Bringing the Northern Forest to Your Classroom

Teacher-Developed Lesson Plans For Active Learning

United States Department of Agriculture

Forest Service

Northern Research Station

General Technical Report NRS-21

Abstract

In recent years the Forest Service has reemphasized the need for increased environmental literacy among the Nation's citizens and has recognized the benefits of addressing that need among school-age children. This publication is a product of an Adirondack Curriculum Project workshop sponsored by the USDA Forest Service, Northeastern Research Station, and Paul Smith's College. The workshop was held at Great Camp Sagamore in Raquette Lake, NY, in June 2005. Great Camp Sagamore is operated by the Sagamore Institute, which is dedicated to the stewardship of the camp and to its use for educational and interpretive purposes. For 2 days, 22 teachers met with resource professionals with expertise in either the Northern Forest or in teaching methods and techniques, or both, and developed the lesson plans in this publication.

The Authors

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Cover Photos

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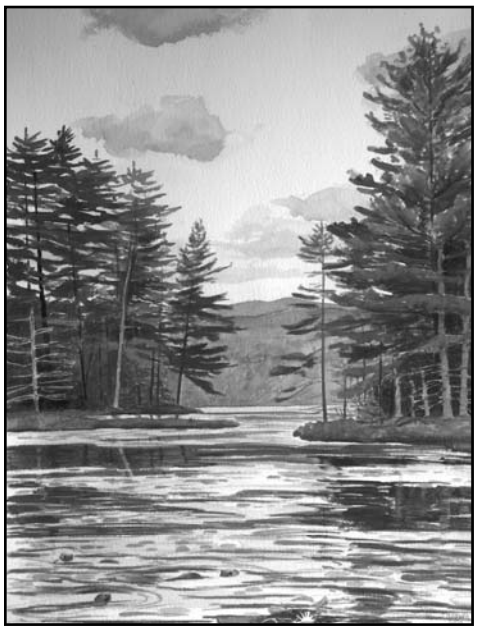

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Mark J. Twery
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Bringing the Northern Forest to Your Classroom

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Bringing the Northern Forest to Your Classroom

Foreword

In recent years the Forest Service has reemphasized the need for increased environmental literacy among the Nation's citizens and has recognized the benefits of addressing that need among school-age children.

This publication is a product of an Adirondack Curriculum Project workshop sponsored by the U.S. Forest Service, Northeastern Research Station*, and Paul Smith's College. The workshop was held at Great Camp Sagamore in Raquette Lake, NY, in June 2005. Great Camp Sagamore is operated by the Sagamore Institute, which is dedicated to the stewardship of the camp and to its use for educational and interpretive purposes. For 2 days, 22 teachers met with resource professionals with expertise in either the Northern Forest or in teaching methods and techniques, or both, and developed the lesson plans in this publication. Based on the structure of Adirondack Challenges, a format developed by the Adirondack Curriculum Project, these lesson plans are founded in "place-based learning." To develop the plans, pairs of teachers explored opportunities for linking some aspect of the Northern Forest to a particular educational goal. The Challenges could be in any field from art to storytelling to ecology or hydrology, but all needed to have explicit links to the Northern Forest. Experts on hand during the workshop provided advice, resource materials, and field experiences to the teachers to stimulate ideas for enhancing classroom experiences in the incubating lesson plans. After the workshop, the teachers returned to their schools and tested the Challenges in their classrooms during the following academic year. Based on those experiences, the Challenges have been revised and refined for presentation here. The Challenges have also been adapted to a broader potential constituency, using national learning standards and generalizing from specific place names. (*The Northeastern Research Station has since merged with the North Central Station to become the Northern Research Station.)

Mark Twery
U.S. Forest Service

Acknowledgments

We want to express sincere thanks to the teacher-participants at the Northern Forest Workshop, who developed the original Challenges on which this publication is based. We are also indebted to the experts who shared their time and resources with the teachers in the workshop, including Michale Glennon, Jerry Jenkins, and Michael Wilson. Members of the Adirondack Curriculum Project Coordinating Committee also helped facilitate the workshop. Bruce Bonney and Jack Drury reviewed the Challenges to ensure they meet educational standards.

Layout - Sandra Hildreth

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The Adirondack Curriculum Project
www.adkcurriculumproject.org

The Adirondack Curriculum Project, or ACP, was created in 2001 by a group of concerned educators in northern New York who felt children living in the Adirondack Park and surrounding areas should have more exciting opportunities to learn about the region's natural and cultural resources. We hope that by focusing on educating young people we will foster better public understanding, appreciation, and stewardship of the area. To accomplish this, we develop and facilitate workshops that give teachers the time and expert resources to create student-centered lessons or "Challenges" to take back and use in their classrooms. We also post all completed (and usually field-tested) Challenges on the Web site, along with other useful links and resources. The Adirondack Challenge format is an adaptation of the student-centered, acitivities-based Challenge created by Education by Design™ and Leading Edge.

Logo by Sandra Hildreth.

The criteria built into developing Challenges help teachers meet educational standards and construct knowledge in one or more of the following six content areas: natural history, human history, culture & the arts, government & civics, economy, and health, recreation & life skills. Teachers formulate an investigative question or issue that the students will be challenged to solve through hands-on activities. A rubric-like Product Quality Checklist is developed as part of the Challenge so that the expected learning outcomes are explicit and can be assessed at the end of the project/lesson.

ACP Challenges developed in workshops are meant to help engender a sense of place. In a recent workshop funded by the U.S. Forest Service in partnership with Paul Smith's College, we extended our notion of "place" to include the Northern Forest region so that teachers from across this shared landscape could have access to these pieces of curriculum owned and developed by other teachers. Most of the Challenges in this book were designed at a workshop at Great Camp Sagamore in the Adirondacks in June 2005 by K-12 teachers and tested by students in the classroom. At the top of each Challenge are listed the National Education Standards that it was designed to meet and the content areas covered. Some may meet more than one Standard, but the main one is in bold and underlined text. Examples of student products are included where available; more can be found on the ACP Web site. They all have Product Quality Checklists to facilitate assessment. The teachers who developed these Challenges included specific "Points Possible" in their checklists, but in this book the points columns have been left blank to allow teachers to customize the Challenge for their own students and curriculum. While often written for a specific course or range of grades, many of these Challenges could be adapted and modified to meet the needs of other classroom levels and subject areas.

If you are interested in developing and posting a new Challenge to share with other educators, or in seeing more Challenges, please see p. 57 or check the ACP Web site for more information. Workshop information is also provided on the Web site.

Sandra Hildreth, Celia Evans, Adirondack Curriculum Project
www.adkcurriculumproject.org

Tree Branch Mobiles

National Standards		Curriculum Content Area
• **Science: Life Sciences** • Life Skills: Thinking & Reasoning; Working with Others • Language Arts: Reading; Writing; Speaking & Listening	**Authors:** Margaret O'Leary & Maureen Peroza, L.P. Quinn Elementary School, Tupper Lake, NY **Grade Level/Course:** 1 - 3	Culture & the Arts Economy Government & Civics Health, Recreation & Life Skills Human History Natural History

Investigative Question or Issue: Which tree are you? How can we tell one type of tree from another?

Challenge: *In teams of four arranged with the help of your teacher, create a mobile made from the key parts of one of the four tree types common to the Northern Forest that you chose to study. You will be using this mobile to help you introduce your tree to the class in a presentation that you will give while standing next to your tree.*

Context for this Challenge: The teacher will want to make available a wide variety of resources (e.g., books, field guides, posters) that describe/illustrate the characteristics of different tree types common to the Northern Forests (see Resources noted below). The teacher may also want to "coach" students in developing their observational and differentiating skills when looking at objects that are related but not the same. These skills will need to be honed as students compare common elements of all trees: the whole tree, leaves, twigs, bark, and seeds.

- **Directions for Students**: As you prepare to create the mobile for your teaching presentation, please consider the following:
- Using your mobile and presentation, you should share accurate information about your tree that you have identified and researched using a field guide and other materials provided by your teacher. You will be able to collect some of this information firsthand when you go into the field to identify, photograph, and collect samples from your special tree.
- During your field research you should collect samples of your tree's branches, twigs, leaves, and seeds. These are the parts you will use to assemble your mobile. You may have to take a rubbing of your tree's bark rather than injure your tree by stripping living bark from it. You will want to include a card naming your tree and perhaps a photograph of the whole tree as part of your mobile.
- When you present your mobile and tree, be sure that your facts are accurate and that you model the criteria for Quality Speaking agreed to in class and mentioned below.
- You and each member of your team should be prepared to teach your classmates (or parents) about two or more of the elements of your mobile.
- Finally, you and each team member should be prepared to identify all four types of trees you've studied either in photographs or while walking along a trail in the woods.

Tree Branch Mobiles

Suggested Book Resources

- “The Secret Life of Trees” by Chiara Chevallier
- “The Tree Identification Book” by George W.D. Symonds
- “Trees, Leaves and Bark” by Diane L. Burns
- “Tree” Eyewitness Books
- “A Tree is Growing” by Arthur Dorros
- “Tell Me, Tree” by Gail Gibbons
- “How the Forest Grew” by William Jaspersohn
- “The Big Tree” by Bruce Hiscock

Quality Standards:

- Mobile is created from actual tree parts, rubbings, or photographs unique to the tree type under study.
- Mobile includes a card naming the tree represented.
- The speakers during the tree presentation each discuss two or more parts of the mobile correctly.
- The speakers during the tree presentation model the criteria for Quality Speaking.
- All the information/facts shared in the presentation are accurate.
- Each team member can identify all four tree types common to the Northern Forest either in photographs or in the field.

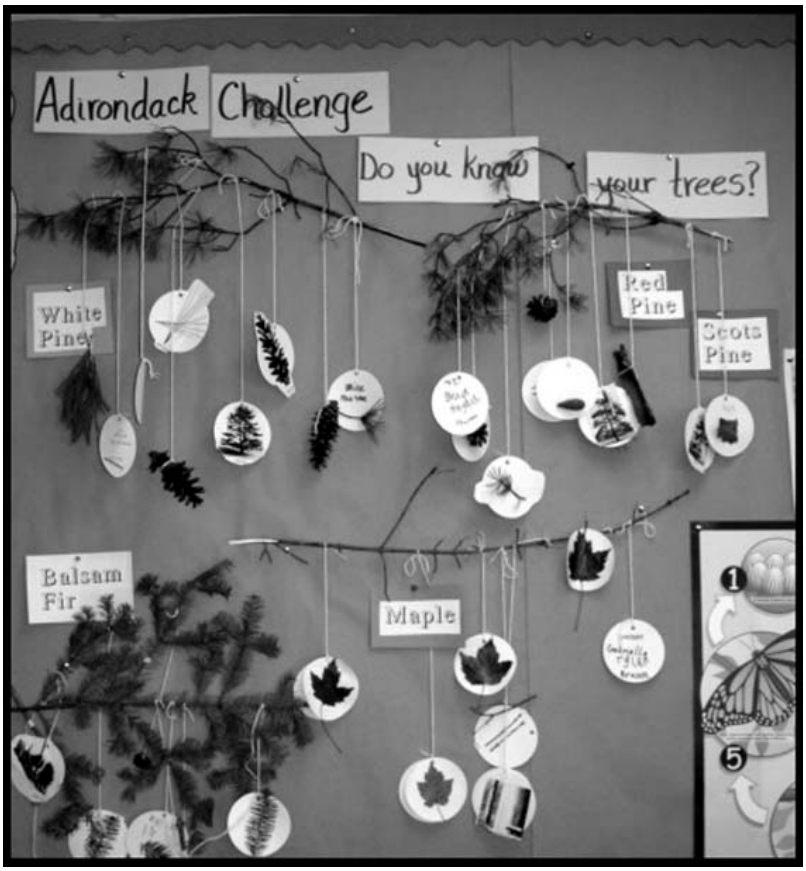


Photo courtesy of Maureen Peroza, Tupper Lake, NY

Tree Branch Mobiles
Product Quality Checklist

Product Author(s): _____

Date: _____ Class: _____

Observed	Standards/Criteria	Points Possible	Points Awarded
	Mobile is created from actual tree parts, rubbings, or photographs unique to the tree type under study.		
	Mobile includes a card naming the tree represented.		
	Speakers during the tree presentation each discuss two or more parts of the mobile correctly.		
	Speakers during the tree presentation model the criteria for Quality Speaking: • Speak clearly		
	• Use appropriate pace		
	• Speak fluently using appropriate intonation, expression, and emphasis		
	• Use animation in the form of gestures and facial expressions		
	• Use appropriate props		
	All the information/facts shared in the presentation are accurate.		
	Each team member can identify all four tree types common to Northern Forests either in photographs or in the field.		
	Total		

