

VIRGINIA ANIMALS & THEIR HABITATS

Topic 6

How Do Animals Adapt to Survive?

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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
	<i>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.</i>
-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 <u>Ducks Don't Get Wet</u> , 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. <i>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.</i> 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 <u>Project WILD</u> 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. <i>Suggested habitats are: parking lot, bowling alley, ice skating rink, swimming pool, putt-putt golf course, movie theater, a school building, etc.</i> 5. Give each group one <i>Adaptation Project Planning</i> sheet. <i>See the <u>Project WILD</u> activity “Adaptation Artistry” (pg. 128) or <u>Project WILD Aquatic</u> “Fashion Fish” (pg. 56) for more information.</i>

Session 6.3 – Designer Animals

Teacher Questions & Notes		Procedures	
		6. Have the students work in their groups to complete the <i>Adaptation Project Planning</i> 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 <i>Adaptation Project Planning</i> sheet (pg. 181). Each team will complete the adaptation project planning sheet using their team’s Virginia animal. d. Introduce the <i>Presentation Rubric</i> (pg. 183 or pg. 242) and answer questions.

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 <u>A Look Outside</u> DVD. (<i>See “Session Supplies” for information on how to get the DVD or video.</i>) <i>The video allows students to see how Tundra swans are tracked to follow their migration pattern and to learn why they need to migrate.</i>
