OCTOBER 2006

EDUCATOR'S GUIDE

This guide is designed to complement the October 2006 issue of National Wildlife Federation's *Ranger Rick*® magazine.

NATIONAL WILDLIFE FEDERATION

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Introduction

Welcome to the *Ranger Rick Educator's Guide!*

This guide provides you with educational activities to bring **National Wildlife Federation's** *Ranger Rick*® magazine alive in the classroom and beyond. Using *Ranger Rick* feature articles as an entry point, this guide engages students ages 7-12 in exploring the natural world to build literacy, critical and creative thinking skills, and understanding across the disciplines. Activities are correlated with the National Education Standards for science and language arts, and are designed to assist you in meeting required curriculum objectives.

Can we have class outside today?

Find out how you can say "Yes!" at **www.nwf.org/backyardwildlifehabitat**. The outdoor environment offers excellent opportunities for active, hands-on, interdisciplinary learning. You can enhance the learning experience by creating your own habitat site. Revitalize an entire schoolyard, a garden, or even a rooftop, windowsill, or balcony by creating an outdoor classroom and sanctuary for birds, butterflies, and other wildlife.

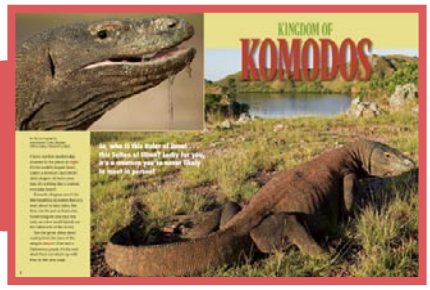
How To Use This Guide

Each section of the guide is matched with a specific *Ranger Rick* feature. After you read through the magazine, choose the stories and activities that complement your curriculum and that will interest your students. Sections include:

- ***Learning Links.*** A summary of concepts presented in the article.
- ***Discussion Questions and Writing Prompts.*** Entry points to engage students in discussion or writing to develop literacy and thinking skills.
- ***Resources.*** Web sites and books where you can find further information.
- ***Activity Ideas.*** Quick investigations and extended projects to complement article topics.
- ***Student Pages.*** Ready-to-copy activity sheets for students.

We have also provided a ***Family Fun*** activities page for you to copy and send home with students.

1



Kingdom of Komodos

pages 4-9

Learning Links:

Komodo dragons, like their fairy-tale namesakes, have characteristics that are hard to believe. But they are real—and they provide a perfect opportunity to discuss the line between fantasy and reality, as well as many other interesting scientific questions.

DISCUSSION QUESTIONS & WRITING PROMPTS

Pre-Reading Questions:

- How would you describe a dragon?
- Are dragons real or imaginary?

Comprehension Check:

- What kind of animal is a Komodo dragon?
- Where do Komodo dragons live? Describe their habitat.
- The story doesn't say exactly how big Komodo dragons can get. Use the clues to make a guess.
- Why do baby dragons live in trees for the first few years of their lives?
- What and how do the dragons eat?
- How does a dragon's sense of smell work? From how far away can it smell things?
- What's special about the dragons' drool?
- What are some questions about Komodo dragons that scientists are studying?

Critical and Creative Thinking Connections:

- How is a Komodo dragon similar to the dragons in fairy tales? How is it different?
- Some scientists think Komodo dragons are more closely related to snakes than to other lizards. Name two facts that support this idea.
- Why do you think most people didn't know Komodo dragons existed until just 100 years ago?
- Why are Komodos in trouble today?
- Komodo dragons can be dangerous. How do scientists who study them protect themselves? What techniques do you think scientists might use to study other dangerous animals?
- Imagine you used a dragon's table manners at your dinner table. Describe what you'd do and how your family would react.

RESOURCES

Endangered Komodo Dragons by Bobbie Kalman (Crabtree, 2004). Learn more about the habitat, behavior, and life cycle of this unusual reptile.

