session 4.4 – Life Cycle Models

Session Supplies:

- Materials for students to make models - plates, different kinds of macaroni noodles, beans, cotton, crayons, clay, construction paper, etc.
- Scissors
- Glue

Session Virginia SOL

Science	English	Mathematics	History & Social Science
2.1 i, j, k, l 2.4 a	2.1 c, d, e 2.2 a, b, c, e 2.3 a, b, c		

Session 4.4 – Life Cycle Models

Teacher Questions & Notes	Procedures
	Topic 4, Session 4
	Prior to this session, the teacher will need to gather materials for students to use when creating their life-cycle models. A list of suggested supplies can be found in the materials section, but you may use any materials you have available. This session may need to be broken into two sessions depending on time available.
	1. Scientists record information in a variety of ways. Students will demonstrate what they have learned by constructing a model of the life cycle of a butterfly, a moth, or a frog. a. Show students the available supplies. If technology is available, you may give students the option to create a PowerPoint, claymation, etc. b. On the board, list three criteria for their projects: i. Your model must show the four life-cycle stages. ii. Your model must be labeled. iii. Your model must include a fact sheet that has at least two additional facts about the butterfly, the moth, or the frog. 2. Have students construct their models. 3. Have students present their models to the class. 4. Using the information learned during the life-cycle presentations, create a class Venn diagram comparing the butterfly, the moth, and the frog life cycles. Also include at least one other animal (e.g., dog, grasshopper, squirrel). Included on the Venn diagram can be information about their life cycle, habitat, physical

Session 4.4 – Life Cycle Models

Teacher Questions & Notes	Procedures
	characteristics, adaptations, etc. The goal is for students to reiterate the fact that some animals like butterflies, moths, and frogs go through a complete metamorphosis as they mature to adults (the baby and adult look nothing alike) and some animals do not go through metamorphosis as they grow and mature (the baby looks similar to the adult).

Topic 4: Session 4.5 – Project Work Time: Life Cycles

Session Supplies:

- Design Brief for the project – a copy should be located in each team project notebook and was introduced in Topic 3, Session 3.4
- *Life Cycle Planning* sheet (pg. 150)

Session Virginia SOL

Science	English	Mathematics	History & Social Science
2.1 i, j, k, l 2.4 a	2.7 d, e 2.12 2.14		

Session 4.5 – Project Work Time: Life Cycles

Teacher Questions	Procedures
	PROJECT WORK TIME: 1. Review the design brief of each team's written report. 2. Have students work in their project teams and give them the *Life Cycle Planning* sheet (pg. 150). Some teams may need additional planning sheets. Teams will use the *Life Cycle Planning* sheet to show how their animal grows from a newborn baby to an adult. 3. Each team will use their project planning sheets and available resources (e.g., books, textbook, Internet) to research their animal's life cycle. 4. By the end of this project work time, each team should complete a team *Life Cycle Planning* sheet for their team animal. 5. At the end of this project work time, each team member should also complete a reflection page in their journal based on the team's work on their animal's life cycle.

Name: _____

Life Cycle Planning Page – Student Sheet

_____ _____ _____	_____ _____ _____
_____ _____ _____	_____ _____ _____

Virginia Animals and their Habitats

Topic 5

What is a Food Chain?

TOPIC 5 – What is a Food Chain?

Topic 5: Overall Information

Overview

In this group of lessons students will define what a food chain is and how each animal is interconnected.

Topic 5 Virginia SOL

Science	English	Mathematics	History & Social Science
2.1 a, b, c, d, e, h, i, j, k, l, m 2.4 a 2.5 a, b 2.8 c	2.1 2.2 a, b, c, e 2.3 a, b, c, d, e 2.9 e, f 2.10 2.12 2.13 2.14	2.11 a, b 2.21	2.10 b

Teacher Background Knowledge

- A food chain is the transfer of food energy from one organism to another as each consumes a lower member and in turn is preyed upon by a higher member. A food chain includes the sun, plants, and animals.
- A food chain always starts with the sun, then plant life, and ends with an animal.
- An example of a simple food chain would be: The sun provides the energy for an acorn to grow into an oak tree. Oak trees are a plant. Oak trees produce acorns. Squirrels eat acorns. Hawks eat squirrels. When the hawk dies, decomposers break down the nutrients in the hawk's carcass and return the nutrients to the soil. Plants can then use the nutrients.
- A food chain shows how each living thing gets its food. Some animals eat plants, some animals eat other animals, and some animals eat both plants and animals.
- The further up the food chain you go, the less food (and hence energy) remains available.
- A food web is a series of food chains that are connected by a plant or animal that is common to several chains.
- Within an ecosystem, all plants and animals are interdependent and interconnected. If one part of the system is missing, the balance of the ecosystem is affected.
- A critical aspect of a problem-based task is the process. Students need to be able to articulate how they solved the problem. Students need to justify and represent their thinking in multiple ways. Not all students will solve a problem using the same approach and students benefit from hearing each other's strategies. This process takes time and the focus is on ***how*** students solved the problem, not just the final answer.

Student Learning Expectations

- Identify organisms in a food chain and describe how they are connected.
- Identify that a food chain always starts with the sun, then plant life, and ends with an animal.
- Create a food web and explain how organisms are interdependent.
- Demonstrate what will happen in a habitat if something removes a species (plant or animal) from the habitat's food web.
- Identify the sun as the source of energy for food chains.

Procedure

NOTE: The procedures in the topic sessions may be divided into several different lesson periods. Each session may take more than one class lesson to complete.

Topic 5: Session 5.1 – Animals and their Food

Session Supplies:

- An apple to show the class

Session Virginia SOL

Science	English	Mathematics	History & Social Science
2.1 h, i, k 2.5 a, b 2.8 c	2.3 a, b, c, d, e 2.12 2.13 a, j		2.10 b

Session 5.1 – Animals and their Food

Teacher Questions & Notes	Procedures
	1. Review the parts of a habitat. (food, water, shelter, space) 2. Give examples of Virginia animals (e.g., white-tailed deer, gray squirrel, frog) and ask the students to identify the parts of their habitat.
	3. Tell your students that they are going to focus today on one part of an animal's habitat – its food. 4. Ask the students "Why is food important for an animal?" and "Why is food important for you?" Make sure that the students identify that animals need food for energy and that they cannot live if they do not have food.
	5. Tell the students that they are going to write poems today about animals and their food. 6. Review the five senses with the students. Tell the students that they are going to use the senses in their poems today (smell, taste, touch, sound, sight).
	7. Show the students an apple. Make sure that they recognize that it is a food source for them and is a source of energy for them. 8. Review what an adjective is and generate a list of adjectives that describe the apple (e.g., red, round, smooth, sweet smelling). Write the words on a chart.
	9. Have students name other foods and generate a list of adjectives that describe each of the foods. Write the words on the chart.
	10. Tell the students that they are now going to write a poem about

Session 5.1 – Animals and their Food

Teacher Questions & Notes	Procedures
	one of the foods using their senses and the adjectives that they have generated. 11. Have the class select one of the foods that they had identified. You can have them vote as a class on which food they want to select.
	12. With the class, generate a poem that follows the format below: a. Line 1: Name the food. b. Line 2: Use a sense and an adjective to describe the food. c. Line 3: Use another sense and an adjective to describe the food. d. Line 4: Use a third sense and an adjective to describe the food. e. Line 5: Write a sentence about the food starting with the words "I wonder…". Example of a poem about an apple: An apple. Looks bright red. Smells sweet. Smooth to the touch. I wonder if there is a worm in my apple.
	13. Generate at least two more class poems about other foods they have identified.
	14. Have the class break into their project teams. 15. With their project team, students identify foods that their animal eats. 16. Have the team generate adjectives that describe the foods their animal eats. 17. Have the team write a poem about one of the foods that their animal eats using the format described in item #12. 18. Have the team put a copy of their team poem in their team notebook.

Session 5.1 – Animals and their Food

Teacher Questions & Notes	Procedures
	19. Have team members each write a copy of their team poem in their journal and illustrate their poem.
	20. Have each team share their poem with the class.

Topic 5: Session 5.2 – Black Bears

Session Supplies:

- Teacher-selected book about black bears (make sure it is about black bears, not other bear species)
- *Compare Yourself to a Black Bear* data collection sheet (pg. 161) *[Used with permission from the Virginia Department of Game and Inland Fisheries, Headquarters, 4010 West Broad Street, P.O. Box 11104, Richmond, VA 23230]* www.dgif.virginia.gov
- Tape measure or ruler to measure students' heights
- Scale to measure students' weights
  - *NOTE: It is important to keep students' weights confidential to each student! When weighing individual students, it needs to be done with each student alone so that no other students can see.*
- *Just the Bear Facts* video found on A Look Outside DVD
  - *NOTE: A Look Outside DVD is available through the Virginia Department of Game and Inland Fisheries (VDGIF). Virginia school librarians can obtain the DVD by contacting the VDGIF Wildlife Educator at (804) 367-0188.*
  - *NOTE: The video can also be accessed for "streaming" from the following:*
    - Log into the Web site: www.ideastations.org (Virginia PBS Stations)
    - Click on the Education gray box
    - Click on the link to Classroom CLIPS
    - In the upper right-hand corner is a Search box. Type "bear" and search
    - Scroll down to "*Just the Bear Facts"*
- Write the math problem in item #16 either on the board or chart paper to then be used with #16 in this lesson.

Session Virginia SOL

Science	English	Mathematics	History & Social Science
2.1 a, b, c, d, e, h, i, j, k 2.5 b 2.8 c	2.2 a, b, c, e 2.3 a, b, c 2.10 b, d 2.12	2.11 a, b 2.21	

Session 5.2 – Black Bears

Teacher Questions & Notes	Procedures
	Lesson preparation that needs to be done a day or two in advance of this session: 1. A day or two before you do this lesson with your students, tell them that they need to find out their weight and their height when they were born, and if possible, their weight at one year old. Explain that they will use this information to compare themselves to black bears. *NOTE: If a student is not able to get his/her weight at one*

Session 5.2 – Black Bears

Teacher Questions & Notes	Procedures
	year of age, you can multiply his/her birth weight by three for a good estimate. 2. Write the problem found in #16 of this session on the board or on chart paper to be used later in the session.
	3. Make a class chart with birth weights and birth heights. Write comparison statements about the information. (e.g., "Ann weighed the least at birth."; Tommy, John, and Jennifer were the same height at birth.") 4. Discuss how the students are different now (e.g., taller, weigh more). 5. Discuss what helped them grow (e.g., food, exercise, sleep). 6. Review with your students why food is an important part of an animal's habitat. 7. Tell the students that we are going to explore black bears, the foods they eat, and how the foods help them grow. *NOTE: Make sure that the information that you gather and the discussion that you have with your students is about black bears, not other bear species.* 8. Select a book about black bears. Read the book with the class. Discuss the food that a black bear eats.
	9. Show the video: *Just the Bear Facts* from the <u>A Look Outside</u> DVD (15 min). 10. Emphasize the importance of precise measurements as you watch the video. *(Teacher note: adaptation and hibernation are introduced and will be further discussed during Topic 6 sessions on adaptations.)* 11. After viewing the video, discuss with the class what kinds of food the bears eat and how their food helps them.
	12. Have the students complete the *Compare Yourself to a Black Bear* sheet (pg. 161).

Session 5.2 – Black Bears

Teacher Questions & Notes	Procedures
	a. Read the Student Data Page, page 21, from Project WILD activity "Bearly Growing". (Prior to reading aloud, preview the passage. You may want to paraphrase some sections. You do not need to use the table at the bottom). b. As you read each paragraph, stop and have the students record new information they hear on their comparison chart. *NOTE: The average standing height of a black bear is 5-6 feet (this information is needed to complete the data sheet).* c. Have students complete the column about themselves. Assist the students, if needed, in measuring their current height and weight. *NOTE: It is important to keep students' weights confidential to each student! When weighing individual students, it needs to be done with each student alone so that no other students can see.*
	13. In their journals have students write the title *Comparison Statements* and then write at least three statements explaining how they are similar or different from a black bear. 14. Explain that they are going to use the data about the weight of bears to solve a math problem. 15. Reread the last paragraph on page 21 of Project WILD. Explain that they need to listen carefully since this is where the data used in their math problem (in item #16) that they are going to solve is found. 16. Share the math problem that you wrote on the board (or on chart paper) with the students and give them time to work on it. Students can work with a partner to talk through the problem and share ideas, but each student needs to record their thinking in their own journal.

