

VIRGINIA ANIMALS & THEIR HABITATS

Topic 3 What is a Habitat?

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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 <i>What Do We Know About Habitats</i> 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
	<p><i>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.</i></p> <p><i>For the Habitrekking activity, print enough Habitrekking Evidence Cards for each student group to have a card.</i></p>
	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.
	<p>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.</p> <p>4. Back in the classroom, have the students draw a line between the food, water, and shelter on their cards, creating a circle.</p>

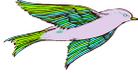
Session 3.2 – Animal Habitat Components

Teacher Questions & Notes	Procedures
<p>-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?</p>	<p>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.</p>
<p>-Did you feel you needed more space? -Why would you need more space? -Do animals and plants need space to survive, too? Why?</p>	<p>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.</p>
<p>-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?</p>	<p>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 <u>carrying capacity</u>. 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.</p> <p><i>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.</i></p>
<p>-What would happen to an animal in its habitat if there was a severe lack of water available?</p>	<p>8. Take the students outside, or in a large open space indoors to gather evidence about habitats using “Habitrekking” (<u>Project WILD</u> pg. 79-81).</p> <p>9. Divide the class into small groups of two to three students. Give each group a <i>Habitrekking Evidence Card</i> (pg. 71). (There are eight different evidence cards on the <i>Habitrekking Evidence Cards</i> sheet.)</p> <p>10. Back in the classroom, discuss what evidence each group discovered.</p> <p>11. Review with the students the components of a habitat and what they have learned about animals and their habitats.</p>

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

Name: _____

Animal Task Card – Student Sheet

 <p>WATER</p>  <p>FOOD</p>  <p>SHELTER</p>  <p>What a Bird Needs to Survive</p>	 <p>WATER</p>  <p>FOOD</p>  <p>SHELTER</p>  <p>What a Deer Needs to Survive</p>
 <p>WATER</p>  <p>FOOD</p>  <p>SHELTER</p>  <p>What a Squirrel Needs to Survive</p>	 <p>WATER</p>  <p>FOOD</p>  <p>SHELTER</p>  <p>What a Bee Needs to Survive</p>
 <p>WATER</p>  <p>FOOD</p>  <p>SHELTER</p>  <p>What a Lady Bug Needs to Survive</p>	 <p>WATER</p>  <p>FOOD</p>  <p>SHELTER</p>  <p>What a Frog Needs to Survive</p>

Habitrekking Evidence Cards

(only need one card per group)

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

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 <i>Sensory Paragraph</i> 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 <i>Sensory Paragraph</i> 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 <i>Sensory Paragraph</i> 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 <i>Sensory Paragraph</i> 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:
<p>Write a paragraph describing what you observed. Use the information you wrote in the boxes above.</p> <hr/>	

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.
<p>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?</p> <p>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.)</p>	<p>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.</p> <p>3. Review the Class Habitat Statement again. Ask if it needs to be revised. Make any necessary revisions.</p>
	<p>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 <i>Talking with a Habitat Scientist</i> sheet (pg. 76).</p> <p><i>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.</i></p>

Session 3.4 – Talking with a Habitat Scientist

Teacher Questions & Notes	Procedures
	<ol style="list-style-type: none"> 5. Complete the second half of <i>What Do We Know about Habitats?</i>(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.
	<p>PROJECT WORK TIME:</p> <ol style="list-style-type: none"> 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 <i>Virginia Animals and their Habitats Project Design Brief</i> (pg. 77-78 or pg. 235-236) for the project. Review the <i>Design Brief</i> with the students and make sure that they understand the project they will complete. The <i>Virginia Animals and their Habitats Project Design Brief</i> 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 <i>Habitat Research Planning</i> 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

