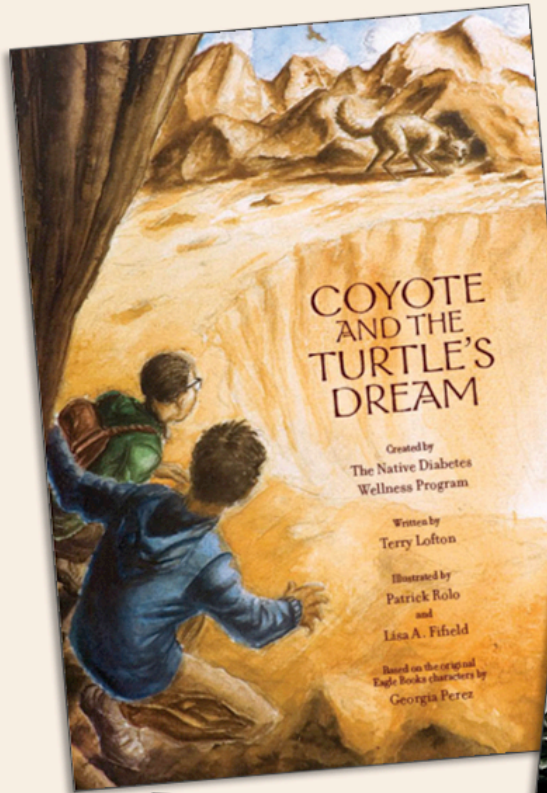




# Eagle Books

## Youth Novels: Educators and Community Guide



### COYOTE AND THE TURTLE'S DREAM

Created by  
The Native Diabetes  
Wellness Program

Written by  
Terry Lofton

Illustrated by  
Patrick Rolo  
and  
Lisa A. Fifield

Based on the original  
Eagle Books characters by  
Georgia Perez



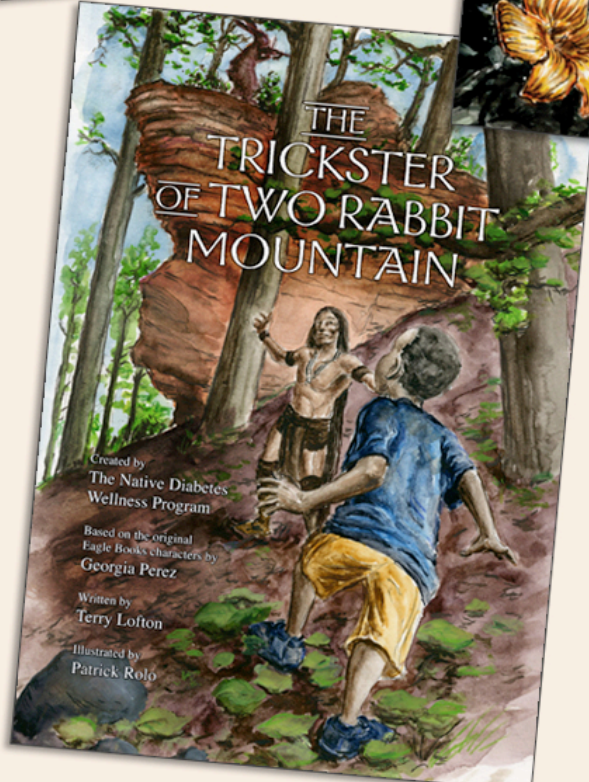
### Hummingbird's Squash

Created by  
The Native Diabetes Wellness Program

Based on the original Eagle Books characters by  
Georgia Perez

Written by  
Terry Lofton

Illustrated by  
Patrick Rolo



### THE TRICKSTER OF TWO RABBIT MOUNTAIN

Created by  
The Native Diabetes  
Wellness Program

Based on the original  
Eagle Books characters by  
Georgia Perez

Written by  
Terry Lofton

Illustrated by  
Patrick Rolo



**Eagle Books**

# **Youth Novels: Educators and Community Guide**

**Native Diabetes Wellness Program,  
Division of Diabetes Translation**

**National Center for Chronic Disease Prevention and Health  
Promotion**

**Centers for Disease Control and Prevention**

**U.S. Department of Health and Human Services**

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## Introduction

Before 1950 type 2 diabetes was rare among American Indians and Alaska Natives. Many elders remember a time when there was no word for diabetes in their language, because it was unknown. Westernized lifestyles with coincident obesity and physical inactivity are powerful risk factors for this relatively new “disease of civilization.” The web of causation is deeper, however, intertwined by historical, economic, environmental, and sociological roots (Satterfield, DeBruyn, Francis, Allen 2012). In recent years, type 2 diabetes has been increasingly diagnosed in young people and even children. American Indian and Alaska Native adults are twice as likely to have diagnosed diabetes as non-Hispanic whites (16.1% vs. 7.1%) (Centers for Disease Control and Prevention [CDC], 2011.) From 1994 to 2004, the age-adjusted rates of diagnosed diabetes doubled for American Indian and Alaska Native people under 35 years of age, from 8.5 per 1,000 population in 1994 to 17.1 per 1000 in 2004 (CDC, 2006). Type 2 diabetes mellitus is now woven into the fabric of losses in tribal communities across North America.

Because of the growing incidence of type 2 diabetes in Native communities, the Tribal Leaders Diabetes Committee (TLDC) in 2001 engaged the CDC’s Native Diabetes Wellness Program (the Wellness Program) to develop culturally-based, primary prevention materials for children. Families were identifying health education for their children as a top priority. Storytelling, they felt, would be the best way to go: “The children need stories—but stories where they see their own faces.”

Listening carefully to this advice, the Wellness Program developed the Eagle Books, a four-book series for young children. The stories, *Through the Eyes of the Eagle*, *Knees Lifted High*, *Plate Full of Color*, and *Tricky Treats*, were written by Georgia Perez of the Nambe Pueblo in New Mexico. They tell the tale of a young boy, Rain that Dances, who is befriended by an eagle. The eagle, helped by a rabbit and coyote, encourages the boy and his friends to eat nutritious foods, play outside, and follow the healthy traditions of their ancestors.

Illustrated by Patrick Rolo (Bad River Band of Ojibwe) and Lisa Fifield (Oneida Tribe of Wisconsin), these colorful books have become very popular with families, educators, and health professionals across the country. The books have been integrated into the National Institutes of Health’s Diabetes Education in Tribal Schools (DETS) curriculum, and are an important feature of local campaigns against type 2 diabetes in many Native communities.

In response to the popularity of the original Eagle Books, the Wellness Program is now developing a series of youth novels. Written by Terry Lofton of Westat, Inc. and illustrated by Patrick Rolo, the novels are aimed at middle schoolers (grades 6 through 8). To increase the appeal of the books, the Wellness Program has adopted entertainment-education (E-E) as its primary communication strategy for reaching out to middle school audiences. E-E incorporates health and other educational messages into popular media such as youth novels, graphic novels, comic books, games, cartoons, and TV shows. Because E-E combines message with fun and age-appropriate story genres, it is especially effective in raising awareness, increasing knowledge, creating favorable attitudes, and presenting positive role models. To maintain the interest of young readers, the Wellness Program has adopted the E-E formula: 85% entertainment and 15% education.



## ***Coyote and the Turtle's Dream***

The first novel, *Coyote and the Turtle's Dream*, introduces the E-E strategy. The four original child characters of the Eagle Books series, Rain that Dances, Hummingbird, Thunder Cloud (Boomer), and Simon, are now “grown up” to 12 years of age. When Rain and Boomer discover fossilized bones of an ancient turtle that have been fearfully thrown away by one of their classmates, the foursome (and their new friend Arianna) embark on a mystery adventure against a ring of fossil poachers. The eagle and rabbit help them avoid the traps of the tricky coyote who has masterminded the entire scheme.

## ***Coyote and the Turtle's Dream: the Graphic Novel***

*Coyote and the Turtle's Dream* has also been adapted as a four-volume graphic novel which tells the trickster story in sequential art. Illustrated by Patrick Rolo, the main characters and the plot remain generally the same, but the graphic novel achieves a faster and more exciting pace by adding action, deleting secondary scenes and characters, and allowing the pictures to tell the story. The graphic novel will give more flexibility to teachers regarding the preferences of middle school readers. Graphic novels have special appeal to boy readers, but enjoy popularity among girls as well.

## ***Hummingbird's Squash***

The second novel, *Hummingbird's Squash*, features Hummingbird's ambition to grow giant vegetables that feed everybody on the reservation. Despite help from Arianna and the boys, her “giant plan” is thwarted by a school bully. The bully, however, soon regrets that he has unknowingly interrupted one of the coyote's games. Joining forces with the eagle and the rabbit, the coyote grows Hummingbird's squash, a magical food mountain that traps the bully in his own schemes, ending his rule of the school.

*Coyote and the Turtle's Dream* and *Hummingbird's Squash* are available for order on CDC's Native Diabetes Wellness Program Web site: <http://www.cdc.gov/diabetes/projects/diabetes-wellness.htm>. *Coyote and the Turtle's Dream: the Graphic Novel* is available for download on the Web site.

## ***Purpose of The Youth Novels: Educators and Community Guide***

*The Youth Novels: Educators and Community Guide* (referred to as “the Guide” in this document) has been designed to assist teachers and communities by providing an array of activities that support the goals of the Eagle Books project and promote the health and educational messages in the youth novels. Most of the activities in the Guide for *Coyote and the Turtle's Dream* can be applied to the graphic novel.

### **Eagle Books Goals**

- Communicate messages about traditional ways of health that are remembered, retold, and talked about in homes, schools, and communities;
- Encourage children to turn to their elders about health;
- Illustrate joy and gratitude for gifts of food and water;
- Highlight the leadership and wisdom of Native communities.

## Health and Educational Messages

The messages in the original Eagle Books series have been maintained and expanded in the youth novels to include the following themes.

Original Eagle Books for Children	Youth Novels
<p>Traditional lifestyle of American Indians and Alaska Natives may have helped to protect many people from developing type 2 diabetes.</p> <p>Native knowledge provides wisdom and power to prevent and control type 2 diabetes.</p>	<p>Traditional lifestyles include indigenous methods for growing and preparing healthy fruits and vegetables developed in the Americas by Native peoples.</p> <p>Native Science, which has contributed many inventions and discoveries to the modern world, is a worthy tradition for young people to follow.</p> <p>Deep understanding of the earth’s past and its relational dynamics help to assure its healthy future.</p> <p>Native wisdom includes the philosophy of a life in balance.</p> <p>Young people have the power to make positive differences in the health of their communities.</p>
<p>Healthy diet and physical activity can help people to prevent and control type 2 diabetes.</p>	<p>Healthy diet and physical activity can help people to prevent and control type 2 diabetes; healthy life style choices can also help persons with type 1 diabetes to maintain their health.</p>
<p>Family and friends can help each other to eat healthy foods and stay active.</p>	<p>The building of healthy families, schools, and communities promotes positive lifestyles and respectful relationships.</p>

## Organization and Design

The Guide is organized into four main subject areas by novel:

- English/Language Arts
- Social Studies
- Art and Music
- Science

The activities or set of activities for all subject areas are presented similarly. They include topic background information and references to scenes in the novels that provide context for the activity; a set of objectives; required materials; and procedural directions. Activities have not been developed specifically for health as a subject area. Many of the lessons in the four main subject areas, however, address nutrition, physical activity, diabetes (type 1 and 2), and mental and social well-being. These lessons are appropriate for health classes.

Teachers will note that the design framework of the Guide is based on storytelling in appreciation of Native tradition and as a learning strategy. The lessons have also been designed to emphasize creative thinking, open expression, group involvement, natural observation, and hands-on participation. To make classroom activities more meaningful and appealing, the Guide includes numerous Online Resources sections that provide Internet links to more activities and games for middle schoolers, and information about relevant tribal and cultural issues.

Additionally, the subject areas are supported by 1) Extension Activities that broaden the objectives and learning opportunities of the main lessons; 2) Cross-Curricular Connections that combine several subject areas; 3) Career Connections that provide information about careers relating to the health of communities and the environment; and 4) Appendices of supporting materials. Each of these sections (excluding the Extension Activities) is located at the back of the Guide. They support both novels and are referenced appropriately throughout the document.

## How to Use the *Youth Novels: Educators and Community Guide*

### Adaptability of Classroom Activities

The Guide has not been designed as a formal curriculum. There are no requirements for training, adherence to the materials provided, or testing. We encourage classroom teachers, health professionals, fitness educators, and/or community volunteers to adapt the lessons to fit the needs and interests of their communities and children. Teachers should also feel free to invite school nurses, school counselors, or appropriate community members to participate in activities that specifically address type 2 diabetes and other topics related to physical, social, and emotional health.

Most of the lessons have been designed to work independently and they can be scaled down as necessary. Teachers, therefore, may use only selected activities or parts of activities. Some lessons may also be adapted for use in high school classrooms. We do suggest, however, that the materials list and procedures for the science activities be followed as stated. The hands-on science activities have all been

tested for workability and safety, given the recommended materials and procedures. We cannot guarantee that the demonstrations and experiments will be reliable or safe if the instructions are not followed.

## In the Classroom or Outside the Classroom?

Not all lessons in the Guide are appropriate to the classroom setting. We have noted those that would be better suited for after-school and weekend times and settings. These activities would more likely be supervised by school clubs; local youth organizations; or health, fitness, and recreation programs. They may require significant outdoor time, preparation time that exceeds a classroom period, kitchen facilities, or easy access to physical activity equipment. Teachers, of course, may adapt these activities to better suit the limitations of the classroom.

## Downloading and Printing

The Guide is accessible for download and printing at the Native Diabetes Wellness Program Web site: <http://www.cdc.gov/diabetes/projects/diabetes-wellness.htm>. It has been arranged so that it can be printed as one document. We recommend that school libraries print the whole document and store it in a three-ring binder. Photocopying sections from a master copy will prove more economical than repeated printings.

Users of the Guide may not be interested in all subject areas. However, we encourage users to review other subject matter areas since the Guide is very cross-curricular in design.

## Diabetes Education in Tribal Schools Curriculum

The Wellness Program would like to encourage middle schools that are implementing the DETS social studies and science curriculum for grades 7 and 8 to use the Eagle Books youth novels and/or *Coyote and the Turtle's Dream: the Graphic Novel* to complement the type 2 diabetes prevention goals and lessons presented in DETS. The novels reflect the same “enduring understandings,” “essential features of inquiry,” “Words of Wisdom” and cultural orientation that anchor the DETS curriculum. The youth novels are highly relevant to the DETS curriculum’s emphasis on oral history storytelling, and “Life in Balance” philosophy. Moreover, the Guide places special emphasis on science activities that promote interest in science and medical careers, and provides a Career Connections section that may be useful in classrooms promoting this key DETS goal. The alignment of the youth novels and the Guide with DETS goals, principles, and activities is presented in Correspondence: Diabetes Education in Tribal Schools Curriculum and the Youth Novels.

## References

CDC (2006). *Diagnosed diabetes among American Indians and Alaska Natives aged <35 years—United States, 1994–2004*. MMWR 2006; 55:1201–3.

CDC (2011). National diabetes fact sheet: national estimates and general information on diabetes and prediabetes in the United States, 2011. Atlanta, GA: US Department of Health and Human Services.

Satterfield D, DeBruyn L, Francis CD, Allen A (2012). *A Stream is Always Giving Life: Communities*



Reclaiming Native Science and Traditional Ways for Diabetes Prevention and Health Promotion. [Invited chapter for (Joe, J. & Young, R.) *Harnessing Cultural Capital to Address the Cultural Complexities of Diabetes in Native Communities*].

## Acknowledgements

The Native Diabetes Wellness Program would like to acknowledge the contributions made by our partner, Westat, in the content development and creative design of the *Youth Novels: Educators and Community Guide*. We would also like to thank Lynn Aho, Ke-weenaw Bay Ojibwa Community College, DETS principal investigator; Mary Hindelang, Michigan Technological University, DETS Science and Health Curriculum Specialist; and Lorelei DeCora, Winnebago Tribe of Nebraska, for providing great ideas, feedback, and review. We also would like to express appreciation to Caryn Galatis for the development and testing of the science activities in *Coyote and the Turtle's Dream* and *Hummingbird's Squash*. A science teacher with the Fairfax County Schools in Virginia for over 30 years, she would make Miss Swallow proud.

# Correspondence: Diabetes Education in Tribal Schools Curriculum and the Youth Novels

The Native Diabetes Wellness Program anticipates that middle schools using the DETS Life in Balance curriculum will find that the youth novels fit well with the social studies and science lessons designed for grades 7 and 8. The activities in the Guide reinforce and support the cultural orientation presented in the DETS curriculum, specifically the Circle of Balance which emphasizes the unity of life, a sense of place, and strong values of family and community. Oral history and storytelling are also major components of the novels and the Guide activities.

Below we provide some guidance in identifying DETS goals, understandings, concepts, and definitions that are relevant to the themes in the youth novels. We also align selected DETS lessons with relevant and compatible activities in the Guide.

## Social Studies

The Social Studies sections of the Guide seek to 1) strengthen healthy relationships between individuals, families, and the community, and 2) promote community health and safety. Other subject areas (English/Language Arts and Science) also offer activities which relate to the DETS social studies lessons.

## Goals and Overview

The goal and overview statements from the DETS social studies curriculum align well with the messages in the youth novels:

### Project Goal 1

To increase students' understanding of health and type 2 diabetes; and to help American Indian and Alaska Native children learn how to maintain balance for themselves, their families, and their communities.

### Unit Overview

Health is a community goal that requires attention and action.

## Lesson 1: Civic Action and Health

### Enduring Understandings

- Health can be defined as life in balance.
- The Circle of Balance includes four equal components: physical, mental, spiritual, and emotional.
- Communities and individuals seek balance in all four components to be healthy. “When one part of the circle is affected, it can start a ripple effect into the other parts.”
- Citizens have a responsibility to help their community to reach their goals.

### Definitions

**Civic Responsibility** Our duty to act for the common good because we belong to the group.

**Civic Action** Things we do or ideas we promote for the common good.

**Role Model** Someone we look up to or want to be like.

**Lifestyle** A series of behaviors and choices that are made by individuals, families, and communities.

## Words of Wisdom

DETS	Youth Novels
<p>Key Ideas from Words of Wisdom</p> <ul style="list-style-type: none"> <li>• Understand our responsibility to others and our community.</li> <li>• Understand the connection of all things.</li> <li>• Think about future generations (and past generations, too).</li> <li>• Honor and return to tradition.</li> <li>• Accept responsibility.</li> <li>• Work together.</li> </ul>	<p>Major themes in both novels reflect these key Words of Wisdom.</p> <p><i>Coyote and the Turtle’s Dream</i></p> <ul style="list-style-type: none"> <li>• The Guide: English/Language Arts—Collecting Family Stories. Students learn about their families and ancestors.</li> <li>• The Guide: Social Studies—Exploring Family and Community. Students learn how families in the community are connected.</li> <li>• The Guide: Art—Cave Stories: The Art of Storytelling. Students learn about how our ancestors told stories in rock art.</li> <li>• The Guide: Science—Part 1: Learning from the Past. Students engage in activities that show how our world was made and our responsibility to honor it.</li> </ul> <p><i>Hummingbird’s Squash</i></p> <ul style="list-style-type: none"> <li>• The Guide: Social Studies—Family Trees and Being a Good Relative. These activities promote family and tribal belonging as a foundation for Being a Good Relative, which encourages responsibility for preventing bullying and promoting positive community relationships.</li> <li>• The Guide: Science               <ul style="list-style-type: none"> <li>○ Part 1: Investigating Earth’s Environment—Balance in Nature. Students learn about balancing forces in the natural world.</li> <li>○ Part 2: Finding the Balance and Wisdom in the Plant World and Native Science. Students learn about the value of plants to human life, protection of indigenous plants and environments, and the traditions of Native Science.</li> </ul> </li> </ul>



DETS	Youth Novels
<p>Community goals:</p> <ul style="list-style-type: none"> <li>• Protect natural resources.</li> <li>• Preserve historical resources and scenic views.</li> <li>• Promote farmland preservation.</li> <li>• Maintain roads.</li> <li>• Improve health of the community.</li> </ul>	<p><i>Coyote and the Turtle’s Dream</i></p> <ul style="list-style-type: none"> <li>• The Novel: Key themes include the preservation of traditions, the protection of native animals and the environment to assure a healthy balance in the future, and improving nutrition of the community.</li> <li>• The Guide: Social Studies—Mapping Our World and Modeling a Healthy Community. Students envision their personal world and learn about ways to improve the world they share with others.</li> <li>• The Guide: Science <ul style="list-style-type: none"> <li>○ Part 1: Investigating Earth’s History: Learning from the Past. Students learn about how our natural resources were formed and our responsibility to protect them.</li> <li>○ Part 2: Investigating Nutrition—You Are What You Eat. Students learn about healthy foods and their role in maintaining health.</li> </ul> </li> </ul> <p><i>Hummingbird’s Squash</i></p> <ul style="list-style-type: none"> <li>• The Novel: Key themes include improving nutrition in the community; improving physical fitness; restoring social harmony; and contributions of Native Science, such as preservation of native habitats, reservation lands, and indigenous foods and seeds.</li> <li>• The Guide: Science <ul style="list-style-type: none"> <li>○ Part 1: Investigating Earth’s Environment—Balance in Nature.</li> </ul> </li> </ul>

## Circle of Balance

<b>DETS</b>	<b>Youth Novels</b>
Define the four parts of the Circle of Balance and what they represent to you.	<i>Coyote and the Turtle's Dream</i> The Guide: Social Studies—Constructing a Mental Map of Our World. Students define their world in terms of the four parts of the Circle of Balance
Construct a Lifestyle Concept Map.	<i>Coyote and the Turtle's Dream</i> The Guide: Social Studies—Mapping Our World. Aspects of this activity can align with a lifestyle concept map.
Lifestyle Choices of Role Models.	Both novels offer examples of adult, child, and animal characters that serve as role models for choosing behaviors relating to healthy diet and physical activity, and those that support family, friends, and community. The novels also offer examples of characters that readers would not want to emulate.

## Lesson 2: Helping Our Town

### Enduring Understandings

- Individuals need to understand the types of things that influence lifestyle choices.
- Challenges may come up when changing a lifestyle, but most can be overcome.
- Community resources are available to support healthy lifestyle.

DETS	Youth Novels
Assuming civic responsibility.	<p><i>Coyote and the Turtle’s Dream</i></p> <ul style="list-style-type: none"> <li>• The Novel: The plot centers on Rain and his friends’ responsibility to answer the eagle’s call for their help in returning the bones to the Great Turtle and restoring the water to the reservation.</li> </ul> <p><i>Hummingbird’s Squash</i></p> <ul style="list-style-type: none"> <li>• The Novel: Hummingbird’s “giant plan” addresses the well-being of the whole community, while the help offered to Walter and Larry represents responsibility to rally around those who are in trouble.</li> <li>• The Guide: Social Studies—The Family Trees and Being a Good Relative activities.</li> </ul>
Evaluating the health of the community.	<p><i>Coyote and the Turtle’s Dream</i></p> <ul style="list-style-type: none"> <li>• The Guide: Social Studies—Modeling a Healthy Community. Students plan and design ways to improve the health and safety of their community.</li> </ul> <p><i>Hummingbird’s Squash</i></p> <ul style="list-style-type: none"> <li>• The Guide: Social Studies—Being a Good Relative. Students learn about ways to stop bullying.</li> </ul>

DETS	Youth Novels
<p>Factors that influence the community's lifestyle choices.</p>	<p>Both novels include information about community resources that support education, traditional agriculture, and health education such as health clinics, the county extension service, tribal colleges, bison co-ops, and food sovereignty initiatives.</p> <p>In <i>Coyote and the Turtle's Dream</i>, Jimmy represents families that have low incomes, limiting their ability to purchase healthy foods. The book also underscores the influence of unhealthy choices in local stores such as Big Weasel's Jif Mart. Big Weasel also represents community members who lack information about diabetes prevention. In <i>Hummingbird's Squash</i>, high prices and lack of fresh vegetables and fruits restrict families' ability to buy healthy foods.</p>

## Lesson 3: Your Community Needs You

### Enduring Understandings

- Lifestyle changes can be made to improve health.
- Community members need information about type 2 diabetes prevention to help them make better choices.
- It is a civic responsibility to help the community work toward balance and prevent type 2 diabetes.

### Educate the Community

DETS	Youth Novels
<p>Make colorful and creative posters with clear messages in pictures and words that promote prevention of type 2 diabetes.</p>	<p><i>Coyote and the Turtle’s Dream</i></p> <ul style="list-style-type: none"> <li>• The Guide: English/Language Arts—The Art of Persuasive Writing: Sharing Ways to Prevent Type 2 Diabetes offers pointers for convincing community members to adopt healthy lifestyles.</li> <li>• The Guide: Art—“Artful” Diabetes Prevention. Students make diabetes prevention posters.</li> </ul> <p><i>Hummingbird’s Squash</i></p> <ul style="list-style-type: none"> <li>• The Guide: Art and Music—Students make health</li> </ul>
<p>Write a song, story, play or commercial.</p>	<p><i>Hummingbird’s Squash</i></p> <ul style="list-style-type: none"> <li>• The Guide: Art and Music—Students write a diabetes prevention song.</li> </ul>
<p>Invite participation by community leaders, parents, and elders.</p>	<p>In both novels, elders are featured as sources of wisdom. Rain’s Great-grandmother Hettie anchors her family in Native tradition, and the character of Joe Red Crane heads the Native Heritage program, teaching Native language, drumming, and providing sage advice.</p>



DETS	Youth Novels
Organize and plan a civic action.	<p data-bbox="667 254 1432 296"><i>Coyote and the Turtle’s Dream</i></p> <ul data-bbox="667 296 1432 590" style="list-style-type: none"> <li data-bbox="667 296 1432 443">• The Novel: Rain and his friends promote “sometime” and “everyday” foods sold at Boo’s Gas ‘n Grocery and a food labeling program.</li> <li data-bbox="667 443 1432 590">• The Guide: Art—Construct a Model of Boo’s Store. Students make the “sometime” and “everyday” snack shelves at Boo’s Gas ‘n Grocery.</li> </ul> <p data-bbox="667 590 1432 632"><i>Hummingbird’s Squash</i></p> <ul data-bbox="667 632 1432 852" style="list-style-type: none"> <li data-bbox="667 632 1432 852">• The Novel: Hummingbird’s “giant plan” provides vegetables and fruits to the community, and her science project, “Invasive Plants on Tribal Rangelands” suggests a potential action for the Bison co-op.</li> </ul>

## Science

Each of the youth novels promotes science themes, showing how Native science complements Western science. In *Coyote and the Turtle's Dream*, Rain and his friends solve the mystery of the missing turtle bones by using a methodical approach to gather evidence. However, they are also guided by the remembered observations and experience of Rain's great-grandmother. In *Hummingbird's Squash*, Hummingbird learns the wisdom of traditional farming and the healthy nature of the foods developed by her ancestors—foods that now feed the world.

The Guide follows the “science as inquiry” principles outlined in the DETS curriculum. Students should ask scientifically testable questions, design appropriate investigations to answer questions, and develop explanations based on the evidence collected. They should also consider alternative explanations and use math and technology to help answer questions, if appropriate. These principles also include the realization that science advances through questioning and observation of the natural world, and that people from different backgrounds and cultures have contributed to scientific knowledge. The following features of inquiry are followed:

- Learners are engaged by scientifically oriented questions.
- Learners give priority to evidence, which allows them to develop and evaluate explanations that address scientifically-oriented questions.
- Learners formulate explanations from evidence to address scientifically oriented questions.
- Learners evaluate explanations in light of alternative explanations, particularly those reflecting scientific understanding.
- Learners communicate and justify their explanations.

## Unit Overview

A balance between food and physical activity is important to good health.

### Enduring Understandings

- Balance is an important concept for individuals who want to lead a healthy life.
- Helping people learn about diabetes and healthful lifestyles is essential to reducing the risk for developing type 2 diabetes.

## Project Goal 1

To increase students' understanding of health and type 2 diabetes, and to help American Indian and Alaska Native children learn how to maintain balance for themselves, their families, and their communities.

### Specific Goals

- Understand lifestyle in terms of dietary patterns, physical activity levels, and personal choices.
- Describe environment in terms of external factors such as physical surroundings and social organization.
- Understand that lifestyles and environment can change over time.
- Understand that lifestyle choices lead to balance or imbalance.
- Appreciate that healthful choices can prevent or delay onset of type 2 diabetes.

## Project Goal 2

To increase American Indian and Alaska Native students' understanding and appreciation of the process for developing scientific and community knowledge with respect to health, diabetes, and maintaining balance.

## Project Goal 3

Encourage interest in entering the health and science professions by developing a better understanding of how diabetes-related biomedical professions work with communities and enhance health.

*Coyote and the Turtle's Dream* and *Hummingbird's Squash* strongly emphasize an interest in science and careers in medicine and public health. The Career Connections section of the Guide provides activities and references related to educational paths to science and health careers and to others that promote healthy communities.

## Lesson 1: History in the Making

DETS	Youth Novels
Discoveries in the past and in recent times that affect tribal life.	<p data-bbox="656 338 1016 369"><i>Coyote and the Turtle’s Dream</i></p> <ul data-bbox="656 401 1417 548" style="list-style-type: none"><li data-bbox="656 401 1417 548">• The Novel: The story highlights Miss Swallow’s Bison Project which demonstrates Native knowledge in restoring prairie environments and increasing the nutritional value of the bison.</li></ul> <p data-bbox="656 579 930 611"><i>Hummingbird’s Squash</i></p> <ul data-bbox="656 642 1409 1024" style="list-style-type: none"><li data-bbox="656 642 1409 747">• The Novel: The story features Coyote’s trick, The Miraculous Tree, which grows fruit, vegetables, and spices developed by peoples in North, Central and South America.</li><li data-bbox="656 779 1409 926">• The Guide: Science—Part 2 Investigation 4: Native Science: Yesterday, Today, and Tomorrow. Students make “rubber” and research other Native contributions to science and technology.</li><li data-bbox="656 957 1409 1024">• The Guide: Art and Music—Native Science and Technology Cards.</li></ul>

## Lesson 2: Focus on Diabetes

### Enduring Understandings

- There is more than one form of diabetes.
- Diabetes is a treatable disease and the treatment varies with the type of diabetes.

<b>DETS</b>	<b>Youth Novels</b>
Part 1: Learn about the different types of diabetes.	Both novels feature the character of Arianna, a young girl with type 1 diabetes. She introduces readers to the differences between type 1 and type 2 diabetes, and demonstrates that with diligent attention to diet and physical activity, she maintains her health. However, the novels do not gloss over the challenge that Arianna faces in maintaining balance in her blood glucose levels. The novels also point out that, like Arianna, everyone, including people with type 2 diabetes, can also benefit from healthy diet and physical activity.
Part 2: Focus on a Diabetes Poster.	<i>Coyote and the Turtle’s Dream</i> <ul style="list-style-type: none"><li>• The Guide: Art—Diabetes Prevention Posters.</li></ul> <i>Hummingbird’s Squash</i> <ul style="list-style-type: none"><li>• The Guide: Art and Music—Posters and Flyers.</li></ul>



## Lesson 3: Health is Life in Balance

### Enduring Understandings

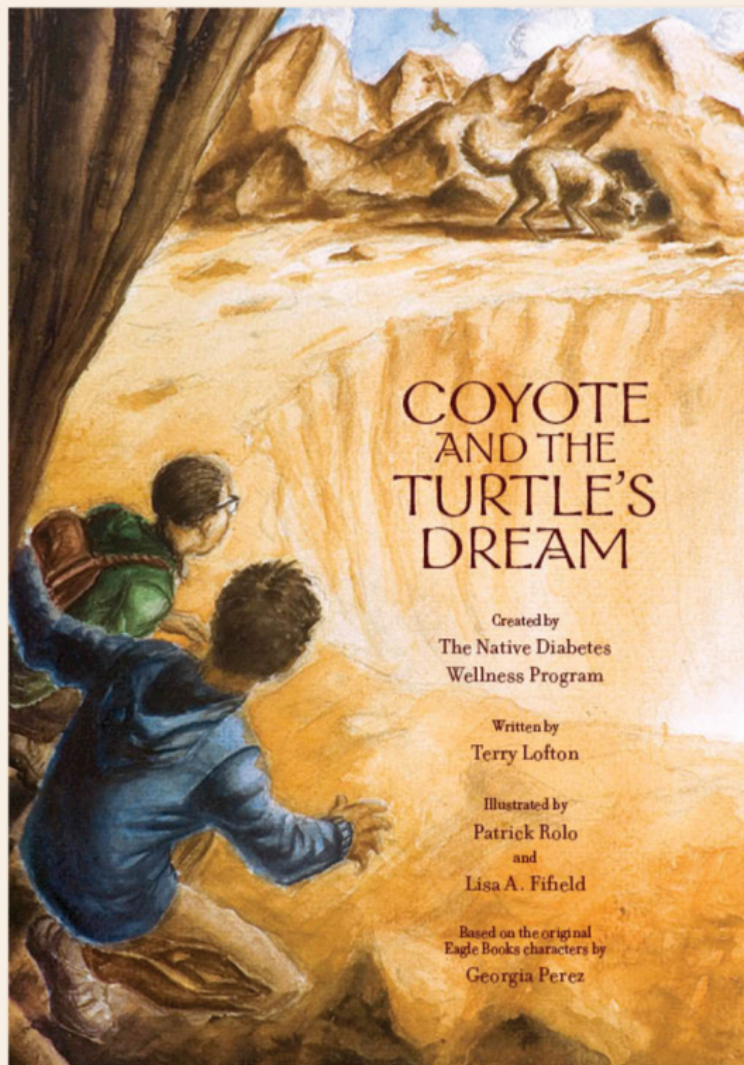
- Balance is an important concept for all individuals to lead a healthy life.
- The MyPyramid food guidance system helps people to learn about healthy patterns of eating and exercising.
- Even small changes in a person’s lifestyle can significantly reduce the risk of developing type 2 diabetes.

<b>DETS</b>	<b>Youth Novels</b>
Guidelines for student letters.	<i>Coyote and the Turtle’s Dream</i> <ul style="list-style-type: none"><li>• The Guide: Social Studies—Modeling a Healthy Community. Students write letters about ways to improve the community to other students who assume the roles of elected officials and planners.</li></ul>

Eagle Books

## Youth Novels: Educators and Community Guide

For Coyote and the Turtle's Dream



# English/Language Arts

## Book Discussion

### Objectives

- Describe and analyze characters and events in the book.
- Learn from different viewpoints.
- Behave respectfully when engaged in debate with others.

### Background for Teachers

A book discussion is a great way to help students develop language skills, learn new ideas, and develop deeper understandings of what they have read. Very importantly, they are exposed to the give-and-take of open discussion which helps them to express their own thoughts and to appreciate and learn from the perspectives of others.

### *Activity: Holding a Book Discussion*

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There are various ways for a teacher to hold a book discussion. The most common is to throw out questions one at a time and call on volunteers who would like offer their point of view.

However, another approach is to write a number of different questions on a set of index cards, break the class into small teams of two to four students, and pass out a card to each team. The team discusses the questions and then shares their thoughts with the class. The class can then ask the team to defend or explain their opinions and conclusions.

Regardless of the discussion approach, students should be encouraged to listen, take turns, and not interrupt when others are speaking.

### *Suggested Questions*

- What did you enjoy about this book? Have you read any books similar to this one?
- How did you experience the book? Were you engaged immediately, or did it take you a while to “get into it”? How did you feel while reading it—amused, sad, disturbed, confused, bored...?
- What are some of the major themes of this book? What was it about?
- Who was your favorite human character? Animal character? What did you appreciate about him/her?
- Consider Rain that Dances, the main character. Why does he behave as he does? What does he believe in? What is he willing to fight for? Does he remind you of anyone you know regarding his personality traits, motivations, or inner qualities? Would you like to have him as a friend?
- What are the most important relationships between and among the human and animal characters? Describe the friendships and how they are different; are there tensions in the

relationships? Does everyone get along all the time?

- Is there a minor character that stands out to you?
- What are the most exciting scenes?
- Was the story believable? The characters believable?
- Is there anything in the book that you would change? Is the ending satisfying? If so, why? If not, how would you change it?
- Has this novel changed you in any way? Have you learned something new or been exposed to different ideas?
- Comment on a specific passage from the book—a description, an idea, a line of dialogue. Why has the author included this passage in the book?
- If you could ask the author a question, what would you ask?
- Would you recommend his book to others? Why or why not?

## “Gaming” a Book Discussion

### Objectives

- Recall themes, characters, events, settings, and objects from the novel.
- Have fun.

### Background for Teachers

Games are a great way to invite students to participate in a book discussion, especially “reluctant readers.” The activities in this section work well in engaging all the members of the class.

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#### *Activity: Snowball*

This game sounds pretty ridiculous, but it’s lots of fun. Ask students to write a question about the book on a piece of notebook paper. Then divide the class into two teams on either side of the room. Crumple the paper into “snowballs” and, at the signal—*Play Ball!*—throw them across the room to the other team. The team who correctly answers the most snowballs wins!

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#### *Activity: Alphabet Soup*

Challenge the class, “Do you know your letters?” Then, work around the room, having each member of the class name a character, event, place, or object from the book—the first letter of which starts with A, the next with B, the next C, and so forth through the alphabet.

## *Activity: Plot a Prop*

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Use a prop to stimulate students' thinking about some aspect of the story. A prop (or property) is an object used by actors in a play to further the plot or story line. The prop list provides some of the props in *Coyote and the Turtle's Dream*. Hold up the prop to the class and ask who can tell you why the object is an important part of the story.

### *Prop List*

- A cigar box
- Turtle fossils
- A Valentine box
- The flyer on the wall at Big Weasel's Jif Mart
- A copy of *The Thunderbird* newspaper
- *Mammoth Boy* comic book
- Shark teeth
- A photo of Delbert when he was in the Army
- A photograph of the Great Turtle
- A bag of Plaster of Paris
- A cup that says "Test Your Hypotheses"
- A tree stump
- A cardboard box stamped "Nelson's Rock and Smoke Shop"
- A braid of sweetgrass

### *Instructor Notes*

Some props will be easy to find like an empty Valentine box or a cardboard box. For items that are difficult to find, just draw them or use a photograph printed from the Internet. (There are online resources offered in the activity "A Day in the Life of the Archelon" where photos of the Great Turtle can be found. This activity is located in the Cross-Curricular section of the Guide.

A few props will take a little imagination. Miss Swallow's cup can be duplicated by taping a paper strip around a cup on which is printed the phrase "Test Your Hypotheses." A facsimile of Delbert's photo can be made by drawing a picture of a young man in an army uniform and putting it in an old picture frame. The flyer, newspaper, and comic book and other objects can be recreated by drawing imagined text and/or pictures on 8 x 11 paper.

## Writing Activities: Write an Invitation

### Objectives

- Decide who would benefit most from being invited to read *Coyote and the Turtle’s Dream*.
- Identify the beneficial information in the book.
- Engage in a “persuasive writing” activity.

### Background for Teachers

The art of persuasion is a practical skill useful for students to develop—especially if they want others to read *Coyote and the Turtle’s Dream*. Because people invest time in reading a book, they may ask, “Why should I read it?” It is up to the students to present reasons why reading the book would provide a benefit, something that is advantageous, helpful, or rewarding. In this activity, we are going to try some “persuasive writing” that includes describing the benefits in the story. These benefits might include: being entertained; learning something new; being exposed to a different way of thinking; sharpening problem-solving skills; and/or learning ways to help prevent type 2 diabetes.

### *Activity: Inviting Others to Read*

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Students should identify a list of friends or relatives they would like to invite to read *Coyote and the Turtle’s Dream*. To make the invitation more appealing, teachers can download an invitation template from the Native Diabetes Wellness Program Web site: <http://www.cdc.gov/diabetes/projects/diabetes-wellness.htm> and photocopy it for the class. The template is illustrated with pictures of the human and animal characters in the book. Then students can choose a message or other subject matter that they think would persuade others to read the book. Some suggestions are below:

- **Get Healthy** by learning Sky Heart’s messages about nutritious foods and physical activity. Students may include information about “sometime” and “everyday” snacks, describe meals eaten by Rain that Dances and his friends, and other information about ways to help prevent type 2 diabetes.
- **Enjoy a Trickster Story** by reading about Coyote’s antics. Students would have fun describing the trouble Coyote caused by leading Delbert and then Jimmy into the cave, his “game” with Rain that Dances, and the tricks he played on Vernon Smeed, the fossil poacher. Students may also include other troublesome or funny events that they suspect Coyote caused.
- **Learn about the Bison Project** and how Miss Swallow promotes the health of the people and environment by protecting the buffalo.
- **Find out about Fossil Poachers** and how important it is to protect the history of the ancient earth. Students can describe Vernon Smeed and the ring of fossil poachers at Nelson’s Rock and Smoke Shop.



## Writing Activities: Write a Book Review

### Objectives

- Learn the difference between a book review and a book report.
- Identify “reading genres.”
- Identify the health and scientific topics in the book.
- Identify health and science careers that are related to the topics in the book.

### Background for Teachers

A book report and a book review have similarities, but they are different. A book report describes a book in terms of its plot, setting, main characters, and the climax of the story. In contrast, a book review is an *analysis* of the story. It may include some brief description of what happens, but it is mainly intended to examine and evaluate. A book review may address: what the author was trying to accomplish; the themes in the book; who the book was written for; how the reader was affected by the book; or what the reader learned, etc.

An important element in the analysis of a book is its genre (the kind of book it is). There are many fiction genres:

- **Fantasy:** This kind of story includes magical powers, talking animals, and other elements that don’t occur under the usual definition of “reality.”
- **Adventure:** This genre involves action, danger, risk, and excitement.
- **Realistic fiction:** The story could really happen although the characters are make-believe.
- **Mystery:** This is a suspenseful story about a puzzling event that features fictional characters and settings.
- **Historical fiction:** This genre takes place in the past. The setting is often real, but many or all of the characters are made up.
- **Traditional literature:** These stories include folktales, fables, and fairytales from different cultures.
- **Science fiction:** This kind of fantasy features science and technology like robots and space ships.

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### **Activity: Review *Coyote and the Turtle’s Dream***

All of the main kid characters in *Coyote and the Turtle’s Dream* want to help prevent type 2 diabetes. Rain is so interested in healthy food that Rain’s dad says that he can’t decide whether his son wants to be a “doctor, a chef or a farmer.” They are also big science fans—especially Simon and Hummingbird. It is probably no secret that Simon would like to study dinosaur fossils when he grows up.

Ask students to pretend that they are writing a review of *Coyote and the Turtle’s Dream* for a Weekly Reader magazine like *Current Science* or *Career World*. Have them address topics similar to the ones

below:

- Describe what kind of book *Coyote and the Turtle's Dream* is. Is it a mystery, a fantasy, an adventure, all three or more?
- Why did the author choose these genres?
- Are Rain and his friends successful in the ways they try to improve the health of their community? If so, how? How do other characters in the book try to protect the well-being of the people and the land? What do they do for a living? What motivates them?
- Identify and describe some of the events/ scenes in the book that involve science.
- Explain, in your opinion, how these scenes make the story exciting, fun, or informative.
- Indicate whether the book would make a reader want to be someone who helps people to prevent type 2 diabetes (perhaps a doctor, a nurse, or a public health worker like a community health representative). Or would students rather be a scientist or science teacher like Miss Swallow? What kind of scientist would they like to be?

### *Extension Activity*

Suggest that students submit their book reviews to the school newspaper.

### *Careers Offer Cross-Curricular Connections*

The book review activity can be an excellent example of cross-curricular teaching. Language teachers may want to collaborate with science teachers regarding interest in science and medical or public health careers. Language teachers may also collaborate with social studies teachers regarding activities in the Guide that focus on other kinds of careers (such as economic developers, city planners, architects, and community organizers) that promote healthy communities. See the Career Connections section for activities that promote career exploration.

### *Instructor Notes*

Below are chapter references for science scenes in *Coyote and the Turtle's Dream*:

Chapter 7: Miss Swallow's Bison Project

Chapter 7: The visit to Dr. Bamsey's lab at the tribal college

Chapter 7: The protection of fossils from poaching

Chapter 10: Granma's description of the cave as told to her by Delbert

Chapter 11: The kid's detective work in putting together their clues from Rain's dream and Granma's story

Chapter 13: The preparation of the "shark kits"

Chapter 14: Hunting sharks teeth and fossil identification at Shell Ridge

Chapter 14: The geology of Shell Ridge



Chapter 22: Rain and Simon’s entry into the cave

Chapter 16, 22: Scenes that involve the fossilized bones of the Great Turtle (*Archelon ischyros*)

## Writing Activities: Write Newspaper Articles

### Objectives

- Learn what reporters do.
- Identify persons to be interviewed.
- List and apply key interviewing questions.
- Follow an outline recommended for writing news stories.

### Background for Teachers

In *Coyote and the Turtle’s Dream*, Mrs. Corn is advisor to the school newspaper. She assigns her class to do a family interview in which she asks her students to think like reporters. A reporter is a kind of journalist. They are people who gather and distribute news to the public. Reporters collect information, write it up as a story, and report it in a newspaper, magazine, on TV or radio, and on Web sites. Reporters play an important role in a community. They inform people about things they need to know. Ask students to try their hand at being a reporter.

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### Activity: Write an Article for The Thunderbird

In Chapter 10, Rain and Simon interview Granma. She tells the story about Delbert following the coyote into the cave and discovering the bones of ancient creatures. The boys write up the story and title it “When Coyote Stood up Like a Man.” Mrs. Corn prints it in the school newspaper.

Since Rain and Simon have already done all the hard work, students will find that they have all the information they need to write up the story. Ask students to review the facts from the interview with Granma in Chapter 10; then write the story (following the outline provided) as it would have appeared in *The Thunderbird*.

### Outline for a Newspaper Article

- The article should have a title that makes people want to read it. Wouldn’t you want to read “When Coyote Stood Up like a Man?”
- The first sentence in the first paragraph should be another attention-grabber. Unusual questions work well, for example, “How many dinosaurs have you ever seen?”
- The rest of the article should be based on answers to the questions on Mrs. Corn’s Tip Sheet:
  - Who? Who is involved in and affected by the story being reported?
  - What? What are the details? Describe what happened.
  - Where? Where does the story take place?

- In one location or several?
- When? When does the story take place?  
Does timing affect the story? Does the story take place over time?
- Why? What are some of the causes and effects (why things happen) in the story?
- Make sure to include a quote from the person or persons being interviewed. In this case the quote would come from Granma.
- Sign the article with the names of the reporters (Rain and Simon).

### **Activity: Write an Article for the Town Newspaper**

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In Chapter 21, Rain saves his great-grandmother and brings down Vernon Smeed’s fossil poaching schemes. The reader can imagine that Rain and his friends will become heroes when the local reservation newspaper reports that they broke up a ring of fossil poachers at Nelson’s Rock and Smoke Shop.