Session 5.2 – Black Bears

Teacher Questions & Notes	Procedures
	MATH PROBLEM: A female bear cub weighs 30 pounds. An adult female black bear weighs 150 pounds. One adult female bear climbs on one end of balance scale. Some bear cubs climb onto the other side to make the scale balanced. How many cubs climbed on the scale? Show your thinking in pictures, numbers, and words. 17. Have the students to share their strategies with the class.

For additional information about black bears, read the background information in Project WILD *How Many Bears Can Live in This Forest"* (pg. 23) and *"What Bears Go Where"* (pg. 118.) For teacher information on bears, view *"Living with Black Bears"* which can be accessed on www.dgif.virginia.gov or at www.ideastations.org.

Name: _____

Compare Yourself to the Black Bear – Student Sheet

(From: Project WILD K-12 Curriculum and Activity Guide, Version 2006, pg. 22)

The average height of an adult male black bear standing upright:	Your height:
The weight of an adult male black bear:	Your weight:
The average weight of a one-year-old male black bear:	Your weight at one year of age:
The average birth weight of a black bear cub:	Your birth weight:
The average number of cubs that a black bear has per litter:	Average number of babies your mom had at one time:
The length of time a cub stays with its mother:	Number of years you probably will stay at home:
The range of a black bear's life span:	Average person's life span:

Topic 5: Session 5.3 – Food Chains

Session Supplies:

- One copy of *A Forest Food Chain* (pg. 165) and cut apart the parts
- Samples of different chains (e.g., a necklace, a tow chain)
- One copy of *Food Chains* (pg. 166) and cut apart the parts of the food chains. (The food chains go across each row. Make sure to keep the parts of each food chain together.)
- Strips of colored paper (yellow, green, and brown) cut to 8 ½ inches long and about 1 inch wide – enough for each student to have one yellow strip, one green strip, and two to three brown strips
- Glue or tape

Session Virginia SOL

Science	English	Mathematics	History & Social Science
2.1 a, i, j. k., l, m 2.5 b 2.8 c	2.1 a, b 2.2 b, e 2.3 a, b, c		2.10 b

An excellent resource about food chains can be found on the New Hampshire Fish and Game Department (NHFGD) Web site at http://www.wildnh.com/Kids/kids.htm, Predators are Part of the Picture Vol. 2, Issue 1.
Wild Times for Kids is published twice a year by the NHFGD. The magazine can be downloaded.

Session 5.3 – Food Chains

Teacher Questions & Notes	Procedures
	1. Review the importance of food as a key part of a habitat. Make sure that students remember that food is a source of energy. 2. Discuss what they learned about what a black bear eats. When the students mention that black bears eat berries, seeds and plants, ask them where a plant would get its energy (sun). When the students mention that black bears may eat small rodents or fish, ask them where the small rodents and fish would get their energy (from eating plants). Ask them what they think might happen to a black bear if there were no plants for them to eat or if there were no small rodents or insects for them to eat? Ask if they think that the bear's food is important for them to survive? 3. Tell the students that they are going to look at many animals and their food. 4. Discuss what a chain is and how it stays together. Show the students the examples of chains. Ask them to name and describe other examples of chains.

Session 5.3 – Food Chains

Teacher Questions & Notes	Procedures
	5. Ask what would happen if we removed a link from a chain. Tell the students that they are going to learn about a special kind of chain – a food chain. 6. Look at the four parts of the forest food chain that you cut apart ahead of time from *A Forest Food Chain* page (pg. 165). 7. Explain to the students that all of these things can be found in a forest habitat. Ask students how these fit together? Give students time to make suggestions. 8. Tell the students that these things fit together as a food chain. 9. Have the students as a group decide on the sequence that they should put these things in to make a food chain. Tell the students that each thing in the food chain gets energy from its food source (flow of energy). 10. Have four students holding the four parts of the food chain. Have the students get into the order the class decides upon. Have the four students link arms to show that they are a chain. 11. Discuss how the energy flows through their food chain.
	12. Divide the class into groups of students. (Some groups will only need four students, but some may need six students.) 13. Give each group a set of items from the *Food Chains* page (pg. 166). 14. Have each group put their items into a food chain.
	15. Let each team form their food chain and tell how the energy flows through their food chain. 16. Discuss how each food chain starts with the sun, has plants in it, has animals that eat plants, and may have animals that eat animals.
	17. Have the students get into their project teams. 18. Have each team start with the sun and build a food chain with

Session 5.3 – Food Chains

Teacher Questions & Notes	Procedures
	plants and animals found in their animal's habitat. Make sure that they include their animal in the food chain. 19. Give each student a yellow strip of paper, a green strip of paper, and two to three brown strips of paper. Have students label the yellow strip with the word "sun." Have them label the green strip with the word "plant" (or the specific name of the plant if they know it). Tell them that the brown strips will be animals. 20. Have each team member build a paper chain of the food chain for their team's animal. Have them label each link in the chain. 21. Help the students note that the yellow link should be at the bottom of their chain, the green link should be next, and then followed by the brown links. Make sure they realize that the animal that eats plants should be linked to the green link, and the animal that eats other animals should be linked to a brown link. 22. Tell the teams that they will act out their food chain for the class. Tell them that they will need one team member to explain the flow of energy through their food chain.
	23. Share the food chains they have built with the whole class. Let the teams act out their food chain. Make sure they include the fact that in a food chain they are showing the flow of energy. 24. Hang the food chain links in the classroom.
	25. As a class, build the food chain for a black bear. (If one of the class teams has selected a black bear as their animal, skip this step.) Discuss the flow of energy in this food chain.

Project WILD food chain or predator / prey activities include *"Quick Frozen Critters" (pg. 122), "Thicket Game" (pg. 114), "Muskox Maneuvers"* (pg. 130), and "*Energy Pipeline"* (pg. 105); and from Project WILD Aquatic "*Marsh Munchers"* (pg. 34).

A complete list may be found in the expanded topic index in the appendices under food chains, energy, or predator /prey relationships.

A Forest Food Chain

SUN
Seeds
Mouse
Owl

Food Chains

SUN	Grass	Grasshopper	Toad	Snake	Hawk
SUN	Plants	Insects	Bat	Owl	
SUN	Plant	Rabbit	Fox	Owl	
SUN	Acorn	Squirrel	Hawk		
SUN	Plant	Caterpillar	Spider	Bird	Hawk

Topic 5: Session 5.4 – Food Chains and Food Webs

Session Supplies:

- Teacher-selected book about food chains and food webs
- *Food Web Cards* sheet (pg. 170)
- *Food Web Writing* sheet (pg. 171)
- Choose a habitat ahead of time. (e.g., forest, pond, wetland, mountains) Identify plants and animals that would be found in that habitat. Make nametags with each plant and animal on it. Be sure to include one nametag with SUN on it.
- Ball of string
- Project WILD

Session Virginia SOL

Science	English	Mathematics	History & Social Science
2.1 a, b, c, d, i, j, k, l 2.5 a, b 2.8 c	2.1 2.2 a, b, c, e 2.3 a, b, c 2.12		

An excellent resource about food webs can be found on the New Hampshire Fish and Game Department (NHFGD) Web site at http://www.wildnh.com/Kids/kids.htm, *What's for Dinner* Vol. 9, Issue 1. *Wild Times for Kids* is published twice a year by the NHFGD. The magazine can be downloaded.

Session 5.4 – Food Chains and Food Webs

Teacher Questions & Notes	Procedures
	1. Review the importance of food as part of an animal's habitat and how each animal is part of a food chain in its habitat. 2. Review that energy flows through a food chain. 3. Ask the students if they would find any other animals in their habitat other than the one their team is studying. Ask them to describe each identified animal's food and if possible, describe the food chain of the animal. 4. Explain that there may be many food chains in their animal's habitat. 5. Ask if they think the different food chains in their animal's habitat are linked? 6. Tell them that you are going to read a book to them about food chains and food webs. Tell the students to think about what a food web might be.

Session 5.4 – Food Chains and Food Webs

Teacher Questions & Notes	Procedures
	7. Read the book you have selected on food chains and food webs. 8. Discuss what a food web is.
	9. Divide the students into two-person teams. 10. Give each team a *Food Web Cards* sheet (pg. 170). The *Food Web Cards* include Virginia plants and animals (sun, grass, mouse, snake, acorn, grasshopper, cardinal, hawk). Have them work together to create a food web using the plants and animals. 11. Have each group share their food web with the class and explain why they placed the plants and animals where they did. Discuss any similarities and differences. 12. Pass out the *Food Web Writing* sheet (pg. 171). Students will select an animal, write an informational story about the animal and the food it eats, and draw about the animal's place in a food chain.
	13. Web of Life Activity: a. Choose a habitat (e.g., forest, wetland, mountains) and give each student in the class a plant or animal from that habitat (give each student a nametag with the name of their organism that is part of the food chain so that others can see it). b. Have students sit in a circle. The teacher is the sun and will hold the beginning of the string. Continuing to hold the beginning of the string, pass the ball of string to a student whose nametag is that of a plant. Ask the class, "Who would eat this plant?" Holding onto the string, the student will pass the ball of string to the student holding the name of the animal that would eat the plant. (Make sure each student holds onto the string as they pass it. At this point, the teacher and the first student should be holding the string, and the second student should now have the ball of the remaining string.) c. When you get to the top of a particular food chain, ask "Who would eat this animal?" Ask what would happen if the

Session 5.4 – Food Chains and Food Webs

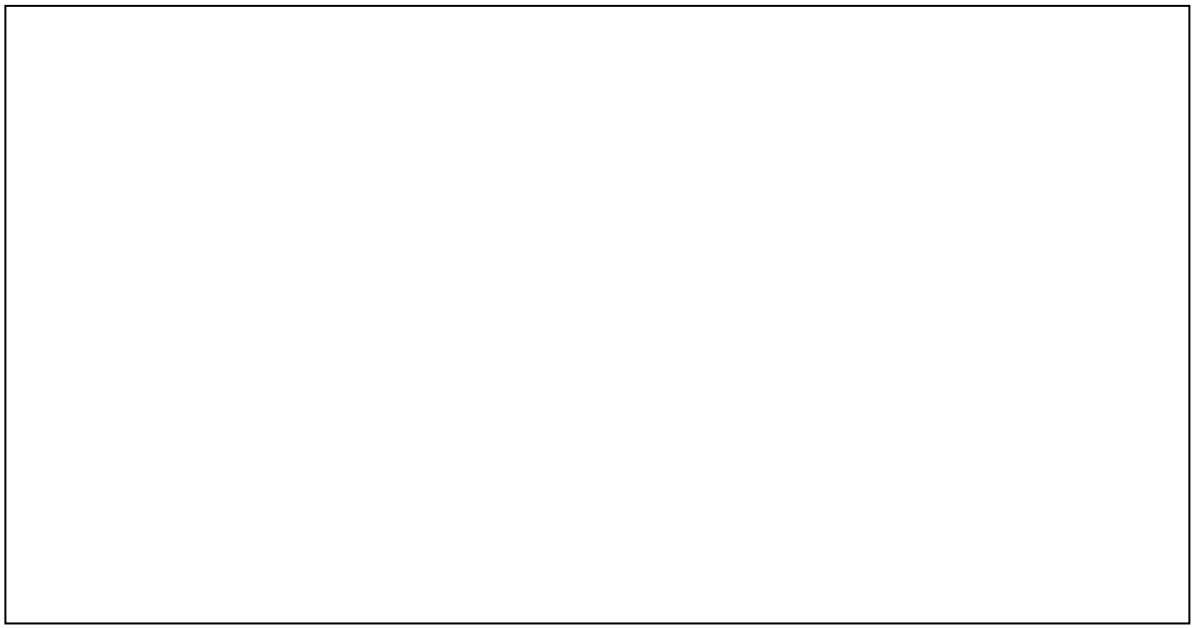
Teacher Questions & Notes	Procedures
	animal died (decomposition). Continue until everyone is connected in one way. (As the person holding the sun, you may be connected more than once since animals and plants that die and their bodies decompose, provide nutrients to the soil which allows for the growth of more plants. The sun is the source of energy for the new plants.)
-What would happen if one plant or animal were taken out?	d. Choose one student to be removed from the food chain. Have this student tug on the string and have all students who felt the tug, raise their hand. All of these people would be affected if this plant or animal were no longer a part of the food chain. Repeat this step several times.
-What does it mean to be interdependent? -How are plants and animals interconnected? -How does an animal depend on a plant for survival? -How does a plant depend on an animal for survival? -What nonliving things are plants and animals dependent on? -What is the relationship between animals on the food chain?	14. Lead students to the understanding that all plants and animals are connected and dependent on each other for their survival.
	15. Create a class shared statement on the meaning of interdependence and add it to the class chart.
	16. Conduct a "Habitat Lap Sit" following the instructions in Project WILD (pg. 61). When you finish the activity, review what the students have learned about the importance of food, food chains, food webs, and interdependence within a habitat.