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

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
<p>-What is measurement? -Why do we measure things?</p>	<ol style="list-style-type: none"> 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: <ol style="list-style-type: none"> a. What is measurement? b. Why do we measure things? 2. Have several students share their responses with the class. <p style="text-align: center;"><i>Measurement is a way to compare items by length, mass, capacity, or temperature.</i></p>
	<ol style="list-style-type: none"> 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. <ol style="list-style-type: none"> 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																																								
	<p>c. Have each group choose a tool. (Each student group will use their selected tool to measure the items listed.)</p>																																								
	<p>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.</p> <p style="text-align: center;">Sample Chart</p> <table border="1" data-bbox="621 684 1468 1142"> <thead> <tr> <th data-bbox="621 684 802 720">Team Tools</th> <th colspan="4" data-bbox="802 684 1468 720">Items to Measure</th> </tr> </thead> <tbody> <tr> <td data-bbox="621 720 802 840"></td> <td data-bbox="802 720 971 840">Chalkboard Eraser</td> <td data-bbox="971 720 1140 840">Stapler</td> <td data-bbox="1140 720 1308 840">Length of Teacher's Desk</td> <td data-bbox="1308 720 1468 840">Width of Classroom Door</td> </tr> <tr> <td data-bbox="621 840 802 875">Paper clips</td> <td data-bbox="802 840 971 875"></td> <td data-bbox="971 840 1140 875"></td> <td data-bbox="1140 840 1308 875"></td> <td data-bbox="1308 840 1468 875"></td> </tr> <tr> <td data-bbox="621 875 802 951">Popsicle sticks</td> <td data-bbox="802 875 971 951"></td> <td data-bbox="971 875 1140 951"></td> <td data-bbox="1140 875 1308 951"></td> <td data-bbox="1308 875 1468 951"></td> </tr> <tr> <td data-bbox="621 951 802 987">Pennies</td> <td data-bbox="802 951 971 987"></td> <td data-bbox="971 951 1140 987"></td> <td data-bbox="1140 951 1308 987"></td> <td data-bbox="1308 951 1468 987"></td> </tr> <tr> <td data-bbox="621 987 802 1022">Unifix cubes</td> <td data-bbox="802 987 971 1022"></td> <td data-bbox="971 987 1140 1022"></td> <td data-bbox="1140 987 1308 1022"></td> <td data-bbox="1308 987 1468 1022"></td> </tr> <tr> <td data-bbox="621 1022 802 1058">Pencils</td> <td data-bbox="802 1022 971 1058"></td> <td data-bbox="971 1022 1140 1058"></td> <td data-bbox="1140 1022 1308 1058"></td> <td data-bbox="1308 1022 1468 1058"></td> </tr> <tr> <td data-bbox="621 1058 802 1142">Three-inch yarn pieces</td> <td data-bbox="802 1058 971 1142"></td> <td data-bbox="971 1058 1140 1142"></td> <td data-bbox="1140 1058 1308 1142"></td> <td data-bbox="1308 1058 1468 1142"></td> </tr> </tbody> </table> <p>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.</p>	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				
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																																									
<p>-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?</p>	<p>4. Once all data have been recorded, have a discussion about the numbers and what the students notice about them.</p>																																								
<p>In appropriate places in the book, ask: -What is an apprentice? -What is the apprentice's task? -Why is the bed too short?</p>	<p>5. Read the book titled <u>How Big is a Foot?</u> by Myller & McCrath or a teacher-selected book about measuring.</p> <p>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.</p> <p>7. Ask the students what they think the apprentice should do? Finish reading the book. At the end, discuss what happened.</p>																																								

Session 3.5 – Measurement Preparation

Teacher Questions & Notes	Procedures
	<p>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.)</p> <p>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.</p> <p>10. Discuss what happened when the students measured using their cut-out feet.</p> <p>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.</p>
<p>-Why is it important to have a consistent unit of measurement?</p>	<p>12. Discuss the fact that scientists share data with other scientists and they need to be able to communicate data accurately and consistently.</p> <p>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:</p> <ol style="list-style-type: none"> Cut out two different colors of 1-inch squares ahead of time. 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. 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. 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? <i>Make sure that the students understand that they are counting the number of inch</i>

Session 3.5 – Measurement Preparation

Teacher Questions & Notes	Procedures
	<i>spaces, not just looking at just the numbers on the ruler.</i>
-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	2.10		
2.5 a, b, c	2.12		
2.7 a	2.13		
2.8 b, c	2.14		

Session 3.6 – Writing for the Student Team Project

Teacher Questions & Notes	Procedures
<p>-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)?</p>	<ol style="list-style-type: none"> 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.
	<p>PROJECT WORK TIME:</p> <ol style="list-style-type: none"> 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 <i>Written Report Rubric</i> (pg. 86 or pg. 240) for their project. Have the student teams look at the <i>Project Design Brief</i> 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
	<p>discuss the parts of a report. When reviewing the <i>Written Report Rubric</i> with each team, review only the three-point column with them since it describes what is expected from the team for their written report.</p> <ol style="list-style-type: none"><li data-bbox="581 506 1453 611">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 <i>Project Design Brief</i>.<li data-bbox="581 653 1437 793">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.<li data-bbox="581 835 1377 898">11. Have the student teams continue their research about their animal.<li data-bbox="581 940 1404 1010">12. Have each team keep a copy of the <i>Written Report Rubric</i> 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. (<i>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.</i>)