Comments:

Nighttime in the Northern Forest

National Standards	Author: Maureen Peroza L.P Quinn Elementary School Tupper Lake, NY **Grade Level/Course:** 1 - 4	Curriculum Content Area
• **Science: Life Sciences; Nature of Science** • Life Skills: Working with Others • Language Arts: Listening & Speaking • Arts: Understands & Applies Media		Culture & the Arts Economy Government & Civics Health, Recreation & Life Skills Human History **Natural History**

Investigative Question or Issue: What is out there after dark? Which animals are up and about in the Northern Forest while we humans sleep?

Challenge: *In small groups of two or three formed with the help of your teacher, create one of the following products: poster, painting, diorama, mobile, photo album, or any other product you can think of that your teacher will approve. Your product will be used to support a presentation to the class in which you tell us important information about a nocturnal animal of the Northern Forests that you have decided to study.*

Context for this Challenge: The teacher will want to ensure the availability of resource materials appropriate to the number of topics selected; guide the class in producing a brainstorm list of nocturnal animals common to the Northern Forest and aid in the selection of five or six animals from the list for indepth study; “coach” students in playing specific roles within the group (e.g., fact finder, writer, illustrator); and introduce them to a formal process of researching and recording data about their animal that they can then use to meet the Challenge described below. Finally, the teacher may want to help students describe appropriate Quality Criteria for each of the products they choose to create.

Directions for Students:
As you research information about your animal, be sure to find out the following facts:

- The name of the animal
- Distinguishing features of the animal by which it could be recognized from a distance
- A general description of the animal (body colors, covering, size)
- The habitat of the animal
- The food of the animal
- The nighttime activities of the animal
- The daytime activities of the animal

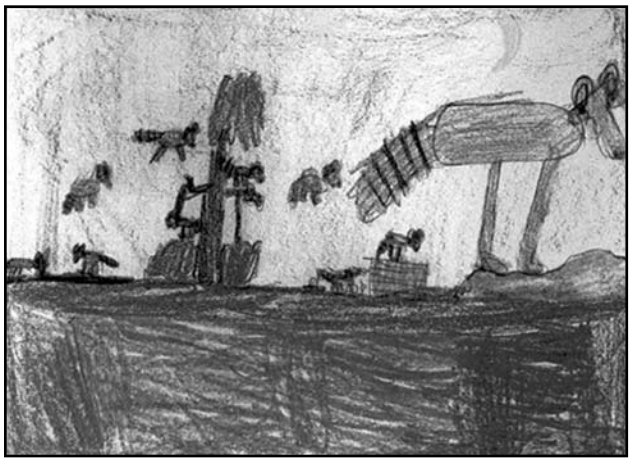
Once you complete your product, you will be asked to give the class a short presentation in which you use your product to help teach the class about the facts you discovered about your animal. Make sure all the information you share about your animal is accurate.

Every member of your team should participate in the presentation in some way.
All team members should be prepared to respond to questions about your animal if asked to do so.

Nighttime in the Northern Forest

Quality Standards:

- Product is completed on time.
- Product conforms to Quality Criteria described in class.
- All the required information/facts are shared as part of the presentation.
- All team members participate in the presentation in some way.
- All information in the product and the presentation is accurate.



Photos courtesy of Maureen Peroza, Tupper Lake, NY

TEACHING TIP

I have done many lessons on this topic throughout the years. Using researched facts, my students and I have written several fictional animal stories to be used as plays or puppet shows. We have made sawdust puppets and clay puppets. We have also used stuffed animals as puppets. The words to the nocturnal animal booklet are written below. Students can illustrate the entire book or classes can create one book by each student doing one or several pages. Enjoy!

Animals of the Adirondack Night

By Maureen Peroza November 1998

One great horned owl
Swooping through the night.
Two tiny field mice
Shivering with fright.

Three white tail deer
Drinking from a brook.
Four baby bunnies
Hiding in a nook.

Five flying squirrels
Floating to the ground.
Six furry brown bats
Darting all around.

Seven blinking fireflies
Flashing in the dark.
Eight gray coyotes
Singing with a bark.

Nine hungry black bears
Lumbering on the lawn.
Ten bandit raccoons
Hunting until dawn.

Many sleeping children
Snoozing the night away.
While these critters stay awake
To hunt and eat and play.

Nighttime in the Northern Forest
Product Quality Checklist

Product Author(s): _____

Date: _____ Class: _____

Observed	Standards/Criteria	Points Possible	Points Awarded
	Product is completed on time.		
	Product conforms to Quality Criteria described in class.		
	All information in the product and the presentation is accurate.		
	All the required information/facts are shared as part of the presentation.		
	All team members participate in the presentation in some way.		
	All team members are able to respond appropriately to questions about their animal when asked to do so.		
	Total		

Comments:

Spiders in Our Backyard

National Standards	Author: Margaret O'Leary L.P. Quinn Elementary School, Tupper Lake Central School Tupper Lake, NY **Grade Level/Course:** 2 - 4	Curriculum Content Area
• **Science: Life Sciences; Nature of Science** • Language Arts: Writing • Life Skills: Working with Others		Culture & the Arts Economy Government & Civics Health, Recreation & Life Skills Human History **Natural History**

Investigative Question or Issue: What kinds of spiders are found in the woods near our school?

Challenge: *Travel out into the woods and observe the habits of at least three different spiders in their natural surroundings. Enter your observations on the sheets your teacher gives you to put in your individual field journals (picture story notebooks).*

Context for this Challenge: Teachers offering this challenge will want to check the immediate environment of their school to make sure an appropriate variety of spiders is available to support this project. Teachers will also want to prepare the support materials identified in the challenge (observations sheets for pasting in story notebooks).

Directions for Students:
The Challenge: With a partner and the help of your teacher, travel out into the woods and observe the habits of at least three different spiders in their natural surroundings. Enter your observations on the sheets your teacher gives you to put in your individual field journals (picture story notebooks).

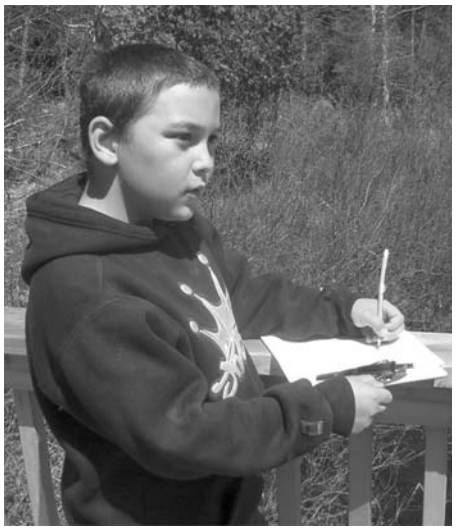


Photo courtesy of Sarah Bencze, Tupper Lake, NY

As you make your observations, please be sure to record the following information:

- What is the date and time of day of your observation?
- What is the weather like?
- Where is the location of your observations?
- What kinds of different spiders did you see? (Draw a picture of them.)
- What did the different spiders do while you were watching them? (Draw a picture of them.)
- What did the webs of the spiders you were watching look like? (Draw a picture of them.)

Using a collection jar with magnifying lens, collect one spider for close observation. Look closely at this spider and record/sketch your observations in your field journal. Be sure to answer the following:

- What color is it?

Spiders in Our Backyard

- How many legs does it have?
- Where did you find/collect it?
- How big is it? (Measure your spider either by using the measuring grid on the bottom of the jar or compare it to something of similar size.)
- What special identifying features does your spider have? (For instance, stripes, more than one color, large eyes)

Based on your observations, write a narrative (about three or four sentences long) from the spider's point of view about what what it looks like, where it lives, and what its life is like. Be creative in this narrative. Maybe give your spider a name. Be sure to give lots of details about your spider when you write.

Please be prepared to present your narrative to the class and share your drawings with us.

Quality Standards:

Field Journal includes the following:

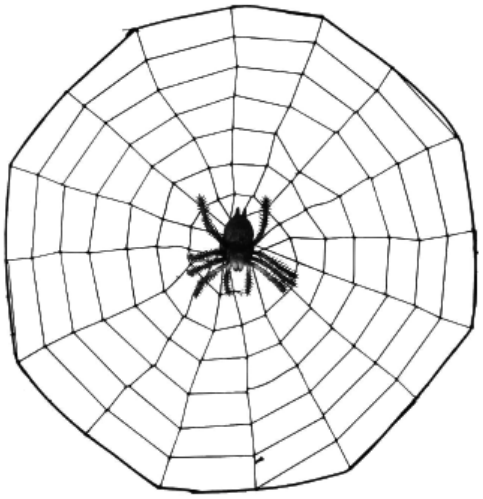
- Observations about spiders seen on the woods walk (date and time, weather, location, appearance of spiders, activity of spiders, appearance of spider web)
- Observations about one specific spider that has been collected (color of spider, number of legs, location of collection point, spider size, special identifying characteristics of spider)
- Illustrations about the spiders seen on the nature trail
- Illustrations about the collected spider

Narrative is:

- Written from the spider's point of view
- Three or four sentences long
- Creative, perhaps naming the spider

Presentation:

- Describes observations made about the collected spider
- Is supported with illustrations showing the collected spider



Spiders in Our Backyard
Product Quality Checklist

Product Author(s): _____

Date: _____ Class: _____

Observed	Standards/Criteria	Points Possible	Points Awarded
	Field journal includes observations about spiders seen on the woods walk. Information includes date and time, weather, location, appearance of spiders, activity of spiders, appearance of spider web.		
	Field journal includes observations about one specific spider that has been collected. This information includes color of spider, number of legs, location of collection point, spider size, special identifying characteristics of spider.		
	Field journal includes illustrations about the spiders seen on the woods walk.		
	Field journal includes illustrations about the collected spider.		
	Narrative is written from the spider's point of view.		
	Narrative is 3 or 4 sentences long.		
	Narrative is creative, perhaps naming the spider.		
	Presentation describes observations made about the collected spider.		
	Presentation is supported with illustrations showing the collected spider.		
	Total		

Comments:

The Water We Drink & Use

National Standards		Curriculum Content Area
• **Science: Earth & Space Sciences; Life Sciences** • Life Skills: Thinking & Reasoning; Life Work; Working with Others • Language Arts: Reading; Writing • Arts: Understands & Applies Media, Techniques & Processes	**Authors**: Hollie Combs & Jennifer Hubert, Queensbury Union Free School District, Queensbury, NY **Grade Level/Course:** 3 - 6	Culture & the Arts Economy Government & Civics Health, Recreation & Life Skills Human History **Natural History**

Investigative Question or Issue: Where does our water come from and how can we keep water clean?