Food Web Cards – Student Sheet

SUN	GRASS
MOUSE	ACORN
SNAKE	GRASSHOPPER
HAWK	CARDINAL

Food Web Writing Activity – Student Sheet

Part 1: Draw your animal within a food chain. You may connect several food chains in order to make a food web.



Part 2: Pretend you are an animal. Write about your place in the food chain. Make sure to include what you eat and what eats you. Bonus: Include the vocabulary words predator, prey, and energy in your story.

_____

_____

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_____

Topic 5: Session 5.5 – Project Work Time: Food Chains and Food Webs

Session Supplies:

- Project team notebooks

Session Virginia SOL

Science	English	Mathematics	History & Social Science
2.1 a, b, c, d, h, i, j, k, l, m 2.4 a 2.5 a, b 2.8 c	2.1 2.2 a, b, c, e 2.3 a, b, c, d, e 2.9 e, f 2.10 2.12 2.13 2.14		

Session 5.5 – Project Work Time: Food Chains and Food Webs

Teacher Questions	Procedures
	PROJECT WORK TIME: 1. Review the progress of each team. Make sure that they are moving forward with all parts of their project. 2. Each team will use available resources (e.g., books, textbook, Internet) to research their animal's food chain and the food web(s) in their animal's habitat. 3. At the end of this project work time, each team member should complete a reflection page in their journal based on the team's work on their project.

Virginia Animals and their Habitats

Topic 6

How Do Animals Adapt to Survive?

TOPIC 6 – How Do Animals Adapt to Survive?

Topic 6: Overall Information

Overview

In this group of lessons students will learn what animals need to survive in their habitats and the adaptations that are necessary for survival.

Topic 6 Virginia SOL

Science	English	Mathematics	History & Social Science
2.1 a, b, c, d, g, h, i, j, k, l, m 2.4 a 2.5 a, b, c 2.7 a 2.8 c	2.1 2.2 a, b, c, e 2.3 a, b, c 2.6 2.7 d, e 2.10 2.11 2.12 2.13 a, b 2.14	2.1 a, c 2.4 c 2.6 2.7 2.11 a 2.17 2.19 2.21	2.4 a 2.5 2.6 2.10 a, c

Teacher Background Knowledge

- All living things adapt to the environments in which they live. Animals adapt to environments in ways that help them to survive and maintain their species population.
- Habitats only support the plants and animals that are adapted to survive within them.
- Animals use colorings and markings as survival tools. Some of the colorings are used as protection, such as camouflage, where the animal blends into his environment. Other markings or colorings are used to attract mates. Still other colorings or markings are used to make a defenseless animal look more like a predator. This is a form of mimicry. An example of this is the stick bug, or a butterfly with large eye-looking markings on its wings.
- Some animals survive the different seasons during the year by using behavioral adaptations which enable it to survive. Examples of these are birds and butterflies which migrate south in winter, or animals which migrate for mating purposes. Animals which are unable to survive a harsher season, but are also unable to migrate, often hibernate, such as groundhogs and most Virginia reptiles and amphibians.
- Some animals use chemical adaptations to survive in their habitat. There are some animals that use a chemical scent to mark their territory to keep other members of their species away. Some animals use a chemical scent to keep predators away. Some animals and plants use a chemically produced bitter taste to discourage animals from eating them.
- During the winters of 2001 and 2002, the Virginia Department of Game and Inland Fisheries, along with our neighboring states, placed satellite transmitters on tundra swans in order to determine the birds' migration route. The transmitters lasted for 1.5 to 2 years,

although some swans lost their transmitters along the way or were not successful in completing the migration. It is critical to know where migratory species such as tundra swans migrate so that both of their habitats, summer and winter, can best be managed to protect the health of the population.

- The tundra swans that spend the winter along the east coast in the Chesapeake Bay region nest in tundra habitats across northern Canada and Alaska in the summer. The swans travel a long distance between these two locations. Sometimes the swans take a break along the way, either on the trip north while they wait for the spring thaw, or on the way south when they are with their young and need to stop and rest. Waterfowl, such as geese, ducks, and swans have historical staging areas where large numbers of birds gather before making the next portion of the trip. These areas usually have abundant food and water supplies that can sustain a large flock. Swans feed on grasses, aquatic vegetation, and small grains such as corn, wheat, and soybeans. The U.S. Fish and Wildlife Service, and the state wildlife agencies across the United States have established numerous wildlife refuges in some of these important staging areas.
- You can see the migration paths, nesting locations, and diaries of three tundra swans that were captured and tagged in Virginia, on the Department of Game and Inland Fisheries Web site at http://www.dgif.virginia.gov/wildlife/swan/index.asp. There are maps of other swans' migration paths from previous years in the archived section.
- Measurement is a comparison of an object to another object.
- Nonstandard measurement is measuring with an object that is not a standard measurement tool (e.g., paper clips, unifix cubes, Popsicle sticks) to compare to an object.
- Measurement of a unit is the distance between each unit.
- Linear measurement measures length and height.
- Math should be taught through inquiry and real-world applications. Students should construct mathematical ideas through classroom discussions. When appropriate, development of new concepts may be necessary.

Student Learning Expectations

- Identify land and water habitats (fresh water, salt water, forest/woodland, wetland).
- Identify how animals have to adapt to seasonal changes and climates within their surroundings.
- Describe behavioral, physical, and chemical adaptations animals make in order to survive (e.g., migration, hibernation, camouflage, adaptation, dormancy).
- Collect data by measuring length (meter, foot), area, and temperature.
- Graph and analyze data collected.

Procedure

NOTE: The procedures in the topic sessions may be divided into several different lesson periods. Each session may take more than one class lesson to complete.

Topic 6: Session 6.1 – Introduction to Animal Adaptations

Session Supplies:

- Books about animals and adaptations. (There need to be enough books for each student to have a book. The books should be on the students' reading levels.)
- Ducks Don't Get Wet, by A. Goldin, or another book about an animal that adapts to its environment
- Student journals

Session Virginia SOL

Science	English	Mathematics	History & Social Science
2.1 a, b, c, d, h, i, j, k 2.5 a, b 2.7 a 2.8 c	2.2 a, b, c, e 2.3 a, b, c 2.6 2.7 d, e 2.12		

More information about birds can be found on the New Hampshire Fish and Game Department (NHFGD) Web site at http://www.wildnh.com/Kids/kids.htm, *Birds! Birds! Birds!* Vol. 3, Issue 2. *Wild Times for Kids* is published twice a year by the NHFGD. The magazine can be downloaded.

Session 6.1 – Introduction to Animal Adaptations

Teacher Questions & Notes	Procedures
	Prior to the lesson, select sets of texts about animal adaptations leveled to meet the reading abilities of the individuals in the class. These may be stories from the basal texts, science texts, trade books, children's newspapers, and magazines.
-What do animals need to survive in a habitat?	1. Ask "What do animals need to survive in a habitat?" Have students brainstorm ideas, and write them on the board, chart paper, or on an overhead.
-How did the ducks survive? -Why is it important that a duck's wings do not get wet?	2. After the brainstorming session, read Ducks Don't Get Wet, by A. Goldin, a book about how ducks are able to meet their needs in their habitat, or select another book that describes how an animal adapts to its environment.
	3. Discuss the information about ducks and introduce the term adaptation. Adaptations are what animals have or do to survive.
-How do we adapt to our environment? -What do we do in winter to go outside when it is cold? -What do animals do when it gets colder? -What are some other ways animals survive?	4. Have students think of ways that animals survive (adaptations). 5. Brainstorm a list of adaptations and write them on the board, chart, or overhead (e.g., long teeth, hooves, big ears, feathers, wings, long legs, claws, hibernation, migration, camouflage, scents).

Session 6.1 – Introduction to Animal Adaptations

Teacher Questions & Notes	Procedures
-What are some of their adaptations?	
	6. Explain to the students that they will now read to find out more information about animal adaptations, or how animals survive. *Having students seated in reading leveled groups at this time will aid this process. Pass out the previously gathered books. Have the students read silently, assisting them as necessary.* 7. On a blank page in their journals, have students write the title "Animal Adaptations." This will be where they will record what they learn during their independent reading.
	8. When they finish reading, have them write in their journals on the "Animal Adaptations" page what they found out. 9. Explain the rules for writing what they have read: a. Books need to be closed when they are writing. b. If they need to look in the books again, they must put their pencil down before rereading. c. ***RULE: Pencils up, books closed. Books open, pencils down.*** (This will keep the children from copying the text, and enable them to write what they have learned in their own words.)
-What else have you found out? -Is there any information on our board that we need to revise? -Do you have any questions about what you've read? -Did anything surprise you about what you read?	10. After they have had time to write in their journals, have students share what they have learned with a partner, then with their groups, and finally, share with the class. As groups share with the class, add the new ideas to the class list previously generated.

Topic 6: Session 6.2 – No Water Off a Duck's Back

Session Supplies:

- Project WILD, (pg. 305) – "No Water Off a Duck's Back"

Session Virginia SOL

Science	English	Mathematics	History & Social Science
2.1 a, d, g, h, i, j, k 2.5 a, b, c	2.12		2.10 a, c

Session 6.2 – No Water Off a Duck's Back

Teacher Questions	Procedures
	Topic 6, Session 2
	1. Do the Project WILD activity, "No Water Off a Duck's Back", page 305. 2. Do only steps 3 and 4 on page 306.

Topic 6: Session 6.3 – Designer Animals

Session Supplies:

- Large drawing paper (enough for one sheet for each group of three to four students)
- List of teacher pregenerated suggested habitats (e.g., parking lot, bowling alley, ice skating rink, swimming pool, putt-putt golf course, movie theater, a school building)
- Project WILD (2006, pg. 128) "Adaptation Artistry"
- Project WILD Aquatic (2000, pg. 56) "Fashion a Fish"
- Variety of drawing supplies
- *Adaptation Project Planning* sheet (pg. 181) (students will use this sheet for "Adaptation Artistry" and a second time for their project)

Session Virginia SOL

Science	English	Mathematics	History & Social Science
2.1 a, d, g, h, i, j, k, l 2.5 a, b, c 2.7 a	2.3 a, b, c 2.7 d, e 2.12 2.14		

Excellent resources about animal adaptations can be found on the New Hampshire Fish and Game Department (NHFGD) Web site at http://www.wildnh.com/Kids/kids.htm, *Surviving in a Wild World* Vol. 3, Issue 1 and *Wildlife in Winter* Vol. 1, Issue 1.
Wild Times for Kids is published twice a year by the NHFGD. The magazine can be downloaded.

Session 6.3 – Designer Animals

Teacher Questions & Notes	Procedures
-What are some of the adaptations you thought of in our last lesson? -Why do animals need adaptations?	1. Review the students' lists of adaptations, and why animals have adaptations.
	2. Explain to the students that they will be creating their own pretend animal that has adapted to live in a habitat that will be given to them. They need to be creative and think of ways for their animal to meet its needs in its habitat. 3. Split the class into groups of three to four students (not the same groups as their project team). 4. Give each group a large piece of drawing paper and a habitat. *Suggested habitats are: parking lot, bowling alley, ice skating rink, swimming pool, putt-putt golf course, movie theater, a school building, etc.* 5. Give each group one *Adaptation Project Planning* sheet. *See the Project WILD activity "Adaptation Artistry" (pg. 128) or Project WILD Aquatic "Fashion Fish" (pg. 56) for more information.*

Session 6.3 – Designer Animals

Teacher Questions & Notes	Procedures
	6. Have the students work in their groups to complete the *Adaptation Project Planning* sheet (pg. 181) and create a picture of their adapted animal.
-What did you name your animal and why? -What adaptations did your animal need to survive in this environment? -Would it be able to survive in any of the other habitats? -Can anyone else think of other adaptations this animal could have? -How do you know? -What do you think we will learn from it?	7. Bring groups back together to share their animals and adaptations.