Session 3.7 – Measuring Tree Heights

Teacher Questions & Notes	Procedures
<p>-How do you think scientists measure things that are very tall? -What other objects could we measure using this method?</p>	<p>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). (<i>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.</i>)</p> <p>6. Complete the following class activity first to prepare the students for measuring a tree using the directions in <i>Measuring Tree Height</i>:</p> <ol style="list-style-type: none"> Ask the students if they have ever held their hand up to block the sun from their eyes on a sunny day. Ask them if their hand is the same size as the sun. (No) 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. 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.
<p>-How could this method be helpful to scientists? -Why would a scientist need to know the height of a tree?</p>	<p>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.</p> <p>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.</p>

Session 3.7 – Measuring Tree Heights

Teacher Questions & Notes	Procedures
	<p>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:</p> <ol style="list-style-type: none">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
	<p>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.</p> <p>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.</p> <p>12. Have groups measure their trees following the directions for the Triangle Method on the <i>Measuring Tree Height</i> directions. Have them note how high up their “nests or food sources” are located in their trees.</p> <p>13. Discuss how this method would be helpful to scientists.</p>
	<p>14. Create some math problems with your students using the information about the tree or building that each group has measured.</p> <p>Sample Problems:</p> <p><i>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?</i></p> <p><i>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?</i></p>

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?

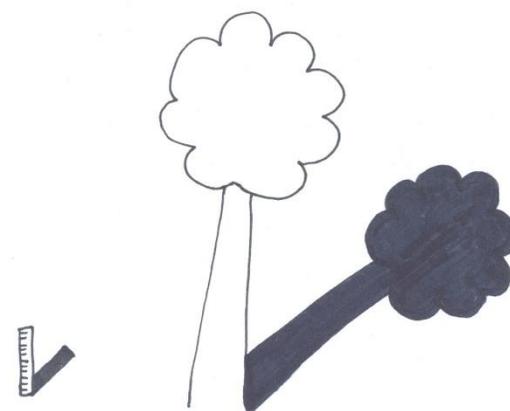
Shadow Method

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:

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

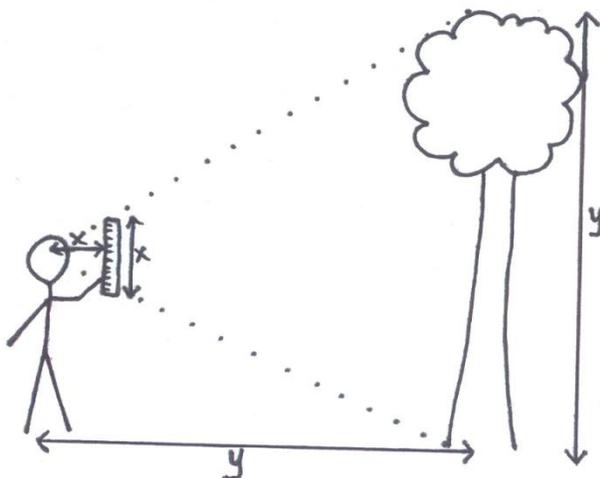
Convert all the measurements to the same units, such as meters or feet. Calculate the tree's height using this equation:

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



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).

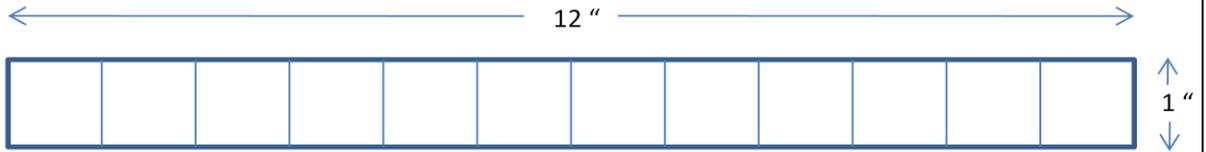
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Topic 3: Session 3.8 – Square-Meter Habitats: Observation 1

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	

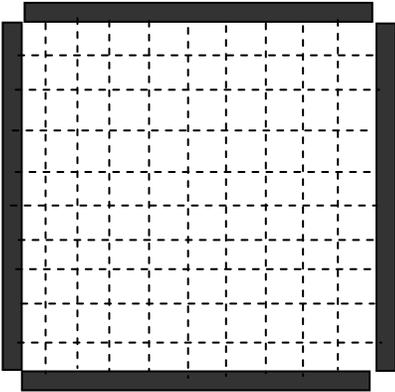
Session 3.8 – Square-Meter Habitats: Observation 1

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.

