

CALIFORNIA

Science · Grades K–6



Exploring Science

Real Science. Real World. Right Now.



Authentic National Geographic Experience

NATIONAL GEOGRAPHIC | Explorer

Jennifer Burney is an environmental scientist. The work she does helps solve food problems around the world. She also helps protect the environment.

Welcome!

Hi! I am Jennifer Burney.

I am a scientist.

I study living things.

Science begins with asking questions.

I have questions about how plants grow.

I want to find ways to change how people grow plants on farms.

You can learn how scientists answer questions.

What is a question you have about how the world works?

Farmers in an African village use a watering system that is powered by solar power. Villagers and Jennifer walk toward the solar panels.

Exploring Science California connects students to real-world science and to real National Geographic Explorers, scientists, and engineers. Students learn **Science and Engineering Practices, Disciplinary Core Ideas, and Crosscutting Concepts** from real scientists and Explorers who use those skills every day to make new discoveries and to solve problems.

National Geographic Explorers

A National Geographic Explorer hosts each grade level of *Exploring Science California*, introducing students to the practices and skills scientists and engineers use to do their work.

Each grade includes other Explorers and scientists who:

- » Are role models for students and encourage them to act and think like real scientists
- » Demonstrate how and why students will use their Science Notebooks
- » Introduce the **phenomena** and concepts of each unit

Kindergarten

Lead Explorer

Jennifer Burney
Environmental Scientist
National Geographic Emerging Explorer

Grade 3 & 5

Andrés Ruzo
Geoscientist
National Geographic Young Explorer

Grade 1

Nalini Nadkarni
Forest Ecologist
National Geographic Grantee

Grade 4

David Moinina Sengh
Biomedical Engineer
National Geographic Emerging Explorer

Grade 2

Asha de Vos
Marine Biologist
National Geographic Emerging Explorer

Grade 6

Zoltan Takacs
Herpetologist and Toxinologist
National Geographic Emerging Explorer

NATIONAL GEOGRAPHIC | Explorers

Lead Explorer: Jennifer Burney

Featured Explorers in National Geographic Exploring Science:

- Jack Andraka
- Nalini Nadkarni
- Simon Ståhl
- Jill Gilgison
- Asha de Vos
- Jana Goodall
- Tyrene Hayes
- Oweil Hwangja Hwang
- Jack Hower
- Shajiqat Hussain
- Barrington Irving
- Derek and Beverly Joubert
- Kakani Katja
- Tim Laman
- Albert Yu-Min Lin
- Dino Martins
- Wesley Meyer
- Patrick Miller
- Brendan Mullin
- Nadhi Mulkani
- Aydogan Ozcan
- Elin Peritt
- Andria Rizzo
- Eric Sala
- Gabby Salazar
- David Suckale Sengh
- Zoltan Takacs
- Martin Wikelski

Host Explorers for each grade

Complete Explorer list, Grades K–6 — Teacher's Edition, pp. T4–T5

Think Like an Engineer Case Study

Save the Bees!

Do you like strawberries? Watermelon? Thanks to bees, we have fruits and other foods to eat. Bees pollinate many plants that make food. Some pollinated flowers transform into fruits that people eat. Dino Martins is a scientist who studies bees and other insects.

Problem

Dino Martins is worried. He's observed patterns that show there are fewer bees today than there were in the past. Fewer bees mean fewer fruits and other foods. People need food, so people need bees, too.

Solution

Dino Martins helps people protect bees. That way, there will be more bees to pollinate flowers. He teaches farmers that bees pollinate crops. Farmers who protect bees harvest more food. We need plenty of food for people to eat.

Some bees' habitats have been destroyed. Bees have lost their hives, which are their homes. So, Dino Martins shows people how to make bee houses. Bee houses are objects that help bees survive.

Wrap It Up!

- Why are bees important?
- What might happen if there were no bees?
- Why do you think Dino Martins work is important?

Exploring Science California:

- » Real Scientists
- » In the Real World
- » Doing Science Right Now

Nalini Nadkarni
National Geographic Explorer

Ecologist

Videos of Explorers introduce students to **phenomena**.

Diverse Science Role Models

Exploring Science California includes Explorers and scientists from all backgrounds. Students see many paths to becoming a scientist or engineer to prove that **any student of any ability can be a scientist or Explorer**.

NATIONAL GEOGRAPHIC | Science Career

Explorer

Barrington Irving is a pilot.

Pilots need to understand motion.

Barrington became interested in flying planes when he was 15 years old.

At 23, he was the youngest person to fly alone around the world.

Today he teaches children about science and technology.

NATIONAL GEOGRAPHIC | Explorer

Gabby Salazar is a nature photographer. She works to help protect plants and animals. Gabby also enjoys teaching photography to children.

NATIONAL GEOGRAPHIC | Explorer

Albert Yu-Min Lin is a research scientist at the University of California, San Diego. His quest for Genghis Khan's tomb is featured in a documentary called *The Forbidden Tomb of Genghis Khan* and has taken him to some of the most isolated areas in the world. Albert also enjoys public speaking, mountain climbing, surfing, and photography.

Case Studies featuring Explorers introduce real-world problems and show how scientists and engineers solve them.

Science Notebooks to Practice Real Science

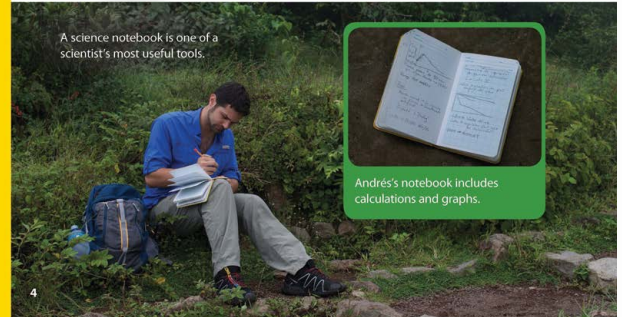
Explorers model for students how they use their notebooks. Students will then apply this knowledge while they create and develop their own Science Notebook.