Komodo Dragons by Anne Welsbacher (Capstone Press, 2002). This book focuses on the role of Komodo dragons as predators and includes many facts about their lives.

Komodo! by Peter Sis (Greenwillow, 1993). In this imaginative and richly illustrated tale, a boy who loves dragons takes a trip to Indonesia and encounters one up close.

www.zoo.org/komodo/index.html Find Komodo facts, photos, video, and more—plus test your knowledge with a quiz—at the Web site of Seattle's Woodland Park Zoo.

unmuseum.mus.pa.us/burden.htm Read an account of a historical expedition to find Komodo dragons in the early 1900s.

ACTIVITY IDEAS

Questioning Komodos

Hold a class discussion about the scientific research being done with Komodo dragons. Why do scientists want to study dragons? What do students think the scientists do with the information they collect from tagging and recapturing dragons? You can read more about Tim Jessop's research at www.sandiegozoo.org/help_wildlife/story_komodo_jessop.html. Then have students brainstorm a list of questions they'd like to ask him if they had a chance to talk to him about his work. In addition, or instead, have them also list questions about Komodos that *they* think would be interesting to research.

TIME:
30 Minutes
MATERIALS:
Internet access
Paper and pencils

Expedition Account

Deadly drool. A tongue that smells rotting meat from six miles away. Cannibalistic tendencies. The ability to gulp down prey whole: hoofs, horns, and all. It's hard to believe Komodo dragons are real! Read an account of a long-ago expedition to find them at unmuseum.mus.pa.us/burden.htm (see Resources). Then have students imagine *they* are the ones who've just discovered these amazing animals. Have them write an account of the discovery. Explain that they should include detailed evidence so they can convince skeptics that such improbable creatures truly exist when they return from the journey.

TIME:
45 Minutes
MATERIALS:
Internet access
Paper and pencils

Design a Monster

Komodo dragons definitely fit the "monster mold." After students learn about the dragons' adaptations, have them design their own imaginary "monsters." Hand out copies of the Design a Monster Student Page and bring on the creativity! Students should include a drawing of the creature and point out its special features and adaptations. Then have them trade papers with a partner. Have each student outline a study to learn more about the mystery monster they've just "discovered." What questions would they want to investigate? How would they find one and trap it? What safety precautions would they need to take? What steps would they follow to find answers to their questions? To conclude, have each monster's "creator" and "scientist" pair up and discuss the study and its likely results.

TIME:
60 Minutes
MATERIALS:
Design a Monster Student Page
Pencils
Art supplies

Wild Journeys

After students read "Kingdom of Komodos," read aloud Peter Sis' book *Komodo!* about a fantastic journey to the dragon islands. Ask students what unusual creature *they* would be most wild about seeing. Where would they have to travel to see it? Have individuals or groups of students create a skit or puppet show about an imaginary journey to that place. How did they get there? What was it like? Did they see the animal? What else did they see? Stage a performance in which students present their work to each other.

TIME:
60 Minutes
MATERIALS:
Komodo! by Peter Sis
Optional: an assortment of puppet-making supplies or skit props

Student Page

DESIGN A MONSTER

Part 1. You've just read about the Komodo dragon and the amazing adaptations that help it survive and hunt. It almost sounds like an imaginary monster, doesn't it? Now it's your turn to invent your own "monster" animal. On the back of this page, draw the monster. Label and describe its special adaptations. Here are some questions to think about:

- In what kind of habitat does the monster live?
- What special senses does it have?
- How does it move around?
- What does it eat, and how does it get its food?
- How does it defend itself from enemies?

Part 2. Imagine you are a scientist who has just discovered the animal on the back of this page, and you want to learn more about it. Plan your study below.