-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 <i>Tundra Swan Migration Paths</i> (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. (<i>Based on your class, determine how many of the migrations you will actually chart on the map.</i>) 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

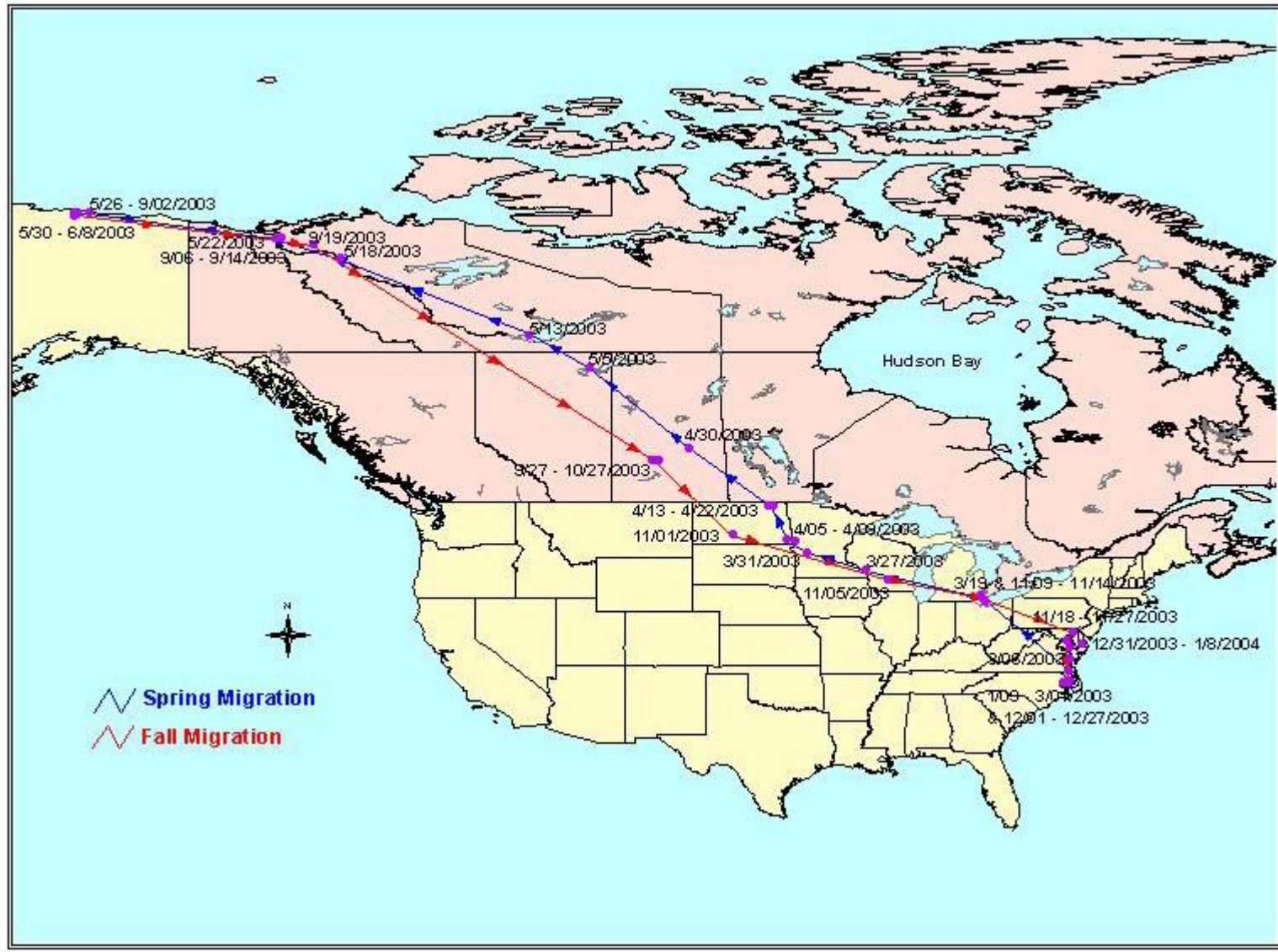
Teacher Questions	Procedures										
	and the Chesapeake Bay are on the map and about the scale on the map (e.g., 1 inch = 100 mi.). f. Remove the string from the map and place it beside a yard stick.										
	2. On the chalkboard or on chart paper, create a T-table to record the data for inches 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.										
-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)	4. Look at the data you wrote on the board or have on a sheet of chart paper when preparing for this session. <table border="1"> <thead> <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> </thead> <tbody> <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> </tbody> </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: - Write the title “Migration Comparison Statements” on the next blank page in their journals. - 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. - For each mathematical statement, have students write a sentence explaining their statement.	Tundra Swan Migration Data		Bird	Miles Traveled on Day 15 of the Migration	Bird 1	84 mi	Bird 2	46 mi	Bird 3	90 mi.
Tundra Swan Migration Data											
Bird	Miles Traveled on Day 15 of the Migration										
Bird 1	84 mi										
Bird 2	46 mi										
Bird 3	90 mi.										