Keeping a Science Notebook

One tool I use in my research is a science notebook. I keep records of observations, measurements, and other data. I look for patterns and study the evidence. From these, I make predictions, explanations, and conclusions. In this program, you will learn how scientists and engineers ask questions and solve problems. And you can keep your own science notebook. Here are some ways to use your notebook. You or your teacher may have more ideas.

- Define and draw science words and main ideas.
- Label drawings. Include captions and notes to explain ideas.
- Collect objects, such as photos and magazine or newspaper clippings.
- Add tables, charts, or graphs to record observations and data.
- Record evidence for explanations and conclusions.
- Think about what you've done and learned. Ask new questions.

Look at the notebook examples for some ideas. Now it's time to set up your own science notebook!



Label drawings. Use captions to explain main ideas.

Add tables, graphs, and maps to your science notebook.

You can use your notebook to think about what you've done and learned.

1. I thought like a scientist when I did research to obtain information on ways that living things change during their lives. I made a model of a life cycle.

2. I thought like an engineer when I designed a new use for magnets. Then I built and tested my design.

3. I learned the difference between weather and climate. I learned that climate is average weather over time.

Write or draw observations in your notebook.

Make drawings, and explain main ideas.

Write about patterns in different aspects of nature.

Earth Science: Patterns in the Sky: The sun, moon and many stars appear to move in the sky. This is because Earth is spinning.

Physical Science: Patterns in Sound: Plucking a string makes a sound. Plucking a rubber band makes a sound. Plucking can make vibrations. Vibrations make sound.

Write observations in charts or tables to show what you learn.

Use pictures to show what you know or to tell what happens.

Draw pictures to show main ideas.

Weather Chart

Day	☀️	☁️	☔️	🌨️
1	☀️	☁️	☔️	🌨️
2	☀️	☁️	☔️	🌨️
3	☀️	☁️	☔️	🌨️
4	☀️	☁️	☔️	🌨️
5	☀️	☁️	☔️	🌨️

Animal Needs

Water

Food

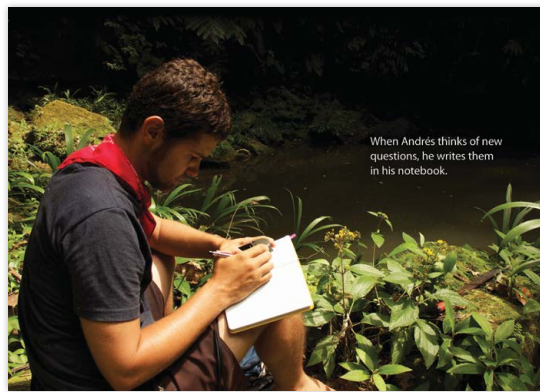
Shelter

Weather

windy weather

a tornado

a blizzard



Science Notebook Companion

Name _____ Date _____

Think Like a Scientist

Make Observations

Student Rubric
Place a check in the box to show the answer that is true for you.

Rubric	Yes	Not Yet
1. I can explain what I am trying to learn about in my investigation.		
2. I can describe land and water habitats found in Africa.		
3. I can describe different living things in each African habitat.		
4. I can compare different plants and animals living in African habitats.		
5. I can record, collect, and organize data on living things in African habitats.		

My Comments

27 © National Geographic Learning, Cengage

Student rubrics are provided for each hands-on activity for students to assess their own ability and knowledge.

Name _____ Date _____

Investigate

Erosion

Record
Record your observations and predictions in the table below.

	My Predictions
first hill	
second hill	

34 © National Geographic Learning, Cengage

Name _____ Date _____

Think Like an Engineer

Design, Test, and Refine a Device

Record
Record your observations in the tables below.

Buzzer Test 1

What I did	Sound?

Buzzer Test 2

What I did	Sound?

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Data sheets for collecting data can be completed and inserted into the Science Notebook.

STEM ENGINEERING PROJECT

Design a Seed Spreader

Have you ever seen a field of bean plants? Farmers grow them in long, neat rows. That way, each plant gets enough light and water. Most farmers use big machines to plant the seeds. These machines are called seeders. A farmer wants to plant beans in a small field. You and your team will help. You will design a seeder. Your seeder must deposit seeds evenly, so the plants will have enough space to grow.

The Challenge

Your challenge is to build a model of a farm seeder. Your model must deposit all the seeds and distribute the seeds evenly in each row.

- Define the problem.** Your model must place some seeds in each row marked on chart paper. Think about the problem you are solving. What does your model need to do? Write the problem in your science notebook.
- Design a solution.** Look at the materials you can use. How can you use them to make your model? Look at the seeds. How can you control how fast the seeds are spread? Draw a design for your seeder. Show it with your team.
- Test your solution.** Try your design. Test your seeder on the chart paper. Count the seeds in each row. Compare your results. Did your seeder deposit the seeds evenly? Can you make your seeder better? Write your ideas in your science notebook. Change a second model, and test it. Compare your results.
- Share.** Show your model to the class. Share the graph of your test results. Tell what worked well and what did not. Answer questions about your design.

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STEM Projects encourage students to use their Science Notebooks as they solve real-world problems through engineering challenges.

