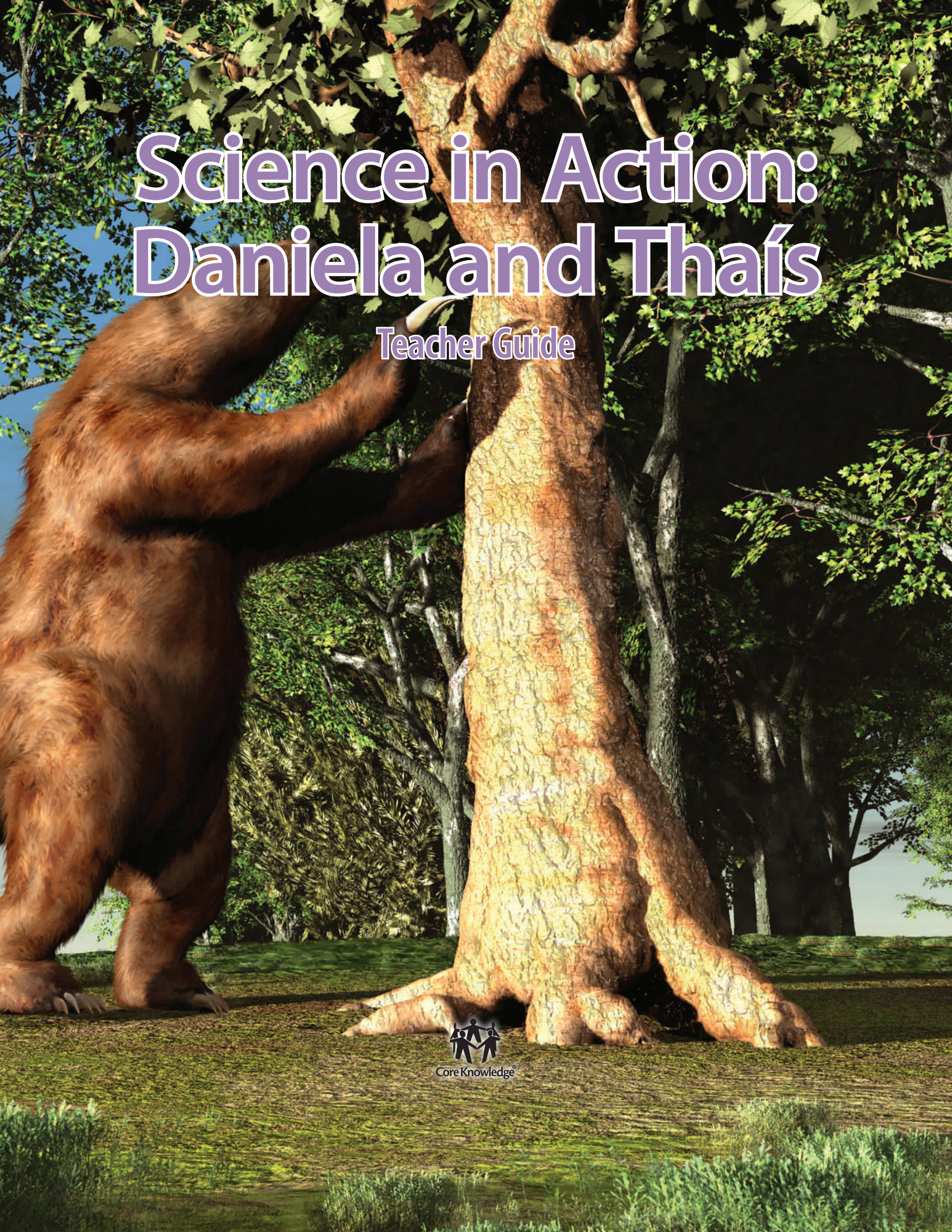
Core Knowledge® SCIENCE

Mary Anning

Science in Action: Daniela and Thaís

Teacher Guide



Science in Action: Daniela and Thaís

Teacher Guide

Core Knowledge®

Creative Commons Licensing

This work is licensed under a
Creative Commons Attribution-NonCommercial-ShareAlike
4.0 International License.

You are free:

to Share—to copy, distribute, and transmit the work
to Remix—to adapt the work

Under the following conditions:

Attribution—You must attribute the work in the following manner:

This work is based on an original work of the Core Knowledge® Foundation (www.coreknowledge.org) made available through licensing under a Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License. This does not in any way imply that the Core Knowledge Foundation endorses this work.

Noncommercial—You may not use this work for commercial purposes.

Share Alike—If you alter, transform, or build upon this work, you may distribute the resulting work only under the same or similar license to this one.

With the understanding that:

For any reuse or distribution, you must make clear to others the license terms of this work. The best way to do this is with a link to this web page:

https://creativecommons.org/licenses/by-nc-sa/4.0/

Copyright © 2025 Core Knowledge Foundation
www.coreknowledge.org

All Rights Reserved.

Core Knowledge®, Core Knowledge Curriculum Series™, Core Knowledge Science™, and CKSci™ are trademarks of the Core Knowledge Foundation.

Trademarks and trade names are shown in this book strictly for illustrative and educational purposes and are the property of their respective owners. References herein should not be regarded as affecting the validity of said trademarks and trade names.

ISBN: 979-8-88970-559-8

Science in Action: Daniela and Thaís

Table of Contents

Science in Action: Daniela and Thaís

Science in Action Teacher Guide

Core Knowledge Science™ Grade 1

GRADE 1

Introduction

About Science in Action

The goal of teaching students science from kindergarten through high school graduation is not to turn every student into a scientist by profession. However, scientific advances occur at a faster rate year after year, and this leads to a job market and society that needs people comfortable with science as part of their daily work lives. And while students traditionally receive an education in science, they may not be familiar with how learning about science leads to a career in the sciences. Students may have an imperfect understanding of how science will impact their future and future career. Students may be undecided about their futures and have no background or understanding about how science could inform their career as adults.

While STEM is now taught as a portion of classes in many grades, there are very few schools with dedicated engineering classes. Many industries have a focus on engineering, which can change rapidly as a result of the faster evolution of technology. As a result, many students receive little exposure to this vital aspect of their future careers. Students are asked to learn about engineering and adapt to new engineering skills in a short time frame without developing the depth and breadth of how to put science in action.

With this in mind, Core Knowledge has developed the Science in Action readers. Each reader features two or more chapters. Students learn first about the early childhood of the subject and how their interest in the sciences and engineering was piqued. The second part features the subject in the present day and explores their academic and engineering experiences in college, their work experiences as they relate to their scientific and engineering experiences, and in some cases their careers post-college. Each account ends with an "Inspired by . . ." section that features one or more scientists or engineers who provided inspiration in their path. The goal is to help young students connect their own experiences at a younger age to their future endeavors and careers as part of the larger society outside the classroom.

Core Knowledge Foundation is committed to educating students in many disciplines. *Science in Action* is intended to show that a person, no matter what age, encounters science and engineering in their everyday experiences. Further, the program intends to help students connect their personal lives with the broader needs and interests of society so when they get to high school and beyond in their academic careers, they will be more familiar with the paths they follow.

Standards

Core Knowledge Science offers units that comprehensively address all of the Next Generation Science Standards (NGSS) in a three-dimensional approach that integrates Disciplinary Core Ideas (DCIs), Science and Engineering Practices (SEPs), and Crosscutting Concepts (CCCs). The program clusters the

NGSS Performance Expectations into physical science, life science, and Earth and space science units. Stemming from the commitment that background knowledge is essential, the units build around Student Books, which largely center on all of the NGSS DCI concepts. However, the pure NGSS approach de-emphasizes reading, and the standards do not treat the Science and Engineering Practices or the Crosscutting Concepts as *content*, or discrete ideas to be taught and learned. This omission makes the SEPs and CCCs logical concepts for focus of direct student attention. Core Knowledge maintains that it is favorable and valuable for students to read or hear stories that are specifically about practices and overarching concepts.

The lessons in Grade 1 Core Knowledge Science in Action are constructed to cultivate student exposure to and understanding of the ideas present in the following NGSS dimensions. Lessons also cite relevant support of Common Core State Standards for English and Language Arts. Additional cross-curriculum standards relevant to specific lessons will be listed at the lesson level.

Nature of Science

NOS1. Scientific Investigations Use a Variety of Methods

- Science investigations begin with a question.
- Scientists use different ways to study the world.

NOS2. Scientific Knowledge Is Based on Empirical Evidence

- Scientists look for patterns and order when making observations about the world.

NOS3. Scientific Knowledge Is Open to Revision in Light of New Evidence

- Science knowledge can change when new information is found.

NOS4. Scientific Models, Laws, Mechanisms, and Theories Explain Natural Phenomena

- Scientists use drawings, sketches, and models as a way to communicate ideas.
- Scientists search for cause-and-effect relationships to explain natural events.

NOS5. Science Is a Way of Knowing

- Science knowledge helps us know about the world.

---

*NEXT GENERATION SCIENCE STANDARDS (NGSS) is a registered trademark of WestEd. Neither WestEd nor the lead states and partners that developed the Next Generation Science Standards were involved in the production of this product, and their endorsement is not implied.

The Common Core State Standards (CCSS) are the domain of the National Governors Association Center for Best Practices and the Council of Chief State School Officers. Neither entity was involved in the production of this product, and their endorsement is not implied.

Sources:

NGSS Lead States. 2013. *Next Generation Science Standards: For States, By States*. Washington, DC: The National Academies Press.

National Research Council. 2012. *A Framework for K–12 Science Education: Practices, Crosscutting Concepts, and Core Ideas*. Committee on a Conceptual Framework for New K–12 Science Education Standards. Board on Science Education, Division of Behavioral and Social Sciences and Education. Washington, DC: The National Academies Press.

National Governors Association Center for Best Practices, Council of Chief State School Officers. 2010. *Common Core State Standards for English Language Arts & Literacy in History/Social Studies, Science and Technical Subjects*. National Governors Association Center for Best Practices, Council of Chief State School Officers, Washington DC.

NOS6. Scientific Knowledge Assumes an Order and Consistency in Natural Systems

- Science assumes natural events happen today as they happened in the past.
- Many events are repeated.

NOS7. Science Is a Human Endeavor

- People have practiced science for a long time.
- Men and women of diverse backgrounds are scientists and engineers.

NOS8. Science Addresses Questions About the Natural and Material World

- Scientists study the natural and material world.

Science and Engineering Practices

SEP1. Asking Questions (for science) and Defining Problems (for engineering)

A practice of science is to ask and refine questions that lead to descriptions and explanations of how the natural and designed world(s) works and that can be empirically tested. Engineering questions clarify problems to determine criteria for successful solutions and identify constraints to solve problems about the designed world. Both scientists and engineers also ask questions to clarify ideas. Asking questions and defining problems in K–2 builds on prior experiences and progresses to simple descriptive questions that can be tested.

- Ask questions based on observations to find more information about the natural and/or designed world(s).
- Ask and/or identify questions that can be answered by an investigation.
- Define a simple problem that can be solved through the development of a new or improved object or tool.

SEP2. Developing and Using Models

A practice of both science and engineering is to use and construct models as helpful tools for representing ideas and explanations. These tools include diagrams, drawings, physical replicas, mathematical representations, analogies, and computer simulations. Modeling tools are used to develop questions, predictions, and explanations; analyze and identify flaws in systems; and communicate ideas. Models are used to build and revise scientific explanations and proposed engineered systems. Measurements and observations are used to revise models and designs. Modeling in K–2 builds on prior experiences and progresses to include using and developing models (i.e., diagram, drawing, physical replica, diorama, dramatization, or storyboard) that represent concrete events or design solutions.

- Distinguish between a model and the actual object, process, and/or events the model represents.
- Compare models to identify common features and differences. Develop and/or use a model to represent amounts, relationships, relative scales (bigger, smaller), and/or patterns in the natural and designed world(s).
- Develop a simple model based on evidence to represent a proposed object or tool.

SEP3. Planning and Carrying Out Investigations

Planning and carrying out investigations to answer questions or test solutions to problems in K–2 builds on prior experiences and progresses to simple investigations, based on fair tests, that provide data to support explanations or design solutions.

- With guidance, plan and conduct an investigation in collaboration with peers (for K).
- Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence to answer a question. Evaluate different ways of observing and/or measuring a phenomenon to determine which way can answer a question.
- Make observations (firsthand or from media) and/or measurements to collect data that can be used to make comparisons.
- Make observations (firsthand or from media) and/or measurements of a proposed object or tool or solution to determine if it solves a problem or meets a goal.
- Make predictions based on prior experiences.

SEP4. Analyzing and Interpreting Data

Scientific investigations produce data that must be analyzed in order to derive meaning. Because data patterns and trends are not always obvious, scientists use a range of tools—including tabulation, graphical interpretation, visualization, and statistical analysis—to identify the significant features and patterns in the data. Scientists identify sources of error in the investigations and calculate the degree of certainty in the results. Modern technology makes the collection of large data sets much easier, providing secondary sources for analysis. Engineering investigations include analysis of data collected in the tests of designs. This allows comparison of different solutions and determines how well each meets specific design criteria—that is, which design best solves the problem within given constraints. Like scientists, engineers require a range of tools to identify patterns within data and interpret the results. Advances in science make analysis of proposed solutions more efficient and effective. Analyzing data in K–2 builds on prior experiences and progresses to collecting, recording, and sharing observations.

- Record information (observations, thoughts, and ideas).
- Use and share pictures, drawings, and/or writings of observations.
- Use observations (firsthand or from media) to describe patterns and/or relationships in the natural and designed world(s) in order to answer scientific questions and solve problems.
- Compare predictions (based on prior experiences) to what occurred (observable events).
- Analyze data from tests of an object or tool to determine if it works as intended.

SEP5. Using Mathematics and Computational Thinking

In both science and engineering, mathematics and computation are fundamental tools for representing physical variables and their relationships. They are used for a range of tasks, such as constructing simulations; solving equations exactly or approximately; and recognizing, expressing, and applying quantitative relationships. Mathematical and computational approaches enable scientists and engineers to predict the behavior of systems and test the validity of such predictions. Mathematical and computational thinking in K–2 builds on prior experience

and progresses to recognizing that mathematics can be used to describe the natural and designed world(s).

- Decide when to use qualitative vs. quantitative data.
- Use counting and numbers to identify and describe patterns in the natural and designed world(s).
- Describe, measure, and/or compare quantitative attributes of different objects and display the data using simple graphs.
- Use quantitative data to compare two alternative solutions to a problem.

SEP6. Constructing Explanations (for science) and Designing Solutions (for engineering)

The end products of science are explanations, and the end products of engineering are solutions. The goal of science is the construction of theories that provide explanatory accounts of the world. A theory becomes accepted when it has multiple lines of empirical evidence and greater explanatory power of phenomena than previous theories. The goal of engineering design is to find a systematic solution to problems that is based on scientific knowledge and models of the material world. Each proposed solution results from a process of balancing competing criteria of desired functions, technical feasibility, cost, safety, aesthetics, and compliance with legal requirements. The optimal choice depends on how well the proposed solutions meet criteria and constraints. Constructing explanations and designing solutions in K–2 builds on prior experiences and progresses to the use of evidence and ideas in constructing evidence-based accounts of natural phenomena and designing solutions.

- Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena.
- Use tools and/or materials to design and/or build a device that solves a specific problem or a solution to a specific problem.
- Generate and/or compare multiple solutions to a problem.

SEP7. Engaging in Argument from Evidence

Argumentation is the process by which evidence-based conclusions and solutions are reached. In science and engineering, reasoning and argument based on evidence are essential to identifying the best explanation for a natural phenomenon or the best solution to a design problem. Scientists and engineers use argumentation to listen to, compare, and evaluate competing ideas and methods based on merits. Scientists and engineers engage in argumentation when investigating a phenomenon, testing a design solution, resolving questions about measurements, building data models, and using evidence to evaluate claims. Engaging in argument from evidence in K–2 builds on prior experiences and progresses to comparing ideas and representations about the natural and designed world(s).