Session 6.6 – Migration Mathematics

Teacher Questions	Procedures
	<i>Allow students to use place value blocks, place value flip charts, or place value cubes to compare and justify their reasoning.</i>
-What is the difference between each bird's total flight?	7. Write the two problems below on the board or on chart paper. $\begin{array}{r} 65 \\ - 43 \\ \hline \end{array} \quad \begin{array}{r} 93 \\ - 78 \\ \hline \end{array}$ 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: - What is the difference between the total miles of Bird 1 and Bird 2? - What is the difference between the total miles of Bird 2 and Bird 3? - What is the difference between the total miles of Bird 1 and Bird 3? - Which bird flew the longest trip? - Which bird flew the shortest trip? <i>Solve these problems together allowing students to use the strategy that makes sense to them (counting up, traditional, using friendly groups of tens, etc.).</i> <i>Make sure that students can demonstrate their answers using subtraction.</i>
-What is the problem asking you to find out? -What is the important information in the problem?	10. Have students complete the <i>Tundra Swan Migration Data</i> sheet (pg. 192). They will use the data in the chart at the top of the <i>Tundra Swan Migration Data</i> sheet to answer each question. <i>Allow them to use the strategy that makes sense for them.</i>

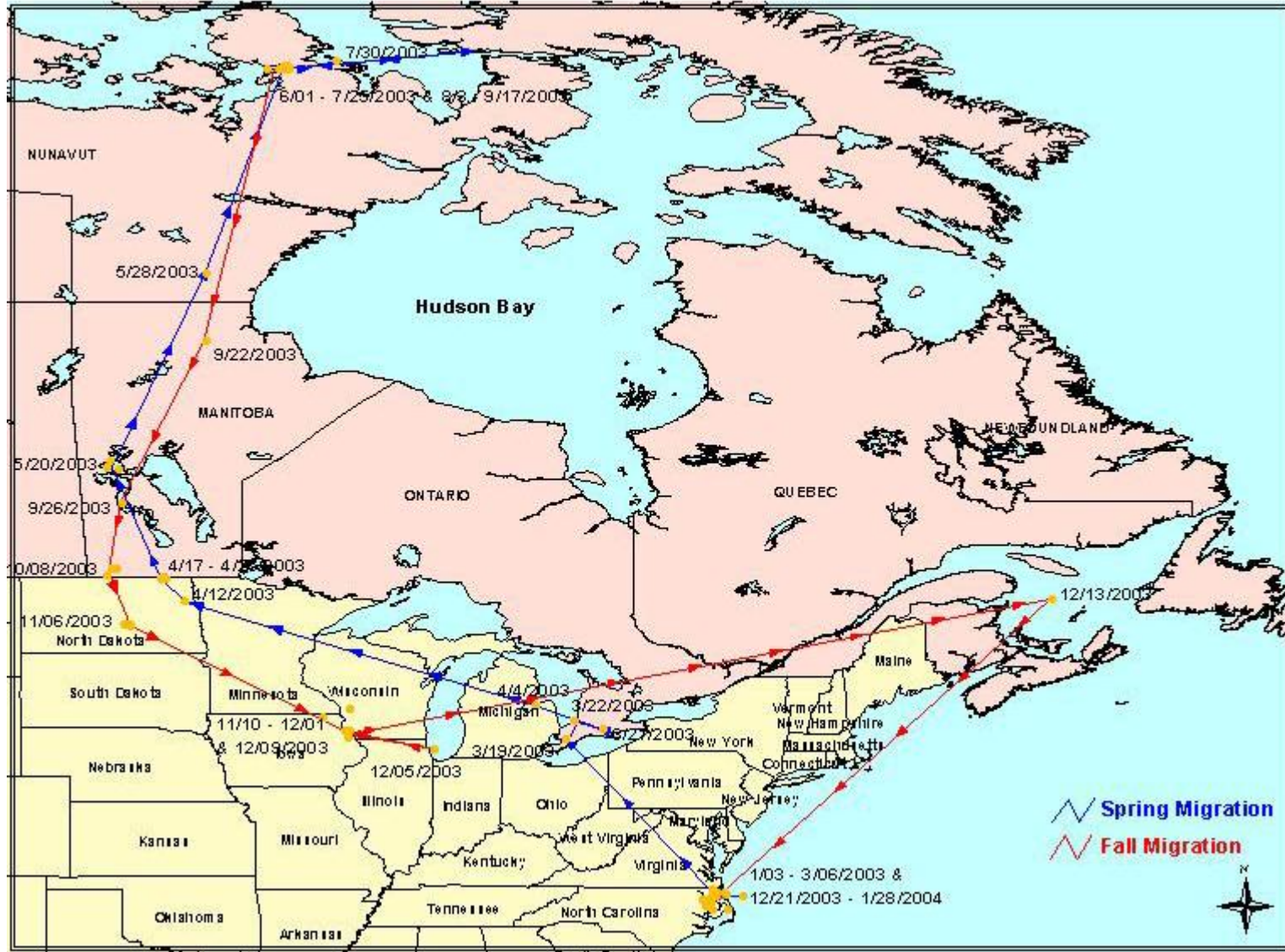
Tundra Swan 888 Migration Path