1. What do you want to find out about this animal? List your questions.

2. How will you observe or trap one?

3. How will you protect yourself from it?

4. What steps will you follow to find answers to your questions?

2

The Fish That Changed the World

pages 18-20

Learning Links:

The discovery of the Tiktaalik fossil is a big step forward in our understanding of how fish evolved into land creatures. This story encourages students to consider how fossils are formed and discovered, and what we can learn from them about how life evolves.

DISCUSSION QUESTIONS & WRITING PROMPTS

Pre-Reading Questions:

- What is a "missing link"?
- What are some differences between water animals and land animals?

Comprehension Check:

- Describe the world in the Devonian period.
- How long ago did the lobe-finned fish (page 18) live?
- How was the tetrapod (page 19) different from that fish?
- What is the word for how living things gradually change over time?
- What is a fossil?
- Why was Tiktaalik such an important discovery?
- Where was it found?
- Why did they call it Tiktaalik?

Critical and Creative Thinking Connections:

- *Before students see the illustrations for this story, read it aloud to them. Then ask:* What do you imagine the lobe-finned fish, Tiktaalik, and the tetrapod might have looked like? Make drawings of all three. Then compare your drawings with the ones in *Ranger Rick*.
- Compare and contrast the lobe-finned fish, Tiktaalik, and the tetrapod. What parts of Tiktaalik's body look most similar to the lobe-finned fish? What parts are more similar to the tetrapod?
- Only a few creatures lived on land before the tetrapod emerged from the water. How do you think their lives changed after it emerged?

RESOURCES

Fossils by Roy Gallant (Benchmark, 2001). Here's a good overview of what fossils are, how they're formed and uncovered, and what scientists learn from studying them.

Eyewitness Books: Fossil by Paul Taylor (Alfred A. Knopf, 1990). Explore the fascinating subject of fossils in this collection of facts, photos, art, and diagrams.

Life on Earth by Steve Jenkins (Houghton Mifflin, 2002). An introduction to evolution concepts for kids.

Our Family Tree: An Evolution Story by Lisa Westberg Peters (Harcourt, 2003). Another take on evolution, beautifully illustrated and focusing on humans' connection with the rest of life.

tiktaalik.uchicago.edu/fossil.html Go straight to the source! Read about the Tiktaalik expedition and learn more about the fossil's significance.

www.devoniantimes.org Read the Devonian Times, a "newspaper" chronicling important events from the past. The fourth edition is all about Tiktaalik.

ACTIVITY IDEAS

Who Owns These Bones?

When paleontologists (scientists who study ancient life) find fossils, they rarely find a complete skeleton. Instead, they have to put it together like a puzzle with pieces missing. Here's an interactive online game where students can try their own hands at assembling skeletons from a jumble of bones: www.bbc.co.uk/sn/prehistoric_life/games/skeleton_jigsaw. With several different levels to choose from, budding paleontologists can build their skills gradually.

TIME:
15 Minutes
MATERIALS:
Internet access

Fleshing Out Fossils

The Tiktaalik fossil is so exciting because it is a transitional form that shares characteristics with both ancient fish and tetrapods, or four-footed land animals. (In acknowledgement of this transitional status, the animal has also been nicknamed "fishapod.") The fish, Tiktaalik, and the tetrapod are all pictured in "The Fish That Changed the World," but, as mentioned at the end of the story, scientists are still looking for more of the missing links in the transitional sequence. Have students create a series of drawings that show how this transition might have taken place, by using their imaginations to flesh out several more intermediate forms. Students could use their drawings to create a flip book or computer animation where they can watch the creature change right before their eyes.

TIME:
30 Minutes
MATERIALS:
Paper and pencils
Optional: computer animation program

Fossil Hunting

Are there any good fossil-hunting areas near you? Take students on a field trip to look for some long-ago creatures yourselves. In the books listed in the Resources section, read about how fossils form. Discuss your finds and what they tell you about the climate and landscape of your region in the past. (For instance, if you find the shells of sea creatures, you know that the land you're standing on was once underwater!)