- Identify arguments that are supported by evidence.
- Distinguish between explanations that account for all gathered evidence and those that do not.
- Analyze why some evidence is relevant to a scientific question and some is not.
- Distinguish between opinions and evidence in one's own explanations.
- Listen actively to arguments to indicate agreement or disagreement based on evidence and/or to retell the main points of the argument.
- Construct an argument with evidence to support a claim.
- Make a claim about the effectiveness of an object, tool, or solution that is supported by relevant evidence.

SEP8. Obtaining, Evaluating, and Communicating Information

Scientists and engineers must be able to communicate clearly and persuasively the ideas and methods they generate. Critiquing and communicating ideas individually and in groups is a critical professional activity. Communicating information and ideas can be done in multiple ways: using tables, diagrams, graphs, models, and equations as well as orally, in writing, and through extended discussions. Scientists and engineers employ multiple sources to obtain information that is used to evaluate the merit and validity of claims, methods, and designs. Obtaining, evaluating, and communicating information in K–2 builds on prior experiences and uses observations and texts to communicate new information.

- Read grade-appropriate texts and/or use media to obtain scientific and/or technical information to determine patterns in and/or evidence about the natural and designed world(s).
- Describe how specific images (e.g., a diagram showing how a machine works) support a scientific or engineering idea.
- Obtain information using various texts, text features (e.g., headings, tables of contents, glossaries, electronic menus, icons), and other media that will be useful in answering a scientific question and/or supporting a scientific claim.
- Communicate information or design ideas and/or solutions with others in oral and/or written forms using models, drawings, writing, or numbers that provide detail about scientific ideas, practices, and/or design ideas.

Crosscutting Concepts

CCC1. Patterns

In grades K–2, children recognize that patterns in the natural and human-designed world can be observed, used to describe phenomena, and used as evidence.

Patterns . . . are a pervasive aspect of all fields of science and engineering. When first exploring a new phenomenon, children will notice similarities and differences, leading to ideas for how they might be classified. The existence of patterns naturally suggests an underlying cause for the pattern. For example, observing snowflakes are all versions of six-side symmetrical shapes suggests something about how molecules pack together when water freezes; or, when repairing a device, a technician would look for a certain pattern of failures suggesting an underlying cause. Patterns are also helpful when interpreting data, which may supply valuable evidence in support of an explanation or a particular solution to a problem.

CCC2. Cause and Effect

In grades K–2, students learn that events have causes that generate observable patterns. They design simple tests to gather evidence to support or refute their own ideas about causes.

Cause and effect lies at the heart of science. Often, the objective of a scientific investigation is to find the cause that underlies a phenomenon, first identified by noticing a pattern. Later, the development of theories allows for predictions of new patterns, which then provides evidence in support of the theory. For example, Galileo's observation that a ball rolling down an incline gathers speed at a constant rate eventually led to Newton's Second Law of Motion, which in turn provided predictions about regular patterns of planetary motion, and a means to guide space probes to their destinations.

CCC3. Scale, Proportion, and Quantity

In grades K–2, students use relative scales (e.g., bigger and smaller; hotter and colder; faster and slower) to describe objects. They use standard units to measure length.

Scale, proportion, and quantity are essential considerations when deciding how to model a phenomenon. For example, when testing a scale model of a new airplane wing in a wind tunnel, it is essential to get the proportions right and measure accurately or the results will not be valid. When using a computer simulation of an ecosystem, it is important to use informed estimates of population sizes to make reasonably accurate predictions. Mathematics is essential in both science and engineering.

CCC4. Systems and System Models

In grades K–2, students understand objects and organisms can be described in terms of their parts, and systems in the natural and designed world(s) have parts that work together.

Systems and system models are used by scientists and engineers to investigate natural and designed systems. The purpose of an investigation might be to explore how the system functions or what may be going wrong. Sometimes investigations are too dangerous or expensive to try out without first experimenting with a model.

CCC5. Energy and Matter (flow in systems)

In grades K–2, students observe objects may break into smaller pieces, be put together into larger pieces, or change shapes.

Energy and matter are basic to any systems model, whether of a natural or a designed system. Systems are described in terms of matter and energy. Often, the focus of an investigation is to determine how energy or matter flows through the system, or in the case of engineering to modify the system, so a given energy input results in a more useful energy output.

CCC6. Structure and Function

In grades K–2, students observe the shape and stability of structures of natural and designed objects are related to their function(s).

Structure and function can be thought of as a special case of cause and effect. Whether the structures in question are living tissue or molecules in the atmosphere, understanding their structure is essential to making causal inferences. Engineers make such inferences when examining structures in nature as inspirations for designs to meet people's needs.

CCC7. Stability and Change (factors to always consider)

In grades K–2, students observe some things stay the same while other things change, and things may change slowly or rapidly.

Stability and change are ways of describing how a system functions. Whether studying ecosystems or engineered systems, the question is often to determine how the system is changing over time and which factors are causing the system to become unstable.

Engineering and Design

ED.A. Defining and Delimiting Engineering Problems

Defining and delimiting engineering problems involves stating the problem to be solved as clearly as possible in terms of criteria for success, and constraints or limits.

- Define: Identify situations that people want to change as problems that can be solved through engineering.

ED.B. Developing Possible Solutions

Designing solutions to engineering problems begins with generating a number of different possible solutions, then evaluating potential solutions to see which ones best meet the criteria and constraints of the problem.

- Develop solutions: Convey possible solutions through visual or physical representations.

ED.C. Optimizing Design Solutions

Optimizing the design solution involves a process in which solutions are systematically tested and refined and the final design is improved by trading off less important features for those that are more important.

- Optimize: Compare solutions, test them, and evaluate each.

Science, Technology, Society, and the Environment

STSE1. Interdependence of Science, Engineering, and Technology

- Science and engineering involve the use of tools to observe and measure things.

STSE2. The Influence of Engineering, Technology, and Science on Society and the Natural World

- Every human-made product is designed by applying some knowledge of the natural world and is built by using natural materials. Taking natural materials to make things impacts the environment.

Common Core State Standards for English and Language Arts

Reading Standards for Informational Text

Key Ideas and Details:

- **CCSS.ELA-LITERACY.RI.1.1:** Ask and answer questions about key details in a text.
- **CCSS.ELA-LITERACY.RI.1.2:** Identify the main topic and retell key details of a text.
- **CCSS.ELA-LITERACY.RI.1.3:** Describe the connection between two individuals, events, ideas, or pieces of information in a text.

Craft and Structure:

- **CCSS.ELA-LITERACY.RI.1.4:** Ask and answer questions to help determine or clarify the meaning of words and phrases in a text.
- **CCSS.ELA-LITERACY.RI.1.5:** Know and use various text features (e.g., headings, tables of contents, glossaries, electronic menus, icons) to locate key facts or information in a text.

- **CCSS.ELA-LITERACY.RI.1.6:** Distinguish between information provided by pictures or other illustrations and information provided by the words in a text.

Integration of Knowledge and Ideas:

- **CCSS.ELA-LITERACY.RI.1.7:** Use the illustrations and details in a text to describe its key ideas.
- **CCSS.ELA-LITERACY.RI.1.8:** Identify the reasons an author gives to support points in a text.
- **CCSS.ELA-LITERACY.RI.1.9:** Identify basic similarities in and differences between two texts on the same topic (e.g., in illustrations, descriptions, or procedures).

Range of Reading and Level of Text Complexity:

- **CCSS.ELA-LITERACY.RI.1.10:** With prompting and support, read informational texts appropriately complex for Grade 1.

What Teachers Need to Know

Supportive information on the content standards and the science they address is provided throughout the lessons at points of relevance:

Know the Standards: These sections, found later in this Teacher Guide, explain what to teach and why, with reference to NGSS and Core Knowledge expectations.

Know the Science: These sections provide supporting, adult-level background information or explanations related to specific examples or Disciplinary Core Ideas.

Students come to elementary classrooms across the country with a wide range of prior experiences. Some have grown up in cities away from nature. Others have grown up in the country, intimately involved in nature.

Some have had teachers and/or family members who have been reading aloud and sharing the wonderful world of animals and plants with them for several years, while others have not. Some have traveled to other cities, states, and countries, while others may know only their own family and neighborhood.

Draw out students. Give them the opportunity to express what they know about the natural world, about rocks, the stars, motion, giraffes, or matter. You can assess the prior knowledge students have about science, and since science deals with everything around a child, the wealth of their background in science should not be underestimated.

Features

Using the Student Book

The *Science in Action* Student Book includes four chapters, intended to be read aloud by the teacher as the students look at images on each page. The Student Book opens with stories of the source of inspiration for a scientist when they were young. The parts that follow the chapters introduce the scientist as an adult and the work they do as an adult in a science-based field. The final part discusses how they were inspired by scientists of the past.

The Student Book is spiral-bound to allow students to lay it flat when reading or following along.

Because students in Kindergarten–Grade 2 are just learning to read and are learning how to decode written words, the complexity and amount of text that these young students can actually read is quite limited.

While some advanced students may be able to read words on a given page of the Student Book, as a general rule, students should not be expected or asked to read aloud the text on the Student Book pages. The text in the Student Book is there so that teachers and parents can read it when sharing the Student Book with students.

The intent of the Grades K–2 CK Science in Action lessons is to build students' understanding and knowledge of science concepts, as well as of associated practices and skills, using a teacher Read Aloud, accompanied by example images and diagrams. Cognitive science research has clearly documented the fact that students' listening comprehension far surpasses their reading comprehension well into the late elementary and early middle school grades. Said another way, students are able to understand and grasp far more complex ideas and texts that they hear read aloud than they would ever be able to read or comprehend when they read to themselves. For a more thorough discussion of listening and reading comprehension and the underlying cognitive science research, teachers may want to refer to Appendix A of the Common Core State Standards for English Language Arts, noting in particular the Speaking and Listening section of the appendix.

Online Resources

Use this link to download the CKSci Online Resources for this unit, where the specific link to this appendix can be found:

www.coreknowledge.org/cksci-online-resources

Using the Teacher Guide

The *Science in Action* Teacher Guide is set up with lessons that parallel the chapters of the Student Book. Additionally, there are experiences that follow some of the lessons. Experiences are class-length labs that support the science content in the Student Book. Within the Teacher Guide is a list of the Nature of Science, SEPs, CCCs, and Literacy standards that students may encounter within the lessons and experiences.

Activity Pages

Activity Pages

AP 1–B.3

Black line reproducible masters for activity pages, as well as an answer key, are included in Teacher Resources on pages 75–81. The icon shown to the left appears throughout the Teacher Guide wherever activity pages (AP) are referenced.

Make sufficient copies for your students in advance of each lesson segment.

Online Resources

Online Resources

For each CKSci unit, the Teacher Guide includes references to online resources (including external websites and downloadable documents) to enhance classroom instruction. Look for the icon on the left.

Use this link to download the CKSci Online Resources for this unit:

www.coreknowledge.org/cksci-online-resources

Materials and Equipment

These lessons suggest a moderate variety of materials to support activities that enhance the Science in Action chapter readings. Prepare in advance by collecting the materials and equipment needed for all the demonstrations and hands-on investigations.

Internet access and the means to project images/videos for whole-class viewing are also required in many lessons but not repeated below.

Lesson 1

- reference books and other research materials
- images of animal teeth of carnivores, omnivores, and herbivores
- crayons or colored pencils

Lesson 2

- reference books and other research materials

Experience A

- reference books and other research materials
- puzzles (1 per group/pair)
- play sand
- modeling clay
- containers to hold sand and clay (2 per pair)
- small objects for excavation (2 per pair)
- coffee stirrers (2 per pair)
- toothbrushes (2 per pair)
- stuffed animals
- colored pencils or crayons

Lesson 3

- reference books and other research materials
- world map
- crayons or colored pencils

Lesson 4	Experience B
• reference books and other research materials • crayons or colored pencils	• reference books and other research materials • images of a variety of different animals

Pacing

The Core Knowledge *Science in Action* Student Book consists of four chapters, each ten pages long. This accompanying Teacher Guide contains one lesson of instructional support per chapter. Each lesson offers prompts for the teacher to use to facilitate class discussion. Many lessons offer brief hands-on activities, teacher demonstrations, or online enhancements in addition to the reading support. All lessons include an activity page reproducible master.

The Science in Action lessons, requiring 30–45 minutes each, can be implemented in sequence, as a stand-alone unit across six consecutive class sessions. The unit can also serve as the basis of an enrichment program. Or teachers may elect to use the lessons in tandem with other physical, life, and Earth/space science content units. To assist with the latter approach, the following table provides a key suggesting the science domain most prominently emphasized in each Science in Action chapter to help pair the chapters meaningfully with other units.

Science in Action Chapter/ Experience	Has content that ties to …	Core Knowledge Grade 1 Units
1. Daniela's Dinosaur Dreams	Life science, STEM	• Plant and Animal Survival • Science for Everyone
2. Daniela Barrera Guevara: Studying Dinosaurs	Life science, STEM	• Plant and Animal Survival • Science for Everyone
Experience A: Exploring Like a Paleontologist	Life science, habitats	• Plant and Animal Survival • Science for Everyone
3. Thaís's Teacher-to-Scientist Dream	Life science, STEM	• Plant and Animal Survival • Science for Everyone
4. Thaís Rabito Pansani: Saving Earth	Life science, STEM	• Plant and Animal Survival • Science for Everyone
Experience B: Acting Like a Paleontologist	Life science, STEM	• Plant and Animal Survival • Science for Everyone

Online Resources

Also, see the Online Resources Guide for recommendations about when to best enhance instruction to support these chapters.

www.coreknowledge.org/cksci-online-resources

LESSON 1

Daniela's Dinosaur Dreams

At a Glance

Learning Objectives

- ✓ Explain how science is about being curious and observing nature.
- ✓ Explain that people from many backgrounds become scientists.

Instructional Activities

- teacher Read Aloud
- class discussion
- vocabulary practice
- drawing

NGSS and CCSS References

NOS3. Scientific Knowledge Is Open to Revision in Light of New Evidence: Science knowledge can change when new information is found.

NOS5. Science Is a Way of Knowing: Science knowledge helps us know about the world.

RI.1.1. Key Ideas and Details: With prompting and support, ask and answer questions about key details in a text.

For detailed information about the NGSS and CCSS References, follow the links in the Online Resources Guide for this unit:

www.coreknowledge.org/cksci-online-resources

Core Vocabulary and Language of Instruction

The Glossary at the end of this Teacher Guide lists definitions for Core Vocabulary and selected Language of Instruction.

Core Vocabulary terms are those that students should learn to use accurately in discussion. During instruction, expose students repeatedly to these terms but not through isolated drill or memorization.

fossil **paleontologist** **paleontology**

Language of Instruction consists of additional terms that you should use when talking about concepts in the lesson. Students benefit from your modeling the use of these words without the expectation that students themselves will use or explain the words.

shore

Instructional Resources

Student Book

Ch. 1

Student Book, Chapter 1
"Daniela's Dinosaur Dreams"

Activity Page

AP 1

Activity Page
Parts for Moving (AP 1)

Materials and Equipment

Collect or prepare the following items:

- reference books and other research materials
- internet access and the means to project images/video for whole-class viewing
- images of animal teeth of carnivores, omnivores, and herbivores
- crayons or colored pencils

Advance Preparation:

Where page numbers exceed the numbers to which younger students can count, students may be challenged to locate the correct chapter when opening their book. Before distributing the books to students, it might be helpful to place paper strips as bookmarks or open all student books so that the first page of Chapter 1 is visible.

The Core Lesson

1. Focus attention on the lesson purpose.

Have students think of some of their favorite animals. Do you often see your favorite animal where you live? Why or why not? Discuss why some favorite animals, such as dogs, might be seen often where students live. However, some favorite animals, such as polar bears, might only be found in areas that are very different from where students live.

2. Read together: "Daniela's Dinosaur Dreams."

Student Book

Ch. 1

While some advanced students may be able to read words on a given page of the Student Book, as a general rule students should not be expected or asked to read aloud the text on the Student Book pages. The text in the Student Book is there so that adults can read it when sharing the Student Book with students.

Guide students to open their books to Chapter 1 on page 2. Tell students that the title of this chapter is "Daniela's Dinosaur Dreams," and alert them to pay special attention to what Daniela's favorite animal was when she was a little girl and the environment where Daniela lives as you read.

Read Aloud Support

Page 2

Ask students to look at the image as you read aloud. Talk about what they notice about the area where Daniela lives.

Ask students the following questions:

LITERAL—What is crashing on the shore?

» water from the waves

INFERENTIAL—Why do you think Daniela likes to watch the waves crash on the shore?

» Maybe she likes to see the patterns of the waves, or maybe she likes to think about the animals that live in the ocean.

Page 3

Ask students to look at the image as you read aloud. Talk about what they notice about the book Daniela is reading.

A Love for Dinosaurs

Daniela learns that whale ancestors might have had legs a long time ago! This makes her curious. If whales once walked on land, what other animals did, too? Daniela decides she wants to study dinosaurs. She starts reading books and watching shows about whales and dinosaurs. Her passion for dinosaurs starts.

3

INFERENTIAL—What did whales do with their tiny legs?

» walk on land

INFERENTIAL—What part of a whale **fossil** would tell us they had tiny legs?

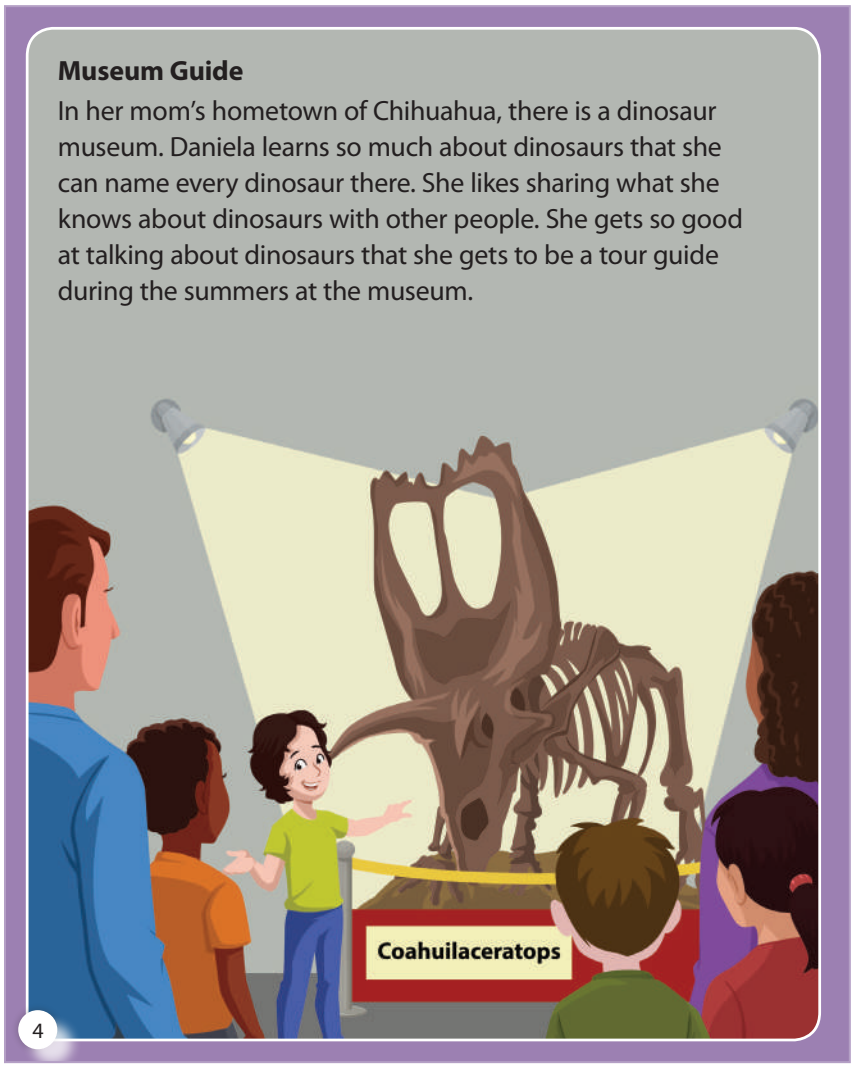
» the bones that look like legs

EVALUATIVE—Why do you think it is important to learn about how animals looked in the past?

» It can help us learn more about the area they lived in and about how much they have changed.

Page 4

Ask students to look at the image as you read aloud. Talk about what they notice about the Daniela at the museum.



INFERENTIAL—Why might Daniela like teaching people about the Coahuilaceratops dinosaur?

» because the dinosaur is from near where she lives

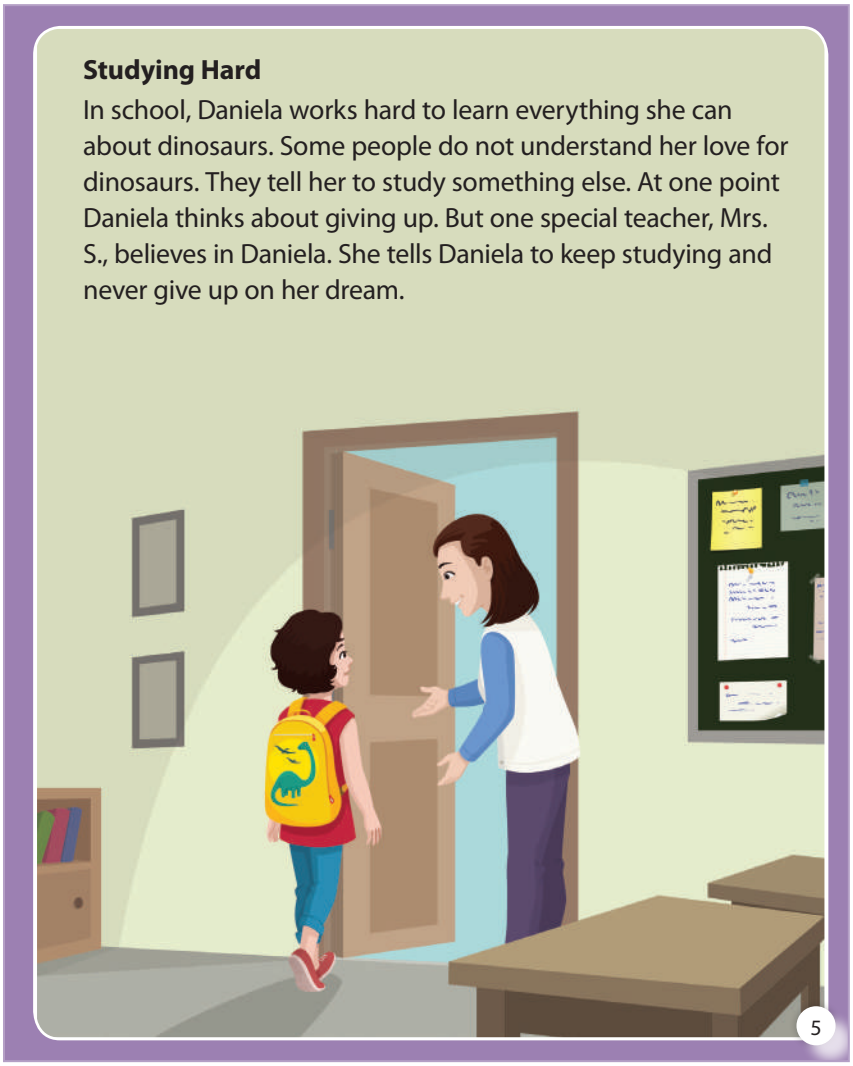
EVALUATIVE—What skills would Daniela need to be a guide at the museum?

» She would have to know a lot about the dinosaurs there. She might need to know a lot about other kinds of dinosaurs. She would need to be able to talk to groups of people. She would need to be friendly.

Explain that people who study and know a lot about what life was like on Earth long ago are known as **paleontologists**. Explain that the study of life on Earth long ago is known as **paleontology**.

Page 5

Ask students to look at the image as you read aloud. Talk about what they notice about the teacher and Daniela.



EVALUATIVE—What does it mean to "believe in someone" like Daniela's teacher believes in her?

» To believe in someone means knowing that the person can do good things and can reach their goals.

Call attention to the facial expression on the teacher as she is looking at Daniela. Point out that she looks happy and encouraging.

Page 6

Ask students to look at the image as you read aloud. Talk about what they notice about what Daniela is doing.

Mrs. S can see that Daniela is very interested in dinosaurs. Mrs. S. helps Daniela find resources to learn more about dinosaurs. Daniela gets books about dinosaurs. She gets articles about dinosaurs. Mrs. S also helps Daniela find websites on dinosaurs.

6

LITERAL—How does Daniela learn about dinosaurs?

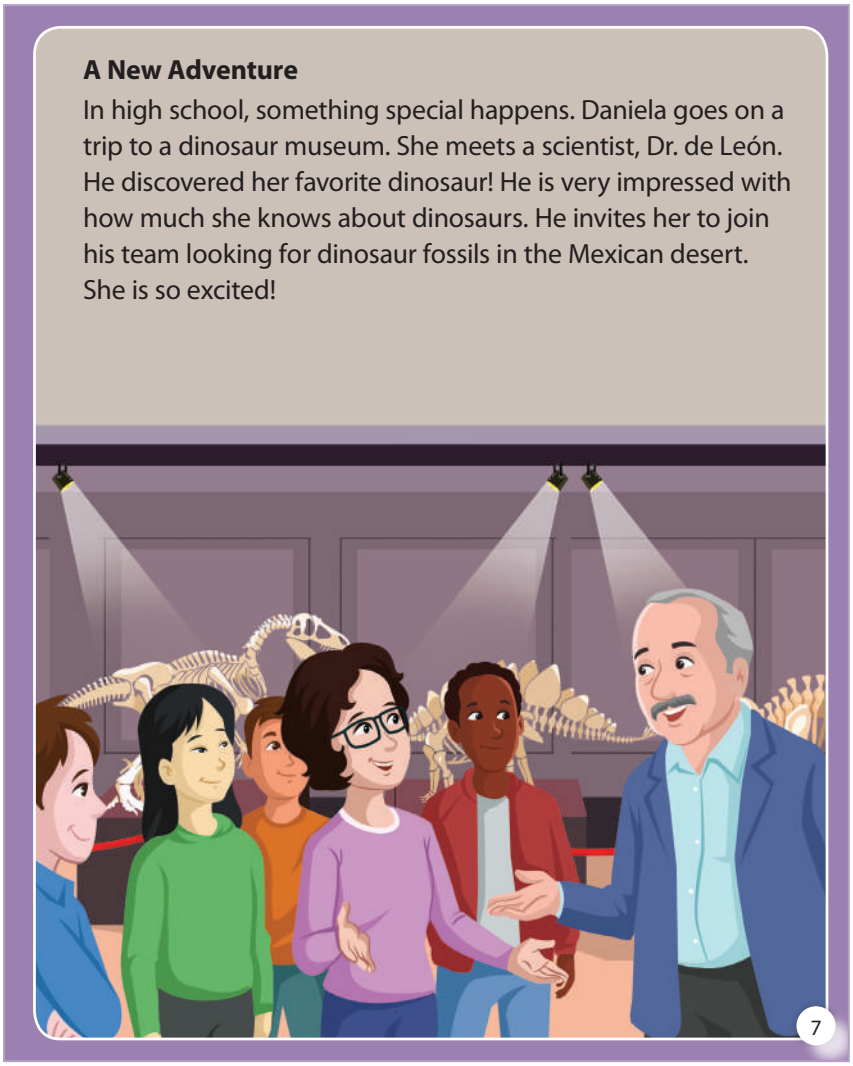
» She reads about dinosaurs in books, in articles, and on the internet.

LITERAL—Besides reading, how else does Daniela learn about dinosaurs?

» spending time at museums

Page 7

Ask students to look at the image as you read aloud. Talk about what they notice about Daniela in the museum.



LITERAL—Who invites Daniela to join the team?

» Dr. de León, a scientist she meets at the dinosaur museum

LITERAL—Why does Dr. de León invite Daniela to join the team?

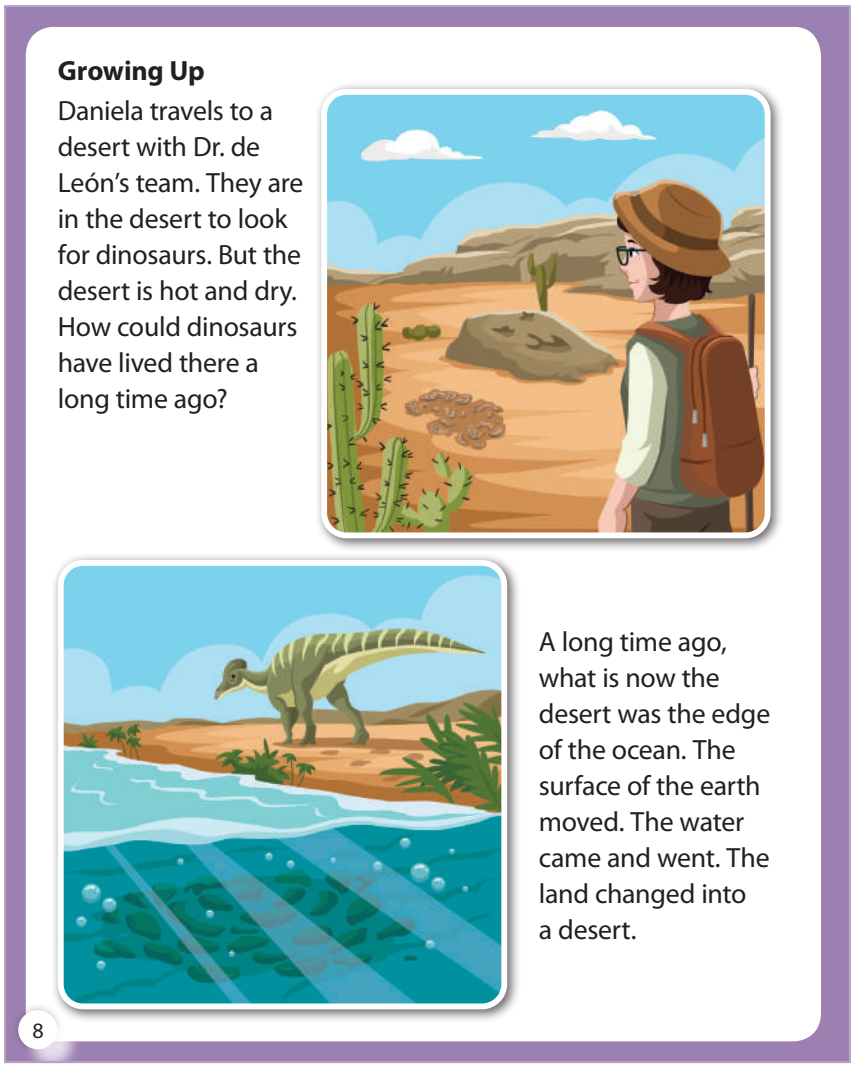
» because she knows a lot about dinosaurs and is very excited to learn about them

INFERENTIAL—How are Mrs. S. and Dr. de León alike?

» They both believe in Daniela and her interest in dinosaurs.

Page 8

Ask students to look at the images as you read aloud. Talk about what Daniela sees when she looks at a desert.



LITERAL—What evidence is there that what Daniela sees is the same location?