Name: _____

Adaptation Project Planning – Student Sheet

Animal Name: _____

Animal's Habitat: _____

Describe the habitat:

_____

_____

_____

Describe your animal:

_____

_____

_____

_____

List three ways your animal has adapted to living in this habitat:

_____

_____

_____

Topic 6: Session 6.4 – Project Work Time: Introduction to the Project Presentation Guidelines

Session Supplies:

- *Adaptation Project Planning* sheet (pg. 181) – clean copy for the team's Virginia animal
- *Presentation Rubric* (pg. 183 or pg. 242)

Session Virginia SOL

Science	English	Mathematics	History & Social Science
2.1 a, d, g, h, i, j, k 2.4 a 2.5 a, b, c 2.7 a 2.8 c	2.10 2.12 2.14		

Session 6.4 – Project Work Time: Introduction to the Project Presentation Guidelines

Teacher Questions & Notes	Procedures
	PROJECT WORK TIME: Conference with each team and check their project progress. a. Answer questions and clarify directions. b. Make sure students have begun the adaptation piece of their written project. c. Give each team a clean copy of the *Adaptation Project Planning* sheet (pg. 181). Each team will complete the adaptation project planning sheet using their team's Virginia animal. d. Introduce the *Presentation Rubric* (pg. 183 or pg. 242) and answer questions.

Team Members: _____

Presentation Rubric

	3 POINTS	2 POINTS	1 POINT
PREPARATION	The team is prepared and knows their material.	The team is mostly prepared and knows most of their material.	The team is somewhat prepared and knows some of their material.
GROUP PARTICIPATION	Everyone in the team participated.	Most of the students in the team participated.	Some of the students in the team participated.
PUBLIC SPEAKING	Everyone looks at the audience. Speakers use a clear and loud voice.	Most team members look at the audience. Speakers mostly use a clear and loud voice.	Some team members look at the audience. Speakers sometimes use a clear and loud voice.
RESPONSE TO QUESTIONS	The team answers questions from the class with clear explanation and details.	The team answers most questions from the class with clear explanation and details.	The team answers some questions from the class with clear explanation and details.

Teacher Comments:

Topic 6: Session 6.5 – Adaptations: Migration

Session Supplies:

- *Tundra Swan* video found on A Look Outside DVD
  - *NOTE: A Look Outside DVD is available through the Virginia Department of Game and Inland Fisheries (VDGIF). Virginia school librarians can obtain the DVD by contacting the VDGIF Wildlife Educator at (804) 367-0188.*
  - *NOTE: The video can also be accessed for "streaming" from the following:*
    - Log into the Web site: www.ideastations.org (Virginia PBS Stations)
    - Click on the Education gray box
    - Click on the link to Classroom CLIPS
    - In the upper right-hand corner is a Search box. Type "swans" and search (be sure to type swans, not swan)
    - Scroll down to "*Tundra Swans: Fly North, Big Bird"* and select it

Session Virginia SOL

Science	English	Mathematics	History & Social Science
2.1 a, g, i, j, k 2.4 a 2.5 b 2.7 a 2.8 c	2.2 a, b, c, e 2.12		2.4 a 2.5 b

Session 6.5 – Adaptations: Migration

Teacher Questions & Notes	Procedures
-What is migration? -Why do animals migrate?	1. Remind students that one of the possible adaptations is the ability to migrate. Ask "What is migration?" Allow students to share ideas about what they think migration is and why they think animals might migrate.
	2. Tell students they will be learning more about migration by studying the Tundra swan. View the Tundra Swan video found on A Look Outside DVD. (*See "Session Supplies" for information on how to get the DVD or video.)* *The video allows students to see how Tundra swans are tracked to follow their migration pattern and to learn why they need to migrate.*
-How would you describe migration now? -Why did the Tundra swan need to migrate to the Chesapeake Bay? -How did the Tundra swan's summer habitat differ from the winter habitat?	3. After the video, discuss the Tundra swans' need to migrate and the new habitats they find to live in during the migration.

Session 6.5 – Adaptations: Migration

Teacher Questions & Notes	Procedures
-How were they alike?	
	4. In their journals, have the students write the title "Tundra Swan Migration" on the next blank page. 5. Have the students reflect on and write about the Tundra swans' need to migrate. 6. With the class, generate a shared statement about migration.

For a list of hazards that waterfowl face while migrating, see the Aquatic Project WILD activity "*Migration Headaches*" (pg. 15).

Topic 6: Session 6.6 – Migration Mathematics

Session Supplies:

- *Tundra Swan Migration Paths* (pg. 189-191) *[Used with permission from the Virginia Department of Game and Inland Fisheries, Headquarters, 4010 West Broad Street, P.O. Box 11104, Richmond, VA 23230]* www.dgif.virginia.gov
- Large map of North America
- String
- Push pins
- Yard stick
- *Tundra Swan Migration Data* (data is found in #4 of this session) written on the board or chart paper
- *Tundra Swan Migration Data* sheet (pg. 192)

Session Virginia SOL

Science	English	Mathematics	History & Social Science
2.1 a, d, h, i, j, k 2.5 a, b, c 2.7 a 2.8 c	2.12	2.1 a, c 2.6 2.7 2.11 a 2.21	2.4 a 2.5 2.6

Session 6.6 – Migration Mathematics

Teacher Questions	Procedures
	Topic 6, Session 6
-What type of map is this? -Where is the Arctic Circle? -Where are the Great Lakes? -Where is the Chesapeake Bay? -How far do you think it is from the Arctic Circle to the Chesapeake Bay?	1. Using a map of North America, find the distance from the Tundra swans' home habitat to their migration habitat. a. Look at the *Tundra Swan Migration Paths* (pg. 189-191). Discuss the migration paths (e.g., length of time for migrations, locations where the swans started at the end of the summer, location where they spent the winter, the differences between the migrations). b. Have the map of North America displayed on the bulletin board. c. With string mark off one of the Tundra swan's migration routes from the Arctic Circle to the Great Lakes and then to the Chesapeake Bay. *(Based on your class, determine how many of the migrations you will actually chart on the map.)* d. Use push pins to mark the Arctic Circle, the Great Lakes, and the Chesapeake Bay. e. Talk about where the Arctic Circle, the Great Lakes,

Session 6.6 – Migration Mathematics

<table>
<tr><th>Teacher Questions</th><th>Procedures</th></tr>
<tr><td></td><td>and the Chesapeake Bay are on the map and about the scale on the map (e.g., 1 inch = 100 mi.).

f. Remove the string from the map and place it beside a yard stick.</td></tr>
<tr><td></td><td>2. On the chalkboard or on chart paper, create a T-table to record the data for inches and miles.

3. As a class, complete the T-table to find out how many inches the string is and the number of miles that it represents.</td></tr>
<tr><td>-Which number is the greatest?
-Which number is the least?
-What is the place value of the 8 in 84?
-What is the place value of the 6 in 46?
-Based on information we learned about the Tundra swans when we watched the DVD, why do you think Bird 2 flew so few miles on day 15? (accept any reasonable answers)</td><td>4. Look at the data you wrote on the board or have on a sheet of chart paper when preparing for this session.

<table><tr><th colspan="2">Tundra Swan Migration Data</th></tr><tr><th>Bird</th><th>Miles Traveled on Day 15 of the Migration</th></tr><tr><td>Bird 1</td><td>84 mi</td></tr><tr><td>Bird 2</td><td>46 mi</td></tr><tr><td>Bird 3</td><td>90 mi.</td></tr></table>
5. Talk with the class about the data so they understand that this is the total number of miles that three different Tundra swans traveled on day 15 of their migration when they were traveling from their winter habitat in the Arctic Circle to their summer habitat in the Chesapeake Bay.

6. Have students use their journals to do the following:

a. Write the title “Migration Comparison Statements” on the next blank page in their journals.

b. Have the students write on their “Migration Comparison Statements” page at least three statements using greater than (>) and less than (<) symbols with the values in the chart.

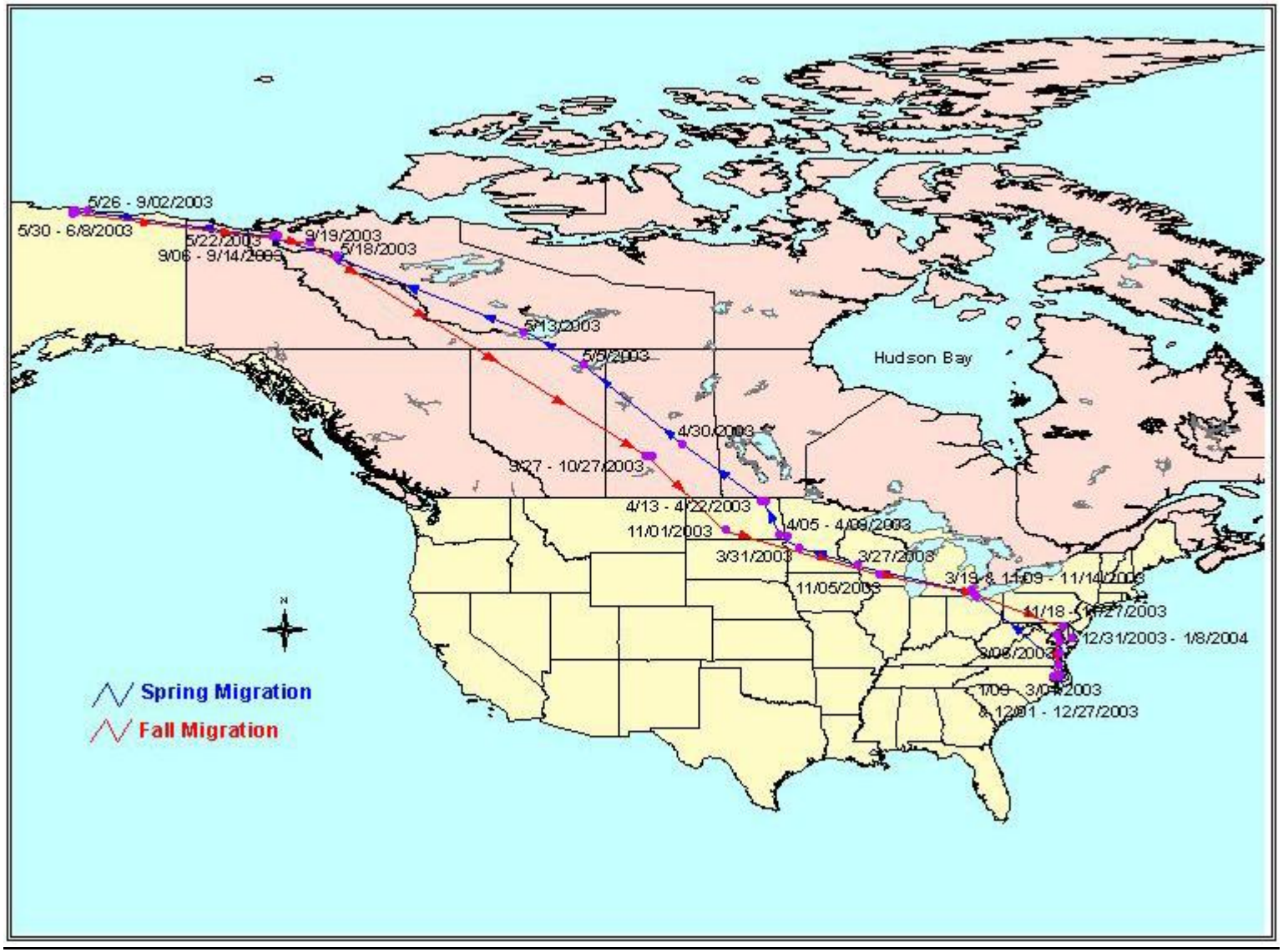
c. For each mathematical statement, have students write a sentence explaining their statement.</td></tr>
</table>

Session 6.6 – Migration Mathematics

Teacher Questions	Procedures
	Allow students to use place value blocks, place value flip charts, or place value cubes to compare and justify their reasoning.
-What is the difference between each bird's total flight?	7. Write the two problems below on the board or on chart paper. 65 - 43 93 - 78 8. As a class, practice subtraction skills by solving the problems together. 9. Using the swan data in question #4, practice subtraction skills by having the students answer the following questions: a. What is the difference between the total miles of Bird 1 and Bird 2? b. What is the difference between the total miles of Bird 2 and Bird 3? c. What is the difference between the total miles of Bird 1 and Bird 3? d. Which bird flew the longest trip? e. Which bird flew the shortest trip? *Solve these problems together allowing students to use the strategy that makes sense to them (counting up, traditional, using friendly groups of tens, etc.).* *Make sure that students can demonstrate their answers using subtraction.*
-What is the problem asking you to find out? -What is the important information in the problem?	10. Have students complete the *Tundra Swan Migration Data* sheet (pg. 192). They will use the data in the chart at the top of the *Tundra Swan Migration Data* sheet to answer each question. *Allow them to use the strategy that makes sense for them.*