TIME:
60 Minutes +
PREPARATION:
Arrange a trip to a site where you can hunt for fossils

Fossil Making

If fossil-hunting isn't feasible, make your own fossils. Use ready-made clay or make your own dough. Take a walk outdoors to look for objects to "fossilize": leaves, twigs, or seed pods; shells; dead pillbugs, beetles or other hard-shelled insects, etc. You could also save chicken bones from the kitchen or form pipe cleaners into footprints and other shapes. Have students flatten the clay and press objects firmly into it, then carefully remove the objects to leave an impression. Let the clay dry overnight and then admire your fossils! Discuss how this process is similar to the way plants and animals from long ago left impressions in soft mud, which then dried and aged over many years to become rock with fossils in it.

TIME:
60 Minutes
MATERIALS:
Clay
Objects to imprint

3

Little Stinkers?

pages 22-26

Learning Links:
Skunks are best known for their odor, of course. Here, Petunia Skunk argues for a less narrow view, and in the process reveals many secrets of skunk life.

DISCUSSION QUESTIONS & WRITING PROMPTS

Pre-Reading Questions:

- Skunks stink—everyone knows that! But what else do you know about them? What would you like to learn?
- Has anyone in your family (including a pet) ever had a "run-in" with a skunk? If so, describe what happened.

Comprehension Check:

- Where are baby skunks born?
- What are baby skunks called?
- Why do skunks have bold black-and-white markings?
- What do skunks eat?
- How many kinds of skunks live in North America?
- What kind does this story focus on?
- Why do skunks stink?
- How do they make the smell?
- How can you tell if a skunk is getting ready to spray?

Critical and Creative Thinking Connections:

- Has anyone ever called you a "little stinker"? Did they mean you were a skunk? Why do you think that is the story's title?
- Using the clues in this story, what kind of habitat would you say skunks live in?
- Why do you think skunks give warnings before they actually spray?
- Do you think skunks have a bad reputation? Should they? Explain your answer.
- Petunia Skunk is trying to persuade readers of something in this story. What is it? What examples does she give to support her argument?
- A skunk's white-on-black markings make it easy to see. Why is this useful?
- What are some other creatures that have warning colors, and why do they have them?

RESOURCES

Skunks by Adrienne Mason (Kids Can Press, 2006). Read more about the lives of the North American skunk species and meet the rest of the family from around the world.

Skunks Do More Than Stink! by D.M. Souza (Millbrook Press, 2002). Another good source of information about skunks, illustrated with lots of photos.

Skunks! by David Greenberg (Little, Brown, and Company, 2001). Are you taking skunks too seriously? Then read this very silly rhyming celebration of skunks and their stink!

www.enature.com/fieldguides/detail.asp?recnum=MA0034 Get tips on identifying and understanding skunks on the eNature Web site.

ACTIVITY IDEAS

Sing a Stinky Song

TIME:
30 Minutes
MATERIALS:
None

A skunk doesn't just run up and spray without warning. It gives lots of warnings, which are easy to see if you know them. Before it sprays, a skunk first stomps its feet, arches its back, scratches the ground, hisses, and raises its tail. Spotted skunks also do a handstand to show off the spots on their backs. If all these warnings aren't heeded, then it's time for the big guns! Discuss the signs with students. Teach them the silly song below (it's sung to the tune of "Turkey in the Straw"). Ask the group to choreograph a performance in which some sing while the rest act out the skunks' part, complete with warning signs leading up to the stinky spray.

Oh, I stuck my head in a little skunk's hole
And the little skunk said, "Well, bless my soul!
Take it out! Take it out!
Take it out! Re-mooove it!"

Oh, I didn't take it out and the little skunk said,
"If you don't take it out, you'll wish you had!
Take it out! Take it out!"
Pheew! I re-moooved it!