Session 3.8 – Square-Meter Habitats: Observation 1

Teacher Questions & Notes	Procedures
<p>-What is area? -What do you notice about each shape on this sheet? -How are they alike or different?</p>	<p>2. Provide students with the <i>What is Area?</i> sheet (pg. 98). Tell them that they are going to cover each shape with one-inch squares.</p> <p>3. Have students cover each shape with the one-inch squares and record the number of squares needed.</p> <p>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.</p>
	<p>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?</p> <p>6. Using four one-foot rulers, create a square on the floor. Explain that what they are looking at is one square foot.</p> <p>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.</p> <p>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.</p> <p>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.</p>
	<p>10. We have been measuring with feet and inches which is standard measurement. What is another measuring system? (metric system)</p> <p>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).</p>

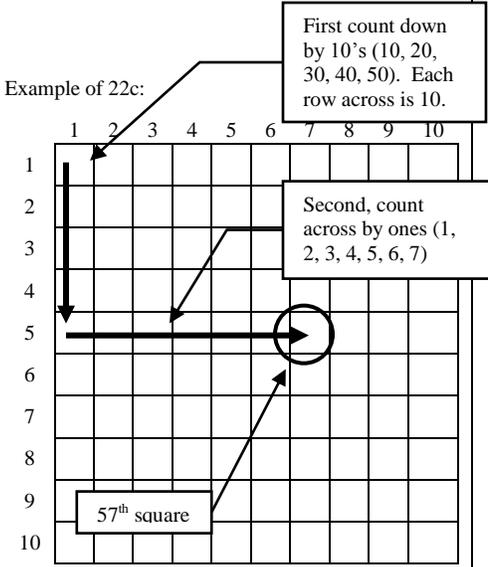
Session 3.8 – Square-Meter Habitats: Observation 1

Teacher Questions & Notes	Procedures
	<p>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.</p>
<p>-Why would we observe the exact same place over and over? -Why would we make more than one observation?</p>	<p>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.</p> <p>14. The working group will observe and write down what they see in their square-meter grid.</p> <p>15. The working group will then make three more observations of the same square-meter grid area at later times.</p>
	<p>16. Hold up a meter stick and talk with the class about how a meter stick is marked off in centimeters.</p> <p>17. Have the class count by tens on the meter stick to the end of the stick.</p> <p>18. Ask the class to calculate ten groups of ten to find how many centimeters are in a meter.</p>
<p>Meter stick </p> <p>String </p> 	<p>19. First build a demonstration square-meter grid to show how a grid is made.</p> <p>a. To build a demonstration square-meter grid, go outside with your students and take the following items:</p> <ol style="list-style-type: none"> (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) <i>First Square-Meter Habitat Observation Record</i> sheet (pg. 99); (5) pencil for each student; (6) copy of the <i>Square-Meter Habitat Group Record</i> sheet (pg. 100) to show to the students; and (7) thermometers.

Session 3.8 – Square-Meter Habitats: Observation 1

Teacher Questions & Notes	Procedures
	<ul style="list-style-type: none">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 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. <p>20. Have students count each created square by ones to see that there are 100 squares in the square meter.</p> <p>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.</p>
	<p>22. Pass out the <i>First Square-Meter Habitat Observation Record</i> sheet and the pencils.</p> <ul style="list-style-type: none">a. Relate the squares in the grids on the <i>First Square-Meter Habitat Observation Record</i> 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.

Session 3.8 – Square-Meter Habitats: Observation 1

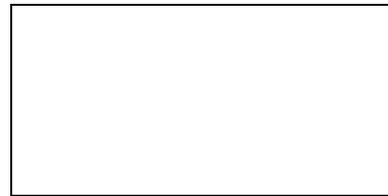
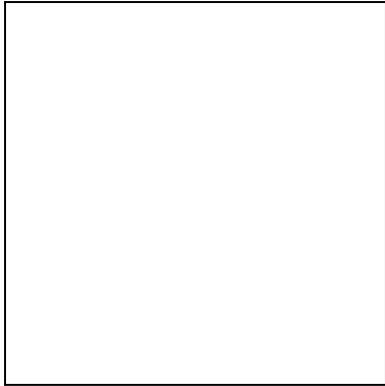
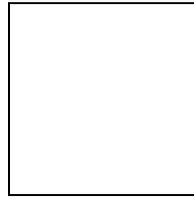
Teacher Questions & Notes	Procedures
<p>Example of 22c:</p> 	<ol style="list-style-type: none"> c. Practice with the class on how to locate specific squares in the grid. Talk with the students about counting down by tens and then across by ones. (e.g., To find the 57th square in the square meter (5 tens and 7 ones), count down the grid 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 <i>First Square-Meter Habitat Observation Record</i> 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 <i>Square-Meter Habitat Group Record</i> 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 (<i>First Square-Meter Habitat Observation Record</i> sheet) onto the group <i>Square-Meter Habitat Group Record</i> 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 <i>Square-Meter Habitat Group Record</i> 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.