Challenge: *In groups of four, create* ***one*** *(your choice) of the following products to help others learn where our water comes from and how we can help to keep it clean.*

1. Write a letter to the editor of your local or school newspaper.
2. Design a t-shirt logo, with an attached information card, to tell consumers about where our water comes from and to persuade them to keep our water clean.
3. Write and perform a one-act skit about where our water comes from, how we use water, and how we can keep it clean.
4. Create an informational display or PowerPoint presentation.

Context for this Challenge: This Challenge is a culminating activity for a unit of study investigating three questions: 1) Where does our water come from? 2) What factors pollute our water? 3) How can we keep our water clean? The teacher will want to lead students in an investigation of the water cycle and encourage students to discuss and share their thoughts about the questions cited previously.

Directions: Distribute handout and Product Quality Checklist, discuss Challenge and Quality Standards, provide resources, and allow students to form groups.

Quality Standards:

- Product shows where our water comes from and how it might be kept clean.
- Product communicates information that is accurate.
- Product is completed on time.
- Product is neat in appearance.
- Product meets all the Quality Criteria as described and posted in class.
- All group members are prepared to explain their product to the rest of the class when asked to do so.

The Water We Drink & Use

Student Handout

The Challenge: In groups of four, create one (your choice) of the following products to help others learn where our water comes from and how we can help to keep it clean.

1. Write a letter to the editor of your local or school newspaper.

- Must use proper letter format.
- Must tell where our water comes from
- Must persuade readers to keep our water clean.

2. Design a t-shirt logo, with an attached information card, to tell consumers where our water comes from and to persuade them to keep our water clean.

- Logo must fit on 8 1/2- x 11-inch paper.
- Logo must be an original colorful design.
- Logo must be mounted on posterboard template of t-shirt.
- An information card of 75 to 100 words must be included.

3. Write and perform a one-act skit about where our water comes from, how we use water, and how we can keep it clean.

- Each student must have a role in writing and performing the skit.

4. Create an informational display or PowerPoint presentation.

- Display must be a colorful original design.
- Display must have 10 written informative facts about where our water comes from and how we can keep it clean.

Whatever your choice, the product must be neat in appearance, communicate information that is accurate, and be completed within the time allotted. All products must also meet the Quality Criteria for that particular product as described in class.

All group members should be prepared to briefly present and explain their product to the class if asked to do so.

The Water We Drink & Use
Product Quality Checklist

Product Author(s): _____

Date: _____ Class: _____

Observed	Standards/Criteria	Points Possible	Points Awarded
	All Products: Product shows where our water comes from and how it might be kept clean		
	Product communicates information that is accurate		
	Product is completed on time		
	Product is neat in appearance		
	All group members are prepared to explain their product to the rest of the class when asked to do so		
	Letter to the Editor: • Is in proper letter format		
	• Persuades readers to keep water clean		
	• Is presented to the class		
	T-Shirt Logo: • Fits on 8 1/2- by 11-inch paper		
	• Must be an original and colorful design		
	• Is mounted on posterboard template of t-shirt		
	One Act Skit: • Each student must demonstrate his or her role in writing the skit		
	• Each student must demonstrate his or her role in performing the skit		
	• Speaking - voice is clear and able to be heard		
	Informational Display or PowerPoint: • Display or presentation is original and colorful		
	• Contains 10 written informative facts about where our water comes from and how to keep it clean		
	Total		

Comments:

Habitats in our Northern Forests

National Standards		Curriculum Content Area
• **Science: Earth & Space Sciences; Life Sciences** • Life Skills: Working with Others	**Author**: Sarah Bencze L.P. Quinn Elementary School Tupper Lake Central School Tupper Lake, NY **Grade Level/Course:** 3 - 6	Culture & the Arts Economy Government & Civics Health, Recreation & Life Skills Human History **Natural History**

Investigative Question or Issue: How do different habitats of the Northern Forest provide the components necessary for plants and animals to live and thrive?

Challenge: *Using the materials available, plan and create a model of one of these habitats: wetland, mountain, forest, or river, and give a brief presentation.*

Quality Standards:

Model Habitat

- Model clearly shows the four features of the chosen habitat: food, shelter, water, and space.
- Plants and animals that live in the habitat are observable and clearly labeled using correct spelling and identification.
- Models or images of the plants and animals that live in the habitat are created using materials from the planning page.

Presentation

- You identify your habitat.
- You describe the features necessary for plant and animal survival.
- You describe the types of animals and plants that live in the habitat.
- You explain how you created your habitat.
- All members of the group should be able to respond appropriately when asked questions about their model habitat.

Photo courtesy of Margaret O'Leary, Tupper Lake, NY

Habitats in our Northern Forests

Student Handout

The Challenge: Divide into four equal groups. Each group will choose one of the following Northern Forest habitats: wetland, mountain, forest, or river. No two groups may choose the same habitat. Using materials that are made available to you, plan and create a model of the habitat you have chosen**.**

Use your planning page to help you select materials that are appropriate.

As you build your model habitat, please consider the following:

- Your habitat needs to clearly show the four features of habitat: food, shelter, water, space.
- The plants and animals that live in this habitat should be created with materials from your planning page.
- All plants and animals should be labeled.
- Your habitat should have a sign identifying your habitat and listing the names of all group members.

You will have one class period to complete your planning page and five class periods (one hour long) to complete your habitats.

When you comple your model, please prepare a short presentation in which you share accurate information about your model with a visiting class. Your presentation should

- Identify your habitat
- Describe the features necessary for plant and animal survival in your habitat
- Describe the types of animals and plants that live in the habitat
- Explain how you created your habitat

All members of your group should be ready to answer questions about your model and the habitat it represents.

Dutchman's breeches (Dicentra cucullaria)
Photo by Mark Twery, U.S. Forest Service

Red trillium (Trillium erectum)
Photo by Mark Twery, U.S. Forest Service

Habitats in our Northern Forests
Product Quality Checklist

Product Author(s): _____

Date: _____ Class: _____

Observed	Standards/Criteria	Points Possible	Points Awarded
	Model Habitat		
	• Model clearly shows the four features of the chosen habitat: food, shelter, water and space.		
	• Plants and animals that live in the habitat are observable and clearly labeled using correct spelling.		
	• The plants and animals that live in the habitat are created using materials from the planning page.		
	• All plants and animals are labeled correctly.		
	• The habitat has a sign identifying the name of the habitat and the names of all group members.		
	• The model habitat is completed on time.		
	Presentation		
	• You identify the name of your habitat correctly.		
	• You describe the features of the habitat that are necessary for plants and animals to survive.		
	• You describe the types of plants and animals that live in the habitat.		
	• You explain how you created the habitat.		
	• All members of the group respond appropriately to questions about the model and the habitat it represents.		
	Total		

Comments:

Growing Up 100 Years Ago

National Standards		Curriculum Content Area
• **Language Arts: Reading; Writing; Speaking & Listening** • History: The History of the Student's Own Region • Life Skills:0 Working with Others	**Author**: Hollie Combs Queensbury School, Queensbury, NY **Grade Level/Course:** 3 - 6	Culture & the Arts Economy Government & Civics Health, Recreation & Life Skills **Human History** Natural History

Investigative Question or Issue: What was the life of a child living in a rural community in the Northern Forests like 100 years ago?

Challenge: *Plan and create an informative and colorful storybook about the life of a 9- year-old child living in the Northern Forests 100 years ago. You should use the writing process (draft, revise, final copy) to create your book. Your book must include a cover, title page, and dedication page. The text and illustrations should be neat and easy to read.*

Context for this Challenge: Students should be familiar with the writing process: draft, revise, final copy. The author of this Challenge had a local performer visit her classroom as an artist-in-residence. The performer, dressed in period costume as the well-known regional writer, Jeanne Robert Foster, gave an interactive presentation for the students about growing up in the Adirondacks 100 years ago. The artist became a resource, in addition to other primary resources and reference books on local history. Children should also be encouraged to interview their grandparents and other older relatives or neighbors.

Photo courtesy of Hollie Combs, Queensbury, NY

The teacher needs to arrange for resources and determine the time schedule and deadline for this project, as well as any specific requirements for length and size of the storybooks. Groups of no more than six students are suggested for peer editing before the projects are handed in.

Presenting the storybooks to an audience of parents, classmates, etc., is also suggested.

Quality Standards:

- Finished on time
- Writing process is used to create the book
- Book's main character is a 9-year-old child living in the Northern Forests over 100 years ago
- Includes all book parts (cover, title page, dedication page)
- Informative – gives reader correct information
- High quality – neat handwriting and illustrations

Growing Up 100 Years Ago
Product Quality Checklist

Product Author(s): _____

Date: _____ Class: _____

Observed	Standards/Criteria	Points Possible	Points Awarded
	Book		
	• Finished on time		
	• Writing process is used to create the book		
	• Book's main character: 9-year-old child living in the Northern Forests over 100 years ago		
	• All book parts included (cover, title page, dedication page)		
	• Informative – the book gives reader correct information		
	• High quality – neat handwriting and illustrations		
	Student		
	• Actively participated in peer editing		
	• Presented or displayed book when completed		
	Total		

Comments:

Meet the Beaver

National Standards	Author	Curriculum Content Area
• **Science: Life Sciences** • Language Arts: Writing; Reading • History: K-4 - History of own region • Arts: Understands & Applies Media • Life Skills: Working with Others	**Author**: Erin Farley-Davis Saranac Lake Central School, Saranac Lake, NY Allison Smith, Lake Placid Central School Lake Placid, NY **Grade Level/Course:** 4 - 6	Culture & the Arts Economy Government & Civics Health, Recreation & Life Skills Human History **Natural History**

Investigative Question or Issue: What might any kid your age want to know about beavers?

Challenge: *Create an interesting and informative "Illustrated Journal of the Beaver" that contains the answers to at least 10 questions that any kids of a similar age would like to know about this fascinating animal.*

Context for this Challenge: Teachers will no doubt want to ensure that enough research materials on beavers are available to permit all the students to research this topic all at one time. Teachers will also want to "coach" their students through the processes of brainstorming questions, researching information about the questions, and then organizing their findings in some systematic way.

Students should be in well balanced groups of four (self-selected or teacher-selected).

Quality Standards:

Student groups will create a Question & Answer Illustrative Journal.