Skunks in the Family

TIME:
45 Minutes
MATERIALS:
Library/Internet access
Paper
Art supplies

Use books about skunks (see the Resources section) to research each of the skunk species in North America. Have students compare each species' pattern and the other characteristics that make them unique. Then have students make a "family album" with photos or drawings of each species and labels that indicate where the skunks live, what they look like, and other fun facts about them.

Cleaning Up Skunks' Reputation

TIME:
60 Minutes +
MATERIALS:
Props for staging commercials
Video camera (optional)

Tell students Petunia Skunk has hired them to help her improve skunks' reputation. As public relations specialists, the students' job is to create a television or radio commercial to promote skunks' positive qualities. To prepare, watch or listen to some commercials as a group. Discuss what kinds of language and action are used to grab attention, entertain, and sell a product or idea. Then teams of students can work together to plan and record their own commercials (or perform them as skits). After each team shares its work with the group, discuss what aspects of the commercials they think would be most effective in helping other people better understand and live with skunks.

Smell Solutions

TIME:
60 Minutes
MATERIALS:
A variety of pantry items: tomato juice, vinegar, baking soda, dish soap, hydrogen peroxide, etc.

Removing mega-stinky skunk smell is a major undertaking! Folk wisdom says to use tomato juice, but many sources say this doesn't work. Read more about the science of stink at www.riverdeep.net/current/2002/01/011402_smells.jhtml. Then engage students in some hands-on experimentation. Mix up some of the hydrogen peroxide/baking soda/dish soap recipe given on the Web site above. Try it out on sweaty socks or your hands after you've rubbed them with stinky cheese or garlic. For comparison, try tomato juice, vinegar, or commercial odor-removers too. What works best? Why do you think that is?

4

Web Masters

pages 30-35

Learning Links:

Spider webs aren't just for Halloween. They are amazing architectural creations employed by spiders to catch a meal in a variety of clever ways. Students learn why and how spiders build webs as well as glimpsing the wide range of forms webs can take.

DISCUSSION QUESTIONS & WRITING PROMPTS

Pre-Reading Questions:

- What are some things from nature that are commonly seen at Halloween?
- Why do you think these things became symbols of the holiday?

Comprehension Check:

- Why do spiders build webs?
- What are three qualities a spider web should have to work well?
- What's special about spider silk?
- Describe the steps spiders follow to spin orb webs.
- When a spider eats its old web, how is this like recycling?
- What are two kinds of webs with built-in hiding places where the spider waits?
- Why is it an advantage for social spiders to live in big groups?
- What kind of web does a net-casting spider make?

Critical and Creative Thinking Connections:

- Spider silk is amazing stuff. If you had a spool of it, how would you use it?
- How does Spider-Man use silk? How is he like and different from a real spider?
- Some spiders can make both sticky and non-sticky silk. Why would that be helpful?
- What are some ideas people have about why spiders add zigzag patterns to some orb webs? Can you think of any other reasons they might do this?
- Why is this story called "Web Masters"? What does this title say to you?
- Why do you think pages on the Internet are called "Web sites"? How is the Internet like a web? (Remind students that "Web" is short for "World Wide Web.")

RESOURCES

Spiders and Their Kin by Herbert Levi and Lorna Levi (Golden Guides from St. Martin's Press, 2001). .Here's a good field guide to take along when you search for spiders and their webs.

Spiders and Their Web Sites by Margery Facklam (Little, Brown, 2001). Meet twelve different spiders and learn about how they use webs in a variety of ways.

Spinning Spiders by Melvin Berger (Harper Trophy, 2003). More about spiders and the webs they spin.

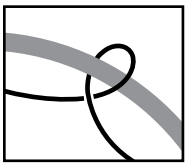
www.spiderroom.info/index.html Visit the Spider Room to explore spider webs and many other spider facts on this interactive Web site.

ACTIVITY IDEAS

Can You Catch a Meal?