Session 3.8 – Square-Meter Habitats: Observation 1

Teacher Questions & Notes	Procedures
<p>-Why did you choose this area of the schoolyard?</p> <p>-Do you think the contents of your habitat will be any different the next time we make an observation of our square-meter habitat?</p>	<p>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 <i>First Square-Meter Habitat Observation Record</i> sheet. Give the groups a set amount of time to complete their observations and recordings.</p> <p>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.</p> <p>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.</p> <p><i>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.</i></p>

Name: _____

What is Area? – Student Sheet



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
	<p>PROJECT WORK TIME:</p> <ol style="list-style-type: none"> 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 <i>Visual Product Rubric</i> (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
	<p><i>NOTE: This session will take a minimum of three session times to complete.</i></p> <ol style="list-style-type: none"> 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.
<p>-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)?</p>	<ol style="list-style-type: none"> 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 <i>Schoolyard Map</i> sheet (pg. 106) to each student. <ol style="list-style-type: none"> 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
	<p>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.</p> <p>c. Have the students assemble into the same group of students with whom they conducted the first square-meter observation.</p> <p>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.</p> <p>e. Have each group add their own square-meter symbol to their maps.</p> <p>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 <i>Schoolyard Map</i>, both at the location of the square meter on the map and in the map legend.</p>
<p>-What differences did you notice? -Why do you think these differences happened? -What didn’t change? -Why didn’t it change?</p>	<p>4. Take the class outside with their <i>Square-Meter Habitat Group Record</i> sheets and their equipment (meter sticks, string, pencils, thermometers, and magnifying glasses) to conduct their second observation of their square-meter habitats.</p> <p>5. On the <i>Square-Meter Habitat Group Record</i> sheet have the students draw observation #2 in another grid and record the data.</p> <p>6. When the class returns to the classroom, have students list any differences between observation #1 and observation #2 on the <i>Schoolyard Map</i> sheet.</p> <p>7. Gather as a class to discuss differences they noticed.</p>
	<p>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.</p>
<p>-What are the elements of a bar graph? -What scale should we use? -What title should we use?</p>	<p>9. After all four observations have been made, create a class bar graph on chart paper or on an overhead transparency to represent</p>

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

Teacher Questions & Notes	Procedures
	<p>the class's data from observation #4 <u>only</u>.</p> <p>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.</p>
<p>-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?</p>	<p>11. Collect the data from each group and display the data on the graph.</p> <p>12. Discuss the graph and what the data tells us about the square-meter habitats.</p>
<p>--What was the same each day? --What was different?</p>	<p>13. Distribute the <i>Graphic Organizer for the Square-Meter Habitat Data Collections</i> (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.)</p> <p>14. After completing the graphic organizers, give each student a <i>Looking at the Square-Meter Habitat Data</i> sheet and have them answer the questions based on the data they have recorded on their graphic organizer.</p> <p>15. At the end of the <i>Looking at the Square-Meter Habitat Data</i> 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).</p>
	<p>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.</p>

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															
	16															
	15															
	14															
	13															
	12															
	11															
	10															
	9															
	8															
	7															
	6															
	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.

Acknowledgments

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**Insect Workbook*

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Twenty/Twenty-Projects and Activities for WILD School Sites

**Insect Safari*

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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)*

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Washington, DC

Animals – Backyard Biology

**Black Swallowtail Butterfly*

**American Painted Lady Butterfly*

**Great Spangled Fritillary*

**Monarch Butterfly*

**Tiger Swallowtail Butterfly*

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University of Kentucky Entomology Kentucky Critters

- **Waved Sphinx Moth* (Blake Newton, photographer)
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- **Measuring Tree Height*

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Wildlife Information

- **Eastern Gray Fox* (Dave Schaffer, USFWS, photographer)
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- **White-tailed Deer* (Lee Walker, photographer)
- **White-tailed Deer Fawn* (WJ Berg, USFWS, photographer)
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- **American Toad* (John White, photographer)
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- **Bullfrog* (Bob Greenlee, photographer)
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- **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*
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- *Hickory-Horned Devil*
- *Saddleback Caterpillar*
- *Fall Webworm Caterpillars*