Citizen Science

Bugs in Our Backyard

Be a Citizen Scientist
Scientists want to bug you! They want to learn more about insects called bugs. Bugs have six legs and wings folded over their backs. Bugs also have special mouthparts. They use their mouths to pierce plants and suck the juices. Scientists have many questions about bugs. Where do they live? What do they eat? But scientists can't be everywhere. Ordinary people help them. They live in different places. These people are citizen scientists. Citizen scientists make observations. They look for patterns. Their observations are data. An organization called Bugs in Our Backyard collects their data. Scientists use the data to answer questions about bugs. You can collect data about bugs, too. Learn about common bugs in your area. Search for bugs, and record what you see. Share what you find with others.

Wrap It Up!

1. What data about bugs do citizen scientists record?
2. What are your data like? Where did you find bugs? How many?

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Students practice real science and record data in their Science Notebooks through Citizen Science projects.

Variety of Lessons Support 3-Dimensional Instruction

Each unit introduces the 3-Dimensions of the CA NGSS from different perspectives through a variety of lesson types.

Stories in Science

A Wild Life: Jane Goodall

Jane Goodall grew up loving animals. She followed her dream to go to Africa. There, Jane lived with chimpanzees. She observed and found out that chimpanzees use tools to get food. Jane was the first to learn many things about chimpanzees.

Wrap It Up!

Why do you think living with chimpanzees helped Jane learn?

Stories in Science

Lessons from the Swamp

"Some frogs developed both male and female organs." — DR. TERRY HIGGS, MICHIGAN STATE UNIVERSITY

As a child, Dr. Terry Higgs would wade through the swamps of South Carolina, catching amphibians. What did he know then that he knows now? He knows that all his experiences with frogs would lead him to a discovery: some frogs have both male and female sex organs. This is called hermaphroditism. It can affect the health of a population.

Wrap It Up!

1. Explain what hermaphroditism is and how it affects frog populations.

Disciplinary Core Ideas (DCI) and **Crosscutting Concepts (CCC)** are supported in *Stories in Science* lessons which feature scientists from all backgrounds (culture, gender, ability) along with their scientific contributions and discoveries.

Investigate

Vibration

How can you use sound to make an object vibrate? You have learned that sound can make objects vibrate. You can observe how the sound of your voice makes a balloon vibrate.

Materials

- inflated balloons
- paper towel tube

1. Work with a partner. Hold the balloon gently with your fingertips.

2. While your partner talks quietly into one end of the tube, hold the balloon very close to the other end.

3. Observe what you hear. Observe what you feel through the balloon. Record what you hear and feel.

4. Switch places and repeat while your partner observes and records.

Wrap It Up!

1. What did you feel when you held the balloon?

2. What was the cause of the vibrations in the balloon?

STEM PROJECT

Design a Drum

Vibrating materials can make a sound. You can make materials vibrate. A key to making sounds is to make a drum. The drum is a flat surface. You strike the drum. Objects on a plastic surface jump.

The Challenge

Design and build a model of a toy drum. The sound must make plastic wrap vibrate. Two different objects on the plastic wrap must jump.

1. Define the problem.

2. Design a solution.

3. Test your solution.

4. Define or change your solution.

Science and Engineering Practices (SEP) are applied in hands-on *Investigate* activities where students explore aspects of specific **DCI's**.

DCI's and **SEP's** are supported with *STEM Projects* that engage students in defining real world problems and developing and refining solutions.

Think Like an Engineer

Design, Test, and Refine a Device

You've read how TK Cultane applied scientific ideas to design his biodigesters. As he made and refined his design, he recognized the lack of resources in the area. He decided to design a device that would be used. Now it's your turn. Imagine that you are working to find an energy solution for people living in remote mountain communities without access to electricity. The current solution of using wood fires to cook food is not sustainable. Wood fires use up forest resources and produce harmful smoke in people's homes.

1. Define the problem.

2. Find a solution.

Think Like a Scientist

Analyze and Interpret Data

Great Rift Valley: The Great Rift Valley is a trench that runs for approximately 6,000 kilometers (about 3,700 miles) through southern Africa.

Japan: Japan is made up of a chain of hundreds of islands.

San Andreas Fault: The San Andreas Fault is a major fault line in California that runs for about 1,200 kilometers (about 750 miles).

Wrap It Up!

1. Compare the locations of the Great Rift Valley, Japan, and the San Andreas Fault. How are they similar? How are they different?

Performance Expectation activities are presented in *Think Like a Scientist* and *Think Like an Engineer* lessons that engage students in applying all 3 Dimensions in one hands-on **performance task**.

Lesson Sequences Target Performance Expectations

Anchoring Phenomenon for the unit: These lessons focus on preparing students for the **Performance Expectation**. MindTap Digital Resources include videos and Virtual Labs.

Unit 1 Planning Guide

Forces and Interactions

Building on Prior Learning

This unit builds upon what students learned about forces and motion in kindergarten. It takes their intuitive models of forces and extends them to incorporate multiple forces as well as forces that act at a distance. Students also learn to use diagrams to model forces and motion.

Selecting an Anchoring Phenomenon

The lessons and activities in this unit lend themselves naturally to the anchoring phenomenon, "Sports and playground activities all involve a variety of forces (pushes and pulls)." However, you may choose to focus instruction on another phenomenon that is relevant to your students' lives, cultures, and experiences.

Advance Planning

The investigations and engineering activities in this unit all use inexpensive and readily available materials. You may want to plan ahead to make sure you have a variety of bar magnets, which students will use in several activities.

Assessment Resources

The following assessment tools are available for this unit.