- Invite students to pretend to be a reporter for Thunder Rock’s local newspaper. Be sure to include details about Granma’s kidnapping, Rain’s rescue of Granma, the capture of Vernon Smeed at Shell Ridge, and additional information about fossil poaching and the ring of poachers at Nelson’s Smoke and Rock Shop. Feature interviews with Simon, Willard Fox Chief, Granma, and any other characters that they think would have interesting comments to make.
- Encourage students to use their imaginations! Just make up the details they don’t know, using the same article-writing techniques as those in the *Thunderbird* activity. Students may also draw a “photo” to be included with the article.

## **Storytelling: Trick a Trickster**

### **Objectives**

- Expose students to trickster stories from different tribes.
- Build vocabulary.
- Review parts of speech.

### **Background for Teachers**

Trickster stories are told all over Indian Country and other parts of the world. West Africa is the home of the well-known trickster Ananzi the Spider, and in Europe, Loki is the shape-shifting god of Norse stories. Coyote is a well-known trickster, but there are many others that not only act the fool, but also try to make fools of people and other animals. Raven, Spider, Old Man, and Rabbit are some other trickster figures in Indian Country. Sometimes they are the hero and sometimes the villain. They can be clownish and very wise at the same time. Whatever the purpose of the story, tricksters are always playing tricks and enjoying it. However, in this game, students do the tricking!

## Activity: Make a “Trickster Fill-in-the-Blank”

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### Procedure

- Start by reading some indigenous trickster stories as told by different tribes. (Many trickster stories are available on the Web, or the school library may have a book of trickster stories.) Students may also know trickster stories told by their Tribe.
- Choose one of these stories and write it down. (Do not use a story that has a sacred meaning—only one that is told for entertainment.) In each sentence replace a key word with a blank. In parentheses beside the blank, indicate the part of speech of the word removed.
- Exchange your “Fill-in-the-Blank” with another student. Tell them to fill in the blanks with any word of their choice that is the correct part of speech required.
- Now read your stories aloud to the class and LAUGH!

## Collecting Stories

### Objectives

- Learn the importance of listening skills.
- Participate in processes that include interviewing techniques, producing a transcript, and writing up a story.
- Gain appreciation for the “living” quality of stories.

### Background for Teachers

In the previous interviewing activities, students have used reporting techniques to write articles based on the information provided in *Coyote and the Turtle’s Dream*. Now, they can interview their own relatives for *real* stories never heard before. If students can’t find a new story, that’s okay—an old one will do just fine. An old story won’t be “old” to new listeners. Although most families will not have stories quite as exciting as Granma Hettie, family interviews open up students to the idea that their families just might be more interesting than they thought. This activity can be as simple as students collecting individual stories from their relatives, or as complex as writing up the stories and assembling them to create a community “storybook.”

## *Activity: A Story Collection Project*

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### *Materials*

- Notepad
- Digital or tape recorder (If students do not have access to a recorder, they may take notes and write up the story.)

### *Procedure*

- Introduce story collection by presenting some examples of interesting stories told by relatives. Interviewed families have told stories about a famous ancestor; a big sports event; the night a tornado blew away the barn; a mystery that was never solved; the time a movie company came to town; and a story about a stolen horse. Brainstorm with the class about topics they think would be interesting.
- Review the **Who**, **What**, **When**, **Where** and **Why** questions used by reporters. Add another important question: “How did it all turn out in the end?” Also, introduce students to the probe questions: “Could you tell me more about that?” and “What else happened?” (A careful listener knows when to ask a probe question.)
  - **Who?** Who is the story about?
  - **What?** What are the details? Describe what happened.
  - **Where?** Where does the story take place?
  - **When?** When does the story take place?
  - **How** did it turn out?
  - **Why?** Why did things happen as they did?
- Introduce interviewing techniques. Set up a class demonstration by inviting a person to class who will be interviewed. Students can observe how the interviewer asks for permission to record the conversation; how the person is identified at the beginning of the interview; how questions are asked (listen carefully and don’t interrupt the speaker); and how a digital recorder is operated. Students may practice by interviewing each other. They may also practice by listening to a recording and writing down what they hear.
- Students will then select those they would like to interview, invite them to participate, and set up a date and time. They will then conduct the interview.
- The activity can be completed by students playing their audio recordings for the class. Or they can write up the story or transcribe the recording. If possible, ask students to obtain an old photograph or newspaper clipping and a recent photo of the people in the story. The family interview will be enhanced by showing photos of “then and now.”

### *Extension Activity*

- Students can assemble their stories in a ring-binder notebook. Now they have a class storybook!
- Submit stories to the school newspaper or community newspaper for publication.

### *Cross-Curricular Connections*

In this activity students have collected family narratives. Many of the techniques used will be helpful in conducting the Family Detective activities in the Social Studies section of the Guide for *Coyote and the Turtle's Dream*. This connection will build awareness of the inter-dependence between the skills students learn in their language classes and the skills needed to explore history.

### *Online Resources*

- Sequoyah Research Center. Family Stories from the Trail of Tears.  
<http://www.ualr.edu/sequoyah/uploads/2011/11/Family%20Stories%20from%20the%20Trail%20of%20Tears.htm>
- StoryCorps: Every Voice Matters. Heritage Month Clips, American Indian Heritage Month.  
<http://storycorps.org/education/storycorpsu/resources-for-educators/classroom-listening-clips/heritage-month-clips/november/>
- A Song for the Horse Nation: A Crow Warrior versus the Nazis.  
<http://www.nmai.si.edu/exhibitions/horsenation/raiding.html>

## Social Studies

### Exploring Family and Community: Family Detectives

#### Objectives

- Build personal connections to family history as seen through the eyes of parents, grandparents, and other relatives.
- Strengthen a personal sense of belonging and pride.
- Understand that history is a living thing.
- Build awareness of shared community identity.
- Make a “Family History Book”.

#### Background for Teachers

A very important part of the concept of “community” is the people who live in the community and their relationships with each other. The most fundamental relationships are those within families. In the English/Language Arts section of the Guide, students had an opportunity to interview a family member about a story they never heard before. Stories are a great way to find out about the lives of our relatives. Another way is to ask them to share information about themselves, other family members, and to tell us what they know about family ancestors. When students share with each other what they have discovered about their families, they appreciate that many families share common experiences and memories—and the meaning of community begins to take shape.

#### *Activity: In Pursuit of Memories*

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Rain that Dances was a good listener. Not only did he love Granma Hettie’s stories, he also knew all of Gerald’s old tales, too. He always wanted to know what it was like when his parents were kids. Some of the things his mom did, he wanted to do, too— like hunting for shark teeth at Shell Ridge. Rain was a good detective as well. He knew how to ask questions and put clues together.

#### *Materials*

- Pencil and notepad
- Digital or tape recorder (optional)

#### *Online Resources*

- 50 Family History Interview Questions.
- <http://genealogy.about.com/cs/oralhistory/a/interview.htm>
- About Writing Good Questions. <http://home.earthlink.net/~ahickling/interviewsuggestions.html>  
(Click on interview suggestions)

### *Procedure*

- **Who to Interview?** Help students to decide who they think knows the most about their family. Usually, grandparents, great-aunts or great-uncles, or even older aunts and uncles will know the most about the things that happened before they were born. Grown-ups like to share their memories, so tell students not to be shy in asking them to tell about their favorites.
- **Asking “Ten.”** Below are some suggested questions students may ask a relative. Other questions, of course, may be added or substituted.
  - What was it like when you were growing up?
  - What were your chores?
  - What did you do for fun?
  - What was school like?
  - Who were your friends?
  - Who did you play with?
  - What did you eat? Was it the same kind of food we eat today? Do you have any recipes that have been passed down in our family?
  - What kinds of jobs did you do when you got older? What did your parents do for a living?
  - How did you meet Grandma/Grandpa/Uncle/Aunt
  - What was my mom/dad like as a child?
  - What do you remember about your grandparents?
- **Start a “Family History Book.”** Students can write up their relative’s responses and include them in a notebook called “My Family History.” Now that they know the kinds of questions to ask, they can conduct interviews with other members of their family. Students may include these topics in their write-up:
  - A summary of their relatives’ answers
  - What they found out that they didn’t know before
  - Things that surprised them
  - Their feelings about what they heard
  - Other questions they would like to ask

### *Activity: Gathering Evidence*

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Good detectives hunt for clues and gather evidence. A “family scavenger hunt” can be a fun way for students to learn more about their families. Have students ask their relatives to help them find some of the items on this list (plus any others that help them to know more about their families).

- Baby book
- Birth certificate
- Newspaper clipping
- Photographs: school pictures, weddings, your parent as a child; your grandparents as children
- School project by your parent or an aunt or uncle
- An old report card
- Military uniform or discharge papers
- Baby clothes
- Old postcards
- A book that belonged to a relative
- Letters your relatives wrote to each other
- School yearbook
- Quilt, needlework, or clothing a relative made
- An old-fashioned toy
- A special piece of jewelry or a watch
- An item of regalia that has been handed down
- A recording of a relative speaking
- A drawing a relative made
- A gift a relative gave to another relative
- A piece of crockery like a teapot or dish
- A piece of furniture or a clock

Ask students to make a list of each item they found and to give themselves a point for each item. If they were able to take photos of some items, they can share those with the class and/or include them in their Family History Book.



### Scoring

Score	Rank
15–20	Super Detective
8–15	Hot On the Trail
1–7	Keep Looking

### Extension Activity

Hold a discussion with the class about their detective work. Then, help them make a list of common experiences, events, things, and ancestors that their relatives described or that they discovered from the family scavenger hunt. These commonalities will make them aware of shared family experiences and values. This “sharing” is the beginning of a sense of community history.

### Cross-Curricular Connections

This activity connects well to the newspaper articles activities in the English/Language Arts section of the Guide. Many of the data collection and interviewing skills are very similar, reinforcing the concept that the same skill sets have many applications. The skills used in interviewing are also like the detective work that epidemiologists do. See the Disease Detectives activity in the Cross-Curricular Connections section of the Guide.

## Exploring Family and Community: Mapping Our World

### Objectives

- Construct a map, labeling the map with five mapping features and using a scale value.
- Create a mental map of one’s place within his or her community.
- Begin building the concept of “healthy community.”

### Background for Teachers

This activity orients students to the importance of place in understanding their community and their own identity. In *Coyote and the Turtle’s Dream*, there is a map that shows the town of Thunder Rock on the Medicine Cave Indian Reservation. It displays all of the important landmarks in the novel, providing a visual orientation to the relationships between those places and the people and events in the story.

### Online Resources

- Map Analysis. A mental map. <http://mapanalysis.blogspot.com/2011/01/mental-map.html>
- Example of a Map Key. [http://www.michiganmapsonline.com/directory/d\\_home/legend.html](http://www.michiganmapsonline.com/directory/d_home/legend.html) (Click on legend.)

- Important Places in Your Community. Making mental maps.  
[http://education.nationalgeographic.com/education/activity/important-places-in-your-community/?ar\\_a=1](http://education.nationalgeographic.com/education/activity/important-places-in-your-community/?ar_a=1)

### *Activity: Creating a Mental Map*

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Students can make a map that shows how they orient themselves to the important people and places in their lives. It is called a “mental map.” This is a fun map because it is not expected to be accurate—just an imaginative perception of their own world.

#### *Materials*

- Construction paper
- Felt tip pens
- Colored pencils
- A ruler

#### *Optional*

Some students may want to create a Google map based on their address. A Google map will show actual roads and will provide a scale.

#### *Procedure*

- Instruct the class to place the following mapping elements on their piece of construction paper:
  - A title which goes at the top of the map
  - The date
  - A north arrow which points upward
  - The source of information. Students may identify themselves as the source.
  - The Legend. Students can make their own symbols for places that are commonly shown on maps; or the teacher may provide a sheet with standard symbols, i.e. a tree is a park or a tent is a camping ground.
  - A Scale. Students will not have an actual scale, but they can estimate one based on their perception of distance.
- Teachers can show students how to draw a scale on the map based on one inch equaling a particular number of miles.
- Next, students can “populate” their maps by drawing in these features:
  - Where they live—place at the center of the map (remember, this is a very personal map).
  - Main roads on the map

- Locations where friends and relatives live
  - Places they go frequently like schools, grocery stores and parks
  - “Outside places” like a farm or ranch, a ball park or recreation center, a powwow ground, a garden or climbing tree, a pool or pond where they like to swim, or a walking trail
  - “Inside places” like a school, a library, or a tribal museum
  - Places where animals live, or other natural sites like rivers, lakes, mountains or hills
- Students can then read their maps (using their scales and rulers to determine distance) and answer questions such as those below. Teachers, of course, can make up different questions according to their interests and those of their students.
    - Based on your estimated scale, how far away do your friends live from you? Are they clumped together or spread out?
    - Do you have relatives on your map? If so, how many and how far away from you do they live? Which ones have you drawn on your map? Brothers or sisters? Grandparent? Aunts, uncles, or cousins?
    - Where do you go that is within walking distance of where you live? Can you walk to school or do you have to ride the bus?
    - When you leave home, where do you go the most? What do you do?
    - How many favorite places did you draw on your map? What are they? Are they mostly inside or outside places?
    - Do you live within the boundaries of a city, town or village, or do you live in the country? Do you consider yourself a “town person” or a “rural person?”
    - Does the place where you live help you to feel like a healthy person?”
  - **Defining a World:** Ask students to put a pencil on the point (a house, school, park, etc.) that is the most distant from the place they live, and then draw a line to the next outermost point going in a clockwise direction. Now students can see an image of the world in which they live!
  - **Illustrate the Map (Optional):** The map in *Coyote and the Turtle’s Dream* shows pictures of the characters in the story. Students may enjoy drawing pictures of their friends and family on their map. Or they may like to draw an important event that happened in their community.

### *Extension Activity: The Balance of Life*

Ask students to look at their “World” again. Have them locate all the places:

where they feel good or happy

where they can play and walk or run to move their bodies

where they can learn and grow

where they feel connected to their families, other living things, and the land around them (the kind of places where they feel there is something bigger than themselves)

Review the four elements that make up the Balance of Life: physical, mental, emotional, and spiritual. Then discuss how balance or harmony is related to good health. Do they feel balance in their world?

## Healthier Families and Communities: Modeling a Healthy Community

### Objectives

- Construct a map or model of their community the way students would like it to be, rather than just the way it is.
- Increase awareness of opportunities to increase the health and safety of communities through improvements to the “built environment.”
- Understand the term “change agent.”
- Increase knowledge of professions and community roles that influence the health and safety of communities.

### Background for Teachers

This activity helps students to understand that assuming civic responsibility and acting on it through civic action can make their communities a healthier place for future generations.

Following Sky Heart’s words and wisdom, Rain that Dances and his friends work very hard to make their community a healthier place. They are acting as “change agents.” A change agent is someone who believes he or she can improve a situation or solve a problem by adjusting the way things are currently being done, or by doing something completely different. They often try to excite others about the possibility for change and convince them it can be done.

In *Coyote and the Turtle’s Dream*, the kids help Boo to transform his store from being an unsuccessful business to a successful one. Their transformation of the shelves into “everyday” and “sometime” snacks was also a big change for Boo’s customers. Now the kids had a new way to help community members make healthier choices in their food purchases.

There are many ways to improve the health of a community. An important way is to make changes in the “built environment.” Elected officials, architects, and transportation and city planners are among the people who are responsible for funding, planning, zoning, and designing the built environment—that is, all of the roads, public buildings, stores, parking lots, gas stations, markets, parks and playgrounds, and housing developments, etc. that are found in a community.

Students will enjoy the activity in this section that allows them to be change agents that improve health and safety in their community.

## *Activity: Construct a Healthy Model of Your Town, Village, or Reservation*

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### *Materials*

- Felt tip pens
- Scissors
- Butcher paper

### **Optional**

- Boxes of various shapes and sizes
- Tempera paint
- Construction paper

Students can access Google Maps and print off maps of their local area as a good resource for understanding the geographic layout of their community.

### *Online Resources*

- The Community Planning Website: <http://www.communityplanning.net/>
- What is Community Planning? <http://www.nyupstateplanning.org/WhatisPlanningBrochure.pdf>
- The Built Environment and Health.  
[http://www.preventioninstitute.org/index.php?option=com\\_jlibrary&view=article&id=114&Itemid=127](http://www.preventioninstitute.org/index.php?option=com_jlibrary&view=article&id=114&Itemid=127)
- Middle School Lesson Plan on the Built Environment: <http://www.ohs.org/the-oregon-history-project/teachers/lesson-plans/middle-school/middle-school-lesson-plan-in-the-built-environment.cfm>
- What Planners Do: [http://www.ci.cumberland.md.us/new\\_site/index.php/contents/view/189](http://www.ci.cumberland.md.us/new_site/index.php/contents/view/189)
- Designing and Building Healthy Places: <http://www.cdc.gov/healthyplaces/>

### *Procedure*

**Classroom Discussion:** Initiate a discussion with the class about how they would increase safety and health in their community. Below are some questions that prompt students to get the discussion started:

<b>Physical Activity</b>	<b>Prompts</b>
What are some ways to increase the opportunity for physical activity in their community?	Build more sidewalks, walking/jogging paths, bicycle trails, fitness centers, and parks with playgrounds.

Clean Air and Water	Prompts
<p>What are ways individuals and communities can protect the environment from pollution? Improve the quality of air in buildings? Improve the quality of drinking water?</p>	<p>Recycle; don't litter; turn off lights when they're not needed; don't pour chemicals down the drain; construct buildings with proper ventilation systems; build and renovate water treatment systems.</p>

Healthy Food Environment	Prompts
<p>What are some ways communities can get access to more healthy food?</p>	<p>Provide community gardens; create a farmer's market where local residents can sell home-grown produce, and distribute produce from community gardens; provide kitchens in a community center where residents are able to can fruits and vegetables.</p>

Aesthetics	Prompts
<p>Aesthetics is a word that means "appreciated for beauty" (teachers may or may not wish to define and use this term). What are ways to make the community a more beautiful, pleasing, and meaningful place to live? (Remember the Balance of Life has emotional and mental components. Our physical environment can deeply affect the way we feel and how we perceive a sense of control over our lives.)</p>	<p>Display artworks by tribal members in public places and inside buildings, build a memorial garden to important historical figures, pick up trash, plant flowers and trees in front of buildings and along major streets, provide open spaces where people can gather, or remove old roadside billboards and paint over graffiti.</p>

**Write Letters!** After the discussion, ask students to assume the roles of community members and persons who hold responsibilities for community planning and decision-making (such as Tribal Council members, a city mayor, or a tribal and county planning department). Then have the community members write letters to the officials about situations in their community they would like to see improved. Those students assuming the role of elected officials and planners will respond to the letters, outlining the way they will take steps to make the community a better place to live.

**Learn Who Does What.** Provide the students a list of the kinds of elected officials, professions, and community members that work together in addressing local needs. Their goals are to find the right balance between assuring safety and health, providing essential jobs and services, and making sure that change means a better future.

Ask students to research and define:

- Professional careers responsible for planning and building communities.
- The roles of people who serve the community through governance and volunteerism. Examples are given below:

### **Professional Careers**

- Economic or Business Developers
- City or Regional Planners
- Transportation Planners
- Land Use Planners
- Architects
- Landscape Architects

### **Elected Officials**

- Tribal Council members
- Mayors
- City Aldermen

### **Community (see Instructor Notes)**

- Community Organizers
- Traditional Leadership (respected elders)
- Volunteer Stakeholders

**Design the Future.** Then ask students to assume the roles of these various players to create the community they would like to see in the future. Instruct them to draw a model of their healthier community on butcher paper using the ideas generated from the discussion and the letter writing. Or students can build a 3-D model using the boxes for buildings and construction paper and tempera paint to make other features.

**Prevent Type 2 Diabetes.** Have students to put a STAR beside those improvements to the built environment that can help prevent type 2 diabetes.

### *Instructor Notes*

Students may have a difficult time finding descriptions of volunteer stakeholders. A description is provided below:

Volunteer stakeholders are people who represent members of their neighborhood, town, or reservation. They help elected officials and planners make decisions about their communities. Sometimes a stakeholder group might include people who know a great deal about an issue (like

doctors, nurses, and diabetes educators know about preventing type 2 diabetes), or it may include groups who would be greatly affected by certain decisions. For instance, farmers would be interested in where the Tribe plans to channel water, or store owners would be concerned about constructing a divided road that would keep cars from turning into their businesses. A stakeholder group may be sponsored by local government or it may organize through a neighborhood committee or a club. Oftentimes, a stakeholder group is led by a “champion.” A champion is a person who cares deeply about an issue and urges community members to get involved. They are the most well-known kind of change agent.

Make sure to check out the careers in the Career Connections section. There are many occupations listed that relate to community development and improvement.



## Art and Music

These activities have cross-subject connections with the English/Language Arts, Social Studies, and Science sections in the Guide. A collaborative approach among teachers can yield a richer experience for students and reinforce understanding that learning does not occur in “little packages” called art, English, math, science or social studies. We draw on all these subjects together when we seek to comprehend, experience, and gain knowledge about a particular topic.

### Cave Stories: The Art of Storytelling

#### Objectives

- Learn about cave art and rock art that has been discovered in different countries all around the world.
- Recognize symbols are that are common among many peoples.
- Understand how pictures can convey aspects of a people’s culture and environment that include: events, beliefs, and practices. These elements may show the way people hunt, the plants they eat, the way they celebrate, or events they have witnessed such as a flood or a solar eclipse.
- Learn how to make cave art that tells a story in pictures.
- Understand why it is important to protect art that was created in the past.

#### Background for Teachers

In *Coyote and the Turtle’s Dream*, Coyote leads Rain that Dances and Simon to a cave at Shell Ridge. Because they make natural shelters and allow passage far below the earth’s surface, caves have served as places to live, and places to bury the dead, hold ceremonies, or to create art that is protected from wind and rain. It is not surprising that Rain and Simon discover ancient drawings of a turtle, coyote, and a human hand in the cave at Shell Ridge. Simon thinks that this cave may be the “medicine cave” that gave their reservation its name.

There are many ways to tell stories—in spoken words, written words, in songs, and in pictures. The tradition of telling stories in pictures goes back 35,000 years (and possibly more) when people began to make images on cave walls and rock surfaces. (We are still telling stories in pictures today--we just call them movies and videos!) These ancient paintings and carvings are very appealing to us, not only because of their beautiful colors and shapes, but also because they remind us that people have been communicating ideas and telling stories for a very long time. When we look at this artwork, we recognize familiar objects like the sun, moon, and stars; human hands; and animals like horses, bears, giraffes, and bison that still roam the earth today. But sometimes the images are unfamiliar (such as animals that have been extinct for thousands of years) or the paintings and carvings show mysterious figures that are difficult to understand.

It is very important that we protect these ancient stories from people who cut out the pictures from the

rock and sell them to collectors. (Yes, there are “Vernon Smeeds” who steal and illegally sell rock art just like they do fossils.) Defacing rock art (such as the graffiti and bullet holes on the ancient drawings shown) hurts us in many ways. It destroys information the art provides to us about the past, it robs American Indians and Alaska Natives and others of their cultural heritage, and it takes away from all of us the opportunity to understand human history and the ability to appreciate something beautiful.

### ***Activity: Cave Art Around the World***

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Break the class into groups and have them view cave paintings and rock art from around the world. There are many Web sites online that provide photos and illustrations that can be photocopied. Help students research cave art and rock art from different countries. Lead a discussion with students asking the following questions:

- What is represented in the pictures (an animal, a person, stars, water)?
- When was the art created?
- What is happening in scenes with more than one animal or where animals and people are shown together?
- Why do they think the artists drew these pictures?
- What materials did they use?
- Compare and contrast: Are there similarities among the pictures? What commonalities do they express? How are they different?

### ***Online Resources***

- Cave Painting: [http://en.wikipedia.org/wiki/Cave\\_painting](http://en.wikipedia.org/wiki/Cave_painting)
- Cave Paintings. From Baja California, India, France, and South Africa: <http://library.thinkquest.org/J0110374/CavePainting.html>
- Petroglyphs U.S.: <http://www.petroglyphs.us/>
- Kentucky Cave Art. <http://heritage.ky.gov/nr/rdonlyres/87b06281-2ba9-47b2-b80f-67ec47654e54/0/prehistorickentuckycaveart.pdf>
- Southwestern Rock Art Gallery: <http://net.indra.com/~dheyser/>

### ***Activity: Story Spin-Off***

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Read page 94 in *Coyote and the Turtle’s Dream*. Write a one-page story about the pictures described on the cave wall. In your story, describe the person or persons who drew the pictures, tell what may have happened that caused someone to make these drawings, identify who put the hand print on the wall, how they made the hand print, and explain why he or she did this. The students may also imagine details about how long ago the drawings were made, and the life of the people who made them.

## *Activity: Creating Cave Art*

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### *Procedure*

**Drawing a Storyboard.** Ask the students to make up a story. Then have the students draw a series of pictures on a piece of construction paper that tell this story. This is a “storybook”—the first step in creating a cave art scene. Students don’t have to draw pictures as big as the ones they will draw on the wall of their “cave.” Instruct students to draw these pictures quickly—they don’t have to be elaborate. The storyboard will help them to remember their story.

**Making Paints, Stenciling Powder, and a “Rock Wall” Paint.** Cave artists obtained their artist’s supplies from nature. They gathered all kinds of natural materials that produced various colors: leaves, grasses, vegetables, flowers, berries, dirt and clay, burnt wood and even bugs! Usually they needed something to help hold and spread the color like grease or egg white.

### *Materials for making paints*

- Green grass or leaves (green)
- Red cabbage (purple/blue)
- Charcoal (black)
- Lemon peel (yellow)
- Beets (red)
- Bar of white soap
- Cornstarch
- Water
- Grater
- Paper towels
- Plastic stirrers
- Paper cups and plastic lids

### *To Make Paint*

- Simmer grass, cabbage, lemon peel, or beets in 1 cup of water for a half hour in a Pyrex dish. Strain off the plant juice into a paper cup. (You may want to borrow alcohol lamps from the science classrooms to boil water. Or the science teacher may oversee the making of paints in the science lab.)
- Grate soap to make 1/3 cup of soap flakes on a paper towel.
- Dissolve the flakes in a half cup of boiling water. Stir until flakes dissolve.
- Combine 1 cup of cornstarch with a half cup of water to make a paste.

- Stir paste into soap mixture.
- Add colored plant juice until the desired color is achieved.
- Store paint in cups and secure lids tightly.

### *Stencil Powder*

Cave artists also created outlines by blowing colored powder over an object—usually their own hands. Powders were created by grinding up minerals of various colors. For our powder, students will take a short-cut: colored chalk!

### *Materials for Making Rock Stencils*

- Colored chalk
- Grater
- Straws

To make stenciling powder, have students grind chalk against a grater on a paper towel until they have a sufficient amount to half fill a straw.

### *Materials for Making a “Rock Wall” Surface*

- Paper grocery bags
- Scissors

Cut out the bottom of the paper bags and cut on one side so that the bag folds out into a length of paper.

Gently crush the bag until the paper is wrinkly. Smooth out on a flat surface.

### *Drawing and Painting a Cave Wall*

Draw and paint the storyboard on the bag paper. The paper may be put on an art table, on the floor, or taped to a surface. Students may enjoy making a “cave” by turning classroom tables on their sides and taping their paper bags to the table top. Some students may also tape their bags under a table. Then, they have to lie on their backs like real cave artists and reach up to make their drawings—just like the artists who lay on scaffolds and painted figures on cave ceilings. Students can draw their pictures with charcoal, and then fill in with paint. Of course, they will need some tools to apply the paint. Try these painting tools:

- Fingers!
- Sticks (fray one end to make a brush)
- Feathers
- Cotton balls
- Steel wool

- A sponge
- A charcoal stick for outlining

### *Signing the Story*

Artists from long ago and today sign their work to say “I made this.” Have students make up a symbol or symbols that represent their name. Draw them on a piece of construction paper and cut out to make a stencil. Then tape the stencil to the bag paper. Fold the tape sticky side out and place it under the stencil. This will hold the stencil in place without leaving a tape mark on the cave art. Next, take a straw filled with stencil powder and blow it on the stencil. When the stencil is removed, the outline will remain. Students can also make a handprint (the way that real cave artists often signed their work) by blowing stencil powder over their hand. Ask students why most handprints in caves show the left hand.

### *Display!*

When finished—put up the “cave art” in the classroom, hallway, or lunchroom.

## **“Artful” Diabetes Prevention: Boo’s Gas ’n Grocery Display**

### Objectives

- Learn to group foods into “everyday” and “sometime” categories.
- Build an interactive health exhibit for elementary classrooms and health fairs.
- Build a tool for guiding healthy choices at school and at home.

### Background for Teachers

In *Coyote and the Turtle’s Dream*, Rain and his friends enter a slogan contest sponsored by the owner of Boo’s Gas ’n Grocery. Boo has an idea that he can improve his business if he promotes it in the right way. The kids win the contest by coming up with the slogan: “If there’s something you can use, you can find it at Boo’s.” Instead of claiming the \$20 prize money, they ask Boo if they can promote something too: namely, healthy foods that can help people to prevent type 2 diabetes. Boo goes along and they reorganize his food shelves into “everyday” and “sometime” shelves. The “everyday” snacks can be eaten every day; and the “sometime” snacks should only be eaten occasionally. Soon Boo starts offering healthy lunch choices and healthy traditional foods, too. Before long his store becomes very popular and starts making a profit.

## *Activity: Construct a Model of Boo's Store*

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### *Materials*

- A cardboard box
- Scissors
- Glue
- Tape
- Tempera paint or colored markers
- Photocopied pictures of snacks and foods from the Internet or colored construction paper

### *Procedure*

- To create a display that promotes healthy food and snack choices, go to the Toolkit on the Native Diabetes Wellness Program Web site: <http://www.cdc.gov/diabetes/projects/diabetes-wellness.htm>. Print off the instructions for assembling a “shelf” from Boo’s store.
- Label half of the shelf “everyday” snacks and the other half, “sometime” snacks. Decorate one side of the shelf with cut-outs of snacks that can be eaten every day; and the other side with snacks that should only be eaten occasionally. Students may use illustrations from the Internet or draw their own snacks. Students can refer to pages 62–63 in *Coyote and the Turtle’s Dream* for a list of healthy foods that are a good choice anytime. Students may divide the healthy snack side of the shelf so that they can include healthy Native foods, too. What healthy traditional foods was Boo offering in his store?

### *Putting the Models to Use*

- Students may take their store models home and set them up in the kitchen. They can be used to organize foods at home into “everyday” and “sometime.” Or the models can be used at after-school programs, the Boys and Girls Club, church, or any place where kids gather and snacks are offered.
- Students can also offer the store models to elementary school classrooms using the original Eagle Books series. They make a fun teaching tool. Students in kindergarten and first grade will enjoy sorting plastic foods or pictures of foods into the “everyday” and “sometime” halves of the models.

## Healthier Families and Communities: Diabetes Prevention Posters

### Objectives

- Identify messages about preventing type 2 diabetes in *Coyote and the Turtle's Dream*.
- Use their own words to express these prevention messages.
- Create posters, adding the messages and their own art work.

### Background for Teachers

The type 2 diabetes prevention messages in the original Eagle Books are the same ones that are emphasized in *Coyote and the Turtle's Dream*: healthy diet, physical activity, respecting traditional ways, and the importance of friends and family in being healthy. There are many resources located in the Toolkit for Classrooms and Families on CDC's Native Diabetes Wellness Program Web site: <http://www.cdc.gov/diabetes/projects/diabetes-wellness.htm> that offer ideas for communicating positive health behaviors to the community.

### Materials

- An assortment of materials may be used:
- Paints
- Colored pencils
- Crayons
- Colored markers

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### **Activity: Making Posters**

Teachers can download poster templates and have students insert the messages they think are most important. Print the templates on 8 x 11 paper and distribute one or several to each student. Posters may focus on one message, a set of related messages, or a set of different messages. Students may also create their own posters (drawings and messages) from scenes in the book, or they can create posters about any behaviors and activities that help to prevent type 2 diabetes and/or any healthy behaviors that promote the health and well-being of the community. Display the posters in the classroom or in the school lunchroom. Students may also take the posters home to share with their families.

# Science: Part 1: Investigating Earth's History

## Learning from the Past

### Objectives

- Identify the main components of the earth's composition and explain that movements of the earth's crust (mantel) can deform its surface over time.
- Understand that movement of the earth's crust can cause the locations of oceans and continents to shift.
- Explain how sedimentary rocks are formed and how fossils are created within them.
- Relate the movement of the earth (plate tectonics) to evidence of aquatic fossils in regions that are no longer under water.
- Identify local geological evidence of change over time.
- Relate oral traditions of American Indians and Alaska Natives to geological history.
- Investigate the role of wind and water erosion in uncovering the history of the earth.
- Relate these forces to the fossils found in the cave in the book, *Coyotes and Turtle's Dream*.
- Explain why understanding the earth's past plays an important role in protecting its future.

### Background for Teachers

The earth is a dynamic environment that is constantly changing. A delicate balance exists between air, water, and the earth and its living organisms. Earth and its systems change over time, both naturally and as a result of human activity. Native American traditions recognize this dynamic environment and the role that humans play in maintaining its balance. That role involves respecting living things and being thankful for the gifts that the earth provides. There are many lessons to be learned if we pay attention and listen to what the earth tries to teach us. Over the thousands of years that the people have lived in the Western Hemisphere, they have observed remarkable events and passed them down as stories of the land. Geologists are now acknowledging the value of Native American oral traditions as evidence that helps to explain our geologic past. This is an example of how different kinds of “knowing”—both Native and Western—produce new and valuable knowledge.

In *Coyote and the Turtle's Dream*, the geologic past is a very important part of the story's setting. Amazing fossils of dinosaurs, other reptiles, and small mammals were discovered in a cave very far from the ocean. How is it that we find fossils of aquatic organisms in high plateaus, mountains, and throughout the Midwest?

The surface of the earth is constantly changing. Fossil and geological records are one way we can study the past. We can look at the layers and types of soil and rock as well as what is trapped within them to determine what happened in the earth's history and by extension, human history. In order to draw proper conclusions from this evidence, we must also understand the structure of the earth's crust, the



forces acting on it, and how it changes. The earth's mantle is made largely of rock plates that float over a central molten iron core. The upper surface above the mantle consists of crustal plates that shift and bump into each other causing them to deform. The study of movement of these crustal plates is called tectonics. *Divergence* occurs when plates move away from each other. *Convergence* occurs when plates move toward each other. Convergence can cause plates to collide creating volcanic activity and earthquakes. The denser plate (its composition is heavier and more compact) moves underneath the less dense plate in a process called *subduction*. Less dense plates ride on top of the denser plates and undergo uplifting. This is the reason fossils once at the bottom of an ocean can be found high in the mountains. The plate movements and resulting deformations constantly rearrange the earth's landforms and oceans. As a result we can find evidence of ocean fossils on dry land where oceans no longer exist.

It is important to learn from the past in order to make good choices for our future. In addition to the natural cycles that occur in nature over time, we also need to look at and evaluate human impacts on our environment. Human activities can result in significant changes to the environment—some of which can have very damaging effects. In *Coyote and the Turtle's Dream*, the healthy balance between the land and the people was disrupted when the Great Turtle's rest was interrupted by the theft of her bones. She no longer dreamed of the waters in which she once swam. This symbolic interference with Shell Ridge, and the ancient water-bearing rock beneath it, caused the Gift of Life (water) to disappear. Understanding environments of the past can help us better predict and manage the effects that human interventions can have on the resources necessary for life. Carefully studying the past and the present will hopefully allow us to make better decisions about balancing human needs and those of the environment in order to provide for a healthy future.

## Online Resources

- The Geology of North America as Illustrated by Native American Stories. <http://www.units.muohio.edu/cryolab/publications/documents/McWilliams%20Geology%20NA%20Illus%20NA%20Stories.pdf>
- Oregon Department of Geology and Mineral Industries. Geologic Hazards on the Oregon Coast: Prehistoric and historic tsunamis. Using Native American oral traditions as evidence of past geological events. <http://www.oregongeology.com/sub/earthquakes/coastal/HistoricTsunamis.htm>
- The Virtual Fossil Museum. Geological History Over Geological Time. <http://fossilmuseum.net/GeologicalHistory.htm>
- United States Geological Survey: Our Changing Continent. <http://pubs.usgs.gov/gip/continents/>
- Earth's Geological Timeline—National Earth Science Teachers Association. [http://www.windows2universe.org/earth/past/geologic\\_time.html](http://www.windows2universe.org/earth/past/geologic_time.html)

## Investigation 1: Investigating Plate Tectonics

### Background for Teachers

Look at models of the earth's structure. The earth has three layers: the earth's crust, mantle, and core. The earth's crust, a relatively thin layer of rock, slides over the mantle, a hot semi-solid rock layer. The core at the center of the earth has an outer layer of liquid metal and an inner core of solid metal. The earth's crust is divided into plates that move around, bump together, and then slide under and over each other. In this activity, we will simulate tectonic movements.

To get the activity started, you may have students color and label a cross sectional diagram of the earth's crust, mantle, and core. Teachers can print off diagrams from many sites available on the Internet.

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### *Activity: Crusty Flakes*

Duration: 30-40 minutes

#### *Materials*

For each group:

- Flexible bowl (the bottom of a 1- or 2-liter plastic soda bottle or margarine container, washed and dried)
- Mantle material (low fat yogurt or other edible viscous material)
- Crustal plate material (large whole wheat cereal flakes or fruit leather cut up into 1 inch squares)
- Spoons

The top model shows the process of mountain building through the convergence of two crustal plates; the bottom model shows the processes of convergence, subduction, and uplifting.

#### *Online Resources*

- Snack Tectonics. Model tectonics using foods. <http://www.windows2universe.org> (Search on Snack Tectonics.)
- United States Geological Survey. Active volcanoes and plate tectonics. [http://vulcan.wr.usgs.gov/Glossary/PlateTectonics/Maps/map\\_plate\\_tectonics\\_world.html](http://vulcan.wr.usgs.gov/Glossary/PlateTectonics/Maps/map_plate_tectonics_world.html)

#### *Procedure*

- Fill the bowl with 1 to 2 inches of mantle material (yogurt). Allow for the rim of the bowl to extend at least 2 inches above the yogurt.
- Carefully arrange crustal plate material to barely cover the mantle material in a single layer.
- Simulate various energy movements through the mantle. Motions need to be strong enough to

cause the cereal flakes or fruit leather to move abruptly but not spill over the sides. Possible activities include:

- Spinning the dish without spilling the contents and stopping suddenly
- Moving the bowl in various directions or moving back and forth
- Record the effect on the crustal plates by drawing pictures of their rearrangement and identifying the energy movement used. Students may try more than one movement but they must record each as a separate record.
- Have students identify any evidence they have in the bowl of the common types of tectonic movements. Circle any occurrences on their drawing. Be sure to clearly label the type of tectonic movement represented. Was there any convergence, divergence, subduction, or evidence of flakes moving on top of others? If students did not contaminate their “crusty flakes” and mantle, they may eat the contents of the bowl!

### *Follow-Up Activities*

- Share results with other groups.
- Discuss how the movement of the flakes demonstrates the behavior of the earth’s tectonic plates.
- Ask students to find out if their Tribe tells stories about how certain land formations were made.

### *Instructor Notes*

- Students will need to move the bowl forcefully to shift the flakes around. Abrupt movements are better than smooth or continuous movements. Point out that the overlapping and lifting up of the edge of one flake over another is supposed to represent the movement of crustal plates when they bump into each other.
- If the yogurt or pudding is too thick, add a small amount of milk to make it a little thinner.
- Suggest that students add fossils (dried fruit) to make eating the result more interesting.

## Investigation 2: Investigating Sedimentary Rock and Fossil Formation

### Background for Teachers

There are three main types of rock formation: sedimentary, metamorphic, and igneous. Fossils are formed in sedimentary rock layers. Sedimentary rocks are formed by sedimentation in aquatic environments and by deposition on land. Sedimentary rock is formed by the buildup of dead plant and animal material that falls onto the sandy bottom of an ocean or lake. The sand comes from the erosion and weathering of rocks and minerals over very long periods of time. Because of the way they are formed, sedimentary rocks contain excellent records of geologic time and events.

Fossils are created during the process of sedimentary rock formation. When organisms die and fall to the ocean floor they are quickly buried which reduces their exposure to oxygen and microorganisms that cause tissues to decay. With the decay processes slowed down, the dead organisms remain relatively intact. As the pressure of the sedimentary rock layers increases over time, the tissues of the remaining organisms are replaced by minerals. This is the process of *fossilization*. The fossils become hard and encased in the sedimentary rock.

“The flats” at Shell Ridge was sedimentary rock that had once been the bottom of the Western Interior Seaway, a shallow sea that formed during the Cretaceous Period from 65-125 million years ago. It stretched from the Gulf of Mexico in the south to the Arctic Ocean in the north, and from Rockies in the west to the Appalachian Mountains in the east. Rain, Boomer, and Simon collected the fossilized remains of creatures that once lived in that sea when they went hunting for shark teeth at Shell Ridge. The Western Interior Seaway, a prehistoric ocean that no longer exists, was home to the Great Turtle, *Archelon ischyros*, 65-75 million years ago, just before the extinction of the dinosaurs.

Investigate the different ways that sedimentary rocks are formed, using the Web sites provided, other online resources, or referring to books in the school library. Discuss why it takes such a long time for the sediments to turn into rock. Identify what other factors, in addition to time, play a role in this process. Identify the different types of sedimentary rock and what caused the differences in their formation.

### **Activity: Rocks and Bones**

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Duration: 45 minutes for setup; two weeks for completion

#### *Materials*

- 500-milliliter plastic drink bottles with caps on and labels removed. (One per person or group)
- Sediment materials: sand, dirt, clay, pebbles, aquarium gravel, or very small rocks and dry leaves
- Fossil material: small shells or shell fragments, twigs, small dried bones, or bone pieces
- Water
- Salt
- Scissors

- Knife or other sharp pointed object
- Spoons
- Toothpicks or small metal picks
- Permanent markers
- Ruler
- Newspaper or paper bags

### *Procedure*

- Obtain a 500-milliliter water bottle and label with your name or initials near the bottom on the side.
- Add small amounts (about 1 inch) of sand, dirt, clay and aquarium gravel to the bottle. Make sure you fill the bottle more than half way. Add a teaspoon of salt. Place the cap on tightly and shake well. Record observations of what is happening in the bottle.
- Remove the cap and add a small amount of dried leaves, one bone fragment, one shell, and a small pebble or two.
- Slowly add water to the bottle until it is within 1 inch of the top (about where the sides of the bottle start to curve in toward the neck). Set the bottle on a flat surface and record observations about how the water is absorbed into the sediments.
- Replace the cap tightly. Shake the bottle vigorously to simulate rapid movement of water in a river or during a storm. Set the bottle back on the flat surface and record what happens as the sediments settle. List what settles first, second, etc. Students should also keep track of how long it takes to settle. Repeat this step several times the first day. Record any differences seen in the sedimentation process with each “storm.” Let the bottle sit overnight undisturbed.
- Observe the next day without disturbing the bottle. Record observations about differences in what has settled and describe the water clarity. Draw or take a picture of the bottle and its contents.
- Shake the bottle multiple times for a day or two. Keep track of how many times storms occur. Also, make note of any significant changes in the sediments, settling rate, or water clarity.
- After 1 to 2 days of storms, allow the bottle to rest undisturbed for 2 to 3 days. Make final observations.
- **This step should be done by an adult.** Take the bottle outside. Have an adult carefully make a small hole in the side of the bottle about 1-half inch above the sediment level. Try not to disturb the sediment during this process. Remove the cap slowly and let most of the water drain out. Cut off the upper half of the bottle about an inch above the top of the sediment. Carefully pour off the last of the water without disturbing the sediment.
- Place the bottom halves of the bottles in a warm sunny area or under a lamp. Allow the

sediments to dry completely. This will take about a week depending on temperature and humidity.

- After the sediment has dried, it will be time to excavate (dig out) the fossils. Record observations of the sedimentary rock before excavating.
- Place the dried sediment sample (still in the plastic bottle) on some newspaper. Using a spoon and a toothpick begin to carefully remove the sedimentary rock. Record all fossil discoveries. Draw a picture of them in situ (still in place in the rock) and record the depth at which they were found.
- Clean up and dispose of the materials as instructed. Wash hands thoroughly.

### *Follow-Up Activities*

- Identify the different depths that fossils and rocks were found in the sample. Compare results between individual students or groups by making a class chart of the different fossil depths. Are there any similarities or differences?
- Discuss the characteristics of the fossils that might explain the depth at which they settled.
- Compare sediment levels in the bottles of different students or groups. Look at differences in the number of layers, the order of the different layers, and the thickness and colors of the layers. Discuss what might cause any similarities and differences. Consider the types and amounts of starting ingredients and the number of storm events, etc.
- Discuss the following: Why are there many different layers in sedimentary rock? What can these layers tell us about the past? Why might different locations and time periods show very different sedimentary rock formations?
- Have students research the kinds of fossils that have been found in their local area. How old are they? What types of plants and animals inhabited the region in the ancient past? Based on the fossil evidence, how does the climate today compare with the climate when the animals or plants lived?
- In *Coyote and the Turtle's Dream*, the fossils were considered very valuable. Discuss what makes some fossils so valuable to collectors. Who was willing to pay money for them in the story? Which characters valued the fossils of the Great Turtle for other reasons?

### *Instructor Notes*

**Safety Note:** *It is important for students to understand that organisms like bacteria live in soils, so they need to wash their hands with soap any time they touch the contents of the bottle.*

- Wide mouth bottles will be easier for the students to use.
- Plain kitty litter can be used for clay if you can't find a source of clay in your area.
- Dirt should be dried in an oven before giving to students in order to kill any living organisms. It helps to have a mixture of top soil and poorer quality soils to generate differently colored layers.

Very coarse sand or small pebbles from the edge of a creek or river can be used in place of aquarium gravel.

- Bones need to be small enough to fit into the bottle opening and should be shorter than the width of the bottle so that they settle naturally. Chicken bones work well as long as you don't use the really light rib bones. Bones also need to be dried in an oven before giving to students.
- The twigs used must not be too light and must be shorter than the width of the bottle. If they float, they won't be good sedimentary material.
- Use metal spoons for the excavation. Plastic ones break easily.
- Explain that the salt was added to simulate ocean water. The salt helps hold the soil together to make the excavation a little more realistic. Also explain that real sandstone and sedimentary rocks are much harder because they were compressed under a large amount of pressure over many thousands of years. It's okay if the soil is not completely dry before excavating.

### *Online Resources*

- United States Geological Survey. School Yard Geology. <http://education.usgs.gov/lessons/schoolyard/RockSedimentary.html>
- Fast FAOS About Rocks and Fossils. Computer models of sedimentation. <http://www.childrensmuseum.org/geomysteries/faq1.html>
- Rock Hounds. Explore rocks, formations, and evidence of the past. <http://www.fi.edu/fellows/fellow1/oct98/index2.html>
- Virtual Fossil Museum. Fossil image galleries. <http://fossilmuseum.net/FossilGalleries.htm>
- Virtual Fossil Museum. More fossil images. <http://fossilmuseum.net/museum-fossils.htm>

## Investigation 3: Why Do We Find Fossils in Unlikely Places? More Tectonics

### Background for Teachers

In *Coyote and the Turtle's Dream*, Rain and his friends find the fossils of marine animal like clams, sea lilies, and sharks at Shell Ridge. Rain is fascinated by the idea that his house would have been under water in the past, especially since the ocean today is hundreds of miles from where he lives. There is, however, a very good explanation for why we find fossils in places we don't expect to find them. Again, the answer is in plate tectonics. Here is how it works:

When the earth's plates collide, they exert tremendous force and pressure on each other. Even though plates move very slowly, they have very large mass that causes great frictional forces to build up over time. The large mass of the colliding plates increases the momentum and friction between the plates.