Tundra Swan 888 Migration Path

(October 2002 – January 2004) *[Used with permission from the Virginia Department of Game and Inland Fisheries, Headquarters, Richmond, VA 23230]*

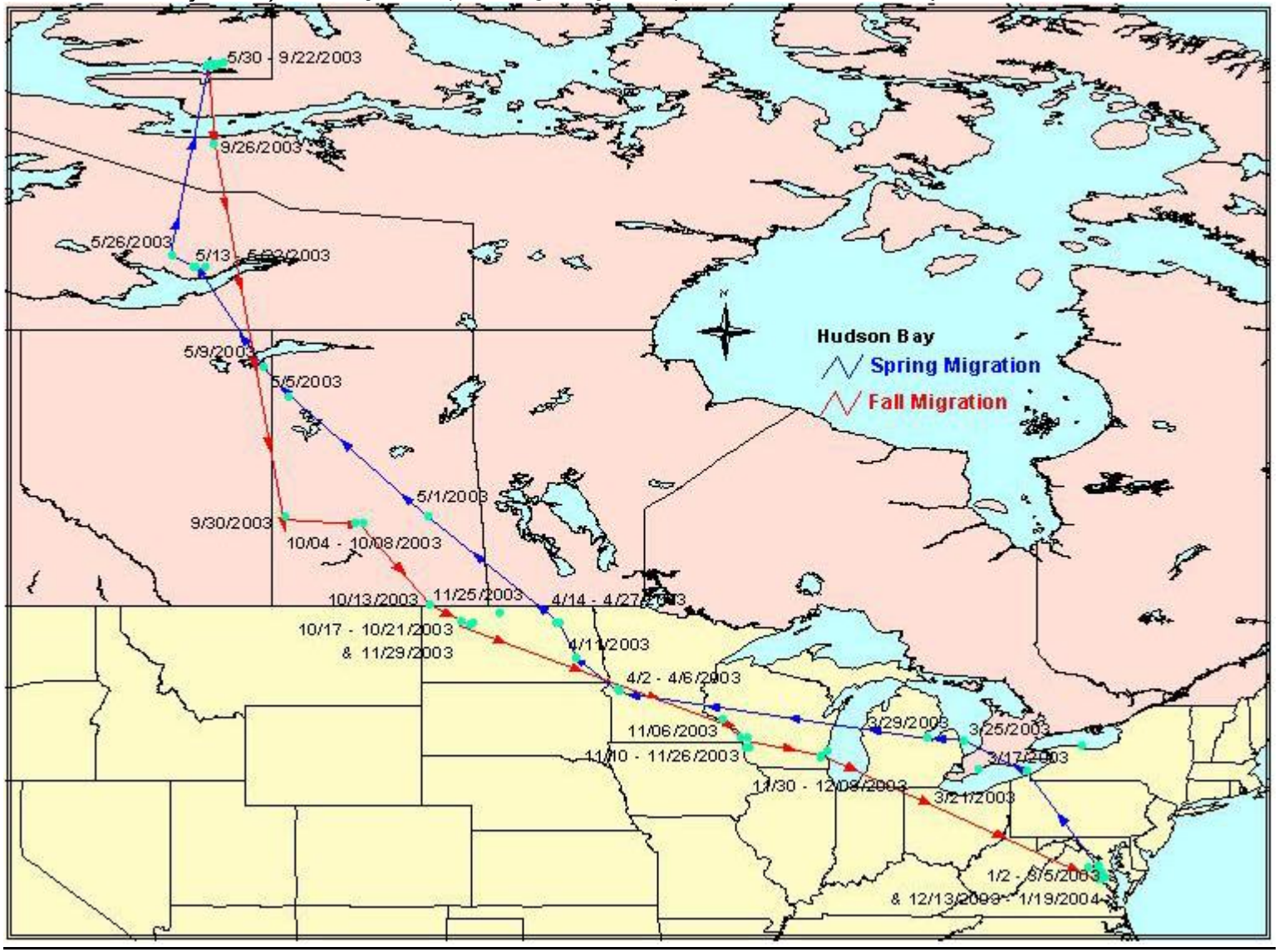


Tundra Swan 893 Migration Path

(October 2002 – January 2004) *[Used with permission from the Virginia Department of Game and Inland Fisheries, Headquarters, Richmond, VA 23230]*

Tundra Swan 894 Migration Path

(October 2002 – January 2004) *[Used with permission from the Virginia Department of Game and Inland Fisheries, Headquarters, Richmond, VA 23230]*



Name: _____

Tundra Swan Migration Data – Student Sheet

Directions: Use the data below to complete these questions. Solve each problem using any strategies you know.

	Days Traveled North	Days Traveled South	Total Days Traveled
Bird 1	27	47	
Bird 2	63	36	
Bird 3	59		87

1. How many days did Bird 1 travel to migrate roundtrip? Show your work and complete the table for Bird 1.

2. How many days did Bird 2 travel roundtrip to migrate? Show your work and complete the table for Bird 2.

3. How many days did Bird 3 travel south? Show your work and complete table for Bird 3.

4. Write two story problems using the data about Tundra Swans.

Topic 6: Session 6.7 – Tundra Swan Migration

Session Supplies:

- Student journals
- *Flying South Problem Solving* sheet (pg. 195) – cut enough strips with the problem on them for each student to have one to paste into their journals. (The second page of the *Flying South Problem Solving* sheet (pg. 196) is made to print on Standard 5162 Address labels.)
- Glue

Session Virginia SOL

Science	English	Mathematics	History & Social Science
2.1 g, h, i, j, k, l 2.5 a, b, c 2.7 a 2.8 c	2.1 2.2 a, b, c, e 2.3 a, b, c 2.7 d, e 2.12 2.14	2.21	2.5

For more information about teaching Numbers and Number Sense and the use of instructional strategies for teaching the number and number sense strand, refer to the Virginia Department of Education Web site: http://www.doe.virginia.gov/VDOE/Instruction/Elem_M/number_sense.html.

Session 6.7 – Tundra Swan Migration

Teacher Questions & Notes	Procedures
-What are some of things a Tundra swan might see during its migration? -What are some dangers along the way? -What are other experiences the swan might have?	1. Explain to the students that now that they have watched the *"Tundra Swan"* video and done some research, they have a good understanding of the Tundra swan and the swan's migration. 2. Ask the students what kind of experiences a swan may have along its migration. 3. After some discussion, have the students write a creative story in their journals about a swan's migration. The students will pretend they are the swan and tell about what things they see, what other animals they may meet, and what other experiences they may have along the way. 4. Allow students who wish, to share their stories with the class. *A possible strategy to use with this activity is peer editing and creating a published story, time permitting.*
	5. Give each student a copy of the *Flying South Problem* sheet (pg. 195 or pg. 196).

Session 6.7 – Tundra Swan Migration

Teacher Questions & Notes	Procedures
	6. Have students paste the problem in their journal and solve the problem: Fly South Problem: A Tundra swan is flying south to migrate for the winter. The swan flies 20 miles south on the first day, 20 miles south on the second day, and 20 miles south on the third day. If this pattern continues, how many miles would the swan have traveled on the seventh day? *If needed, change the numbers in the problem to meet the ability levels of students. Allow students to solve this problem using any of the strategies (e.g., T-table, repeated addition, multiplication).* 7. Have students draw a representation of how they solved the problem, showing the strategy they used. 8. Have students write a written description about how they solved the problem.

Flying South Problem Solving Task – Student Sheet

A Tundra swan is flying south to migrate for the winter. The swan flies 20 miles south on the first day, 20 miles south on the second day, and 20 miles south on the third day. If this pattern continues, how many miles would the swan have traveled on the seventh day?

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Flying South Problem Solving Task (for Standard 5162 Address Labels) – Student Sheet

A Tundra swan is flying south to migrate for the winter. The swan flies 20 miles south on the first day, 20 miles south on the second day, and 20 miles south on the third day. If this pattern continues, how many miles would the swan have traveled on the seventh day?

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Topic 6: Session 6.8 – Other Animals Migrate, Too!

Session Supplies:

- Book about animals that migrate to read to the class

Session Virginia SOL

Science	English	Mathematics	History & Social Science
2.1 g, h, i, j, k 2.5 a, b, c 2.7 a 2.8 c	2.2 a, b, c 2.12		

Session 6.8 – Other Animals Migrate, Too!

Teacher Questions & Notes	Procedures
-Why did the Tundra swans migrate? - Can you think of any other animals that migrate? -Why do they migrate? -What do some animals do in the winter if they can't migrate? (hibernate)	1. Review the lesson on Tundra swans and their migration. Ask the students if they know about other animals that migrate and why they migrate. 2. Read a book to the class about other animals that migrate. 3. Discuss the animals in the book as you read about them, and have students retell why the animals migrate.
	4. In their journals, have students write the title "Animal Migration Recordings" on the next blank page. 5. Have the students write statements about at least three animals that migrate. They should include an explanation as to why they migrate. *Students can also draw pictures of the three animals or locate pictures of them that they can include in their journal.*

Topic 6: Session 6.9 – Caterpillar Adaptations

Session Supplies:

- Book about caterpillars to introduce facts about caterpillars
- Pictures of a variety of caterpillars (There are pictures of several varieties of caterpillars at the end of this session. (pg. 201-212) You may also find other pictures by searching on the Internet for "caterpillar pictures.")
- For student research:
  - collection of books about caterpillars, including encyclopedias
  - available computers

Session Virginia SOL

Science	English	Mathematics	History & Social Science
2.1 a, h, i, j, k 2.5 a, b, c 2.7 a 2.8 c	2.2 a, b, c, e 2.3 a, b, c 2.10 2.11 2.12 2.14		

Session 6.9 – Caterpillar Adaptations

Teacher Questions & Notes	Procedures
- How many of you have seen caterpillars? - Are all caterpillars alike? - Why or why not?	1. Explain to your students that you are going to explore caterpillars and ways that they adapt to their environment. Read the book about caterpillars that you have selected. 2. Discuss some facts about caterpillars. Be sure to include: *CAUTION: The hairs on some caterpillars are toxic and if touched, can cause itching and localized swelling.* a. Caterpillars hatch from a tiny egg. b. Caterpillars are the larval stage of butterflies and moths. c. The larval stage usually lasts from two weeks to one month. d. Caterpillars mostly eat the leaves of flowering plants and trees. e. Many species will only eat the leaves from a single type of plant.

Session 6.9 – Caterpillar Adaptations

Teacher Questions & Notes	Procedures
	f. The body of the caterpillar (like all insects) is divided into three parts: the head, the thorax, and the abdomen. g. Caterpillars have an exoskeleton that they molt (shed) as they grow. Most caterpillars molt four or five times. h. Caterpillar have sensory hairs located all over, giving them their sense of touch. i. Caterpillars breathe through holes in their side called spiracles. j. Caterpillars have tiny antennae which are near the mouth parts and sense smells. k. Many caterpillars have special adaptations that help them survive (e.g., eyespots that look like large eyes, spike-like protrusions, colors that blend with their surroundings, poisonous if eaten, emitting of a bad smell). 3. Discuss the various types of caterpillars found in the book and discuss the different adaptations that the assorted caterpillars have to help them survive.
-Look at the adaptations we thought of already. Can you think of any more adaptations which aren't already on our list?	4. Have each student select a partner. Pass out to each student group one of the pictures of caterpillars that you have gathered or one of the pictures of caterpillars found at the end of this session (pg. 201-212). 5. Have the student groups look at their pictures and be prepared to share how the group thinks their caterpillars might have adapted to their environments. 6. Allow time for each group to share what they think might be adaptations for their caterpillars.
	7. Give groups time to research information about their caterpillars using books, encyclopedias, the Internet, etc.

Session 6.9 – Caterpillar Adaptations

Teacher Questions & Notes	Procedures
	8. Have each group write a page about their caterpillar. Explain to the groups that their group pages will become part of a classroom book about caterpillars. Tell groups that they must include the following information about their caterpillar: a. the name of the caterpillar; b. what butterfly or moth the caterpillar changes into when it metamorphoses; c. three interesting facts about the caterpillar including information about at least one adaptation; and d. a question about the caterpillar that they did not find during their research. 9. Put the group pages together with the pictures of the caterpillars to create a class book about caterpillars. 10. Share the book with the class.