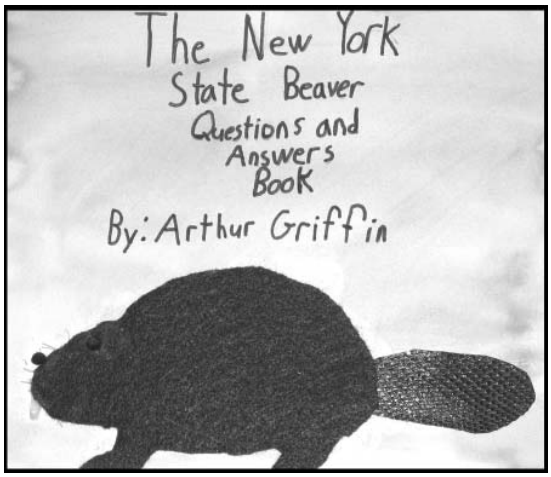


Photo courtesy of Erin Farley-Davis, Saranac Lake, NY

Form:
- Journal is completed on time.
- Journal has a title page that identifies the names of the authors, and that page is interesting and attractive
- Journal is typed if possible; spelling and grammar are correct.
- Last page of journal includes a bibliography of correctly cited references.

Content:
- Journal contains answers to 10 or more questions about the beaver that any kid of a similar age would like to know.
- Information in the journal is accurate and questions are answered thoroughly.
- Journal contains multiple visual images to show what the authors are talking about.

Meet the Beaver

Student Handout

The Challenge: In well-balanced teams of four organized with the help of your teacher, create an interesting and informative “Illustrated Journal of the Beaver” that contains the answers to at least 10 questions that any kid your age would like to know about this fascinating animal.

As you create your illustrated journal, please consider the following:

- The journal should answer the questions you chose to address as accurately and thoroughly as possible.
- The journal should contain lots of visual images – pictures, drawings – to show the reader what you are talking about.
- The text of the journal should be typed if possible. Spelling and grammar should be correct.
- The journal should have a title page where you list the members of your team of authors. This page should be as interesting and visually attractive as possible.
- The last page of the journal includes a bibliography of the references used. These references should be cited correctly.

As you prepare this journal, please complete a daily journal of your work, in which you record what each member of the group did that day to contribute to the success of the project.

Meet the Beaver
Product Quality Checklist

Product Author(s): _____

Date: _____ Class: _____

Observed	Standards/Criteria	Points Possible	Points Awarded
	Form		
	• Journal is completed on time.		
	• Journal has a title page that identifies the names of the authors; this page is interesting and attractive.		
	• Journal is typed if possible; spelling and grammar are correct.		
	• Last page of journal includes a bibliography in which references are cited correctly.		
	Content		
	• Journal contains answers to 10 or more questions about the beaver that any kid of a similar age would like to know.		
	• Information in the journal is accurate and questions are answered thoroughly.		
	• Journal contains multiple visual images to show what the authors are talking about.		
	Process		
	• Group completes a daily work journal that documents what each member did each day.		
	Total		

Comments:

Northern Forest Storytelling

National Standards		Curriculum Content Area
Language Arts: Writing, Reading, Listening & Speaking Arts: Theatre: Uses Acting Skills; Directs	**Authors**: Aimee Barney & Joanne McCormick, Potsdam Central School, Potsdam, NY **Grade Level/Course:** 4 - 6, Language Arts	**Culture & the Arts** Economy Government & Civics Health, Recreation & Life Skills **Human History** Natural History

Investigative Question or Issue: How can we use our knowledge of Northern Forest folklore and history to create an entertaining original story?

Challenge: *With the help of your teacher, arrange yourselves into teams of no more than three. Write and orally present from memory an original story using information you have learned about storytelling and our Northern Forest region. Give a written copy of your story to your teacher before you present.*

Context for this Challenge: In preparation for this challenge, the teacher needs to model or provide examples of the following storytelling techniques:

- Taking on the voice of a character
- Candle lighting
- Stick puppets
- Simple costumes (such as hat, bonnets, apron, shawls)
- Masks
- Narration by one member while others act out the story
- Setting of the scene

Photo courtesy of Aimee Barney, Pottsdam, NY

The elements of form required for the project will need to be introduced or reviewed and may certainly be modified as needed.

Appropriate resources about the Northern Forest region will need to be provided.

Quality Standards:

Product: Original Northern Forest story

Form:

- Story is creative and original, and oral version uses at least three storytelling techniques.
- Story has a title.
- Story has an introduction that includes background information.
- Story is in a narrative form.
- Story describes a sequences of events.
- Story has a beginning, middle, and end and shows both conflict and resolution.
- Oral storytelling performance is at least 2-3 minutes long but does not exceed 5 minutes.
- Story makes sense.

Northern Forest Storytelling

- Story involves interesting vocabulary.
- Story has sentences that are varied.
- Story has correct spelling/punctuation.
- Story is written in complete sentences.
- Story is handwritten neatly or typed.
- Written version of story includes a list of the references you used.

Content: Both the written and oral version of story contain the following:

- A description of a Northern Forest village
- A description of a Northern Forest animal
- A description of a Northern Forest person from the past
- A description of a Northern Forest body of water
- Language that sets the story in a specific time period (e.g., early 1800s, 1930s)
- Celebration or description of people and events from the Northern Forest region

The next section may be duplicated as a student handout.

Photo courtesy of Aimee Barney, Pottsdam, NY

4th Grade Students at Potsdam Central School

Northern Forest Storytelling

Student Handout

Group Members:

Your Challenge: Your cooperative group will write and memorize your original Northern Forest Tale. Your group will present your story to an audience. Your performance should be 2-3 minutes long, but no more than 5 minutes. A written version will also need to be handed in (neatly handwritten or typed).

Elements of your Northern Forest Tale:

- Choose a Northern Forest village or mountain as the setting
- Include at least one animal that lives in the Northern Forest
- Include a Northern Forest person from the past
- Include a Northern Forest body of water
- Select a time period for your story
- Use at least three storytelling techniques:
  - Take on the voice of a character
  - Candle lighting
  - Stick puppets
  - Simple costumes (such as hat, bonnets, apron, shawls)
  - Masks
  - Narration by one member while others act out the story
  - Setting of the scene

Your Northern Forest story needs to

- Include a title
- Begin with an introduction that includes background information
- Be in narrative form, with a beginning, middle, and end
- Describe a sequence of events and make sense
- Include both conflict and resolution
- Use interesting vocabulary (appropriate for time period), varied and complete sentences
- Use correct spelling and punctuation in the written version
- Include a list of references used in the written version

Northern Forest Storytelling
Product Quality Checklist

Product Author(s): _____

Date: _____ Class: _____

Observed	Standards/Criteria	Points Possible	Points Awarded
	Content: Story contains the following:		
	• A description of a Northern Forest village		
	• A description of a Northern Forest animal		
	• A description of a Northern Forest person from the past		
	• A description of a Northern Forest body of water		
	• Language that sets the story in a specific time period (e.g., early 1800s, 1930s)		
	• A celebration or description of people and events from the region		
	Story:		
	• Is creative and original		
	• Has a title		
	• Has an introduction that includes background information		
	• Is in a narrative form		
	• Describes a sequences of events		
	• Has a beginning, middle, and end		
	• Shows both conflict and resolution		
	• Makes sense		
	• Involves interesting vocabulary		
	• Has sentences that are varied & complete		
	• Has correct spelling & punctuation		
	• Is handwritten neatly or typed		
	• Written version includes a list of the references used		
	Performance:		
	• Creative and original		
	• Uses three storytelling techniques		
	• Is 2-3 minutes long – no longer than 5 minutes		
	Total		

Comments:

The Bugs Will Tell You: Macroinvertebrates Spill the Beans

National Standards		Curriculum Content Area
• **Science: Earth & Space Sciences** • Life Skills: Thinking & Reasoning; Working with Others	**Author**: Valerie Valla & Marion Shorey Ballston Spa Central School Ballston Spa, NY **Grade Level/Course:** 4 - 7	Culture & the Arts Economy Government & Civics Health, Recreation & Life Skills **Human History** **Natural History**

Investigative Question or Issue: How might resource managers use macroinvertebrate populations to assess the health of a stream or river?

Challenge: *Conduct a macroinvertebrate survey of the local waterway to which you have been assigned. Create a poster suitable for use in a presentation in which you communicate your findings to others.*

Context for this Challenge: This Challenge may require much “coaching” from the teacher. It may be necessary to assist students in the processes of taking a valid macroinvertebrate population sample, collecting and interpreting data, and comparing data to that collected by other researchers so as to draw some general conclusions about the investigative question above. Refer to references on the next page to find help with procedures.

Directions: Put students into groups of two or three to perform a macroinvertebrate survey of a local waterway.

Posters should include the following items:

- The name of the waterway investigated
- A map of the waterway, locating it accurately in your region
- A bar or pie graph of findings that shows the relative presence of each of the following categories of invertebrate in your waterway: sensitive, somewhat sensitive, and tolerant
- A tally sheet that shows the raw data from the research
- A concluding statement (paragraph) that explains the findings and draws a conclusion about the health of the waterway based on the data collected

Students should be prepared to use their posters to support a short presentation to the class in which they share their findings and conclusions based on those findings. All members of the group should be prepared to answer questions about the study and defend the accuracy of the data and final conclusions.

All work should satisfy the Quality Standards identified below and in the Product Quality Checklist that follows.

The Bugs Will Tell You: Macroinvertebrates Spill the Beans

Quality Standards:

Bar/Pie graph & Map (group activity):

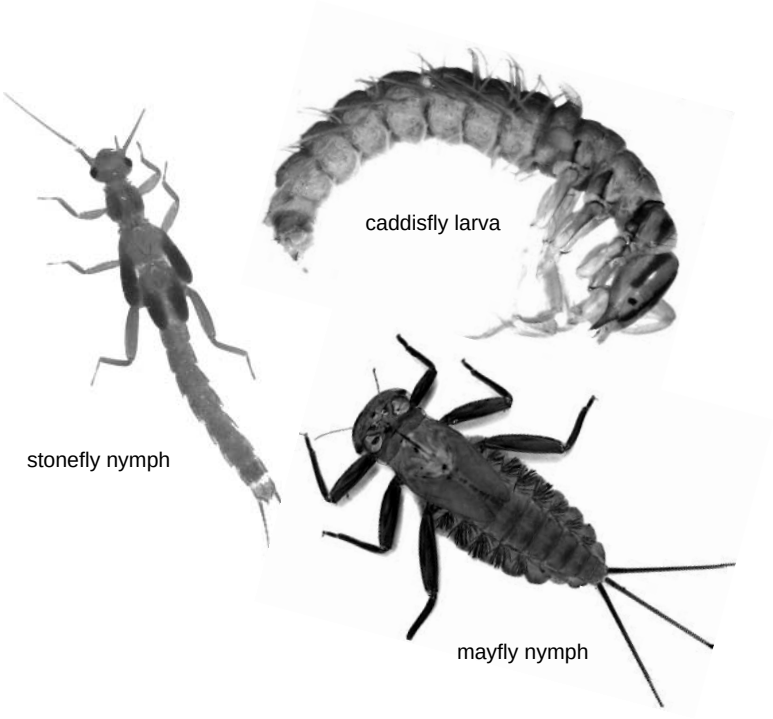
- Different color for each bar/wedge
- Neat
- Accurate
- Graph fills the page
- Axes & bars/wedges clearly labeled
- Appropriate increments
- Title
- Waterway highlighted on map

Presentation (group activity)

- Informative
- Accurate
- Well designed and thought out
- Clear
- Interesting

Poster (group activity)

- Student names, teacher name, and section in upper left corner on poster
- Incorporates portions of the entire lesson
- Attractive
- Neat
- Proper grammar and spelling



Caddisfly larva, by Steve Solado, NABS, www.benthos.org
Mayfly nymph, by Howell Daly, NABS, www.benthos.org
Stonefly nymph by Brian Duffy, Vermont Agency of Natural Resources

References:

- Artstream: Macroinvertebrate Lunch, West Plains Middle School 2002-2003, sponsored by Missouri Department of Natural Resources: www.watersheds.org/stream_movie.htm
- Meet the Movie Characters of Macroinvertebrate Lunch: www.watersheds.org/teacher/stream.htm
- The World in Your Watershed Resources: www.watersheds.org/teacher
- NYSDEC Stream Biomonitoring Program Overview: www.dec.state.ny.us/website/dow/bwam/sbu.html
- Hudson Basin River Watch: www.hudsonbasin.org
- NYSDEC Division of Water: www.dec.state.ny.us/website/dow/stream/
- USGS National Water Quality Assessment for New York State: ny.water.usgs.gov/projects/hdsn
- Stroud Water Research Center: www.stroudcenter.org/
- Critter Search: www.dnr.state.wi.us/org/caer/ce/eek/teacher/critrsrch.htm

The Bugs Will Tell You: Macroinvertebrates Spill the Beans

Student Handout

The Challenge: In groups of two or three formed with the help of your teacher, conduct a macroinvertebrate survey of the local waterway to which you have been assigned. Create a poster suitable for use in a presentation in which you communicate your findings to others.