Evidence of these collisions can be seen in earthquakes, volcanic eruptions, and mountain formation. The density of the colliding plates generally determines whether the process of subduction or uplifting occurs between the two plates. *Uplifting* occurs when the less dense plate travels over the top of a denser plate. The plates under the ocean are denser than plates on the land (continental plates)—so the continental plates tend to undergo uplifting. Uplifting is one method of mountain formation and can explain how the fossils of organisms that were once underwater end up on land at high elevations. The process of uplifting can be modeled using layered clay to simulate layers of sedimentary rock moving on a tectonic plate.

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### *Activity: When Plates Collide*

Duration: 30 minutes

#### *Materials*

- Four different colors of modeling clay or commercial play dough (to represent layers of sedimentary deposits)
- Pea gravel, aquarium gravel, or small beads (to represent fossils)
- 12 x 12 inch squares of plastic sheeting or cardboard covered in plastic wrap
- Wooden dowel or other round object for rolling out clay or dough

#### *Procedure*

For each group or person

- Roll out three colors of clay on the plastic sheet, each in a 2 x 4 inch rectangle about 1/8 inch thick. Use a pencil, pen, or wooden dowel as a rolling pin.
- Obtain a fourth color of clay and roll it out into a 2 x 4 inch rectangle that is very thin—about 1/16th inch thick.



- Stack the layers of clay with the thin layer on top. This will be your model of sedimentary rock. Place a few beads or gravel bits under the thin top layer to represent organisms that have died and been buried under layers of ocean sediment. It is best if they are placed near the end that will collide with another plate in the next step.
- Pair up with another group or student. Place the two “sedimentary rock” clay formations on their plastic sheets end to end about 2 inches apart. The sedimentary rock layers are now part of a “plate” on the earth’s crust. With their hands, have students push the blocks of clay together to make them collide with some force. Record the deformations that occur by drawing a cross sectional diagram of the plate collision. Identify areas where uplifting occurred.

### *Follow-Up Activities*

- Where are the “fossils” (beads) located after the collision of the two plates? How does this compare to where they were located before?
- Aquatic organisms fall to the bottom of a lake or ocean when they die and are buried in the sediment. They are then covered with more sediment over time. Discuss how pressure from the sediments and lack of oxygen promote fossil formation.
- Describe how plate movements and uplifting can create mountains and plateaus.
- Explain how fossils that were buried at the bottom of the ocean can be discovered in mountains. (Now students may understand how the Great Turtle [*Archelon ischyros*] was found near Red Water Mountain.)
- Research the Western Interior Seaway where the Great Turtle once swam to see what parts of North America used to be under water and when. Identify the types of plants and animals that existed during that time. How did the climate during the Cretaceous period compare to the climate today?
- What caused the Western Interior Seaway to dry up? When did this occur?
- Ask students if there is any evidence of tectonic activity (active or dormant volcanoes, earthquakes, or mountain building) in the area where they live. Are there any fault lines in their area? What is the relationship of fault lines to tectonic movements? Which geologic events do fault lines predict?

### *Online Resources*

- Endangered Earth: Ancient Sea Levels North America, Cretaceous. [http://www.thelivingmoon.com/41pegasus/02files/Global\\_Warming\\_002.html](http://www.thelivingmoon.com/41pegasus/02files/Global_Warming_002.html)
- United States Geological Survey. Sea level changes in the Western Interior Seaway. <http://geology.cr.usgs.gov/crc/fossils/ammonites.html>
- Map of the Western Interior Seaway. <http://www.fossilmuseum.net/fossil-art/maps/seaway/seaway100mya.htm>

- Towel Geology. Another way to show colliding plates using towels!  
<http://www.geosociety.org/educate/LessonPlans/TowelGeology.pdf>

### *Instructor Notes*

Homemade dough with food coloring can be used in place of modeling clay. Recipes for making homemade dough can be found at: <http://www.bestrecipes.com.au/recipe/No-Cook-Play-Dough-L2119.html> or <http://prekinders.com/play-dough-recipes/>.

## Investigation 4: Uncovering the Past—Erosion and Weathering

### Background for Teachers

Shell Ridge on the Medicine Cave Indian Reservation must have been a wonderful place to explore. But with all its canyons, caves, and gullies, it would also be an easy place to get lost! When Rain, Boomer, and Simon go hunting for shark’s teeth, Roberta, Rain’s mom, cautions them not to climb too high on the Ridge and to stick on the edge of the “flats.” In such a weathered environment, she knew that the rock and soil would not be stable, and that the network of ancient, eroded water channels through the sedimentary rock could lead into dangerous territory. Later in the story, it is Coyote that safely leads Rain and Simon to the “place where the giants sleep” and to the bones of the Great Turtle.

Without the natural processes of erosion and weathering that break down materials into smaller and smaller parts, Rain and Simon would never have been able to discover the fossils of the marvelous creatures in the cave. In nature, these processes are caused by wind, water, biological, chemical, and mechanical actions.

Have students look up examples of each type of process and compare them with eroded and weathered formations they find in their area. Also investigate how caves are formed and what types of weathering and geological events are involved. Then students can discuss why fossils are commonly found in caves and areas that show a large amount of erosion and weathering.

Even though these processes occur naturally, there are many human activities that contribute to these processes and increase their impact on the environment. The class can also think about and discuss possible human activities that contribute to erosion and weathering.

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### *Activity: Weathering by Water and Wind*

#### *Background for Teachers*

Weathering by rain, wind, and ice constantly erodes earth's land surface so that the resulting broken-down rock and soil are transported to the oceans. If it were not for the movement of the earth’s crustal plates that makes new mountains, erosion would transport *all* the dry land on the planet into the oceans. Weathering is a powerful force that wears down mountains and carves out caves. Water and wind can also create strange and wonderful rock shapes like the photograph on this page of a sandstone sculpture. In this activity, students try their hand at weathering a “mountain.”

#### *Materials*

- Sand
- Small rocks
- Plastic cups (2 per group)
- Straws (one per person)
- Rectangular pans (one per group)

- Water

### *Weathering by Water Procedure: (For each group or person)*

Duration: 60 minutes

- Fill a plastic cup with a mixture of wet sand and some small rocks (to represent hidden fossils). Place rocks randomly as you add sand. Pack the mixture tightly and completely fill the cup.
- Place the rectangular pan upside down over the sand cup. Make sure the cup is close to one end of the pan (not centered). Holding the cup tightly to the pan, carefully invert the pan so it is right side up.
- Place the pan with the sand cup at a slight angle on a table by putting a wedge of paper or wood under the end with the cup.
- Carefully fill the low end of the pan with enough water to cover about 1/3 to 1/2 of the bottom of the pan. This will represent the nearest river or lake.
- Carefully remove the cup holding the sand so that the sand mountain remains. Don't worry if there are slight cracks or small amounts of sand dislodged during this process. Let this structure set for about 30 minutes. Have students draw a picture of their mountain and lake.
- Simulate water erosion by very slowly pouring water from the cup over the top of the sand mountain. Repeat this procedure varying the location where the water is poured—starting on the side closest to the lake. Pour only a small amount at one time pausing between each addition.
- Continue until you have significant weathering of the mountain. Pour small amounts of water until only half of the mountain remains. Record observations by drawing and describing changes in the mountain caused by the water. Note any fossils uncovered.
- Observe and record what is happening to the lake.
- Dispose of the sand and clean the pan according to the teacher's instructions.

### *Weathering by Wind Procedure*

Duration: 60 minutes

This activity is messy and should be done outside. (See Instructor notes!)

- Repeat the first four steps for Weathering by Water. However, the sand mountain will need to dry longer. It should set overnight (if left inside) or be set out in the sun for an hour if it is warm and dry.
- Simulate wind action and storms by blowing on the sand mountain through a straw. Blow on the sand from the lake side of the pan. **If students are working in groups, they should be very careful to take turns blowing on the mountain. They should not blow sand toward someone else.** If goggles or eye protection are available, wear them.

- Change the location where the wind action is directed. Observe the difference when the wind is blown on the top surface and sides of the mountain. Record these observations by drawing changes in the mountain caused by the wind actions. Ask students to see if they can develop any shallow surface caves.
- Continue this process until significant weathering and erosion of the mountain has occurred (at least one fourth or more of the mountain is gone).
- Observe and record what is happening to the lake.
- Dispose of the sand and clean the pan according to the teacher's instructions.

### *Follow-Up Activities*

- Which occurs more quickly, weathering by wind or water? Have students provide evidence for their answers. Compare with other groups, did everyone have the same result?
- Were there any differences in weathering around cracks or the small rocks in the sand? If so, describe them and try to explain why this happens. Compare answers with others.
- The erosion caused by weathering causes loss of the mountain mass. What effect did this have on the lake? Can you explain how this process contributes to sedimentation and formation of sedimentary rocks?
- American Indians and Alaska Natives strongly believe in the balance of forces in nature. Explain how this balance can be evidenced in the processes of weathering, erosion, sedimentation, and mountain formation.
- Identify evidence seen in everyday life of weathering and erosion by wind.
- Identify evidence seen in everyday life of weathering and erosion by water.

### *Online Resources*

- Wind Erosion Movie Archive. Dust Bowl Storm Footage, Dune Sand in a Wind Tunnel, Close-up of Dune Sand in a Wind Tunnel, Dune Sand and Plants in a Wind Tunnel.  
<http://www.weru.ksu.edu/vids/>
- Carlsbad Canyons National Park. Caves, Canyon, Cactus & Critters: Middle School Geology.  
[http://www.nps.gov/cave/forteachers/upload/geology\\_ms\\_gravel.pdf](http://www.nps.gov/cave/forteachers/upload/geology_ms_gravel.pdf)
- National Park Service. Ozark National Scenic Riverways Park: How Caves Form.  
<http://www.nps.gov/ozar/forteachers/how-caves-form.htm>
- Weathering and Climate. Mechanical and Chemical Weathering.  
<http://ees.as.uky.edu/sites/default/files/elearning/module07swf.swf>

### *Cross-Curricular Connections*

See Cross-Curricular Connections for more lessons about investigating the earth's history.

- Science and English/Language Arts — A Day in the Life of the Archelon
- Science and Social Studies — Protecting the Fossil Record
- Science and Math — Dating Fossils: Understanding Half-life

### *Instructor Notes*

Students will need to be closely supervised, or this activity could be done as a demonstration by the instructor if there is concern about safety.

**Safety Note:** *The sand will blow around in the air. Students should wear safety glasses or goggles. Do not let two students blow on the sand mountain at the same time. Observers should stand behind the person blowing. Different groups should be far enough apart so they do not blow sand at each other. Having all groups blowing in the same direction and with the wind is strongly recommended. If sand does get in the eye, carefully flush with lots of water.*

- Have students work in pairs; each can make a sand mountain that they will use for the wind activity and the water activity.
- Students will need to let the sand mountains dry a bit before applying “wind.” You might have them make both structures at the beginning of the activity so that the second sand mountain can dry while they weather the first with water.
- When students are blowing through the straws, they will need to blow hard. Taking turns is a good idea to prevent them from getting light headed. Also, they will need to hold the end of the straw close enough to move the sand, but not so close that they get sand blown back into their faces.

## Science Part 2: Investigating Nutrition

### You Are What You Eat

#### Objectives

- Evaluate the nutritional contents of foods in order to make healthy choices about the types and amount of foods consumed.
- Identify healthier alternatives to high-sugar and high-fat foods and how to incorporate these alternatives into cooking and food choices.
- Identify the role and effects of fat and sugar in the body.
- Explain how we need to maintain a balance between eating enough nutrients to be healthy, but not eating so much food that the amounts are excessive.
- Identify different types of carbohydrates, their structures, and their effects on the glycemic index.
- Understand the effects of food processing on the increase of simple sugars in foods, and explain why raw fruits and vegetables have a lower glycemic index, even when they are cooked.
- Compare fats and carbohydrates in different foods.
- Explain how increased portion sizes and a lifestyle of decreased activity have contributed to increased rates of obesity and type 2 diabetes.
- Be able to identify the different kinds of diabetes.

#### Background for Teachers

Rain and his friends are always trying to eat healthy foods and they are very physically active. In the story, they play basketball, chase down newspapers, explore Shell Ridge, and run after Coyote to discover the Great Turtle's cave. Arianna, who has type 1 diabetes, also knows a lot about eating healthy and playing sports. The kids remember very well the eagle's messages about good nutrition and exercising regularly to maintain a healthy lifestyle.

Our bodies need proteins, fats, and carbohydrates to provide the energy we need, and vitamins and minerals to keep our bodies functioning properly. The energy we don't use is stored mostly as fat for later use. Frequently, consuming more food calories than we use through activity or metabolic processes will increase the amount of fat accumulating in the body. One key to health is keeping a balance between what we eat and how many calories we use.

It is important to understand the nutritional value of the foods we eat and the amount of calories we use in order to maintain a healthy balance in our bodies. Not all foods are created equally. They differ not only in the amount of calories, but also in the amounts of carbohydrates, fats, and proteins they contain. The nutritional profiles of foods are important to consider because fats provide 9 Calories per gram, while carbohydrates and proteins each provide 4 Calories per gram. (Note that Calorie with a

capital C is a kilocalorie or 1,000 calories.) All three types of food are needed in the diet as they each have different functions in the body:

- Carbohydrates are the main energy source for metabolism.
- Proteins are needed for tissue building and energy.
- Fats are needed for cell structure, to insulate organs, and to store excess energy.

The key is to consume these foods in proper proportions, eating those that provide more calories in moderate amounts. Awareness of the foods that provide us with the best nutrition is the first step. Taking action, like Rain and his friends did when they helped Boo to rearrange his store to help customers find healthy food choices, is also important. Not eating a balanced diet, controlling portion sizes, or getting enough physical activity can lead to a variety of health problems including type 2 diabetes and obesity.

Diabetes is a disease in which blood glucose levels are above normal. Most of the food we eat is turned into glucose, or sugar, for our bodies to use as energy. The pancreas, an organ that lies near the stomach, makes a hormone called insulin to help glucose get into the cells of our bodies. When someone has a form of diabetes, his or her body either doesn't make enough insulin or doesn't use its insulin as well as it should. This causes sugar to build up in the blood. We need some sugar in our blood at all times so it can be delivered to our cells where it is converted into energy. But too much sugar in the blood, over time, can cause serious damage to the eyes, kidneys, nerves, and heart.

There are two main types of diabetes: type 1 and type 2. People with type 1 diabetes usually find out they have diabetes when they are children or young adults. The pancreas of a person with type 1 makes little or no insulin. Scientists are learning more about what causes the body to attack its own pancreas and stop making insulin, the hormone that regulates blood glucose. People with type 1 diabetes must inject insulin every day to live. Arianna in *Coyote and the Turtle's Dream* has type 1 diabetes. To survive, she must have insulin delivered by injection or a pump. This form of diabetes usually strikes children like Arianna and young adults, although it can develop at any age. Risk factors for type 1 diabetes may be autoimmune, genetic, or environmental. There is no known way to prevent type 1 diabetes. Healthy eating, physical activity, and insulin injections are the basic therapies for type 1 diabetes. The amount of insulin taken must be balanced with food intake and daily activities. People with type 1 diabetes must monitor their blood glucose levels frequently.

However, most people with diabetes—at least nine out of ten—have type 2 diabetes. The pancreas of people with type 2 diabetes keeps making insulin for some time, but the body can't use it very well. Most people with type 2 diabetes find out about their diabetes after age 30 or 40.

Some people at high risk for type 2 diabetes (and heart attack and stroke) have a condition called prediabetes. Individuals with prediabetes have blood glucose and/or A1C levels higher than normal, but not high enough to be classified as type 2 diabetes. They often have muscle, fat, and liver cells that resist using insulin properly. As a result, their bodies need more insulin to help glucose enter their cells. The pancreas tries to keep up with this increased demand for insulin by producing more. Eventually, the pancreas fails to keep up with the body's need for insulin. Excess glucose builds up in the bloodstream,



setting the stage for type 2 diabetes. Many people with insulin resistance have high levels of both glucose and insulin circulating in their blood at the same time. But the good news is that people with prediabetes who eat a healthy diet, lose 7 to 10 percent of their body weight, and increase their physical activity may prevent or delay the onset of type 2 diabetes. If people do develop type 2 diabetes, they can help to control it by eating healthy, being physically active, and testing to assure that they are keeping their blood glucose levels balanced. In addition, they may require oral medication, insulin, or both to control their blood glucose levels.

People with diabetes, either type 1 or type 2, must take responsibility for their day-to-day care, and keep blood glucose levels from going too low or too high. They need a health care provider to help them monitor their diabetes and learn to manage it. People with diabetes may need endocrinologists who specialize in diabetes care, ophthalmologists for eye examinations, podiatrists for routine foot care, and dietitians and diabetes educators who teach the skills needed for daily diabetes management.

The last type of diabetes appears during pregnancy. It is called gestational diabetes. If not treated, it can cause problems for mothers and babies. Gestational diabetes develops in 2 to 10 percent of all pregnancies but usually disappears when a pregnancy is over.

In the past, it was rare for American Indians and Alaska Natives to develop type 2 diabetes. They ate a diet that had a good balance of healthy foods. The modern American diet has evolved to contain many processed foods and large portion sizes. Mass production has made foods that were “sometime” treats into “everyday” foods. Diets today contain much higher amounts of processed sugars and fats as well as the tendency to contain many more calories per meal. Because of the availability of processed foods, it can be much harder to eat a healthy balanced diet. Recently, some food companies have started to respond to this problem and are offering smaller packaging and healthier alternatives. However, care should be taken with foods marketed as “healthy alternatives.” These “healthy” low-fat or low-sugar foods are not always healthy. Sometimes more sugar and salt are added to the low-fat foods to make them more appealing. Reading labels is important if we are to understand what we are eating.

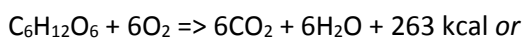
## Online Resources

- Virtual Chembook: Energy for the human body.  
<http://www.elmhurst.edu/~chm/vchembook/592energy.html>
- Definition of Metabolism. <http://encyclopedia.kids.net.au/page/me/Metabolism>
- Kids’ Games. Little D’s and Arianna’s Expedition Nutrition Games.  
<http://www.nutritionexplorations.org/kids.php>
- Nutrition for Kids. Activities/puzzles. <http://nutritionforkids.com/kidactivities.htm>

## Investigation 1: Are All Carbohydrates Equal?

### Background for Teachers

Carbohydrates are compounds containing carbon, hydrogen, and oxygen. The body burns these compounds to provide energy for our bodies to grow and function. There are three main types of carbohydrates found in foods: sugars, starches, and cellulose. Sugar in the form of glucose is needed to provide the energy that fuels our bodies. The general chemical equation that describes this reaction is:



Glucose + oxygen  $\Rightarrow$  carbon dioxide + water + energy

Our cells use glucose, a simple carbohydrate also known as a simple sugar. Complex carbohydrates like starch and cellulose are made up of long chains of simple sugars and must be broken down before they are used as fuel by our cells. Complex carbohydrates supply energy in addition to cellulose (commonly called dietary fiber that is not digested, but aids in digestion) and other nutrients. The bonds that hold the complex carbohydrates together are broken down by enzymes and/or heat and acids. The digestive system supplies enzymes in saliva and acids in the stomach. Cooking provides heat and creates acids that break down the bonds as well. Because complex carbohydrates are composed of hundreds or thousands of chains of simple sugars, it takes the body longer to digest them (break down their bonds). The sugars from complex carbohydrates usually move more gradually into our bloodstream than simple sugars. However, grains or other starches that are highly processed or refined break down into sugar very quickly because they are mechanically pre-digested. In contrast, grains or legumes that remain whole, such as brown rice or beans, digest more slowly.

One way to determine the effect of carbohydrates on our blood glucose levels is by using the glycemic index (GI). The GI is a ranking of carbohydrates on a scale from 0 to 100 that indicates the extent to which they raise blood sugar levels after eating. Foods with a high GI are those which are rapidly digested and absorbed. They result in a rapid rise in blood sugar levels. Foods with a low GI, because they are slowly digested and absorbed, produce gradual rises in blood sugar and insulin levels. Low GI diets have many health benefits. They help to control weight because they help control appetite and delay hunger, and they have been shown to improve blood glucose levels in people with diabetes (type 1 and type 2).

## *Activity: Making Sugar and Starch*

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Duration: Variable

### *Background for Teachers*

There are several ways that teachers may approach the activities in this investigation:

- The procedure described below can be followed by middle school students constructing their own sugar and starch molecules. However, these steps would probably be most appropriate for an advanced middle school class or a high school class.
- To shorten and simplify the lesson, teachers or high school students and other volunteers may assemble the molecules for use by small groups of middle school students. Although the 18 molecules required for each group are pre-assembled, the concept that simple and complex carbohydrates are not equal can be demonstrated in the next activity when middle school students “digest” the molecules by taking them apart.
- This investigation will also work well as a teacher demonstration or as a class demonstration presented by a small group of students. This approach will reduce the need for multiple sets of molecules.

### *Materials*

- Thirty-six pipe cleaners. Three 12-inch pipe cleaners (fuzzy sticks) of a single color will be needed to construct one glucose molecule. (A minimum of 18 molecules will be needed for each group of students to complete the next activity.)
- Colored markers (Choose three colors that are different from the color of the pipe cleaners.)

### *Procedure*

- “Molecule constructors” will make molecules of a monosaccharide (a simple sugar) to represent glucose. Follow the directions below to construct 18 glucose molecules. Set aside six glucose molecules for the digesting activity next.
- Next, the molecule constructors will make a disaccharide from two glucose molecules. Use the remaining twelve molecules from the first step above to make six disaccharides. Examples of disaccharides are sucrose (table sugar), fructose (fruit sugar), maltose (malt sugar) and lactose (milk sugar). Twist two glucose molecules together to simulate one disaccharide molecule—in this case, maltose. (Malt sugar is often added to milk shakes. A milk shake made with malt sugar is called a “malt.”) Set aside three disaccharide molecules for the digesting activity next.
- Connect the three remaining disaccharide molecules using the same method as in the second step above. It will make a chain of six glucose molecules. Now we have a starch! Set aside for the digesting activity next. (Teachers should keep in mind these are simplified models and do not actually reflect the complexity of starch molecules. Real starches would have chains of about 300-600 monosaccharide molecules.)

## *Activity: Building Sugar Models*

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Follow the directions below to build models of glucose, maltose, and starch. The pipe cleaners (fuzzy sticks) are usually sold in 12-inch lengths. You will need the following to build each glucose molecule:

### *Materials*

Three 12-inch sticks per molecule cut into the following lengths

- One 12-inch stick
- One 4-inch stick
- Four 3-inch sticks
- One 2-inch stick

### *Procedure*

#### **Assembly of Glucose**

- Take the 12-inch stick and twist the ends together to make a circle to represent the carbon ring in glucose. Where the two ends are joined together is indicated by the arrow in the model to the right.
- Starting at the join, measure every 2 inches around the ring and make five marks on the carbon ring. Bend the pipe cleaner into the hexagonal shape shown. Except for the join, a carbon atom is found at every hexagonal bend on the ring.
- Attach the 3-inch pipe cleaners at positions 1 - 4 by twisting them on the carbon ring. One inch of the 3-inch pipe cleaner should be below the carbon ring at positions 1 and 3, and 2 inches should be below the ring at positions 2 and 4.
- Bend the 2-inch portions above and below the ring at a 90° angle (as shown in the models).
- Attach the 4-inch pipe cleaner at position 5 so that 1 inch is below and 3 inches are above the ring.

Attach the 2-inch pipe cleaner to the position 5 pipe cleaner about 1 inch above the carbon ring. It should form a t-shape as shown.

- Painting color key:
  - Color #1 (red) should be painted where the ring is joined (shown by the arrow) and on each attached pipe cleaner at the 90° bend. *These are the positions of the six oxygen atoms.*
  - Color #2 (blue) should be painted where each pipe cleaner attaches to the ring, including where the 2-inch stick crosses the 4-inch stick at position 5. *These are the positions of the six carbon atoms.*
  - Color #3 (green) should be painted at the each end of every pipe cleaner. *These are the positions of the 12 hydrogen atoms.*

- The completed molecule is glucose! It has 6 carbons, 12 hydrogens, and 6 oxygens. It should look similar to the model shown. Glucose is a mono-saccharide. “Mono” means one and “saccharide” means sugar. Glucose is a one sugar molecule.

### **Assembly of a Disaccharide**

To simulate a disaccharide (a two-sugar molecule), attach two molecules together by twisting a hydrogen atom attached to the carbon at position 1 in the first glucose molecule to the hydrogen and oxygen atom at position 4 in the second glucose molecule. This will result in a loss of hydrogen atom from a carbon in the first molecule and the loss of a hydrogen and oxygen from in the second molecule. The remaining oxygen joins the two molecules. (When the two glucose molecules bond together, water is produced.) This disaccharide is a molecule of maltose.

### **Assembly of a Starch**

To simulate starch, connect glucose molecules together in the same manner as above to create a chain of six molecules.

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## *Activity: Digesting Sugar and Starch*

Duration: 30 minutes

### *Materials*

- Six individual monosaccharide (glucose) molecules; three disaccharide molecules composed of two glucose molecules each; and a chain of starch composed of six glucose molecules.
- Three buckets or paper bags

### *Procedure*

- Divide the class into several groups of three, depending on the number of students in the class. In each group of three, one student will have the monosaccharide molecules; one student will have the disaccharide molecules; and one will have the starch molecule. The students will pretend to be parts of the digestive system (enzymes in saliva and acids in the stomach) that help extract glucose from more complex carbohydrates like the disaccharides and starches.
- Give each group a paper bag representing the blood stream.
- Review or discuss the structure of the glucose molecule. Instruct the students to break the bonds between the glucose molecules at the point where the pipe cleaners are twisted together. (If the students did not construct the molecules themselves, indicate where this bond is located.) Caution students not to pull apart the glucose molecules themselves.
- Each student should begin “digestion” at the same time. The goal is to see which students fill their bags with glucose molecules first. (Of course, students with the six individual glucose molecules can fill their bags immediately. The others will take longer to disassemble their more complex carbohydrate molecules.)

Ask students why the students digesting the individual glucose molecules were able to dump them into the blood stream right away. Which molecule(s) entered the blood stream the slowest? Why?

### *Follow-Up Activities*

- Discuss how carbohydrates of different complexity have different effects on blood glucose levels.
- High heat and acids can also break down the bonds between the monosaccharides in starches. Predict how cooking vegetables might affect the glycemic index of those foods. Look up the glycemic index of raw versus cooked forms of some vegetables. Do the data support the student's predictions?
- Prior to the introduction of foods and cooking methods from other parts of the world, Native Americans consumed a higher percentage of raw or less processed foods. Discuss why this is considered to be healthier. How does cooking affect the digestion of carbohydrates?
- Today's modern diet contains many packaged processed foods. Research how these foods are prepared in factories. Besides the loss of nutrients that can occur by over-processing foods to produce a long shelf life, how might the processing affect the glycemic index of these foods?
- The online resource below shows a table of foods by glycemic index and glycemic load. Some foods have sugars and starches that are broken down more quickly than others. Which of the foods on the list contain sugars and starches that are broken down the fastest? Which ones the slowest? What kinds of sugars and starches (simple or complex) do you think the high GI foods contain? Which kinds do the low GI foods contain? Discuss how this information might affect your food choices. Have students research the difference between the glycemic index and the glycemic load.
- Based on what you have learned about type 1 and type 2 diabetes, which kinds of carbohydrates would be a problem for persons with diabetes?

### *Online Resources*

- Glycemic index and glycemic load for 100+ foods.  
[http://www.health.harvard.edu/newsweek/Glycemic\\_index\\_and\\_glycemic\\_load\\_for\\_100\\_foods.htm](http://www.health.harvard.edu/newsweek/Glycemic_index_and_glycemic_load_for_100_foods.htm)

## Investigation 2: Sugar and Fat Content in Foods

### Background for Teachers

Rain, Boomer, Hummingbird, and Simon believed it was really important to educate tribal members about the ingredients in the foods they eat. Eager to improve the health of their community, they set up a label reading project during the summer at local groceries stores. Rain, of course, checked out what was in the pots every night at supper, and he really gave his mom grief when she bought the can of tomatoes that had 50 percent of the daily allowance of salt in one serving!

Many foods naturally contain sugars, sodium (salt), and fats as they are essential components of a healthy diet. Unfortunately, many foods in the modern diet contain *added* fat, sodium, and sugar that can result in unhealthy amounts of each in our overall diet. It is important to read the Nutrition Facts on food labels to understand how much fat, sodium, and sugar we are really eating.

There are many products marketed to health conscious individuals that are lower in fat, sugar, and sodium. Look at labels for these types of foods and compare them to labels of similar foods that are not advertised as low-sugar, low-fat, or low-sodium. Students may notice that many times when the fat is lower the total carbohydrates are higher. In order to make healthy food choices, we need to be educated about sugars, sugar substitutes, salt (sodium), fats, and fat substitutes.

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### *Activity: Sugar and Fats Revealed!*

Duration: 30-45 minutes

#### *Background for Teachers*

Teachers may choose to demonstrate this activity or have a group of students demonstrate several snack products to the rest of the class. This alternative may be preferred to save expenditure on food materials required for the activity. If the school has rules against bringing food items into the classroom, teachers can photocopy food labels of popular snacks, treats (including dairy treats), and sodas. Nutrition Facts for most foods (including fresh fruits and vegetables) and snacks by brand are available online.

#### *Materials*

- Sticks of fat (butter, regular margarine, or shortening) cut into 1 tablespoon portions
- Sugar cubes (4 gram size) or granulated sugar (1 teaspoon of granulated sugar equals one sugar cube)
- Packaged or canned snacks and treats such as candy, cookies, or chips
- Canned or bottled soda
- Measuring spoons
- Cups

### *Procedure*

- Each student (or a group) should choose packaged or canned snacks, treats, and/ or sodas to bring to class.
- For each snack item read the label to find out the number of grams of sugar and total fat in a serving. If the serving size is 1/2 cup, but students would normally eat 1 cup or more, use that portion size to reveal the amount of sugar or fat that they are really eating. (Students may need some assistance with the calculations.) Do the same for the sodas (in ounces or milliliters) to reveal the amount of sugar consumed.
- Translate the amount of fat in the portion size into the equivalent amount of fat cubes. Measure out the correct number of fat cubes (1 tablespoon equals one cube) in the item. (Use nearest whole number, do not cut cubes smaller.) Each cube of fat (1 tablespoon) is about 11 grams and represents between 100-110 Calories of fat.
- Measure out the number of sugar cubes represented in the food item or put the equivalent amount of granulated sugar into a cup. (Use nearest whole cube equivalent.) Each cube (1 teaspoon) of sugar is 4 grams or about 15 Calories.

### *Follow-Up Activities*

- Invite the class to discuss their expectations about the amounts of sugar and fat in the snacks, treats, and sodas. Were students surprised by the amounts?
- Examine the Nutrition Facts information on the packages of the snacks and treats and cans of soda in regard to the Percent Daily Values recommended based on a 2,000-calorie diet. What percent of the recommended daily amounts do the snacks and sodas represent for Total Fat, Total Carbohydrates, and Total Sodium? Have students research Nutrition Facts online for various fruits, vegetables, and other healthier food choices. What percent of the recommended daily amounts do the healthier food choices represent?
- Rain's Challenge: Have student groups research online for natural alternatives to fats and sugars that can be used in recipes (like egg white substitutes and apple sauce instead of sugar). Choose their favorite recipes and brainstorm how they might alter the recipe to reduce the amount of fat and/or sugar. Make the new recipe at home. Share the results with the group, making sure to identify the substitutions used, why they were chosen, and the effect on taste and texture.
- Prepare a report on the healthiest and unhealthiest fast foods. There are several Web sites online that provide access to different fast food restaurants and the Nutrition Facts on hundreds of menu items.
- Find examples of food and snack advertising and promotion online, in magazines, or on TV. Note the sources of this information and discuss as a group which sources would be more reliable or trustworthy. Discuss how marketing might affect your choices and how you can use this information to be a smarter consumer.

Note: The Federal Food Administration (FDA) sets the Recommended Daily Intake (RDI) that is used in



nutritional labeling. The RDI for Total Fat = 65 grams; for Sodium =2,400 milligrams; and for Total Carbohydrates =300 grams. The FDA does not set guidelines for sugar consumption, but Nutrition Facts labels do provide grams of sugar content per serving amount. The 2010 Dietary Guidelines Advisory Committee has recommended that no more than 5-15 percent of total dietary energy should be derived from solid fats and added sugars (soFAS). Solid fats (soF) are those solid at room temperature and added sugars (AS) are sugars and syrups that are added to foods or beverages when they are processed or prepared. Milk, vegetables, and fruits naturally contain some sugar, but added sugars are considered “empty calories” because they provide no nutritional value.

### *Online Resources*

- US Department of Agriculture. Dietary Guidelines for Americans. <http://www.cnpp.usda.gov/Publications/DietaryGuidelines/2010/DG2010Brochure.pdf>
- Choosing Healthy Fats. [http://www.helpguide.org/life/healthy\\_diet\\_fats.htm](http://www.helpguide.org/life/healthy_diet_fats.htm)
- A Healthier You. Recipe substitutions. [http://www.health.gov/dietaryguidelines/dga2005/healthieryou/html/tips\\_healthy\\_subs.html](http://www.health.gov/dietaryguidelines/dga2005/healthieryou/html/tips_healthy_subs.html)
- Nutrition for Kids. Healthy recipes. <http://www.kidsgethealthy.org/resources/>

## Investigation 3: How Much Should We Eat—Portion Control

### Background for Teachers

Obesity and type 2 diabetes are increasing in our country at a time when people are eating more, and technology and lifestyle choices are influencing us to be less active. This phenomenon is compounded by the fact that many of the foods we eat are less nutritious and loaded with sugars and fats. One way to combat this problem is to develop an awareness of how much we eat and how much we really need to eat to be healthy and maintain an optimum weight and health. People also need to get the right amount of physical activity to help them stay healthy. Teachers may ask students to research how portion sizes have increased in the fast food industry in the United States. Or students may talk to family members to see if they have noticed how portion sizes of meals, sodas, and snacks have increased in restaurants and convenience stores. Students will then be prepared to discuss what factors may have contributed to these trends.

The first step in understanding the effect of how much we eat is to understand the Calorie. A Calorie is a unit of heat. It is the energy needed to raise the temperature of 1 gram of water to 1° C. A nutritional Calorie (with a capital C) is the unit of energy we use in determining the energy content of foods. The Calorie reported on food labels is actually a Kilocalorie, which equals 1,000 actual calories. A food Calorie would be the amount of energy needed to heat 1,000 grams (about a quart) of water to increase the temperature by 10 C (about 20 F).

Discuss with students how differences in energy needs may be based on gender, age, and lifestyle. Students may have noticed that members of the same family who eat similar foods can have very different weights and amounts of body fat. Some people use calories more efficiently than others based on their metabolism. People who get regular physical activity tend to burn calories more efficiently than those who get little physical activity. People with less body fat tend to burn calories more efficiently as well. There are also genetic components to the efficiency with which we burn and store calories. A person's metabolism determines how efficiently he or she burns and stores calories as well as extracts nutrition from foods. Differences in metabolism help explain why people getting the same amount of physical activity and eating the same diet in the same amounts will lose or gain weight at different rates.

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### *Activity: Determining the Calories We Need*

Duration: 30-60 minutes

The amount of calories a person needs per day depends on many variables. Have students research the following questions online:

- Look up the average number of food Calories needed per day for adults. Daily Calories for boys and girls, aged 9 – 13 can be found at:  
<http://www.netwellness.org/healthtopics/obesity/aaprecommendations.cfm>.
- Discuss why there is a difference for males and females.
- Discuss why daily caloric needs are presented as a range.

- Predict which factors may determine how many food Calories an individual would require on a daily basis.
- Discuss which factors students think they can influence by the choices they make versus those that they have difficulty controlling or can't control.

### *Activity: Comparing Calories*

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#### *Background for Teachers*

A fascinating Web site, "What Does 200 Calories Look Like," compares the amount of various foods and beverages that yield 200 Calories of energy: <http://www.wisegeek.com/what-does-200-calories-look-like.htm>. Two hundred Calories was selected because some foods are so calorie-dense (like oils) that 100 Calories would yield a very tiny portion size.) Have students compare the Calories in favorite snacks and treats with the portion sizes of various solid foods such as fruits and vegetables, bread and cereals, and cheeses presented on the Web site. As in Investigation 2, this activity may be more suitable to a teacher or group demonstration in order to control costs and follow school policies.

#### *Materials*

- Selected food items (non-snacks) from the "What Does 200 Calories Look Like" Web site.
- Favorite snack foods and treats
- Balance (or a kitchen scale that measures in grams)
- Cup and spoons
- Paper plates of the same size

#### *Online Resources*

- Understanding Obesity and Weight Management. Dietary guidelines for children, including children of middle school age.  
<http://www.netwellness.org/healthtopics/obesity/aaprecommendations.cfm>.
- Healthy Eating Food Plate. <http://www.hsph.harvard.edu/nutritionsource/index.html>.
- Nutrition for Everyone. Nutrition Basics.  
<http://www.cdc.gov/nutrition/everyone/basics/foodgroups.html>

#### *Procedure*

- Divide the class into groups and have each group select some non-snack food items. Include peanut butter, nuts, eggs, and solid dairy products like cheese.
- Measure out the appropriate number of grams for each selected non-snack food that represents 200 Calories using a balance. Place it on a paper plate.
- Use the package information for the snacks (chips, pretzels, crackers, etc.), and treats (cookies, cakes, and candies) to determine the amount that would equal 200 Calories. For instance, the

Nutrition Facts on a popular brand of potato chips notes that the package contents weighs 1 ounce (28 grams) and yields 150 Calories. Two hundred Calories would weigh approximately 37 grams. (Use a simple algebraic relationship to determine the weight:  $28 \text{ grams} \times 200 \text{ Calories} / 150 \text{ Calories} = 37.3 \text{ grams}$ .) Weigh out the snack amount in grams on the balance and place on a paper plate of the same size. Now compare with non-snack foods!

- Have each group share their portion comparisons with the class. Discuss the most surprising results.

### *Follow-Up Activity*

Look at a representation of the USDA recommended food pyramid and the new food plate at [ChooseMyPlate.gov](http://ChooseMyPlate.gov). Discuss how the comparison of equivalent Calories between foods relates to those recommendations. Many diets allow us to eat large amounts raw vegetables and fruits. Discuss why this recommendation is beneficial and helpful in controlling hunger. (**Hint:** Remember the benefits of complex carbohydrates!)

## Cross-Curricular Connections

### Science, English/ Language Arts, and Social Studies: Disease Detectives

*A cross-curricular activity for Write Newspaper Articles (English/Language Arts) as well as Family Detectives, Gathering Evidence (Social Studies).*

#### Objectives

- Find out what epidemiologists do.
- Solve disease mysteries online by investigating infectious disease outbreaks.

In the English/Language Arts section we interviewed characters in *Coyote and the Turtle's Dream* for articles that would be printed in the Thunder Rock newspaper. We also collected stories from family members. The interviewing techniques we used were based on Mrs. Corn's "who, what, where, when, and how" questions. These questions were very similar to the ones that Rain and his friends asked when they were organizing the similarities and differences between Rain's dream and Granma Hettie's story about the cave. They were being good detectives. Indeed, they came up with some hypotheses about how the coyote was involved in the mystery and why Jimmy ran away. In the Family Detectives activities in the Social Studies section, students further utilized these same interviewing questions to find out clues about their family trees.

Disease detectives or epidemiologists ask comparable questions when they try to solve mysteries about diseases. They study many kinds of diseases, including infectious diseases and lifestyle/environmental diseases. Infectious diseases are those that spread parasites, bacteria, and viruses from person to person through exposure to other people, animals, and insects, and by ingesting contaminated water or food. Lifestyle diseases (like heart disease, stroke, many cancers, respiratory diseases such as emphysema, and type 2 diabetes) are related to peoples' behaviors, such as what and how much they eat and drink, their level of physical activity, and whether they smoke. Environmental diseases are those related to peoples' exposures to harmful substances where they live or work. Epidemiologists want to know what causes a disease so they can stop it from making people sick. They find clues about the causes of a disease by gathering information about where and when it occurs, and who gets the disease. Below are some games and Web sites that describe what disease detectives do.

#### Online Resources

- Outbreak at Waters Edge: a Public Health Discovery Game.  
<http://www.mclph.umn.edu/watersedge/>
- Welcome to the Headquarters of the Disease Detectives. Includes a Disease Detectives board game. <http://www.disease-detectives.org/Welcome.html>
- Disease Detective. Includes an interactive Disease Detective game.  
<http://www.pbs.org/wgbh/nova/body/disease-detective.html>

- Bam! Body and Mind: Disease Detectives. Meet Dr. Asthma.  
[http://www.bam.gov/sub\\_diseases/diseases\\_detectives.html](http://www.bam.gov/sub_diseases/diseases_detectives.html)

## Science and English/Language Arts: A Day in the Life of the Archelon

*A cross-curricular activity for Part 1: Investigating Earth's History—Learning From the Past. Investigation 4: Uncovering the Past—Erosion and Weathering*

In *Coyote and the Turtle's Dream*, a fossil poacher tries to get Grandma Hettie and Jimmy to take him to a cave that hides the fossilized remains of the biggest turtle that ever lived. The fossil poacher wants to steal the fossil and sell it on the black market for a lot of money. The turtle's scientific name is Archelon ischyros (translated from Greek as the Ruler Turtle, Strong Turtle, or Chief Turtle). In the story, Rain and his friends call her the Great Turtle.

Although she was not a dinosaur, the Great Turtle became extinct along with the dinosaurs at the end of the Cretaceous period. This time period is called the K-T extinction event or the Cretaceous-Tertiary event. However, although Archelon ischyros died out, she has relatives that still swim the oceans of the world today. Some of them probably experience life much as she did, but there are differences. Sea turtles alive today, unlike the Archelon, don't have to flee from monster reptiles like the mosasaurs! (The mosasaurs became extinct, too.)

There are many Web sites on the Internet about Archelon ischyros and sea turtles. Have students research the Archelon on the Web sites provided, and do the following activities:

- Make up a story about a day in the life of the Great Turtle.
  - Describe when the ancient turtle lived and what she looked like.
  - What did these turtles eat?
  - How were their babies born?
  - Who were their enemies?
  - Did they like deep water or shallow water?
  - Warm or cold water?
  - Did they swim long distances?
  - How did they sleep?
  - Imagine what would it be like to swim with the Great Turtle? What would it be like to be the Great Turtle?
- Illustrate the story with a picture of the Archelon and other creatures and plants that lived in the sea during the Cretaceous period.
- Many Archelon fossils showed that they were often in the state of hibernation on the bottom of the sea when they died. This state of hibernation is called brumation. Ask students to look for information about brumation or brumating.

## Online Resources

- The Archelon. Photos of how she looked in life.  
<http://www.bbc.co.uk/science/seamonsters/factfiles/archelon.shtml>
- What Is a Giant Sea Turtle Doing in South Dakota? The giant Archelon ischyros.  
[http://www.uhaul.com/supergraphics/states/south\\_dakota/turtle/index.html](http://www.uhaul.com/supergraphics/states/south_dakota/turtle/index.html)  
(Click on the turtle in the photo to enter the site.)
- Archelon ischyros. My Barbaric Yawp. Great photos. <http://www.mcorriss.com/DA2.html>
- About.com Dinosaurs. Enter Archelon in “search” and learn more about the giant turtles.  
<http://dinosaurs.about.com/od/aquaticdinosaurs/p/archelon.htm>
- Fossil Sea Turtles. <http://www.euroturtle.org/fossil.htm>
- The End-Cretaceous (K-T) Extinction. Learn about the theories that explain the end of the dinosaurs. <http://park.org/Canada/Museum/extinction/cretmass.html>

## Science and Social Studies: Protecting the Fossil Record

*A cross-curricular activity for Part 1: Investigating Earth’s History—Learning From the Past. Investigation 4: Uncovering the Past—Erosion and Weathering*

- Have students research fossil poaching online. Find out who the poachers are, who buys the fossils, and where fossil poaching often occurs.
- Find out more about laws that protect fossils in their state. Which government agency holds responsibility for protecting the fossil record? How are the laws enforced? What are the penalties for fossil-poaching?
- Write to a local college, county extension service, or state park service and invite a speaker to talk to the class about fossil protection and fossil poaching.
- Read articles about the controversies surrounding who owns the fossils, especially the story about The Curse of the T. Rex. Hold a class discussion about the roles that tribes play in protecting the fossil record.
- Have a class debate about the pros and cons of preserving fossils in their natural environment verses removing them for study and display. Also discuss whether individuals should be allowed to own fossils. What kinds of fossils should individuals be allowed to own?

## Online Resources

- Fossils in Native American Lands. Whose bones, whose story?  
<http://www.stanford.edu/dept/HPS/Mayorwhosebones.pdf>
- NOVA: The Curse of the T. Rex (1997) Describes the controversy that surrounded the discovery of “Sue,” the biggest and most complete fossil of T. Rex ever found.

## Science and Math: Dating Fossils: Determining Half-life

*A cross-curricular activity for Part 1: Investigating Earth's History—Learning From the Past. Investigation 4: Uncovering the Past—Erosion and Weathering*

### Background for Teachers

All living materials contain carbon. Not all atoms of carbon are exactly the same. While all carbon atoms must have the same number of protons (6) to be carbon, they might have different numbers of neutrons. Atoms of the same element with different numbers of neutrons have different masses. These atoms are called isotopes.

Radio carbon dating is one method used to date fossils. C-14, an isotope of carbon with eight neutrons, is radioactive. That means that it will break down and lose some of the particles in its atoms. Radioactive isotopes spontaneously decay until they become stable or non-radioactive like C-12. While an organism is alive, the level of C-14 remains relatively constant as the organism interacts with its environment (eats food, for instance). When the organism dies, it no longer takes in carbon from the environment and the C-14 begins to decay. Radioactive isotopes decay at a constant rate. The amount of time it takes for half of the C-14 isotopes to decay is called the half-life period. The amount of time it takes for half of the remaining sample to decay is always the same.

If scientists measure the ratio of C-14 to C-12 in a fossil, they can calculate the age of the sample by using the half-life for the decay of C-14.

In this group activity, students can simulate radioactive decay using pennies. Using simulation data they can determine how many years it will take for a “fossil,” containing 100 pennies when it was alive, to decay and finally lose all of its pennies. Students will be able to see that the age of the “fossil” can be estimated as the percent of pennies decrease at a steady rate. In our activity, pennies have a half-life of 100 years.

### Materials

For each group:

- 100 pennies
- Graph paper
- A container to shake the pennies (a can or plastic container).