Caterpillar Pictures

Pipevine Swallowtail Caterpillar

(R. Bessin, 2001)

http://www.uky.edu/Ag/CritterFiles/casefile/insects/butterflies/butterflies.htm

Spicebush Butterfly Caterpillar

(R. Bessin, 2001)

http://www.uky.edu/Ag/CritterFiles/casefile/insects/butterflies/butterflies.htm

Fritillary Caterpillar

(R. Bessin, 2002)

http://www.uky.edu/Ag/CritterFiles/casefile/insects/butterflies/butterflies.htm

Monarch Caterpillar

(R. Bessin, 2002)

http://www.uky.edu/Ag/CritterFiles/casefile/insects/butterflies/butterflies.htm

Tent Caterpillar

http://www.ext.vt.edu/departments/entomology/ornamentals/2-6.jpeg

Green-Striped Mapleworm

http://www.ext.vt.edu/departments/entomology/ornamentals/2-15.jpeg

Gypsy Moth Caterpillar

http://www.ext.vt.edu/pubs/entomology/444-750/444-750.pdf

Hickory Horned Devil

http://www.ext.vt.edu/departments/entomology/ornamentals/2-20.jpeg

Saddleback Caterpillar

http://www.ext.vt.edu/departments/entomology/ornamentals/2-21.jpeg

Fall Webworm Caterpillars

http://www.ext.vt.edu/departments/entomology/ornamentals/2-26.jpeg

Giant swallowtail butterfly caterpillar

(larvae disguised as bird droppings)

(Maryann Frazier, PSU Entomology)

http://ento.psu.edu/extension/insect-image-gallery/all-images/giant-swallowtail-butterfly-larvae-disguised-as-bird-droppings-showing-osmiteria.jpg/view

Pandora's sphinx moth caterpillar
(Maryann Frazier, PSU Entomology)
http://ento.psu.edu/extension/insect-image-gallery/all-images/pandora-s-sphinx-moth-caterpillar.jpg/view

Topic 6: Session 6.10 – Yum Yum Caterpillars

Session Supplies:

- Chenille stems (pipe cleaners), both bumpy and straight, and in assorted colors, cut into two to three inch lengths (These Chenille stem pieces will be used as "caterpillars" for this session. You will need five Chenille stem pieces for each student. Chenille stems can be found at local hobby or craft stores.)
- Large paper grocery bag or cardboard box (All the cut Chenille stems will be placed in this container.)
- *Graphing* sheet (pg. 217)

Session Virginia SOL

Science	English	Mathematics	History & Social Science
2.1 a, d, h, i, j, k, l, m 2.5 a, b, c 2.7 a 2.8 c	2.13 a, b	2.4 c 2.17 2.19	

Session 6.10 – Yum Yum Caterpillars

Teacher Questions & Notes	Procedures
	Prior to this lesson, determine two areas in the schoolyard that will be used for the outside activity. If an area is not available or if weather does not permit an outside activity, do the activity indoors. *The outdoor activity will be a "Caterpillar Search." Each student will have the opportunity to randomly select five chenille caterpillars from the bag or box where the cut-up pieces of chenille stems have been placed.* *For the activity, the class will then be divided into two groups. Each group will go to their designated area on the playground to hide (camouflage) their five caterpillars. Once all the caterpillars are camouflaged, the two groups will switch areas and will search for the hidden caterpillars. Each person can find up to five caterpillars.* *Prepare the container of the chenille stems before you start this session with your students.*
	1. Review several of the different adaptations that caterpillars have to help them survive. 2. Have each student select five "chenille caterpillars" from the container. Students can bend their caterpillars into U or S shapes. *Extension: Discuss the movement of caterpillars and let*

Session 6.10 – Yum Yum Caterpillars

Teacher Questions & Notes	Procedures
	the students try moving like a caterpillar. 3. On the next blank page in the student journals, put the title "Yum, Yum Caterpillars." 4. Writing in a complete sentence, have students record the colors of caterpillars that they selected.
	5. Tell your students that they are going to count off so each student has a number (first student is #1, second is #2, third is #3, etc., until all students have a number). Remind students that they need to remember their numbers. 6. Have all the students whose number is an even number stand on the left side of the class. Have all students with an odd number stand on the right side of the class.
	7. Explain the purpose and rules for the activity, "Yum, Yum Caterpillars." *Purpose: Caterpillars are going to be hidden in two designated "habitat areas" and the students will have the opportunity to be birds that are looking for caterpillars to eat.* *Rules for Yum Yum Caterpillar participants:* *a. Hide your five caterpillars in your designated habitat. Use color, shape, etc., (adaptations) to hide the caterpillars. Do NOT put caterpillars under something to hide it. You have five minutes to hide your caterpillars.* *b. When your caterpillars are hidden, return to the common area.* *c. You will be a bird and will search for caterpillars in the opposite area from where you hid your caterpillars.* *d. You can ONLY pick up one caterpillar at a time.* *e. You may ONLY use your thumb and forefinger to pick up the caterpillars (fingers simulate a bird's beak).* *f. You may only find five caterpillars. Once you have reached five caterpillars or when the teacher says time for hunting is over, return to the common area.*

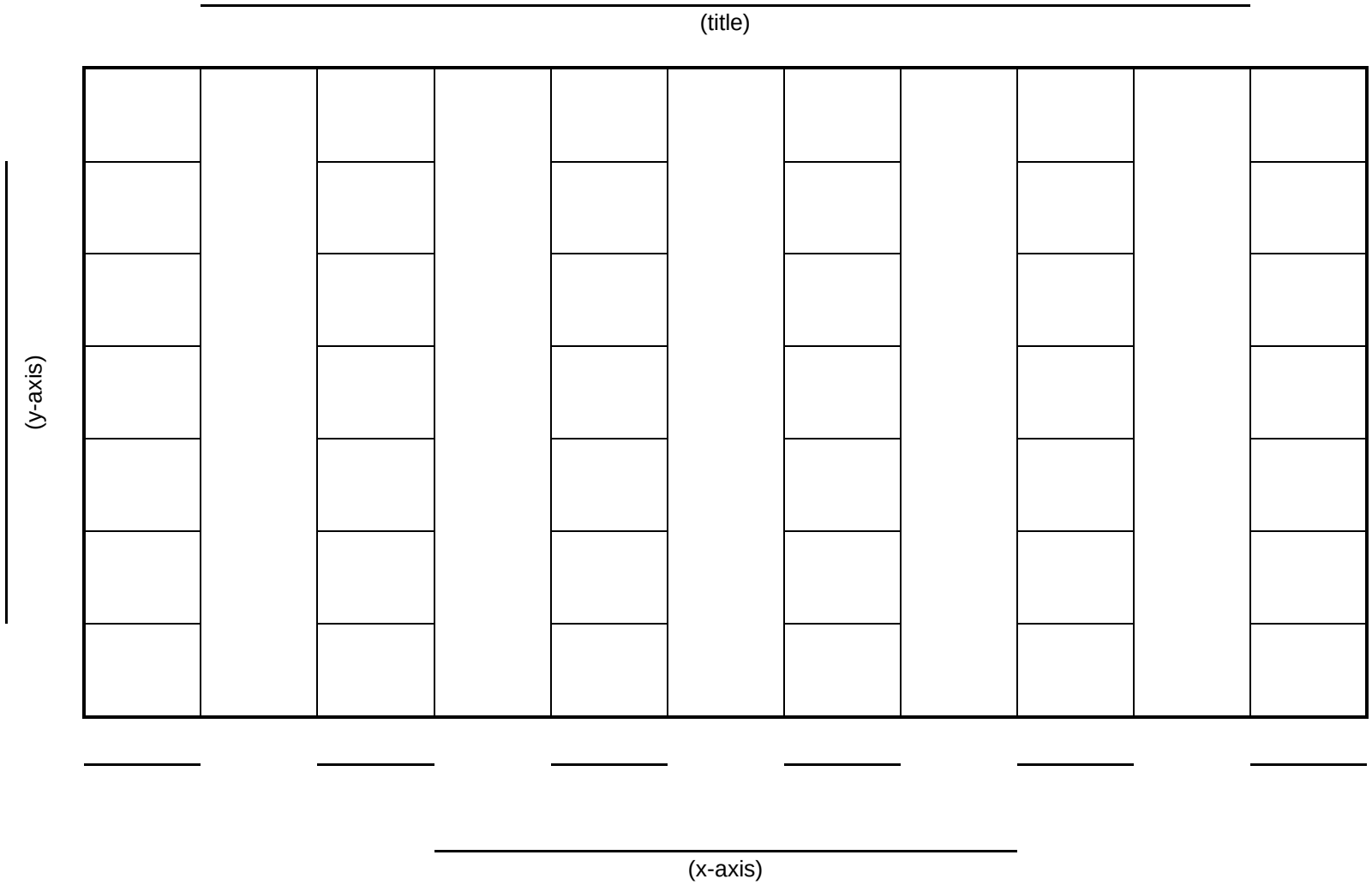
Session 6.10 – Yum Yum Caterpillars

Teacher Questions & Notes	Procedures
-Which colors of caterpillars are left? -Which do you see more clearly? -What colors blend more into the grass or ground? -Why is color helpful to caterpillars? To birds?	8. Allow about two minutes for the students to retrieve five caterpillars. 9. After the caterpillar search is complete, have students return to the area where they originally hid their caterpillars. Have each student check the five locations where they hid their caterpillars. If any of their caterpillars were not found, have them retrieve the caterpillar. Discuss as a group why some of the caterpillars were not found. Put any caterpillars that were not found during the search, but have now been retrieved by the original student, in the original bag/box. These caterpillars will not be a part of the remaining activities in this session.
-What is the word we use when something blends into the environment? (camouflage) -What other animals use camouflage?	10. Create a graph on the ground or other large space of the collected caterpillars using the actual chenille stems that were found. 11. Use the graph to discuss which caterpillars were most readily collected and why. Continue the discussion about camouflage and brainstorm about other animals that also use camouflage. 12. Tally the caterpillar data as a class. 13. Have the students pick up all the caterpillars that they had found from the graph.
-What are the parts of a bar graph?	14. In the classroom, have the students recall the parts of a proper bar graph. 15. Write the parts of a bar graph on the board for review as the students name them.
-What would be a good title for our graph on collected worms? -What labels do we need? (colors of chenille stems used) -Given our data, what would be a good scale to use?	16. Discuss an appropriate title and scale for a graph about the collected caterpillars. 17. Write the tallies of the collected data on the board or on a chart so that the class can see them.
	18. Have students create their own bar graphs using the given data. This can be done on a blank page in their journals or on the *Graphing* sheet (pg. 217). 19. Have the students write two true statements and two false

Session 6.10 – Yum Yum Caterpillars

Teacher Questions & Notes	Procedures
	statements about their graph. 20. Circulate among the students as they create the graphs, checking for individual understanding, giving assistance as necessary.
	21. In their journal on the "Yum, Yum Caterpillars" page, have students draw a picture of the location they think was the best for hiding one of the caterpillars that they found and write a sentence about why the caterpillar was so well hidden.
- Was one habitat better to hide the caterpillars in than the other? Why or why not? - Did the color of the caterpillars make a difference as to how easily they were found? - Did the shape of the caterpillars make a difference as to how easily they were found?	22. Discuss as a class the difference between the two schoolyard "habitats" where the caterpillars were hidden. *Extension:* 1. *Make a class map of the two habitats where the caterpillars were hidden. Have students glue their caterpillars on the map in the locations where they were found.* 2. *Have students pick one of their caterpillars and write a story about a day in its life.*

Graphing Sheet – Student Sheet



Topic 6: Session 6.11 – Hidden Lizards

Session Supplies:

- *Lizard Pattern* sheet (pg. 221)
- Supplies to color in the *Lizard Pattern* sheet
- Glue

Session Virginia SOL

Science	English	Mathematics	History & Social Science
2.1 a, l 2.5 a, b, c 2.7 a 2.8 c	2.3 a, e 2.12		

Session 6.11 – Hidden Lizards

Teacher Questions & Notes	Procedures
-What is camouflage? -Why is camouflage helpful to animals? -Is camouflage good for predators, too?	1. In this session, students will look at how a predator uses camouflage. Review the previous lesson on camouflage. Animals use camouflage to keep from being eaten. Predators use camouflage to sneak up on their prey. In their food web, lizards are classified as a predator. They feed on a wide variety of insects including crickets, moths, and caterpillars. Pictures of lizards native to Virginia can be found at http://www.dgif.virginia.gov/wildlife/. In addition to blending into their surroundings, lizards move very slowly as they approach their prey and then strike very rapidly.
	2. Tell the students that they will now try to camouflage a lizard in the classroom. a. Give each student a *Lizard Pattern* sheet (pg. 221). b. Have them silently look around the classroom and decide on a spot where their lizard will blend into an area of the classroom. Explain that they do NOT want to discuss the spot that they plan to use. c. Have the students color their lizards so that they will be camouflaged when they place them in their chosen spots. The goal is to make them so hidden through camouflage that it will be difficult for others to find them. d. Give the students time to color and cut out their lizards.