Your poster should include the following items:

- The name of the waterway you investigated
- A map of your waterway, locating it accurately in your region of the Northern Forests
- A bar or pie graph of your findings that shows the relative presence of each of the following categories of invertebrate in your waterway: sensitive, somewhat sensitive, and tolerant
- A tally sheet that shows the raw data from your research
- A concluding statement (paragraph) in which you explain your findings and draw a conclusion about the health of your waterway based on the data you collected

Be prepared to use your poster to support a short presentation to the class in which you share your findngs and conclusions based on those findings. All members of your group should be prepared to answer questions about the study and defend the accuracy of your data and final conclusions.

Be sure all of your work satisfies the Quality Standards identified below and in the Product Quality Checklist that follows.

Quality Standards:

Bar/Pie Graph & Map (group activity):
- Different color for each bar/wedge
- Neat
- Accurate
- Graph fills the page
- Axes & bars/wedges clearly labeled
- Appropriate increments
- Title
- Waterway highlighted on map

Presentation (group activity)
- Informative
- Accurate
- Well designed and thought out
- Clear
- Interesting

Poster (group activity)
- Student names, teacher name, and section in upper left corner on poster
- Incorporates portions of the entire lesson
- Attractive
- Neat
- Proper grammar and spelling

The Bugs Will Tell You: Macroinvertebrates Spill the Beans
Product Quality Checklist

Product Author(s): _____

Date: _____ Class: _____

Observed	Standards/Criteria	Points Possible	Points Awarded
	Poster (group activity)		
	• Student names, teacher name, and section identified		
	• Informative and interesting		
	• Accurate, neat, and clear		
	• Well designed and thought out		
	• Incorporates portions of the entire lesson		
	• Proper grammar and spelling		
	Bar/Pie Graph (group activity)		
	• Student names, teacher name, and section identified		
	• Different color for each bar/wedge		
	• Neat and accurate		
	• Graph fills the page; appropriate increments		
	• Axes and bars/wedges clearly labeled		
	• Title		
	Map (group activity)		
	• Student names, teacher name, and section identified		
	• Waterway highlighted on map		
	• Accurate, neat, and clear		
	Presentation (group activity)		
	• Student names, teacher name, and section identified		
	• Informative and interesting		
	• Accurate, and clear		
	• Well designed and thought out		
	• Incorporates portions of the entire lesson		
	• All members of the group are able to respond accurately to questions about their data and conclusions		
	Total		

Comments:

A Tour Guide for Northern Forest Environments

National Standards		Curriculum Content Area
• **Science: Life Sciences** • Language Arts: Listening & Speaking • Like Skills: Working with Others	**Author**: Lori Bishop and Karen VanAlstine Ballston Spa Central School Ballston Spa, NY **Grade Level/Course:** 4 - 6	Culture & the Arts Economy Government & Civics Health, Recreation & Life Skills Human History **Natural History**

Investigative Question or Issue: How do plants and animals adapt to living in different environments?

Challenge: *Work in groups to create a "Tour Guide" for a local nature trail or park.*

Context for this Challenge: Teachers will want to ensure that students have ready access to the various types of Northern Forest habitats/environments mentioned in this Challenge. Local nature trails, environmental centers, or parks may be a good place to stage this Challenge especially because they may permit repeat visits over a period of time to record observations and gather longitudinal data. The staff of such centers may be asked to visit with students to show them how to conduct a guided tour. The teacher will also want to spend time helping students understand the responsibilities of the different roles to which they may be assigned.

Quality Standards:

- The challenge is completed at the end of the allotted time.
- The tour script contains correct spelling and punctuation.
- All focus questions are addressed accurately and thoroughly for all three sites.
- The tour is informative – it gives visitor important information about the plants and animals of the site.
- The tour is interesting – the tour presenters use different tones of voice and speak to listeners directly.
- The tour presenters point out specific connections between plant/animal adaptations and types of environment at each site.

Photo courtesy of Sandra Hildreth

A Tour Guide for Northern Forest Environments

Student Handout

The Challenge: You are a member of a cooperative group of four. Each one of you will have one of the following jobs: zoologist, botanist, cartographer, or geologist. Your group will plan and conduct an interesting and informative guided tour of three different natural sites that can be found in a nearby Northern Forest area. Each site chosen should represent a different type of habitat. Here are examples of habitats: in or near water, dry or wet soil, sunny or shaded area.

At each site on your tour, please be prepared to discuss the following focus questions:

1. What environmental conditions exist here?
2. What plants live here?
3. What animals live here?
4. How have the plants and animals adapted to survive here?

Please prepare a script of your tour and share it with your teacher. You will use this edited script to guide you when you conduct a mini tour for our class during week five of this project. Make sure that the final edition of this script has correct spelling and punctuation and that all the focus questions are answered accurately and thoroughly. Parents and community members will then be invited to take our guided tours. Each group will lead visitors along the trail and conduct their tour.

A Tour Guide for Northern Forest Environments
Product Quality Checklist

Product Author(s): _____

Date: _____ Class: _____

Observed	Standards/Criteria	Points Possible	Points Awarded
	The challenge is completed at the end of the allotted time.		
	The tour script contains correct spelling and punctuation.		
	All focus questions are addressed accurately and thoroughly for all three sites.		
	The tour is informative – it gives visitor important information about the plants and animals of the site.		
	The tour is interesting – the tour presenters use different tones of voice & speak to listeners directly.		
	The tour presenters point out specific connections between plant/animal adaptations and the types of environment at each site.		
	Team members' names are on all written work.		
	Total		

Comments:

Where Does the Rain Go?

National Standards		Curriculum Content Area
• **Science: Earth & Space Sciences** • Life Skills: Working with Others • Language Arts: Writing	**Author**: Sandra Bureau Indian Lake Central School, Indian Lake, NY **Grade Level/Course:** 6 - 8 Science	Culture & the Arts Economy Government & Civics Health, Recreation & Life Skills Human History **Natural History**

Investigative Question or Issue: Where does the rain go?

Challenge: *In teams organized with the help of your teacher, produce a travel guide for a drop of water entering our local watershed from the atmosphere. You may choose any location in our watershed as the point of impact for the water droplet.*

Context for this Challenge: This Challenge is intended as a culminating experience after students have studied the topic of watersheds: what they are and how to map them.

Directions: Organize teams, provide resources, and hand out student directions along with the Product Quality Checklist. Allow 5 class days to complete the Challenge.

Quality Standards:

- Travel guide is completed within 5 days.
- Travel guide is no larger than two pieces of 8 1/2- x 11-inch paper.
- Travel guide is colorful and creative in the spirit of a travel guide. It includes narratives, graphics like a map that would allow the water droplet to “find” its way, and pictures.
- Travel guide is neat and easy to read. Standards of proper English are met.
- Travel guide accurately describes the water cycle of the droplet. The processes of precipitation, evaporation, condensation, runoff, soaking in, and absorption are accurately and appropriately described as they apply to the droplet.
- Travel guide indicates at least two possible paths of travel through the watershed for the droplet.
- Travel guide accurately identifies major features in our landscape.
- Travel guide contains graphics at least one of which illustrates the water cycle for the water droplet.
- Planning sheet and work schedule are completed on time and show a division of tasks and a realistic work schedule.
- Work journal contains entries every day that accurately reflect student activity and contributions as productive team members.

Teaching Tip

It might be fun and valuable to give this Challenge to your students before formally introducing the topic of watersheds. Some experts suggest that learning is more effective when students engage in constructing their own knowledge before getting an explanation. If they are actively trying to figure out “where does the rain go,” they will actually be discovering for themselves the definition of a watershed After this Challenge is completed, then all the facts and information about watersheds and why they are important will be much more meaningful and can probably be covered in less time. This is a more “constructivist” approach to teaching and learning.

Where Does the Rain Go?

Student Handout

The Challenge: In teams organized with the help of your teacher, produce a travel guide for a drop of water entering our local watershed from the atmosphere. You may choose any location in our watershed as the point of impact for the water droplet.

As you prepare your travel guide, please consider the following:

- Your travel guide should be colorful, neat, and easy to read and understand. Proper English grammar and spelling are expected. Your guide should be no larger than two pieces of 8-1/2 x 11 inch paper.
- Your travel guide should be creative and catchy. Write it as if you want to attract every droplet of water to our area. Tell the reader about at least two possible pathways the droplet might take in the watershed as it makes its way back into the atmosphere. Provide a map and pictures so that a droplet could find its way through our watershed. Include some narration to explain or describe the different paths the droplet might follow and the implications.
- Be sure to use the terms **precipitation, evaporation, condensation, runoff, absorption,** and **soaking in** accurately as they describe the droplet's experience in your watershed. Identify major features such as mountains, fields, parking lots, and rivers that the water may be traveling on or in. Identify what the water will be doing as it travels and how those features in the landscape can influence how the water travels. Will one pathway allow it to travel quickly? More slowly? Will it pick up things along the way?
- Include graphics and illustrations wherever they may help support your message. You must include at least one graphic that accurately shows the water cycle as it applies to your droplet.

To assist you in planning and completing this project, you and your group should read the Challenge and the Product Quality Checklist and then brainstorm a list of necessary tasks. You will be asked to divide up the tasks, assign duties, and fill out a planning schedule to accomplish your project in the time allotted. Show this planning sheet to your teacher as soon as you can in the process.

Each team member is expected to keep a work journal with a record of accomplishments and reflections for each day.

You will have 5 class days to complete this Challenge.

Where Does the Rain Go?