### Online Resources

- Physics 2000: Isotopes and Radioactivity.  
[http://www.colorado.edu/physics/2000/isotopes/radioactive\\_decay3.html](http://www.colorado.edu/physics/2000/isotopes/radioactive_decay3.html)



## Procedure

- Place all 100 pennies into the container and shake well.
- Pour the pennies onto a flat surface. Remove all pennies that are tails up. Record the number remaining (heads up) in the data table provided under half-life #1. (See the sample data table below.)
- Place the remaining heads up pennies back into the container and shake again.
- Pour the pennies onto a flat surface. Remove all pennies that are tails up. Record the number remaining (heads up) in the data table under half-life #2.
- Repeat the third and fourth steps above until all pennies are removed or only one remains. (Students should note that with each throw the half-life in years increases as shown in the table.)
- Calculate the percent of pennies left based on the original 100 pennies. How many years have passed when the percent of pennies left is almost zero?
- Using the data table, make a graph (see the sample graph below) with the percent of pennies remaining that are heads up (Y-axis) vs. Time in Years (X-axis). Place the first point where the 100% line starts on the 0 year line; place the second point (half-life #1) at the appropriate percent on the 100 year line. Continue until the data are exhausted. Draw a line connecting the points. The pennies will probably be exhausted before the data table is completed.

## Follow-Up Activity

- Graphs enable students to make estimates. Use the graph to determine the age of a penny sample in years that is found to contain 80% heads-up pennies. Mark and label this point on the graph. Estimate the number of years that have passed when 80% of the sample is left. What percent of the sample has decayed?
- Use the graph to determine the age of the penny sample in years that are found to contain 30% heads-up pennies? Mark and label this point on the graph. How old is the penny sample now?

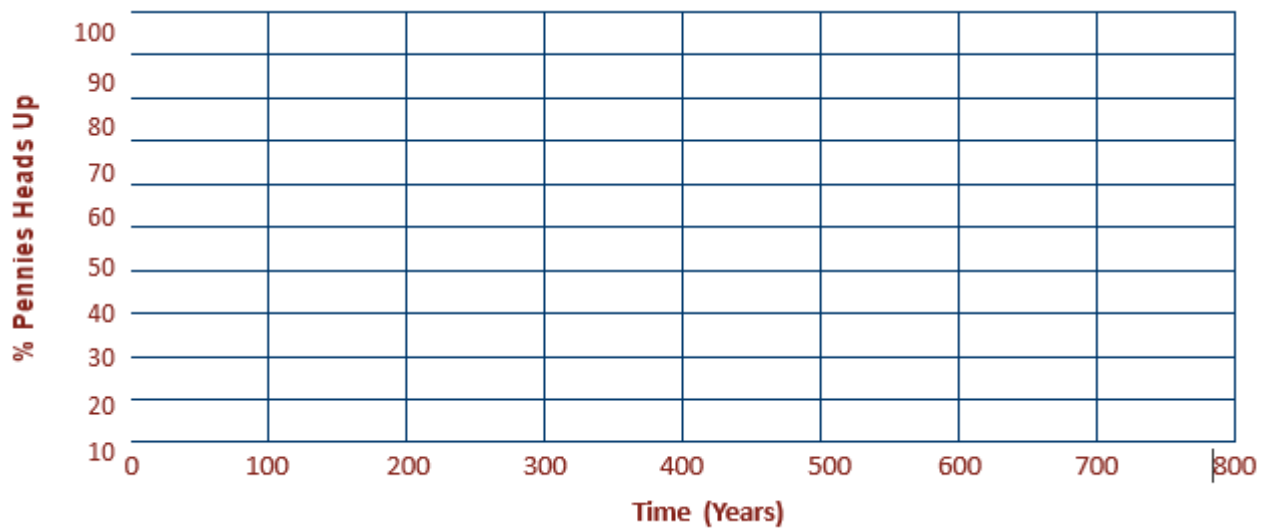
## Sample Penny Data Table

Table 1: Half-Life of Pennies

Half-life Period	Time (years)	Number of Pennies Remaining (heads-up)	Percent of Pennies (heads up)
0	0	100 pennies	100
1	100	42	42%
2	200	22	22%
3	300	12	12%
4	400	6	6%
5	500	3	3%
6	600	1	1%
7	700		
8	800		

## Sample Graph

Figure 1: Half-Life of Pennies



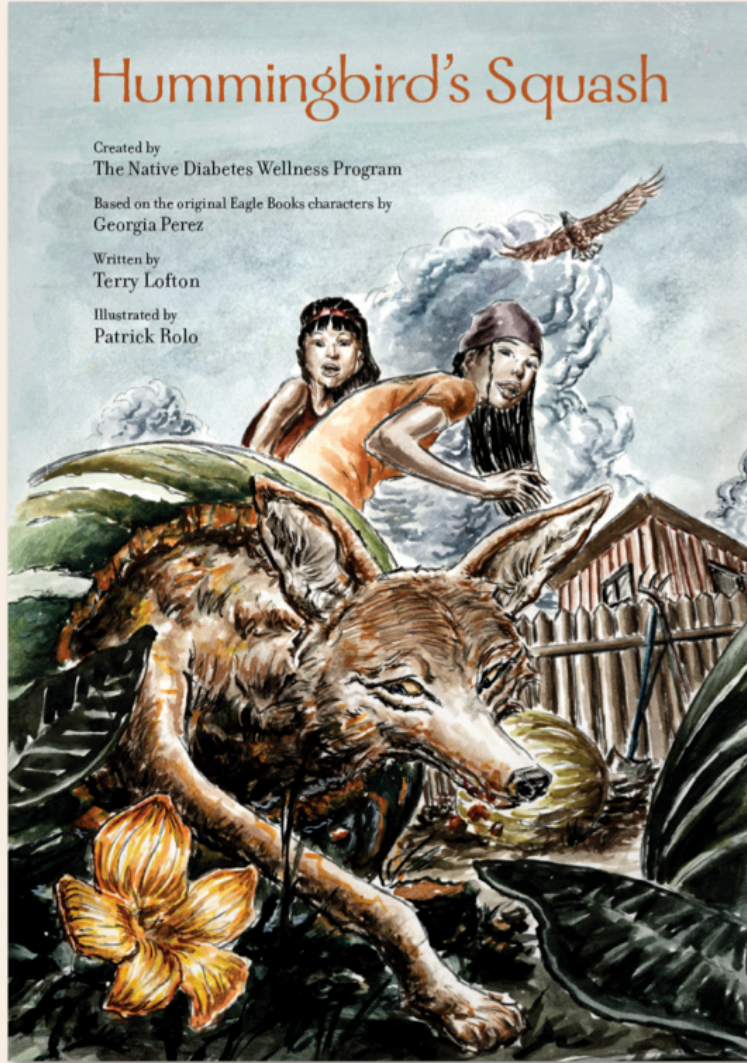


# Eagle Books

## Youth Novels: Educators and Community Guide



### For Hummingbird's Squash



# English/Language Arts

## Book Discussion

### Objectives

- Describe and analyze characters and events in the book.
- Learn from different viewpoints.
- Behave respectfully when engaged in debate with others.

### Background for Teachers

A book discussion is a great way to help students develop language skills, learn new ideas, and develop deeper understandings of what they have read. Very importantly, they are exposed to the give-and-take of open discussion which helps them to express their own thoughts and to appreciate and learn from the perspectives of others.

### *Activity: Holding a Book Discussion*

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There are various ways for a teacher to hold a book discussion. The most common is to throw out questions one at a time and call on volunteers who would like offer their point of view.

However, another approach is to write a number of different questions on a set of index cards, break the class into small teams of two to four students, and pass out a card to each team. The team discusses their question and then shares their thoughts with the class. The class can then ask the team to defend or explain their opinions and conclusions.

Regardless of the discussion approach, students should be cautioned to listen, take turns, and not interrupt when others are speaking.

### *Suggested Questions*

- What specific themes did the author emphasize throughout the novel? What messages do you think she is trying to convey to the reader?
- Do the human characters seem real and believable? Can you relate to their predicaments? Have you ever experienced anything similar to some of the situations in the book? Explain your answers.
- How do characters change or evolve throughout the course of the story? What events make the changes happen?
- Did certain parts of the book make you feel happy, angry, or uncomfortable? If yes, what parts were they? What made you feel that way? Did your feelings change as you read the book? If so, how did they change?
- Did reading the book lead to a new understanding or awareness of some aspect of your own

life or the lives of your friends? Has reading this book changed your opinion about a subject or a problem? Explain your answers.

- What did you find surprising about the information introduced in this book? There is information about types 1 and 2 diabetes, the history of Native Science, gardening, and bullying. What did you learn that you did not know before?
- At the end of the book, did you feel hopeful for the future of all the characters in the book? Or only some of them? Why?

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### **Activity: Storytelling**

#### **Background for Teachers**

Writing and telling stories help students improve comprehension, oral presentation, retention of concepts, and higher level skills such as analysis and synthesis. Storytelling in the classroom also promotes storytelling traditions in the community.

There are many classroom activities that can be used to sharpen students' storytelling and writing skills. *Hummingbird's Squash* is a story that can be used to help students understand the essential elements in a novel (theme, setting, characters, plot, and point of view), and to practice using their imaginations in writing and telling fictional stories.

This section includes a set of activities that address each of the main components of a novel. Teachers can choose among the activities for ones that they think their classes would enjoy.

#### **Storytelling Theme**

- Main ideas and messages

#### **Objective**

- Learn to recognize themes.

#### **Background for Teachers**

*Hummingbird's Squash* is a trickster story. We know that the author will have Coyote, the trickster, set up situations in which Hummingbird and her friends embark on some kind of adventure. What does Coyote want them to learn? Putting it another way, what are the main ideas or messages (themes) that the author wants the readers to remember?

In *Hummingbird's Squash*, the major theme is Hummingbird's quest to help the people to eat healthy and prevent type 2 diabetes.

A theme can also branch out into various subthemes. These are other topics related to the main idea that help flesh it out and give it meaning in terms of the feelings, thoughts, and experiences of the characters. The story emerges from the intertwining of the subthemes. A subtheme in many novels is that obstacles lie in the path of persons pursuing a dream or goal like Hummingbird's. The major obstacles in *Hummingbird's Squash* are presented by the bully characters, Chris Sorrel and his brothers.

But the readers learn that, with help from one's friends (both human and animal), bullying and other challenges can be overcome.

Another subtheme is the soundness of Hummingbird's method for fulfilling her quest. Is growing giant vegetables the best way to provide healthy fruits and vegetables for everyone?

Themes are not an easy concept for some students. Themes are not just lying on the surface of the story, already identified for students. They have to dig to find them. Below are two activities that help students understand the concept of theme. In one the theme is very clear; in the other, students have to dig.

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### *Activity: Finding the Theme in a Fable*

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A good place to start when learning how to identify a theme is to read or listen to old fables (usually animal stories) that teach a single moral. A fable has one theme called "the moral of the story." A moral and a theme, however, are not the same thing. A moral is a lesson about the proper way to behave, but a theme is not limited in meaning. The moral in a fable is usually very easy to spot!

Print copies of the Cherokee story "How the Possum Lost the Hair on His Tail" (see below). Distribute to the class. Ask students to identify the moral or key theme of this story which is that people will put you in your place if you act too proudly or are conceited. Or to put it another way: be too proud and someone will trim your tail.

### *Why the Possum Lost the Hair on His Tail*

The Possum used to have a long, bushy tail and was so proud of it that he combed it out every morning and sang about it at every dance. Finally, the Rabbit, who had had no tail since the Bear pulled it out, became very jealous and made up his mind to play a trick on the Possum.

There was to be a great council and a dance at which all the animals were to be present. It was the Rabbit's business to send out the news so, as he was passing the Possum's place, he stopped to ask him if he intended to be there. The Possum said he would come if he could have a special seat, "Because I have such a handsome tail, I ought to sit where everybody can see me." The Rabbit promised to attend to it and to send someone to comb and dress the Possum's tail for the dance. So the Possum was very much pleased and agreed to come.

Then the Rabbit went over to the Cricket (who is such an expert hair-cutter that the people call him "the barber") and told him to go the next morning and dress the Possum's tail for the dance that night. He told the Cricket just what to do and then went on about some other mischief.

In the morning, the Cricket went to the Possum's house and said he had come to get him ready for the dance. So the Possum stretched himself out and shut his eyes while the Cricket combed out his tail and wrapped a red string around it to keep it smooth until that night. But all this time, as he wound the string around, he was clipping off the hair close to the roots, and the Possum never knew it.

When it was night the Possum went to the townhouse where the dance was to be. He found the best seat all ready for him, just as the Rabbit had promised. When his turn came in the dance, he loosened the string from his tail and stepped into the middle of the floor. The drummers began to drum and the



Possum began to sing, “See my beautiful tail.” Everybody shouted and he danced around the circle and sang again, “See what a fine color it has.” They shouted again and he danced around another time, singing, “See how it sweeps the ground.” The animals shouted more loudly than ever, and the Possum was delighted. He danced around again and sang, “See how fine the fur is.”

Then everybody laughed so long that the Possum wondered why they were laughing so much. He looked around the circle of animals. Then he looked down at his beautiful tail and saw that there was not a hair left on it. It was as bare as the tail of a lizard! He was so astonished and ashamed that he could not say a word. He grinned and rolled over on the ground like he was dead—just as the Possum does to this day when taken by surprise.

—Old Cherokee Story

### *Activity: Identifying Main Ideas*

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Another way to understand the concept of theme is to identify main ideas in short passages from a novel. Select passages from *Hummingbird’s Squash* or other novels. Ask students to read them and identify the main idea and any supporting ideas (like a subtheme). Provide a list of topics like those below to assist them in identifying themes. Have students explain their choices.

#### *Topic List*

- Determination
- Friendship
- Foolishness
- Forgiveness
- Hope
- Journey or quest
- Fear
- Self-doubt
- Curiosity
- Deception
- Freedom
- Generosity
- Jealousy
- Selfishness
- Wonder
- Tradition
- Respect
- Lack of respect
- Self-respect
- Overconfidence/arrogance
- Discovery
- Justice
- Family
- Science
- Health
- Courage

Demonstrate to students that putting several topic ideas together creates a complex theme. For instance, friendship, courage, and fear combine to become: “Friendship can give you the courage to overcome things that once scared you.” This is the key theme of Walter and Larry’s story.

## Storytelling Theme

- Character development

## Objectives

- Learn how to write a back story.
- Learn the dimensions (many sides) of a character.

## Background for Teachers

Students may wonder how writers “dream up” the characters in their stories. Many authors use a technique called a background story or back story that makes the characters seem real. A back story also helps the writer to understand how a character thinks and what he or she would do in certain situations.

Authors have to imagine a whole life for the characters they create. Fictitious characters are not real, but they have to be believable. Sometimes authors will draw on aspects of their own lives or will remember things about real people they have known. The back story for a character usually includes something about a character’s personality or nature, what they look like, a description of their family, where they live and/or where they were born, what they like (for example, playing sports), what they don’t like (for example, washing dishes), and what makes them happy (such as birthdays) or sad (such as being alone). Like real people, characters have hopes and fears, strengths and weaknesses, and one or more goals. When the different characters in a story have different goals, then conflict will arise and the story will be more exciting.

All the descriptions in a back story don’t have to be used in a book, but it really helps a writer or storyteller to understand the people he or she has invented.

## Activity: Write a Back Story

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Ask students to select a character from *Hummingbird’s Squash* and write a back story for that character. Since the major characters of *Rain* and *Hummingbird* are more developed, students may want to select Boomer, Simon, or Arianna. Perhaps they would like to develop more understanding of Chris Sorrel. There are also many other interesting secondary characters like Larry, Miss Swallow, Boo, Aunt Chick, and Uncle Luther. If students need an example to get started, show them the back story originally developed for Walter (see below). Students will notice that not all of Walter’s back story was used in *Hummingbird’s Squash*.

Compare the different back stories that students create for the same character. Are the back stories similar or do they sound like completely different people?

## Walter’s Back Story

Walter (also known as Dumptruck) is big for his age—almost too big. At 13 he is a classic example of the boy who falls over his own feet. This could be because he never ties his shoe laces. Although tall, he is soft around the middle and slumps when he walks.

He spends a lot of time snacking and watching TV by himself. Sometimes he plays video games with his



cousins. His grades at school are poor and he always sits at the back of the class. Walter once surprised his science teacher, however, when he correctly answered questions about the forces that keep a plane in the air. Walter's secret wish is to be a pilot. He reads everything he can about planes.

Walter's parents are divorced. He hasn't seen his father in 3 years. He lives with his mother, Suzanne, in a small apartment that is subsidized by the Tribe. He has two younger sisters that live with his Aunt Marcie and Uncle John. Walter's uncle tries his best to fill in for dad, but he knows that Walter needs more. He is genuinely fond of the boy and has offered to take him into his household, too. But Walter's mother says she would miss him if she couldn't see him every day. She loves him too much.

Suzanne works in housekeeping at a motel owned by the Tribe. Walter wants nice clothes and a cell phone like some other kids, but his mother can't afford it. She tells him that it will be different one day. Walter understands. He tells his mom that his favorite thing is renting a movie and making popcorn for her on Saturday nights. One night his mother rented an old Disney movie about a dog called "Old Yeller." When the dog died in the movie, Walter cried but wiped away his tears before his mom could see them. Walter is very soft-hearted, but he wants people to think he is tough.

In the seventh grade, Walter, who had always been quiet and withdrawn at school, found a "friend" when Chris Sorrel started giving him money to buy ice cream at lunch. Walter felt guilty when he found out that Chris was taking it from other kids, but he wanted to belong to Chris's crowd, especially when Chris became one of the most popular kids at school.

Walter often will bully other students for Chris because he wants to be accepted by Chris and his friends. He has gotten into trouble for bullying on the school bus several times. He has promised his mother that he will be "good," but he doesn't keep the promise. Walter is very conflicted about this. He cares about his mother and does not want to disappoint her.

### **Many decades in the future**

Just like we can write a back story for Walter, we can imagine his future, too. Walter's wish as a boy was to be a pilot. True to his ambition, with a lot of study and determination, and not to mention excellent eyesight, he becomes a naval aviator. Walter joins NASA when the agency begins a new era of exploration into deep space. Eager to walk on new worlds, Walter becomes one of eight members of the first manned expedition to Mars in the year 2041.

### *Storytelling Theme*

- The setting: making a world

### *Objectives*

- Recognize types of settings.
- Create a setting.

## Background for Teachers

A setting includes geographic location, time, and the context that makes a story believable. It establishes the immediate surroundings. Stories usually include descriptions that include lighting, smells, temperature, objects that are used or seen by the characters (trees, benches, computers, axes), and the larger environment. The setting helps a storyteller establish the mood of the story (“It was a dark and stormy night”). The setting also provides details about the culture of the characters in the story. The primary setting in *Hummingbird’s Squash* is the Medicine Cave Indian Reservation and the town of Thunder Rock. There are also secondary settings: the school, Boo’s Gas ‘n Grocery, the gardens, the shed, houses and backyards, the pow-wow arena, and the fairgrounds. It is a whole world.

## Activity: Fictional and Nonfictional Settings

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Introduce students to the different kinds of settings in fiction and nonfiction. Then have them try their hand at creating a world for these three settings:

### A Reality Setting

Describe your bedroom as if it were a setting. Describe the furniture. What is on the walls? Is there a closet? What is hanging in the closet? Is there a window? What side of the room is it on? Is there a light on the ceiling? Are there lamps? In your imagination, what time of day is it? Is there anything in the room that would tell someone this is *your* room?

### A Fictional Setting

A fictional setting usually involves made-up characters in a setting that *could* be real. The setting is believable. Storytellers can create a setting that seems real because they draw on their knowledge and memories of real places and environments (like the bedroom above). The major setting in *Hummingbird’s Squash* is the Medicine Cave Indian Reservation. Does it seem real? Why? Does it remind you of your own town? If not, what would you change to make it seem more like the place where you live? Make up a community based on your own town or village where the characters in *Hummingbird’s Squash* might live.

### A Fantasy Setting

Fantasy is a kind of fiction. *Hummingbird’s Squash* includes setting elements that are termed fantasy because people do not usually experience situations or see objects like those created by Coyote. That is because Coyote used his powers to create them. (The trickster, of course, would not consider himself to be a fantasy because his teachings are real.) Describe the magical settings in the book. If you could create a fantasy place in your community, what would it be? What kinds of things would grow there? Live there? What would happen there? How would this fantasy world benefit the community?

## Storytelling Theme

- Point of View

### Objective

- Learn about the concept of point of view through role play.

### Background for Teachers

Point of view is the position from which events are told. In other words, through whose eyes do we see the action? It is common in a novel for the point of view to be the author (or perhaps the author and one other character) who describes the action and what everyone is thinking and feeling. The author sees and knows all! This is the point of view in *Hummingbird's Squash*.

But there are also novels in which the story is told by a particular person. This is called a "first person" point of view. *To Kill a Mockingbird*, by Harper Lee, is told by the little girl, Scout, and the Sherlock Holmes mystery stories, told by Dr. Watson, are examples of books told in first person. In 2007, Sherman Alexie, a member of the Spokane Tribe, won the 2007 National Book Award for Young People's Literature for his novel *The Absolutely True Diary of a Part Time Indian*. This popular novel is told in first person by a 14-year-old boy.

Students shouldn't be surprised that the storyteller doesn't have to be human. In the novel, *Black Beauty* by Anna Sewell, the horse tells the story!

### Activity: Writing Letters as a Character

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Writing a letter as a character in *Hummingbird's Squash* encourages students to imagine themselves in the role of the character. Using first person ("I") point of view, they can ask questions of other characters. They can also describe events in the book from their point of view, and express how they feel about what is happening.

A fun activity is to have another student answer the letter pretending to be the character to which the letter was addressed. Students may download the stationery on the Native Diabetes Wellness Program Web site: <http://www.cdc.gov/diabetes/projects/diabetes-wellness.htm> and use it to write their letters.

### Examples of Letters

- Perhaps students would find it interesting to write a letter from Rain that Dances to Sky Heart, respectfully asking the eagle to tell him the reasons why he chose to give his health messages to him and his friends. In Chapter 17, Hummingbird tells Arianna that the kids want to know why *them*? Why are they so special? They know the eagle has a reason, but they are not sure what it is. Students who assume the role of Sky Heart can really call on their creativity in responding to this letter.
- In the book, Mr. Berry requires that Walter and Larry write a letter to Arianna, apologizing for calling her Miss Ding-Ding. What would each of them say to her? How would Arianna respond to them? What would she say to educate them about type 1 diabetes?

- What would Boomer want to know about Coyote’s burping techniques? What would Coyote tell him about the burping contest with the Blue Whale? Students will enjoy checking out *Ocean Explorer* on the National Oceanic and Atmospheric Administration’s Web site for a sound recording of the “Bloop.” The origin of the Bloop, one of the loudest sounds ever recorded, has never been determined. There are many sites on the Internet that offer opinions and debate about its origin.

### *Online Resources*

- A Collection of Sounds from the Sea. The Bloop!  
<http://oceanexplorer.noaa.gov/explorations/sound01/background/seasounds/seasounds.html>

### *Storytelling Theme*

- Plot: structuring the action

### *Objective*

- To understand the components of a plot.

### *Background for Teachers*

A plot is the action that takes place in a story from the beginning chapter to the last chapter. The plot is usually driven through the actions and goals of the characters. Throughout the story, they encounter surprises and overcome obstacles until they finally reach their goals (their intended goals or goals they never thought they would reach). If the novel has a good plot, the story will get more exciting as it goes on. In *Hummingbird’s Squash*, the major plot line is driven by Hummingbird’s goal to raise giant vegetables and fruits that will feed the people on the Medicine Cave Indian Reservation. At the end of the story, she achieves her goal.

A novel can have subplots, too. There are several subplots in *Hummingbird’s Squash* about Chris Sorrel, Walter and Larry, and Arianna.

The components of a plot are:

- Introduction: The beginning of the story where the characters and setting are described and the action is launched.
- Rising action: The part of the book where most of the story takes place. “Rising action” is mostly about revealing the conflict in the story. A good story always has tension between the characters and their different goals. The main character or protagonist is usually the “good guy” in the story; the “bad guy” or antagonist creates the obstacles that the protagonist struggles to overcome. The antagonist is not always a person—it can be a force of nature or an animal, too. Because a character often struggles against his or her own desires and impulses, the protagonist and antagonist may be the same character!

In *Hummingbird’s Squash*, Chris Sorrel is Hummingbird’s main antagonist. But Coyote creates a lot of tension in the story, too. As a trickster he can set up a lot of situations that make life complicated for

Hummingbird, her friends, and the bullies. Sometimes he is a good guy and sometimes he just makes trouble. Regardless of his motive, Coyote really moves the story.

- Climax: The highest point of interest or the turning point in the story. (There may be several in a book.)
- Falling action: The conflict and problems begin to resolve themselves.
- Resolution: The outcome of the story.

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### ***Activity: Discuss The Main Plot Elements in Hummingbird’s Squash***

- Introduction: Where are we when the story opens? By the end of the first chapter, how many characters have we been introduced to? Have we already encountered a problem? Has the antagonist showed up?
- Rising action: What is Hummingbird’s goal? How many obstacles does the antagonist put in her way? What kinds of problems does the antagonist present for other characters? Who helps Hummingbird and her friends to overcome the obstacles?
- Climax: What part of the book describes how Hummingbird achieves what she set out to do at the beginning of the story? There can also be a climax of a subplot. What is the climax of the subplot about Miss Swallow and the Miraculous Tree?
- Falling action: What problems begin to go away after Hummingbird achieves her goal?
- Resolution: How does the story end?

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### ***Activity: Describe a Subplot***

In addition to discussing the major plot line, students may want to explore one of the other subplots in *Hummingbird’s Squash*. The plot about Walter (Dumtruck) and Larry (Tater Tot) turning over a new leaf and abandoning their bullying behavior is an exciting one. Ask students to describe 1) the part of the novel that introduces their characters, 2) the rising action that shows their conflict with Chris Sorrel and their strategy for “de-bullification” (with a lot of help from their new friends); 3) the climax at the basketball tryouts; 4) the falling action that describes how their past bullying behavior is forgiven and resolved; and 5) the resolution that is evidence of their friendship with Hummingbird, Arianna, and the boys. Have students tell the story that occurs in each of the plot elements.

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### ***Activity: Write a Different Ending or an Epilogue***

Students may enjoy writing a different resolution to the story. Perhaps Coyote plays another big trick and the giant squash experiences another fate than to be eaten by the families on the reservation. Perhaps the news reporter and the photographer arrive at the reservation before the giant squash is “turned into groceries.” They photograph it and submit a news story to a national news outlet. Hummingbird and the Medicine Cave Indian Reservation become world famous!

Or students may enjoy writing an epilogue, another chapter which tells what happens next or several

months or years later. What happens to Chris Sorrel? Does Simon learn to drum and sing? Will Larry move away from the reservation? Will Hummingbird ever try to grow giant vegetables again? Will she tell Miss Swallow about the coyote? Will Coyote start up another game? Who will he try to trick next?

## Story Games

### Background for Teachers

Fun and play is a way to learn. When the students' creativity is encouraged through word games, treasure hunts, art projects, role-playing, singing, and other methods that are promoted in the Guide, middle schoolers have an opportunity to mix intellectual, emotional, social, and cognitive challenges with entertainment. That is the premise behind the Eagle Books youth novels. When readers are entertained, educational messages embedded in the story are more easily learned. This section includes some fun activities that relate to the suggested storytelling and writing activities. Have a good time with them. Coyote would approve!

### Coyote's Plot

In this game, students sit in a circle. One student is tapped to start telling a story about an experience that is real or purely imaginary (the teacher may suggest a topic). He or she begins the story in a positive way, describing wonderful events and situations.

Then, the teacher hollers, "Coyote!" and the next student in the circle continues the story, but now only strange or negative things occur in the plot. The teacher yells, "Coyote!" again and the next storyteller shifts back to a positive story. As the story progresses, the teacher will yell "Coyote!" more quickly. See how fast the story can shift back and forth. Make the class really work for the rising action!

### Rabbit from a Hat

There are many games which involve slips of paper with random words, phrases, or quotes written on them. These phrases can be suggested by members of the class. "Rabbit from a Hat" is one of these types of games.

Write nouns on slips of paper. Proper nouns are acceptable. In fact, the stranger the noun, the more entertaining this game will be. Once all of the nouns have been collected into a hat (a bag will do fine), a scene begins between two storytellers.

About every 30 seconds or so, as they establish their storyline, the performers will reach a point in their dialogue when they are about to say an important noun. That's when they reach into the hat and grab a rabbit (noun). The word is then incorporated into the scene. The results are really funny! (This game is similar to "Tricking a Trickster" in the English/Language Arts section for *Coyote and the Turtle's Dream*.)

Teachers or invited storytellers can play the game to entertain the class. Students will see how to play the game and then can give it a try.

### Presto Change-O

On cold winter days play this game in the classroom. Type up a tribal trickster story that is told socially in winter or at any time. (Follow the guidance of tribes regarding when and where a story can and cannot be told.) Cut up the story into sections. Paste each section on a separate sheet of paper and number in sequence with the beginning of the story being page 1. Give out the sheets to students. Have them read their section and prepare to orally present their part of the story. Assemble the students in a line starting with the student who received page 1. Have each student retell his or her part in the plot's

sequence. Keep the flow going as the story is told. Do a second round by giving students different sections to retell.

Students will be amazed that the story has completely changed the next time it is told! But magic is not involved. As each student takes his/ her turn, they respond differently based on the way previous tellers are now relating the story.

### Pirate's Treasure

Two groups in a class select a well-known fable or folktale. The teacher simplifies the plot into a sequence of events that can be transcribed onto cards with short sections of the tale on each. Each group hides their story cards throughout the school or classroom. The story will naturally be out of sequence. Each group makes a treasure map showing the exact location where all the cards are hidden and gives it to the other group. The two groups then compete with each other to find the cards and assemble them in correct order. The winning group will be the first to correctly assemble the whole story (the treasure) of the opposing group.

### Wacky Tales

Give students a hand-out that includes a list for each of three story elements: characters, a setting, and an object in the setting. Instruct the students to select one choice from each list. Then write a one page story based on the characters, setting, and object they selected. The stories are more fun to write when the characters and settings are a bit wacky. Teachers can use the provided lists (cartoon characters are always fun) or make up their own lists.

- **Characters:** Batman™ and Superman;™ Tom and Jerry;™ Yogi Bear™ and Boo Boo;™ Alvin™ and Theodore™ (chipmunks); Scooby Doo™ and Shaggy;™ SpongeBob™ and Sandy Cheeks;™ Wily E. Coyote™ and the Roadrunner;™ Fred and Wilma Flintstone;™ Bugs Bunny™ and Elmer Fudd;™ the Powder Puff Girls;™ Blossom,™ Bubbles,™ and Buttercup.™
- **Settings:** A hot desert, an island in the middle of the ocean, the planet Mars, a submarine, a cave, a library, a rollercoaster, a hollow tree, a hot air balloon in the sky, an ice cream truck, the top of a snowy mountain, in the middle of a forest fire, or a pow-wow.
- **An object in the setting:** A sandwich, a birthday cake, a frog, a snake, a hat, a key, a firecracker, a pair of sunglasses, a television set, a rope, an ice cube, a gallon of gas, a screwdriver, a cough drop, a flashlight, a bag of charcoal, a sack of money, or a camera.

### Online Resources

- Graphic Organizer: Plot Sheet and Conflict List. A worksheet for organizing plot and conflict in a story. <http://www.scholastic.com/teachers/lesson-plan/graphic-organizer-plot-sheet-and-conflict-list>
- Storytelling in Schools. The resources section is great! <http://www.storynet-advocacy.org/edu/>
- Circle of Stories. This site uses documentary film, photography, artwork and music to honor and explore Native American storytelling. There are wonderful lesson plans for teachers. <http://www.pbs.org/circleofstories/>



## Instructor Notes

For an excellent article on the value of storytelling, teachers will enjoy “The Power of Story: Using Storytelling to Improve Literacy Learning” by Sara Miller and Lisa Pennycuff. *Journal of Cross-Disciplinary Perspectives in Education* 2008; 1: 36-43.

## Social Studies

### We Are All Related: Family Trees and Histories

#### Objectives

- Create a chart that traces family lineage through time.
- Gather a family history.
- Incorporate personal family history into the larger community and build understanding of relationships across families.
- Create a community tree.

#### Background for Teachers

Family trees are an excellent way for students to learn their personal histories and to use some of the tools of the historian. Finding our ancestors and relatives binds us to our families and to each other. Family histories and stories become meaningful when they are understood within the larger history of a reservation, city, county, state, or country. The historical “why, who, and when” questions are answered in the personal histories of families. As students share family stories, they can become aware of how interconnected they are, and how their Tribe’s history is also their history.

In *Hummingbird’s Squash*, characters like Rain, Boomer, Simon, and Hummingbird have families that have lived for generations on the Medicine Cave Indian Reservation. The oral histories of their families would have much in common, whereas characters like Arianna and Larry, who are new to the community, would have families with different historical roots. Because some tribes live in their original homelands or moved together from other parts of the country to their present location, their community histories go back a very long way. Many families are fortunate to have stories passed down to them about their ancestors and important events that happened in the past. Tribes also have family records in their enrollment offices. These sources are very valuable for obtaining the names of ancestors and finding out where and when they were born.

#### **Activity: My Family Tree**

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##### *Materials*

- A hard copy of a family tree template

There are many kinds of family tree templates that are free on the Internet (several are provided below in Online Resources). Print copies of a four to five generation tree and have students fill in the blanks as best they can. The templates that have labeled blocks are the easiest to use. Choose a tree that allows students to put in the names of individuals and their spouses.

- Advise students to fill in the blocks on the bottom of the tree with their name and the names of their sisters and brothers first. This is the current generation. Then work backwards to their

parents and their siblings, and then to their grandparents and great-grandparents, etc. Students will have to ask family members to help them fill out their trees.

- Make photocopies of the family trees created by the class. Give each student a copy of his or her tree to share with their families. Display the originals in the classroom.

### *Online Resources*

- Mike Stevens. Native American Genealogy Presentation for the “Nourish Your Family Roots” Workshop.  
[http://freepages.genealogy.rootsweb.ancestry.com/~mikestevens/native\\_american\\_genealogy.htm](http://freepages.genealogy.rootsweb.ancestry.com/~mikestevens/native_american_genealogy.htm)
- Family Tree Templates.  
[https://www.google.com/search?q=family+tree+template&hl=en&prmd=imvns&tbn=isch&tbo=u&source=univ&sa=X&ei=mFLST804hpzxBK\\_1geMD&ved=0CKQBELAE&biw=1366&bih=673](https://www.google.com/search?q=family+tree+template&hl=en&prmd=imvns&tbn=isch&tbo=u&source=univ&sa=X&ei=mFLST804hpzxBK_1geMD&ved=0CKQBELAE&biw=1366&bih=673)

### *Activity: Ancestral History*

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The techniques for collecting an oral history are described in the interviewing and Family Detectives activities included in the English/ Language Arts section for *Coyote and the Turtle’s Dream*. Ten questions are suggested that could help students start a family history book about their living relatives. Now that they have constructed a family tree, students know the identities of more people in their lineage. Finding out information about them will involve talking to more relatives and asking questions that dig deeper into the history of their families. Here are some suggested questions for family interviews:

- Who was the oldest relative you remember as a child? What do you remember about him or her?
- How did our family get its name?
- How did our family come to live where we do today? If we are not in our original homeland, where did we come from? Why did we move?
- What stories have come down to you about your parents? Grandparents? More distant ancestors? What were some of the things that happened during their lives?
- Are there any stories about famous relatives in our family? Did any of them do really interesting or exciting things? Join the rodeo? Become a war veteran? Fight forest fires?
- Ask your relatives if they are familiar with the names on your family tree. Do they know who these people are or were?
- Did any of the people on the family tree move away? Where are they or their descendants now?

Have students write up their interviews. Follow up by scheduling a class period for students to narrate their family tree by presenting highlights of their family’s history.

## *Activity: A Community Tree*

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### *Materials*

- Butcher paper
- Magic markers
- Paste or tape
- Copies of class members' family trees

As students share their family histories, they can appreciate their commonalities in terms of values and beliefs, stories of triumph and struggle, and ties to a specific land. As students examine their family trees, they will come to appreciate one of the most important aspects of tribal and community belonging: kinship.

Have students compare their family trees with those of their classmates. Ask them to consider these questions:

- Do any of the people in your family tree share a last name with people in other family trees?
- Do any of the people in your family tree show up in other trees? Like your parents, grandparents, or great-grandparents?
- Is the son or daughter of someone in your tree married to someone in a classmate's tree? Did they have children?
- Is there a married person in your family tree who was also married at one time to someone in a classmate's tree? Did they have children?
- Looking way back in your family tree, do you share a common ancestor with someone in your class or school?

Have students make a list of all of their classmates with whom they share a living relative or an ancestor. Beside each classmate's name, list the names of the relatives and ancestors shared. Make a count of the male and female relatives they have in common.

Questions for students: How many of their classmates' families are they related to? Can they find individuals in the family trees that are ancestors to many students? Who are they?

Now the class is ready to make a community tree. Spread out butcher paper on the floor. Draw a large tree with many branches. Paste the family trees that share the most relatives on a single branch. Then name the branches. The branch may be named after an ancestor, a family surname, or other term that categorizes the family relationships. In some tribes, clans or other kinship relationships may determine the number and kinds of branches.

## Being a Good Relative: Bullying: Forgetting Our Relatives

### Objectives

- Define bullying and kinds of bullying.
- Understand why bullying is so harmful.
- Understand some of the reasons why people bully others.
- Learn ways to deal with bullies.
- Identify ways that bullying can be prevented and stopped.

### Background for Teachers

Harmony is a key cultural value in American Indian and Alaska Native communities. Harmony is the result of living a life in balance. A balanced life is a healthy life. This state of wellness is created through equilibrium in the emotional, physical, mental, and spiritual aspects of our being. The people who support us in attaining a life in balance are our families and the members of our larger community. In turn, we support them by acting in ways that uphold the traditional values that many tribes hold in common: respect; generosity; kinship and good group relations; honoring elders; being humble; gratitude; bravery; and being spiritually connected to people, animals, and the land.

This interaction is about what it means to be a “good relative” and, as we have learned, in Native communities that is not just an expression. It is the core of the eagle’s message about following healthy traditions. If we asked the eagle what he thought about bullying he would probably say, “We help to prevent bullying the same way we help to prevent type 2 diabetes—by reaching out to our relatives and working together to create a life in balance.”

One of the major themes in *Hummingbird’s Squash* is the struggle against bullying, a behavior which threatens the health and well-being of students at Thunder Rock Middle School. In the story, the primary bully, Chris Sorrel, does not know how to be a good relative. As we read the story, we find out why Chris is the way he is. We also read about how Hummingbird and her friends, our animal heroes, the teachers, families, and others in the community all work together to restore the harmony at the school. They do this by reminding us about what it means to be a good relative. The activities in this section examine what bullying is, the characteristics of bullies and its causes, and include some ways to prevent and stop it. Most of the information referenced in these activities is derived from the online resources provided at the end of this section.

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### **Activity: What is Bullying?**

#### *Defining “Bullying”*

Engage students in a discussion about what bullying is. Encourage them to draw on what they read in *Hummingbird’s Squash*. Guide the discussion so that the following three key characteristics of bullying are included: 1) an attack or intimidation with the intention to cause fear, distress, or harm, 2) a real or perceived imbalance of power between the bully and the victim, 3) repeated attacks or acts of

intimidation between individuals over time. With class input, help students to agree on a definition of bullying in their own words. If students wish to discuss their own experiences with bullying, teachers should arrange for a session with the school counselor and/or follow their school's anti-bullying policies.

### *Kinds of Bullying*

There are several kinds of bullying: verbal (name-calling, insults, and teasing); relational or *psychological/social* (spreading rumors, ignoring, and acting in ways to make other people feel not wanted or excluded from activities); *physical* (hitting, pushing, tripping, and destruction or stealing of personal items and property); *spiritual* (mocking or scolding others because of their religious or spiritual beliefs); and *electronic/cyber* (bullying that occurs through online chat rooms or blogs, instant messaging, text messaging, e-mails, and videos or pictures posted on Web sites or sent through cell phones).

Discuss the different kinds of bullying with students. Then ask them to identify the kinds of bullying that happened in *Hummingbird's Squash*.

### *Consequences of Bullying*

Bullying can have physical, mental, and emotional consequences. Bullying can result in physical injuries and even death. Young people who are bullied can feel stressed, worried, and depressed. Young people who are victimized can struggle to concentrate, may have sleep difficulties, can feel physically sick, and have difficulties doing their schoolwork. Young people who bully others also have difficulties and are at increased risk for substance use, academic problems, and violence later in adolescence and adulthood. When a young person is both a bully and a victim, they have a greater risk for experiencing mental health and behavior consequences than their peers who are only a bully or only a victim.

Ask students to reflect on the story. What were some of the consequences of bullying for Hummingbird? What were the consequences for Simon? Were there other students at Thunder Rock Middle School who experienced bullying? What were their reactions? Ask students to describe how they think it feels to be bullied. Remind students that Chris was bullied, too.

### *Consequences in Tribal Communities*

When people bully, they can bully strangers, peers, and their own relatives—people with whom they share ancestors and history. Discuss with students how bullying affects individuals and the community. Include these questions and explore by asking students to explain their answers:

- Does bullying make victims feel like they don't matter? Like their ancestors and history don't matter?
- Does it make them feel different? Like they don't belong?
- Does it make them less likely to trust people on whom they should be able to depend?
- How does bullying affect those who witness it? Does it make them feel bad? Do they just accept it? Do they join in?
- What effect does bullying have on the bully?

- Does bullying weaken the health of the community? Has the community become less steady, less strong? What happens to community harmony?

### *Activity: Why Do People Bully?*

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#### *Kinds of Bullies*

Oftentimes, the victims of bullies will ask—“Why is he/she picking on me? What causes them to act that way? Why do they think they can act that way?” The answers to these questions usually relate to the kind of bully a person is and to personal characteristics that relate to his/her environment.

There are two basic kinds of bullies. Teachers will probably want to translate the following descriptions into terms that would be commonly understood by middle schoolers:

- Some are well-connected to their peers, have social power, are overly concerned about their popularity, and like to dominate or be in charge of others.
- Some are more isolated from their peers and may be depressed or anxious, have low self-esteem, be less involved in school, be easily pressured by peers, or not identify with the emotions or feelings of others.

Which kind of bully was Chris? Which kind was Walter? Which kind was Larry? Do Walter and Larry show all the characteristics of their type of bully? Does Chris?

Although students know less about Mindy or Chris’s brothers, Melvin and Jesse, they may be able to find characteristics in these descriptions that describe them, too.

#### *Characteristics of Bullies*

A number of factors can increase the risk of a young person to engage in bullying. These influences include a family environment with little warmth and affection, high levels of conflict, and limited parental involvement. Youth who are impulsive, behave aggressively in other ways, and believe it is okay to engage in violence are more likely to bully others. It is important to remember that the presence of these risks do not always mean a young person will become a bully. It is also important to know that a bully does not have to be bigger or stronger than his or her victim. The power imbalance between a bully and victim can come from a number of sources, such as popularity, older age, and intelligence.

Which characteristics below are most like Chris? Which ones are most like Walter or Larry?

- Bullied by others at school
- Bullied by family members
- Has a parent that ignores bullying behavior; little discipline at home.
- Has a parent that displays bullying behavior.
- Sees bullying behaviors and other forms of aggression as okay.
- Believes that parents don’t care about him/her; parents don’t share feelings.

- Has to be in control of others.
- Needs to feel superior.
- Feels rewarded by others when joining in bullying behavior.
- Feels powerful because others fear him/her; enjoys the reputation.
- Believes that rules are for other people.
- Can't feel what others feel.
- Gets angry easily; takes offense easily.

In Chapter 10, "Coyote's Diagnosis," the coyote puts Chris through some tests to find out why he bullied people. What did Coyote think the problem was? How did he think Chris got that way? Was Coyote right? Did Coyote have hope that Chris could change?

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### *Activity: Steps to Prevent and Stop Bullying*

#### *Myths About Bullying*

One of the first steps in preventing bullying is to understand that bullying isn't just a normal part of school life. Now that students have read *Hummingbird's Squash* and have learned more about bullying in activities 1 and 2, they are ready to address some of the common myths about bullying. Have students answer the True/False Questions for the quiz, "Myths about Bullying" (see below). Hold a discussion about the students' answers regarding these common beliefs.

#### *Myths About Bullying*

*Bullying is just harmless teasing*

**Answer:** False. While many bullies tease, others use violence, intimidation, and other hostile tactics. Sometimes teasing can be funny and the person being teased is in on the joke. But bullying always hurts.

**Discussion:** There are many forms of bullying. Let's see if you can identify them and the impact bullying had. Was Chris bullying Hummingbird when he was teasing her? How did Humming-bird feel? Were Melvin and Jesse teasing when they bullied Simon at the recreation center? How did Simon feel?

*Some people deserve to be bullied— they bring it on themselves.*

**Answer:** False. No one ever deserves to be bullied. No one "asks for it." Bullies will often harass people who are different in some way. Being different is never a reason to be bullied.

**Discussion:** Why was Arianna bullied? Did she "deserve" to be bullied because she has type 1 diabetes? Was the sound of her insulin pump's alarm a reason to embarrass her? Did Simon "deserve" to be bullied by his cousins because he was awkward when he tried to sing and dance? Discuss with children why it is never justifiable to pick on someone who looks different, acts or speaks differently, has an illness or disability, or just doesn't know the things that "everyone knows."

*Only boys are bullies*



**Answer:** False. Both boys and girls can be bullies. Sometimes the type of bullying done by boys and girls may be different, but all forms of bullying can be harmful. Boys are more likely than girls to physically bully others. Physical bullying can be very noticeable, which is why there is a myth that only boys, not girls, are bullies. Girls tend to use less obvious forms of bullying, such as spreading rumors and embarrassing or excluding others. While this type of bullying is less direct or obvious, it is just as harmful.

**Discussion:** There were not many girl characters in the book who were bullies. But Chris’s “groupies” supported him, especially Mindy. Why did Mindy take the science test to Mr. Pence? Why did she lie about finding it? Was she bullying Hummingbird, too? Girls often bully just as much as boys, but in different ways.

Even though they may not do it intentionally, students may encourage bullies by gossiping and spreading rumors. How did Sammie, Little Deb, and Star help to make Chris’s cyber attack on Rain more successful?

*People who complain about bullies are babies*

**Answer:** False. People who complain about bullies are standing up for their right not to be bullied. They are also letting others know that bullying is hurting them or someone else and that hurting others is not acceptable in their school or community.

**Discussion:** To whom did Rain, Simon, and Boomer complain about Chris’s bullying? Whom did Hummingbird and Arianna talk to? Whom did Walter and Larry confide in? What did they say? Did they sound like babies?

*Bullying is a normal part of growing up*

**Answer:** False. Getting teased, picked on, pushed around, threatened, harassed, insulted, hurt, or abused is never normal or acceptable behavior. Bullying can result in physical injury, social and emotional distress, and even death. Believing that bullying is normal and acceptable lessens the likelihood that someone will say or do anything to stop it.