Lesson Sequence	Student Edition pp. 22-35	Pacing: 13 days
PERFORMANCE EXPECTATION		
3-PS2-1 Plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces on the motion of an object.		
Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Developing and Using Models: Planning and Carrying out Investigations	PS2.A Forces and Motion. Each force acts on one particular object and has both strength and a direction. An object at rest typically has multiple forces acting on it, but they add to give zero net force on the object. Forces that do not sum to zero can cause changes in the object's speed or direction of motion.	Cause and Effect: Connections to Engineering, Technology, and Application of Science: Interdependence of Science, Engineering, and Technology: Influence of Engineering, Technology, and Science on Society and the Natural World
OVERVIEW		
In the lessons in this sequence, students refresh their knowledge of forces as pushes and pulls and then explore cause and effect relationships involving balanced and unbalanced forces. In <i>Think Like an Engineer</i> , they apply concepts of forces to the design and building of bridges. And finally, in the <i>Think Like a Scientist</i> they plan and conduct an investigation of balanced and unbalanced forces.		
	Student Pages	Teacher Pages
Pushes and Pulls	22-23	23a-23d
Balanced Forces		
Unbalanced Forces		
Think Like an Engineer: Bridges		
Changing Direct		
Think Like a Scientist: Conduct an Investigation		

Self-Assessment

Students can use their Science Notebooks along with the rubrics in the *Science Notebook Companion* for reflection and self-assessment throughout the unit.

Formative Assessment

- Unit Pre-Assessment (Assessment Handbook, pp. 3-5)
- Formative Assessment Checkpoints (Assessment Handbook, pp. 6-8)
- Rubrics for all Investigates, STEM Projects, Think Like a Scientist lessons, and Think Like an Engineer Lessons (Assessment Handbook, pp. 52-65)
- MindTap Virtual Lab: Marble Collisions. This self-contained learning module includes multiple-choice and open-ended assessment questions.

Summative Assessment

- Unit Test (Assessment Handbook, pp. 9-12)
- Unit Performance Task (Assessment Handbook, pp. 13-14)

21a Physical Science | Unit 1

Assessment overview for the unit

21c Physical Science | Unit 1

Every lesson builds towards a specific **Performance Expectation**

MINDTAP
From Cengage

MindTap Digital Lesson Enhancements

DCI's and SEP's come to life even more in the MindTap interactive lessons, Virtual Labs, and Explorer videos. Students experience the 3-Dimensions digitally to further prepare them for mastering the **Performance Expectations**.

Interactive Digital Lessons

Virtual Labs

Assessments in a Variety of Formats

Exploring Science California provides teachers with a variety of self-assessments, formative assessments, and summative assessments to support instruction and to assess student progress.



Student Self-Assessment

Keeping a Science Notebook

I use a science notebook. I ask questions. I record observations and data. I look for patterns. I explain what I learn. You can keep a science notebook, too. Here are some ways to use your notebook.

- Make drawings of new science words and main ideas.
- Label drawings. Write to explain ideas.
- Collect photos, news stories, and other objects.
- Use tables, charts, or graphs to record explanations.
- Record reasons for explanations and conclusions.
- Write about what scientists and engineers do.
- Ask new questions.

Look at the notebook examples for some ideas. Now set up your science notebook!

Use lists and pictures to show what you learned.

Use drawings to show and tell what you observe in nature.

Write or draw observations in tables or charts.

Science Notebooks help students monitor their own learning and reflect on their thinking and understanding of key concepts and practices.

Investigate

Speed

How is the speed of an object related to its energy?

Student Rubric

Place a check in the box to show the answer that is true for you.

Rubric	Yes	Not Yet
1. I can explain the relationship between speed and energy of an object.		
2. I can identify and describe the relevant evidence to support my explanation.		
3. I can use reasoning to connect the evidence to support my explanation.		
4. I can use observations (such as amount of sound produced, change in motion, or distance traveled) to estimate the energy of a moving object.		

My Comments

Student Rubrics for each type of hands-on lesson are available in the Science Notebook Companion. Students monitor their progress and record comments and questions in their notebooks.

Formative Assessment

Formative assessment is available in the student book *Wrap It Up!* questions for each lesson and in the Assessment Handbook. The Assessment Handbook includes:

Unit 1 Pre-Assessment

Directions: Read each question. Then choose the best answer.

- Janice has three houseplants. Which one got the things it needs to grow?
 - A
 - B
 - C
- What do plants need to live and grow? Choose all that are correct.
 - A shade
 - B light
 - C water
- Which of these does a seed need to grow into a healthy plant?
 - A to be near its parent plant
 - B pollen
 - C space to grow
- Where do most plants get the water they need to grow?
 - A rain
 - B leaves
 - C other plants
- What does the sun provide that plants need?
 - A water
 - B heat
 - C light

Unit Pre-Assessments help assess student prior knowledge of the **DCI's** for the unit.

Unit 4 Opening Activity

What are properties of matter?

Directions: Matter is all around us. All matter has properties. A property is what something is like. What do you know about properties of matter? Read the bold word below. **Property**. For each letter of the word, write a statement about the topic.

PROPERTY

P _____

R _____

O _____

P _____

E _____

T _____

Y _____

Directions: Review what you wrote. Put a check mark ✓ next to the sentences you are most sure about. Put an X next to the sentences you are least sure about. Next, you will learn more about the properties of matter. Then you will have a chance to revise what you wrote based on what you've learned and how your thinking has changed.

Unit Opening Activities provide additional insight into student thinking about **DCI's** and their readiness to apply one or more of the **SEP's** targeted in the unit.

Unit 4 Checkpoint Quiz 2

Directions: Read each question. Then choose the best answer.