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



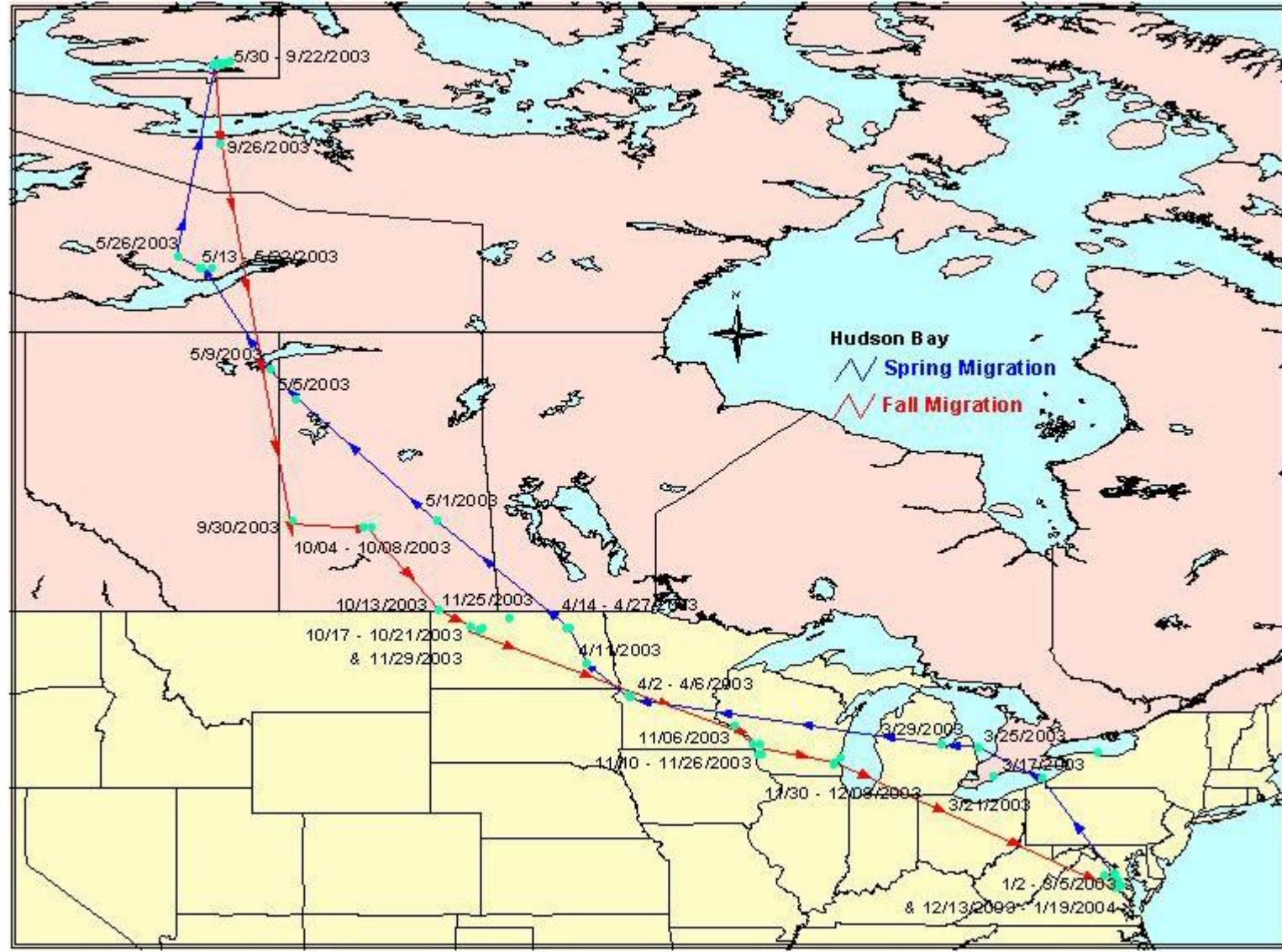
Tundra Swan 893 Migration Path

(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 “<i>Tundra Swan</i>” 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. <i>A possible strategy to use with this activity is peer editing and creating a published story, time permitting.</i>
	5. Give each student a copy of the <i>Flying South Problem</i> 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? <i>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).</i> 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. <i>Students can also draw pictures of the three animals or locate pictures of them that they can include in their journal.</i>

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: <i>CAUTION: The hairs on some caterpillars are toxic and if touched, can cause itching and localized swelling.</i> 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. Caterpillars 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-osmeteria.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
	<i>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.</i> <i>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.</i> <i>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.</i> <i>Prepare the container of the chenille stems before you start this session with your students.</i>
	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. <i>Extension: Discuss the movement of caterpillars and let</i>