**Discussion:** Were there people in Thunder Rock that thought it was normal to be bullied? What did Simon’s cousin say to him when he complained about Melvin and Jesse running him out of the recreation center? Was this good advice? Did he seem to accept the situation? Do you think he said anything about Simon’s complaint to an adult in the family? Did Hoke, Chris’s stepfather, think bullying was normal? Did his acceptance create a “normal” family environment for Chris?

*Bullies will go away if you ignore them*

**Answer:** True and False. Ignoring a bully is a good nonviolent way to try to stop the bullying, and sometimes this strategy makes bullies go away. Unfortunately, ignoring does not always work, and some bullies may keep bullying others until they get a reaction. Other strategies include children talking to a trusted adult if they are bullied or see others being bullied. The adult can potentially help find a nonviolent solution and can give comfort, support, and advice if they can’t solve the problem directly.

**Discussion:** Can you think of a scene in *Hummingbird’s Squash* where Rain and the boys made jokes and

were trying to ignore Chris? What happened in this scene when Chris got frustrated because Rain, Boomer, and Simon did not seem to be taking him seriously? Did he stop bullying or bully more? Who realized that Chris's bullying was becoming more threatening and harmful? What did Walter and Larry do? Even though they later made half-hearted attempts at bullying Simon (on Chris's orders), did they want to continue bullying Simon? Why not?

*All bullies have low self-esteem. That's why they pick on other people*

**Answer:** False. Some bullies have high self-esteem and some have low self-esteem. Most of the time, bullying isn't about high or low self-esteem. It's about having power, especially power over other people.

**Discussion:** Did Chris have high or low self-esteem? What evidence do you have for his opinion about his own abilities and intelligence? Did he think he was smarter than other people? What about Walter and Larry? How did they feel about themselves? What were these three characters trying to achieve by bullying other people?

*It's tattling to tell an adult when you're being bullied or see someone else being bullied*

**Answer:** False. It's smart to tell an adult who can help you do something about bullying. It's also smart to tell an adult if you see someone else being bullied. Bullying is a form of victimization or peer abuse. Just like we do not ask victims of other forms of abuse (child abuse) to stay quiet and deal with it themselves, we should not expect victims of bullying to remain silent.

**Discussion:** In the story, the 6<sup>th</sup> graders didn't tell anyone that Walter and Larry were taking their money. They were afraid of being beaten up. But when other children saw the bullying and told their teachers, the stealing stopped. Chris said anyone who told was a "snitch." Why is it braver to report bullying than to turn away and ignore it? Why does fear of being called a snitch play into the hands of bullies? Is calling someone a snitch making bullies more powerful?

*The best way to deal with a bully is by fighting or trying to get even*

**Answer:** False. If you fight with a bully, someone might get hurt. Plus, you might get into trouble for fighting. If you try to get even, you're acting the same way as the bully and your acts may contribute to the bullying continuing or getting worse. Either way, fighting only makes things worse. Better solutions are ignoring the bullying, telling the bully to stop in a clear and calm way, using humor to change the situation, and telling a trusted adult to get support.

**Discussion:** Neither Rain nor Hummingbird or any of their friends dealt with Chris's bullying by fighting, nor did they try to play any dirty tricks on Chris to get even. How did they deal with the situation? What did they do to protect themselves? Did Granma's recommendation that they "stick together" work?

*People who are bullied might hurt for a while, but they'll get over it*

**Answer:** True and False. The effect of bullying really depends on the person and the situation. Bullying can have serious effects that can last a lifetime. Bullying can result in physical injury, social and emotional distress, and even death. Victimized youth are at increased risk for depression, anxiety, sleep difficulties, and poor school adjustment, and these difficulties can continue even after the bullying

stops.

**Discussion:**

- Chris was bullied by his stepbrothers for years. Do you think he will easily forget their bullying? Do you think he will need help in trying to get over his anger? Will he need help in learning how to relate to other children and his family in another way? What kind of help will he need? Does Coyote think that there is hope for Chris?
- As for Larry, how did he feel about being called Tater Tot? Had the nickname hurt him for a long time?
- How had Simon's confidence been affected by his cousin's ridicule? Did Rain and Boomer convince him to join the drum group? Did he join in the Grand Entry at the pow-wow? Why not?
- Why do you think Hummingbird and Arianna were able to get over Chris's bullying so quickly?

*Getting Serious About Prevention*

As the True/False test shows, many commonly held beliefs about bullying are not true. Bullying is not something that has to be tolerated. There are various ways that bullying can be prevented in schools and communities; some of these are included in *Hummingbird's Squash*. In the book, Rain, Hummingbird, and their friends got serious about preventing bullying. Their school, the parents, and others in the community got serious, too. Have students discuss the following questions about ways *Hummingbird's Squash* encourages the prevention of bullying. (For a list of the anti-bullying strategies and attitudes in the book that answers these questions, see below.)

**Hummingbird, Rain, and Their Friends**

- What did they do to follow Granma and Joe's advice? How did this advice reduce their chances of being a victim? How did it reduce the chance that a bullying incident would become more violent? How did Simon and Arianna behave when they were bullied?
- Why did Walter and Larry want to stop bullying? How did Hummingbird, Arianna, and the boys respond to Walter and Larry? How were their actions shaped by Sky Heart's message to follow their traditional ways?
- What does preventing type 2 diabetes have in common with preventing bullying?

**School Administrators and Teachers**

- Describe what Mr. Berry did to control and move to stop the bullying situation? What did the teachers do? How did Mr. Berry find out that Chris was behind stealing other kids' lunch money? What steps did Coach Brown take when Chris acted out at the basketball tryouts? How did Mr. Berry and the Coach handle the situation with Walter and Larry?

**Parents and Family**

- What did Hummingbird's mother, Darlene, do when Bird told her about Chris? What did Granma say when Rain told her about Hummingbird's being bullied? What did Tom, Hummingbird's

father, do when she told her family about the vandalism at the garden? Did Hummingbird's family press charges against Chris when he confessed to tearing up the garden?

### **Other Community Members**

- How did Boo help Walter and Larry stop bullying? What was Boo's attitude toward Walter and Larry when he found out they had been stealing? How did Willard, the police chief, handle Chris's vandalizing Hummingbird's squash at the Annual Harvest Fair and Pow-Wow? What advice did he give Hoke and Althea, Chris's parents?

### *Messages in Hummingbird's Squash that Address Bullying*

#### **Messages that involve the actions of students**

- Talk to your parents and teachers if someone is bullying you.
- Tell your teacher if you see someone bullied at school. Don't be a bystander that does nothing.
- Avoid fighting if you are bullied.
- Stick with your friends if someone is bullying you. Don't be alone.
- Support your friends if they are upset about being bullied.
- Accept apologies and offers of friendship from children who seek to make amends for bullying.
- Don't exclude others from school activities.
- Damaging the property of others for the purpose of hurting them is bullying.
- Gossiping or spreading rumors at school (including spreading rumors on the Internet) are forms of bullying.

#### **Messages that involve the actions of school administrators and teachers**

- Pay attention to children's reports of bullying.
- Teachers should intervene in bullying situations.
- Schools should assign teachers to oversee school grounds and activities.
- There should be consequences for bullying behavior.
- Teachers should report incidents and children's reports of bullying to the principal.
- Schools should seek to understand the circumstances of bullying situations and investigate reports of bullying.
- Principals should inform parents about their children being bullied or bullying others. They should also offer advice and resources to help children stop bullying and support those who have been bullied.
- Schools should educate children about bullying and work on adopting anti-bullying policies that teachers, parents, and children understand and support.

- Schools should seek ways to support children in changing the behaviors that promote bullying.
- *Youth Novels: Educators and Community Guide*

#### **Messages that involve the actions of parents and families**

- Take children’s reports of bullying seriously.
- Communicate with the school about bullying incidents your child reports.
- Give appropriate anti-bullying advice to children.
- Take the school seriously if the principal or a teacher reports to you that your child is involved in bullying.
- Seek to understand why your child is bullying others.
- Try to understand the effects of your child’s bullying on others.
- Seek help as a family when looking for programs to help a child stop bullying.
- Parents of bullies and children who have been bullied should seek non-confrontational resolutions to the situation.

#### **Messages aimed at community members**

- Support children’s wants and needs to be involved in community activities that build self-esteem and belonging.
- Offer positive experiences and appropriate advice to others about community services.

### ***Activity: School Anti-Bullying Policy***

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Have students create their own version of the Thunder Rock Middle School Anti-Bullying Policy, Being a Good Relative. Refer them to their discussion about what school administrators and teachers can do to prevent bullying. Also have them consider the actions of parents and students. (Teachers may wish to refer to the provided online resources that show various examples of policies.)

Check to see if your school district or school has an anti-bullying policy. If one is available, review it with the students. How does it compare with the classes’ own policy statements in Being a Good Relative?

#### ***Online Resources***

- Stop Bullying.gov. A comprehensive site for anti-bullying strategies.  
<http://www.stopbullying.gov/index.html>
- Youth Violence: Electronic Media and Youth Violence—A CDC Issue Brief for Educators.  
<http://www.cdc.gov/ViolencePrevention/pub/EA-brief.html>
- Electronic Aggression: Technology and Youth Violence.  
<http://www.cdc.gov/ViolencePrevention/youthviolence/electronicaggression/index.html>

- Stand Up Against Bullying in Indian Country. Indian Health Service Video PSA. <http://www.stopbullying.gov/videos/2011/12/bullying-in-indian-country.html>
- Canada Safety Council. Positive Steps Against Bullying: A Teacher's Guide. Long and short term anti-bullying strategies. <http://www.bullfrogfilms.com/guides/bullyguide.pdf>

## Art and Music

### Posters and Flyers

#### Objectives

- Learn about health promotion.
- Design a poster or flyer.
- Write persuasive or promotional health messages.

#### Background for Teachers

In the English/Language Arts section for *Coyote and the Turtle’s Dream*, we wrote invitations to friends and family asking them to read the book. To convince them, we used a strategy called “persuasion writing.” We can also use poster art to persuade people—to go to a movie, to join a club, to vote for a candidate, to read a book, or to adopt a healthy behavior. Professional artists are often employed to create posters that display health messages. This is an important activity called “health promotion.” The goal of health promotion is to encourage people to take action by adopting healthy behaviors and creating healthy environments.

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#### **Activity: Making Posters and Flyers**

Define the difference between a poster and a flyer for students. A poster is a piece of paper, displayed on a wall that usually includes pictures and text that are eye-catching and communicate a message. A flyer is smaller than a poster and is usually printed and distributed on inexpensive paper in large numbers. Flyers are displayed in public places and direct people to a service or contain a simple message. An example of a simple health message would be, “Eat Your Five Fruits and Vegetables Today!” or “Sign Up for Summer Swimming at the Recreation Center—Now!”

Instruct students to think about what they want their poster or flyer to communicate, and who they want to see them—that is, they should determine their “audience.” The audience is the group of people they want to influence with the message on their poster or flyer. The message may be to encourage others to read *Hummingbird’s Squash*, convey the importance of growing gardens, protecting environments native to their area, or engaging in physical activity and eating fruits and vegetables. Ways to prevent bullying would make a good poster, too.

Next, have students select some exciting scenes from *Hummingbird’s Squash* that convey their message(s). Remind students that it is important to select a scene that will grab the attention of people walking past their posters. Then, illustrate the scenes and write “copy”—the text that provides the information they want their audience to see. These posters could be displayed in the school library or lunchroom, or at the grocery store, a health clinic, or a local recreation center (with proper permission, of course). Telephone poles might work, too!

### *Materials*

- Poster board of various sizes
- 8 x 11 paper (for small posters or flyers)
- Colored markers or tempera paints.

### *Cross-Curricular Connections*

This activity would work best with collaboration between Art and English/Language Arts teachers.

### *Career Connections*

Go to Career Connections in the Guide for information about public health professionals and artists who work together to promote healthy behaviors.

## **Storytelling with Pictures**

### Objectives

- Translate book text into pictures.
- Create “sequential art.”
- Learn what comic book artists do.

### Background for Teachers

Many artists work as illustrators in the publishing industry, drawing the pictures in comic books and graphic novels. A comic book illustrates a short story in picture panels. Modern comics usually feature a set of popular superheroes like Superman or Spiderman. A graphic novel is much longer and is usually a one-of-a-kind story. Many times a graphic novel is based on a written novel.

A whole team of artists’ works with a writer’s script to bring a story to life through the development of illustrated characters and background settings. Artists called “pencillers” draw the pictures of characters, and artists called “inkers” draw the black lines around the figures. There are also “painters” who put in the color and “letterers” who place text in the captions and dialogue bubbles on the pages.

### *Activity: Making a Storyboard*

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Have students choose a scene in *Hummingbird’s Squash* that shows some action. There are many scenes that are exciting and have a health message about preventing type 2 diabetes. Make sure that the scene can be shown as sequential art—that is, the characters are doing something that can be illustrated in a series of panels. Give students the following instructions so they can take on all the illustration tasks or share the tasks with a partner:

- Have students write what their characters are saying to each other.
- Then sketch what is happening in the series of panels. These drawings are called “a storyboard.” Students may want to play around with several ideas, so don’t spend too much time on these



drawings. Choose the storyboard that seems to work the best.

- Sketch speech bubbles in the panels. Then insert the dialogue. Do the words fit in the bubble?
- Now students should redraw their figures, add speech bubbles, and color the panels (if students draw their storyboard in blue pencil, they can redraw on top of the blue pencil sketches, then photocopy the sheet of paper and apply color. The blue pencil sketch will not show through). Remind students to put in some background that shows the setting.
- Teachers can print examples of speech bubbles from the online resource provided. The bubbles show whispers, thinking, sounds of a phone ringing, a radio broadcast, etc.

If students would like to see how it's done, compare the novel, *Coyote and the Turtle's Dream*, to *Coyote and the Turtle's Dream: the Graphic Novel*. They will notice that Patrick Rolo, the artist, sometimes changed the story. If a graphic novel is different from the book on which it is based, it is called an adaptation.

Students may also want to make up their own stories or choose a favorite comic book character for their sequential art.

### *Materials*

- Construction paper or typing paper
- Pencils
- Blue pencils (optional)
- Colored markers, water colors, or tempera paints.

### *Online Resources*

- Comic Book Grammar and Tradition. <http://www.blambot.com/grammar.shtml>

## **Native Science Cards**

### Objectives

- Select and research an invention or discovery made by Native peoples in North, Central, or South America.
- Design, draw, and write a description for a "Science Card" using a selected science/technology theme.

### Background for Teachers

This set of activities is very cross-curricular. It is included in Art and Music because the activities can best be done in art class. However, English/Language Arts, Social Studies, and Science are heavily involved. Twelve Native Science and Technology Cards are provided on the Native Diabetes Wellness Program Web site. They show many inventions and scientific discoveries of the indigenous peoples of North, Central, and South America. The cards feature math, astronomy, time keeping (calendars), water

engineering, plant- growing techniques, food preservation, building technology, and transportation. The cards, however, cannot possibly display all of the important contributions that American Indians and Alaska Natives have made to the world.

### *Activity: Making Native Science Cards*

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#### *Materials*

- 8 x 11 card stock
- Colored pencils or fine-point colored markers

#### *Procedure*

Print copies of the Science and Technology Cards from the Native Diabetes Wellness Program Web site: <http://www.cdc.gov/diabetes/projects/diabetes-wellness.htm> for students to review. Have them look at the way the cards are designed with pictures of the inventions and discoveries on one side of the folded card stock, and a written description on the other side. The graphics side of the card includes a border with symbols that show the card's theme, such as math/astronomy, growing techniques, etc. and several pictures that portray the specific scientific contribution.

Ask students to go online and research Native contributions from the suggested Web sites provided. They can print information about the inventions and discoveries and any illustrations or photos available. Students will then be prepared to design and draw their own cards, choosing to 1) expand on the current Science Card topics, or 2) develop cards with new themes.

#### *Health and Medicine*

Students may choose to select medicinal plants (pharmaceuticals); dentistry and surgery; and mental health therapies. Or class members may want to investigate Native medicines that their own Tribe uses.

#### *Writing Systems*

The peoples of Central America had a variety of writing systems, some of which were phonetic, meaning that symbols represented sounds in their languages. Look for facts about the first writing discovered in the Americas (the best guess by archeologists is that it was developed by the Olmecs). Also check out indigenous writing systems in North America like the Wiigwaasabak birch bark scrolls of the Ojibwa and the Mi'kmaq writing system. The Cherokee syllabary (developed by Sequoyah) is also a fascinating invention which allowed the Cherokees to print materials and communicate in their own language in post-European contact times. Students may find it interesting to see what a written phrase looks like in Maya writing—just go to the listed Web site and type in 240 characters for immediate translation.

#### *Textile and Basket Manufacture*

Examine loom and weaving technology and the uses of textiles for ceremonial, artistic, and, increasingly, commercial purposes. Also research basket-making techniques and water-proofing methods.

## Ceramics

Pottery from the Americas is known for its utility and artistic decoration.

## More Foods That Feed the World

Review the many fruits, vegetables and spices that grew on the Miraculous Tree in *Hummingbird's Squash*. A most interesting card would be on the history of maize (corn). Students might also be interested in creating a card for the many kinds of squashes and gourds grown in the Americas. Of course, nobody has ever really seen a squash 9 feet tall like Hummingbird's squash! The stinking buffalo gourd, otherwise known as "coyote squash," may make a very attractive card, too. Coyote would think so.

## Online Resources

- Free Online Translator of Your Language into Mayan Glyphs.  
[http://www.event12.com/mayan\\_glyphs/index.html](http://www.event12.com/mayan_glyphs/index.html)
- Ojibwa Writing. <http://en.wikipedia.org/wiki/Wiigwaasabak>
- Mi'kmaq Hieroglyphic Writing. [http://en.wikipedia.org/wiki/Mi%27kmaq\\_hieroglyphic\\_writing](http://en.wikipedia.org/wiki/Mi%27kmaq_hieroglyphic_writing)
- Overcoming Challenges: Sequoyah's Syllabary.  
<http://www.sequoyahmuseum.org/index.cfm/m/6>

## Activity: Coyote Cards: Wild Facts and Fun Stuff from the Native Peoples of the Americas

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Students may also enjoy making some "Coyote Cards" that describe other inventions, including some of the fun ones below:

- **Chewing gum and bubble gum!** (Central America) Make a Coyote Card. Just don't stick it under your desk.
- **Laundry Detergent.** (North America) Check out coyote squash root. The Cahuilla and Diegueno people in California did, and they found a "combo" stain remover, bleach, and laundry detergent. It works as an insecticide, too.
- **Toboggans!** (North America) Originally designed for transportation, now an Olympic sport!
- **Popcorn!** (North, Central and South America) What would the movies be without it?
- **Blowguns.** (North, Central, South America) Very useful in hunting small game—silently!
- **Float suits and water proof suits.** (North America: Inuit) If an Inuit hunter fell out of his kayak, he just might be wearing an invention that would save his life.
- **Snow Goggles.** (North America: Inuit) Who needs sunglasses? The Inuit used the goggles to protect their eyes from snow blindness.
- **Hammocks.** (South America) Two trees and a summer day is all you need for a comfortable

snooze, thanks to the people of Amazonia.

- **Toys.** (Central America) Stilts, kites, wheeled animals; (North America) Tops, board games and “buzzers.”
- **Ball Games.** (North, Central, and South America) Ice hockey and field hockey (based on lacrosse and stickball), double-ball, and the Mesoamerican ball game.

### *Extension Activities*

An excellent extension activity (cross-curricular with English/Language Arts and Social Studies) is an exploration of the life of Nezahualcoyotl (1402 –1472) or as his name translates from the Nahuatl language: Fasting Coyote or Hungry Fox (or Hungry Coyote). Nezahualcoyotl was king of the city of Texcoco, one of the cities in the Aztec Triple Alliance. He was a great engineer, city planner, sponsor of the arts, and a poet. He designed the Chapultepec aqueduct and founded a school of music. His poems and songs were recorded by his grandson and have come down to us today.

Students will also enjoy learning about Sequoyah, the inventor of the Cherokee syllabary. A syllabary is a set of written symbols that represent the syllables that make up words. A symbol usually represents a consonant sound followed by a vowel sound. Although Sequoyah did not read or write English, he was determined to develop a writing system for the Cherokee language. He worked on the syllabary for 12 years, finally introducing it to the Cherokee people in 1821. By 1828, the Cherokees were printing their own newspaper, the *Cherokee Phoenix*, using the syllabary.

### *Online Resources*

- Aboriginal Sports: Timeless Play. [http://www.aadnc-aandc.gc.ca/DAM/DAM-INTER-HQ/STAGING/texte-text/ach\\_lr\\_ks\\_rrds\\_spo\\_1302785051137\\_eng.pdf](http://www.aadnc-aandc.gc.ca/DAM/DAM-INTER-HQ/STAGING/texte-text/ach_lr_ks_rrds_spo_1302785051137_eng.pdf)
- Nezahualcoyotl. <http://en.wikipedia.org/wiki/Nezahualcoyotl>
- The Flower Songs of Hungry Coyote: Poet of Ancient Mexico. <http://www.red-coral.net/Hungry.html>
- A Brief Biography of Sequoyah. <http://www.sequoyahmuseum.org/index.cfm/m/5>

## Songs to Prevent Type 2 Diabetes

### Objectives

- Review the eagle’s health messages about physical activity, healthy diet, following the traditions of ancestors, and benefits of support from friends and family.
- Learn that successful health messages are often conveyed in ways that entertain and have cultural meaning.

### Background for Teachers

Students may enjoy doing some health promotion by writing and singing a song about preventing type 2 diabetes. In the language of health promotion, the song conveys “messages” that inform people about how to reduce their “risk factors” for developing type 2 diabetes. The song is considered the “channel” through which the students reach their “audience” with these messages.

Creating lyrics about Sky Heart’s messages would make a great song. Singing about Rain that Dances and his friends would be fun, too. Teachers can invite a member of a drum group to class to advise the students about composing a song. Or students could get ideas by listening to kids’ powwow songs that are available on iTunes.

Some favorites for kids have been recorded by the Black Lodge Singers (their Web site is provided in this section’s Online Resources). These songs feature popular cartoons, toys, and novelty songs, as well as songs about animals and childhood remembrances. Some popular titles are:

- Looney Tunes™
- Mighty Mouse™
- Mickey Mouse™
- Flintstones™
- Monster Mash
- Ask Your Mom for Fifty Cents
- Barbie’s™ Round Dance
- SpongeBob SquarePants™
- Little Bear
- When We Were Little Bitty Boys

## *Activity: Compose and Perform a Song*

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### *Procedure*

- Have students review the eagle's major health messages or identify passages from *Coyote and the Turtle's Dream* and *Hummingbird's Squash* that describe the various characters' positive health behaviors. Students should select the messages they want to sing about.
- Suggest that students create their own drum accompaniment, chose one used by the Black Lodge Singers, or chose one from a favorite song.
- Finally, have students write the lyrics. They may use free verse or rhyming words. Fit the words to the drum beat. Students can tape-record themselves to hear how their song sounds. Then they can make improvements as the song is developed.

Perform the song at a school assembly, pep rally, field day or at a community health fair. These events would offer good opportunities for the song writers to perform their song and share messages that will make their community a healthier place. That's good citizenship!

### *Online Resources*

Excerpts from contemporary songs for children recorded by the Black Lodge Singers can be heard at these Web sites:

- Kids' Pow-Wow Songs. <http://www.allmusic.com/album/kids-pow-wow-songs-r264366/review>
- Black Lodge: MORE Kids' Pow-Wow Songs.  
<http://store.canyonrecords.com/index.php?app=ecom&ns=prodshow&ref=CR-6387>

# Science: Part 1: Investigating Earth’s Environment

## Balance in Nature

### Objectives

- Identify the components of an ecosystem and explain the importance of maintaining biodiversity (the degree of variation in life forms in an environment) and a balance in the natural processes that create health in an ecosystem.
- Understand that there is a fixed amount of matter in our environment and that it is constantly recycled by natural processes.
- Identify and explain important cycles that occur in nature.
- Understand how ecosystems evolve (change) naturally over time through changes that pressure animals and plants to adapt, develop into new species, or go extinct.
- Identify the influences that humans have on natural processes that affect the health of ecosystems.
- Describe biodiversity and the role it plays in healthy ecosystems and the production of healthy foods.
- Identify the resources that provide the foods we eat and how humans manage these resources.
- Compare traditional American Indian farming techniques to the farming techniques in the 21st century; discuss current trends in farming and gardening that focus on local markets, sustaining resources, and more diversity in agricultural products.

### Background for Teachers

The earth’s environment—including the land, water, and atmosphere— is mostly “closed;” that is, while we occasionally exchange matter with the outside universe, the resources to support life on the planet are mostly fixed except for the energy we get from the sun. As a result, it is very important to understand, respect, and manage our natural resources to sustain the balance of life.

All matter and energy are recycled by different cycles in nature. Understanding these cycles is essential to appreciating how nature maintains balance and how human activities can sometimes interfere with or disrupt this natural balance. It is also important to understand that there are forces such as major weather changes or geological events that can disrupt the balance in nature. The natural world is dynamic, having amazing ability to adapt and repair itself. However, sometimes changes are so abrupt or profound that nature cannot adapt, and species must adjust or they will die out.

There is evidence in the geological and evolutionary records of both large- and small- scale environmental changes. For example, much of the current landscape in North America shows that vast areas were once covered in glaciers. There is also evidence in the fossil record that at various times in the ancient past most of North America was covered in oceans or had a very tropical environment. The

plant and animal species that inhabited North America have changed with these environmental shifts. Plant and animal species have either evolved to adapt to the changing environment or become extinct.

Natural events play the largest role in changing the environment, but humans also influence and change the environment on large and small scales. The purpose of some changes that humans have made was to make their lives easier and more predictable, such as clearing land to plant crops, channeling water to cities and farms, and building dams for flood control and power generation. However, in order to make good decisions about these changes, we need to consider the benefits to humans as well as any negative effects we might make on the environment as a whole. Unfortunately, we do not always understand the effects of humans on the environment until after we have interfered in many natural processes.

Examples are dams blocking spawning runs for fish, the drop in soil nutrients that occurs when flooding no longer replenishes the land, and human interference that disrupts the balance in predator and prey populations.

Our ability to harness nature by domesticating both plants and animals to provide a stable food source has affected both the quantity and quality of food sources. There are both positive and negative aspects of this domestication. While we have more plentiful and stable food resources, the nutritional value of many foods has decreased. For example, cattle raised on corn have a much higher fat content in their meat than do free-roaming grazers. Domesticated animals (like chickens) tend to need antibiotics to prevent diseases when they are housed closely together. Another environmental concern about modern farming is the nutrient runoff caused by over-use of fertilizers and disposal of animal wastes in relatively small areas. Excess nutrient runoff can lead to overgrowth of algae in water ways, and animal excrement can lead to bacterial infection of life forms that live in water.

Developing plants and breeding animals to have desirable traits (they grow fast and taste good) may produce animals or plants that are all alike, leaving them susceptible to being wiped out by insects, diseases, or climate change. The potato famine in Ireland in the mid-19th century is a good example. The variety of potato species grown and eaten by the Irish was very limited. When the potatoes were infected by a fungus, they rotted and the people starved. In more recent times, a variety of banana (the Big Mike) that was cultivated almost to the exclusion of all other varieties for the U.S. market was wiped out in South America and Africa by a fungus called Panama Disease. It disappeared from grocery stores by 1960. Growers replaced it with the Dwarf Cavendish, a smaller banana tree that was resistant to the fungus, but unfortunately is now infected by another strain of Panama Disease. As one would suspect, Dwarf Cavendish bananas are all just alike. They have little biodiversity—not a promising future for kids' cereal bowls everywhere.

However, susceptibility to disease is not the only drawback of plants and animals that are grown to the exclusion of other varieties and breeds. They may also promote bad health. Plants grown only for their higher starch or sugar content may taste good, but they offer much less nutrition, and animals bred to have higher fat content produce meat that is not good for human health.

Low genetic variability can also affect animals in the wild whose population has decreased because their habitat (like tall prairie grass, meadow, or forest) has been destroyed and replaced by cropland. They



have a hard time producing healthy offspring. An example of this is the near extinction of the Greater Prairie Chicken in Canada and the United States.

Selective breeding of animals and selective planting of certain crops reduces *biodiversity*. Plant biodiversity is needed because of the wide range of climates and soils that exist in different ecosystems. If all plants in an area were the same, then a single microbe or predator could wipe out the entire population. Diversity in *plant* life is what allows and supports the diversity of *animal* life. It is nature's way of protecting life on our planet.

While some species might die out over time, new species are always replacing them. The earth has a natural capacity to heal itself over time. For example, when habitats are destroyed by fire, there is a natural succession of plants that begin to grow, allowing the area to recover and repair itself. Humans sometimes can disrupt these natural processes because of our ability to engineer our surroundings and because we have very few natural predators. The biggest killers of humans are other humans and diseases. Because we have the ability to control our environment, we do not experience the same checks and balances that other species do. Humans put great stresses on the natural environment by our sheer numbers and our efforts to manipulate it. We build dams to control flooding and provide power. We strip forests for wood and prairies for agriculture. We build homes, factories, and electronic devices to make our lives easier. As a result, we need ever-growing sources of energy which we obtain from the environment. Humans are also the biggest polluters of the environment because of our industries which contaminate the air and water. Because of population growth and industrialization, we now have a huge responsibility to preserve and respect our environment, avoid wasting the resources we have, and repair the damage that we have caused.

There is much to be learned from Native traditions which promote biodiversity and efficient use of natural resources. Native peoples today are calling on their traditional values to help them restore seed diversity and promote sustainable forestry, organic farming, and free-range animal husbandry.

In Part 1, Investigating Earth's Environment— Balance in Nature, students will learn in Investigation 1 about ecosystems, primarily food chains, natural cycles, and predator/prey relationships. In Investigation 2 they will look at soils and composting, and in Investigation 3 they will focus on ecosystem producers and consumers, principally plant producers. Throughout, the class we will explore more about the wisdom of Native traditions that promote the health of the earth and all living things, including ourselves.

## Career Connections

Careers related to management of ecosystems and agriculture can be found in the Career Connections section of the Guide.

## Online Resources

- USDA National Resources Conservation Service. This site provides links to a multitude of lesson plans and teaching resources related to agriculture and the environment.  
[http://soils.usda.gov/education/resources/7\\_12/index.html](http://soils.usda.gov/education/resources/7_12/index.html)

- Biodiversity for Kids: Stage 2 Science—Teacher’s Guide. This teacher’s guide provides a wealth of lesson plans about biodiversity. This teachers’ guide provides a wealth of lesson plans that address biodiversity  
<http://www.environment.nsw.gov.au/resources/education/BiodiversityTeachersGuide.pdf>
- Biomes. A comprehensive site for kids that provide descriptions of all the different “biomes,” or large geographical areas characterized by certain plants and animals.  
<http://www.cotf.edu/ete/modules/msese/earthsysflr/biomes.html>
- Native Americans and the Environment, National Council for Science and the Environment. A comprehensive resource about environmental issues; farming, ranching, and fisheries; and conservation affecting tribes across North America. <http://www.cnie.org/nae/index.html>
- Geography for Kids, the Study of Our Earth: Ecosystems. Kids Geo: The Totally Free Children’s Learning Network provides an extraordinary array of earth sciences resources, games, and movies. <http://www.kidsgeo.com/geography-for-kids/0164-ecosystems.php>
- Sustainable Table Issues. Sustainable approach to farming and gardening.  
<http://www.sustainabletable.org/intro/>
- Biodiversity for Kids. An amazing resource from Mrs. Mitchell’s Virtual School that provides a large number of links to Web sites describing the issue of biodiversity around the world.  
<http://www.kathimitchell.com/biodiver.htm>
- Native Americans Modified American Landscape Years Prior to Arrival of Europeans. Impact of Native American cultural practices on the environment in the past.  
<http://www.sciencedaily.com/releases/2011/03/110321134617.htm>

## Investigation 1: Investigating Ecosystems

### Background for Teachers

An ecosystem is a set of relationships among the living resources, habitats, and residents of an area. An ecosystem like a forest would include plants, animals, micro-organisms, water, climate and soil.

Ecosystems can be very large like a forest or a desert, or small like a pool of water. Even the surface of our skin has a variety of mini-ecosystems. For instance, dry skin, oily skin, and moist skin create different environments that host different kinds of bacteria and fungi. The energy driving an ecosystem usually comes from solar energy (the sun) that is harnessed by plants and provided to animals. There are, however, other ecosystems, based on geothermal and chemical energy, that do not use sunlight.

Ecosystems that develop around hydrothermal vents in the ocean floor are an example. These cracks in the earth's surface eject or leak water heated to scalding temperatures by volcanic activity inside the earth. Bacteria living in or near these vents are fueled by chemicals dissolved in the hot water. Strange animals, like giant tube worms and blind shrimp, live near hydrothermal vents called black smokers. They feed on the bacteria and thrive in total darkness.

Plants and bacteria trap solar or chemical energy and are consumed by animals, moving the energy along a chain where animals eat other animals. As organisms get their food by consuming other organisms, energy cycles through the ecosystem. We can show this movement of energy by looking at *food chains*. A food chain based on solar energy is a system in which a producer (a plant) makes starch and passes it along to a number of consumers (a grasshopper eats the plant, a frog eats the grasshopper, a snake eats the frog, and a hawk eats the snake). When food chains overlap, they become part of a *food web*. A food web shows how the food chains of different plants and animals are interconnected.

Inorganic (non-living) materials also cycle through an ecosystem in a similar manner. Teachers may want to present information on the carbon, nitrogen, and water cycles, and discuss the flow of these substances through an ecosystem. Point out how these cycles are related to each other, the food chain, and an ecosystem. Teachers may also want to review or present how oxygen and carbon dioxide are kept in balance by the photosynthesis of plants and the respiration of animals.

An interesting “getting started” discussion would be to ask students why the balance between plant and animal life is so critical to the health of our planet. Introduce the concept of carrying capacity (the maximum number of organisms of various kinds that an ecosystem can support). When an ecosystem tries to support more plants and animals than it is capable of—exceeding its carrying capacity—organisms will begin to die off. What happens to the balance between predators (wolves) and prey animals (deer) when the predators are removed? What happens to the predators when the prey animals die off from disease or loss of habitat?

## *Activity: Create an Ecosystem—Terrarium in a Bottle*

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Duration: 45 minutes for set-up; one to two weeks of observations

Observing a terrarium is an excellent way to see an ecosystem in action. It gives a close-up view of the parts of an ecosystem, the recycling of energy through the system, food chains within the ecosystem, and how the ecosystem can change.

### *Materials*

For each group:

- An empty 2-liter plastic bottle
- Small plastic cap from another bottle (about one inch in diameter)
- Good top soil from outside
- Small plants about 2 to 3 inches in height
- Seeds (herb and coleus seeds work well)
- Small worms, snails, or insects
- Stream, lake, or river water
- Clear packing tape, 2 inches in width (to seal up bottles)

### *Procedure*

- Cut the plastic bottle in half about 4 inches up from the bottom. Make four vertical half-inch cuts that are equally spaced into the bottom edge of the upper half of the bottle. These cuts will allow the top half of the bottle to fit back inside the bottom half when re-assembled. (See the terrarium activity that follows).
- Fill the bottom of the container with about 3 inches of soil.
- Insert the small plants and seeds in the soil.
- Invert the bottle cap and bury it into the soil close to one side of the bottle. The edge of the cap should be even with the surface of the soil. The cap should form a small well.
- Carefully water the soil with the water from the stream, lake, or river, making sure the soil is moist but not overly wet.
- Fill the small cap with some of the water.
- Fit the top half of the bottle inside the bottom half, overlapping it about  $\frac{1}{4}$  to  $\frac{1}{2}$  inches. Seal the halves together using the clear packing tape.
- Add insects, snails, or worms through the top opening and reseal the bottle's cap.
- Place the terrariums on a well-lit shelf or table in the classroom.

## *Activity: Terrarium in a Bottle*

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**Reassembly of the Bottle:** Make sure soil is moist before re-assembling the bottle. To re-assemble, push the bottom of the top part of the bottle into the top of the bottom part of the bottle containing the soil and plants. The top piece should fit inside of the bottom piece and overlap by about ½ inch. Then tape the seam closed all the way around with 2-inch wide clear packing tape.

To add worms and insects, remove lid, drop them in, and re-seal the lid.

### *Follow-Up Activities*

- Now watch what happens over the next few weeks! How does the ecosystem in the terrarium grow and change? Write down your observations.
- What observations indicate that the ecosystems are active and healthy? Did the seeds sprout? Is there any evidence of stress? Are any plants or animals dead? Is there something out of balance?
- What evidence is there of the water cycle in the ecosystem?

At the end of the 2-week period, allow students to take their terrariums home for future observation.

### *Online Resources*

- Ecosystems. <http://library.thinkquest.org/11353/ecosystems.html>
- Herbivores. [http://education.nationalgeographic.com/education/encyclopedia/herbivore/?ar\\_a=1](http://education.nationalgeographic.com/education/encyclopedia/herbivore/?ar_a=1)
- Earth's Water Cycle. [http://education.nationalgeographic.com/education/activity/earths-water-cycle/?ar\\_a=1](http://education.nationalgeographic.com/education/activity/earths-water-cycle/?ar_a=1)
- The Water Cycle for Kids: A Placemat. <http://ga.water.usgs.gov/edu/watercycleplacemat.html>
- The Water Cycle. [http://www.epa.gov/ogwdw/kids/flash/flash\\_watercycle.html](http://www.epa.gov/ogwdw/kids/flash/flash_watercycle.html)
- US Geological Survey Ecosystems. <http://www.usgs.gov/ecosystems/?item=ecosystems>
- Nitrogen Cycle. <http://extension.missouri.edu/p/WQ252>
- Kids Corner Ecosystems. <http://forest.mtu.edu/kidscorner/ecosystems.html>
- Nitrogen Cycle Animation. [http://www.classzone.com/books/ml\\_science\\_share/vis\\_sim/em05\\_pg20\\_nitrogen/em05\\_pg20\\_nitrogen.swf](http://www.classzone.com/books/ml_science_share/vis_sim/em05_pg20_nitrogen/em05_pg20_nitrogen.swf)
- An Ecological System. [http://www.geography4kids.com/files/land\\_ecosystem.html](http://www.geography4kids.com/files/land_ecosystem.html)
- Carbon Cycle. <http://www.elmhurst.edu/~chm/vchembook/306carbon.html>

## *Activity: Investigating Food Chains—Energy and Matter Cycling*

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Duration: 60 minutes (class time)

### *Materials*

- Pictures of various plants and animals (printed photos from Web sites work well)
- Construction paper or poster board
- Colored pencils and markers

### *Procedure*

- Each student, a two-partner team, or a small group of students will research one animal online or from a library book. Animals can be those in *Coyote and the Turtle’s Dream* or *Hummingbird’s Squash* (the bald eagle, eastern cottontail rabbit, box turtle, coyote, and bison), or students may select any animal (large or small) of interest to them.
- Students will gather information about the animal’s habitat, which plants it eats, which animals prey upon it and which animals does it prey upon, its various other behaviors, special adaptations that enhance its survival, and anything else of interest about that animal. For instance, who were its ancestors? Did it originate in another location and migrate to its current territory? Which animal is its closest relative? (In *Coyote and the Turtle’s Dream*, the kids were very interested in Miss Swallow’s poster of the different bison species that existed in the past. Students may enjoy looking up *Bison antiquus*, the giant ancestor of today’s bison.)
- On a large sheet of poster paper construct a food chain to show where the selected animal gets its energy and where its energy goes. Start with sunlight and plants (primary producers) that the animal eats or that its prey would eat, then include who the animal provides energy to—that is, which animals eat your animal. Students should also include what happens to their animals when they die. Remind them that their animals, even when dead, remain a part of a larger food web. What types of other animals and plants consume or decompose animals that have died?

### *Follow-Up Activities*

Have students share their food chains with the class. Then create a larger food web by arranging the food chain posters on the classroom wall to show how the food chains of the different animals living in the same ecosystem relate to each other. Identify where the food chains of the chosen animals overlap.

### *Online Resources*

- Food Chain (a food chain game).  
[http://www.ecokids.ca/pub/eco\\_info/topics/frogs/chain\\_reaction/](http://www.ecokids.ca/pub/eco_info/topics/frogs/chain_reaction/)
- Another Link in the Food Chain. [http://www.geography4kids.com/files/land\\_foodchain.html](http://www.geography4kids.com/files/land_foodchain.html)

## ***Activity: Owl Pellet Lab—Everybody is Somebody's Lunch***

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### ***Background for Teachers***

The Owl Pellet Lab is a standard lab done in many biology classes. Owl pellets are the remains of a meal that the bird coughs up. They tell us what kinds of animals a predator like the owl has been eating. Owls are carnivores, animals that eat other animals. There are, of course, birds (the fruit and seed eaters) that don't eat other animals. They are herbivores, animals that eat plants. Like the owls, we can see what they have been eating by examining their droppings. And guess what? Their droppings are full of seeds! They spread the seeds over the land as they fly. The seeds germinate in soils to which they are adapted and new plants will grow. Birds are very important, therefore, to the health of many ecosystems.

Predators are a very important part of the ecosystem, too. They eat animal prey like rodents that reproduce quickly and need to have their population kept in check—so they don't overpopulate and throw an ecosystem out of balance. What do you think would happen if the mouse population suddenly exploded! What would they do to the plants?

But animals like our friend Coyote are special. They are omnivores—animals that eat everything. They eat animals and plants. In *Hummingbird's Squash*, Coyote eats the seeds in the fruit of the coyote squash and plants them in the hills near the town of Thunder Rock. His scat (another name for animal poop) would contain little bones and hair of the animals he ate, as well as seeds and other plant parts. This material is an excellent fertilizer and gives seeds a good start when they germinate. Raccoons and bears also spread seeds in the same way. Animal scat can play a very important role in an ecosystem. Check out this Web site for a photo of coyote scat (Tip: it's the one with the red seeds)  
<http://eternalyouthofnature.blogspot.com/2009/11/animal-poopie-dobles.html>.

### ***Materials***

Information on where to order owl pellets, background explanations, and lab procedures are given in the links below. There is also a Web site below which provides a Virtual Owl Pellet dissection. It is not as exciting as really cutting apart an owl pellet, but you don't have to wash your hands!

### ***Extension Activity***

In *Hummingbird's Squash*, Thistle says, "Eeewww" when Coyote tells her that he is going to fertilize the coyote squash seeds he has eaten with his own fertilizer. Coyote reminds her that rabbits eat their food twice. But Thistle interrupts him, stating that he is getting into "private rabbit business." Have students check out how rabbits produce cecal pellets, a special kind of nutrition pellet that rabbits re-eat to extract all the nutrition from their food. Rabbits obviously take recycling very seriously.

### ***Instructor Notes***

**Safety Note:** *If doing the real lab (not virtual), students should wash hands thoroughly after handling the owl pellets even if they haven't touched samples directly. Tables and counters should be disinfected (diluted bleach works well) even if the samples have not had direct contact with table surfaces. Samples should be disposed of properly by burning, composting, or bagging for proper trash disposal.*

### Online Resources

- The Mystery of Rabbit Poop. <http://www.bio.miami.edu/hare/poop.html>
- What is a Cecal Pellet? <http://www.sandiegorabbits.org/diet/cecal.html>

Owl pellets and lab materials can be ordered at the sources listed below:

- Mountain Home Biological. [http://www.pelletlab.com/barn\\_owl\\_pellet](http://www.pelletlab.com/barn_owl_pellet)
- Genesis, Inc. Product Catalog. <http://www.pellet.com/catalog.aspx?id=4>

Other sources of information about owl pellet labs:

- Owl Pellet Dissection: Virtual Simulation.  
<http://www.kidwings.com/owlpellets/barnowl/index2.htm>
- Owl Pellet lab: Student Instructions and 'Worksheet'.  
<http://www.biologycorner.com/worksheets/owlpellet.html>
- Owls: Top of the Food Chain. Lesson plan using an Owl Pellet lab to illustrate the food chain.  
<http://sciencenetlinks.com/lessons/owls-top-of-a-food-chain/>

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### Activity: Understanding Adaptations—Predator/Prey

Duration: 40-60 minutes

In *Hummingbird's Squash*, Thistle always tries to conceal herself as she moves about in her environment. An eastern cottontail, her brownish- gray fur blends in well with a number of habitats. She also uses a mound of brush to camouflage the location of her nest. One might say that the success of Thistle's species is due, in part, to the fact that rabbits hide so well within a wide variety of ecosystems. In the activity below, we see how important adaptation to an environment is to the survival of a species and how the predator/prey relationship is affected when the environment is changed.

### Materials

For groups of students

- A 24-inch square of multicolored printed fabric with a dark background (See Instructor Notes)
- A 24-inch square of white fabric
- Construction paper of six different colors, plus white (The colored paper should match the colors in the multicolored fabric square). The number of colors can be less than six, but the activity becomes more complex as the number of colors increases.
- Hole punch
- Small containers for mixing colored dots
- Graph paper



### Procedure

- Punch 20 dots for each color, plus white, from the construction paper. (Each color represents a different prey species.) Make 200 dots for each student group (6 x 20 dots = 180 dots + 20 white dots). Ask student volunteers to help make dots for this activity.
- Divide students into small groups. The groups will include three to four “predators” and a student assigned to be the “dot distributor” and “counter/record keeper.”
- Give the dot distributor for each group a data table (like the Sample Data Table below), a container with a mixture of the 20 dots for each color, plus white, and the colored fabric “ecosystem.” Lay the fabric smoothly on a flat surface for each group.
- The dot distributor for each group should shake the container of dots to mix randomly. Then he or she should pour them out evenly over the fabric. Make sure the dots are spread out and not overlapping each other. The predators should have their backs turned during this process. No peeking!!
- Have the first student predator turn around and quickly remove the first *five dots* he or she sees from the fabric. (The student should not be given time to study the fabric.) The other predators should have their backs turned as the first predator picks up his/her prey. After the first predator has finished, he or she will give the selected dots to the dot distributor (who is also the record keeper) and turn around again. The record keeper will subtract the number of each color removed from the beginning set of 20 dots for each color. The number remaining for each of the six colors, plus white, will be recorded. The record keeper should then carefully rotate the fabric square, trying not to disturb the dots. (The rotation keeps the predators from remembering where the remaining dots are located.)
- The second student predator will turn around and *quickly* remove the first five dots he or she sees from the fabric. The other predators should still have their backs turned. The second predator will turn his or her back to the fabric “ecosystem” and give the selected dots to the record keeper. The record keeper will repeat the procedure in the fifth step above.
- Each predator in succession should remove five dots, until it is the first predator’s turn again.
- Repeat the steps above, until most of the dots are removed.
- Lay down the white fabric “ecosystem.” We have now changed the environment in which the predators and prey are struggling to survive. Have the groups repeat the first five steps using a new set of containers, each with 20 dots of the six different colors, plus white. (A set of 200 dots of the same colors will be required.)
- The data recorded by the record keeper will then be tabulated.
- Help students graph their groups’ results for the colored fabric and the white fabric activities. Remember, each dot color represents a different prey species. Graph the number of each species remaining after each pick-up by predator 1, 2, 3, and 4. See the Sample Bar Graph in Appendix 7. (Teachers: note that in the Follow-Up Activities there is a data validation exercise

associated with the bar graph below.)