TIME:
30 Minutes
MATERIALS:
Hula hoops
Yarn
Ping pong balls
Self-stick Velcro® (hook and loop)

Give students a chance to try their hands at weaving effective webs. Each student (or small group of students) will need a hula hoop and a ball of yarn. Demonstrate how to loop the yarn around the hoop to make a "spider web"



(see diagram). Attach strips of adhesive-backed Velcro® to ping pong balls. Then have students try to throw these "insects" through the web. Do they get stuck? Try different web designs and ask students to evaluate which ones are most effective and why. Ask them to compare and contrast these "webs" and "insects" with real spider webs and the prey they're designed to catch.

Seeking Out Spiders

TIME:
30-60 Minutes
MATERIALS:
Spider Search Student Page
Bug boxes
Hand lenses
Field guide to spiders

If it's not too wintry for spiders to be active in your part of the world, take students outside to look for spiders and webs. If you don't find spiders outside, go on an indoor spider hunt; plenty of out-of-the-way corners might hold a web. Make copies of the "Spider Bingo" card on page 37 and play as you go. Or use the **Spider Search Student Page** to focus the investigation. Look for and closely examine intact webs. Carefully collect some spiders in bug boxes for observation with hand lenses. Can you find some of the web types pictured in "Web Masters"? Can you identify the spiders with help from a field guide?

Web Designers

TIME:
30 Minutes
MATERIALS:
Various art supplies

After students read about how a spider builds an orb web, they can make their own artistic webs to display. Here are several methods:

- Find a branched stick. Use string or yarn to weave a web design inside this frame. Plant the stick in a pot of sand or a lump of clay to display it.
- Draw a web on a sheet of paper. Cover it with waxed paper and squeeze thin lines of white glue over the lines of the web. Sprinkle the glue with glitter. When the glue dries, carefully peel off the web and hang it up.
- Place a sheet of black construction paper inside a gift box lid. Dip a marble in white paint. Drop it onto the paper and roll it around by tilting the lid in all directions until you've created a beautiful web.
- Draw a web on graph paper. Have some math fun by calculating the length of the web's perimeter, the area inside it, and the total length of silk needed to construct it.

Spectacular Spider Silk

TIME:
45 Minutes
MATERIALS:
Library/Internet access
Paper and pencils

Send students on a "research scavenger hunt" on the Internet to find answers to the questions below. When they've discovered spider silk's amazing characteristics (stronger than Kevlar, the strongest synthetic fiber known!), engage them in a brainstorm session about all the ways synthetic spider silk could be used.

1. What are some of the special properties of spider silk?
2. Why can't people harvest silk from spiders as they do from silkworms?
3. Have people been able to make an artificial version of spider silk?

Student Page

SPIDER SEARCH

Now that you've read about spiders and their webs in *Ranger Rick*, take a close-up look at the real thing! Here's how:

1. Look for a spider web. Good places to check include trees, bushes, fences, tall grass, or even an out-of-the-way corner indoors. Draw the web in the box below.

What kind of web do you think it is?

Can you find any other webs? Are they the same as the one you drew or different?

If they are different, what kind(s) do you think they are?

2. Look for a spider on or near a web. Draw the spider in the box below.

Label its eight legs, its head, and its spinnerets (on the back end). Add any patterns or colors it has on its body.

How big is the spider? Compare it to something familiar such as a pencil eraser or a penny.

What is the spider doing? Describe its behavior.

National Wildlife Federation®
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Family Fun!

Dear Parent or Guardian,
Your child is reading Ranger Rick magazine in class. Each month, amazing photos, feature articles, and activities bring nature, wildlife, and conservation to life. Extend the learning and fun at home with these engaging family activities. Enjoy!

NIGHT WALK

Read the poem "The Owl" on pages 2-3. Then bundle up and head out for a walk on a crisp fall evening. If you're really lucky, maybe you'll hear an owl hooting. But you might hear lots of other interesting things, too! Open your ears and tune in to the sounds of rustling leaves, whispering wind, and creaking trees.