Product Author(s): _____

Date: _____ Class: _____

Observed	Standards/Criteria	Points Possible	Points Awarded
	Form: • Travel guide no larger than two pieces of 8 1/2- x 11-inch paper.		
	• Travel guide is colorful and creative in the spirit of a travel guide.		
	• Travel guide is neat and easy to read; standards of proper English are met.		
	• Travel guide includes narratives and graphics such as a map that would allow the water droplet to “find” its way and pictures.		
	Process: • Travel guide is completed within 5 days.		
	• Planning sheet and work schedule are completed on time and show a division of tasks and a realistic work schedule.		
	• Work journal contains entries every day that accurately reflect student activity and contributions as productive team members.		
	Content: • Travel guide accurately reflects the water cycle and uses the following terms: evaporation, condensation, runoff, precipitation and absorption.		
	• Travel guide indicates at least two possible paths of travel through the watershed for the droplet.		
	• Travel guide accurately identifies major features in our landscape.		
	• Travel guide contains graphics at least one of which illustrates the water cycle for the water droplet.		
	Above & Beyond		
	Total		

Comments:

Changing Maples

National Standards	Authors	Curriculum Content Area
• **Science: Understands the Nature of Scientific Inquiry**	**Authors**: Tammy Morgan & Dan Mayberry Lake Placid Central School, Lake Placid, NY **Grade Level/Course:** 9 -12	Culture & the Arts Economy Government & Civics Health, Recreation & Life Skills Human History **Natural History**

Investigative Question or Issue: Why do leaves change color in the fall and are changes related to temperature?

Challenge: *The color of a leaf is related to the concentrations of pigments. In teams, you will conduct a study of leaf pigment concentrations over a 1-month period in the autumn. Review the role of leaf pigments such as chlorophyll a and b, carotenoids, and anthocyanin and what happens when leaves begin to senesce in autumn, then develop some hypotheses about what you expect to happen to the leaf pigment concentrations and their relationship to temperature. Then, once or twice a week, your team will collect data on pigment concentrations. After collecting, graphing, and analyzing the data, your group will produce a scientific poster (with all the parts of a scientific paper) to present to your classmates and other interested people.*

Context for Challenge:
This Challenge is intended to help students understand the role of pigments in plant leaves. Students should connect this understanding with what happens as winter approaches, temperatures get colder, and leaves turn color and drop. This Challenge should also help familiarize students with the scientific process. Sugar maple (*Acer saccharum*) is a good species to use, but other species will work. If teams choose different species, they can compare potential differences.

To prepare for this Challenge the teacher should:

1. Find some scientific literature about the colors of leaves and the physiological roles of each type of pigment.
2. Allot some time for student groups to digest the information together (perhaps with some guiding questions) and to develop at least two hypotheses about how pigment concentrations should change over time and in relation to changing temperatures.
3. Discuss the format of the scientific poster to be prepared and have students develop a list of criteria that can be turned into a rubric for product assessment.

Procedures:
Leaf Sampling Procedure (for each sampling time/date):

1. Use a hole punch to collect two leaf discs from each of four different leaves on one tree. Collect from one leaf in each of the cardinal directions (N,S,E,W) around the tree.
2. Collect all samples on the same day and at the same time.

Pigment Extraction and Measuring Procedures:

Changing Maples

1. Chlorophyll/carotenoid
   - Into a small labeled test tube, pipet 3 ml of 80% acetone (20% water).
   - Put one of the leaf discs in and use a glass stir rod to gently grind the disc to break up the tissue and allow for better extraction. Repeat with each replicate disc.
   - Refrigerate in the dark at approximately 4 °C for 24 hours to extract pigment.
   - Spin in a centrifuge on high speed for approximately 1.5 minutes.
   - Pour off the supernatant into a cuvette and read absorption with a spectrophotometer at 470 nm for chlorophyll a, 647 nm for chlorophyll b, and 663 nm for carotenoids.
2. Anthocyanin:
   - Into a small labeled test tube pipet 3 ml of 3M HCL:H_2O:MeOH (1:3:16).
   - Put one of the leaf discs in and use a glass stir rod to gently grind the disc to break up the tissue and allow for better extraction. Repeat with each replicate disc.
   - Refrigerate in the dark at approximately 4 °C for 24 hours to extract pigment.
   - Spin in a centrifuge on high speed for approximately 1.5 minutes.
   - Pour off the supernatant into a cuvette and read absorption with a spectrophotometer at 530 nm.

Quality Standards:

- The project is finished by the due date.
- The poster is creative and informative.
- Information is accurate and addresses the investigative question.
- Background information is included about pigment changes related to time and temperature.
- Assessment criteria in the poster rubric are met. (Criteria can be developed by the student or the Product Quality Checklist below can be used.)

Teaching Tips

Depending on the grade level, this Challenge could be used to introduce basic statistical concepts like variation by teaching how standard deviations are calculated and graphed and what they mean. The experiment can be carried out for as long in the autumn as the teacher has time. It can be done with one species, or several, or each group could look at a different deciduous species. This is a great challenge for explicitly working with “the process of science”.

If time is available, the teacher could involve students in searching for available resources on the topic and in selecting tree species. Student groups could present why they might choose one tree or another and what pigment concentrations they might expect to see in the fall, given what colors they see in each of the species, or the role of that species in the canopy or in a successional sequence. After collecting data for several (3-5) species, groups of students could compare a subset of species and pigment types to answer a question they have phrased and support their discussion of the results using the literature.

Photo courtesy of Sandra Hildreth

Changing Maples
Product Quality Checklist

Product Author(s): _____

Date: _____ Class: _____

Observed	Standards/Criteria	Points Possible	Points Awarded
	Title: Centered, descriptive, large enough, includes authors' names		
	Abstract: Brief description of purpose, methods, results, and conclusions (200 to 300 words typically)		
	Background information (giving credit to sources – includes citations): Physiological role of the three pigment categories A description of the role of chlorophyll in photosynthesis Reasons for leaf senescence in autumn Possible relationships between pigment concentrations and temperature		
	Methods: Describes how samples were taken (including number of samples, when taken), how they were prepared and analyzed Describes how temperature was monitored (how often & where) Provides enough detail so others could recreate the Challenge		
	Results: two graphs – one showing how pigments change over time and one showing how temperature changed over time Graphs must be clearly labeled with units Each graph must be accompanied by a short paragraph about what trends it shows		
	Discussion/Conclusions: Describes how different pigments changed over time in relationship to each other and comments on whether or not the data appear to support the hypothesis Describes how temperature changed in relationship to pigment concentrations and comments on whether or not the data appear to support the hypothesis Talks about other research that supports or goes against the data; gives some possible explanations for this either way		
	Sections are separated and clearly identified in a neat way		
	Visuals are helpful and aesthetically pleasing		
	Poster is easy to read from a 4- to 6-ft distance		
	Total		

Comments:

Non-English Speaking Tourists & the Northern Forest

National Standards		Curriculum Content Area
• **Foreign Language: Use of Written Language** • Technology: Use of Software	**Author**: Shannon McKeighan Glens Falls Middle School Glens Falls, NY **Grade Level/Course:** 8 - 12 Foreign Language	Culture & the Arts Economy Government & Civics **Health, Recreation & Life Skills** Human History **Natural History**

Investigative Question or Issue: How can we encourage non-English speaking tourists to visit our part of the Northern Forest region?

Challenge: *Create a travel brochure or slide show in a language other than English (French, German, Swedish, etc.) that could be used to attract non-English speaking tourists to our part of the Northern Forest region.*

Context for this Challenge: Before issuing this Challenge, the teacher will want to ensure access to the appropriate computers and software (such as Publisher or PowerPoint) necessary to complete this project as written. Resource materials about the Northern Forest, both text and online, should also be available. Students need to have enough foreign language proficiency to be able to compose written material effectively.

Directions: A student handout with the following requirements and a deadline should be prepared, and copies of the Product Quality Checklist may also be given out. They may be modified to whatever the teacher feels is appropriate for the students in his/her classroom.

Quality Standards:

- Product includes a map of the Northern Forest region with at least eight physical features labeled.
- A section of the brochure or sequence of slides is devoted to each of the four seasons. All information in each of these sections is in the language of the target non-English speaking population.
- The name of each season is identified.
- Two or three weather conditions typical of the season with suggested clothing to adapt to those conditions comfortably are described.
- Four or five recreational activities that are common during the season that may be of interest to the tourist are described.
- Several visuals that give viewers a sense of what the season will “look like/feel like” when they visit are included.
- All information is accurate.
- Language usage, vocabulary, and punctuation are correct.
- Product is engaging and visually appealing.

Non-English Speaking Tourists & the Northern Forest Product Quality Checklist

Product Author(s): _____

Date: _____ Class: _____

Observed	Standards/Criteria	Points Possible	Points Awarded
	Product is engaging and visually appealing.		
	All information is accurate.		
	Language usage, vocabulary, and punctuation are correct.		
	Product includes a map of the Northern Forest region with at least eight physical features labeled.		
	The name of each season is identified.		
	Two or three weather conditions typical of the season with suggested clothing to adapt to those conditions comfortably are described.		
	Four or five recreational activities that are common during the season that may be of interest to the tourist are described.		
	Several visuals that give viewers a sense of what the season will “look like/feel like” when they visit are included.		
	Total		

Comments:

Chronic Wasting Disease

National Standards		Curriculum Content Area
• **Language Arts: Writing; Reading; Listening & Speaking** • Life Skills: Thinking & Reasoning; Working with Others • Civics: What Should Government Do	**Author**: Ray and Maryann Gawlas Retired Educators **Grade Level/Course:** 9 - 12, Language Arts or Government Course	Culture & the Arts Economy **Government & Civics** **Health, Recreation & Life Skills** Human History **Natural History**

Investigative Question or Issue: How might the presence of Chronic Wasting Disease affect the lifestyles of residents of the Northern Forest?

Challenge: *Prepare for a debate in which you take either the "pro" or "con" side of the investigative question cited above.*

Context for this Challenge: This Challenge may require some "coaching" from the teacher as students prepare for the task. At a minimum the teacher will want to research and arrange for access to several Web sites that have current information relevant to the Challenge. Experts on the topic may also be invited to visit the classroom to speak with students. The teacher may also want to guide students on classic debate strategies when presenting and rebutting an argument effectively.

Distribute the student handout, organize teams, allow appropriate time for research, and create a classroom environment suitable for a debate or arrange to use the school auditorium. Students should turn in a work summary at the end of each day detailing what they accomplished.

Quality Standards:

- Team presents its position in the debate using accurate and effective arguments.
- Team uses specific data to support its arguments in the debate.
- Each team member presents a work summary sheet at the end of every workday. This summary details the member's contribution to the effort and thoughts on the topic and process.
- Each team member hands in a one-page essay after the debate in which (s)he clearly explains his/her position on the issue. The essay contains at least three facts correctly cited.

Teaching Tip

Conducting the debate in front of an audience would really make this activity meaningful, because it would provide the students with a "real world" application of skills and knowledge.

The audience could be another class of students, parents, or perhaps even members of a local Fish & Game club.

Chronic Wasting Disease

Student Handout

The Challenge: In teams of four to five students arranged by your teacher, prepare for a debate in which you take either the “pro” or “con” side of the investigative question on the effect of chronic wasting disease. In the debate the “pro” side will argue that “CWD will have no detrimental effects on lifestyles in the Northern Forest.” The “con” side will argue that “CWD will have a negative impact on lifestyles in the Northern Forest.”

As you research, be sure to gather accurate information on the following Focus Questions:

1. What is CWD? Where and when was it first found? Where is it found now?

2. What environmental conditions are currently present in the Northern Forest that might support an outbreak of CWD?

3. What effect might CWD have on the various lifestyles found in the Northern Forest (deer hunters, wildlife observers, meat processors, sporting goods retailers, and other business people connected to these outdoor pursuits)?

4. What can be done to minimize the impact of CWD in the Northern Forest?

To ensure that all team members contribute their fair share to the success of the team’s effort, each member of your team is required to maintain a work journal to document his/her work and contribution each day.