### *Notes*

In choosing the colored fabric, make sure the colors in the pattern are similar to the construction paper dots and that the colored areas are somewhat larger than the size of the paper dots. This way the fabric will act as better camouflage for the dots. If you need to, you can reduce the number of individual colors and/or increase the number of dots of each color. Also, you don't have to have the same pattern for each group; different patterns between groups might lead to interesting discussions of variance between group results.

- If finding fabric with appropriate patterns is difficult, you could have the students paint patterns on white cloth before beginning the activity.

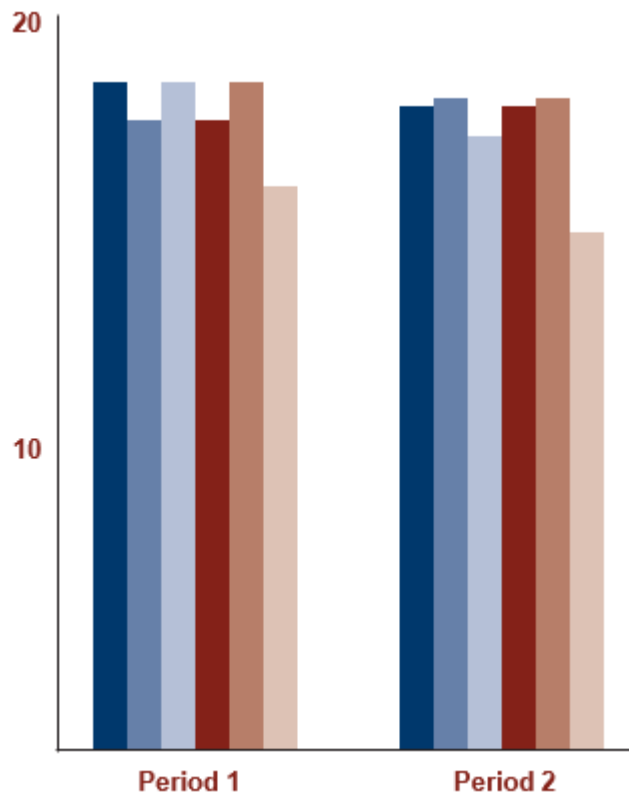
### *Sample Data Table*

Table 2: Ecosystem Prey Population

<b>Period</b>	<b>Red</b>	<b>Blue</b>	<b>Yellow</b>	<b>Orange</b>	<b>Green</b>	<b>White</b>
<b>0</b>	20	20	20	20	20	20
<b>1</b>						
<b>2</b>						
<b>3</b>						
<b>4</b>						
<b>5</b>						

### Sample Bar Graph

Figure 2: Number Remaining



### Follow-Up Activities

- In each “ecosystem” (colored vs. white fabric) determine the first species to become extinct. Discuss why that species disappeared first.
- What was the biggest difference between the colored fabric and white fabric activity?
- Identify any patterns that developed as the selections were made. Discuss what might have caused them.
- What do these graphed data indicate about adaptations to the environment and predator/ prey relationships?
- Ask students to identify any species in their area that have developed camouflage adaptations to protect them from predators. Discuss why these adaptations are successful.
- Make a graph like the sample data graph above. Ask students to interpret the data. If they do not identify the problem, point out that some of the bars representing different species are higher in Period 2 than Period 1. In Period 2 the number of dots for each color should remain the same or be smaller, not larger. This graph represents a recording error. Emphasize how important it is for students to check their data!

## *Activity: Why “Many” and “Different” are Healthy—A Look at Biodiversity*

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Duration: 60-75 minutes

### *Background for Teachers*

Variety is essential to the health of ecosystems. The purpose of this activity is to find and identify as many animals and plants as possible within a specific area, in this case a square meter. We will try to determine the amount of biodiversity within a square meter—a very small ecosystem. Students may have to go to different locations to identify the different ecosystems in their community—the shoreline of a pond, a meadow, a woodland area, a rocky outcrop, a swamp, a desert area, a garden plot, or the lawn in front of the school. Even the beaten down dirt of the playground could be an ecosystem! This activity works well for a science club, a traditional culture or heritage program, or youth leadership organizations like 4-H or Future Farmers of America. A small area ecosystem will most likely yield information about plants and small animals like insects, spiders, and worms.

### *Materials*

For each group

- A hula hoop or a 1-meter square made of wood
- Notebook
- Graph paper
- Tweezers
- Camera (optional)
- Garden gloves (optional)
- Sandwich-size plastic baggies (optional)
- Field guide for local plants and insects (optional) or ability to look them up online
- Site Survey and Species Key
- Plot Map

### *Procedure*

- Divide students or club members into groups. Each group will mark an outdoor area with the hula hoop (or square meter). The areas should be chosen somewhat randomly and have different levels of biodiversity and human impact. The groups should write up and draw a general description of the area surrounding their sample area as well as include some details about what they see inside it. (See the Sample Plot Map below.)
- Make a site survey which includes the name and number of the plants and animals found. Also make a species key, giving a unique number to each plant and animal. (See Sample Species Key below). Using the species key, plot where the plants and animals were found within the square

meter. (See the Sample Plot Map below.)

- Take a picture (if a camera is available) or make a sketch of each plant and animal species found. An indicator sample of each species can be collected in plastic baggies and brought back to the classroom to examine and identify later. If animals or plants are collected, students should wear gloves and an adult should be supervising to assure that children do not collect or touch poisonous species.
- Identify each species using a field guide or online resources. For any species students can't specifically identify, they can give it a general ID (grass #3, bug #2, etc.).
- Have students determine the percentage of each species in their sample area using this formula:  

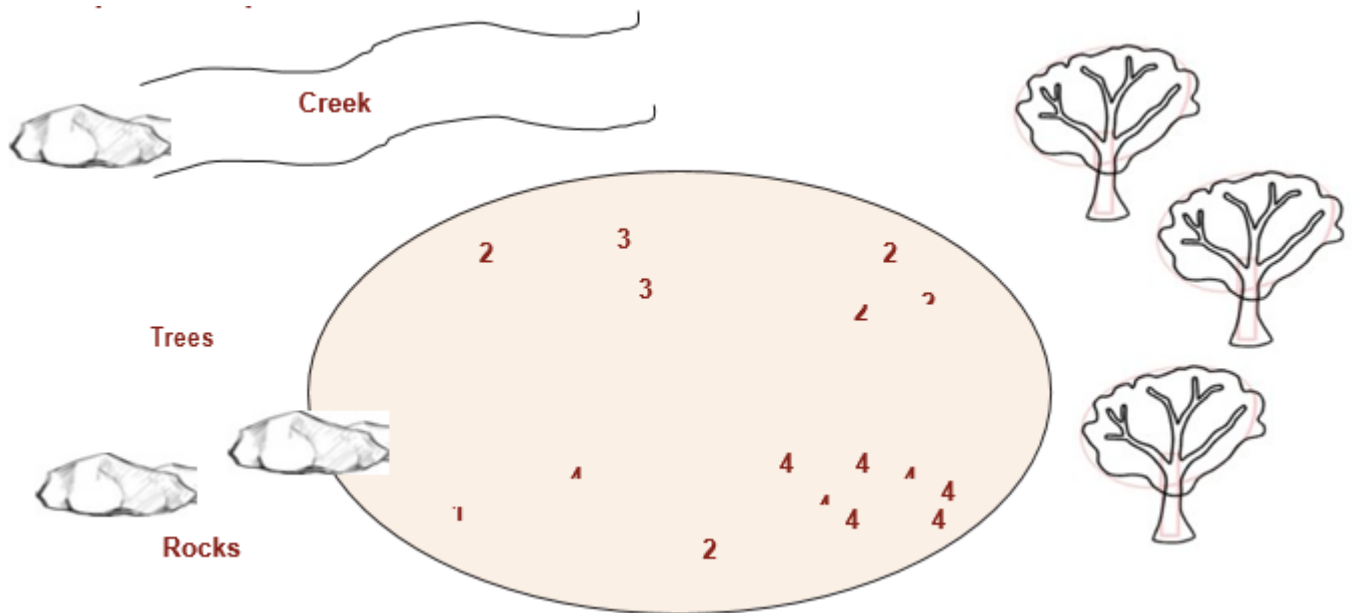
$$\text{Number of a single species} / \text{Total number of all species}$$
 Example: 3 grasshoppers/54 (total number of all species) = 5.6%  
 Total number of all species = Animals: 5 caterpillars, 2 earthworms, 16 ants, 3 spiders, 1 ladybug, 4 beetles, 3 grasshoppers. Plants: 4 bottlebrushes, 5 switchgrasses, 3 oxeye daisies, and 8 golden rods.
- Help students graph their results on graph paper. Record the type of species on the X axis and population of the species on the Y axis.
- Calculate the biodiversity index for the sample area. 0 = no diversity and 1 = highest diversity.  

$$\text{Number of different types of species} / \text{Total number of all individuals (plant and animal)}$$
 Example: 11 species/ 54 individuals = .20
- Share results with other groups. Have students summarize the plant, animal, and nonliving components in the area they studied. Where were the most diverse areas? The least diverse? Was the biodiversity index related to the kind of area chosen to sample? For instance, was there more diversity in areas of less human impact? Which were the healthiest ecosystems? Did they discover any ways that different species depend on each other in the ecosystem that they studied? If so, what were they?

Table 3: Sample Site Survey and Species Key

Species	Name	Quantity	Type
#1	cricket	1	Animal
#2	broad leaf of grass	5	Plant
#3	dandelion	2	Plant
#4	ants	8	Animal

Figure 3: Sample Plot Map



### Notes

- Have different groups analyze different areas to look at effects of human interaction. For example, a high traffic area, a garden or lawn, or a more remote area distant from human habitation, etc. Looking at a variety of ecosystems allows comparison of areas to demonstrate how human behaviors and peoples' ability to engineer their surroundings affects ecosystems.
- If hula hoops are not available or constructing a square meter out of sticks is not practical, then you can use small sticks and string to mark off a one meter square area.
- If regional plant identification guides are not readily available, the Internet offers excellent resources. Should teachers and students be really stumped about the identity of a sample, the local county extension service or college/university may offer advice.

### Follow-Up Activities

- Discuss the relationship between biodiversity and maintaining a healthy ecosystem.
- Predict what would happen in a larger ecosystem if one of the primary consumers became extinct. How might the natural balance be reestablished? Tip: It would be reestablished more easily if there were other animals similar to the extinct primary consumer that could move into its niche. (A niche is the specific area where an animal or plant lives and the role it plays in an ecosystem.) What would happen if the balance couldn't be reestablished?
- Investigate natural and manmade extinctions.
- Discuss how manmade extinctions may have been prevented.
- Many peoples, including American Indians and Alaska Natives, have long respected the majesty of eagles. Bald eagles were once an endangered species. Find out how they became endangered

and what was done to help them recover and flourish in some areas.

- Identify any extinct or endangered plant or animal species in your area. Discuss ways that the endangered species might be replenished. Who or what group would decide whether the time and money should be invested in their recovery? What factors may have to be considered in making such a decision?
- Discuss the importance of maintaining healthy ecosystems and how humans can have both positive and negative influences on the delicate balance in nature. Research how Native peoples are working to protect the natural environment, thereby maintaining their culture and values.

### *Online Resources*

- Living in the Everglades. The Seminole’s Everglades Restoration Initiative that promotes biodiversity. <http://sofia.usgs.gov/sfrsf/plw/living.html>
- Greater Everglades Partnership Initiative, Florida. <http://www.fws.gov/southeast/evergladesheadwaters/pdf/GreaterEvergladesFactsheet.pdf>
- Environmental Restoration Efforts. The Shakopee Mdewakanton Sioux Community seeks balance in natural habitats. <http://www.shakopeedakota.org/enviro/restoration.html>
- News Release. Grants awarded to tribes to restore mountain-prairie ecosystems. <http://www.fws.gov/mountain-prairie/pressrel/DC%2014.htm>
- Restoring a Prairie Icon. Tribes play a role in restoring the bison. <http://www.nwf.org/News-and-Magazines/National-Wildlife/Animals/Archives/2012/Restoring-Bison.aspx>
- Columbia River Inter-Tribal Fish Commission. CRITFC for Kids. Learn about the salmon and ways the Northwest Coast tribes seek to restore wetlands and watersheds. <http://www.critfc.org/for-kids-home/for-kids/>
- Welcome to “Manoomin—the Good Berry.” Find out all about protecting the harvest of Manoomin (wild rice). [http://www.glifwc.org/publications/pdf/Fall2008\\_Manoomin\\_Supplement.pdf](http://www.glifwc.org/publications/pdf/Fall2008_Manoomin_Supplement.pdf)

### *Instructor Notes*

**Safety Note:** *When having students do sampling outdoors, be sure to know if they have any plant or insect allergies and take precautions. Also, wearing gloves (garden, regular, or non-latex rubber) is recommended to avoid direct contact with plants and insects. Do not collect known poisonous species. Make sure students clean up properly whenever handling specimens or sampling outside. If students are allowed to collect samples to bring back for identification, they should leave samples in the plastic baggies.*

## Investigation 2: Gettin' Dirty—Healthy Soils

### Background for Teachers

When Miss Swallow examined Aunt Chick's garden after Coyote had eaten up all the squashes smashed by the bullies, she said it looked like a "moonscape." She couldn't even find a worm casting. Miss Swallow knew that the garden soil growing the squashes would have required four major components: inorganic (non-living) matter, organic (living) matter, water, and air. All she could find was a hard-packed inorganic material that was airless, waterless, and lifeless. Coyote had vacuumed up everything else.

Needless to say, Coyote left the garden in a poor state. For the best growing conditions, inorganic components should make up about 45 percent of soil by volume and contain rocks and minerals in the form of sand, silt, and clay. Organic components will make up about 5% of soil by volume and contain living and dead plants and animals. Air and water will be about 25% each of soil by volume. Soils deficient in any of these components will not be as productive in supporting plant and animal life. Areas with poor soil quality will have sparse plant growth and high competition for resources. Areas with good quality soil can support a high density of plant and animal life.

Natural conditions in an ecosystem, such as temperatures and rainfall, will influence the type of soil and soil quality found. But human activities have a big influence, too. In agriculture, we try to improve soil and crop yield by adding air (aeration), adding nutrients (fertilization), and adding water (irrigation). However, these agricultural activities can have negative effects on the soil and other parts of the environment. If not carefully controlled, aeration loosens the soil which can lead to loss of soil and nutrients due to runoff. Over-fertilization can lead to high nutrient loads in our waterways which can cause algae blooms and eutrophication (the overgrowth of plant life due to too many nutrients in the water). Over-irrigation can lead to lowering of the water table, excessive runoff into local waterways, and nutrient depletion.

Agriculture is not the only way humans affect soil quality. Heavily trafficked areas will have compacted soils which do not support good plant growth and tend to erode more easily. Also, areas of high human activity tend to be polluted with chemicals that damage the living organisms in the soil and contaminate ground water.

As with most things in nature, keeping soils healthy is a matter of understanding and maintaining the balance of natural components. Respecting the types and quantity of plant life that an area can support is also important. Planting crops too densely depletes soil nutrients and can lead to the use of artificial fertilizers to replace them. Harvesting plants and not returning the non-harvested components to the soil also depletes nutrients. Composting these components and returning them to the soil helps offset the loss of soil nutrients used to fuel plant growth.

Plants grow primarily in the top layer of soil called topsoil. The depth and quality of topsoil is very important to plant biodiversity and agriculture. Topsoil contains the largest amount of organic matter. Topsoil is made stable primarily by plants' root systems and the rock structure. Without stability of the topsoil layer, natural weathering and water runoff can remove the topsoil layer nutrients and mass. Topsoil is naturally replenished by the decomposition of plant and animal materials and the weathering



of rocks.

Natural aeration of soils is performed primarily by worms, insects, microbes, and plant roots that live in the soil. In areas of high human activity, soils can become compacted, reducing the air pockets. Lack of oxygen can interfere with microbes which break down mineral and organic components into nutrients. Compacted soil can also make it much more difficult for plant roots to become well established, reducing plant yield and diversity. Lack of porosity (air pockets) in the soil can also reduce water absorption, causing increased water runoff and flooding.

The type of soil is determined by the relative amounts of sand, silt and clay. Sand feels very rough and gritty because of the larger particle sizes. Silt will feel smooth when both wet and dry because of the smaller and smoother particle sizes. Sand and silt do not bind together well. They stay loosely packed and are poor at holding soil together. Clays feel hard when dry but sticky and moldable when wet. Clays are also much more chemically active and have good binding properties due to their very small particle size and stickiness. Clays are very important in their ability to bind soil particles together and retain water.

Sandy soils have high porosity (large holes between particles) and do not hold water efficiently. Excess water drains quickly, often removing nutrients and contaminants from the soil into the ground water. Soils that are mostly silt or clay have low porosity (small holes between particles) and drain poorly. As a result, nutrients and contaminants do not pass readily into the ground water. The lack of drainage in silt and clay soils will cause increased surface runoff of water, moving both nutrients and contaminants to rivers and streams.

The most stable soils are loamy soils. Loamy soils contain a rough balance of sand, silt, and clay. As a result, they have good drainage and absorption of water, so they tend to hold water and nutrients necessary for organisms that live in the soil. Loamy soils are also good at filtering out contaminants before they can get into the ground water or surface water-ways. The diagram to the left shows the relationship between the different types of soils.

## Online Resources

- Earth's soils. <http://www.kidsgeo.com/geology-for-kids/0002-the-earths-soil.php>
- Composting Physics. <http://compost.css.cornell.edu/physics.html>
- S.K. Worm Answers Questions about Soils. US Geological Survey Water Resources. <http://www.usgs.gov/water/>
- Just for Kids: Soil Biological Communities. <http://www.blm.gov/nstc/soil/Kids/>

## *Activity: Are All Soils Alike?*

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Duration: 60-75 minutes

Farmers and gardeners know that all soils are not alike. They want to grow their fruits and vegetables in the best quality soil. Nutrient-rich soil with lots of oxygen produces healthier plants that yield vegetables and fruits with the best nutrition and taste. This activity is well-suited to an after school or weekend project that takes children outside.

### *Materials*

For each group/person:

- Hand trowel or shovel
- Ruler (to measure area and depth of soil sample)
- Plastic bags (quart-size freezer bags work well)
- Permanent markers to label bags
- Newspaper to cover a table
- Rubber or latex gloves, if available (or make sure hands are washed thoroughly after examining soil)
- Toothpicks or tweezers (or suitable clean, pointed sticks)
- Scissors (garden or kitchen types are best)
- Soil test strips (optional)
- Data Table

### *Procedure*

- Divide students into groups. Each group should obtain a soil sample from a different area. Remind students to obtain permission to take a soil sample from any nonpublic areas. Before removing the sample, they should take notes and draw a sketch that describes the area. Provide as much detail as possible, including nearby features that might influence the soil type and quality. Is there a dripping water fountain nearby? Do tree roots penetrate the area?
- Dig a circle about 6 to 8 inches in diameter and about 6 to 8 inches deep. Remove the sample 1 inch in depth at a time, keeping the different depth samples in different bags. Label each of the bags by location and depth. Cut off any plant matter that is above the top of the soil in the first layer. Don't pull it out as that will remove the roots which are a part of the soil. Any remaining plant and/or animal matter should be placed in the bag with the soil at the depth where they were located.
- Cover a table surface with newspaper before emptying bags for examination.
- Examine each layer of your soil separately as follows and record the observation in a data table.

(See the Sample Data Table below)

- Pour out the sample for layer one (soil taken from 1 inch deep) on the paper. Wear thin rubber gloves if available. Take a pinch of the soil between your thumb and forefinger, rub gently. Does it feel gritty, smooth, hard, sticky, or some combination of these? Put a few drops of water on the sample as you rub it. Add the results to your observations. Wash your hands thoroughly when done.
  - Have students classify their soil types using the soil pyramid in the Background for Teachers.
  - Describe and record the overall color and moistness of the sample.
  - Using tweezers or toothpicks, separate the sample into three piles: inorganic material, plant material, and animal material. Students will then place the inorganic sample into a 100-milliliter graduated cylinder and record the volume. Repeat for the plant material and animal material. Add the three volumes together and calculate the percentage of each, based on the total volume.
  - Scrape the samples back together and place into the bag, seal it and mix well. Students will use the materials again in the composting activity below.
  - Repeat the first four substeps above for each 1- inch layer collected. Keep careful track of which layer is being analyzed and record it correctly in the data table.
- Clean up the table and wash hands thoroughly.

Have each group share their data with the class. Discuss similarities and differences between the different areas sampled. Were there differences in soil color, water content, porosity (amount of air between particles)? Suggest reasons for these differences. Where are the healthiest soils to be found? Which areas would students predict would grow the most nutritious fruits and vegetables?

### *Follow-Up Activities*

- What natural and human influences contribute to the location of healthy and poor soils in the community?
- What is ground water? What role does it play in the water cycle? Why is clean ground water so important? (Hint: Think about wells that provide water to homes and businesses.) What role do soils play in maintaining clean and drinkable well water? Why is it important to keep pollutants out of soils? What human activities can lead to soil contamination? How can we prevent them?
- Soils are a type of ecosystem. Identify their living and nonliving components. Discuss what balances need to be maintained in order for soils to be healthy and sustain life.

Table 4: Sample Data Table

Soil Layer	Color	Dry Texture	Wet Texture	% Plant (Vol)	% Animal (Vol)	% Inorganic (Vol)	Observations
1 (Top)							
2							
3							
4							
5							
6							

### *Activity: Improving Soils—Composting*

Duration: 60 minutes for set-up; several weeks/months for composting

#### *Background for Teachers*

Reservation communities all across the country are becoming involved in composting. Students can build their own miniature compost pile called a “bioreactor.” They will observe how composting produces a nutrient-rich natural fertilizer. This would be a great activity to do with help from those in the community who are involved in traditional foods programs that do composting.

#### *Materials*

For each group

- Two 2-liter plastic soda bottles for constructing a bioreactor (See bioreactor construction activity below for assembly instructions.)
- A cap from one of the plastic bottles
- A plastic lid from a container similar in diameter to the plastic bottles
- Dead plant material broken up into 1- to 2- inch pieces (leaves, grass, twigs, pine needles, corn husks, saw dust, etc.)
- Live plant material broken up into 1- to 2- inch pieces (leaves, grass, etc.)
- Household garbage materials, broken up into 1- to 2-inch pieces (vegetable and fruit peelings, coffee grounds, tea leaves, egg shells, lettuce, onion, banana peel, etc.)
- Recyclable material broken up into 1- to 2-inch pieces (cardboard, plastic, old fabric, magazine paper, newspaper, Styrofoam, egg cartons, etc.) These ingredients are optional.
- Garden soil or top soil from outside (Students may use soil collected in the activity above.)

- Local pond, lake, or stream water (Since it is not chlorinated, this water is friendlier to microorganisms like bacteria and fungi that chemically break down compost materials, and more hospitable to the larger organisms like insects and worms that mechanically grind it up.)
- Rubber bands or tape
- Large bowl or bucket
- Thermometer (An electronic kitchen thermometer is best and one can be shared between all groups.)
- Duct tape or clear packing tape
- Utility knife or sharp scissors
- Permanent marker
- Insulating material (bubble wrap, flexible cardboard, small towels, cloth, etc.)
- Twigs that are 3 to 4 inches long

### *Procedure*

- Assemble the components of the bioreactor according to the instructions in the bioreactor activity below. Label the bottle by group so that it is identifiable.
- Select and add several handfuls each of dead plant material, live plant material, and garden soil to the bucket. Use roughly equal amounts of each and break up into small pieces. Mix thoroughly. Record observations of each material before they are added. Students will need enough to fill (loosely packed) about 6 to 7 inches of the 2-liter bioreactor.
- Select three household garbage materials you want to compost and add a small amount of each to the mix. Record observations of the material before adding. Different groups should use different materials to add variety.
- Select the recyclable materials you want to compost and add several scraps of each to the mix. Record observations of the material before adding. (Optional)
- Add a few of the twigs to help prevent compacting. Mix all ingredients well by tossing loosely. Add pond water until the mixture is moist, but not saturated with water.
- Carefully add this mixture on top of the plastic lid inserted into the bottom of the bioreactor. Make sure it's loosely packed so there will be good air circulation through the compost material.
- Place the top on the bioreactor according to the directions in the bioreactor activity below. Tape the seam together.
- Insert the thermometer into the top opening of the reactor so that the bulb is centered into the composting material. Record the initial temperature of the mixture as Day Zero. Recap the bottle lid after removing the thermometer.
- Make general observations of the compost mixture and record on Day Zero.

- Wrap the straight sides of the bottle with insulating material, secure with tape or rubber bands. Be sure the air holes at the bottom are not covered. Place the bioreactors on a table or shelf in a warm place (not under a cold window or in an unheated room).
- Now let the bioreactors “cook.” For each day of composting or as frequently as possible, do the following:
  - Record temperature.
  - Unwrap the insulation and record observations.
  - Carefully rewrap the insulation.
- Continue recording the observations for several weeks up to 2 months or until the volume is reduced by one-third to one-half.
- On the last day of composting, take the bottle outside and remove the insulation and top part of the bio-reactor. Pour the contents over some newspaper. Using sticks, spread out the mixture. Record observations describing what materials composted completely, partially, or not at all. Compare these observations to those made on Day Zero.
- Clean up and dispose of materials as the adult supervising the activity directs. Wash hands thoroughly. (Composted material may be added to a local garden.)
- Have the groups share their findings. Discuss any similarities between substances that composted quickly and those that did not. Use this information to predict the relative amount of time it might take for various trash items to break down.

### *Follow-Up Activities*

- Ask the class to discuss what they have learned about composting.
- What materials compost easily? Which do not? How can composting reduce trash volume? What are the benefits of composting? What are the drawbacks to composting? (Some drawbacks are that composting takes a long time, it has to be turned to make sure that it is decomposing properly, and compost may smell bad. Compost also doesn’t have all the nitrogen that the soil may require.)

### *Activity: Constructing a Bioreactor*

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#### *Procedure*

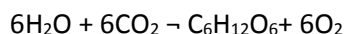
- Cut the first bottle 8 inches up from the bottom and make air holes around the bottom just below where the bottle straightens out. Discard the top of the bottle.
- Cut the second bottle about 2.5 inches from the bottom. Cut four vertical half-inch slits in the bottom to help it fit inside the other bottom section.
- Place the second bottom upside down inside of the first bottom section.

- Trim the plastic container lid to a diameter just smaller than the bottom bottle section.
- Make air holes in the plastic lid.
- Place the lid on top of the inverted bottom inside of the first bottle bottom.
- Trim the bottom edge of the top portion of the second bottle so that it is seven inches long from top to bottom.
- Cut four vertical half-inch slits on the bottom edge of the top portion of the second bottle.
- Make air holes near the top of the second bottle.
- Add compost material on top of the plastic lid in the bottom section.
- Place the top section into the lower section. The sections should overlap about one half inch. Cap the bottle.
- Tape the seam at the overlap with two-inch clear plastic tape.
- Between observations, wrap the middle of the bioreactor with cloth or other insulating material and secure with tape or rubber bands. Be sure not to cover the air holes.
- When making temperature observations, a thermometer can be inserted through the top by removing the cap.

## Investigation 3: Producers and Consumers

### Background for Teachers

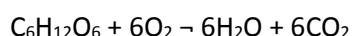
Plants harness energy from the sun through photosynthesis. They are *primary producers* because they make energy on their own. During photosynthesis, chlorophyll converts water from the ground and carbon dioxide (CO<sub>2</sub>) from the air into glucose (sugar) and oxygen.



Chlorophyll in plants gives them their green color. Plants obtain nutrients — such as nitrogen, phosphorous, potassium, and other trace minerals—from the soil to assemble the thousands of compounds that make up a plant’s structure. One important role that plants play in the environment is removing CO<sub>2</sub> from the air. Plants are also the food/energy source for both primary (herbivores) and secondary consumers (carnivores and omnivores).

It is important to maintain an adequate plant supply to support animal life and to prevent excess amounts of CO<sub>2</sub> in the air. Excess amounts of CO<sub>2</sub> could result in increased warming of the atmosphere which could cause changes in ecosystems. Plants also play a role in the water cycle. They absorb water from the ground to use in photosynthesis, and they lose water to the air through transpiration from their leaves. Plants also provide shade which helps to prevent evaporation of water from soils.

Plants and animals are dependent on each other so that all life can survive and flourish. The carbon cycle is an important example of this balanced interdependence. Much of the CO<sub>2</sub> used by plants during photosynthesis is produced by animals as they respire (breathe out CO<sub>2</sub>). The basic process of respiration occurs when animals burn sugar from the food they eat by breathing in glucose-consuming oxygen produced by plants and breathe out CO<sub>2</sub> and water.



This process is the chemical opposite of what happens during photosynthesis in plants. During photosynthesis sugar and oxygen are produced; during respiration CO<sub>2</sub> and water are produced. This is why plants and animals (including humans) can’t get along without each other.

### Online Resources

- The Importance of Plants in Different Ecosystems. <http://www.blueplanetbiomes.org/plants.htm>
- Photosynthesis. Ecosystem relationships and the role of producers and consumers. <http://www.sheppardsoftware.com/content/animals/kidscorner/foodchain/photosynthesis.htm>
- Photosynthesis Animation. <http://www.biology.ualberta.ca/facilities/multimedia/uploads/alberta/Photo.html>
- Relationship Between Photosynthesis and Respiration. [http://www.science-resources.co.uk/KS3/Biology/LifeProcesses\\_and\\_Cells/relationship\\_between\\_photosynthesis\\_and\\_respiration.htm](http://www.science-resources.co.uk/KS3/Biology/LifeProcesses_and_Cells/relationship_between_photosynthesis_and_respiration.htm)



- Photosynthesis and Plant Nutrients. <http://www.ncagr.gov/cyber/kidswrld/plant/nutrient.htm>

### ***Activity: Investigating Natural Fertilizers—Plant Growth***

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#### ***Background for Teachers***

Because they wanted to grow giant vegetables, Hummingbird and Arianna had a big interest in fertilizers. A fertilizer is a substance added to soil to supply nutrients essential to plant growth. Aunt Chick donated organic and inorganic fertilizers to the girls so they could pursue their “giant plan.” This activity is about testing the capacity of organic fertilizers to promote plant growth. Remember to do a better job of labeling your seeds and fertilizers than Hummingbird did!

#### ***Materials: For groups***

- Seeds (24-36 per group). Corn, cucumber, lettuce, pumpkin, radish, turnip, or squash seeds can be used.
- Soil (1/2 to 1/3 gallon per group). Use local soils.
- Different natural fertilizers, 1 cup per group. (Natural fertilizers may be compost, coffee/ tea grounds, ground-up egg shells, cornmeal, old herbs and spices, alfalfa meal, grass clippings, chicken litter (a mixture of sawdust, bedding, and chicken manure), vegetable juices, or wood ashes.)
- Water from a local stream, pond, or lake
- Gallon-sized plastic bags
- Egg cartons (two per group)
- Plastic spoons
- Plastic wrap
- Medicine dropper
- Rulers
- Plant Growth Data Record

#### ***Online Resources***

- New Hampshire Giant Pumpkin Growers Association. <http://www.nhgpga.org/> Great videos of pumpkin weigh-offs.
- The Elusive 2,000-Pound Pumpkin. <http://www.utne.com/Environment/Atlantic-Giant-Pumpkin-Extreme-Gardeners.aspx>
- 10 Steps to a Giant Pumpkin. <http://www.backyardgardener.com/wcgp/tips/10steps/10steps.html>.
- The World Record Carrot Growers—[Heaviest](#) & [Longest](#).

<http://www.carrotmuseum.co.uk/record.html>

- Botanical Record Breakers: Amazing Trivia About Plants.  
<http://waynesword.palomar.edu/ww0601.htm>
- Stinking Buffalo Gourd. <http://www.deercanyonfolks.org/flora/buffalo-gourd-june-2011.html>

### *Procedure*

- Divide the class into groups. Have each group choose a different natural fertilizer. Make sure the natural fertilizers are finely ground.
- Prepare soil by filling a gallon bag 1/4 full with soil and adding 1 cup of the chosen fertilizer. Close the bag and toss ingredients thoroughly.
- Label each well of two egg cartons with a different number. Use a plastic spoon to fill each well of one egg carton with the fertilized soil until slightly mounded and gently packed down. Label the egg carton containing the fertilized soil (identify the fertilizer used). The second egg carton should be filled with unfertilized soil and labeled appropriately.
- Each group should select one type of seed to plant in the two egg cartons. Place one seed in each well on top of the soil. Carefully push the seed about 1/4 inch into the soil with a pencil or small stick. Carefully cover the hole with soil. Label each carton with the kinds of seeds that have been planted.
- Use a medicine dropper to add pond water to each well. The soil should be moist to slightly wet, but not saturated. Loosely cover the egg carton with plastic wrap to help prevent evaporation. Samples should be checked daily for signs of germination and to make sure the soil stays moist. Add pond water in small amounts as needed to keep the soil moist.
- Check the egg cartons daily. Re-water if they start to dry out. Keep them moist but not wet. Record the number of days each seed takes to sprout. Once the seeds have all sprouted, calculate the overall percentage that germinated.

Number of seeds germinated/

Total number of seeds planted

x 100 = % germination

- Each day after the seeds sprout, measure the height/length, number of leaves, amount of branching, and color of leaves. Record these measurements daily for 2 weeks. Students will need to create a data table to keep track of these data for the 24 seedlings for at least 2 weeks. (See Sample Plant Growth Data Record in the next activity.)
- At the end of 2 weeks, have the groups use their data tables to compare their growth results. Which seeds have grown the most—fertilized or unfertilized? Was there variation among the different seeds? Was there variation in growth according to the different fertilizers used?

### Follow-Up Activities

- Invite students to research growing giant fruits and vegetables just like Simon and Arianna did. See the Web sites provided. Find out about seed varieties that produce giant fruits and vegetables. What roles do soil quality, fertilizer, and water play in growing the giants? How heavy are the biggest pumpkins ever grown? What are the records for the biggest cabbage, carrot, and radish?
- Coyote grew a giant specimen of the stinking buffalo gourd (or coyote squash as he would prefer it to be called). Check out the actual size of the fruit, flowers, and leaves of *Cucurbita foetissima*. See the Web site provided.

### Activity: Investigating Natural Fertilizers – Plant Growth

For each egg carton the students set up, they will need a separate data table like the one below. The title should include all of the information about what is contained in the wells: seed type, fertilized or unfertilized soil, and type of fertilizer, if used. The students should have 12 rows and columns for the number of days they measure the plants' growth (14-21 days).

#### Sample Plant Growth Data Record

Table 5: Carton #: Descriptions of Seed Type, Type of Soil, etc.

Well #	Day 3	Day 4	Day 5	Day 6
1	Height Color # of leaves # of branches	Height Color # of leaves # of branches	Height Color # of leaves # of branches	Height Color # of leaves # of branches
2	Height Color # of leaves # of branches	Height Color # of leaves # of branches	Height Color # of leaves # of branches	Height Color # of leaves # of branches
3	Height Color # of leaves # of branches	Height Color # of leaves # of branches	Height Color # of leaves # of branches	Height Color # of leaves # of branches
4				
5				
6				

## Science Part 2: Finding the Balance and Wisdom in the Plant World and Native Science

### Objectives

- Explain why we are encouraged to “eat our colors.” Identify the nutritional benefits of colors in plant foods.
- Compare the nutrition of indigenous plant foods with the low-quality processed foods that are a large part of the modern diet.
- Explain how plant colors are used in identifying acids and bases, and how plant-based acid/ base indicators are used to protect our health and safety.
- Identify inventions and discoveries of American Indians/Alaska Natives that have contributed to the scientific, technological, and medical knowledge of today.
- Describe Maya rubber-making technology.
- Explain why corn is more nutritious when processed with ash before eating.
- Understand the danger that invasive plants present to the environment and how farm and rangelands can be protected.
- Describe the safety aspects of the Inuit kayak.
- Explain how “Elephant’s Toothpaste” can be made with hydrogen peroxide and other materials.
- Define the role of a catalyst in chemical reactions.
- Explain water transport in plants.

### Background for Teachers

Students will learn in Part 2 about the many ways that plants provide us not only with healthy nutrients, but also with the resource materials that we use for making the products that we use every day. The activities also highlight the ways that plant colors provide the nutritional value of the foods we eat and help us to balance the soils in which our foods grow. Students will also enjoy learning how Native Americans have applied Native Science in maintaining nutritional balance in the processing of plants foods, ecological balance in the maintenance of indigenous plant communities, and the invention of a new product like rubber from the combination of different plant fluids.

In terms of nutritional balance, it is important for students to understand that our bodies need *macronutrients* (big nutrients) in the form of proteins, carbohydrates, and healthy fats to supply energy and build body tissues. But we also need many *micronutrients* (little nutrients) that are present in fresh foods, such as the vitamins and minerals that help us to build tissues, maintain optimum health, and prevent disease.

The nutrients in fresh fruits and vegetables are related to their colors. Many traditional plant foods that

were domesticated in the Americas are characterized by their rich colors. The brilliant yellow and orange hues of squash and pumpkins, the red and black in beans, and the multiple colors of corn come from carotenoids and anthocyanins—the chemicals in plants that give them not only their colors, but also much of their flavor. Carotenoids tend to be red, orange, or yellow, and anthocyanins tend to be red, purple and blue. In plants, these chemicals play a role in resisting disease and pests. In humans, they play a similar role. As important micronutrients in the human diet, they help strengthen the immune system, help repair cells and tissues, and prevent disease. The idea behind “eating your colors” is to make sure we are getting foods high in micronutrients, but lower in calories and fats. Nutrient rich foods make calories count! Moreover, the colors in plants allow us to measure the acidity and alkalinity of foods, beverages, and personal products that assure their safe use and consumption. In Investigation 1, students learn how to use vegetables, fruits, and flowers as indicators of pH.

Of course, unprocessed foods (raw vegetables and fruits and nuts) and less processed food (simply cooked meats, fish, vegetables, and breads made from whole grains) satisfy hunger and best provide the body with the materials needed for important body functions. However, technology has changed the way that much of our food is grown, processed, transported, and consumed. Many processed foods and snacks (cake mixes, cookies, cheese spreads, chips, and luncheon meats) are produced by adding (1) fillers that retard spoilage and bulk up the calories with sugar, fat, and salt; and (2) artificial colors and flavors that increase eye appeal and taste. These low-quality processed foods are easy to transport because they won’t go bad, and they are cheap to produce. But, these processed foods have a problem: they are low in nutrients and high in *trickiness*. That’s right. They are *Tricky Treats*. Why? Because many people don’t realize they are full of salt and empty calories from sugar and fat. Most processed foods are rarely as nutritious as fresh foods and are less satisfying. Not only are they low in nutrients and high in empty calories, but pre-cooking destroys vitamins and flavor. People who eat large amounts of cheap processed foods tend to eat bigger portions, get hungry sooner after eating, and eat more often.

The good news is that some processed foods are high in quality. Frozen vegetables, for instance, preserve much of their vitamin content, and whole-wheat breads and cereals can be fortified with fiber, vitamin D, and calcium. The processed foods featured in the Native Science projects in Investigation 2 are excellent examples of healthy processing, preservation, and prevention of nutritional deficiencies.

Some vitamins in plant foods prevent deficiencies by helping to catalyze (speed up) a wide variety of chemical reactions in our bodies. Vitamin deficiencies lead to many diseases in humans because chemical reactions needed to keep our bodies functioning are too slow. In *Hummingbird’s Squash*, Hummingbird demonstrated the role of a catalyst in producing Elephant’s Toothpaste. Investigation 3 offers students an opportunity to make their own non-explosive Elephant’s Toothpaste and to have some Coyote fun changing the colors of flowers via water transport in plants.

## Career Connections

Careers relating to promoting good nutrition, ecological sciences, soil science, environmental engineering, and health education are found in the Career Connections section of the Guide.

## Online Resources

- Fruits/Vegetables. Great resource on nutrients derived from fruits and vegetables. <http://food.oregonstate.edu/learn/fruitveg.html>
- FAQs: Phytochemical Info Center. How the colors of foods (phytochemicals) work in the body. <http://www.pbhfoundation.org/about/res/pic/faqs/>
- Color Me Healthy—Eating for a Rainbow of Benefits. <http://www.todaysdietitian.com/newarchives/110308p34.shtml>
- Cancer Institute of New Jersey. September Is Fruit and Vegetable Month. [www.cinj.org/fruit-and-vegetable-month-september](http://www.cinj.org/fruit-and-vegetable-month-september)
- The Colors of Fruits and Vegetables. Importance of eating colors. [http://dug.org/storage/school-garden-curriculum/Colors\\_Fruits\\_Vegetables.pdf](http://dug.org/storage/school-garden-curriculum/Colors_Fruits_Vegetables.pdf)
- Micronutrients and Macronutrients. <http://diet.ygoy.com/2009/06/19/micronutrients-and-macronutrients/>

## Investigation 1: Acids and Bases—Using Plant Wisdom to Find the “Balance”

### Background for Teachers

The Eagle Books recommend that we eat a “Plate Full of Color.” The colored pigments in plants provide many benefits to humans and animals, and to plants themselves. They allow plants to make their own food using chlorophyll (a green color) to trap the energy from sunlight, and they help plants by attracting insects that pollinate flowers and warding off insects that eat plants. They can also act as a plant’s sunscreen.

In addition to the health benefits from the colors we eat, plant pigments also provide us with colors for paints and fabric dyes. Another important use of plant pigments is in the identification of acidic and basic substances.

Almost everybody knows what it means when we say something has an “acid taste” (think of lemons). We often describe acidic foods as tasting sour. But rarely would we hear someone say that a substance tasted “basic.” However, if anybody asks, just tell them to remember what soap tastes like! Most basic substances, like soap, have a bitter taste. The bitter taste warns us that bases are often poisonous. Labels on cleaning products like ammonia and bleach, which are bases, warn users that they are poisonous.

Understanding acids and bases requires that students understand pH, which is the potential (p) of a solution to have hydrogen (H) in it. When dissolved in water, bases *reduce* the hydrogen concentration in water whereas acids *increase* the concentration of hydrogen in water. The pH scale allows us to rank an acid or base on a scale of 0–14. Zero is most acidic and 14 is most basic. Water is neutral with a pH of 7 (it is neither acidic nor basic). Acids and bases are thought of as opposites. When we combine an acid with a base, we can neutralize them, creating a solution that approaches a pH of 7, like water. We can find out which solutions are acidic or basic by testing for their pH with chemicals called *acid/base indicators*.

Guess where we can find acid/base indicators? We can find them in the colored pigments of fruits, vegetables, and flowers. Plant pigments that have *one color* in acid solutions and a *different color* in basic solutions tell us if a substance (when mixed with water) is acidic or basic. Why is this information important? Ask a farmer or a gardener! He or she will tell you that a healthy soil is necessary for growing healthy food. When soils are too acidic or too basic, plants will not grow properly. A gardener can test the pH of the soil and add an acidic or basic solution to bring it into balance, if needed. Some plants like their soil a little more acidic, and some like it a little more basic. But most plants thrive in a *balanced* soil that has a pH of 7, the pH of water. No wonder we call water the “gift of life.”

Indicators from colored pigments are also used in the manufacture of safe cosmetics; personal care products like shampoos, deodorant, and toothpaste; and medicines. We don’t want these products to irritate our eyes, skin, or stomachs, or to damage our hair. It is important that their pH be as close as possible to that of water.

## Online Resources

- The pH Factor. Great middle school activities from the Miami Museum of Science that explain pH. <http://www.miamisci.org/ph/>
- Approximate pH of Foods and Food Products. <http://foodscience.caes.uga.edu/extension/documents/FDAapproximatepHoffoodslac-phs.pdf>
- What is BrainPop? Acids and Bases. <http://www.brainpop.com/science/matter/acidsandbases/preview.weml>

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### *Activity: Veggie Chemistry*

#### *Background for Teachers*

In order to determine which plant pigments are indicators, we will expose them to an acidic environment (vinegar) and a basic environment (baking soda solution) and compare their colors. If they undergo a distinct color change, then they are acid or base indicators.

#### *Materials*

- Vinegar
- Baking soda solution (dissolve one tablespoon of baking soda in 1 cup of water)
- Various flowers, vegetables, fruits or fruit juices (the highly colored ones tend to work better). Try vegetables and fruits such as red cabbage, beets, red radishes, blackberries, carrots, cherries, strawberries, or cranberries. A spice like curry powder works, too. Flower petals that change color in acid and base solutions are geraniums, morning glories, pansies, petunias, violets, and roses.
- Spoons
- Small bowls or cups for testing substances

#### *Procedure*

- Prepare pigments by grinding up fruits, vegetables or flowers with a small amount of water to extract the pigment. Juices can be used directly.
- Test the pigments by adding five to ten drops of each pigment to a teaspoon of vinegar (an acid) and to a teaspoon of baking soda solution (a base) until the color stops changing.
- Record the color in each solution.
- Identify which pigments are good acid or base indicators by noting those that are one color in vinegar, but another color in the baking soda solution.

Which fruits, vegetables or flowers were the best indicators? What colors were they? What color changes occurred?



### *Extension Activity*

If students would like to do another indicator activity, go to Cabbage Chemistry at [http://www.sciencebuddies.org/science-fair-projects/project\\_ideas/Chem\\_p013.shtml](http://www.sciencebuddies.org/science-fair-projects/project_ideas/Chem_p013.shtml) for instructions. This demonstration uses red cabbage as an indicator. Students have a lot of fun pouring acidic and basic solutions into the red cabbage indicator, making it change color instantly from basic (green/yellow) to acid (red) and other colors that indicate various pH values. Referring to the chart given in the activity, which color is closest to neutral, a pH of 7?

## Investigation 2: Native Science: Yesterday, Today and Tomorrow

### Background for Teachers

Science Fairs are an excellent opportunity for students to undertake and present their own research. Independent research allows students to learn about designing an experiment, recording their observations as data, analyzing it, and drawing conclusions about what happened. Science Fairs can be as simple as presenting projects in front of a class or community group or a formal competition with awards. In addition, students learn that real experiments may not work out the way they expected. Students can appreciate that important learning comes from the mistakes they make and the ways they figure out a problem. In real science, if everything worked the first time, there wouldn't be much need for experimentation.

The best projects are those that really grab the interest of the students. The Eagle Books project has developed a series of Science and Technology Cards that we hope “grab the interest” of students. They describe and illustrate Native peoples' scientific contributions to the world. In *Hummingbird's Squash*, Chris investigated one of these contributions: the making of rubber. Even though Chris was pretty cranky most of the time, he really enjoyed the time and hard work that went into doing an award-winning project.