WILD JOURNEY

After you read "Kingdom of Komodos" on pages 4-9, look for Peter Sis' book *Komodo!* at your library. It's all about a family's fantastic journey to the dragon islands. Is anyone in your family wild about a weird creature? Where would you have to travel to see it? Take turns telling your own stories about taking a journey to see komodo dragons or another unusual animal.

STAMP ART

Check out the Southern Florida Wetland postage stamps in "Dear Ranger Rick" on pages 10-11. Then take up the challenge in the "Whatcha Think" box to design your own stamp. Feeling motivated? Use the Florida wetland as a model to design a whole stamp scene for your own region. What special parts of your landscape can you show? What animals and plants will you include to best represent your area?

FALLING LEAVES

You can read the scientific explanation for why leaves change color in the fall in "Ask Rick" on page 28. Now go outdoors and enjoy the artistic effect! Take a walk around your neighborhood or a hike in your favorite wild place and admire the fall colors. Take along a camera and capture images of your favorite trees, or have a contest to see who can find the most beautiful leaf.

SPIDER SEARCH

Read all about spider webs in "Web Masters" on pages 30-35. Then play a round of Spider Bingo (page 37). How many of the webs on the card can you find? You might want to take a spray bottle of water with you: If you find a web with no spider in it, you can spray it with a fine mist of water for a better look at the design.

PICK A PUMPKIN

Even if you don't call yourselves extreme pumpkin carvers (pages 38-39), you can still have lots of fun carving pumpkins. Have a pumpkin patch nearby? Pay a visit to pick the perfect pumpkin. Then turn it into your own Halloween masterpiece.

NATIONAL EDUCATION STANDARDS

NATIONAL SCIENCE EDUCATION STANDARDS

Science as Inquiry

		1	2	3	4
K-8	Abilities necessary to do scientific inquiry	■	■	■	■
K-8	Understandings about scientific inquiry	■	■	■	■

Life Science

		1	2	3	4
K-4	Characteristics of organisms	■	■	■	■
K-4	Life cycles of organisms	■		■	
K-4	Organisms and environments	■	■		■
5-8	Structure and function in living systems				
5-8	Reproduction and heredity		■		
5-8	Regulation and behavior	■	■		
5-8	Populations and ecosystems	■	■		
5-8	Diversity and adaptations of organisms	■	■	■	■

Earth & Space Science

		1	2	3	4
K-4	Properties of Earth materials		■		
K-4	Objects in the sky				
K-4	Changes in earth and sky		■		
5-8	Structure of the Earth system		■		
5-8	Earth's history		■		
5-8	Earth in the solar system				

Science & Technology

		1	2	3	4
K-4	Abilities to distinguish between natural and human objects	■	■		■
K-8	Abilities of technological design				■
K-8	Understanding about science and technology				■

Science in Personal and Social Perspectives

		1	2	3	4
K-8	Personal health			■	■
K-4	Characteristics and changes in populations	■			
K-4	Types of resources				
K-4	Changes in environments	■	■		
K-4	Science and technology in local challenges			■	■
5-8	Populations, resources, and environments	■			
5-8	Natural Hazards			■	
5-8	Risks and benefits				
5-8	Science and technology in society			■	

History and Nature of Science

		1	2	3	4
K-8	Science as a human endeavor	■	■	■	■
5-8	Nature of science	■	■		■
5-8	History of science	■	■		

ENGLISH LANGUAGE ARTS

		1	2	3	4
1	Reading for perspective	■	■	■	■
2	Understanding the human experience	■	■		
3	Evaluation strategies	■	■	■	■
4	Communications skills	■	■	■	■
5	Communications strategies	■		■	
6	Applying knowledge	■		■	
7	Evaluating data	■		■	■
8	Developing research skills			■	■
9	Understanding and respecting diversity	■			
10	Developing English competency	■	■	■	■
11	Participating in literary communities	■	■	■	■
12	Using language for oneself				