- Compare a table, a fence, and a ladder. How are they alike?
 - A They are all small pieces that are used to make new objects.
 - B They are all made of one piece.
 - C They can be built from many pieces of wood.
- Which of these could be taken apart and made into something new?
 - A
 - B
 - C
- Which change can be reversed?
 - A Water turns to ice.
 - B A cake bakes.
 - C Wood burns.
- Greg cracks an egg into a pan. He puts the pan on a hot stove. What change will he observe after a few minutes?
 - A The egg will melt into a liquid.
 - B The egg will cook and become a solid.
 - C The egg will freeze into a solid.
- Look at the shapes below. Use the shapes to draw two different objects. Each object should have the same number of pieces in it. Label each drawing.
 -
 -
 -

Quizzes provide a formative check of students' learning at the end of each lesson sequence.

Summative Assessment

The Assessment Handbook provides multiple summative assessment components to measure student progress and mastery of the 3-Dimensions.

Unit 1 Performance Task

Animals Help Plants

Part 2: Draw Seeds Moving

Directions: Look at the drawings in Part 1 that show plant parts that have seeds. Think about the way seeds travel away from a parent plant, such as a tree or shrub. Draw a picture that shows a seed being moved by wind or by an animal. Include as many details in your drawing as you'd like.

Tell what your drawing shows.

My drawing shows _____

Unit Performance Tasks use a variety of formats that require students to demonstrate at least two of the three Dimensions associated with particular **Performance Expectations**.

Think Like a Scientist

Plan and Investigate

Teacher Rubric

Use the scale descriptions to guide your assessment of the student's work. Assess each item separately, and then decide on an overall score, using the following scale:

Rubric	3	2	1	0
1. The student made predictions about an object's properties based on prior experiences and knowledge.				
2. The student planned and conducted an investigation to produce data that could serve as the basis for evidence to answer questions about classifying objects according to their properties.				
3. The student evaluated different ways of observing objects to determine how to classify them.				
4. The student used observations to collect data that could be used to correctly classify a variety of objects.				

Overall Score _____

Comments _____

Rubrics for all *Investigate* activities, *STEM Projects*, *Think Like a Scientist*, and *Think Like an Engineer* activities align with the CA NGSS.

Unit 2 Test

Directions: Read each question. Then choose the best answer.

- Hal is in a place with tall grasses. He does not see many trees. What habitat is he likely in?
 - A the coast
 - B a wetland
 - C a grassland
- Look at the pictures. What animals live in the grasslands of Africa? Choose all that are correct.
 - A
 - B
 - C
- Look at the pictures. What animals live in a pond? Choose all that are correct.
 - A
 - B
 - C
- Which live at the sandy coast? Choose all that are correct.
 - A crab
 - B camel
 - C sea grass

Unit Tests use a combination of constructed response and selected response items to assess student mastery of the targeted **Performance Expectation**.



MindTap Digital Gradebook

The MindTap Gradebook and its analytics tools allow teachers to track and analyze an individual student's progress and view the class grades for each activity. Teachers can view assignment details such as the distribution of answers by item, view the scores and answers for each individual student, and categorize assignments for different assessments.

Assignments Gradebook

	Start	Due	Select
Cover	--	--	<input type="checkbox"/>
Program Consultants	--	--	<input type="checkbox"/>
National Geographic Explorers in Exploring Science	--	--	<input type="checkbox"/>
California Evaluation Criteria for Science	--	--	<input type="checkbox"/>
Nature of Science Planning Guide			
Lesson 1: What Is Science?	--	--	<input type="checkbox"/>
Lesson 2: How Do Scientists Work?	--	--	<input type="checkbox"/>
Lesson 3: Who Are Scientists?	--	--	<input type="checkbox"/>
INVESTIGATE 1: Practice Science	--	--	<input type="checkbox"/>
Unit 1 Physical Science Planning Guide			
Lesson 1: Batter Up!	09/27/18	--	<input type="button" value="Edit"/> <input type="button" value="Unassign"/>
INVESTIGATE 1: Speed	--	--	<input type="button" value="Edit"/> <input type="button" value="Unassign"/>
Lesson 2: Hit the Ball	--	--	<input type="button" value="Edit"/> <input type="button" value="Unassign"/>
INVESTIGATE 2: Collisions	--	--	<input type="button" value="Edit"/> <input type="button" value="Unassign"/>
Lesson 3: Sounds of the Game	--	--	<input type="button" value="Edit"/> <input type="button" value="Unassign"/>
INVESTIGATE 3: Sound	--	--	<input type="button" value="Edit"/> <input type="button" value="Unassign"/>
Lesson 4: The Sun's Light	--	--	<input type="button" value="Edit"/> <input type="button" value="Unassign"/>

Integrated Literacy

ENGLISH LEARNERS

ELD.1.1 Speaking actively to speak English in a range of social and academic contexts.

Emerging Before reading, ask yes/no questions, such as: Do all plants look alike? (No.) Is it possible that the same types of plants could look different? (Yes.)

Expanding After the first reading, provide sentence frames such as: Flowers on _____ (zinnia) plants grow in different _____ (colors) and _____ (sizes).

Bridging Ask more detailed questions, such as: How else could zinnia plants be different? (They could have different numbers of petals.) What do you know about the shapes of zinnia plant leaves? (They all have the same shape.)

ENGLISH LEARNERS

ELD.1.1 Speaking actively to speak English in a range of social and academic contexts.

Emerging After the first reading, read aloud the questions. Ask: What can cause weather? (The interaction of tiny particles and the rotation of Earth on its axis.) Say: We are going to study many different things in this section.