Chris used natural materials (the sap of the rubber tree and morning glory juice) just as the first rubber-makers, the Olmecs, did. Latex is the ingredient in the plant sap or “milk” that makes rubber. When exposed to an acid or when dried, the molecules of latex bond together in long chains called *polymers*. The long strands of polymer get tangled together like wet spaghetti. Polymer molecules are the basis for most plastics, glues, and rubber. Natural polymers can be made from plant saps or “milks” and animal proteins or plants juices containing sulfur. The Olmecs, and later the Mayas and Aztecs, made rubber that was very stable. We still have some of the rubber balls that the Olmecs made 3,500 years ago to play their ball game. To see one of these ancient balls, go to the National Geographic Web site in the online resources provided in this section.

Today, we use synthetic polymers (they are not made from plants) to make products we use every day—like plastics. In the first activity, we will make a “rubber” polymer using synthetic, not natural products. For a classroom activity, it would be difficult to obtain the sap of the rubber plant and the morning glory juice that Chris used. However, the process of breaking down synthetic glue into polymer chains is very similar to breaking down the rubber sap into polymer. In the second activity, students are invited to research the other science projects, including Hummingbird's, that were described in *Hummingbird's Squash*.

## *Activity: Chris's Science Fair Project—Making Rubber*

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### *Materials*

- A bottle of Elmer's white liquid glue (to act as plant "milk")
- Borax (an acid that can be bought in grocery or hardware stores)
- Corn starch (a plant-based carbohydrate polymer)
- Food color (optional)
- Measuring spoons
- Meter stick or measuring tape
- Pint-size plastic bags with a zip closure

### *Online Resources*

- Aztec, Maya Were Rubber-Making Masters?  
<http://news.nationalgeographic.com/news/2010/06/100628-science-ancient-maya-aztec-rubber-balls-beheaded/>
- The Game: Watch how the Mesoamerican ball game is played today. It's called "ulama!"  
<http://www.ulama.freehomepage.com/about.html>
- The Sport of Life and Death: The Mesoamerican Ballgame. <http://www.ballgame.org>
- How to Make Rubber at Home. Making rubber from the rubber tree and morning glories.  
<http://hassam.hubpages.com/hub/How-To-Make-Rubber-At-Home>

### *Procedure*

- Make a borax solution by dissolving 1 teaspoon of borax in 1/4 cup of warm water. Stir to dissolve completely.
- Place 2 tablespoons of glue into the baggie.
- Add 2 tablespoons of corn starch to the glue in the baggie. Add one to four drops of food color (optional).
- Mix the glue and starch mixture by squeezing the outside of the bag.
- Add 1 teaspoon of the borax solution to the ingredients in the baggie and seal the bag. Let sit for 15 to 20 seconds.
- Then knead the ingredients in the bag until it starts to form a semi-solid mass.
- Remove the mass from the bag and continue to knead it. Then roll the mass into a ball. Use paper towels to dry off any excess water. Wash hands.
- Try to bounce the ball in the table or floor. Record observations.

- Using the meter stick as a guide, drop the ball from a height of 24 inches to a flat surface. Measure how high it rebounds.
- Bounce the ball and record observations five more times and calculate the average result.
- Compare the rebound results to others in the class.

### *Activity: Other Native Science Activities*

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Students may be interested in researching or reading about other projects that won awards at the Thunder Rock Middle School science fair:

#### *Little Deb's Project*

##### **Ash and Corn—Releasing the Nutrition**

Students can read about “nixtamalization.” This process is named after two Nahuatl (Aztec) words: nextli, meaning “ashes,” and tamalli, meaning “unformed corn dough.” Many tribes boiled corn with ashes to release niacin, an important nutrient. On the Web sites below, students will learn about pellagra, a terrible disease that affected poor Americans in the southern United States that lived mainly on a diet of pork and corn. They did not boil their corn with ashes (or other alkalines) to release niacin like American Indians had done for thousands of years. The result was mental illness and skin disease due to nutritional deficiency.

- The History of Pellagra in Alabama. <http://www.uab.edu/reynolds/pellagra/history>
- Dr. Joseph Goldberger and the War on Alabama. <http://history.nih.gov/exhibits/goldberger/index.html>
- Preparation of Corn. Recipe for releasing niacin using ash. <http://ancestral.nativeaccess.com/corn/winter.html>

#### *Hank's Project*

##### **The Kayak—From Hunting Boat to Modern Sport**

- The History of Kayaking. Traditional kayak designs and functions. <http://www.kayak.spirithawk.net/history.html>
- Outline of Canoeing and Kayaking. Modern kayaks and canoes. [http://en.wikipedia.org/wiki/Outline\\_of\\_canoeing\\_and\\_kayaking](http://en.wikipedia.org/wiki/Outline_of_canoeing_and_kayaking)

#### *Mindy's Project*

##### **Freeze Drying Potatoes—The Inca Way**

- Food of the Incas. <http://library.thinkquest.org/C005446/Food/English/inca.html>
- Andean Native Potatoes. Learn about the thousands of potato varieties grown in the Andes Mountains (talk about diversity!) and how to make chuño (pronounced choon-yo). <http://www.underutilized-species.org/species/brochures/Andean%20potatoes.pdf>

## *Hummingbird's Project*

### **Invasive Plants on Tribal Rangelands**

Hummingbird's project is about protecting native prairie grasses that bison eat and the greater nutrient value of meat from bison that range free. The following Web sites provide information about bison and controlling invasive plants that crowd out native plant species.

- Intertribal Buffalo Council (Miss Swallow would probably be a member). <http://itbcbuffalo.com/>
- The Ecological Importance of Bison in Mixed-grass Prairie Ecosystems. Download a free 4-page ebook at <http://ebookbrowse.com/fallon-the-ecological-importance-of-bison-doc-d16333666>
- Where's Weedo? Students can try to spot invasive plants.  
[http://www.blm.gov/pgdata/etc/medialib/blm/wo/Communications\\_Directorate.Par.0136.File.dat/WildSide%2013.pdf](http://www.blm.gov/pgdata/etc/medialib/blm/wo/Communications_Directorate.Par.0136.File.dat/WildSide%2013.pdf)
- Invasive Plants of Nebraska. See how the State of Nebraska invites people to recognize and help control invasive plants. <http://snr.unl.edu/invasives/invasiveplants.htm>
- Silent Invaders. Middle School curriculum about invasive plants in the Florida ecosystem. Provides key concepts for protecting native ecosystems.  
[http://plants.ifas.ufl.edu/education/module1/web/silent\\_invaders.html](http://plants.ifas.ufl.edu/education/module1/web/silent_invaders.html)
- Alien Invasion. Great site for activities about invasion of alien species, for grades 5-8.  
<http://www.pbs.org/saf/1204/teaching/menu.htm>

### *Cross-Curricular Connections*

See other Native Science activities in the *Hummingbird's Squash*, Art and Music section of the Guide. These activities offer a variety of ways to utilize the Native Science and Technology Cards.

### *Instructor Notes*

**Safety Note:** *It may be better to for teachers to prepare the original borax solution in the rubber activity above so that students are not handling it directly. Make sure students are careful not to touch their eyes without washing their hands.*

The "rubber" balls will hold up quite well if stored in the baggies between us.

## Investigation 3: Fun Science the Coyote Way

### Background for Teachers

Science is a fascinating subject filled with wonder. It can also be fun! One way to make science entertaining is to include laboratory experiments and demonstrations that are colorful or fizzy and have the ability to surprise. In *Hummingbird's Squash*, Coyote certainly surprised Mr. Pence's class when he instigated the spectacular explosion of Elephant's Toothpaste. For safety's sake, a demonstration of Elephant's Toothpaste made with 35% hydrogen peroxide is best watched online. However, we can make foamy "toothpaste" in class with simple household products.

We can also create some amazement by making flowers or celery change their colors. Coyote might want students to think it is magic, but, of course, the transformation is all scientifically explainable.

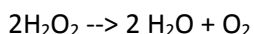
Hopefully, students won't end up looking like Mr. Pence after making their Elephant's Toothpaste!

### *Activity: Elephant's Toothpaste*

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Duration: 30-45 minutes

The Elephant's Toothpaste that erupted in Mr. Pence's class probably involved 35 percent hydrogen peroxide which is dangerous and should only be used in a proper lab setting. (Of course, since Coyote was involved in creating the explosion we can't be sure how he did it.) In this activity we will be using 3 percent hydrogen peroxide that is sold in stores and is used as a disinfectant for cuts in the skin. Hydrogen peroxide is unstable and naturally decomposes into water and oxygen gas. That is why hydrogen peroxide is good only if it has been purchased recently. The bottle should be stored in the refrigerator and the cap twisted on tightly to keep the oxygen from escaping. After the cap has been removed even once, the hydrogen peroxide will degrade rather quickly. An open bottle of hydrogen peroxide will give off all its oxygen in a very short time and only water will be left in the bottle.



#### **Reaction 1: Speeding up the breakdown of hydrogen peroxide**

The rate at which H<sub>2</sub>O<sub>2</sub> breaks down into water and oxygen can be significantly increased by adding a catalyst, a substance that speeds up a chemical reaction. Students will remember the explosion that occurred when Hummingbird added a catalyst to the 35 percent hydrogen peroxide. But don't worry, our demonstration won't explode—just fizz and foam. Our catalyst will come from minerals like oxides of manganese and iron that are in dirt.

By mixing dish detergent in with the vinegar, the carbon dioxide bubbles will get trapped in the soap and produce lots of foam. Food coloring can be added to make it a little more fun.

#### **Reaction 2: Making Elephant's Toothpaste**

An easy way to make foamy "toothpaste" is to create an acid/base reaction between vinegar (an acid) and baking soda (a base) that produces a salt, water, and carbon dioxide gas. This "recipe" doesn't use hydrogen peroxide or a catalyst, but it does make a show.

## *Materials*

### **Reaction 1**

- Hydrogen peroxide (a new bottle of 3 % solution)
- Dirt
- Cup

### **Reaction 2**

- Vinegar
- Baking soda
- Liquid dish detergent
- Food coloring
- 100-milliliter graduated cylinder, or tall narrow glass or tube about 1 inch in diameter
- Small cup
- Shallow pan

## *Procedure*

### **Reaction 1**

- Place 2 to 3 milliliters of hydrogen peroxide in a small cup. Describe what is happening.
- Sprinkle some dirt into the cup. Describe what is happening now. Is the dirt acting as a catalyst?

Show students other common substances that will make hydrogen peroxide bubble. Try a slice of potato or celery, or a pinch of powdered detergent. They contain an enzyme called catalase that is a catalyst. Ask students if they have seen 3% hydrogen peroxide poured on a cut in the skin. What happens? It bubbles because blood and damaged cells also release the same enzyme—catalase.

### **Reaction 2**

- Place about 40 milliliters of vinegar into the graduated cylinder. Add about 1 milliliter of dish detergent and mix thoroughly.
- Add three to five drops of food coloring. Place the graduated cylinder upright in a shallow baking pan.
- Quickly add 1 heaping tablespoon of baking soda. The easiest way to do this is to measure the baking soda, place it onto a piece of paper, fold the paper in half, and add the baking soda by placing the crease above the opening and letting the powder slide into the cylinder. Have students record their observations and compare them to what happened in Mr. Pence's classroom.
- Pour the Elephant's Toothpaste ingredients into the sink and rinse. Clean up sink area.

### Online Resources

- Watch a demonstration almost as big as Hummingbird's.  
<http://www.youtube.com/watch?v=ezs0L0L1c>
- Elephant Toothpaste demonstrations using concentrated hydrogen peroxide and a catalyst. One of these, a Fourth of July celebration is as big as Hummingbird's.  
<http://www.stevespanglerscience.com/experiment/hydrogen-peroxide-eruption>

### Activity: Roses Are Red, Carnations Are...Blue?

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#### Background for Teachers

Hummingbird and Arianna didn't know that Coyote had changed their turnip, cabbage, and carrot seeds into coyote squash—squash that would sprout and grow two feet tall in one day! The secret to the rapid growth was the xylem tubes that go up from the roots into the rest of the plant. Water and nutrients were going up these tubes "like crazy," making the plants grow faster and faster. Just how did this magic take place?

Coyote knew that plants absorb water from the soil through their roots. The water travels by capillary action up through the xylem. *Capillary action* is the way water travels upward through adhesion. Adhesion is the force that attracts water to other surfaces, in this case the xylem tubes. Water goes up these tubes and is lost through transpiration. *Transpiration* occurs when water is carried from the roots to tiny pores on the underside of leaves, where it changes to water vapor and is released into the air. The loss of water from the leaves creates a negative pressure which pulls more water up the xylem tubes—similar to the way you drink out of a straw. The water brings along dissolved nutrients which are used by the plant to grow its many structures. In the following activity we can do our own magic using a plant's ability to draw water upward through the xylem.

#### Materials

- Blue food coloring
- Water
- Fresh cut flowers or fresh cut celery stalks (colored flowers like white carnations or Queen Anne's Lace work well.)
- Magnifying glass or microscope (optional)
- Cup, tall glass, or graduated cylinder (to hold flower stems)
- Knife or box cutter

### Online Resources

- National Science Teachers Association. Up Goes the Water.  
<http://www.nsta.org/publications/news/story.aspx?id=49197>
- Color Changing Carnations. <http://www.stevespanglerscience.com/experiment/colorful->



carnations

### *Procedure*

- Fill a cup with about 6 to 8 ounces of water. Add food coloring until the water is a darker color.
- With a sharp knife, cut a very thin cross section off the bottom of the flower stem or celery stalk. Observe the cross section with a magnifying glass or microscope. Draw the structures that you see and label them.
- Place the freshly cut flower stem or celery stalk into the cup of water with food coloring. Record observations of any changes every 20 minutes during the class period.

Check out the flower or celery stalk the next day. What happened? What role did the xylem play?

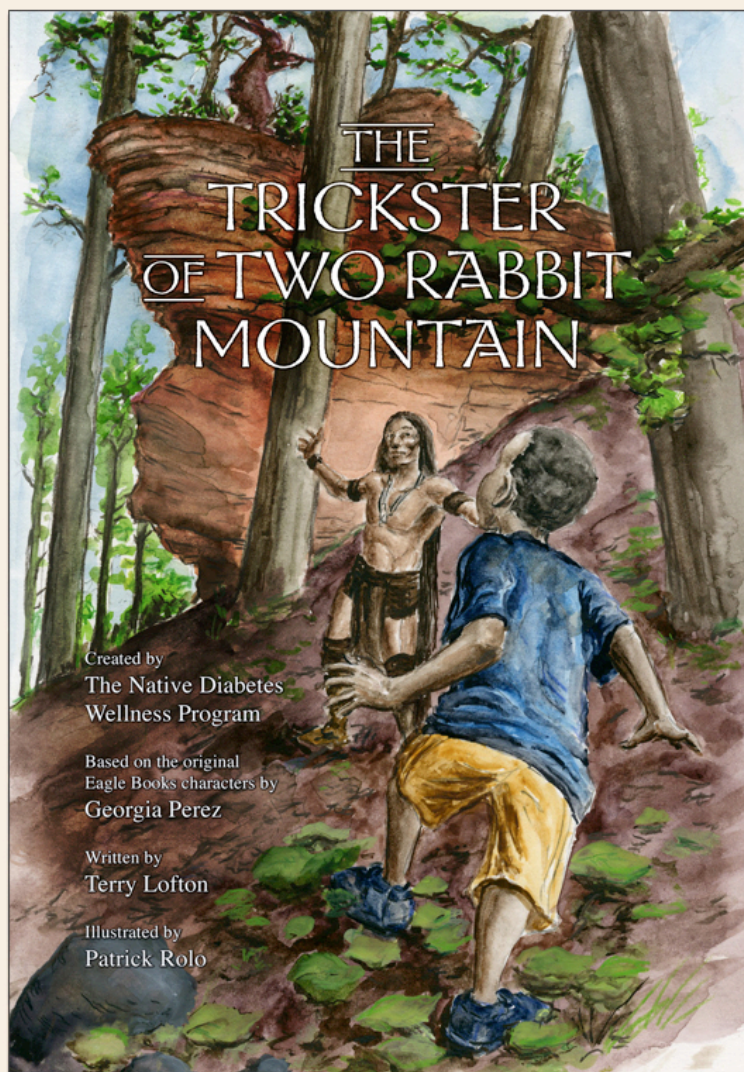
### *Follow-Up Activity*

Split the stem of a white or very light-colored flower in half, starting beneath the flower and slicing downward. Place half of the stem in a cup containing blue food coloring and the other half of the stem in a cup containing red food coloring. Check out the flower after 30 minutes. What is happening?

Eagle Books

## Youth Novels: Educators and Community Guide

For The Trickster of Two Rabbit Mountain



## English/Language Arts

### *Activity: Holding a Book Discussion*

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#### *Objectives*

- Describe and analyze characters and events in the book.
- Learn from different viewpoints.
- Behave respectfully when debating with others.

#### *Background for Teachers*

The major theme in *The Trickster of Two Rabbit Mountain* is “harmony” —the seeking of balance and accord among the many aspects of life. These may include health, economics, community, family, individual wellbeing and identity, and the relationship between people and the natural environment. When these different elements, like musical notes, blend together in the right proportion, a state of wellness is produced that results from a balance of physical, mental, emotional, and spiritual health. This the Balance of Life concept that emphasized in the *Coyote and the Turtle’s Dream* and *Hummingbird’s Squash* sections of the Guide.

In the novel, the harmony of the Little People is disrupted when a mysterious helicopter appears repeatedly over their towns. The elders of Turtletown send Sigigi to Taniba Springs to find out why the “whirling bird” is harassing them. There he meets Rain that Dances and his friend, Boomer, and their new friends, Hailey, and her brother, Marcus. From different communities and ethnic backgrounds (Native American and African American), these young people create their own harmony by joining forces to help Sigigi. In the adventure that follows, they are introduced by the Little People to Brother Rabbit, a great trickster, whose identity is a blend of story traditions from Native America and Africa. Brother Rabbit’s stories and his magical abilities help our young heroes to thwart an economic plan that would disrupt the forested home of the Little People and a scheme to capture them. As the story unfolds, they must help to make difficult decisions regarding the fate of Eugene Frimble, the author of the economic plan that would unintentionally harm the Little People’s towns, and Max Bigelow, the helicopter pilot whose plan is to make a fortune by capturing the Little People and selling the story to TV and the tabloid press. They also meet Lennie Blatch, the helicopter mechanic, whose conflicted feelings about his multi-ethnic background makes him vulnerable to supporting Max’s plot, and Myrtle Owl, an elder with knowledge about the Little People, who tries to help Lennie.

These story elements, along with Rain’s bringing the eagle’s messages about preventing type 2 diabetes to the Little People, offer many opportunities for an interesting book discussion with students. Classes may also enjoy discussing Thistle and Coyote’s success in convincing Brother Rabbit to join them in creating new stories about diabetes prevention that promote a Life in Balance.

The background information, activities, and questions found in “Holding a Book Discussion” in the English/Language Arts sections for both the *Coyote and the Turtle’s Dream* and the *Hummingbird’s Squash* sections of the Guide, can be used to discuss the third novel. Here are some additional questions

for *The Trickster of Two Rabbit Mountain*.

The children have American Indian and African American backgrounds. Lennie’s grandfather is a tribal member and the rest of his family is non-Native. What is your own cultural background? How does it affect your life? Do your parents, aunts and uncles, grandparents, or elders teach you about your culture?

Making good decisions can be difficult. Something positive, like a new business that brings jobs to a community can also be negative if it hurts the environment or disrupts the lives of the local people. Have you ever had to balance the good with the bad before you made a decision? Can you describe how you made your decision? Share this experience with the class and fellow students.

Rain, the main character, eats healthy food and gets lots of exercise because he knows these things will help protect him from type 2 diabetes. But sometimes just knowing what to do isn’t enough. What would help you and your friends get started?

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### ***Activity: The Trickster of Two Rabbit Mountain Jeopardy!™ Game***

#### ***Objectives***

- Encourage teamwork, collaboration and cooperation, and presentation skills.
- Reinforce reading and retention.
- Familiarize key elements of the novel.
- Emphasize that knowledge is fun.

#### ***Background for Teachers***

Educational messages are more easily learned when readers are entertained. Games are a great way to invite students to participate in a book discussion, especially “reluctant readers.” Games also reinforce learning. For example, middle-school student Rain can still remember the game song about physical activity that he learned from the great eagle as a child. And, later in the book, Little People from all seven towns play on competitive stickball teams—another example of worthwhile game activity. Team games can help students develop essential organizational and negotiation skills, and learn how to work toward common goals.

#### ***Materials***

- One clicker, bell, or buzzer per team
- Small prizes

#### ***Procedure***

- Determine how many students are familiar with the game show Jeopardy!™
- Explain the premise of the game: Answers are provided and players are challenged to come up with the applicable questions.

- Tip: Find out when Jeopardy!™ airs in your area and encourage students to watch it ahead of time, or watch it as a class.
- Divide the classroom into two or more teams.
- Assign an equal number of chapters from the novel to each team.
- Each team writes 15 or 20 answers and questions from their chapters.
- Each team selects a host.
  - Note: Keep the “questions” from each team separate. Do not mix all together. The team that wrote the “answers” does not play in that round.
- Classroom game: Each host acts as emcee and keeps score. Team members take turns reading answers to the opposing team or teams. If there are only two teams, students compete as individuals.
- Host calls on the team that clicks in first with the question.
- Teachers predetermine the amount of time for game play, act as referees or judges, and if needed, administer a final playoff question. Teachers may award small prizes (or privileges, such as personal reading time.)

Tip: Have the class hum aloud or record the “Final Jeopardy!™” theme music to speed the game along.

Extension: Games are a wonderful way to reenergize a classroom, both mentally and physically.

## Understanding Languages and the Spoken Word

### Objectives

- Appreciate the challenges of learning new languages.
- Increase understanding of regional dialects, accents, and pidgin languages.
- Identify contributions of Native American and African languages to English.

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### *Activity: Learning Another Language*

#### *Background for Teachers*

In the previous novels, Rain and his friends studied their native language with Joe Red Crane. Re-learning a native language or learning a new language can be a challenge. When we learn a new language we struggle to remember new words and grammar and will often pronounce words with vowel and consonant sounds that are like the language we speak most fluently. When Sigigi was learning to speak English, he was smart to listen to the radio as a way to learn the sounds and rhythms of the new language; he also listened to the radio to practice his listening comprehension. He was also lucky to have a native English speaker, Duffy, to help him with pronunciation and vocabulary.

Sigigi was not shy about trying to speak English. He was more interested in communicating than worrying about making grammatical mistakes. People who have this attitude learn to speak a language faster than those who are concerned about sounding foolish. It didn't bother Sigigi that he spoke in "broken English," often using the wrong diction and syntax. He spoke in short sentences, usually used present tense (not concerning himself about past and future tense), and rarely preceded nouns with articles like "the" and "a" or "an." Everyone who learns another language initially makes adaptations like these. Because his listeners understood him very well and he understood them, Sigigi would be considered a "basic English speaker."

#### *Procedure*

- Ask students to find Sigigi's dialogue in the novel. Ask if they had difficulty understanding what he was saying. Invite them to rewrite his dialogue in standard English.
- Have students discuss their own experiences learning to speak English in school or learning their own native language.



## *Activity: Accents and Dialects*

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### *Background for Teachers*

Persons who speak more than one language will often have an accent. An *accent* is a way of pronouncing a language. For instance, a person who is a native French speaker will speak English with a French accent.

People who speak their native or mother tongue do not always sound alike. Groups of people who live in particular towns, in particular parts of a country, or who belong to different ethnic groups may speak in their own individual way. They may pronounce words differently, have different meanings for words, and use different grammar. This identifiable way of speaking is called a *dialect*.

Everybody speaks a dialect of their language. Dialects that are spoken by large numbers of people are considered to be more standard; that is, they are the most accepted version of the language. In the United States we have many different dialects.

Dialects can be a way to stereotype groups of people. For instance, many people in the southeastern and south central part of the United States speak with a drawl (a slow way of speaking that lengthens vowel sounds). Some people may assume that because a person speaks more slowly than others that he or she thinks slowly, too. This is a misconception about dialect and intelligence.

### *Procedure*

- Select a passage from the novel that is familiar to the students.
- Read it aloud with an exaggerated upper-class British accent.
- See if the students can identify the accent.
- Ask them if hearing the accent caused them to think differently about the events or characters in the passage.
- Did they make assumptions about the speaker? Was this fair or unfair?

### *Online Resources*

- Ask a linguist: What is an accent? <http://linguistlist.org/blog/2013/07/ask-a-linguist-what-is-an-accent/>
- “Do You Speak American?” Interactive quiz and information about regional dialects: <http://www.pbs.org/speak/>

## Activity: Pidgins, Creoles, and New Languages

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### Background for Teachers

If people with different dialects live apart for a long period of time, they may eventually struggle to understand each other. In some cases, different dialects will develop into totally different languages.

New languages can also emerge when different languages come together and people start to share words. In *The Trickster of Two Rabbit Mountain*, different groups of Little People who represented different tribes came together near Taniba Springs. Although they spoke languages that were related to each other like the Muscogean language family (Muscogee Creek, Choctaw, Chickasaw, etc.), they could not understand each other. The towns of Little People who spoke a Muscogean language probably would not have understood their neighbors who spoke Cherokee (Iroquoian language family) or Quapaw (Siouan language family).

In this story, the Little People began to communicate by sharing words and phrases—probably so they could conduct trade—and were soon speaking a pidgin language. A *pidgin* is a simplified form of speech that is usually a mixture of two or more languages. It has an uncomplicated grammar and vocabulary and is never spoken as a first or native language. (Spanglish is an informal blend of two languages that may become a pidgin language.)

When children begin to speak the pidgin language, they may add more grammar rules and vocabulary from the parent languages as well as brand new grammar and words. Soon the children are speaking this language all the time. When this happens, a new language called a *creole* is born.

### Procedure

#### **Pidgin**

Ask students to look for examples of pidgin languages online. Pidgin languages usually developed to meet trade needs. In fact, the word “pidgin” is believed to derive from the word for “business” in Chinese pidgin.

#### **Creole**

Have students also search for examples of different creole languages online. There are several creoles in the United States. One is Gullah, a creole language spoken by African Americans on the South Carolina and Georgia coasts. Another creole language is Afro-Seminole. Related to Gullah, Afro-Seminole is spoken in Florida, Oklahoma, and Mexico by the descendants of Seminole and African Americans who fought in the Seminole Wars during the 19th century.

Students will enjoy listening to the sounds of pidgin and creole languages on several of the websites listed below.

### Online Sources

- Listen to “The Three Little Pigs in New Guinea Pidgin”:  
<http://www.abc.net.au/local/stories/2007/09/18/2036578.htm>



- “Crossing East: Proud to Speak Pidgin, Brah.” Listen to Hawaiian pidgin: <http://www.npr.org/templates/story/story.php?storyId=4773414>
- Gullah Net: Explore Gullah Culture in South Carolina. This site has stories, lesson plans, and music: <http://www.knowitall.org/gullahnet/>
- Learn more about the Gullah language at “The Gullah: Rice, Slavery, and Sierra Leone Connection”: <http://www.yale.edu/glc/gullah/06.htm>
- English-based creoles: [http://en.wikipedia.org/wiki/English-based\\_creole\\_languages](http://en.wikipedia.org/wiki/English-based_creole_languages) Look up Afro-Seminole creole on this site.

### *Activity: Languages Enrichment*

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#### *Background for Teachers*

A language can be enriched by words and phrases from other languages. English has been greatly expanded by words and phrases from Native American and African languages and from different dialects spoken by Native Americans and African Americans.

#### *Procedure*

- Have students find Native names of towns and cities, rivers, mountains, and other natural features in their city, county, state, and in the country as a whole.
- Identify the states whose names have a Native origin.
- Define the meaning of these state names.
- Have students compile lists of words and phrases that were “borrowed” from various tribal languages in Native America and Africa.
- Go to these sites to see words, phrases, and meanings contributed from these sources.
- A list of words and origins is included for your use.
- Use the worksheet in Appendix C to have students unscramble words with Native American and African American origins.

#### *Online Sources*

- “The Impact of African Languages on American English” by Joseph E. Holloway, Ph.D., California State University Northridge: [http://www.slave-studies.net/history/hs\\_lp\\_languages.html](http://www.slave-studies.net/history/hs_lp_languages.html)
- List of English words of African origin: [http://en.wikipedia.org/wiki/List\\_of\\_English\\_words\\_of\\_African\\_origin](http://en.wikipedia.org/wiki/List_of_English_words_of_African_origin)
- List of English words from indigenous languages of the Americas: [http://en.wikipedia.org/wiki/List\\_of\\_English\\_words\\_from\\_indigenous\\_languages\\_of\\_the\\_Americas](http://en.wikipedia.org/wiki/List_of_English_words_from_indigenous_languages_of_the_Americas)

- Southern Poverty Law Center: Native American Influences in U.S. History and Culture: <http://www.tolerance.org/activity/native-american-influences-us-history-and-culture>

### *Activity: Writing in Dialect*

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#### *Background for Teachers*

In *The Trickster of Two Rabbit Mountain*, Brother Rabbit uses some phrases and grammar common to African American English and Southern English in general. The heavy dialect in the original Brother Rabbit (Brer Rabbit) stories is difficult to read. Many of the folktales have been rewritten using a more understandable dialect.

In this novel, Brother Rabbit uses certain expressions (“mighty fine,” “howdy-do,” “powerful hongry”), drops the “g” from words ending in “ing,” and employs double negatives. The purpose of using dialect for Brother Rabbit is to establish his unique character. It gives “flavor” to his speech without slowing down the reader.

#### *Procedure*

- Introduce the concepts of “dialect” and “standard English” to students.
- Read the following conversation between Marcus and Brother Rabbit aloud, twice—once using dialect as the novel is written, and once using standard English.
- Ask students why they think the author chose to use dialect. Would Brother Rabbit’s speech be as effective if it were written in standard English instead of dialect?

#### *Excerpt from The Trickster of Two Rabbit Mountain*

The rabbit dismissed Marcus’s worry with the wave of his paw. “Don’t you fret. You’ll be eatin’ a sammich with your daddy before you can say ‘Impty-Umpty.’” The trickster’s eyes began to twinkle. “Time is a real interestin’ thing, Marcus. There’s all kinds of time. Why there’s some time, anytime, daytime, nighttime, downtime, halftime, and the same time. Then there’s supper time, bedtime, summer time, winter time, meantime, overtime, and ah, let’s see, which ones did I leave out?”

“You didn’t say playtime.”

The rabbit slapped his knee again and shook his head in disbelief. “Why, how could I forget playtime? I declare! I must be losing my wits.” The trickster hadn’t entertained a child in a long time, and he was enjoying himself enormously. “Oh, indeedy, there’s all kinds of time...but there’s nothin’ like story time. Story time is real special—mostly ’cause it ain’t got no time at all!” Getting ready to commence his first tale, the rabbit thought to ask, “Oh, by the way, you got any brothers, Marcus?”

“No, just my sister, Hailey.”

“Well, then. I can be the brother you ain’t got. Why don’t you call me...Brother Rabbit?”

“I thought your name was the Two Rabbit.”

“Oh, it is, and for good reason,” the rabbit said. “But I got lots and lots of names.” Looking around as if it

were a big secret, he whispered, “You wanna hear my favorite name?”

Marcus nodded. “What is it?”

“Ol’ Hoppum-Skippum Run and Jumpum.”

The boy laughed. “That’s funny!” Then he asked shyly, “Will you call me Brother Marcus?”

“Why, I surely will! When you come passing by, I’ll tip my hat and say, ‘How you doin’ this mornin’, Brother Marcus?’ And you’ll say, ‘Mighty fine, Brother Rabbit, and you?’”

### *Online Resource*

- Middle school lesson plan: “Dialect Awareness in Literature and Life”:  
<http://www.learnnc.org/lp/pages/3588>

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## *Activity: Character Sketch Storytelling*

### *Objectives*

- Help students retain key messages from the story.
- Build oral language skills.
- Use body language to help convey messages.
- Improve self-confidence and problem-solving ability.
- Enhance communication, critical thinking, and creative thinking skills.
- Encourage students to be spontaneous and to “think on their feet.”
- Enable students to experience levity and self-expression in a safe environment.

### *Background for Teachers*

In indigenous communities, long before any writing was used to preserve information, storytelling served as the primary method to teach, share, warn, and entertain. Native communities, particularly in the fall and winter months, would gather special firewood that burned quietly yet brightly and build fires around which the children and families would gather to hear elders and others tell their tales. These stories often taught valuable lessons—discipline, perseverance, family, and community history—and were often witty and wise. Even favorite recipes and food preparation information was passed down orally. Hearing the stories over and over helped listeners learn and remember them. As your students reenact scenes from *The Trickster of Two Rabbit Mountain*, they will re-experience the novel and its important health messages in an engaging way.

### *Materials*

- Props as applicable
- Cast of Characters section from novel
- Staging and performing area

### Procedure

- Have each student select or draw at random a character from the novel. Review the Cast of Characters if desired.
- Then, acting alone or in character along with others in their characters, perform skits of different scenarios.
- Select a scene from the book and perform it for others.
- Select a scene from the book and perform it creating a different ending.
- Perform your character interacting with another character(s) to create a scene not included in the book.
- Perform as a character from the book and have others guess the character's identity (charades).
- Perform impromptu skits as characters from the book with classmates suggesting scenes from the book or making up their own. These may be comical. (e.g., Max asks Myrtle for driving directions, Niska teaches Duffy to dance).
- Use your own ideas.

### Extension: Trickster Tales

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Tricksters are found in many Native American traditions as well as others around the world. Sometimes foolish and sometimes wise, the trickster figure is a master of creative deception who teaches valuable lessons. Among the characters in *The Trickster of Two Rabbit Mountain* are Coyote—a familiar figure to students who have read the earlier youth novels—and Brother Rabbit, a trickster figure popular in African American folklore. In this novel, Brother Rabbit is also called *Chufezomo*. This is the name given to him by Thistle's family of rabbits who are of Muscogean origin. The name combines the southeastern trickster Rabbit (*Chufe* in the Creek language) with *Zomo* (the African trickster hare). The name, *Chufezomo*, illustrates Brother Rabbit's origins in the storytelling traditions of the great tribes of the Southeast and of western Africa.

### Procedure

- Have each of your students create a short story that may include Chufezomo (Brother Rabbit), Raven, Iktomi the Spider, Coyote, Zomo the Hare, Ananzi the Spider Boy or other tricksters as a key character.
- Encourage each writer to include a lesson to be learned within the story.
- Create a mock fire pit for the performance and gather listeners.
- Add crackling fire sound effects if possible.

### *Online Resources*

- Native Languages of the Americas: Native American Indian Legends and Folklore:  
<http://www.native-languages.org/legends.htm>
- A Tale of Two Tricksters Communicating Science through Art and Interactive Storytelling:  
[http://www.tcd.ufl.edu/Data/Sites/44/media/documents/workshops/Taleoftwotricksters\\_Dec\\_11.pdf](http://www.tcd.ufl.edu/Data/Sites/44/media/documents/workshops/Taleoftwotricksters_Dec_11.pdf)
- Teaching suggestions: African and African American storytelling:  
<http://www.learnnc.org/lp/pages/6582>

### *Extension: African American and Caribbean Tales*

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In the United States and the Caribbean, Compere Lapin, Cunny Rabbit, and Brother Rabbit (Brer Rabbit) embody the rabbit trickster traditions from Native America and Africa. Aunt Nancy (Ananzi) is a spider trickster from Africa also found in African American and Caribbean folklore. Some of these spider stories are retold with Brer Rabbit as the trickster hero. Old John and John the Conqueror are human, not animal, tricksters that are found in the African American folklore.

### *Online Resources*

- “The animal trickster – an essential character in African tales”: [http://www.etonline.org/modules/newbb/dl\\_attachment.php?attachid=1266750631&post\\_id=211](http://www.etonline.org/modules/newbb/dl_attachment.php?attachid=1266750631&post_id=211)
- Tricksters Around the World:  
<http://www.learningace.com/doc/858644/1160b33e0763742072efa8dabbccf92b/tricksters>
- Storytelling Lesson Plans: <http://www.storyarts.org/lessonplans/lessonideas/>
- Three African Trickster Myths/Tales:  
<http://www.yale.edu/ynhti/curriculum/units/1998/2/98.02.04.x.html>

## Social Studies

### The Little People

#### Objectives

- Learn about the Little People and the lessons they teach
- Appreciate the widespread telling of Little People stories in the Americas
- Define the differences between folktales and memorates.
- Identify common themes among Little People stories

Stories of the Little People are found all over the world. Leprechauns, elves, fairies, dwarfs, trolls, and ogres populate the folklore of Europe, and Little People are found in the story traditions of the Americas, Asia and the Middle East. Little People are also part of our popular culture today---most children have seen the munchkins in the movie, *The Wizard of Oz* and the hobbits in the movies based on Tolkien's Lord of the Rings novels. The Oompa Loompas from Roald Dahl's *Charlie and the Chocolate Factory*, and the cartoon Smurfs demonstrate the continuing ability of the Little People to entertain us. They also continue to teach us important values and life lessons. The tiny population of Whoville in Dr. Seuss' *Horton Hears a Who* echo a common theme in the Little People stories from all over Native America—that we should help to protect the natural world in which they live from harm and that "a person's a person, no matter how small."

In Native America, Little People stories are told in the United States, Canada, and throughout the western hemisphere. Like some stories of leprechauns and fairies in Ireland and other parts of Europe, stories about Little People are usually told by American Indians and Alaska Natives as being true. These stories are called "memorates" (not folktales) because they derive from the memory of the storytellers or a person who told them the story.

Although Little People stories are told differently by different tribes, they usually have certain themes in common. Little People are a source of power and wisdom, despite their small size. They reinforce the message that being big and strong does not always make a person powerful. The small and weak in strength can be powerful, too. (This is also a common trickster message.) The Little People teach that anything is possible: disease can be overcome, the weather can be controlled, and nutritious food can be grown in great abundance. Most of all, they teach endurance and survival.

Among other commonalities are that some Little People are playful and mischievous. They enjoy playing tricks on people, but they can be helpful to people and bring them luck. Sometimes, however, Little People will punish people if they offend them. There are also traditions of wicked Little People among some tribes that do harm to people and should always be avoided. In most stories, the Little People live in the woods or in streams, lakes, or the sea. On land, they live in caves and rocky places that they like to keep secret. Some also build houses and structures where they come together to sing and dance. Many stories also describe them living in large groups with community members representing the same kinds of roles and dispositions as those found among Big People. Some are leaders and others are followers,

and some are pranksters, while others are thinkers, healers, and those who work hard to provide food to community. In appearance, they may be young and beautiful or they may be old. Most have very long hair, speak ancient forms of language, and dress themselves after the style of the tribes that tell their stories.

In *The Trickster of Two Rabbit Mountain*, the Little People do not represent the story tradition of any one tribe. Their behavior and way of living is a mixture of many traditions, just as the language they speak is a blend of many languages.

## Instructor Notes

More Information about the Little People can be found in the online and book resources below. Included is an adaptable lesson plan for *The Cherokee Little People* by MariJo Moore. Students whose tribes tell Little People stories are encouraged to find out more about this important aspect of their traditional culture.

## Online Resources

- Native American Little People of Myth and Legend. <http://www.native-languages.org/little-people.htm> This site lists tribes that tell Little People stories and includes links to Little People stories.
- Native American Tales from Appalachia: The Little People. <http://www2.ferrum.edu/applit/bibs/tales/littlepeople.htm> this site is a comprehensive list of resources.
- The Cherokee Little People by MariJo Moore. [http://rigby.hmhco.com/HA/correlations/pdf/r/r104\\_2\\_people.pdf](http://rigby.hmhco.com/HA/correlations/pdf/r/r104_2_people.pdf) a lesson plan format that can be adapted to *The Trickster of Two Rabbit Mountain*.

## Book Resources

*The Deetkatoo: Native American Stories about Little People* (1998). Edited by John Bierhorst and illustrated by Ron Hilbert Coy. William Morrow and Company, Inc., New York.

*The Secrets and Mysteries of the Cherokee Little People* (1998). Written and illustrated by Lynn King Lossiah. Cherokee Publications, Cherokee, North Carolina.

## Kindness=Harmony

### Background for Teachers

In the Social Studies section of the Guide there are several activities aimed at building healthier communities, including recommendations that address ways to prevent and stop bullying. In this novel, the Little People adopted the following activity to promote harmony between and within their community. In the Trickster, after Sigigi excuses himself to help an elderly man fix his roof, Duffy tells Rain and Boomer about the Little People's custom of "doing a kindness." In earlier times, many groups of Little People had followed their tribes to the lands near the Wetumka Mountains. Some tribes had

been enemies and there was much quarreling. Then the elders intervened, instructing the Little People to make harmony among themselves by performing a kindness for another each day—especially someone with beliefs different from their own. “Doing a kindness” helped to stop the trouble among the Little People.

### *Activity: Being Helpful, Not Hurtful*

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Duration: 2 weeks

This activity is based on activities promoted by the Random Acts of Kindness Foundation (see the website provided in the online resources section below). It is designed to allow students to better understand the effects of their positive behaviors on others, and importantly, how those behaviors affect their own feelings and attitudes.

#### *Materials*

- Daily journal

#### *Procedure*

- Brainstorm ideas for how to be helpful to others. These should be simple things that students can do for their classmates, teachers, and their school. The longer the list, the better. Label this list “Random Acts of Kindness.” The following list of 20 friendly acts is an example:
  - Smile at people.
  - Let someone in front of you in line.
  - Open a door for a classmate or a teacher other than your own.
  - Choose a classmate who is not a strong player to be on your team.
  - Study with a classmate.
  - Make a new friend. Speak to someone that you don’t talk to very much. (See Instructor Notes below.)
  - Read to a child in the elementary grades.
  - Listen to someone without interrupting. It is respectful and also kind because it is telling that person that he or she is important.
  - Share a healthy fruit or vegetable snack with someone at lunch.
  - Encourage someone. Tell them, “You can do it!”
  - Pick up trash in the halls or lunchroom.
  - Say “thank you.” When was the last time you heard a student say thanks to your bus driver?
  - Offer praise when someone does something well.



- Tell a classmate a joke. Laughing is fun and friendly.
  - Admit to a mistake; apologize for something you have done wrong; forgive those who apologize to you.
  - Cheer on a teammate.
  - Be kind to someone who has not been nice to you.
  - Be kind to yourself. Go running! (When we get physical activity, our brains produce special chemicals called endorphins that make us feel good. When we feel good, we usually have a better attitude toward other people.)
  - Be kind to yourself. Drink more water! (Water helps us digest our food and it helps our blood carry oxygen and the nutrients we need to our cells. We feel better when our bodies can do their job.)
- Students certainly don't have to do 20 acts of kindness every day, but they should choose several that they would like to do for 2 weeks. The acts can vary from day to day.
  - At the end of the first day, students should complete an entry in their daily journal. The entry should describe what they did, what happened, and how they about felt it. The journal should be filled out until the end of the second week.
  - At the end of each week, hold a group meeting so that students can discuss their experiences. Were all of their experiences positive? Did some students respond negatively to their attempts to be friendly? Were there any other difficulties? Ask the school counselor to attend the meetings. They can offer advice about unexpected responses.
  - Ask the participating students to discuss what they learned about themselves from this experience. What did they learn about other people? Discuss both positive and negative experiences.
    - Were people receptive to their efforts? Why or why not?
    - Did they make any new friends? Were there any classmates who they got to know better?
    - Did anything happen that they didn't expect? What surprised them?
    - Did being kind to others make them feel better about themselves? Why or why not?

### *Follow-Up Activities*

- Repeat the Random Acts of Kindness activity at home for a week. Tell students not to tell their family what they are doing. At the end of the week, they can share their "secret" with the family. How did their family members respond? Also share the results with the class.
- Invite community elders to speak about how helping our relatives and friends connects our mind, body, and spirit.

### *Cross-Curricular Connections*

Teachers choosing to do the Random Acts of Kindness activity may want to do some of the Being a Good Relative activities in the *Hummingbird's Squash* Social Studies section.

### *Instructor Notes*

- In generating the list of kind acts the students may perform, try to get them to come up with most of the ideas by asking leading questions. If they miss acts that are obvious (like smiling, greeting people, letting someone go first, or giving someone a compliment), you should make sure those acts make it on the list.
- Be sure to discuss with students the possibility that some classmates may reject or be suspicious of their motives for “being nice.” They may not want to be friends or accept help. Assure students that they should not take the rejection personally. There can be reasons why a person is not being friendly. An act of kindness should not be forced. Tell students to just smile and withdraw in a nice way. It’s okay.
- Make sure you have ongoing discussions about how the activity is progressing. Check in to see that students know what to do and how to get help with any issues that they can’t resolve themselves.
- Make sure students’ journal responses are private unless they choose to share.

### *Online Resources*

- Random Acts of Kindness: <http://www.randomactsofkindness.org/>
- The Relationship Between Physical and Mental Health: [http://www.redorbit.com/news/health/117001/the\\_relationship\\_between\\_physical\\_\\_mental\\_health\\_\\_cooccurring\\_mental/](http://www.redorbit.com/news/health/117001/the_relationship_between_physical__mental_health__cooccurring_mental/)
- Improving Emotional Health: [http://www.helpguide.org/mental/mental\\_emotional\\_health.htm](http://www.helpguide.org/mental/mental_emotional_health.htm)
- Bam! A Guide to Getting Along: [http://www.bam.gov/sub\\_yourlife/yourlife\\_conflict.html](http://www.bam.gov/sub_yourlife/yourlife_conflict.html)

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### *Extension Activities: Bursting Stereotypes*

Adapted from a lesson plan by Gary Hopkins found on Education World.

### *Objectives*

- Learn the meaning of the word stereotype.
- Work in groups to come up with stereotype statements.
- Discuss whether the statements are fair.
- Archive what was learned from the activity.

### *Background for Teachers*

On their drive through Taniba Springs, Rain and Boomer notice a “Big Brave Motel” and wonder if its restaurant sells “Big Chief Burgers.” Rain’s dad, Gerald, informs the boys that a motel in their home town is about to be renamed the “Wigwam Motor Inn.” Rain and Boomer think “that corny Indian stuff” is hilarious. But Gerald understands that stereotypes can be damaging and resolves to talk to the boys about them. He knows that stereotypes can disrupt harmony between and within communities. In this activity, balloons serve as a conduit by which students “burst” stereotypes that unfairly label individuals or groups.

### *Materials Needed*

- 2 dozen multicolored balloons, inflated
- 2 dozen paper or tag board sentence strips, 2 inches wide by 12 inches long
- Crayons or markers
- Common pin or tack

### *Procedure*

**Before the lesson:** Cut paper for sentence strips (paper or tag board cut to lengths approximately 2 inches wide and 12 inches long), and inflate about two dozen small balloons. Store balloons in a plastic trash bag in a closet.

**Introduce the lesson:** To begin the lesson, write the words *man* and *woman* side-by-side at the top of the chalkboard or on a piece of chart paper. Draw a vertical line between the two words to create a two-column chart. Have students set up a piece of writing paper in the same way. Then ask students to write words or phrases that describe the qualities or characteristics of a man under the word *man* and words or phrases that describe a woman under the word *woman*. To get the ball rolling, you might ask students to share a few ideas with their classmates. Following are some typical students’ responses:

Man: active, sports-lover, hardworking, truck driver, breadwinner, strong

Woman: loving, nurse, shop, likes flowers, cries easily, long hair

Give students a few minutes to compile their lists.