Session 6.10 – Yum Yum Caterpillars

Teacher Questions & Notes	Procedures
	<i>the students try moving like a caterpillar.</i> - On the next blank page in the student journals, put the title “Yum, Yum Caterpillars.” - Writing in a complete sentence, have students record the colors of caterpillars that they selected.
	- 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. - 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.
	- Explain the purpose and rules for the activity, “Yum, Yum Caterpillars.” <i>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.</i> <i>Rules for Yum Yum Caterpillar participants:</i> <i>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.</i> <i>When your caterpillars are hidden, return to the common area.</i> <i>You will be a bird and will search for caterpillars in the opposite area from where you hid your caterpillars.</i> <i>You can ONLY pick up one caterpillar at a time.</i> <i>You may ONLY use your thumb and forefinger to pick up the caterpillars (fingers simulate a bird’s beak).</i> <i>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.</i>

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 <i>Graphing</i> 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. <i>Extension:</i> 1. <i>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.</i> 2. <i>Have students pick one of their caterpillars and write a story about a day in its life.</i>

Graphing Sheet – Student Sheet

(title)

(x-axis)

(y-axis)

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 <i>Lizard Pattern</i> 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

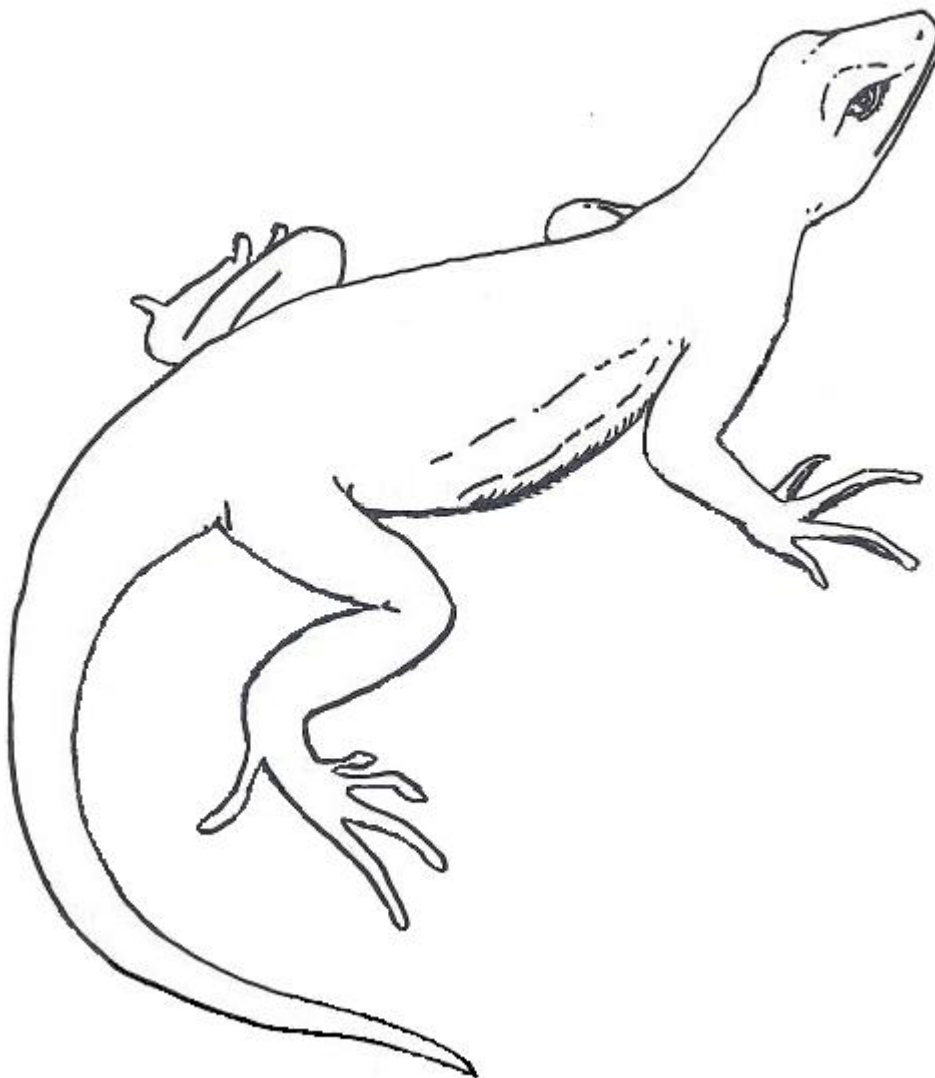
Teacher Questions & Notes	Procedures
	e. After they color their lizards, have them write in their journals about where they plan to place them and why they think they will blend into that area. Again, remind them that they do NOT want to share this information with anyone else.
	3. After the students 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.

