



Start the Experience



A rare Suwannee cooter swims through clear Florida waters.



Promote science success as you share
The National Geographic Experience

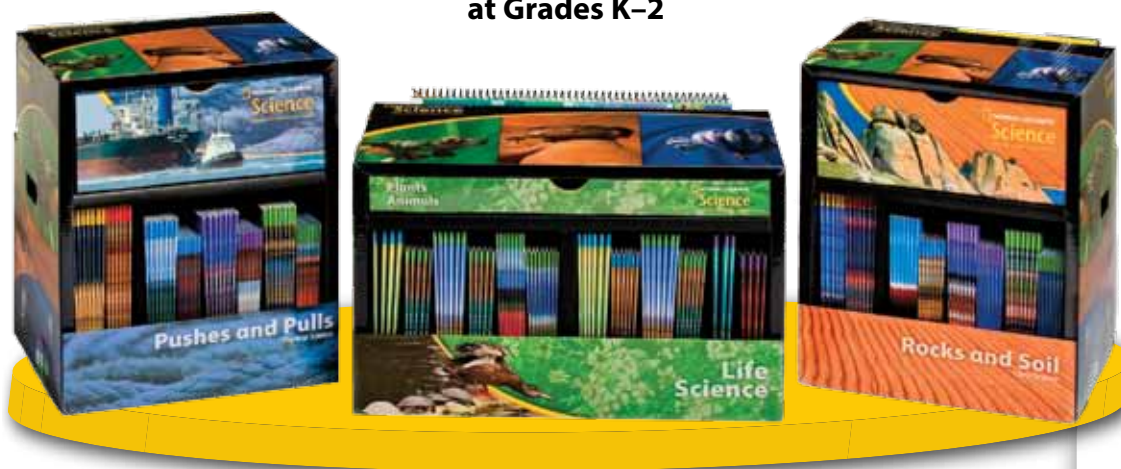
- Immerse Students in the Nature of Science and Inquiry
- Unlock the Big Ideas in Science for All Learners
- Build Scientific and Content Literacy



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 in English and Spanish. 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



**English and
Spanish
Option**

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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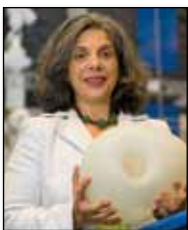
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Designed to Take Students Beyond

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, and provide an excellent opportunity to address STEM topics in the classroom.



Constance Adams
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National Geographic Emerging Explorer, Urban Planner



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National Geographic Emerging Explorer Marine Biologist, Filmmaker



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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.

	Kindergarten	Grades 1 & 2
PROCESS SKILLS	OBSERVE	OBSERVE & INFER
Nature of Science	<ul style="list-style-type: none"> Science knowledge is based on evidence. Science knowledge can change based on new evidence. 	<ul style="list-style-type: none"> Science conclusions are based on observation and inference. Science theories are based partly on things that cannot be observed.

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

English and
Spanish
Available



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

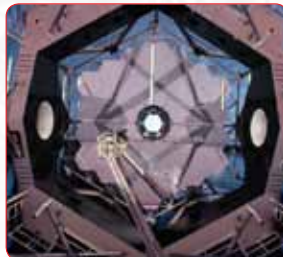
Science and Technology

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

How Technology Helps Scientists

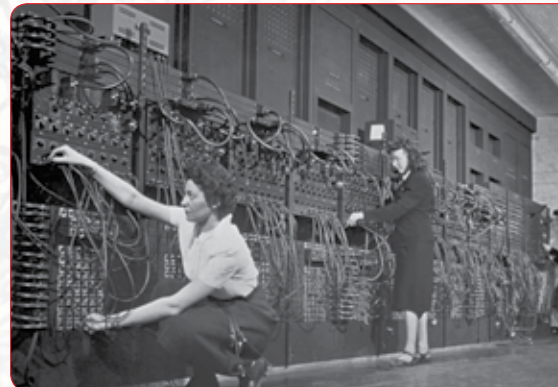
Technology helps scientists to discover new information and to make people's lives better. Modern telescopes, digital computers, and electronic microscopes allow scientists to make better observations and measurements than in the past.

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.



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

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.



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.



Address STEM Through 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.

Materials
Two sorting circles, blue and green cards, marker, plant picture cards, animal picture cards.

What to Do

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

Plants: water lily, duckweed, cactus, swift fox, prairie dog, angel fish.

Animals

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.

Open Inquiry

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, paper towel.

What to Do

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

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

Immerse Students in the Nature of Science and Inquiry

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

Question How do star positions change over time?

Science Process Vocabulary

observe verb
Scientists often use tools to take a close look at, or **observe**, objects and events.

compare verb
When you **compare**, you look at two or more things to see if they are the same or different.

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.

Materials

- safety goggles
- plastic containers
- plastic foam cups
- paper clips
- soil
- plastic foam blocks
- plastic tubing
- plastic tubing
- plastic tubing

Do an Experiment
Write your plan in your science notebook.

Make a Hypothesis
In this investigation, you will pour water through holes in a cap 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

- Put on your safety goggles. Label the plastic containers 1, 2, and 3. Put one paper cup of soil in 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.
- 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

Question How does weathering affect the shape of rocks?

Science Process Vocabulary

model noun
A **model** can show how a process, such as weathering, works.

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

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 cool 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 affect 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 make a possible answer to a question that can be tested by an experiment.

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](https://myNGconnect.org).



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 in English or Spanish.



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

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

Contents

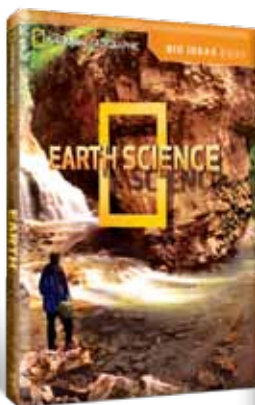
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TECHTREK
myNGconnect.com



e eEdition

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.



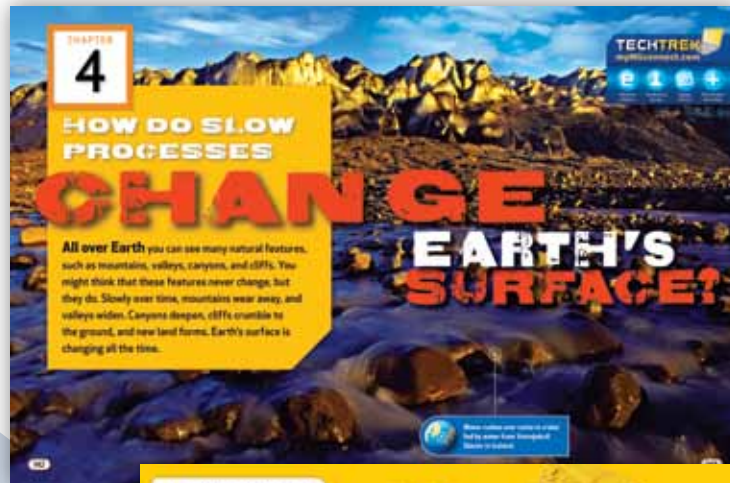
Leveled **Explore On Your Own** books carry forward the topical exploration at grades K–2, offering the flexibility to either extend learning in Science, or to provide connected nonfiction reading in your Language Arts block.



Unlock the Big Ideas in Science for All Learners



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.

Through his work, Tim 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.

Tim'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. Tim 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 soon be taking our work to share our results in Nigeria," says Lincecum.

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 the text says 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.

2 Model the Strategy
Read the text on page 10. Tap something like: **The text says that plants give off oxygen, and animals breathe in oxygen to survive. 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 by reading over the strategy to students. Then students to another page in *Big Ideas Big Book*. Work together with students to apply the strategy using the sentence frames.
I read... I know...
And so...

Encourage students to share self-knowledge or world knowledge that connects with the text. Then lead them to draw from this connection with their understanding.
See pages 716 and 717 for suggestions for guided and independent applications of this strategy.

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 a new place.)
2. Explain How does a mountain form? (When a glacier melts, it leaves behind the dirt that had been carried in the ice. A mountain forms when the glacier deposits rocks or ridges of ice.)
3. Summarize How has glacial erosion helped shape Yosemite Valley? (Glaciers by glaciers shaped the deep, U-shaped main valley of Yosemite. Another glacier carved the smaller hanging valleys, where some water falls now flow.)

Read
Ask students to select 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 Becomes an Expert section. Have students compare what they wrote with a classmate.

Draw **Write**
Help students think into 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.

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
Nonfiction Narrative
Nonfiction Narrative
Nonfiction Narrative
Nonfiction Narrative

Nonfiction narratives have specific characteristics.
1. Events in the story include several characters of a nonfiction narrative.
Before reading the text aloud to students, you may want to read some of its characteristics of the 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**
a scientist walks into a canyon's trap.
the scientist caught the coyote.
the scientist took the coyote to the forest.

TEXT STRUCTURE • Problem and Solution
Some nonfiction narratives have a problem and solution structure.
The text includes a problem. A scientist created a trap to catch a coyote.
To include the problem's solution. A scientist created a trap to catch the coyote in a forest habitat.

TEXT FEATURE • Tell About Events That Already Happened
Nonfiction narratives are usually told in past tense.
The text begins, "One morning in Chicago, something unusual happened. A mouse walked into a comfortable den."

LESSON 10 • Write Like a Scientist

Objectives
Students will be able to:
• Investigate through writing. Like a Scientist, choose a question, gather materials to test, 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 to test the hypothesis, and write a conclusion, explain and share results, tell a conclusion, think of another question.

Write About an Investigation
Crystal Formation
Use this writing model to help students write about their investigations. The writing model uses the Open Inquiry checklist to guide writing.

Page 146 supports Jean's investigation. Read the page aloud and ask: **What did Jean want to investigate?** (He wanted to know if temperature affects how fast crystals form.)
The writing model begins on page 147 with Jean'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 have each of things and only look to them if you do the experiment.)
Read students this their questions (they'll be focused and stay on task). They should try to ask materials that are available in the classroom. Ask: **Ask students to make sure their questions are testable.** Ask them to identify any possible safety hazards.
Jean's hypothesis is on page 148. Help students notice the "If... then..." structure of the hypothesis. Read out that the hypothesis has two parts. Tell students that they can write their hypothesis in a similar way.
Page 147 has Jean's variables and controls. Ask: **Which variable is Jean changing?** (The temperature at which the solution is mixed.)
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, Jean would not be able to do a fair test.)

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.



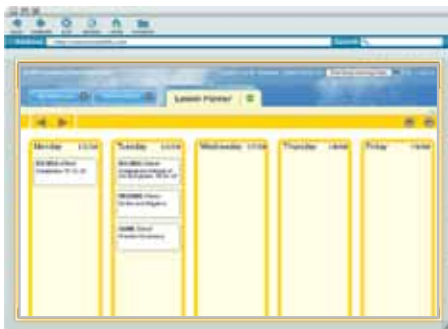
Enrichment Activities

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



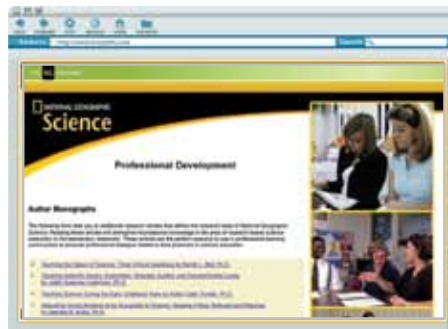
myNGconnect for Teachers

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

Life Science	Earth Science	Physical Science
 	 	 

Grades 1–2 Modular Units

Life Science	Earth Science	Physical Science
		
		
		
		



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	■	■	■	■	■

■ Spanish available

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

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- Unlock the Big Ideas in Science for All Learners
- Build Scientific and Content Literacy
- Available in Spanish
- Address STEM Inquiry



JAN/13

ISBN-13: 978-11338-43702
ISBN-10: 11338-43700



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