Next, arrange students into small groups and ask them to share their lists with group members. Then give each group two minutes to brainstorm additional words or phrases describing a man, and two minutes to brainstorm additional words or phrases describing a woman.

Bring the groups together to create a class list of words and phrases about men and women. Write them on the chalkboard as students share them. Then ask some of the following questions:

- Are you happy with the lists you have created? Do you see any changes you would like to make to them?
- Are there terms that do not belong under the heading they're under? Are there terms that might fit under both headings?

- Is it fair to say that all men \_\_\_\_\_ or that all women \_\_\_\_\_?

### *What is a Stereotype?*

Write the word *stereotype* on the chalkboard or chart. Ask students if they know what the word means. Write down the dictionary definition of the word. For example, Scholastic Children's Dictionary defines the term this way:

Noun: An overly simple picture or opinion of a person, group, or thing. It is a stereotype to say all old people are forgetful.

### *Expand the Lesson*

Write on the chalkboard or chart the following phrases:

All old people are forgetful.

Men are better at math than women are.

Give students a few moments to consider those phrases. Then ask them to share their reactions. Lead students to the conclusion that the statements are too general to be true; encourage them to recognize that it is unfair to make such sweeping statements. Help students make the connection between the phrases and the term *stereotype*.

Have students return to their small brainstorming groups and ask them to come up with additional stereotypes they might have heard or thought about. Tell them keep a written record of the stereotypes they think of. When the flow of stereotype statements seems to be slowing down, ask students in each group to take a final look at their lists and mark with an asterisk 6 to 10 of the most interesting stereotypes. Bring the class back together so they can share their ideas. Each time a student shares a stereotype, hand that student a sentence strip so he or she can write the stereotype on a sentence strip. Instruct students to write large and bold; markers or crayons work best.

Some stereotypes that students might have thought of include:

- Kids who are into computers are geeky.
- Young kids are noisy.
- People who wear glasses are smart.
- Poor people are lazy.
- Women are better cooks than men.
- Girls are not as athletic as boys.
- All politicians are crooks.
- Everyone believes in God.
- Indians live in teepees.
- All doctors are rich.

- All Americans like to watch baseball.
- All tall people are good basketball players.

Now it is time to grab from the closet the bag of inflated balloons. Call students holding sentence strips to come one at a time to the front of the classroom. Have each student read aloud the statement on his or her strip and hold the strip up for classmates to see. Hold up a balloon as the strip holder calls on classmates to explain why that stereotype on the strip is not true. Once satisfied that the stereotype has been blasted, pop the balloon.

### *Follow-up Activities*

Ask students to discuss how bursting stereotypes can promote respect and more harmonious relationships. Ask them to share how they felt about the lesson. What did they learn? Were there times during the lesson when they felt angry or sad? Why?

**Games:** Games can also promote harmony by bringing communities together through friendly competition. They are a great way to have fun as well encourage community spirit and physical health. Social dancing serves the same purpose. In the novel, *Sigigi* describes the way that the Little People towns build community through stickball games, foot races, as well as dancing, singing and holding feasts. Students will enjoy learning how to play stickball and learning about the history of traditional Native ball games on the websites below.

Games are also a good way to reenergize the classroom by introducing some welcome physical activity. The following websites include some great ideas for classroom activities that get the muscles moving!

### *Online Resources*

- Keep it moving in childcare: Activity across the Curriculum. 10 Simple Activities to Encourage Physical Activity in the Classroom.  
[http://msue.anr.msu.edu/news/keep\\_it\\_moving\\_in\\_childcare\\_activity\\_across\\_the\\_curriculum](http://msue.anr.msu.edu/news/keep_it_moving_in_childcare_activity_across_the_curriculum)
- Igniting the Power of Public Education, The Colorado Legacy Foundation. Take a Break: Teacher Toolbox for Physical Activity Breaks in the Secondary Classroom (6th – 12th).  
<http://colegacy.org/resources/movemore/>

# What is Ecotourism?

## Objectives

- Build understanding about ecotourism.
- Introduce students to the concept of unintended consequences.
- Heighten student awareness about local environmental issues.

## Background for Teachers

Ecotourism is an increasingly popular form of tourism in which tourists seek out relatively undisturbed, pristine areas such as rainforests or mountains for socially responsible, low-impact educational trips. In the novel, the kids' fathers go to Taniba Springs to attend a conference about developing the economy of reservation communities. Eugene Frimble believes that ecotourism may be a way to enhance their economic welfare. Ecotourism can indeed have many positive effects on a local economy and the environment; however, it may also have negative effects—on the local people, their culture, and the environment. In these activities, your students will learn how ecotourism is related to economic development and its relationships to indigenous culture and the land.

## Definition

*Ecotourism* is defined as travel to specific nature and outdoor areas that not only conserves the environment by leaving it the way you found it, but also improves the well-being of local people.

## Principles of Ecotourism

Ecotourism is about uniting conservation, communities, and sustainable travel. This means that those who implement and participate in ecotourism activities should follow the following ecotourism principles:

- Minimize impact.
- Build environmental and cultural awareness and respect.
- Provide positive experiences for both visitors and hosts.
- Provide direct financial benefits for conservation.
- Provide financial benefits and empowerment for local people.
- Raise sensitivity to host countries' political, environmental, and social climate.

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### ***Activity: Letters to Leaders***

Tribal leaders all over the country are looking for good ideas to promote tourism without harming the environment or tribal culture. Introduce your students to the concepts of ecotourism and, working in small groups, have them conduct research using the sources listed below. Invite students to write their ideas on the board until the class has generated as large a list as possible. As a class, discuss and

evaluate the list. Then ask each student to write a letter to a tribal leader that explains his or her favorite ideas.

### *Online Resources*

- Ecotourism: What is it? Background information: <http://en.wikipedia.org/wiki/Ecotourism>
- What is Ecotourism: <http://www.ecotourism.org/what-is-ecotourism>
- Amazon Interactive: The Ecotourism Game: <http://www.eduweb.com/ecotourism/eco1.html>
- Impact of Ecotourism from an Alaska Native Perspective: <http://www.nativescience.org/html/eco-tourism.html>
- Ecotourism and its Impact on Forest Conservation: <http://www.actionbioscience.org/environment/lowman.html>

### *Extension: Follow Your Nose*

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In this activity, students use the sense of smell to increase understanding about local environmental issues. Many times we can find things that are out of place in the environment. This exercise will help the students understand where some of the “unnatural objects” in our environment are coming from.

### *Materials*

- Small jars or plastic containers with lids
- Notebooks or note cards
- Road map or forest map, if available
- Blindfold

### *Procedure*

Take a walk with your students along a nature trail or through nearby streets. Instruct the students to “follow their noses” and stop when they encounter a smell. Identify the source: trees, brush, litter, moist earth, gasoline, pollution, sea air, acorns, crushed leaves, etc. Have students note location and record smells and sources. Where practical, have students collect samples, place in jars or bags, and label each jar. Note: Do not touch items such as broken glass, animal droppings, or spoiled food that could be dangerous or unsanitary. These items can be identified and noted, but not collected.

Keep the items separated and enclosed in containers so that the odors do not mix. Put blindfolds on students or have students close their eyes and ask them to:

- Identify the item by smell.
- Rate the odor (strong, pleasant, neutral).
- Tell about any memories associated with these smells, and with any others noted on the trip.

Have the students plot the source of each smell on a map. Conduct a class discussion. What can we

learn about the local environment by examining the map? Can we connect the smells to environmental issues? Was any smell collected in an unnatural location? Was this interpreted as a positive or negative impact?

### *Activity: Unintended Consequences*

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#### *Background for Teachers*

Ecosystems like the Wetumka National Forest near Taniba Springs are complicated and interconnected. If you make changes to one part—for example, by building a road through the trees—you are almost certain to cause unpredictable changes somewhere else. Perhaps your road will interfere with the migration patterns of local wildlife and their numbers will dwindle in the years to come. Perhaps it will force secret residents like the Little People to pick up stakes and move. Introduce your students to the concept of unintended consequences. Define this concept from positive and negative point of view. In the social sciences, there is a “law of unintended consequences” that serves as a warning against the false belief that humans can fully control the world. Unintended consequences can be roughly grouped into three types:

- A positive, unexpected benefit (usually referred to as luck, serendipity, or a windfall).
- A negative, unexpected detriment occurring in addition to the desired effect of the policy (e.g., while irrigation schemes provide people with water for agriculture, they can increase waterborne diseases that have devastating health effects).
- A perverse effect contrary to what was originally intended (i.e., when an intended solution makes a problem worse).

#### *Examples of Unintended Consequences*

Provide students with the examples below. Ask them to summarize them and describe the commonalities. Conduct a class discussion about unintended consequences related to agricultural and environmental policies.

**The Great Sparrow Campaign:** The Chinese in 1958 tried to exterminate the entire sparrow population to keep them from eating crops. The next year, the locust population exploded and ate all the crops. Thousands of people starved to death.

**The Great Dustbowl:** Homesteading and farming practices helped to bring about one of the biggest ecological disasters in American history. Removal of indigenous animals and plants played a large role.

**The Cotton Gin:** Eli Whitney’s cotton gin was intended to make it easier to separate the seeds from the cotton, a task that consumed many hours of slave labor. The cotton gin was very successful in reducing the amount of labor to remove the seeds, but the resulting explosion of the cotton market and increase in the slave labor population was unintended.

**Laws protecting coastlines:** In North Carolina, laws banning hard structures along the coastline are preserving natural beauty but leaving homes and businesses unprotected from the ocean.



### *Online Resources*

- Additional information about unintended consequences can be found at two websites:  
<http://legal-planet.org/2010/04/16/unintended-consequences-and-environmental-policy/>  
[http://www.princeton.edu/~achaney/tmve/wiki100k/docs/Unintended\\_consequence.html](http://www.princeton.edu/~achaney/tmve/wiki100k/docs/Unintended_consequence.html)
- Great Sparrow campaign summary:  
<http://www.crisiswatch.net/environment/GreatSparrowCampaign.html>
- America's 10 worst man-made environmental disasters:  
<http://www.crisiswatch.net/environment/GreatSparrowCampaign.html>
- The Dust Bowl: [http://library.thinkquest.org/26026/History/the\\_dust\\_bowl.html](http://library.thinkquest.org/26026/History/the_dust_bowl.html)
- The Cotton Gin: <http://centuryofprogress.org/p/unintended-consequences-eli-whitney-and-cotton-gin>
- Coastline Laws: <http://www.learnnc.org/lp/editions/nchist-recent/6374>

## Art and Music

### *Activity: Friendship Round Dance*

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Group size: Any

Time: 40-50 minutes

#### *Objectives*

- Teach students about American Indian and Alaska Native dance, music, and history.
- Help students understand the values of tradition, recreation, and friendship.
- Help students understand the concept of teamwork and community when dancing together.

#### *Background for Teachers*

In *The Trickster of Two Rabbit Mountain*, Rain and Boomer look forward to dancing in the powwow at Taniba Springs. Music and dance are very important to American Indian and Alaska Native people. Today, as in the past, songs and dances are performed at powwows and other social gatherings. Each American Indian and Alaska Native ceremony and special occasion is accompanied by chanted songs that explain that event's purpose.

Songs are traditionally from that tribe or borrowed from other tribes and used in the specific tribe's customs. There are powwow songs, friendship songs, love songs, family songs, sacred songs, honor songs, and war dance songs. There are also specific dances for each special event. Friendship dances are performed for fellowship and pure enjoyment. One type of friendship dance is called the Round Dance.

In the Round Dance, all of the powwow dancers and audience, old, young, male, female, relatives, and friends—regardless of their tribal affiliation—are invited to dance together. Round Dance participants form a circle around the drum and drummers. The Round Dance is similar to other American Indian dances today, because the dancers move left, or clockwise, around the circle. This dance is different from other American Indian dances because of the sidestep pattern in which all dance together. In other American Indian dances, the performers act as individuals. In the old days, women used to let the men start the singing and dancing. The men went one way, while the women went the opposite direction. Today a few women still let the men go first, but most begin to dance and sing together. As with all people, ways of doing things eventually change.

Most American Indian song and dance is accompanied by the beat of the drum. The rhythm of the pounding drum in each tribe's music sounds like the rhythmic heartbeat of an animal. It sets the pace for the speed at which the dance is performed. A change of the drum beat, or rhythm, tells the dancers when to dance backwards or forwards. Round dances go on for hours, as long as the singers can sing, the drummers drum, and the dancers can still dance. Rest breaks are taken by the singers and drummers, while the dancers can leave or join the Round Dance line as they wish.

This activity can be performed in the gym, on the playground, or as an afterschool activity.

### *Preparation*

- Provide large open space with room for students to dance.
- Make sure you have selected a Round Dance drumming song from YouTube to play during the dancing or have ready the other source from American Indian Drumming Music.

### *Materials*

- Computer or audio device player
- Audio tape or CD player with drumming music

### *Procedure*

- Arrange the students standing in one big circle.
- Show the students how to take their own pulse with their wrist or jugular vein, and feel their pulse (1 minute). Remind students that the drum beat is like the rhythmic heartbeat. Have the students softly tap their own heartbeat.
- Turn on the audio file or YouTube video, Round Dance songs.
- Ask students to close their eyes and listen to the drum beat (1 minute).
- Have the dancers stand in place and bend their knees in tune to the drum beat.
- Ask for a student volunteer to stand in the middle of the circle and point to the left.
- Ask the student in the middle of the circle to demonstrate the sidestep to the other dancers.
- Have the dancers lift their left foot first and place it further to their left, to start the dancing in a clockwise fashion around the circle.
- Let the dance go on until the end of the first song, or until the dancers get tired. Stop and take a break.
- Turn off the audio tape and play the remainder of the video tape during this break. Turn off the video as desired.
- Start another Round Dance again while the audio tape is on.
- Continue to Round Dance as time provides. Stop audio anytime.
- Dancers can leave the Round Dance and join or rejoin it at will.

### *Follow-up Questions*

- Why do you think the Round Dance is called a friendship dance?
- Why do you think that music is an important part of American Indian culture?

### *Follow-up Activities*

- Attend a powwow or cultural event to see the different kinds of dances and songs.

- Have each student write a story about a song, dance, or musical instrument that was special to them or their family.
- Have an American Indian or Alaska Native visitor come to the class to demonstrate singing, dancing, drumming, or other musical instruments like rattles and flutes.
- Have the students ask their parents what kind of group or circle dances are part of their cultural tradition.

### *Online Resources*

- Wild Horse “Round Dance” Hand Drum Song: <http://www.youtube.com/watch?v=p9UuRUI6F9Q>
- Round Dance song: <http://www.youtube.com/watch?v=U-F2XYNb9DM>

### *Extension Activities*

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*The Trickster of Two Rabbit Mountain* provides plenty of dancing, music-making, and singing. In the novel, Brother Rabbit, Coyote and Thistle engage in a round of lively dancing and fiddle playing; the Little People demonstrate their talents as singers and dancers; and even Marcus sings the song that Brother Rabbit taught him about the wonderful foods that originated in Africa and the Americas. Invite students to go to the websites below to learn about African American and Native American contributions to music and dance in the United States and to hear some bouncy tunes and beautiful harmonies.

### *Online Resources*

- Music of the Southwest. <http://msw.arizona.edu/content/native-american-music> See photos of an Apache fiddle and learn tradition of Native American fiddling and Waila music of the Tohono O’odham and Yaqui peoples.
- Waila: Music of the Tohono O’odham. [http://anthrofilm.onlinefilm.org/en\\_EN/film/47403](http://anthrofilm.onlinefilm.org/en_EN/film/47403) Includes a film of Gertie Lopez and the Tohono O’odham Boyz.
- From the Tennessee River to A History of Cherokee Fiddling.
- [http://www.academia.edu/1067754/From\\_the\\_Tennessee\\_River\\_to\\_Tahlequah\\_A\\_Brief\\_History\\_of\\_Cherokee\\_Fiddling](http://www.academia.edu/1067754/From_the_Tennessee_River_to_Tahlequah_A_Brief_History_of_Cherokee_Fiddling)
- Folkstreams.net: Films about Fiddle Traditions. <http://www.folkstreams.net/film,271> The Life and Time of Joe Johnson: the last black traditional fiddle player in North Carolina; and Medicine Fiddle: Musical and dancing traditions of Native and Metis families in Canada and the United States.
- Jazzbows: The Soul of Jazz Strings. <http://www.jazzbows.com/blackfiddlelinks.html> This site offers many links to recordings of African American fiddling. It also includes numerous links which describe the influence of early African American music and instruments on the development of modern music in America, including rock, jazz, and country music.

- Imagine how the Little People Sound When They Sing. The Cricket Chorus. <http://www.wishadoo.org/video/95/gods-cricket-chorus-sample> Listen to the choir-like singing of crickets when their chirping is slowed down. One can imagine the sound of Little People singing and the enchanting voice of Sigigi’s sister, Cricket.

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### *Activity: From Found to Fabulous*

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#### *Objectives*

- Reinforce environmental awareness.
- Encourage children to be resourceful.
- Enable self-expression and creativity.
- Promote problem-solving skills.
- Promote art exploration.

#### *Background for Teachers*

In the novel, Lennie makes “tinkers” from various kinds of found objects—mostly scraps of metal, wood, and plastic. Lennie was making art from “found objects.” Sigigi also found materials in the campgrounds that he and his friends brought back to Turtletown. They collected pieces of glass, bottle caps, and made fishing lures from pieces of see-through plastic. All around the world, artists repurpose natural and human-made materials into objects of beauty, interest, and cultural significance.

#### *Materials*

- Found objects: cleaned tossed household items, shells, stones, sticks, acorns, pine cones, etc.
- Glue, hot glue, sticky tack, etc. (Use of a hot glue gun may require supervision.)
- Construction paper, fabric, or string
- Open work space

#### *Directions*

Either as a class outing or as a homework assignment, challenge the students to visit the beach, walk along a trail, meander the woods, or simply rummage the recycle pile for household materials of interest. Have them collect an assortment of objects. During class time, have each student create a work of art using these found objects. Students can make mosaics, collages, mobiles, pebble pictures, sculptures, or jewelry.

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#### *Extension: Host an Art Exhibit*

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Host an exhibit event for parents and community to view the student artworks. Serve healthy treats or even a meal featuring traditional foods. Invite elders to come and provide a storytelling session. Welcome a local drum or dance group to perform.

### *Online Resources*

- Recycling Crafts for Kids: Art on a Shoestring: <http://www.kinderart.com/recycle/>

### *Activity: Hocus Pocus: Putting on a Magic Show*

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#### *Objectives*

- Develop creativity and dexterity
- Create a written script with entertaining “patter”
- Learn about optical illusions
- Develop presentation skills

#### *Background for Teachers*

Brother Rabbit and the Little People (assisted by our young adventurers) play lots of tricks in *The Trickster of Two Rabbit Mountain*. Coyote and Thistle even play a “now you see me, now you don’t” trick on motorists as they travel across the country to Taniba Springs. Invite students to play their own tricks by putting on a magic show. These shows are fun examples of performance art. They catch and focus the attention of students, both performers and audience members. Shape-shifting may be beyond skill level of your students, but some sleight of hand with coins and cards, plus the old rope trick may be right up their alley. Go to the websites below for tricks and lesson plans.

### *Online Resources*

- Magic Tricks! <http://www.kidzone.ws/magic/>
- A Magical Mystery Tour. <http://www.taconichills.k12.ny.us/webquests/magic/>
- Cool Card Tricks: <http://www.goodtricks.net/frameset6.html>

# Science

## *Activity: Rain's Homemade Energy Bars*

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Duration: 30-50 minutes

### *Objectives*

- Teach students which foods can be used for nutritious energy.
- Provide students the ability to create a healthy snack option.

### *Background for Teachers*

To live a healthy life, students must provide their bodies with nutritious foods. Remember when Rain and Boomer were camping out in the tent with Sigigi? Rain shared some energy bars, made by his mother, that were both tasty and high in proteins and complex carbohydrates.

American Indians have known how to make “energy bars” for generations. In fact, they invented the first known transportable nutrition-packed energy bar. It is called pemmican and is made of dried meat (protein), dried berries (for vitamins and tangy flavor), and melted fat to bind the mixture together and provide energy. Many varieties of fruit are used in pemmican, depending on the availability of fruits that grow in various regions of the country. Cranberries have always been the choice among the New England tribes, and chokecherries are popular on the plains. In California, tribes used acorn flour in their pemmican.

This is a healthy food activity that all of the characters in the Eagle Books novels would have enjoyed. It gives directions for making energy bars with beans, grains, fruits, and nuts, and is packed with macronutrients and micronutrients. Students can also make energy bars using recipes from their own tribe. This activity would be suitable for an after-school activity at a community center or church with a kitchen. It could also be done as a special project by students at home.

### *Procedure*

- Have each pair or group of students select beans, grains, fruits, nuts, sweetener, spices, and a binding agent that they think would make a tasty and nutritious treat.
- Each group should pick a different combination of ingredients so it will be more interesting to compare results.
- Ask students to identify how many colors are in their mixture before mixing it.
- What kinds of macronutrients and micronutrients can be found in their energy bars?
  - Sample the bars from each group and rate them in order of preference. Share recipes and discuss what seemed to work well and what did not.

## Recipe

Most energy bars are approximately 20–40% protein, 15–30% carbohydrates, 15–30% fat, 15–20% fiber by weight. The recipe below offers several ingredients that are ingredients in traditional Native dishes: beans, pumpkin, cranberries, cocoa, maple syrup, honey, and various nuts.

This energy bar recipe is found at: <http://www.nomeatathlete.com/homemade-energy-bar-recipe/>

- 1.5 cups cooked beans
- ½ cup binder (see recommended binder ingredients below)
- ¼ cup sweetener (see recommended sweeteners below)
- ¼ cup fresh or frozen fruit
- 1 teaspoon of flavoring extract (optional)
- 1 teaspoon of dry spice (optional)
- ¼ teaspoon sea salt
- 1.5 cups of oats
- 1 cup dry base ingredient
- 1 cup stir-ins

## Instructions

In a blender or food processor, combine beans, binder, sweetener, soft fruit, extract, spice, and salt until smooth. Add the oats and dry base ingredients and pulse just to combine. Add stir-ins and pulse again just to combine. If the consistency seems spreadable, you're good. If it's too dry, add 1/4 cup of water; if it's too runny, add an additional 1/4 cup of the dry base ingredient.

Grease the 13×9-inch pan with baking spray or rub with 1 tablespoon vegetable oil, then spread mixture into the pan. Bake at 350 degrees for 15-18 minutes. Note: Use unsalted, unsweetened versions of the ingredients.

## Food Suggestions

### Beans

White beans  
Black beans  
Pinto beans  
Chickpeas

### Binders

Peanut butter  
¼ cup of ground flax seed  
mixed with ¼ cup water  
Pureed pumpkin  
Pureed sweet potato  
Maple syrup  
Honey

### Soft, Sweet Fruits

Unsweetened applesauce  
Mashed banana (about half  
of one)  
Chopped dates (remove the  
pits!)  
Crushed pineapple  
Mashed persimmon



**Recommended Optional Flavorings**

Vanilla  
Almond  
Lemon  
Coconut

**Dry Spices**

Cinnamon  
Ginger  
Nutmeg\*  
Allspice  
Cardamom\*

\*For stronger spices like nutmeg and cardamom, use just ¼ to ½ teaspoon and combine with less intense spices like cinnamon.

**Dry Base Ingredients**

(A combination is usually best)  
Protein powder  
Cocoa powder (no more than ½ cup)

Whole wheat flour  
Buckwheat flour

**Stir-Ins**

Dried cranberries or blueberries  
Raisins  
Dried apricots  
Chopped nuts  
Dry cereal

***Follow-Up Activities***

Students may also enjoy making granola, varying the composition of the same dried fruits, nuts, and whole grains: <http://cookingmatters.org/recipes/homemade-granola>

Students should recognize that many of the ingredients used in the energy bar recipe are traditional plant foods. In many Native communities, people are actively promoting the understanding that their way to health is through a return to their traditional diets and gardening methods. This is an important message in the Eagle Books that is being followed by Myrtle in *The Trickster of Two Rabbit Mountain*. Help students use the websites provided to understand how tribes are reclaiming their heritage of nutritious foods that can help to prevent obesity, type 2 diabetes, and other chronic diseases.

## *Activity: A Conversation About Diabetes Prevention*

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### *Objectives*

- Learn the type 2 diabetes risk factors.
- Understand the difference between prediabetes and diabetes.
- Learn which actions and activities can reduce the chances of developing diabetes.
- Develop research skills.
- Develop presentation skills.

### *Background for Teachers*

Type 2 diabetes is a disease that affects how the body uses glucose, the main type of sugar in the blood. Glucose, which comes from the foods we eat, is the major source of energy needed to fuel the body's functions. To use glucose, the body needs the hormone insulin. But in people with diabetes, the body either can't make insulin or the insulin doesn't work in the body like it should.

Type 2 diabetes can sometimes be prevented. Excessive weight gain, obesity, and a sedentary lifestyle are all factors that put a person at risk for type 2 diabetes. In the past, type 2 diabetes almost exclusively affected adults, usually those who were overweight. Doctors even referred to type 2 diabetes as adult-onset diabetes. But now, more children and teens are being diagnosed with type 2 diabetes which experts say is related to the rapidly increasing number of overweight kids.

Although kids and teens may be able to prevent or delay the onset of type 2 diabetes by managing their weight and increasing physical activity, other risk factors for type 2 diabetes can't be changed. Kids with one or more family members with type 2 diabetes have an increased risk of developing the disease.

Don Johnson, the father of Hailey and Marcus, has been told he has prediabetes. This alarms his daughter, who fears for his health. But Rain and Boomer reassure her that people with prediabetes can reduce their chances of developing the disease by eating nutritious food and becoming active. In this activity, your students will research type 2 diabetes risk factors and actions that can help prevent it.

### *Materials*

- DETS curriculum or computer access for online research
- Props and costumes as needed (optional)

### *Procedure*

- Assign students to work in pairs.
- Ask them to conduct research about diabetes prevention, using online sources or the DETS curriculum.
- Tell the students to prepare a script of a conversation between two people.
  - One student should pretend to be a doctor, nurse, or community health representative.

- The other should pretend to be a person who doesn't know much about diabetes and has lots of questions.
- Have the students rehearse and then perform their conversation in front of the class. They should be prepared to cover the following questions:
  - What is type 2 diabetes?
  - What is prediabetes?
  - Does a person with prediabetes always get diabetes?
  - What are the risk factors for diabetes?
  - Do people with these risk factors always get diabetes?
  - How can a person reduce the chances of diabetes?
  - Where can a person get more information about diabetes?

### *Online Resources*

- State of Rhode Island Department of Health: <http://www.health.ri.gov/chronicconditions/diabetes/index.php/children.php>
- Diabetes Education in Tribal Schools: <http://kbocc.org/index/2011-12-24-18-54-16/dets-downloads>
- The History of Diabetes: <http://www.med.uni-giessen.de/itr/history/diabhis.html>.
- In the story, Toloowa, the healer, learns about type 2 diabetes from Rain and Boomer. She described the young men at Turtletown who developed type 2 diabetes as being “stung by the bee.” Other doctors and healers in the past who observed the effects of type 2 diabetes on the body noted how insects were attracted to the sugar in the urine of those with the disease. This website provides information about the main events in the history of diabetes mellitus, which means “honey sweet urine.”

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### *Extension: Diabetes Talking Circles*

#### *Background for Teachers*

Since 2005, the Native Diabetes Wellness Program, in partnership with the Seva Foundation, supported diabetes talking circles throughout Indian Country, conducted by Lorelei DeCora, RN, BSN (Ho-Chunk/Winnebago Nation, Nebraska). Inspired by the power of talking circles and the Eagle Books messages and characters, the Native Diabetes Wellness Program is developing new stories, which talking circles with youth have helped to inform. Go to the online resources below for ideas regarding a Diabetes Talking Circles activity in the classroom or as an afterschool activity.

#### *Online Resource*

- Diabetes Talking Circles Online Tutorial:

## ***Activity: Better-Than-Max's Video (Cross-Curricular: Science, Social Studies, and Arts)***

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### *Objectives*

- Gain understanding about ways to prevent type 2 diabetes.
- Reinforce the connection between traditional culture and healthy living.
- Develop problem solving, storytelling, critical thinking, media production, and decision making skills.

### *Background for Teachers*

Max is determined to cash in on a pile of money by making a video of the Little People that's just as sensational as "I had a Date with Bigfoot." Fortunately, Max's plan doesn't succeed and his video of the Little People is a blurry mess. Your students can do better than Max in making a video! New technologies have made video creation much easier than it used to be. But with or without access to the latest and greatest, your students can create a product they are proud to show to others. This activity invites students to reinforce learning about type 2 diabetes prevention, explore storytelling techniques, and practice teamwork. Please note that we are not providing a complete set of instructions here. For additional information, please consult the online sources listed below and seek out experienced colleagues, parents, and tech-savvy students.

### *Materials*

- Digital camera
- TV or computer for playback
- Video editing software
- Microphone (optional)
- Lights (optional)
- Props and costumes

### *Procedure*

- As a class, view this 9-minute video narrated by famous actor Wes Studi (an elder from the Cherokee Nation who has appeared on TV and in movies such as Avatar, Dances with Wolves, and The Last of the Mohicans). "Our Cultures are our Source of Health"  
<http://www.cdc.gov/CDCTV/OurCultures/index.html>
- Instruct the class to look for diabetes prevention messages, such as learning from elders and traditions, staying physically active, and eating healthy foods. (See if you can spot the youth reading one of the original Eagle Books!)

- Conduct a class discussion or another learning activity about the video.
- Then, follow these steps to make your class video.
- **Outline:**
  - Lead the class in developing a script outline that tells a digital story. Of all the steps in a video, creating a good outline is the most important. The video can be humorous or serious but, like the Wes Studi video, should include type 2 diabetes prevention messages that tie to culture.
  - Your video can be an interview, documentary, play, music video, or even a simple animation. Refer to the storytelling activities in the *Hummingbird's Squash* English/Language Arts section of the Guide for inspiration.
- **Script:** Students need to know what to say, and having a script will make filming go more quickly.
- **Storyboard and list of shots:** The storyboard can be as simple as a series of stick figure drawings. (Refer students to the Art storyboard activity in the *Coyote and the Turtle's Dream* section of the Guide.)
- **Filming:**
  - This will go more smoothly with a complete script, storyboard, and shot list.
  - Students learn the most when they take full ownership of a project, but in the interest of time you may wish to operate the camera and editing equipment yourself, or enlist a knowledgeable ally.
- **Editing:** This includes removing unwanted footage, arranging footage in the desired order, adding music, titles, and transitions, and if necessary converting the video into the correct format.
- **Publishing:** Before publishing a student video, make sure that you have checked your school's Acceptable Use Policy with regard to student privacy, and also made sure that copyright infringement has not occurred.

### *Instructor Notes*

Equipment and other resources. Become familiar with available equipment. Some schools own the latest cameras, software, and presentation devices, but many do not. But you can make a good video with older equipment.

- **Scheduling:** Your class can make a short, simple video over the course of a few days. A more elaborate video is a longer-term project.
- **Format:** Will you post the video online? Play it on a DVD at a school assembly or health fair? Watch it in the classroom on your laptop? Determine the correct digital format to use.
- **Length:** Short (5 minutes or less) makes for a simpler project. A short video can be very

effective.

- **Music:** Will you use music at the beginning, end, or throughout the video? Consider having students sing or play instruments, and record the soundtrack.
- **Assignments:** Decide which of the following roles will be needed and make assignments or ask for volunteers:
  - Writer(s)
  - Director
  - Photographer
  - Actors
  - Voice-over announcer
  - Editor
  - Audio recorder
  - Sound effects manager
  - Lighting
  - Wardrobe
  - Music
  - Props

### *Online Resources*

- Using video in the classroom: “Lights, Camera...Engagement!”:  
<http://www.edutopia.org/blog/using-video-in-classroom-ron-peck>
- Video in the Classroom: <http://edtechteacher.org/index.php/teaching-technology/presentation-multimedia/112-video>
- Learning Through Video Production:  
<http://www.pbslearningmedia.org/resource/avd09.pd.tavidprod/learning-through-video-production/>
- How to Make a Video: <http://www.mediacollege.com/video/tutorial/>

### *Activity: Glucose Glossary Race*

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#### *Objectives*

- Increase knowledge about diabetes and type 2 diabetes prevention
- Experience physical activity
- Build diabetes-related vocabulary

## *Background for Teachers*

As students read the novel, they will encounter words associated with diabetes. This activity is designed to help them retain these words and their meanings, and to experience physical activity. It can be conducted as part of a science, physical education, or language arts class.

### *Materials*

- Diabetes glossary list (see Appendix D)
- White board or chalk board (optional)
- Card stock or blank note cards (optional)
- Printer
- Microphone (if played in big venue)

### *Preparation*

In Appendix D, you will find a list of diabetes-related terms taken from the glossary of the novel. Print one copy per student, increasing the size as much as possible. Cut each term into strips, separating the word from its definition. For durability, tape or glue the pieces to card stock or note cards. You may make multiple copies of each word or just one, depending upon how you wish to play the game.

### *Procedure*

The teacher or game host keeps the word cards. Distribute definition cards equally to the students. You may give each student all definitions or a random set of definitions to each. The host announces and posts one word for the class to see. Each student reads through the definition cards. As soon as the definition is found, that student runs to the front of the class. The student reads the word, and then the definition. If correct, the student must then use the word in a sentence. If incorrect, the play continues until the correct answer is presented. To increase exertion levels, hold this activity in the gym or outdoors requiring students to run far and fast to get their answers in.

Note: You can also use this game to follow other themes such as the environment, tricksters, etc., and play a different set each time the game is played. To do this, copy and print the glossary pages from the book.

## Appendix A: Career Connections

One of the objectives of the youth novels is the promotion of interest in careers that advance the health and well-being of Native communities. There are many careers that relate to the major themes in the youth novels. These themes are:

- The prevention and control of type 2 diabetes through physical activity, healthy diet, the support of family and friends, and respect for Native traditions.
- The control of type 1 diabetes through physical activity, healthy diet, the support of family and friends, and continuous commitment to the maintenance of good health.
- The building of healthy families, schools, and communities through promotion of positive lifestyles and respectful relationships.
- The protecting of the earth's past and assuring its healthy future via deep understanding of its relational dynamics.
- The contributions of Native Science to our modern world and the continuation of that great tradition. and
- The power of young people to make a positive difference in the health of their communities.

The Web sites provided in this section offer a wealth of ideas that teachers and communities can use to stimulate students' thinking about what they want to be when they grow up. These sites offer not only practical information but fun activities as well.

### **Career Zone Pennsylvania: Job Families**

<http://www.pacareerzone.org/clusters>.

This wonderful site is well suited to the needs of middle schoolers. It offers information, slide shows, and videos on career clusters that include medicine, science, community and social services, education, architecture and engineering, and many other job families.

### **EEK! Get a Job**

<http://dnr.wi.gov/org/caer/ce/EEK/job/index.htm>

EEK means Environmental Education for Kids at this career Web site. Find out what park naturalists, fish biologists, and hydrogeologists do!

### **U. S. Bureau of the Interior**

[http://www.blm.gov/wo/st/en/res/blm\\_jobs/our\\_careers/career\\_cards/career\\_cards\\_\\_natural.html](http://www.blm.gov/wo/st/en/res/blm_jobs/our_careers/career_cards/career_cards__natural.html)

Provides a "career cards" Web site that describes 20 different careers that are necessary to management of lands and natural resources.

### **Careers in Soil Science**

<http://soils.usda.gov/education/facts/careers.html>



Soil careers at the U. S. Department of Agriculture

### **Discover Science Careers**

<http://library.thinkquest.org/11465/careersinfo.html>

Explore science careers and scientific interests.

### **The Science Spot**

<http://sciencespot.net/Pages/career.html>

A great Web site for fun activities that introduce middle schoolers to various career choices. The activities include “Name that Career” and “Career Clusters.”

### **Ask a Scientist**

<http://www.askascientist.org/>

This Web site has many science activities for kids, including exploring science careers.

### **Web Adventures**

<http://webadventures.rice.edu/>

Students enthusiastic about science may want to check out the “Cool Science Career” games on this site.

### **Native Access to Engineering**

<http://www.nativeaccess.com/>

This Web site, developed by Queens University in Canada, offers an interactive educational activity called Bear Paw Trail. Visitors can walk down several trails learning about science and engineering.

There are also features called “A Day in the Life of an Engineer” and “Ancestral Engineering.”

Educational requirements for engineers are clearly defined.

### **American Indian Science and Engineering Society: A Universe of Opportunities**

<http://www.aises.org/who/board#bod>

Students can go online to meet the Board of Directors, Native scientists and engineers from many tribes, and the Council of Elders that advises the society. The site features the Department of Energy’s Intertribal Middle School Science Bowl, hosted by the society. Each year, ten teams from tribes across the country take part in this science and engineering tournament. The Web site also features the biggest science fair for American Indian/Alaska Native students in the country: the National American Indian Science & Engineering Fair and EXPO.

### **Association of American Indian Physicians**

<http://www.aaip.org/?page=NNAYISTUDENT>

The site provides information about the Patty Iron Cloud National Native American Youth Initiative which brings youth together to promote interest in health careers.

## Learning About Careers

The careers below are organized by the job families on the Career Zone Pennsylvania Web site. Some of these careers are specifically mentioned in the youth novels; others are related to the themes in the novels or to the activities in the *Youth Novels: Educators and Community Guide*.

Students can go to Career Zone Pennsylvania to find careers that may interest them. Of course, not every career is represented on the Web site. If there is a career that students can't find on Career Zone Pennsylvania, have them look up the career online. Once students have settled on some careers of interest, have them make "career cards" that summarize key information about the careers. These cards should include the type of work done, the education required, the most interesting aspects of the work, and how the careers contribute to society.

### Health Care Practitioner and Technical Occupations

There are many health care professions. Some specifically address the control of type 1 diabetes and prevention and control of type 2 diabetes. Not all of these, however, are listed on the Career Zone Pennsylvania site. Some of the health professions listed below include Web sites that provide more information about these very important health care providers:

- Physician (Endocrinologist) A specialist in the management of type 1 and type 2 diabetes.  
Diabetes and Endocrinologists. <http://diabetes.about.com/b/2007/03/07/diabetes-and-endocrinologists.htm>
- Certified Diabetes Educator (CDE) A CDE may be a nurse, dietitian, exercise physiologist, pharmacist, or social worker who has specialized in diabetes education and care management.  
American Association of Diabetes Educators.  
<http://www.diabeteseducator.org/ProfessionalResources/Certification/>
- Registered Nurse and Diabetes Specialist Nurse.  
The Role of a Specialist Diabetes Nurse. [http://www.ehow.com/about\\_5201899\\_role-diabetes-specialist-nurse.html](http://www.ehow.com/about_5201899_role-diabetes-specialist-nurse.html)
- Medical Nutritionist. [http://www.ehow.com/facts\\_5579755\\_medical-nutritionist\\_.html](http://www.ehow.com/facts_5579755_medical-nutritionist_.html)
- Community Health Worker (Indian Health Service Community Health Representative)  
<http://www.ihs.gov/nonmedicalprograms/chr/>
- Dietician
- Physical Therapist
- Emergency Medical Technician
- Fitness Trainer
- Exercise Physiologist

### **Community and Social Services Occupations**

- Community Organizer
- County Extension Service Manager
- Economic Developer
- Neighborhood Watch Officer
- School or Clinical Counselor
- Social Worker

### **Life, Physical, and Social Science Occupations**

- Archeologist
- Paleontologist
- Botanist
- Biochemist
- Geologist
- Oceanographer
- Hydrologist
- Meteorologist
- Ecologist
- Environmental Scientist
- Laboratory Scientist
- Zoologists and Wild Life Managers
- Soil Scientist
- Horticulturalist
- Psychologist
- Urban and Regional Planners
- Geographer

### **Public Health**

This career category is not listed on the Career Zone Pennsylvania Web site. Public health brings people together from all kinds of job families. Public health addresses the health of the whole community, not just the health of individuals. Some public health careers are listed above. Find out more about public health careers at Excite! Careers in Public Health. <http://www.cdc.gov/excite/careers/index.htm>

### **Education, Training, and Library Occupations**

- Elementary, Middle School, and High School Teachers
- English/Language Arts
- Health
- Math
- Science
- Art and Music
- Librarian
- Physical Education (Coaches)
- Ethnic and Cultural Studies
- School Administration

### **Architecture and Engineering**

- Architect
- Landscape Architect
- Environmental Engineer
- Biochemical Engineer

### **Protective Service Occupations**

- Police Chief
- Tribal Law Enforcement Officers

### **Transportation and Materials Moving**

- Light Truck and Heavy Tractor Trailer Drivers

- Public Health Physicians and Nurses
- Epidemiologist (A Disease Detective)
- Health Educators
- Environmentalists

### **Public Health and Health Communication**

Creative people like writers, graphic artists, photographers, and videographers are essential to public health campaigns. They make videos, design brochures, create characters, and generally provide the imaginative concepts and imagery that makes health messages come alive.

Find out more about health communication at <http://www.cdc.gov/healthcommunication/>

## Appendix B: Words with Native American Origins

Taken from *Talk the Talk: English Speech Is Within Your Reach*:

[http://www.istudentcity.com/feature/091900\\_native.asp](http://www.istudentcity.com/feature/091900_native.asp)

- Avocado: Nahuatl, also called Aztec
- Barbecue: Taino, a language of the West Indies
- Canoe: Taino
- Caribou: Micmac
- Chipmunk: Algonkian group of languages
- Chocolate: Nahuatl/Aztec
- Coca: Qeuchua, also called Inca
- Condor: Qeuchua
- Cougar: Tupi, a language still spoken in Brazil
- Coyote: Nahuatl
- Guano: Qeuchua
- Hammock: Taino
- Hogan: Navajo
- Hominy: Algonkian
- Hurricane: Taino
- Igloo: Inuit
- Jaguar: Tupi
- Kayak: Inuit
- Kiva: Pueblo peoples
- Llama: Qeuchua
- Maize: Taino
- Moccasins: Virginia Algonkian
- Moose: Algonkian group of languages
- Mukluks: Inuit
- Persimmon: Algonkian group of languages,
- Petunia: Tupi
- Potato: Taino
- Potlatch: Chinook
- Powwow: Narraganset or Massachuset
- Puma: Qeuchua
- Quinine: Qeuchua
- Raccoon: Algonkian group of languages,
- Opossum, possum: Algonkian group of languages
- Skunk: Algonkian group of languages
- Squash: Algonkian group of languages
- Squash: Narraganset
- Succotash: Narraganset
- Tapioca: Tupi
- Tapir: Tupi
- Teepee, tipi, teepee: Dakota
- Terrapin: Algonkian group of languages
- Tobacco: Spanish tabaco from Taino
- Toboggan: Micmac
- Tomahawk: Virginia Algonkian
- Tomato: Nahuatl/Aztec
- Vicuña: Qeuchua
- Wampum: Narraganset
- Wigwam: Algonkian group of languages

## Appendix C: Word Scrambler

Unscramble the words!

### English Words with Native American Origins

- uksnk
- osoem
- gauraj
- pihckunm
- oocnarc
- sumosp
- uoriba
- necap
- ckihory
- ccotbao
- hsuaqs
- ovcdao
- mtotao
- ottpao
- caurhiaen
- akyak

### English Words with African American Origins

- naabna
- obogn
- ebogoi
- igerhcg
- nmcpheezi
- loca
- ihp
- zjaz
- ijev
- mbmao
- oomj
- rkao
- gnato
- toet
- doovoo
- mya

### Answers: English Words with Native American Origins

- |            |          |             |           |
|------------|----------|-------------|-----------|
| • uksnk    | skunk    | • ckihory   | hickory   |
| • osoem    | moose    | • ccotbao   | tobacco   |
| • gauraj   | jaguar   | • hsuaqs    | squash    |
| • pihckunm | chipmunk | • ovcdao    | avocado   |
| • oocnarc  | raccoon  | • mtotao    | tomato    |
| • sumosp   | possum   | • ottpao    | potato    |
| • uoriba   | caribou  | • caurhiaen | hurricane |
| • necap    | pecan    | • akyak     | kayak     |

## English Words with African American Origins

- naabna      banana
- obogn      bongo
- ebogoi      boogie
- igerhcg      chigger
- nmcphceazi      chimpanzee
- loca      cola
- ihp      hip
- zjaz      jazz
- ijev      jive
- mbmao      mambo
- oomj      mojo
- rkao      okra
- gnato      tango
- toet      tote
- doovoo      voodoo
- mya      yam

## Appendix D: Diabetes Glossary Terms

Term	Definition
Blood sugar	A substance in the blood that rises after eating. People with diabetes have blood sugar levels that are too high.
Carbohydrate	A compound (usually represented by sugars, fiber, and starches) that supplies energy to the body. Carbohydrates are found in dairy products, fruits and vegetables, and grains.
Complex carbohydrates	Carbohydrates that the body breaks down slowly. This slow digestion creates a constant release of energy. Complex carbohydrates are found in foods like whole grains, beans, oatmeal, brown rice, and vegetables like broccoli and spinach. The less healthy simple carbohydrates like table sugar, honey, candy, sodas, and some fruit juices enter the blood stream immediately, causing blood sugar levels to rise and fall rapidly.
Glucose	Blood sugar that provides energy to the body's cells.
Imbalance	A state of disproportion that causes problems. In this story, "imbalance" refers to different parts of the body not working together to produce a state of health.
Immune system	The set of tissues within one's body that work together to resist infections.
Insulin	A hormone, produced by the pancreas, which helps the body use carbohydrates and fats for the energy it needs. It helps the cells in the liver, muscle, and fat tissue to take up glucose (blood sugar) from the blood and store it as energy.
Nutrition	Foods that form a diet promoting health and growth.
Pancreas	A large gland near the stomach that produces insulin and other substances that help in the digestion of food.
Prediabetes	A condition in which a person's blood glucose levels are higher than normal but not high enough to be type 2 diabetes. People with prediabetes are more likely to develop type 2 diabetes. However, type 2 diabetes may be prevented or delayed in persons with prediabetes if they adopt a healthy diet, lose weight, and increase physical activity.



<b>Term</b>	<b>Definition</b>
Type 1 diabetes	A form of diabetes in which the body does not produce insulin. People with type 1 diabetes must inject insulin so their bodies can process glucose. The disease usually starts in childhood or the teenage years, but can also develop in adults. Type 1 diabetes is much less common than type 2 diabetes.
Type 2 diabetes	A form of diabetes in which the body does not respond properly to insulin. It usually develops in overweight adults, but can also start in children or teenagers. People with type 2 diabetes are asked to manage the disease with weight loss, healthy diets, regular exercise, medicine, and sometimes by injecting insulin. Type 2 diabetes is much more common than type 1 diabetes.
Sting by Bee disease	In the novel, the name used by the Little People to describe the disease we know as diabetes. In ancient times, healers noticed that people with untreated diabetes had sweet-smelling urine—a product of too much blood sugar—that could attract bees and other insects.