Acknowledgments

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**Insect Workbook*

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Columbus, Ohio

Twenty/Twenty-Projects and Activities for WILD School Sites
**Insect Safari*

Pennsylvania State University – Department of Entomology
State College, Pennsylvania

Insect Image Gallery

**Tailed Jay Butterfly* (Jon Lelito, photographer)

**Postman Butterfly* (Jon Lelito, photographer)

**Julia Butterfly* (Jon Lelito, photographer)

**Isabella Butterfly* (Jon Lelito, photographer)

**Leopard Moth* (Maryann Frazier, photographer)

**Imperial Moth* (Maryann Frazier, photographer)

**Io Moth* (Maryann Frazier, photographer)

**Giant Swallowtail Butterfly Caterpillar* (Maryann Frazier, photographer)

**Pandora Sphinx Moth Caterpillar* (Maryann Frazier, photographer)

Smithsonian National Zoological Park
Washington, DC

Animals – Backyard Biology

**Black Swallowtail Butterfly*

**American Painted Lady Butterfly*

**Great Spangled Fritillary*

**Monarch Butterfly*

**Tiger Swallowtail Butterfly*

University of Kentucky – Extension Entomology
Lexington, Kentucky

University of Kentucky Entomology Kentucky Critters

- **Waved Sphinx Moth* (Blake Newton, photographer)
- **Clearwing Sphinx Moth* (Blake Newton, photographer)
- **Pipevine Swallowtail Caterpillar* (Ric Bessin, photographer)
- **Spicebush Butterfly Caterpillar* (Ric Bessin, photographer)
- **Fritillary Caterpillar* (Ric Bessin, photographer)
- **Monarch Caterpillar* (Ric Bessin, photographer)

USDA Forest Service
Washington, DC

*The NatureWatch, Wildlife, Fish, and Threatened and Endangered Species
Program's Photograph Library*

- **Prince Baskettail* (David Arboux, photographer)
- **Argiope Spider* (David Arboux, photographer)

Virginia Department of Forestry
Charlottesville, Virginia

- **Measuring Tree Height*

Virginia Department of Game and Inland Fisheries
Richmond, Virginia

Wildlife Information

- **Eastern Gray Fox* (Dave Schaffer, USFWS, photographer)
- **Virginia Opossum* (John White, photographer)
- **White-tailed Deer* (Lee Walker, photographer)
- **White-tailed Deer Fawn* (WJ Berg, USFWS, photographer)
- **Black Bear* (Steven Ferguson, photographer)
- **Eastern Gartersnake* (John White, photographer)
- **Black Vulture*
- **Gray Squirrel* (Jeff Trollinger, photographer)
- **Eastern Box Turtle* (John White, photographer)
- **Osprey*
- **American Toad* (John White, photographer)
- **Largemouth Bass*
- **Bullfrog* (Bob Greenlee, photographer)
- **Little Grass Frog* (Paul Sattler, photographer)
- **Mountain Chorus Frog* (Paul Sattler, photographer)
- **Northern Green Frog* (Paul Sattler, photographer)
- **Pickerel Frog* (John White, photographer)
- **Insects student sheet*
- **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*

Virginia Tech – Department of Entomology
Blacksburg, Virginia

Insect Identification Lab

- *Gypsy Moth* (E.A. Roberts, Senior Research Associate, Department of Entomology; Virginia Tech)
- *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*