After the debate, you will be asked to write a one-page essay that clearly explains your stance on the topic and includes a minimum of three factual statements in support of your argument. These facts must be cited properly.

Suggested Web sites:

- www.dec.state.ny.us
- www.agmkt.state.ny.us
- www.nyhealth.gov/nysdoh/zoonoses/cwd.htm
- www.cwd-info.org

Use the Internet to search for state fish and wildlife agencies, state agriculture and markets, state health departments, state and nationwide sportsmen’s groups, U.S. Department of Agriculture, international fish and wildlife agencies, Chronic Wasting Disease Alliance, or world health organizations.

Chronic Wasting Disease
Product Quality Checklist

Product Author(s): _____

Date: _____ Class: _____

Observed	Standards/Criteria	Points Possible	Points Awarded
	Team presents its position in the debate using accurate and effective arguments.		
	Team uses specific data to support its arguments in the debate.		
	Each team member presents a work summary sheet at the end of every workday; this summary details the member's contribution to the effort and thoughts on the topic and process.		
	Each team member hands in a one-page essay after the debate in which (s)he clearly explains his/her position on the issue; the essay contains at least three facts correctly cited.		
	Total		

Comments:

Art & Literature of the Northern Forest

National Standards		Curriculum Content Area
• **Language Arts: Reading; Writing** • Arts: Understands the Arts in Relation to History & Culture; Understands the Merits of Specific Artwork	**Author**: Terri Smith Newcomb Central School Newcomb, NY **Grade Level/Course:** 9 - 12 Language Arts	**Culture & the Arts** Economy Government & Civics Health, Recreation & Life Skills Human History Natural History

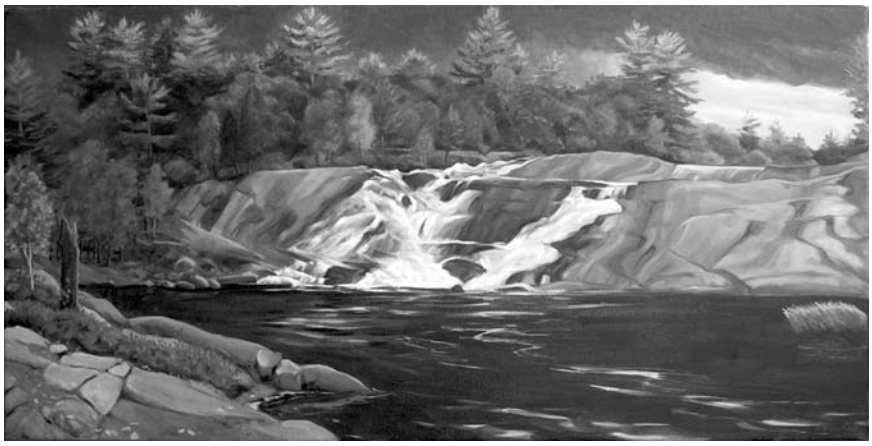
Investigative Question or Issue: How can an exhibit book reflect our appreciation and interpretation of regional art and writing within the historical milieu in which they were created?

Challenge: *Given a historical era, work individually and with your class to create an "exhibit book" that has uniform font and format and a cover representing a theme common among the book's content.*

Context for Challenge: The students will analyze and write about regional art and literature of their choice (based on specific teacher directions) and will each contribute pages to a class "exhibit book." The author of this Challenge was able to have a local artist give a presentation to her class on historic as well as contemporary artists whose work focused on this region. The guest artist also modeled the process of analyzing art (see supplementary art analysis worksheet). Artists of the Hudson River School created works in the 19th century inspired by a much broader region than the name implies, including much of the Northern Forest area. Many contemporary artists are also inspired by the forests, rivers, lakes, and mountains, and this project provides an opportunity to learn about local artists and craftspeople. Area arts councils or arts in education organizations may be able to provide funding for an "artist-in-residence." Teaming up with an art teacher might also be useful.

Directions: Distribute and discuss handout, preferably after a presentation by an artist. Provide lists of appropriate regional literature, art history resources, and contemporary regional artists. Allow students to come to consensus on format, size, font, and design of the exhibit book that they will collectively produce. One or more students may elect to function as book editors or cover designers. Review the Product Quality Checklist.

Quality Standards:
See the Product Quality Checklist.



"Autumn, Lampson Falls," oil, 2005
Sandra Hildreth

Original art by Sandra Hildreth, used with permission.

Art & Literature of the Northern Forest

Student Handout

Challenge: Given a historical era, work individually and with your class to create an exhibit book that has uniform font and format and a cover representing a theme common among the book's content.

As an individual you will

- Given a list, select a contemporary artist and piece of his/her art.
- Working with the materials provided, select a literary companion piece (poem or excerpt from a larger work) for this art work.
- Given a list and assigned an era, select a historic artist and piece of his/her art.
- Working with the material provided, select a literary companion piece (from the same era) for this art work.
- Select a third piece of art from either your contemporary artist or historical artist and write an original piece of literature as a companion piece to your selected art.
- Write a critical essay of at least six paragraphs long that compares and contrasts your analysis of two pieces of selected art.

As part of the class you will work toward consensus to decide

- The format and font for the written pieces in the book.
- The way to display copies of the artwork in the book.
- The theme, shape, and content of the cover of the book.

As a member of the class you will

- Contribute your pieces of art and literature on time and following the guidelines decided on by the class.
- Work as an editor, copy designer, or developer of the table of contents.

To achieve this goal, take notes as your guest artist models how to look at and interpret visual art. Review the "analyzing art" worksheet.

Use print and Internet sources to gather fine art, literature, historical information, and models for your book. (Keep a working bibliography.)

Use process writing to produce all written pieces for the book.

Use a variety of materials to create the book cover.

Work cooperatively.

Meet deadlines.

Art & Literature of the Northern Forest

Analyzing Artwork

Internal (Personal Observation)

1. Look at the artwork very carefully – what do you see? How would you describe it to a blind person?

2. How did the artist work with the “visual elements”? (How were lines, shapes, colors, textures, and values used? What is emphasized? What do you notice most?)

3. What meaning, mood, or message is communicated by this artwork? What do you think the artist wanted to communicate?

4. Judge the artwork – what do you like about it? (Hint: see #1, 2, & 3) Is it “meaningful” to you?

External (Historical Analysis)

1. This artwork best matches what “style” or art movement?

2. What was going on in the world that might have had an impact on this artist? Or, is there anything in the artwork that connects to other events?

3. How is this artwork judged by art historians and critics?

Art & Literature of the Northern Forest
Product Quality Checklist

Product Author(s): _____

Date: _____ Class: _____

Observed	Standard/Criteria	Points Possible	Points Awarded
	Exhibit Book Uniform font and format Attractive, neat, appealing Cover reflects theme of contents Cover attractive, neat, appealing Edited for no errors All bylines, titles, citations, etc. included		
	Creative Literature Typed Process writing used (pre-write, draft, revise, edit) Poetic devices effective Description/imagery included Interesting word choice Obvious connection with art Covers important aspects of the art piece		
	Compare/Contrast Critical Essay Shows evidence of understanding of artist Shows evidence of using research Includes thoughtful personal interpretation Employs the elements of analyzing art Compares fully both art pieces Contrasts fully both art pieces Uses process writing (pre-write, draft, revise, edit) Uses writing at grade level (language, organization, etc.) Developed fully using appropriate examples		
	Companion Pieces Good choices Historical period or movement aligned Connection evident and insightful		
	Individual Contributions Stay focused Work diligently Meet deadlines		
	Teamwork Consider others' choices Meet deadlines Work for the good of the team		
	Research Keep working bibliography Take notes Include all sources Cite all pictures Use proper MLA Format		
	Total		

Acid Rain & the Northern Forest: A Chemical Perspective

National Standards		Curriculum Content Area
• **Science: Life Sciences & the Nature of Science** • Civics: Citizen Participation • Language Arts: Research & Writing • Arts: Use Elements & Principles for Effective Communication	**Author**: Shannon Hansen Ballston Spa Central School, Ballston Spa, NY **Grade Level/Course:** 7 - 12, Chemistry, Language Arts, Government	Culture & the Arts Economy **Government & Civics** Health, Recreation & Life Skills Human History **Natural History**

Investigative Question or Issue: What can citizens do about acid rain?

Challenge: *In a team of two, create a pamphlet and a complementary letter that is both informative and persuasive regarding the issue of acid rain and its impact on northern forests. Think of a local newspaper, a local politician, or a local organization as a potential audience for your product.*

Context for this Challenge: This task is designed to raise student awareness about the connection between science and politics. Before starting this unit, the teacher should collect examples of brochures, video clips, posters, handouts, articles from journals, letters, song lyrics, or political cartoons to show students the many ways that advocacy groups present their issue and views to the public and politicians. The teacher will also want to ensure that students have ready access to the Internet for research and to MS Publisher, Word, or similar programs for developing the written products of their choice.

Procedures:

- Provide students with the Student Handout (page 52) and go over the directions.
- Have students form teams of two and provide them with several examples of political advocacy media that environmental groups have used to raise public awareness of environmental issues or to persuade politicians to take a specific course of action on those issues. Teams are to discuss the question: **"What are the characteristics of an effective advocacy message on any important environmental issue?"**
- Each team should reach its own conclusions on these characteristics and make a list.
- Conduct a discussion with the full class and create a master list of all the characteristics that can be agreed upon. This list will serve as part of your Product Quality Criteria for this Challenge.
- The products should meet the Quality Standards and include the characteristics of effective advocacy as determined by the class discussion.
- Arrange for 2 days in the computer lab to access the Internet for research on acid rain and its impact. Appropriate software applications should be available for students to use.

Acid Rain & the Northern Forest: A Chemical Perspective

- The final product is due fully completed and ready for presentation to the class on _____. At that time both co-authors should be prepared to respond to questions and defend their choices on any aspect of their work.

Quality Standards:

Advocacy Message (in letter and pamphlet):

- Communicates in an informative way—contains at least 10 facts or pieces of information about acid rain that are scientifically verifiable
- Communicates in a persuasive way—expresses an opinion supported by convincing evidence or argument
- Meets the criteria for a quality advocacy message as set in class
- Includes authors' credentials
- Contains well-written text that is basically free of spelling and grammatical errors
- Includes illustrations, graphs, or diagrams that are factually correct
- Cites specific law, policy, or ordinance, if possible
- Calls for a specific action to take place
- Uses research and computer lab time efficiently
- Challenge completed on time
- Both co-authors can respond adequately to questions and defend choices on content/form of medium

While primarily a science challenge, the interdisciplinary nature of this challenge involves creative art skills, persuasive writing, and encourages participation in government. Examples of student work can be found on the Adirondack Curriculum Project Web site at: adkcurriculumproject.org/NF05acidrain.htm

Acid Rain & the Northern Forest: A Chemical Perspective

Student Handout

With a partner (team of two), examine several examples of political advocacy media that environmental groups have used to raise public awareness of environmental issues or to persuade politicians to take a specific course of action on those issues. Discuss the question: What are the characteristics of an effective advocacy message on an important environmental issue?

Reach your own conclusions about these characteristics and then discuss them with your classmates. Create a list of the characteristics to which you all agree. This list will serve as part of your Product Quality Criteria for this challenge.

CHALLENGE: Working as a team, think of a local newspaper, a local politician, or a local organization as a potential audience for your product. The team is to compose a letter and create a complementary pamphlet to send to its selected audience. The pamphlet and letter should be designed to be mailed out (it is optional), so they are to be serious and professional. Each partner will get an individual grade for what the team produces.