Session 6.11 – Hidden Lizards

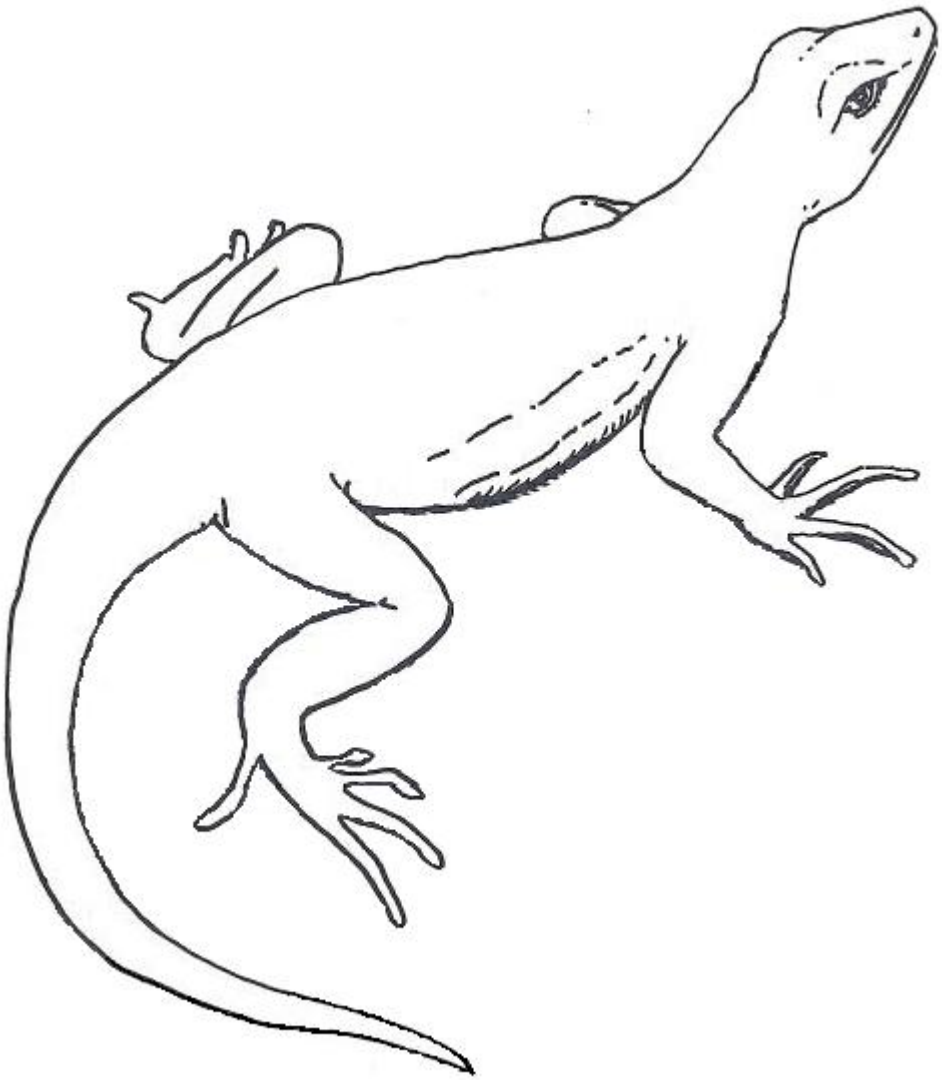
Teacher Questions & Notes	Procedures
	e. After they color their lizards, have them write in their journals about where they plan to place them and why they think they will blend into that area. Again, remind them that they do NOT want to share this information with anyone else.
	3. After the students have completed their lizards and journal entries: a. Have the class line up outside the classroom. b. Let each student go into the classroom individually, or send them in small groups to place their lizards. Give them a piece of tape so that they can tape it in their chosen place. c. Remind them not to pick up anything to hide their lizard. Remind them that a lizard would not be able to move something to hide.
	4. After all students have placed their lizards, bring the class back into the classroom and have them sit in their seats. a. Explain that they will want to do the next part of the activity SILENTLY so as not to give away a lizard's location to other students. b. In their journal on the next blank page, write the title "Lizard Camouflage." c. Have them walk around silently with their journals, looking for the lizards. d. Each time they find a lizard, they will number a blank line on the journal page and note where they found it. e. Make sure that the students understand that they will <u>NOT</u> pick up any of the lizards.
-Where did you find lizards? -How well did they blend? -Which lizards were most easily	5. After five minutes, gather together to talk about where they located the lizards, and which ones were most easily spotted. As

Session 6.11 – Hidden Lizards

Teacher Questions & Notes	Procedures
found? -Which were harder to spot and why? -If you were a lizard in this classroom, what colors would you be?	a lizard is discussed, if students found that lizard, have them put a check mark in front of its number in their journals. 6. Determine if there are any lizards that were not found by anyone. If so, have the student whose lizard was not found point it out to the rest of the class. Discuss why it was not found.
	7. After the activity, have the students retrieve their lizards, glue them in their journals on the Lizard Camouflage pages and write about where they placed their lizards and how well they blended into their surroundings.

Name: _____

Lizard Pattern Sheet – Student Sheet



Topic 6: Session 6.12 – Student Project Work Time: General

Session Supplies:

- Group project notebooks

Session Virginia SOL

Science	English	Mathematics	History & Social Science
2.1 h, i, j, k, l 2.5 a, b, c 2.7 a 2.8 c	2.2 a, b, e 2.3 a, b, c 2.10 2.12 2.14		

Session 6.12 – Student Project Work Time: General

Teacher Questions & Notes	Procedures
	PROJECT WORK TIME: 1. Conference with each research group about the visual portion of their project. 2. Review the rubric, clarify, and answer questions. 3. Have all students work on their projects and practice their presentations.

Virginia Animals and their Habitats

Topic 7

Unit Culmination

TOPIC 7 – Unit Culmination

Topic 7: Overall Information

Overview

In this group of lessons students will present their projects. Evaluation of what students have learned throughout the unit will be conducted and conclusions will be drawn by the students about the interdependency of organisms and the importance of conservation.

Topic 7 Virginia SOL

Science	English	Mathematics	History & Social Science
2.1 a, d, g, h, i, j, k, l, m	2,1	2.3 a	2.5
2.4 a	2.2 a, b, c, e	2.17	2.6
2.5 a, b, c	2.3 a, b, c	2.19	2.7
2.7 a	2.10		2.9
2.8 c	2.12		

Student Learning Expectations

- Construct and interpret a graph.
- Create a map key for a Virginia map.
- Demonstrate the interdependency of organisms.
- Orally share information with a group.
- Compose a reflection statement to synthesize their learning.

Excellent resources about environmental issues that can be included as an extention to Topic 7 can be found on the New Hampshire Fish and Game Department (NHFGD) at http://www.wildnh.com/Kids/kids.htm, *Here Today, Gone Tomorrow* Vol. 1, Issue 2, and *Wildlife at Risk* Vol. 6, Issue 2.
Wild Times for Kids is published twice a year by the NHFGD. The magazine can be downloaded.

Procedure

NOTE: The procedures in the topic sessions may be divided into several different lesson periods. Each session may take more than one lesson period to complete.

****Activities in Topic 7 sessions are intended to be used as summative assessments.**

Topic 7: Session 7.1 – Student Project Presentation Preparations

Session Supplies:

- Several different maps that use symbols and have a key for those symbols
- One 3"x5" index card for each team
- Scissors – one pair per team
- Supplies for teams to create their animals' symbols
- Envelope for each team to store the team's symbols (the symbols will be a small size since the symbol cards will be 1 ¾" x 2 ½")

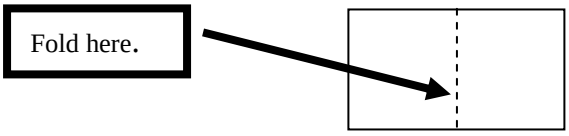
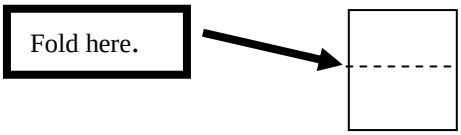
Session Virginia SOL

Science	English	Mathematics	History & Social Science
	2.2 e	2.3 a	2.6

Session 7.1 – Student Project Presentation Preparations

Teacher Questions & Notes	Procedures
	1. Each team needs to design and create a symbol for their team animal that will be placed on a Virginia map. 2. Discuss with the students the definition of a map symbol. 3. Look at several different maps. Look specifically at the different symbols that are used. 4. Ask the students why you would use a symbol on a map instead of writing out the name of the various objects on a map. 5. Explain that as a team they will design and make four identical copies of a symbol for their animal. 6. Discuss with the students that their symbols should be simple line drawings and should not have a great deal of detail. Discuss with them why that would be true.
	7. Give the teams time to design their animals' symbols on a blank piece of paper. 8. Remind them to keep the drawings simple. 9. Remind them that they will be drawing the actual symbols fairly small.
	10. Give each team one 3x5 index card. They are going to divide and cut their card into four equal pieces.

Session 7.1 – Student Project Presentation Preparations

Teacher Questions & Notes	Procedures
	a. Have each team hold their 3x5 card so that the long sides are on the top and bottom. Fold the 3x5 card in half. b. Discuss what should be alike about the two sides of the card if they folded it correctly.  c. Now fold the 3x5 card in half again.  d. Discuss what should be alike about all four divisions of the card now. e. Have students unfold the card and, using the scissors, cut the card on the folds so that they now have four equal pieces.
	11. Have the teams draw their symbols on each of the four cards. Remind them that the symbols should be the same on all four cards. 12. Have each team put their four symbol cards in an envelope and label the envelope with their team members' names. Seal the envelopes so that the cards are not lost before they are needed.

Topic 7: Session 7.2 – Student Project Presentations

Session Supplies:

- Envelopes with the team map symbols
- Copies of the *Presentation Rubric* (pg. 242) for each team presentation

Session Virginia SOL

Science	English	Mathematics	History & Social Science
2.1 a, l, m 2.4 a 2.5 a, b, c 2.7 a 2.8 c	2.1 2.2 a, b, c, e 2.3 a, b, c 2.10		2.5 2.6

Session 7.2 – Student Project Presentations

Teacher Questions & Notes	Procedures
	You may want to break the presentations into several days depending on the length of the presentations and the number of groups. Student teams giving their presentations will need the envelopes with their animal symbols so they can place them on the large classroom Virginia map. Animals may be located in more than one place in the state, so the teams may need to place multiple copies of their symbols on the map.
-What have we learned so far? -Is there a connection between the animals? -Are the habitats similar?	1. Before student teams begin their team presentations, review the *Presentation Rubric* (pg. 242) with the class. 2. Have each student team give their presentation about their animal. Each student should have a part in the team's presentation. 3. After each presentation, allow audience members to ask at least three questions. Each team member should contribute to the answers.
	4. A large scale Virginia map should be posted where all students can see the map. 5. After each presentation, have the student team add their animal symbol to the map key and place their animal symbols on the map. 6. Stop after every two to three presentations to discuss how the animals and habitats are related.

Session 7.2 – Student Project Presentations

Teacher Questions & Notes	Procedures
	7. After all the presentations have been given, have the students examine the map and discuss.

Topic 7: Session 7.3 – Interdependence: Animals with their Living and Nonliving Surroundings

Session Supplies:

- Project WILD 2006, (pg. 9) "Classroom Carrying Capacity"

Session Virginia SOL

Science	English	Mathematics	History & Social Science
2.1 g, j, k, m 2.4 a 2.5 a, b, c 2.7 a 2.8 c	2.3 a, b, c 2.12		2.7 2.9

Session 7.3 – Interdependence: Animals with their Living and Nonliving Surroundings

Teacher Questions & Notes	Procedures
-How are the different Virginia animals we've studied interdependent with each other? -Are they interdependent with anything else in their habitat?	1. Review class discussions about how animals and habitats are related.
-Is there an unlimited supply of living and nonliving resources within their habitat?	2. Review the "Classroom Carrying Capacity" activity in the Project WILD 2006 (pg. 9). This was completed during Topic 3, Session 3.2. 3. Emphasize the meaning of *carrying capacity* (the number of plants and animals that an environment can support) prior to beginning the activity.
	4. In their journal, have students respond to the following scenario: *Pretend the animal you studied left its habitat. In your journal on the next blank page, write the title "What if ____ _____ Left its Habitat…" Write a story explaining what you think would happen.* 5. Put students into small groups that are not their project teams. (Each student within the group should have studied a different animal.) Allow students to share their journal responses. 6. Have one representative from each group share with the class something they learned from their small group discussion.