Expanding After the first reading, provide the following sentence frame for students: Energy _____ is a fundamental _____ of Earth's climate system. Ask: How can you figure out the answers to the questions? (Reading through the section.)

Bridging Have students reread each Let's Explore section and summarize it for a partner. Have the partner add relevant missing information to the summary.

Literacy Through Science

Write Opinion Pieces

W.1.1 Use a combination of drawing, dictating, and writing to compose opinion pieces in which they tell a reader the topic or the name of the book they are writing about and state an opinion or preference about the topic or book (e.g., My favorite book is _____).

Present the book *Summer is the Best!*, a persuasive writing mentor text. Discuss what an opinion is, sharing examples. Point to the title of the book, reading it aloud. Explain that the title gives an opinion. Connect with students' background knowledge by reviewing the types of weather you've already studied: sunny, cloudy, and windy weather. Share that summer is a season that can have different kinds of weather. Have students

3 Draft your report.
Your report will be in the form of a booklet, poster, or computer slide presentation. In your report, summarize the main ideas. The information you present should be in your own words. Your report should include the following for each product:

- the name and picture of the product
- an explanation of how the product works or what it does
- a description of who can use the product and the advantages and disadvantages of it
- a description of how the product affects the environment
- two interesting facts about the product

Review and revise the draft of your report to make it the best it can be. Do more research to add additional information as needed. Make the final draft of your booklet, poster, or computer slide presentation.

4 Present your report.
Work with your partner to decide who will give each part of the presentation. Decide how you will display visual information. Practice giving your part of the report aloud. Your oral presentation should express main ideas that are supported by significant details. Ask your partner to give you feedback you can use to make your part of the presentation better. With your partner, present your report to the class. Put information in a logical order. Use descriptions, facts, and details to describe the wind and solar products. Remember to give two additional interesting facts about each product. Listen as your classmates present their reports. How many different wind and solar energy products did your classmates identify and report on?

ELD Support

The Teacher's Editions include support for the three CA levels of instruction: Emerging, Expanding, and Bridging. These strategies aid all students in improving academic vocabulary and their understanding of science content.

Writing for Science

Writing is incorporated throughout *Exploring Science California* as students interact with their Science Notebooks for each lesson. Grades K-2 use *Write About Science* Big Books for writing practice.

STEM Research Projects for grades K-6 include report writing and shared media such as posters, booklets, or slide presentations.

LITERACY CONNECTION

Use Key Details

RI.1.1 Ask and answer questions meaning words and phrases in the text. Guide students to ask and help them clarify the or phrases in the text. **EXPLAIN** section, when animals use mouth parts examples that apply to. Encourage students to *crash, grind, and dig* it answer. For example: A digs into tree bark.

ACADEMIC VOCABULARY

Observe

After students read the lesson, ask a volunteer to find the words explore and explorer. Say: You have read the word "observe" in many of your earlier lessons as you "observed" sounds and vibrations. In this lesson, you were asked to "think like a scientist," which means that you "observed" what happened as you tested each material in the investigation. Ask: Is the word "observe" a noun or a verb? (a verb) Ask: How would you define the word observe? (Possible answer: Watch or notice something while you are studying it.) Ask: Is the word "observation" a noun or a verb? (a noun) Ask: How would you define the word observation? (Possible answer: It is the process of watching something closely while studying it.)

LITERACY CONNECTION

Determine Word Meaning

RI.1.4 Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a grade 5 topic or subject area.

The caption on the second page of the lesson begins with the following sentence: "Maglev trains do not have wheels that roll on rails." However, the term *maglev* is undefined and may perplex students. Have students continue to read the caption, searching for clues to the meaning of *maglev*, which is provided in the next sentence. Students should discover that the term derives from the amalgamation of the first syllables of the words *magnetism* and *levitate*.

Literacy Support for Teachers

The Teacher's Editions provide additional Literacy Connection and Academic Vocabulary supports throughout the unit.

Exploring Science Through Literacy

Exploring Science Through Literacy is an optional library of leveled readers that enriches the science curriculum by providing access for all students to a wide variety of informational texts.

- » Support **Disciplinary Core Ideas**
- » Differentiate content for three reading levels
- » Extend the National Geographic experience

Optional sets of readers for each grade present the same content and vocabulary at three reading levels. This allows students of all abilities to equally access **Disciplinary Core Idea** concepts and vocabulary.

Grade 3 example, from the title *Hidden Discoveries*

Below-Level

Grade 3 530L

ISBN-13: 978-1-3378-7376-1

9 781337 873761

888-915-3276 NGL.Cengage.com/school

On-Level

Grade 3 650L

ISBN-13: 978-1-3378-7380-2

9 781337 873802

888-915-3276 NGL.Cengage.com/school

Above-Level

Grade 3 790L

ISBN-13: 978-1-3378-7376-5

9 781337 873765

888-915-3276 NGL.Cengage.com/school

The content and vocabulary is the same for each leveled reader, but the text complexity and length varies.

Text to speech audio support

On-screen definitions



MindTap Digital Literacy Support

The MindTap digital platform includes pop-up definitions for vocabulary words as well as a built-in text reader for extra audio support. Students can also highlight key content and take notes digitally.

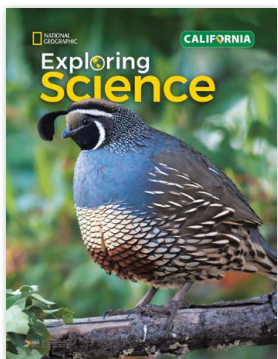
Grade, level, and Lexile® are indicated on the back of each book

Balanced Instruction to Meet the Needs of Your Classroom

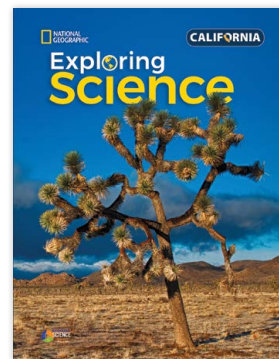
Exploring Science California is smartly designed to fit the needs of any school or classroom with flexible components and a broad range of content lessons, hands-on investigations, and literacy options.