Quality Standards:

- Communicates in an informative way — contains at least 10 facts or pieces of information about acid rain that are scientifically verifiable
- Communicates in a persuasive way — expresses an opinion supported by convincing evidence or argument
- Meets the criteria for a quality advocacy message as set in class
- Includes authors' credentials
- Contains well-written text that is basically free of spelling and grammatical errors
- Includes illustrations, graphs, or diagrams that are factually correct
- Cites specific law, policy, or ordinance, if possible
- Calls for a specific action to take place
- Uses research and computer lab time efficiently
- Challenge completed on time
- Both co-authors can respond adequately to questions and defend choices on content/form of medium

You will be given 2 days in the computer lab to access the Internet as you research acid rain and its impact, and you will have access to various software applications if you choose to use them.

Your final products are due fully completed and ready for presentation _____. Both co-authors should be prepared to respond to questions and defend your choices on any aspect of the work.

Related Resources

- http://www.adirondackcouncil.org
- http://classes.colgate.edu/aleventer/geol101/acidadir/acid14.htm
- http://www.citizenscampaign.org/campaigns/acid_rain.htm
- http://www.epa.gov/airmarkets/acidrain

Acid Rain & the Northern Forest: A Chemical Perspective
Product Quality Checklist

Product Author(s): _____

Date: _____ Class: _____

Observed	Standards/Criteria	Points Possible	Points Awarded
	Advocacy Message: Letter & Pamphlet		
	• Communicates in an informative way—contains at least 10 facts or pieces of information about acid rain that are correct, specific, and scientifically verifiable		
	• Communicates in a persuasive way—expresses an opinion that is supported by convincing evidence or argument		
	• Conforms to the criteria for a quality advocacy message as set in class		
	• Includes authors' "credentials"		
	• Contains well-written text, in appropriate format, and basically free of spelling and grammatical errors		
	• Includes illustrations, graphs, or diagrams that are factually correct		
	• Cites specific law, policy, or ordinance, if possible		
	• Calls for a specific action		
	Process		
	• Research and computer lab time is used efficiently		
	• Projects completed and handed in on time		
	• Co-authors can respond to questions and defend choices about content and form adequately		
	Total		

Comments:

Silviculture Challenge

National Standards	Author: Anne Green & Joe Winters Hadley-Luzerne Central School Lake Luzerne, NY **Grade Level/Course:** 10 -12, Living Environment	Curriculum Content Area
• **Science: Understands the Nature of Scientific Inquiry** • Mathematics: Uses basic and advanced procedures while performing the processes of computation		Culture & the Arts Economy Government & Civics Health, Recreation & Life Skills Human History **Natural History**

Investigative Question or Issue: Do the trees in your forest have enough space to grow?

Challenge: *In your lab groups, create a field inventory of all the trees found in an area chosen with the help of your teacher. Your inventory should include an accurate accounting of the species, diameter, height, and basal area of each of the trees found in your plot. Once you have collected the data on each tree in your forested area, you will need to calculate the number of trees/acre, and the total basal area of trees/acre. As a group, you will then draw conclusions using the same charts that foresters use about whether the forest is "overstocked," "adequately stocked," or "understocked." Be sure to check with your teacher to find out the criteria for a quality field inventory. Make sure that every group member understands and agrees with all the data submitted in your inventory and is prepared to verify, explain, and defend all the data submitted when asked to do so.*

Context for this Challenge: Foresters make management decisions (whether to thin or cut trees) based on forest inventory data. Inventory data can help provide information on how crowded a forest is, based on the number, size, and type of trees, and provide insight about possible disturbances in the recent past. The teacher can choose to have students do more interpretation of their inventory results in those areas. This Challenge specifically has students use forestry measurements and summaries to determine the density of the forest, which is reported as number of trees/acre and basal area of trees/acre. Basal area (BA) of a tree is defined as the cross-sectional area of a tree stem at 4.5 ft from the ground, the height at which diameter is measured.

The teacher will want to show students how to use a Biltmore stick and give them some tools for tree identification before beginning this Challenge. The students will eventually need to know the area (in acres) they are inventorying.

Procedures:

- Determine the minimum diameter of trees to inventory (4 inches is typical).
- Develop a field plan for collecting the data (strategy for identifying and measuring all the trees; determine group roles/jobs.
- The equation for determining individual tree basal area (BA) is : BA (square feet) = DBH (diameter at breast height in inches) X 0.005454.

Silviculture Challenge

Quality Standards:

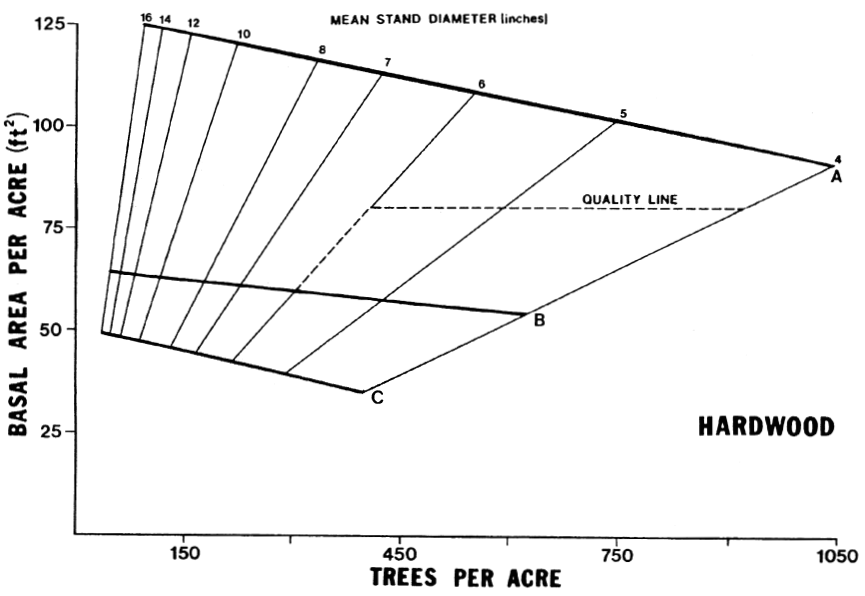
- Each group member participates in creating the field inventory.
- Each group member can demonstrate the capacity to identify a tree species using a tree identification key.
- Each group member can demonstrate the capacity to use a Biltmore stick to measure a tree in the field.
- All aspects of the field inventory meet the criteria for a quality field inventory as agreed upon in class.
- Each group member can verify, explain, and defend the data presented in the inventory when asked to do so.

Resources:

- http://www.fs.fed.us/na/morgantown/frm/stewardship/pubs/refhbk/refhbk.pdf
- http://www.na.fs.fed.us/pubs/misc/flg/index.cfm

NORTHERN HARDWOOD STOCKING GUIDE

Stocking guides for even-aged northern hardwoods, based on number of trees in the main canopy, average diameter, and basal area per acre. Stands above the A line are overstocked. Stands between the A and B lines are adequately stocked. Stands between the B and C lines should be adequately stocked within 10 years, and stands below the C line are definitely understocked.



From: A Silvicultural Guide for Northern Hardwoods in the Northeast. RP-NE-603.

Silviculture Challenge
Product Quality Checklist

Product Author(s): _____

Date: _____ Class: _____

Observed	Standards/Criteria	Points Possible	Points Awarded
	All aspects of the field inventory meet the criteria for a quality field inventory.		
	Each group member can demonstrate the capacity to identify a tree species using a tree identification key.		
	Each group member can demonstrate the capacity to use a Biltmore stick to measure a tree in the field.		
	Each group member participates in the creation of the field inventory.		
	Each group member can verify, explain, and defend the data presented in the inventory when asked to do so.		
	Total		

Comments:

How to Create Your Own Challenge

You can download a blank “Challenge” template, formatted in Microsoft Word, from the Adirondack Curriculum Project Web site (www.adkcurriculumproject.org) or you can create your own. The easiest way to develop your own Challenge is to use the technique of “backwards planning.”

1. Identify some specific knowledge or skills that are already a part of your regular curriculum to adapt into a Challenge. Finding a way to connect the Challenge to your own community, region, or state can give it more meaning.

2. Because Challenges are meant to be “student-centered,” it’s important to think about what kind of product(s) your students could create that would enable them to show evidence of their understanding and skill level. One of the most effective things is to put students into the position where they need to “teach” or explain what they have learned to someone else – an “audience.” Create a poster. Write a letter to the editor. Design a diorama. Having several options is a great way to allow for students to use different learning styles.

3. Once you’ve decided upon the product(s), then work your way backwards and identify what kind of instructional activities and resources you’d need to provide to prepare your students for the Challenge. Some of these activities could be done in cooperative groups. This could also be an opportunity to incorporate skills specifically needed on standardized tests.

4. Clarify the Challenge statement now that you know what you expect the students to do. Develop an investigative question that will inspire your students to take the Challenge – Why do leaves change color in the fall? Does acid rain affect me?

5. Write the Quality Standards – guidelines for your students so they will clearly know what is expected of them.

6. Create the Product Quality Checklist. This is an assessment form using rubrics that ideally should be given to students while they are working on the Challenge. The points columns on the form have been left blank so teachers can customize them to emphasize what they feel are the most important components of the Challenge. Sometimes it is even possible for the students to help develop the checklist – what they think a “good quality” product should look like.

If you’d like to submit your Challenge to the Adirondack Curriculum Project for publication online, please visit the Web site (adkcurriculumproject.org) and use the **Contact** link to inquire about the process. All Challenges are reviewed and sometimes edited before publication.

This Challenge format might initially seem like more work, but in the long run, it involves the students more actively in designing and developing (constructing) their own learning, with the teacher providing resources, instruction, coaching, and guidance as needed. Besides meeting state and national standards, many Challenges provide opportunities to use important lifelong learning skills. You can learn more about the teaching approach known as Constructivism by visiting the Institute for Learning Centered Education’s Web site: www.learnercentereded.org.

Challenge Title		
National Standards	**Author:**	**Curriculum Content Area**
•	**Grade Level/Course:**	Culture & the Arts Economy Government & Civics Health, Recreation & Life Skills Human History Natural History
Investigative Question or Issue: **Challenge:**		

Quality Standards:

Challenge Title
Product Quality Checklist

Product Author(s): _____

Date: _____ Class: _____

Observed	Standards/Criteria	Points Possible	Points Awarded
	Total		

Comments:

Twery, Mark J.; Hildreth, Sandra J.; Evans, Celia A. 2008. **Bringing the northern forest to your classroom.** Gen. Tech. Rep. NRS-21. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station. 59 p.

In recent years the Forest Service has reemphasized the need for increased environmental literacy among the Nation's citizens and has recognized the benefits of addressing that need among school-age children. This publication is a product of an Adirondack Curriculum Project workshop sponsored by the USDA Forest Service, Northeastern Research Station, and Paul Smith's College. The workshop was held at Great Camp Sagamore in Raquette Lake, NY, in June 2005. Great Camp Sagamore is operated by the Sagamore Institute, which is dedicated to the stewardship of the camp and to its use for educational and interpretive purposes. For 2 days, 22 teachers met with resource professionals with expertise in either the Northern Forest or in teaching methods and techniques, or both, and developed the lesson plans in this publication.

KEY WORDS: environmental education, constructivism, place-based learning, curriculum units, Adirondacks, environmental literacy, lesson plans

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