Topic 7: Session 7.4 – Classifying our Virginia Animals

Session Supplies:

- The Virginia class map with the student project animal symbols

Session Virginia SOL

Science	English	Mathematics	History & Social Science
2.1 a, d, h, i, j, k 2.5 a, b, c		2.17 2.19	

Session 7.4 – Classifying our Virginia Animals

Teacher Questions & Notes	Procedures
-How could we sort the animals we studied? (Lead students to name the six classifications from the beginning of the unit.)	1. Discuss with the class that they have now mapped the location of all the animals that were researched by the student teams. Discuss the importance of having a balance within a habitat. 2. Remind the students that at the beginning of the unit, they sorted Virginia animals into six different classifications. Review the six classifications. 3. As a class, sort the specific Virginia animals the students studied into the six classifications.
	4. The next activity should be done independently as it is intended to be used as an assessment. a. Have students create a graph of the data that were collected and sorted in #3. b. Have each student write one statement about what the data on their graph show and one question that can be answered using the information on the graph. They should do this activity on a blank page in the back of their journal. Encourage them to make comparisons. (Additionally, the teacher may want to create specific questions for the students to answer based on the data.) c. After students have completed their graphs, share some of their ideas as a class.

Topic 7: Session 7.5 – Virginia Animal Food Chains and Food Webs

Session Supplies:

- The Virginia class map with the student project animal symbols
- Chart paper for each small group

Session Virginia SOL

Science	English	Mathematics	History & Social Science
2.1 a, g, h, i, j, k, l 2.4 a 2.5 a, b, c 2.7 a 2.8 c	2.2 a, b, c, e 2.3 a, b, c		

Session 7.5 – Virginia Animal Food Chains and Food Webs

Teacher Questions & Notes	Procedures
	1. Review the Virginia map with the team animals added, review the sorting and graphing of the animals, and the carrying capacity lesson. Emphasize how all organisms depend on each other to survive and how animals are connected to each other.
	2. Review the concept of food chains and food webs. 3. In small groups, have students use chart paper and work together to create a food chain or web based on the Virginia animals they have studied. Students may need to add additional Virginia animals and plants to complete the chain or web. 4. Share the webs and discuss any similarities and differences.

Topic 7: Session 7.6 – Protecting Virginia's Habitats

Session Supplies:

- Construction paper
- Supplies for art work

Session Virginia SOL

Science	English	Mathematics	History & Social Science
2.1 a, g, h, i, j, k 2.5 a, b, c 2.7 a 2.8 c	2.12		2.7 2.9

Session 7.6 – Protecting Virginia's Habitats

Teacher Questions & Notes	Procedures
	1. As a class, discuss why it's important to protect our habitats and the animals that live in them. 2. As a class, make a list of human activities that are helpful for the survival of plants and animals. 3. As a class, make a list of human activities that can be harmful to the survival of plants and animals. 4. Have students pick one of the human activities than can be harmful and write about what they might do to help change it. For example: a. Harmful activity: littering b. What they can do to change it: I can throw away my trash and pick up litter I see. 5. Have students illustrate the statements that have been written on the construction paper and post them around the Virginia map. Students who want to complete more than one could post them throughout the school. 6. Have students select the next blank page in their journal and write the title "Final Journal Reflection." 7. Have the students complete the following reflection on their page: *If everyone studied animals and their habitats, do you think that the world would be different? Why or why not?*

Virginia Animals and their Habitats

Appendix A

Student Project Information

Appendix A - Student Project Information

Teacher Directions for the Student Team Projects

Throughout the unit, students will be working in teams of three to four students to create a culminating project. This project is to be completed at school. Each team will select one Virginia animal to research. The final products from the student teams will include: a presentation about their animals to be given to the class, a visual product to be displayed, and a written report about their animals. The three final products will include information about the animal, its habitat, life cycle, adaptations, and its place within a food chain.

Assigning the Project:

- Before beginning the *Virginia Animals and their Habitats* unit, you need to place your students in teams of three to four students. Use your discretion to assign teams. Students will work in these teams for their projects throughout the unit. The project is to be completed at school, not at home.

Materials:

- Examine the list of Virginia animals ahead of time and gather a variety of books from your classroom and school library that students can use during their research. When appropriate, utilize your science textbook and grade-level resources. If your school has a science lead teacher, he/she would be an excellent resource. The intent is for you to use the resources your school has available.
- You may want to bookmark Web sites about Virginia animals for your students ahead of time so that they will be able to easily access data about their team animals from the Internet.
- The *Design Brief* is included in Appendix A and is an overview of the components of the project. It is to be utilized as a checklist to make sure that each student team has all of the required elements for their projects. When you introduce the project to the student teams, go over the *Design Brief* with them.
- You have been provided a rubric for each section of the project. You will need to preview these ahead of time so that you know the student team expectations for each part of the project. These will be given to student teams at different times during the unit and discussed with them so that they understand the expectations for their project's culminating products. Each student team should keep the *Design Brief* and the rubrics in their team notebooks so they can refer to them as they are working.

Logistics

- Time has been built in throughout the unit for students to work on the different components of their team projects during class time. Additional class time can be added if needed. At the end of the unit, each team will combine all the pieces they have been working on and put them together into the final project products – the presentation, the visual product, and the written report. The intent is not for the student teams to do the project all at once!
- You will have many roles throughout the unit. Your instruction will give students the content and tools necessary to complete each aspect of the project. You will monitor each student team's progress throughout the unit. At the end of the unit, you will facilitate the analysis of the cumulative information gathered and given during the unit. You will also help students to develop group statements on the key concepts of interdependency and conservation within Virginia's ecosystems.

Team Members' Names: _____

Virginia Animals and their Habitats Project Design Brief

You have learned about animals and their habitats. Now you need to use this knowledge to complete a team project.

Design Challenge:

Your team must choose one Virginia animal to research. You will create a project that will be presented to the class. The project will include a written report with information about the animal, its habitat, life cycle, adaptations, and its place within the food chain. Your team will also create a visual product such as a poster, a diorama, a PowerPoint presentation, or a play.

Criteria:

- ☐ The written report must include:
  - description of your animal;
  - description of your animal's habitat;
  - picture of your animal's life cycle;
  - description of your animal's adaptations; and
  - description of your animal's food chain including your animal's place in the chain.

- ☐ The visual product must include:
  - map of Virginia showing where your animal lives;
  - a graph; and
  - a picture of your animal and its habitat.

- The presentation must include:
  - description of your animal;
  - description of your animal's habitat;
  - picture of your animal's life cycle;
  - description of your animal's adaptations; and
  - description of your animal's food chain including your animal's place in the chain.

- Team rules for the presentation:
  - Everyone on your team must have a role in the presentation.
  - Your team will answer at least three questions from the class.

Virginia Native Animals List

This list includes a sampling of Virginia animals. You are NOT limited to only these animals when you are working with this unit.

American Shad
Bald Eagle
Big-eared Bat
Black Bear
Black Rat Snake
Blue Crab
Brook Trout
Bullfrog
Canvas-backed Duck
Cardinal
Cow-nosed Ray
Deer
Dolphin
Dragonfly
Egret
Great Blue Heron
Large Mouth Bass
Laughing Gull
Loggerhead Sea Turtle
Mallard
Monarch Butterfly
Mosquito
Mussels
Nurse Shark
Osprey
Oyster
Painted Turtle
Pileated Woodpecker
Praying Mantis
Raccoon
River Otter
Snapping Turtle
Spotted Salamander
Sturgeon
Tiger Swallowtail
Water Strider
Wood Duck
Gray Squirrel

Team Members' Names: _____

Habitat Research Planning Sheet – Student Sheet

Where in Virginia is your animal's habitat located? _____ _____ _____ _____	Describe how your animal's habitat looks? _____ _____ _____ _____
What types of plants/flowers grow in your animal's habitat? _____ _____ _____ _____	What other animals live in your animal's habitat? _____ _____ _____ _____
Is there a water source in your animal's habitat? What is it? _____ _____ _____ _____	What are your animal's sources of food? _____ _____ _____ _____

On the back, list any other interesting facts you learn during your research.

Group Reflection

What did my group do?	**What did I do?**
What questions do we still have?	**How well did we work together?** We worked at a level: _____ **3** – Everyone contributed and cooperated. **2** – Most of us contributed and cooperated. **1** – Some of us contributed and cooperated. I think this because

Reflection Window
Date: _____

Team Members' Names: _____

Written Report Rubric

REQUIRED VOCABULARY WORDS:					
Animal Words (Choose a minimum of five.)					
habitat	**life cycle**	**adaptation**	**food chain**	**interdependence**	
migration	**hibernation**	**camouflage**	**organism**	**survival**	
Verbs (Choose a minimum of three.)					
observe	**identify**	**describe**	**compare**	**contrast**	**investigate**
predict	**data**	**conclude**	**explore**	**measure**	**summarize**

	3 POINTS	2 POINTS	1 POINT
CONTENT	The report contains all the criteria from the design brief.	The report contains most of the criteria from the design brief.	The report contains some of the criteria from the design brief.
VOCABULARY	The report includes all of the required animal words (5) and required verbs (3).	The report includes most of the required animal words (4) and required verbs (2).	The report includes some of the required animal words (<4) and required verbs (<2).
SPELLING	All words are spelled correctly.	Most of the words are spelled correctly.	Some of the words are spelled correctly.
GRAMMAR: PUNCTUATION & CAPITALIZATION	Every sentence begins with a capital letter and ends with the appropriate punctuation.	Most sentences begin with a capital letter and end with the appropriate punctuation.	Some sentences begin with a capital letter and end with the appropriate punctuation.
APPEARANCE	The product is written neatly. There is good organization. The title page includes the name of project, team member names, date, name of teacher, grade level, school, a colorful border, and the paper is either stapled or placed in a folder.	The product is written neatly. The organization is somewhat clear. The title page includes most of the required components (name of project, team member names, date, name of teacher, grade level, school, a colorful border, and the paper either is stapled or placed in a folder).	The product is difficult to read and unorganized. The title page is missing or has only some of the required components (name of project, names in team, date, name of teacher, grade level, school, a colorful border, and the paper either is stapled or placed in a folder).

Team Members' Names: _____

Visual Product Rubric

	3 POINTS	2 POINTS	1 POINT
ANIMAL AND HABITAT	The product clearly shows the animal in its appropriate habitat.	The product shows the animal in its habitat, but some mistakes may be present.	The animal and/or habitat is not clearly shown.
MAP	The map includes all of the required elements: a title, compass rose, map key, and date. The James River, Appalachian Mountains, and Atlantic Ocean are accurately labeled. Symbols are used to show where the animal lives.	The map includes most of the required elements.	The map includes some of the required elements.
GRAPH	The graph includes a title, headings, key, and scale with equal increments. The graph accurately reflects the data and is made correctly.	The graph includes most of the required elements (a title, heading, key, and scale with equal increments). For the most part, the graph accurately reflects the data and is made correctly.	The graph includes some of the required elements (a title, heading, key, and scale with equal increments). The graph somewhat accurately reflects the data and is partially correct.
APPEARANCE	The product is well-planned, neatly presented, and done to the best of the group's ability.	Most of the product is well-planned, neatly presented, and done to the best of the group's ability.	Very little of the product is well-planned, neatly presented, and done to the best of the group's ability.

Teacher Comments:

Team Members' Names: _____

Presentation Rubric

	3 POINTS	2 POINTS	1 POINT
PREPARATION	The group is prepared and knows their material.	The group is mostly prepared and knows most of their material.	The group is somewhat prepared and knows some of their material.
GROUP PARTICIPATION	Everyone in the group participated.	Most of the students in the group participated.	Some of the students in the group participated.
PUBLIC SPEAKING	Everyone looks at the audience. Speakers use a clear and loud voice.	Most group members look at the audience. Speakers mostly use a clear and loud voice.	Some group members look at the audience. Speakers sometimes use a clear and loud voice.
RESPONSE TO QUESTIONS	The group answers questions from the class with clear explanation and details.	The group answers most questions from the class with clear explanation and details.	The group answers some questions from the class with clear explanation and details.

Teacher Comments: