

NATIONAL GEOGRAPHIC  
**Science**

CORE  
**K-5**



**Start the Experience**





A rare Suwannee cooter swims through clear Florida waters.



Promote science success as you share  
***The National Geographic Experience***

- Immerse Students in the Nature of Science and Inquiry
- Unlock the Big Ideas in Science for All Learners
- Build Scientific and Content Literacy

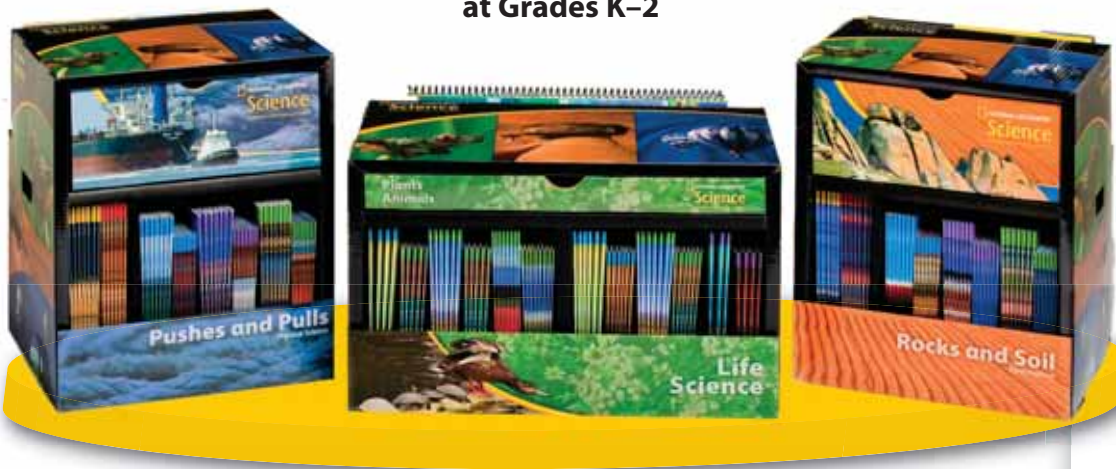




## Built for Your Classroom

Modular Life, Earth, and Physical Science units at the primary grades allow you to engage K–2 students in a wealth of active discovery and shared exploration through the use of Big Books and little books. The program then grows with your students by transitioning to grade-level sets of Life, Earth, and Physical Science Student Books at grades 3–5. At every grade, [myNGconnect](#) gives students and teachers online access to the books and digital program resources.

### Modular unit-based Classroom Sets at Grades K–2



### Life, Earth, and Physical Science Student Books at each Grade 3–5



Complete and Flexible



Integrated Print and Technology with Hands-On Inquiry

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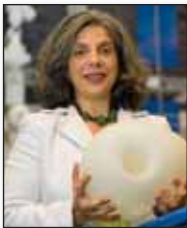
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# Designed to Take Students Beyond

Students join leading National Geographic Scientists and Explorers in the field via special video segments launching each unit and at various points throughout the program. These valuable interactions provide students with real-life models of how scientists conduct studies and gain scientific knowledge.



**Constance Adams**  
National Geographic Emerging Explorer, Space Architect



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Science Writer and Former NASA Flight Controller,



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NASA Astrophysicist



**Albert Yu-Min Lin, Ph.D.**  
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**Greg Marshall**  
National Geographic Filmmaker, Marine Biologist, Conservationist, Inventor



**Mireya Mayor, Ph.D.**  
National Geographic Emerging Explorer Primatologist, Conservationist



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**Tierney Thys, Ph.D.**  
National Geographic Emerging Explorer Marine Biologist, Filmmaker



**Katey Walter, Ph.D.**  
National Geographic Emerging Explorer Aquatic Ecologist, Biogeochemist



Connections to Real Scientists!






## Revealing the Nature of Science

In *National Geographic Science*, process skills build at each grade level to ensure a complete understanding of the Nature of Science. Throughout the program, process skills and the Nature of Science work together to help students think and act like scientists.

PROCESS SKILLS	Kindergarten	Grades 1 & 2
	<b>Nature of Science</b>	<b>OBSERVE</b> <ul style="list-style-type: none"> <li>• Science knowledge is based on evidence.</li> <li>• Science knowledge can change based on new evidence.</li> </ul>



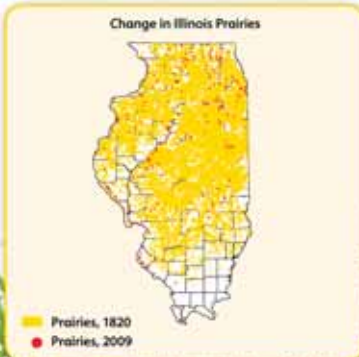
**Think**  
Like a Scientist

### How Scientists Work

#### Solving Problems Together


Many prairies once grew in Illinois. Now farms, roads, and cities cover the land. Most prairies are gone. Many animals that depend on prairie plants cannot survive.

Some scientists want to save more prairie habitats in Illinois. These scientists are collecting seeds to grow new prairie plants. They search for the best places to collect seeds and where to plant them. They tell other scientists what they find out.



Change in Illinois Prairies

■ Prairies, 1820  
● Prairies, 2009



24

25



Modeling Real Scientists in the Field

## Grade 3

### CLASSIFY

- There is often no single “right” answer in science.

## Grade 4

### PREDICT/HYPOTHESIZE

- Scientific theories provide the base upon which predictions and hypotheses are built.

## Grade 5

### DESIGN EXPERIMENTS

- There is no single, scientific method that all scientists follow.
- There are a number of ways to do science.

**Think Like a Scientist**

## Science and Technology

### How Technology Helps Scientists

Technology helps scientists to discover new information and to make people's lives better. Modern telescopes, digital computers, and electronic microscopes allow scientists to make better observations and measurements than in the past.

**Telescopes** An optical telescope is a system of lenses or mirrors that collects light from distant objects. Telescopes allow observers to see fainter, more distant objects than they can see with only their eyes. Scientists today use telescopes to investigate the age of the universe, observe the life cycles of stars, and look for planets outside our solar system. Telescopes help scientists learn more about space.

**Digital Computers** Scientists use digital computers to collect and store data, make calculations, and create models. Since the middle of the twentieth century, digital computers have been changing our world. They contribute to saving lives with medical equipment, navigating jet planes, and forecasting weather. Computers allow us to use email, the Internet, and television. Banks, stores, and hospitals depend on computers that store and share data. Video games and movies are produced with the help of computers. Tiny computers are in appliances, watches, phones, and toys. Digital computers affect many things in our work and play.



The Keck telescopes allow astronomers to see two colliding galaxies nearly 5 billion light-years away.



Each of the twin Keck telescopes has a 10-meter system of mirrors. They are the world's largest optical telescopes.



This ENIAC (Electronic Numerical Integrator and Computer) from the 1940s was the first electronic digital computer in the United States. It filled a 9-by-18-meter room. A laptop computer today is more powerful than ENIAC was.



# Delivering Leveled, Hands-On Inquiry

*National Geographic Science* provides students with abundant and relevant hands-on explorations to facilitate a thorough understanding of key science concepts. The four levels of inquiry in the program are designed to help students build confidence and competence in scientific thought and inquiry.

## Explore Activity

The *Explore Activity* builds background for the unit and activity **engages** students as they **explore**.

**Guided Inquiry**

**Explore Activity**

**Investigate Habitats**

**Question** Which plants and animals live on land and which live in water?

**Science Process Vocabulary**

**observe** verb  
When you **observe**, you use your senses to learn about an object or event.

**Plants:** water lily, duckweed, cactus

**Animals:** swift fox, prairie dog, angelfish

**Materials:** two sorting circles, blue and green cards, marker, photo picture cards, animal picture cards

**What to Do**

- Unfold your sorting circles.
- Make 2 habitat cards. Write **water** on 1 card and **land** on the other.

## Directed Inquiry

In *Directed Inquiry*, the teacher gives direct instruction throughout the activity. Students are given opportunities to **explain** what they have done, **elaborate** by asking further questions, and **evaluate** by answering questions and using a self-reflection rubric.

**Directed Inquiry**

**Investigate How Desert Plants Survive**

**Question** How can the waxy covering of a leaf help a plant survive in a dry desert?

**Science Process Vocabulary**

**model** noun  
You can make a **model** to show how something works.

**predict** verb  
When you **predict**, you tell what you think will happen.

**Materials:** green construction paper, scissors, spray bottle with water, unlined paper

**What to Do**

- Draw two leaf shapes. Cut out the leaf shapes. These are **models** of leaves.
- Spray both leaf models with the same amount of water.



Also Included

Science in a **Snap!**

offers quick investigations to activate understanding of science concepts.



**Science Inquiry Kits** provide all the materials required to complete inquiry activities.

**Explore Activity**  
**Investigate Star Positions**

**Guided Inquiry**  
**Investigate Erosion**

**Question** How does the way water moves on soil affect the way the soil moves?

**Science Process Vocabulary**  
**variable** noun  
A variable is a part of an experiment that you can change.  
You change only one variable while you keep all the other parts the same. You control the parts that do not change.  
*(I will only change one variable in the experiment.)*

**Materials**  
plastic container, paper cup, soil, water, paper clip, wood block, paper, ruler, measuring cup, spoon, paper towel, plastic foam cup, paper plate, paper cup, soil, water, paper clip, wood block, paper, ruler, measuring cup, spoon, paper towel, plastic foam cup, paper plate.

**Do an Experiment**  
Write your plan in your science notebook.  
**Make a Hypothesis**  
In this investigation, you will pour water through holes in a cup onto soil. Water moves slowly through small holes and quickly through large holes. How will this affect the amount of erosion you observe? Write your hypothesis.  
**Identify, Manipulate, and Control Variables**  
Which variable will you change?  
Which variable will you observe or measure?  
Which variables will you keep the same?

**What to Do**  
1 Put on your safety goggles. Label the plastic containers 1, 2, and 3. Put one paper cupful of soil at one end of each of the containers. Put a wood block under the same end of the container as the soil. You will not pour any water into container 3.  
2 Use the paper clip to poke two small holes in the bottom of the plastic foam cup.

## Guided Inquiry

In *Guided Inquiry*, students become independent learners with guidance from the teacher. Students may manipulate variables, provide **explanations**, **elaborate** by asking further questions, and **evaluate** by answering questions and using a self-reflection rubric.

**Directed Inquiry**  
**Investigate Weathering**

**Open Inquiry**  
**Do Your Own Investigation**

**Question** Choose one of these questions, or make up one of your own to do your investigation.

- How can you use shadows caused by the sun to tell time?
- If I sand half an alum solution at room temperature and half in a cold temperature, will the crystals that form be the same?
- What happens to sand particles of different sizes when they are blown by the wind?
- How does gravity effect soil on a slope?
- What happens when pure water and tap water evaporate?
- How is air temperature different over land and water?

**Science Process Vocabulary**  
**hypothesis** noun  
When you make a hypothesis, you state a possible answer to a question that can be tested by an experiment.  
*(If I place an alum solution in the sun, the crystals that grow will be large.)*

**Open Inquiry Checklist**  
Here is a checklist you can use when you investigate.

- Choose a question or make up one of your own.
- Gather the materials you will use.
- If needed, make a hypothesis or a prediction.
- If needed, identify, manipulate, and control variables.
- Make a plan for your investigation.
- Carry out your plan.
- Collect and record data. Analyze your data.
- Explain and share your results.
- Tell what you conclude.
- Think of another question.

## Open Inquiry

In *Open Inquiry*, students choose their own questions, create and carry out their own plans, collect and record their own data, look for patterns, and share that data. Students **explain** their results, **elaborate** by asking further questions, and **evaluate** by answering questions and using a self-reflection rubric.

**e Inquiry eHelp**

online inquiry support for teachers at [myNGconnect](http://myNGconnect.com).



## Exploring Standards In Depth

At every level, *National Geographic Science* is targeted and focused on the Big Ideas in Science, inviting students to question, engage, actively explore, and understand standards-based Science content.

At grades K–2, each unit is centered on three chapter “**Big Ideas**” that target instruction to the science standards.

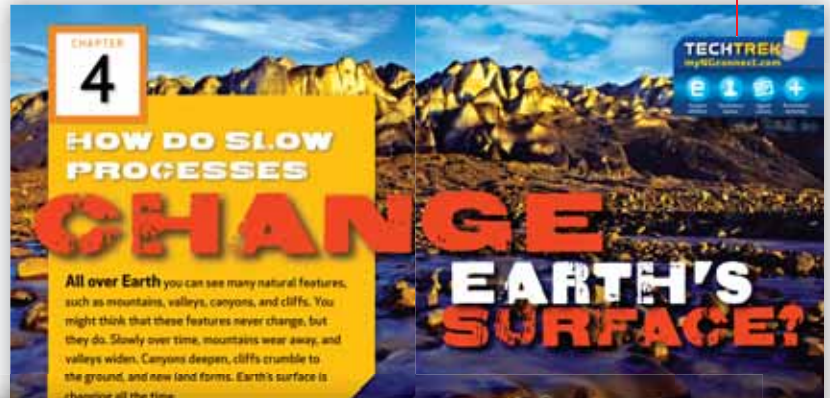
Moving through the unit, students delve deeper into understanding the chapter **Big Ideas** through collaborative and independent work.

### Contents

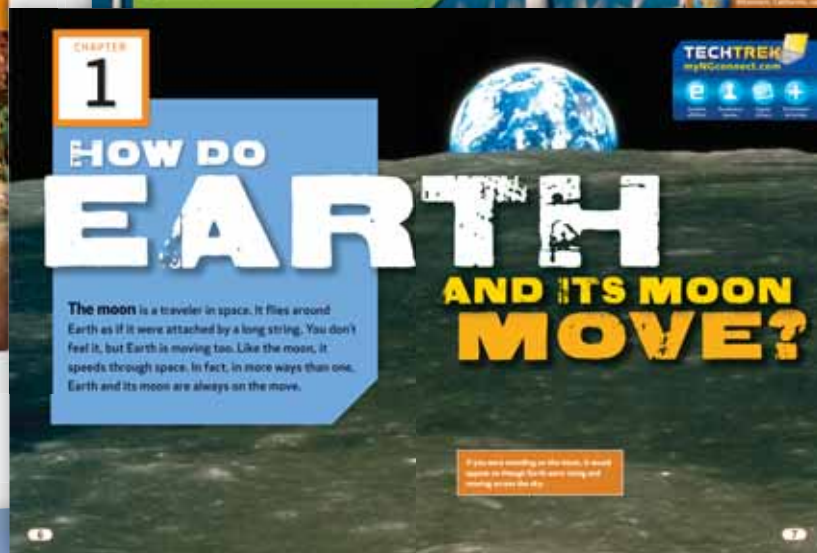
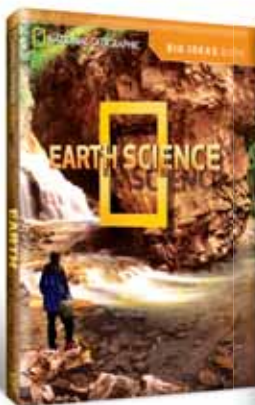
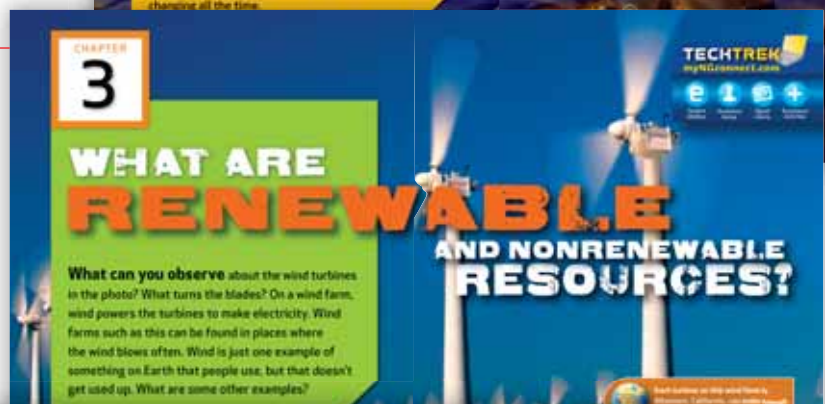
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TECHTREK  
myNGconnect.com



At grades 3–5, each chapter presents a **“Big Idea”** that focuses instruction on the science standards.





## Providing Access to Content

*National Geographic Science* is designed to engage all learners in exploring and understanding the Big Ideas of Science. Focused instruction with built-in support helps you reach students of varying ability levels.



**Become An Expert** books for grades K–2 tie directly to the unit’s Big Ideas and are presented at three reading levels, enabling teachers to effectively differentiate instruction.



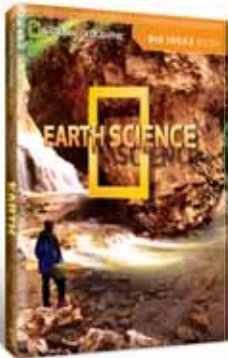
Leveled **Explore On Your Own** books carry forward the topical exploration at grades K–2, offering the flexibility to either extend learning in Science, or to provide connected nonfiction reading in your Language Arts block.





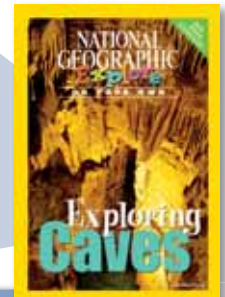
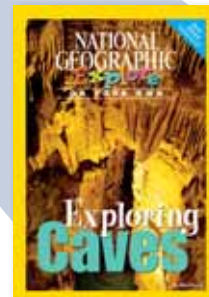


Online Interactives



In the **Become An Expert** section of each chapter in grades 3–5, students apply what they've learned through concrete examples found throughout our world.

Pioneer and Pathfinder editions of the **Explore On Your Own** books for grade 3–5 provide the same content at two different reading levels, encouraging all students to read independently.





# Instilling a Legacy of Scientific Literacy

Real-life models of National Geographic Explorers and scientists in the field help students to develop scientific literacy and better understand the Nature of Science.



Students learn that Science is:

- A way of knowing
- Empirically based and consistent with evidence
- Subject to change when new evidence presents itself
- A creative process



Explorer Videos

### Collect and Record Data

Scientists want to find an answer to their questions. They collect and record **data**. Data are observations and measurements scientists gather in an investigation or experiment.

The tools and probes Tim leaves in the tornado's path take measurements of how the weather changes. The probes have cameras that record the actual tornado. This data, or information, helps Tim answer his questions.



### Look for Patterns

Scientists try to repeat their experiments or investigations more than once. They look for patterns in the data.



Tim has chased over 250 tornadoes. But every storm is different. Sometimes Tim doesn't put the probes in the exact path of the tornado. Sometimes the tornado doesn't touch down at all.

### Make Conclusions

After finishing a plan and analyzing data, a scientist tries to reach a **conclusion**. A conclusion may be an answer to a question or a solution to a problem. Sometimes scientists don't reach conclusions. Instead, they may come up with more questions.



"In order to make our work effective, we have to figure out what things worked and what we would need to do in order to replicate the work in other environments," says Colburn.

Through his work, T.H. has concluded that it is important to provide all people with the knowledge of how to access basic human needs, like clean water and food. This knowledge is vital to a more peaceful and eco-friendly world.

### Share Results

Scientists **share** their results with other people. They want others to learn what they find out.



T.H.'s work has allowed entire cities to change for the better. When families learn how to live a more sustainable lifestyle, they share their knowledge with others. T.H. moves on to other areas in need of his help.

"I work with my team to take our work around the world to conferences and classrooms and homes and villages and cities. We will never be taking our work to other areas in need of his help," says Colburn.



## Supporting Literacy Through Science

*National Geographic Science* also builds literacy skills to help students succeed across content areas.

### Reading Comprehension

Teacher Edition support at K–2 includes opportunities to work with four comprehension strategies to ensure content learning is deep and lasting.

- Preview and Predict
- Monitor and Fix Up
- Make Inferences
- Sum Up

At Grades 3–5, these four strategies are used to reinforce content learning.

**READING COMPREHENSION STRATEGIES**

### Make Inferences Mini-Lesson

To teach this strategy, use the *Big Ideas Big Book*. Readers mainly use this strategy during reading.

- 1 Describe the Strategy**  
**Make Inferences**  
 Tell students that when you make an inference you combine what you read with what you know to arrive at new understandings that are not already stated. Making inferences helps you better understand what you read, so you can learn more about it.  
**How to Make Inferences**  
 I read \_\_\_\_\_  
 I know \_\_\_\_\_  
 And so \_\_\_\_\_
- 2 Model the Strategy**  
 Read the text on page 30. The something that **The text says that plants give off oxygen, and animals breathe in oxygen to breathe. I already know that people need oxygen to breathe. So I think that plants help people, too.**  
 You can make an inference by thinking:  
 I read \_\_\_\_\_ I know \_\_\_\_\_  
 And so \_\_\_\_\_
- 3 Collaboratively Use the Strategy**  
 Begin building over the strategy to students. Direct students to another page in *Big Ideas*. Work together with students to apply the strategy using the sentence frame:  
 I read \_\_\_\_\_ I know \_\_\_\_\_  
 And so \_\_\_\_\_

**BECOMING AN EXPERT**

### 4 SHARE AND COMPARE

**Write** **Draw**

**Share and Compare**

**Turn and Talk**

Ask students to turn to partners and talk about what they learned about how weathering, erosion, and deposition formed Yosemite Valley. Prompt students by asking:

- 1. Recall:** How do weathering, erosion, and deposition work together? (Weathering helps break down and loosen rock and creates sediment. Erosion picks up the sediment and carries it to a new place. Deposition drops the sediment in its new place.)
- 2. Explain:** How does a moraine form? (After a glacier melts, it leaves behind the dirt that had been carried in the ice. A moraine forms when the glacier deposits this dirt or rock.)
- 3. Summarize:** How has glacial erosion helped shape Yosemite Valley? (Erosion by glaciers shaped the steep, U-shaped main valley of Yosemite. Smaller glaciers eroded the smaller hanging valleys, where some waterfalls now flow.)

**Read**

Ask students to read two pages that are most interesting to them. Ask them to practice reading their pages and share them with a partner or small group. Have them discuss why they found their pages interesting.

**Write** **Draw**

Have students write a caption for the *Beacon of Expert* section. Have students compare what they wrote with a classmate.

**Draw** **Write**

Have students make two groups of four. Have each student in a group draw a picture of a different landscape in Yosemite Valley that was created by a glacier. Tell students to add labels to their drawings. Ask groups to put their drawings together to form a wide view picture of the valley.

Earth Science 1188

### Expository Writing

Instruction at K–2 includes ample opportunity for students to express their understanding in four modes of scientific writing.

- Nonfiction Narrative
- Expository Nonfiction
- Procedural Text
- Persuasive Text

At Grades 3–5, students are given opportunities to write like a scientist by practicing procedural writing in the Science Inquiry and Writing Book.

**READ - Nonfiction Narrative**

### Teach the Genre

It gives us specific characteristics. It deals in the City includes several characteristics of a nonfiction narrative. Before reading the book aloud to students, you may want to teach some of the characteristics of this genre.

**AUTHOR'S PURPOSE** = Tell a True Story

Nonfiction narratives are true stories. They are based on actual events, real people, and are told in a story format.

**TEXT STRUCTURE** = Chronological Sequence

Most nonfiction narratives are written in the order that things happened.

First Next Last

It explains events and a central idea. The author says the events in the text.

**TEXT STRUCTURE** = Problem and Solution

- Some nonfiction narratives have a problem and solution structure.
- This text includes a problem. It explains a problem. It explains a way to solve the problem.

**TEXT FEATURE** = Tell About Events That Already Happened

- Nonfiction narratives are usually told in past tense.
- The text begins, "This morning in Chicago, something unusual happened. A coyote walked into a neighborhood!"

**LESSON 10 - Write Like a Scientist**

**Objectives**

Students will be able to:

- Investigate through *Write Like a Scientist* explore a scientific question, make a hypothesis or prediction, identify, manipulate, and control variables if needed, make and carry out a plan for an investigation, collect and record data in charts, tables, and graphs, analyze data, explain and share results, tell a conclusion, write an answer question.

**Write About an Investigation**

**Crystal Formation**

- Use the writing model to help students write about their investigations. The writing model sets the open inquiry decision to guide writing.
- Page 147 explains Joann's investigation. Read the page aloud and ask: **What did Joann want to investigate?** (She wanted to know if temperature affects how fast crystals form.)
- The writing model begins on page 147 with Joann's question and list of materials. Ask: **Why might it be important to write down the question and list of materials?** (It is easier to keep track of things and refer back to them if you write them down.)
- Remind students that their questions should be focused and easy to test. They should try to use materials that are available in the classroom. Ask: **How did students to make sure their activities are safe?** Ask them to identify any possible safety hazards.
- Joann's hypothesis is on page 148. Help students write the "If...then..." comparison of the hypothesis. Ask: **How did the hypothesis help her plan?** Tell students that they can write their hypotheses in a similar way.
- Page 147 has Joann's variables and controls. Ask: **Which variable is Joann changing?** (The temperature at which the dissolved solids.) **Which variable will be observed or measured?** (How quickly the crystals form.)
- Ask: **Why is it important to keep the other variables the same?** (If the other variables change, Joann would not be able to do a fair test.)

1188B Write Like a Scientist

## Integrated Technology

### myNGconnect for Students

The Student Home Page provides easy access to an array of technology tools designed to support and enhance the student's learning.



#### Student eEditions

- **Big Ideas, Student Inquiry Books, Become an Expert, and Explore On Your Own** books available online
- Highlighting, note-taking and search tools built-in, along with Read-to-Me audio support.



#### NG Digital Library

- Access to videos, images and simulations
- Easy-to-use search and topic-specific media packages.



#### Vocabulary Games

- Highly-interactive student games with rewards to teach vocabulary from units at K-2 and chapters at 3-5.



#### Enrichment Activities

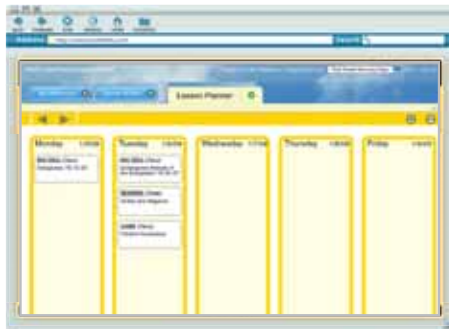
- Interactive resources to expand science concepts presented in the units.





## myNGconnect for Teachers

The Teacher Home Page provides the ability to easily find and manage program technology resources and provides online access to the full array of student and teacher materials.



### Online Lesson Planner

- Tailor instruction to the amount of time you have each day
- Plan group and independent work
- Print plans at-a-glance or in detail.



### Online Professional Development

- Resources to enhance lesson delivery and encourage best practices.



### Teacher eEdition

- Online edition with embedded links to Unit Launch Videos, Assessment Handbook, and Learning Masters.



### Classroom Presentation Tool

- Allows teachers to project all print materials and visuals for a lesson.

## Kindergarten Units



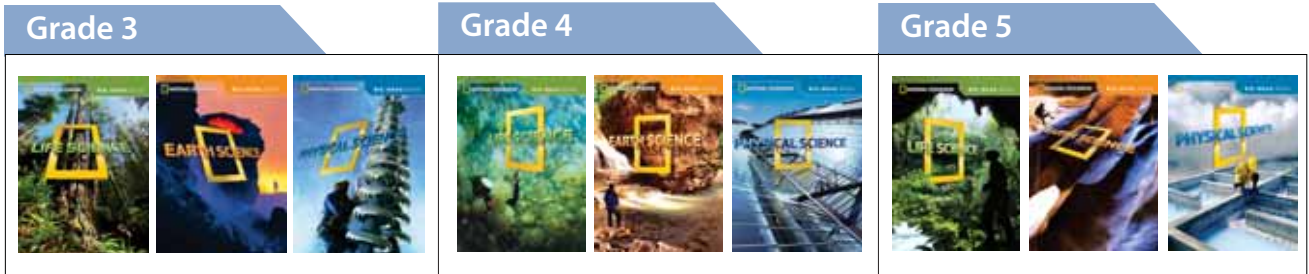
## Grades 1–2 Modular Units







# Life, Earth, and Physical Science for Grades 3–5



## Program Components

	Kindergarten	Grades 1–2	Grade 3	Grade 4	Grade 5
Big Ideas Big Books	■	■			
Big Ideas Student Books		■	■	■	■
Science Inquiry Big Books	■				
Science Inquiry Student Books		■			
Science Inquiry and Writing Student Books			■	■	■
Become An Expert Books	■	■			
Explore On Your Own Books	■	■	■	■	■
Teacher's Editions	■	■	■	■	■
Big Ideas & Vocabulary Cards	■	■			
Write About Big Books	■	■			
Learning Masters	■	■	■	■	■
Assessment Handbook	■	■	■	■	■
ExamView® CD-ROM		■	■	■	■
Science Methods and Process Skills Big Book and Teacher's Guide	■	■	■	■	■
Science Inquiry Kits	■	■	■	■	■
Science Inquiry Safety Kits	■	■	■	■	■
Science Inquiry Kit Consumables Refill	■	■	■	■	■
myNGconnect Technology	■	■	■	■	■

## Promote science success as you share ***The National Geographic Experience***

- Immerse Students in the Nature of Science and Inquiry
- Unlock the Big Ideas in Science for All Learners
- Build Scientific and Content Literacy