Flexible Print and Digital Paths

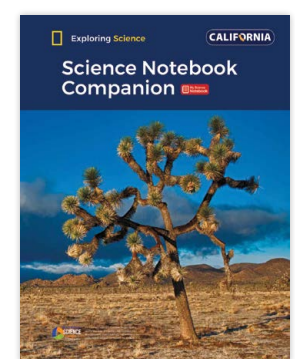
Print



Big Books for Kindergarten



Hard cover student books for Grades 1-6

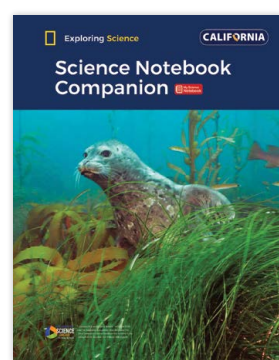


Science Notebook Companion

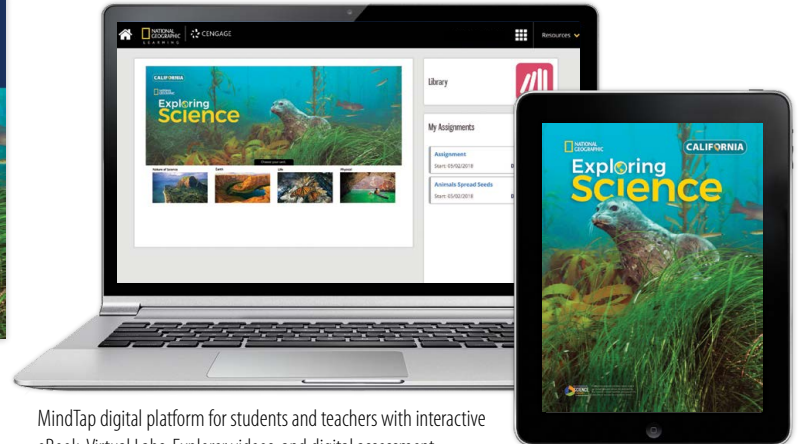
Print and Digital



Hard cover student books for Grades 1-6 (Big Books for Kindergarten)

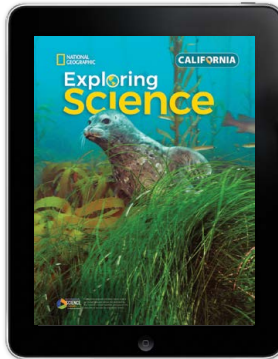


Science Notebook Companion

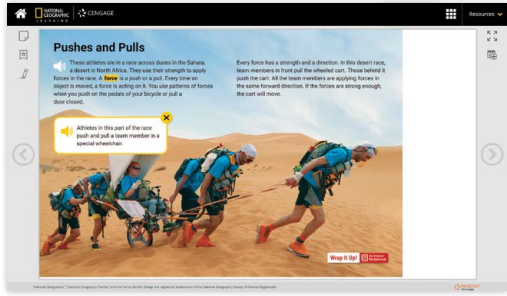


MindTap digital platform for students and teachers with interactive eBook, Virtual Labs, Explorer videos, and digital assessment

Digital Path



MindTap digital platform for students and teachers with interactive eBook, Virtual Labs, Explorer videos, and digital assessment



Integrated Hands-on Activities Balanced with Content

National Geographic-quality lessons targeting the **Disciplinary Core Idea** content are supported by a variety of hands-on investigations and activities.

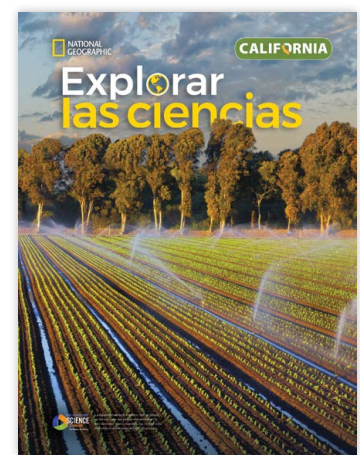
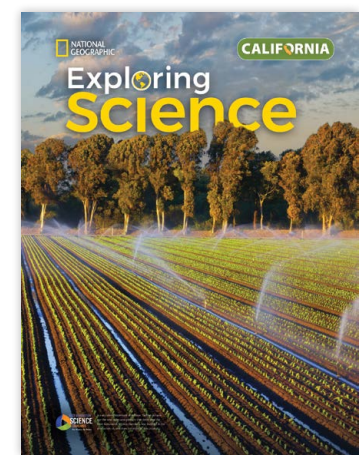


Investigation Kits Available

Available in Print, Digital, and Spanish

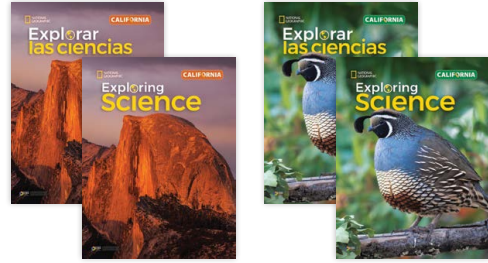
100% English and Spanish

All student resources and assessments are available in English and Spanish.



Core Components for Students

Kindergarten Big Books



Earth, Life, Physical, Let's Do Science

Hard Cover Student Books



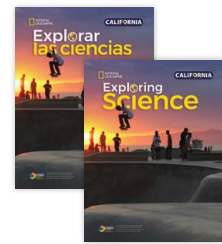
Grade 1



Grade 2



Grade 3



Grade 4



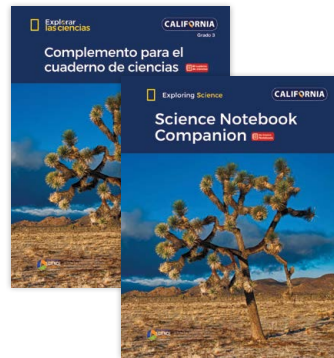
Grade 5



Grade 6

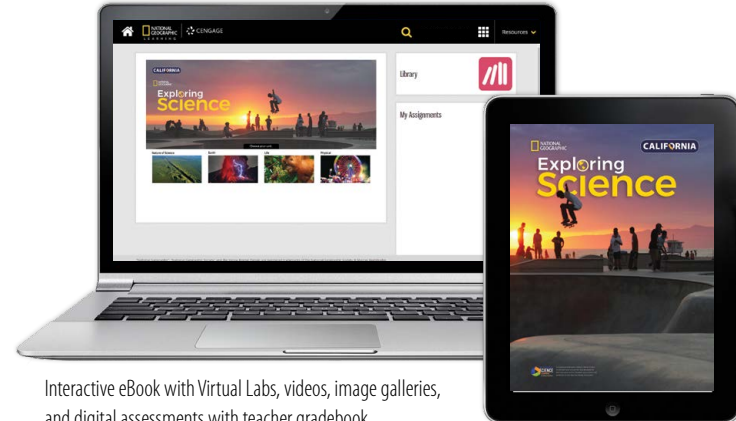
Available in Print, Digital, and Spanish

Science Notebook Companion



Includes black line master data tables and student rubrics

MindTap Digital



Interactive eBook with Virtual Labs, videos, image galleries, and digital assessments with teacher gradebook

Additional Components

Investigation Kits



Investigation Kits are available for each grade which include all materials needed to conduct each *Investigate* activity, *STEM Project*, *Think Like a Scientist*, *Think Like an Engineer*, and *Science in a Snap* lesson.

Exploring Science Through Literacy



Leveled science readers provide additional opportunities to extend access to science informational texts

Core Components for Teachers

Teacher's Editions



Kindergarten



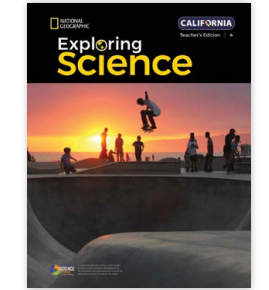
Grade 1



Grade 2



Grade 3



Grade 4



Grade 5



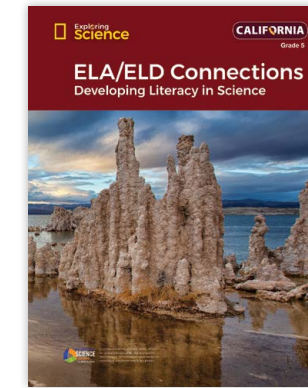
Grade 6

Assessment Handbook



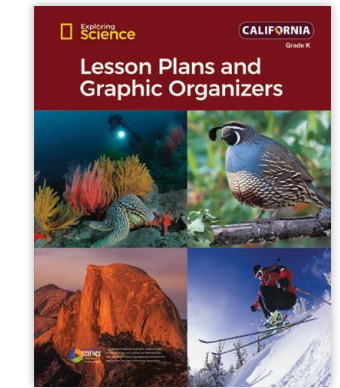
Includes Quizzes, Unit Pre-Assessments, Opening Activities, **Performance Tasks**, and Tests, as well as Teacher Rubrics for each type of hands-on lesson

ELA/ELD Connections



Includes scaffolded activities and more activities to develop literacy in science

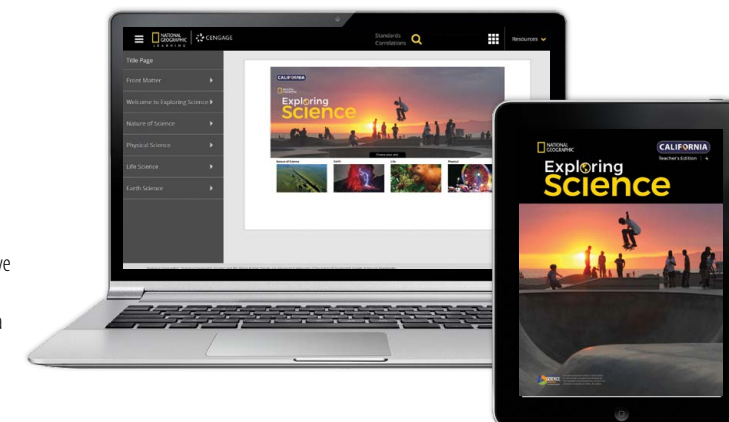
Lesson Plans and Graphic Organizers



Includes an overview of each lesson and graphic organizer masters

MindTap Digital

Includes access to all student content and an interactive Teacher's Edition. It also includes the ability to create assignments, a robust gradebook with analytics, and a CA NGSS correlation tool.





Exploring Science

- » Authentic National Geographic experience with Explorers doing real science right now
- » Science Notebooks to practice real science
- » Variety of lessons support 3-Dimensional instruction
- » Integrated literacy combines science content and literacy skills development
- » Balanced instruction to meet the needs of your classroom

YOUR CALIFORNIA TEAM GRADES K–6

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