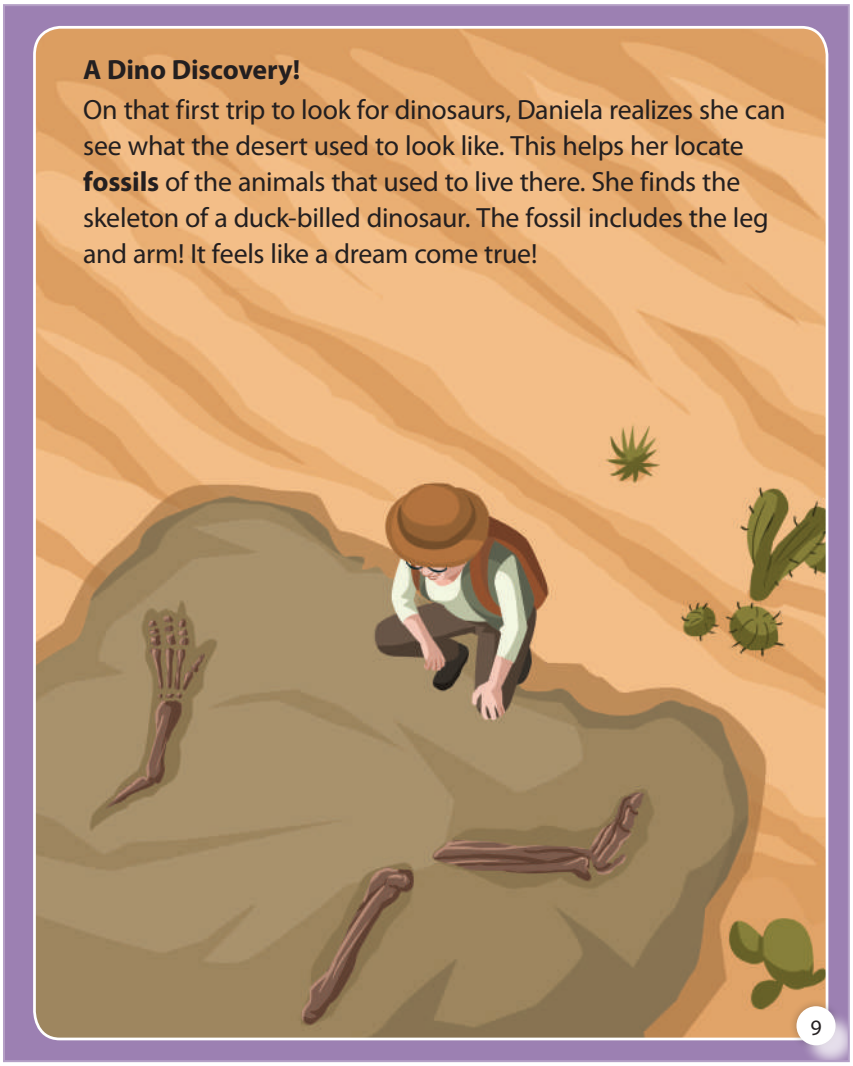
» The shells in the sand look like the oyster bed near the dinosaur, and the footprints look the same.

LITERAL—What evidence is there that it is not the same location?

» Daniela is in a desert, but the dinosaur is in a swamp or near the water.

Page 9

Ask students to look at the image as you read aloud. Talk about what they notice about Daniela's location.



INFERENTIAL—How do you think Daniela feels when she finds her first dinosaur fossil in the desert?

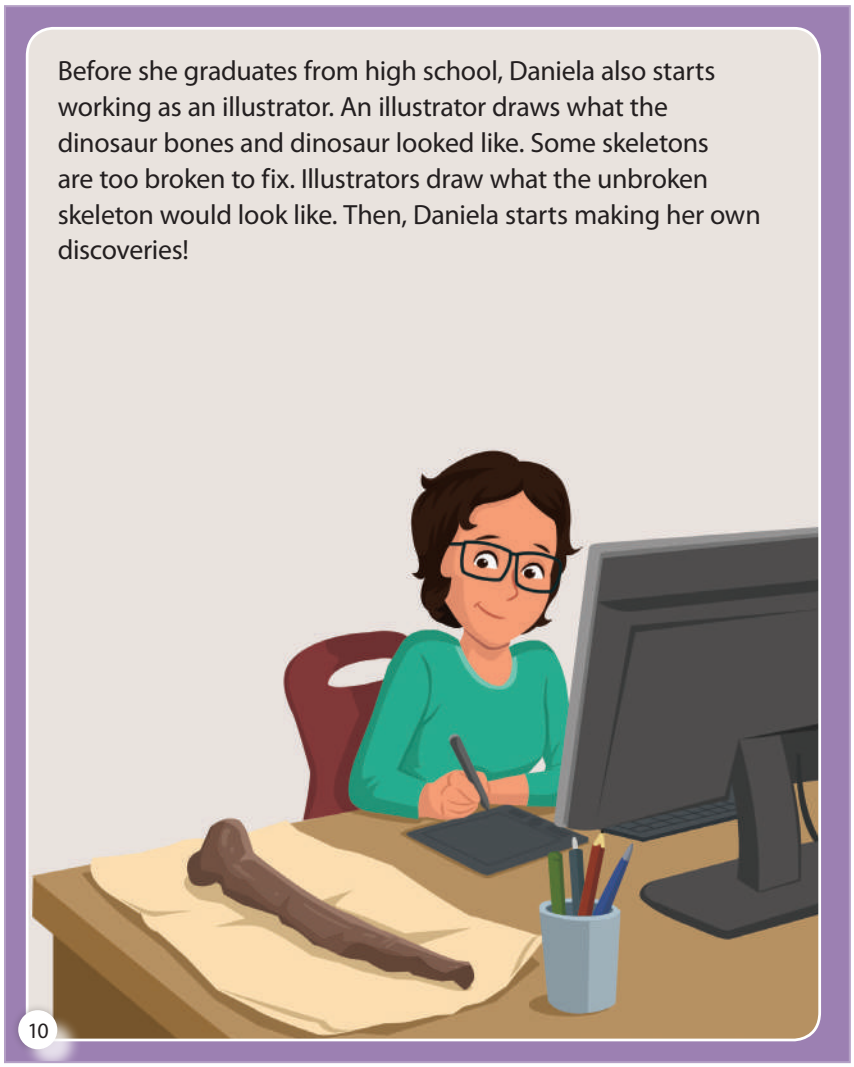
» She probably feels very happy and proud of herself.

EVALUATIVE—Why do you think scientists work with other scientists when they hunt for fossils?

» The scientists can help each other see things differently and locate fossils.

Page 10

Ask students to look at the image as you read aloud. Talk about what they notice about Daniela's work as an illustrator.



INFERENTIAL—Why would scientists want an illustration of broken dinosaur bones?

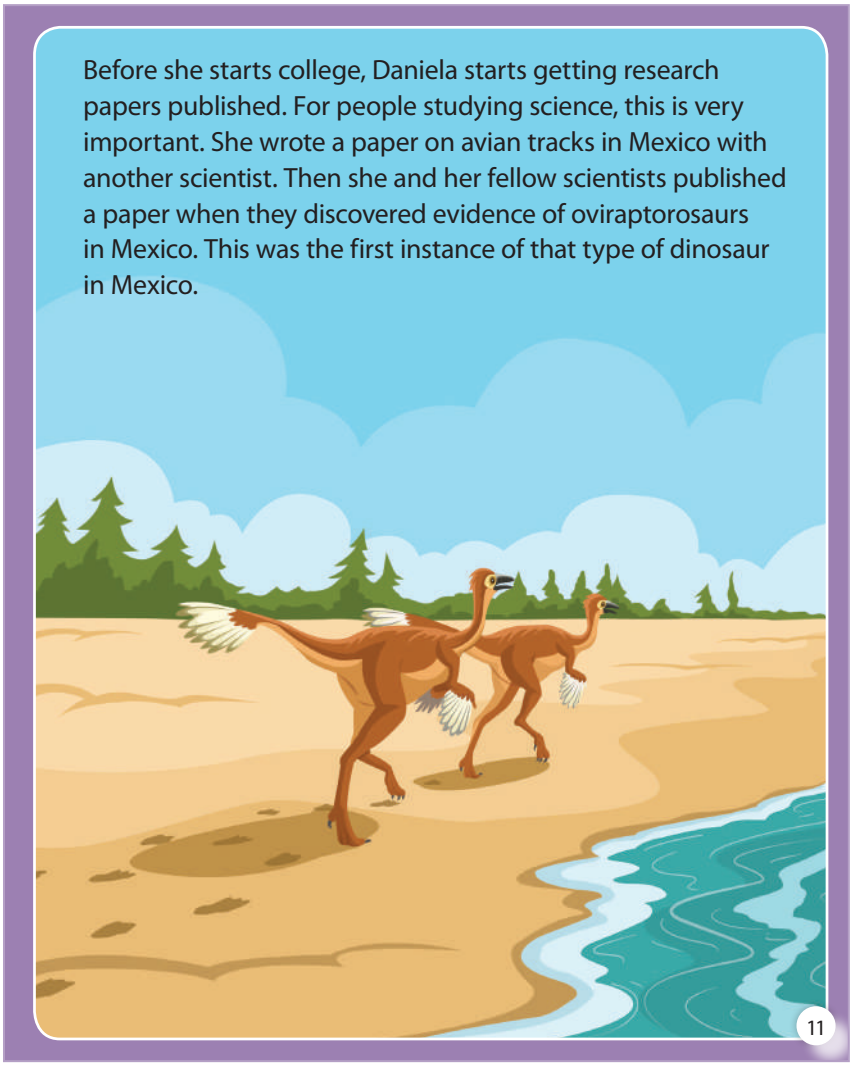
» They can use the illustration to compare the broken parts to a complete bone and figure out what the dinosaur was like.

LITERAL—How is an illustration of a complete dinosaur fossil with broken bones a model of the dinosaur?

» The illustration helps scientists understand what the dinosaur looked like and how it might have lived.

Page 11

Ask students to look at the image as you read aloud. Talk about what they notice about the dinosaurs running.



LITERAL—What are the dinosaurs doing on the beach?

» running

EVALUATIVE—How would the dinosaur tracks be considered a fossil?

» The tracks show how the dinosaurs moved.

3. Connect to lived experience.

Activity Page

AP 1

Invite students to share any details from the chapter that resemble someone or something familiar to them. Ask students to tell details about the chapter that interested them most. Invite students to ask questions about details that might not have been clear to them.

Use AP 1 to reinforce students' reflections on the chapter.

See the Activity Pages Answer Key for correct answers and sample student responses.

LESSON 2

Daniela Barrera Guevara: Studying Dinosaurs

At a Glance

Learning Objectives

- ✓ Explain how science is about being curious and observing nature.
- ✓ Explain that people from many backgrounds become scientists.

Instructional Activities

- teacher Read Aloud
- class discussion
- vocabulary practice
- comparing

NGSS and CCSS References

NOS3. Scientific Knowledge Is Open to Revision in Light of New Evidence: Science knowledge can change when new information is found.

NOS5. Science Is a Way of Knowing: Science knowledge helps us know about the world.

RI.1.1. Key Ideas and Details: With prompting and support, ask and answer questions about key details in a text.

For detailed information about the NGSS and CCSS References, follow the links in the Online Resources Guide for this unit:

www.coreknowledge.org/cksci-online-resources

Core Vocabulary and Language of Instruction

The Glossary at the end of this Teacher Guide lists definitions for Core Vocabulary and selected Language of Instruction.

Core Vocabulary terms are those that students should learn to use accurately in discussion. During instruction, expose students repeatedly to these terms but not through isolated drill or memorization.

change **dig site** **fossil** **quarry** **skeleton**

Language of Instruction consists of additional terms that you should use when talking about concepts in the lesson. Students benefit from your modeling the use of these words without the expectation that students themselves will use or explain the words.

nest

Instructional Resources

Student Book

Ch. 2

Student Book, Chapter 2
"Daniela Barrera Guevara: Studying Dinosaurs"

Activity Page

AP 2

Activity Page
Is It a Bird? (AP 2)

Materials and Equipment

Collect or prepare the following items:

- reference books and other research materials
- internet access and the means to project images/video for whole-class viewing

Advance Preparation:

Where page numbers exceed the numbers to which younger students can count, students may be challenged to locate the correct chapter when opening their book. Before distributing the books to students, it might be helpful to place paper strips as bookmarks or open all student books so that the first page of Chapter 2 is visible.

The Core Lesson

1. Focus attention on the lesson purpose.

Have students think about why images of dinosaurs are not photos and are illustrations. Why don't we see photos of Daniela with a live dinosaur? Do we see her in photos with **fossils** of dinosaurs? Why or why not? Discuss that dinosaurs are now extinct. What we have now of dinosaurs are the **skeleton** remains. This is why we see Daniela in pictures with dinosaur fossils but not with actual dinosaurs.

2. Read together: "Daniela Barrera Guevara: Studying Dinosaurs."

Student Book

Ch. 2

While some advanced students may be able to read words on a given page of the Student Book, as a general rule students should not be expected or asked to read aloud the text on the Student Book pages. The text in the Student Book is there so that adults can read it when sharing the Student Book with students.

Guide students to open their books to Chapter 2 on page 12. Tell students that the title of this chapter is "Daniela Barrera Guevara: Studying Dinosaurs," and alert them to pay special attention to the differences in Daniela's favorite dinosaurs as you read.

Read Aloud Support

Page 12

Ask students to look at the images as you read aloud. Talk about what they notice about where Daniela went to college.

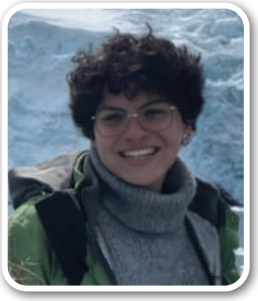
CHAPTER 2

Daniela Barrera Guevara: Studying Dinosaurs

Daniela Digs Dinosaurs

Remember Daniela, the girl from the last chapter? Well, here she is now, all grown up!

A lot of people go straight from high school to college. Daniela was busy discovering and drawing dinosaurs. She also was writing papers and was in charge of leading dinosaur discovery projects. Because of all her work, professors at the University of Alaska Museum of the North reached out to her. They wanted Daniela to go to college there!



12

Ask students the following questions:

LITERAL—Where is Daniela a student?

» University of Alaska

INFERENTIAL—Why do you think Daniela decides to go to the University of Alaska?

» so her dreams of being a paleontologist can happen

Page 13

Ask students to look at the images as you read aloud. Talk about what they notice about Daniela and her college experience.

Off to College

First, she moved from Mexico to Anchorage, Alaska, where the school is located. The Museum of the North, which is part of the school, is located there, too.

Then, she was invited to a dinosaur **dig site** in Montana! So, she moved from Alaska to Montana. She lived there and in North Dakota for three months. In Montana, they looked for Tyrannosaurus rex **fossils**!

13

LITERAL—Where does Daniela meet other scientists?

» Museum of the North

LITERAL—How many different states in the United States does Daniela look for dinosaurs fossils in?

» three states

INFERENTIAL—What qualities does Daniela have that make other scientists like to work with her?

» She knows a lot about dinosaurs and finding dinosaur fossils.

Page 14

Ask students to look at the image as you read aloud. Talk about what they notice about the dinosaur's head.

Daniela at a Dig Site

In Montana, Daniela worked on the dig site. As part of her schoolwork, she had to train to be a **quarry** master. A quarry master is like a teacher in a classroom. They organize the dig site. They tell people how to dig. They tell people where to dig. And they help tell what dinosaurs they are finding.

14

LITERAL—What sort of things would the people at a **dig site** be looking for?

» fossils like dinosaur bones and dinosaur tracks

EVALUATIVE—Why might a dig site need a **quarry** master?

» The quarry master makes sure each person is doing their specific job.

Page 15

Ask students to look at the image as you read aloud. Talk about what they notice about what Daniela is doing at the dig site.

Find a Fossil

Many fossils are found in rock. People must be careful when breaking the rock away from the fossils. Fossils can be a different color from the rock around them. Daniela uses a brush to clean the loose rock away.

15

LITERAL—What tools is Daniela using?

» a pick and paintbrush

INFERENTIAL—Why do you think one of her tools is a paintbrush?

» A paintbrush is very soft. It can remove loose dirt without harming the fossil.

Page 16

Ask students to look at the images as you read aloud. Talk about what they notice about what Daniela and the rest of the team are doing at the dig site.

Protect the Fossil

Fossils can break easily. Daniela and her team wrap the fossils in a cast.

She uses plaster and cloth to make the cast on the bone, just like the cast a person gets when they break a bone. This helps keep the fossil together when they move it.

Daniela checks that the fossil is wrapped well.

16

LITERAL—What does the dig team use to move a fossil, and why would they want to move the fossil from where it was found?

» A cast makes it safe to move the fossil to another, safer location like a museum. Sitting outside, the fossil could get damaged by the weather.

INFERENTIAL—Why would scientists use something soft like plaster to make a cast?

» A cast would be stiff enough to hold things together but soft enough to take off the fossil once it is moved.

Page 17

Ask students to look at the images as you read aloud. Talk about what they notice about the size of the skeleton.

Move the Fossil

Once the fossil has a strong cast, Daniela gives a thumbs-up to move the fossil. The fossil will be moved to a lab. There are more tools there to clean the fossil.

In the lab and at the museum, Daniela has more tools to clean up the fossil. Daniela and her team work hard to make the fossil look like a fossil and not a rock. When people visit the museum, they will see it is a Tyrannosaurus skull!

17

EVALUATIVE—Why do you think the dinosaur Daniela is working on has sharp teeth?

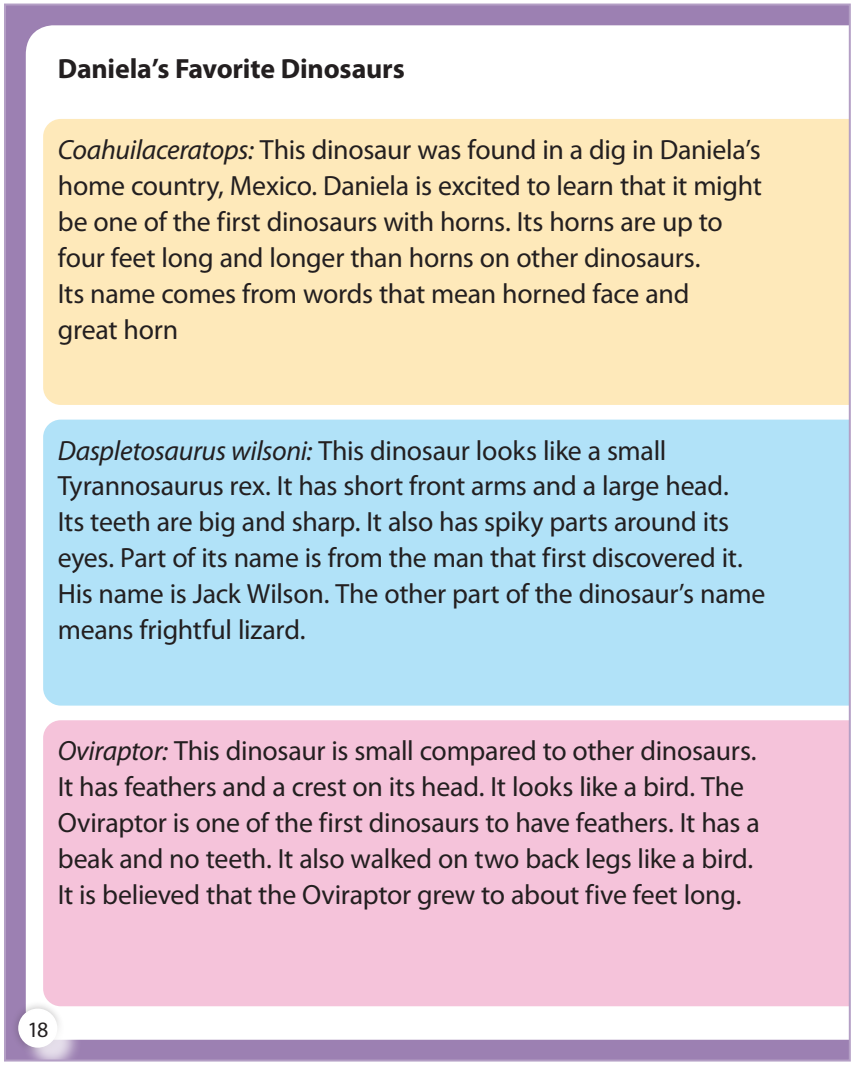
» to tear food and eat meat

Call attention to the teeth on the dinosaur Daniela is working on. Point out that the teeth are sharp, indicating the dinosaur was a meat eater.

EXTEND—Show students a variety of teeth from animals that are carnivores, omnivores, and herbivores. Have students try to match the type of eater with the animal teeth.

Page 18

Ask students to look at the image as you read aloud. Talk about what they notice about how this dinosaur looks different from the other dinosaurs in this chapter.



Daniela's Favorite Dinosaurs

Coahuilaceratops: This dinosaur was found in a dig in Daniela's home country, Mexico. Daniela is excited to learn that it might be one of the first dinosaurs with horns. Its horns are up to four feet long and longer than horns on other dinosaurs. Its name comes from words that mean horned face and great horn

Daspletosaurus wilsoni: This dinosaur looks like a small Tyrannosaurus rex. It has short front arms and a large head. Its teeth are big and sharp. It also has spiky parts around its eyes. Part of its name is from the man that first discovered it. His name is Jack Wilson. The other part of the dinosaur's name means frightful lizard.

Oviraptor: This dinosaur is small compared to other dinosaurs. It has feathers and a crest on its head. It looks like a bird. The Oviraptor is one of the first dinosaurs to have feathers. It has a beak and no teeth. It also walked on two back legs like a bird. It is believed that the Oviraptor grew to about five feet long.

18

LITERAL—How long were the Coahuilaceratops horns?

» up to four feet

INFERENTIAL—Why do you think people think the Coahuilaceratops looks like a rhinoceros?

» They both have large horns on their heads.

LITERAL—How does the Daspletosaurus wilsoni look like the Tyrannosaurus rex?

» It had short front arms and a large head.

EVALUATIVE—What type of food do you think the Daspletosaurus wilsoni ate? Why?

» Meat; it had sharp, big teeth.

Page 19

Ask students to look at the images as you read aloud. Talk about what they notice about the skeletons.

LITERAL—About how long was the Oviraptor?

» about five feet

LITERAL—How does the Oviraptor look like a bird?

» It had feathers and a beak. It also walked on its back legs.

EVALUATIVE—How do you think the Oviraptor ate if it had no teeth?

» Maybe it swallowed things whole or broke up food with its beak before swallowing it.

Page 20

Ask students to look at the images as you read aloud. Talk about what they notice about the difference in work Daniela does in the field and inside the museum.

Dino Digs

The areas Daniela digs for dinosaurs are deserts. But millions of years ago, all those areas were beaches. Not only does Daniela study how dinosaurs **change** over time, but she also studies how areas change over time. It is like she is uncovering a giant puzzle from the past. Every new discovery is exciting!

20

LITERAL—What else does Daniela study besides dinosaurs?

» how areas **change** over time

INFERENTIAL—Do you think Daniela might find animals that lived in water in her digs in Coahuila, Mexico? Why or why not?

» Yes; the area used to be a beach. Some animals that lived in water might be buried in the area.

Page 21

Ask students to look at the images as you read aloud. Talk about what they notice about what Daniela does to help others learn about dinosaurs.

The Big Picture

Daniela still studies dinosaurs at the Museum of the North at the University of Alaska. One of Daniela's jobs is to understand how animals like dinosaurs change over time. She loves sharing what she learns with others by writing papers and giving talks. Learning about the past helps everyone understand the world today.

21

LITERAL—How does Daniela share what she learns?

» by writing papers and giving talks

INFERENTIAL—What dream did Daniela achieve?

» becoming a paleontologist

EVALUATIVE—Do you think Daniela still loves whales? Why or why not?

» Yes; learning about whales having legs made her think of animals that lived in the past. Loving whales started her dream of being a paleontologist.

Page 22

Ask students to look at the images as you read aloud. Talk about what they notice about how the information is set up with the image of Mary Anning.

LITERAL—What is the name of this person?

» Mary Anning

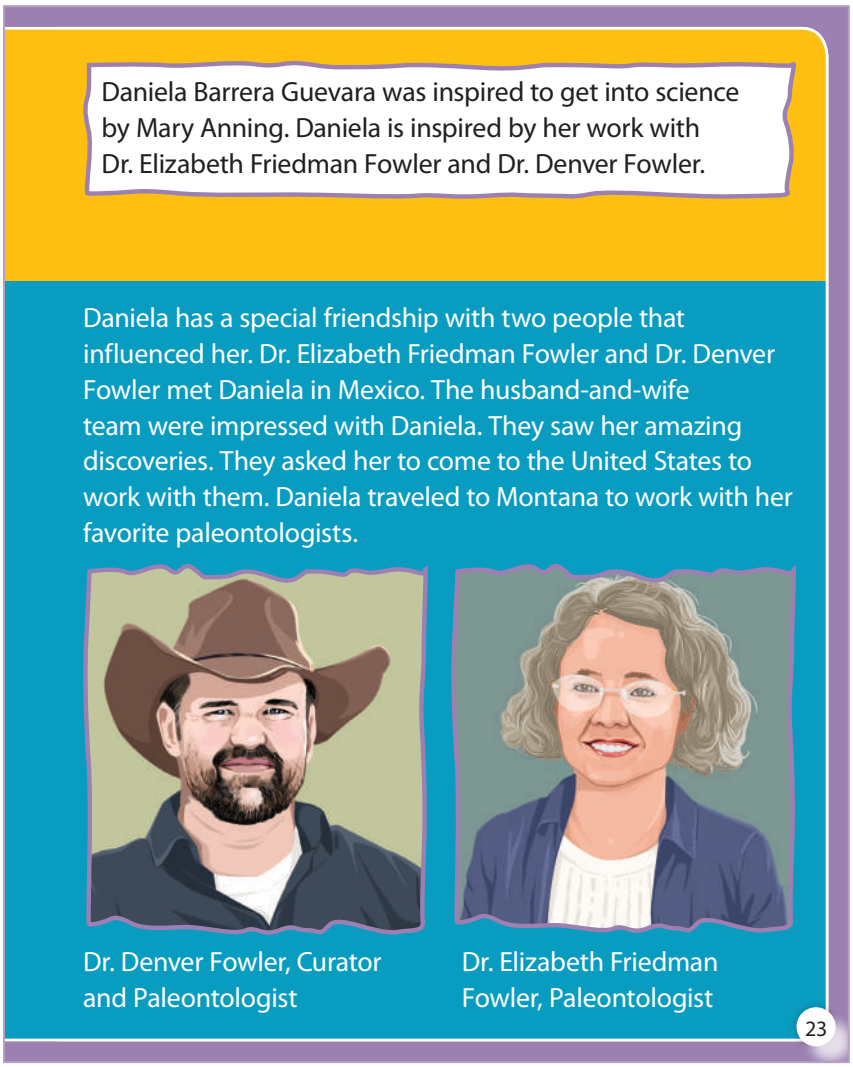
INFERENTIAL—Why do you think Daniela was inspired by Mary Anning?

» Mary Anning hunted for fossils and learned about the past from the fossils she found in the earth, just like Daniela. They both lived near beaches.

Call attention to the setup of the page. Point out that this is an infographic. It provides information with the image. It is another way to share information.

Page 23

Ask students to look at the images as you read aloud. Talk about what they notice about these two paleontologists.



INFERENTIAL—Why do you think Dr. Elizabeth Friedman Fowler and Dr. Denver Fowler were impressed with Daniela?

» She has made amazing discoveries and teaches others about what she learns about the past and dinosaurs.

3. Connect to lived experience.

Activity Page

AP 2

Invite students to share any details from the chapter that resemble someone or something familiar to them. Ask students to tell details about the chapter that interested them most. Invite students to ask questions about details that might not have been clear to them.

Use AP 2 to reinforce students' reflections on the chapter.

See the Activity Pages Answer Key for correct answers and sample student responses.

EXPERIENCE A

Exploring Like a Paleontologist

At a Glance

Learning Objectives

- ✓ Observe details.
- ✓ Record details.
- ✓ Discuss details.

Instructional Activities

- puzzle
- excavation activity
- angle view drawing

NGSS and CCSS References

NOS2. Scientific Knowledge Is Based on Empirical Evidence: Scientists look for patterns and order when making observations about the world.

NOS4. Scientific Models, Laws, Mechanisms, and Theories Explain Natural Phenomena: Scientists use drawings, sketches, and models as a way to communicate ideas.

NOS5. Science Is a Way of Knowing: Science knowledge helps us know about the world.

For detailed information about the NGSS and CCSS References, follow the links in the Online Resources Guide for this unit:

www.coreknowledge.org/cksci-online-resources

Core Vocabulary and Language of Instruction

The Glossary at the end of this Teacher Guide lists definitions for Core Vocabulary and selected Language of Instruction.

Core Vocabulary terms are those that students should learn to use accurately in discussion. During instruction, expose students repeatedly to these terms but not through isolated drill or memorization.

excavate

Language of Instruction consists of additional terms that you should use when talking about concepts in the lesson. Students benefit from your modeling the use of these words without the expectation that students themselves will use or explain the words.

digs **pieces** **tools**

Instructional Resource

Activity Page

AP A

Activity Page
My Angle Views (AP A)

Materials and Equipment

Collect or prepare the following items:

- reference books and other research materials
- internet access and the means to project images/video for whole-class viewing
- puzzles (1 per group/pair)
- play sand
- modeling clay
- containers to hold sand and clay (2 per pair)
- small objects for excavation (2 per pair)
- coffee stirrers (2 per pair)
- toothbrushes (2 per pair)
- stuffed animals
- colored pencils or crayons

Advance Preparation:

Bury small objects under play sand and modeling clay for students to excavate. Each pair will need one object in sand and one object in clay.

The Core Lesson

1. Focus attention and preview the investigation.

Remind students that they learned in Chapter 2 that Daniela studies dinosaurs and how areas change over time. She participates in fossil digs and records her observations. She also works with other paleontologists to determine how the information they observe fits together. Invite a discussion on how to explore like a paleontologist.

Set the stage for the investigations you plan for your students.

Investigation 1—Observe the sides of puzzle pieces and work on fitting them together to complete the puzzle.

Investigation 2—Act like a paleontologist at a dig and excavate an object.

Investigation 3—Observe an object from different angles and draw the observations from each point of view.

2. Facilitate Investigation 1.

- Place students in small groups or in pairs.
- Provide a puzzle for each group or pair. Puzzles with few pieces and easily identified patterns, such as a puzzle with the alphabet or numbers, will work best for the investigation.
- Lead a class discussion on how to fit pieces together, and point out that each piece of the puzzle has a specific spot where it should be placed.
- Tell students to look at all the pieces of the puzzle and to pick up a piece that has a straight side and a piece that does not.
- Have the students explain where the piece with a straight side fits into the puzzle compared to the piece that does not have a straight side.
- Now have students work in their groups to put the puzzle together.
- If some groups finish early, suggest they ask other groups if they would like some help. Explain that paleontologists often help other groups of paleontologists to figure out how pieces of fossils fit together.
- Once the puzzles are completed, have students discuss how they are exploring like a paleontologist in this investigation.

3. Facilitate Investigation 2.

- Place students in pairs.
- Lead a class discussion on how Daniela and other paleontologists participate in fossil digs. Explain that Daniela and the other paleontologists **excavate**, or dig up, fossils.
- Revisit the tools in the images that Daniela is using during the digs.
- Have students discuss how a pick and a soft brush might be used in a dig.
- Talk about how working in a dig takes patience and time.
- Provide the premade excavation containers of sand and clay to the pairs.
- Students will decide on the appropriate tool to use for each excavation. Then they will start excavating the object from each container.
- Remind students that the goal is to excavate the object without ruining it.
- After objects have been excavated, have students discuss the easier and more difficult parts of the excavation.
- Have students discuss how they are exploring like a paleontologist in this investigation.

ALERT—Make sure to use clean play sand instead of sand from outside that may be contaminated.

ALERT—Be mindful of any allergies students may have to the ingredients in the modeling clay. Discuss with students that the sand, clay, and tools should not be eaten or placed in their mouths.

4. Facilitate Investigation 3.

Activity Page

AP A

- Share that students will work individually on this investigation.
- Lead a class discussion about how Daniela and other paleontologists draw what they find from all different sides of an object. Share that this shows the object in more detail.
- Explain the six different angles the students will be observing and drawing.
- Use a visual and show the students the front, back, left side, right side, top, and bottom angles of an object.
- Provide a stuffed animal or similar object to each student.
- Students will start by observing the stuffed animal and determining the different angle sides. Provide help with the left and right sides.
- Now students will start drawing each of the six angles on My Angle Views (AP A).
- Once students have completed their drawings, have them turn in their activity page and stuffed animal.
- Place all the stuffed animals in a central location so that all students can see each stuffed animal.
- Students will now choose an activity page that is not their own and try to determine from the drawings the stuffed animal that matches the drawings.
- Have students discuss how they are exploring like a paleontologist in this investigation.

EXTEND—A way to have students explore more like paleontologists is to have all students draw the angles of the same stuffed animal. Then have students compare their drawings with a partner to see how they are alike and different.

5. Summarize and discuss.

For Investigation 1, have students share their observations of the easier and more difficult parts of working on the puzzle.

- Which pieces were easiest to place in the puzzle? (*Possible answer: The pieces that have a straight side. We know those are on the outside of the puzzle.*)
- Which pieces were more difficult to place in the puzzle? (*Possible answer: the pieces that didn't have a picture that was recognizable*)

For Investigation 2, have students share the objects excavated.

- What tool did you use with the sand and why? (*Possible answer: I used the brush because the sand is soft, and I didn't want to ruin the object.*)
- What tool did you use with the clay and why? (*Possible answer: I used the coffee stirrer because the clay is harder, and the brush did not remove the clay. I needed a stronger tool.*)
- Why is it important for paleontologists to use the correct tool in a dig? (*Possible answer: so that the fossils are not ruined when taking them out of the land*)

For Investigation 3, have students share their drawings from My Angle Views (AP A).

- What angle was the easiest to draw? (*Possible answer: The bottom angle. There were not many details to draw.*)
- What angle helped the most when trying to determine which stuffed animal the drawing was of? (*Possible answer: The front angle. It has the most details.*)

6. Check for understanding.

Invite students to summarize what they learned about exploring like paleontologists. Prompt observations shared earlier as needed.

See the Activity Pages Answer Key for correct answers and sample student responses.

LESSON 3

Thaís's Teacher-to-Scientist Dream

At a Glance

Learning Objectives

- ✓ Explain how science is about being curious and observing nature.
- ✓ Explain that people from many backgrounds become scientists.

Instructional Activities

- teacher Read Aloud
- class discussion
- vocabulary practice
- drawing

NGSS and CCSS References

NOS3. Scientific Knowledge Is Open to Revision in Light of New Evidence: Science knowledge can change when new information is found.

NOS5. Science Is a Way of Knowing: Science knowledge helps us know about the world.

RI.1.1. Key Ideas and Details: With prompting and support, ask and answer questions about key details in a text.

For detailed information about the NGSS and CCSS References, follow the links in the Online Resources Guide for this unit:

www.coreknowledge.org/cksci-online-resources

Core Vocabulary and Language of Instruction

The Glossary at the end of this Teacher Guide lists definitions for Core Vocabulary and selected Language of Instruction.

Core Vocabulary terms are those that students should learn to use accurately in discussion. During instruction, expose students repeatedly to these terms but not through isolated drill or memorization.

biology **nature** **scientist**

Language of Instruction consists of additional terms that you should use when talking about concepts in the lesson. Students benefit from your modeling the use of these words without the expectation that students themselves will use or explain the words.

country **survey**

Instructional Resources

Student Book

Ch. 3

Student Book, Chapter 3
"Thaís's Teacher-to-Scientist Dream"

Activity Page

AP 3

Activity Page
What Is in Nature? (AP 3)

Materials and Equipment

Collect or prepare the following items:

- reference books and other research materials
- internet access and the means to project images/video for whole-class viewing
- world map
- crayons or colored pencils

Advance Preparation:

Where page numbers exceed the numbers to which younger students can count, students may be challenged to locate the correct chapter when opening their book. Before distributing the books to students, it might be helpful to place paper strips as bookmarks or open all student books so that the first page of Chapter 3 is visible.

The Core Lesson

1. Focus attention on the lesson purpose.

Have students think of their favorite subject or topics they would like to learn more about. How do you think you can learn more about your favorite subject or thing? Discuss a variety of ways to learn more about a topic, such as reading more about it in books or reputable websites. People also learn more by going to talks or visiting places related to the topic. Taking classes about the topic is also a way to learn more about a topic.

2. Read together: "Thaís's Teacher-to-Scientist Dream."

Student Book

Ch. 3

While some advanced students may be able to read words on a given page of the Student Book, as a general rule students should not be expected or asked to read aloud the text on the Student Book pages. The text in the Student Book is there so that adults can read it when sharing the Student Book with students.

Guide students to open their books to Chapter 3 on page 24. Tell students that the title of this chapter is "Thaís's Teacher-to-Scientist Dream," and alert them to pay special attention to how Thaís learns more about ways to protect Earth as you read.

Read Aloud Support

Page 24

Ask students to look at the images as you read aloud. Talk about what they notice about the location on the map where Thaís grew up. Discuss how close it is to the Atlantic Ocean.

CHAPTER 3

Thaís's Teacher-to-Scientist Dream

Thaís's Beginning

Thaís (*Tah-ees*) Pansani is a scientist from Americana, Brazil. Americana is a small town in the countryside. Thaís lived with her mom, dad, and sister. Her dad's job made the family move a lot. Thaís went to many different schools in São Paulo. She was used to moving and meeting new people. Thaís enjoyed spending time with her family and exploring new places.

24

Ask students the following questions:

LITERAL—What country did Thaís grow up in?

» Brazil

INFERENTIAL—Why did Thaís go to many different schools when she was younger?

» Her dad had a job that had the family moving often. When they moved, Thaís changed to a school closer to her.

Call attention to the map on the page. Point out that the continent is South America. Show students a world map and point out the city the school is in and where Thaís lives. Briefly discuss the scale of the map and about how far Americana is from the city the school is located in.

Page 25

Ask students to look at the image as you read aloud. Talk about what they notice about the setting.

A Dream of Teaching

When Thaís was little, she dreamed of being a teacher. She didn't think about being a scientist. Thaís used a small chalkboard to teach her stuffed animals. She loved playing teacher and giving lessons. Thaís likes to help others learn. She dreamed of having a classroom one day. Thaís felt happy when she was teaching her pretend students.

25

LITERAL—What does Thaís want to be when she grows up?

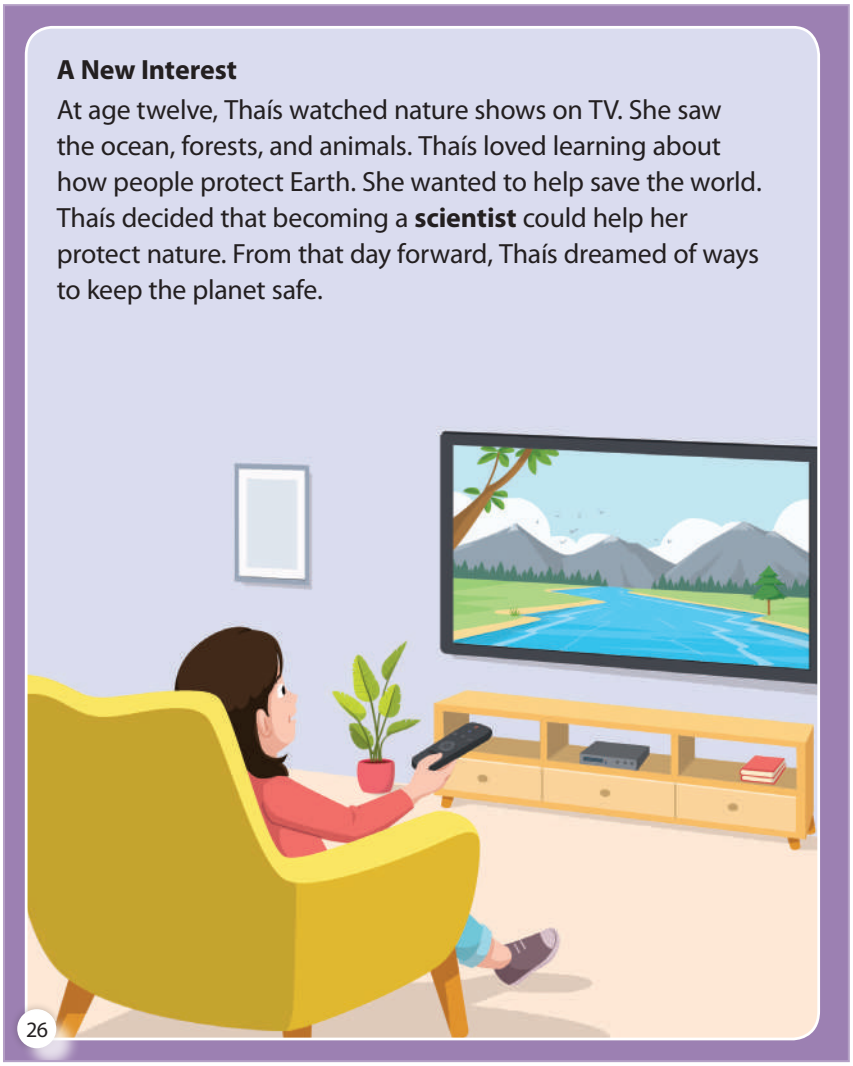
» a teacher

INFERENTIAL—Why does Thaís want to be a teacher?

» She wants to help people learn.

Page 26

Ask students to look at the image as you read aloud. Talk about what they notice about how Thaís is learning.



INFERENTIAL—Why did Thaís change her mind about being a teacher?

» She watched nature shows and decided she wanted to save and protect Earth.

EVALUATIVE—Do you think watching **nature** shows is a good way to learn? Why or why not?

» Yes; watching nature shows is a way to learn about nature that is not near you.

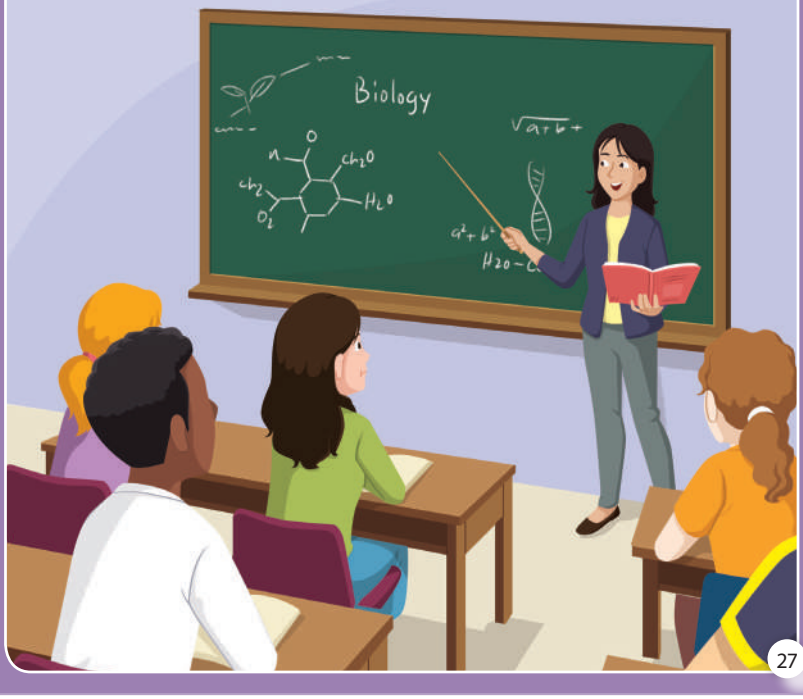
EXTEND—If possible, have students do a survey on something in nature they want to learn more about. Locate a nature clip online to play for the class on the chosen topic.

Page 27

Ask students to look at the image as you read aloud. Talk about what they notice about the classroom.

A Love for Biology

When Thaís started high school, she took her first biology class. She loved it right away! Thaís learned about plants, animals, and the environment. She enjoyed learning how life works together. Thaís loved everything about **nature**. She asked questions and wanted to learn more. She knew that biology was what she wanted to study for the rest of her life.



27

LITERAL—When did Thaís take her first **biology** class?

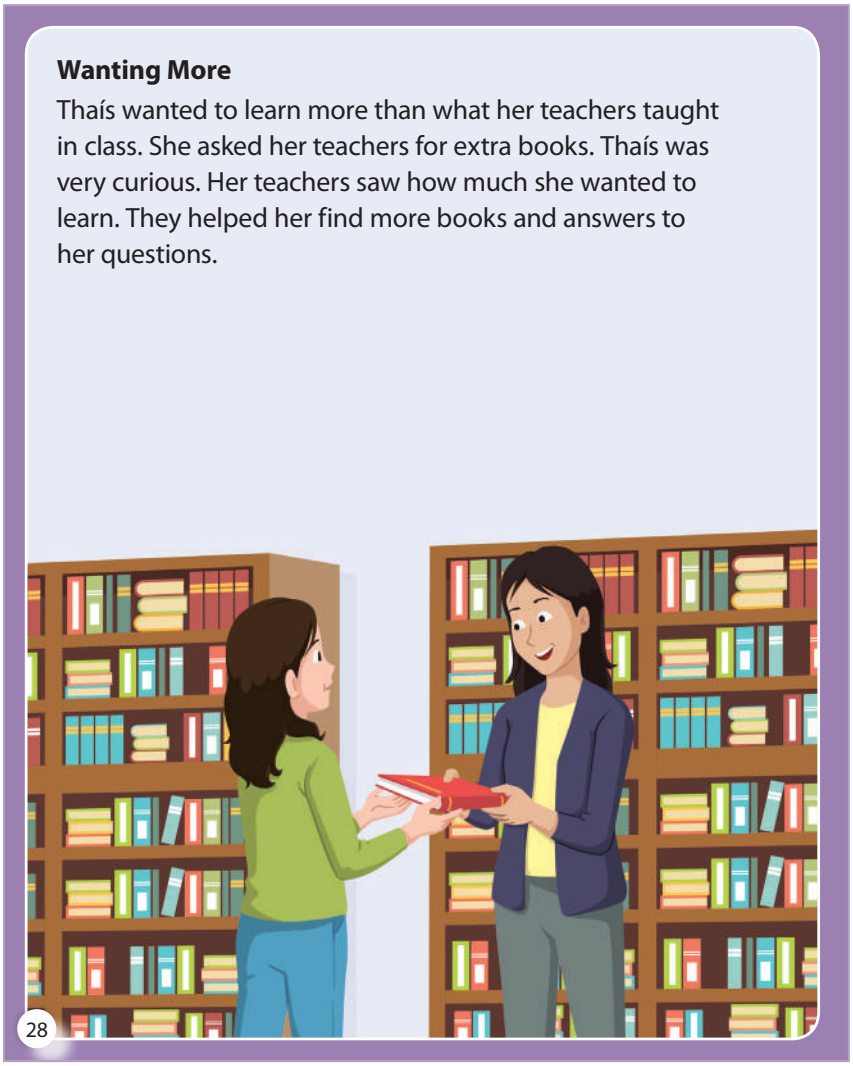
» in high school

INFERENTIAL—Why does Thaís love biology class?

» She likes to learn more about nature, plants, animals, and the ecosystem.

Page 28

Ask students to look at the image as you read aloud. Talk about what they notice about the setting where Thaís goes to learn more.



INFERENTIAL—Why does Thaís ask her teachers for extra books?

» to learn more

EVALUATIVE—What are some ways you learn more about something?

» read books, listen in class, check online, watch shows, ask questions

Call attention to the setting of the media center. Point out that there are a variety of ways to learn more about something and a certain way to learn isn't better than another way.

Page 29

Ask students to look at the image as you read aloud. Talk about what they notice about Thaís's parents and their facial expressions.

Thaís's Family Support

Thaís's parents never told her to be a scientist, but they didn't stop her either. They always said to their daughters, "Do what you love." Her sister wanted to be a journalist and moved to São Paulo. Thaís kept dreaming of being a biologist. Her family encouraged her to follow her dreams.

29

INFERENTIAL—What type of **scientist** does Thaís want to be?

» a biologist

EVALUATIVE—What does it mean to be encouraging?

» to support and believe in someone

Page 30

Ask students to look at the image as you read aloud. Talk about what they notice about how the school Thaís goes to is the same as and different from their school.

Getting into University

In Brazil, the best schools for science are very hard to get into. Thaís studied hard for the entrance exam. She worked every day to prepare. After lots of studying, Thaís was accepted into the Federal University of São Carlos (Universidade Federal de São Carlos). She was so excited to start college! Thaís was proud of herself. She was ready to learn even more about biology and the world.

30

LITERAL—What school does Thaís go to?

» Federal University of São Carlos

INFERENTIAL—What is an entrance exam?

» a test you have to pass before you can go to the school

Page 31

Ask students to look at the image as you read aloud. Talk about what they notice about how Thaís is collecting information by observing.

Choosing Her Path

In college, Thaís learned more about biology. She loved everything about life on Earth. But she became especially interested in paleontology. Thaís wanted to know how life has changed over millions of years. She read books about fossils and animals from the past. By the end of her first year, Thaís knew she wanted to study the past and learn about the animals that lived long ago.

31

LITERAL—What type of science does Thaís become really interested in during college?

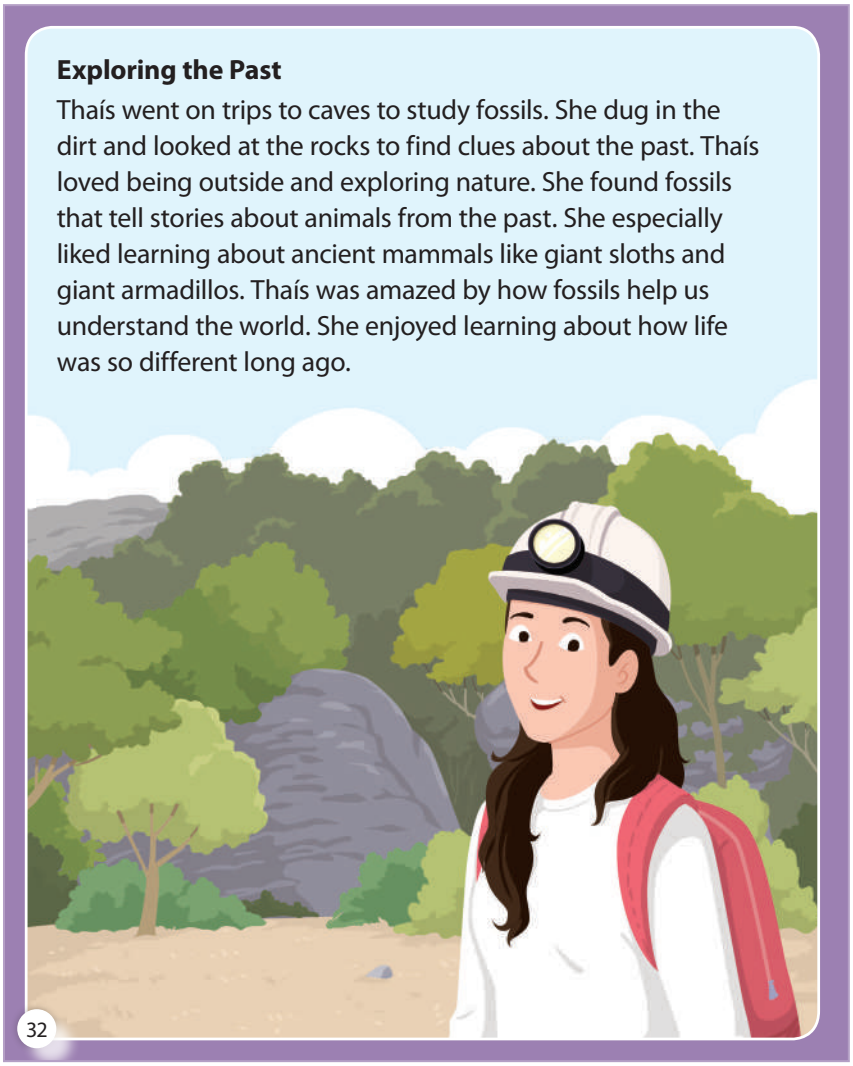
» paleontology

LITERAL—What does Thaís want to study and learn more about?

» the past and creatures that lived a long time ago

Page 32

Ask students to look at the image as you read aloud. Talk about what they notice about the environment Thaís is in.



INFERENTIAL—Why does Thaís have to dig in the dirt?

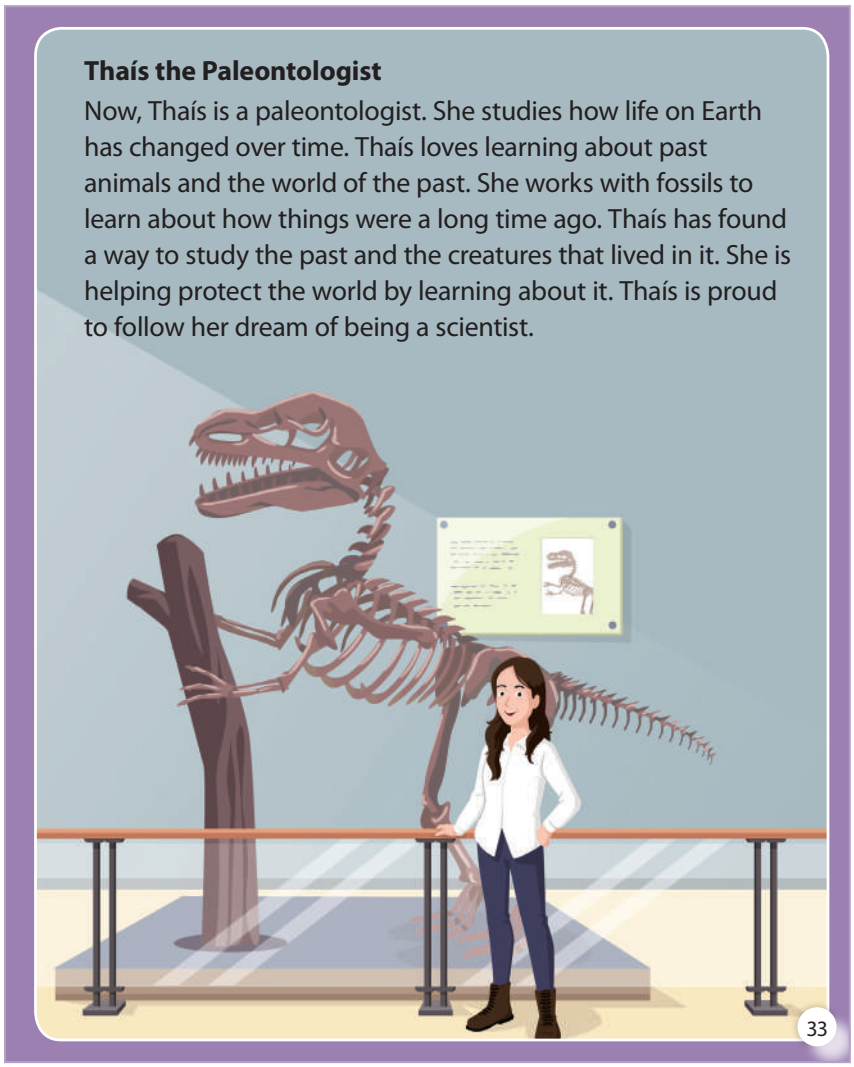
» The fossils she is looking for are buried.

LITERAL—Where does Thaís go to study fossils?

» caves

Page 33

Ask students to look at the image as you read aloud. Talk about what they notice about the fossils in the image with Thaís.



LITERAL—Why does Thaís work with fossils?

» to learn about how things were a long time ago

3. Connect to lived experience.

Activity Page

AP 3

Invite students to share any details from the chapter that resemble someone or something familiar to them. Ask students to tell details about the chapter that interested them most. Invite students to ask questions about details that might not have been clear to them.

Use AP 3 to reinforce students' reflections on the chapter.

See the Activity Pages Answer Key for correct answers and sample student responses.

LESSON 4

Thaís Rabito Pansani: Saving Earth

At a Glance

Learning Objectives

- ✓ Explain how science is about being curious and observing nature.
- ✓ Explain that people from many backgrounds become scientists.

Instructional Activities

- teacher Read Aloud
- class discussion
- vocabulary practice
- categorizing
- drawing

NGSS and CCSS References

NOS3. Scientific Knowledge Is Open to Revision in Light of New Evidence: Science knowledge can change when new information is found.

NOS5. Science Is a Way of Knowing: Science knowledge helps us know about the world.

RI.1.1. Key Ideas and Details: With prompting and support, ask and answer questions about key details in a text.

For detailed information about the NGSS and CCSS References, follow the links in the Online Resources Guide for this unit:

www.coreknowledge.org/cksci-online-resources

Core Vocabulary and Language of Instruction

The Glossary at the end of this Teacher Guide lists definitions for Core Vocabulary and selected Language of Instruction.

Core Vocabulary terms are those that students should learn to use accurately in discussion. During instruction, expose students repeatedly to these terms but not through isolated drill or memorization.

biology **teeth**

Language of Instruction consists of additional terms that you should use when talking about concepts in the lesson. Students benefit from your modeling the use of these words without the expectation that students themselves will use or explain the words.

claws **common** **tusks**

Instructional Resources

Student Book

Ch. 4

Student Book, Chapter 4
"Thaís Rabito Pansani: Saving Earth"

Activity Page

AP 4

Activity Page
Different Teeth (AP 4)

Materials and Equipment

Collect or prepare the following items:

- reference books and other research materials
- internet access and the means to project images/video for whole-class viewing
- crayons or colored pencils

Advance Preparation:

Where page numbers exceed the numbers to which younger students can count, students may be challenged to locate the correct chapter when opening their book. Before distributing the books to students, it might be helpful to place paper strips as bookmarks or open all student books so that the first page of Chapter 4 is visible.

The Core Lesson

1. Focus attention on the lesson purpose.

Online Resources

Students will be exposed to a variety of different animals that Thaís studies. Some of the animals will look like animals that are alive today. As students name some animals, guide students to understand how comparing animals in the past to those that are living today can help us understand more about the past animals. One physical trait that scientists compare is **teeth**. The shape of teeth can give us an idea of the diet of the animals. Have students watch a short online video of different animal teeth.

2. Read together: "Thaís Rabito Pansani: Saving Earth."

Student Book

Ch. 4

While some advanced students may be able to read words on a given page of the Student Book, as a general rule students should not be expected or asked to read aloud the text on the Student Book pages. The text in the Student Book is there so that adults can read it when sharing the Student Book with students.

Guide students to open their books to Chapter 4 on page 34. Tell students that the title of this chapter is "Thaís Rabito Pansani: Saving Earth," and alert them to pay special attention to the parts of the different animals as you read.

Read Aloud Support

Page 34

Ask students to look at the image as you read aloud. Talk about what they notice about the area behind Thaís.

CHAPTER 4

Thaís Rabito Pansani: Saving Earth

Thaís in School

Thaís loves to learn. When she was in elementary school, she wanted to be a teacher. As she got older, Thaís had to choose what to study in college. She liked **biology**. She liked paleontology. Biology is about living animals and plants. Paleontology is the study of animals and plants from the past.

34

Ask students the following questions:

LITERAL—What is **biology**?

» the study of living animals and plants

LITERAL—What is paleontology?

» the study of animals and plants from the past

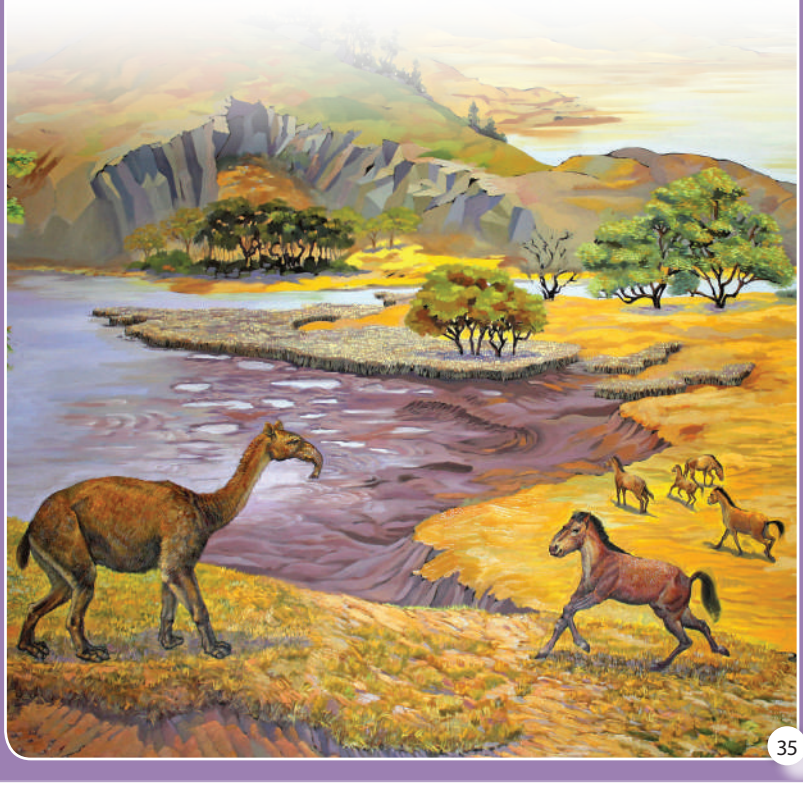
Call attention to the ending of both *biology* and *paleontology*. Point out that *logy* means "the study of." *Bio* means "life," and *paleo* means "old" or "ancient."

Page 35

Ask students to look at the image as you read aloud. Talk about what they notice about the animals on the page.

Thaís Becomes a Research Scientist

Thaís decided to study biology at first, but she still loved learning about Ice Age mammals. Thaís decided to be an active paleontologist. She studied paleoecology. That is the study of how the environment was in the past. She wants to learn about how the world used to be to help save the world now.



35

LITERAL—What do you notice about these ancient mammals?

» Many of the animals look like current animals, like the horses, but they look like they are different sizes than they are today.

LITERAL—How would these animals compare to animals today?

» One animal looks like a camel or maybe an elephant, but it doesn't look exactly like an animal we see today.

Page 36

Ask students to look at the images as you read aloud. Talk about what they notice about this animal and an animal that is alive today.

Thaís at the Smithsonian

Thaís worked with the Smithsonian Institute. She wrote a paper. Her paper had to support an important idea. Thaís studied megafauna. These are very large animals. They are extinct now, but their fossil remains are studied by scientists. Thaís studied the giant ground sloth.

Giant ground sloths could grow to twenty feet long. They could weigh as much as two cars.

36

LITERAL—What are some characteristics of megafauna?

» Megafauna were larger than the animals today. Megafauna lived a long time ago.

INFERENTIAL—What do you think happened to the megafauna?

» They were so large they could not survive long as the environments changed.

Page 37

Ask students to look at the image as you read aloud. Talk about what they notice about the giant ground sloth.

The Giant Ground Sloth

People thought giant ground sloths lived in Brazil a long time ago before humans arrived. But she noticed that some of the fossils looked different. She did some tests on the fossils. She found evidence that the sloths lived near humans. This became the important idea Thaís wrote about.

Why Her Idea Is Important

People believe that humans first arrived in the Americas about 14,000 years ago. The evidence Thaís presented was different. It showed that people were living in the Americas about 25,000 years ago. People have discovered many places where people lived about 20,000 years ago.

37

LITERAL—What did the long claws help the giant ground sloth do?

» reach high tree branches

EVALUATIVE—How do you think the giant ground sloth was similar to the sloths we see today?

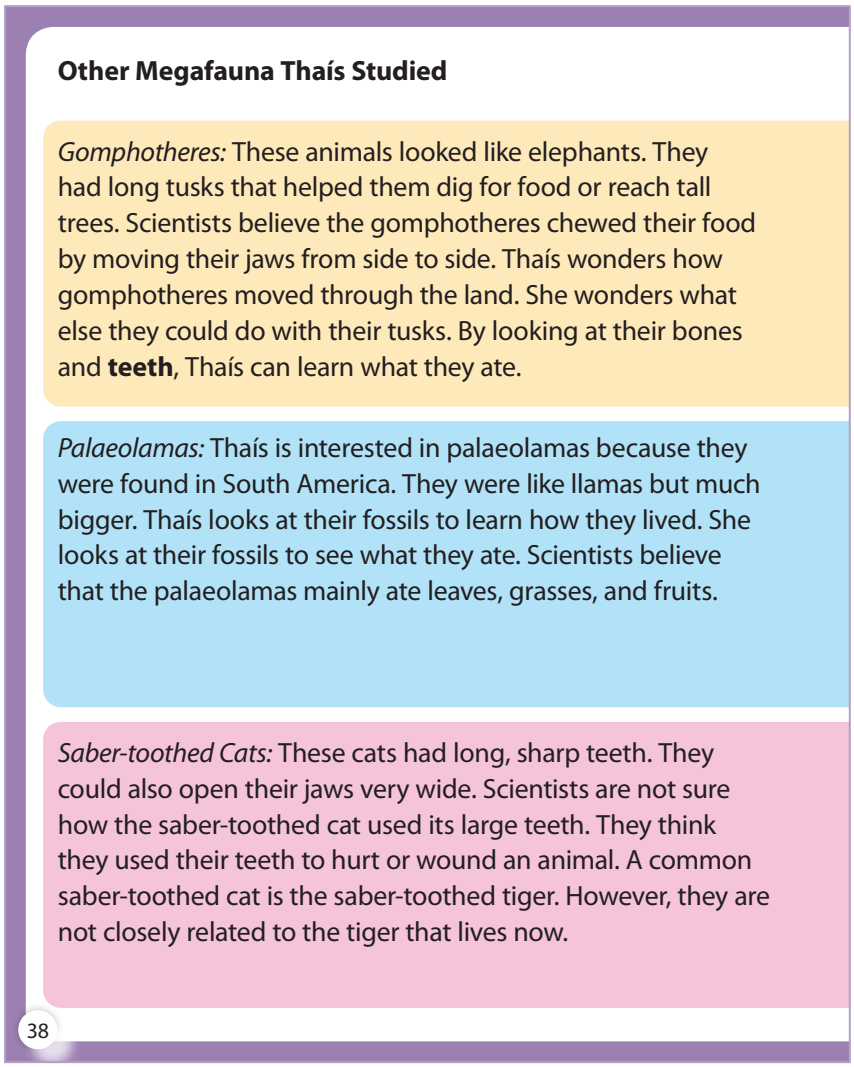
» It might have been slow-moving, like the sloths today.

INFERENTIAL—Think about the important idea Thaís wrote a paper about. What else do you think might have happened to the megafauna?

» If they were around when people were around, people might have hunted the animals.

Page 38

Ask students to look at the images as you read aloud. Talk about what they notice about the large teeth on the saber-toothed cats.



Other Megafauna Thaís Studied

Gomphotheres: These animals looked like elephants. They had long tusks that helped them dig for food or reach tall trees. Scientists believe the gomphotheres chewed their food by moving their jaws from side to side. Thaís wonders how gomphotheres moved through the land. She wonders what else they could do with their tusks. By looking at their bones and **teeth**, Thaís can learn what they ate.

Palaeolamas: Thaís is interested in palaeolamas because they were found in South America. They were like llamas but much bigger. Thaís looks at their fossils to learn how they lived. She looks at their fossils to see what they ate. Scientists believe that the palaeolamas mainly ate leaves, grasses, and fruits.

Saber-toothed Cats: These cats had long, sharp teeth. They could also open their jaws very wide. Scientists are not sure how the saber-toothed cat used its large teeth. They think they used their teeth to hurt or wound an animal. A common saber-toothed cat is the saber-toothed tiger. However, they are not closely related to the tiger that lives now.

38

LITERAL—How do scientists think the gomphotheres chewed food?

» by moving their jaws from side to side

INFERENTIAL—Why do you think people think the gomphotheres look like elephants?

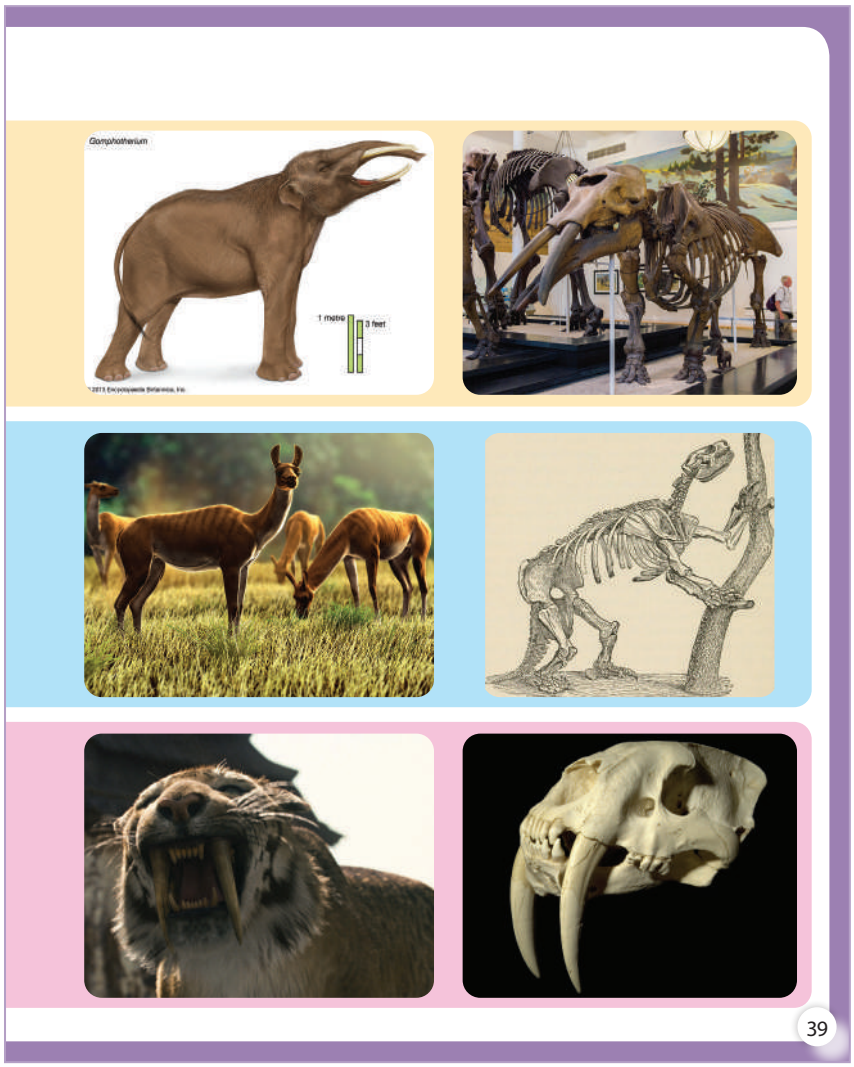
» They both have long, curved tusks and similar-looking trunks.

EVALUATIVE—Why do you think Thaís is interested in paleolamas?

» The fossils were found in South America. This is where Thaís was born and grew up.

Page 39

Ask students to look at the images as you read aloud. Talk about what they notice about the animals pictured.



INFERENTIAL—Why do you think people think the paleolama looks like a llama?

» They both have long necks and similar bodies.

LITERAL—What do saber-toothed cat **teeth** look like?

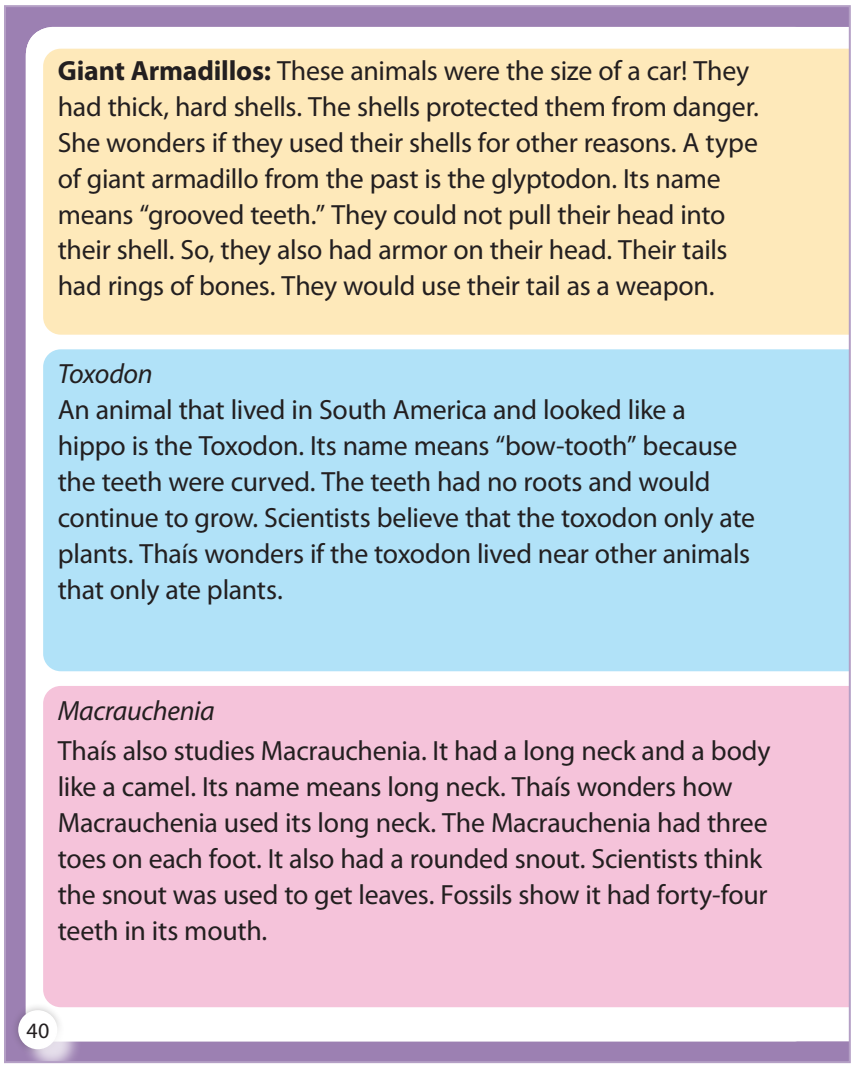
» They are long and sharp.

LITERAL—What is a common saber-toothed cat?

» saber-toothed tiger

Page 40

Ask students to look at the images as you read aloud. Talk about what they notice about the shape of the toxodon compared to a hippo.



Giant Armadillos: These animals were the size of a car! They had thick, hard shells. The shells protected them from danger. She wonders if they used their shells for other reasons. A type of giant armadillo from the past is the glyptodon. Its name means "grooved teeth." They could not pull their head into their shell. So, they also had armor on their head. Their tails had rings of bones. They would use their tail as a weapon.

Toxodon
An animal that lived in South America and looked like a hippo is the Toxodon. Its name means "bow-tooth" because the teeth were curved. The teeth had no roots and would continue to grow. Scientists believe that the toxodon only ate plants. Thaís wonders if the toxodon lived near other animals that only ate plants.

Macrauchenia
Thaís also studies Macrauchenia. It had a long neck and a body like a camel. Its name means long neck. Thaís wonders how Macrauchenia used its long neck. The Macrauchenia had three toes on each foot. It also had a rounded snout. Scientists think the snout was used to get leaves. Fossils show it had forty-four teeth in its mouth.

40

INFERENTIAL—How is the giant armadillo the same as the armadillos we see today? How is it different?

» Same: They both have thick, hard shells for protection. Different: The giant armadillo was the size of a car. The armadillos today are much smaller.

EVALUATIVE—How do you think the giant armadillo used its tail as a weapon?

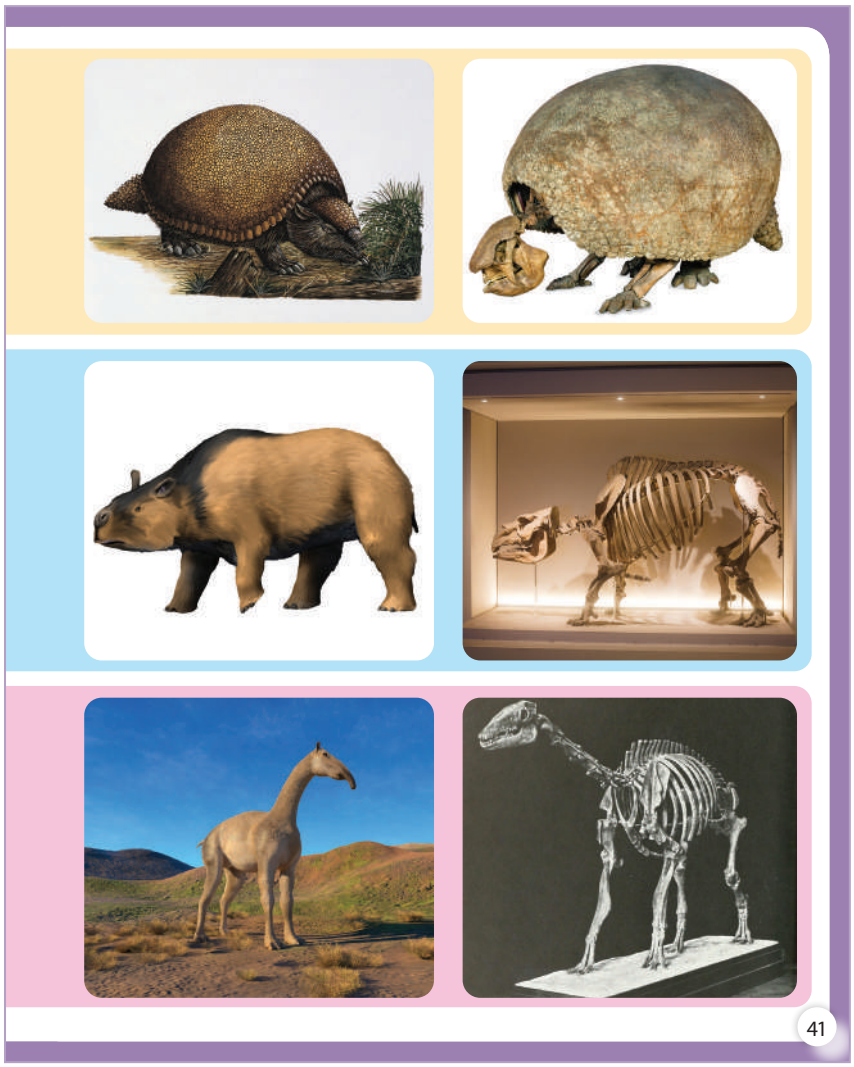
» by whipping it around

LITERAL—What does *bow-tooth* mean?

» curved teeth

Page 41

Ask students to look at the images as you read aloud. Talk about what they notice about the neck of the Macrauchenia.



INFERENTIAL—Why do you think people think a toxodon looks like a hippo?

» Their bodies look the same, and they both have large heads.

LITERAL—What two animals does the Macrauchenia look like?

» a giraffe and a horse

LITERAL—How many toes did the Macrauchenia have on each foot?

» three

Page 42

Ask students to look at the image as you read aloud. Talk about what they notice about how Thaís is learning more about fossils.

What Thaís Does Now

Today, Thaís continues to study. Thaís spends time studying fossils and analyzing how animals lived and how humans lived with them.

Thaís loves her work because it helps her learn more about Earth's history. She also shares what she learns with other scientists and students. Thaís is proud to be a scientist and she hopes her work will inspire others to study and learn about the world around them.

42

LITERAL—Why does Thaís love her work?

» because she learns more about Earth's history

INFERENTIAL—How is Thaís like a teacher?

» She shares what she learns with other people.

Page 43

Ask students to look at the image as you read aloud. Talk about what they notice about the setting of the image.

Keep Learning Like Thaís

Thaís worked hard in school to follow her passion for science. She didn't stop asking questions or reading about animals. Now she helps others learn about them, too. Just like Thaís, you can be curious and keep learning about the things that excite you! Whether it's animals, plants, or anything else, studying what you love can lead to amazing discoveries. So, keep reading, keep asking questions, and follow your dreams. One day, you might be a scientist like Thaís, learning about the world and making discoveries that help everyone understand it better!

43

INFERENTIAL—What subject do you think is Thaís's favorite?

» science

EVALUATIVE—How do you stay curious?

» I can keep asking questions and learning more.

Page 44

Ask students to look at the images as you read aloud. Talk about what they notice about the person and his interests.

LITERAL—What is the name of this person?

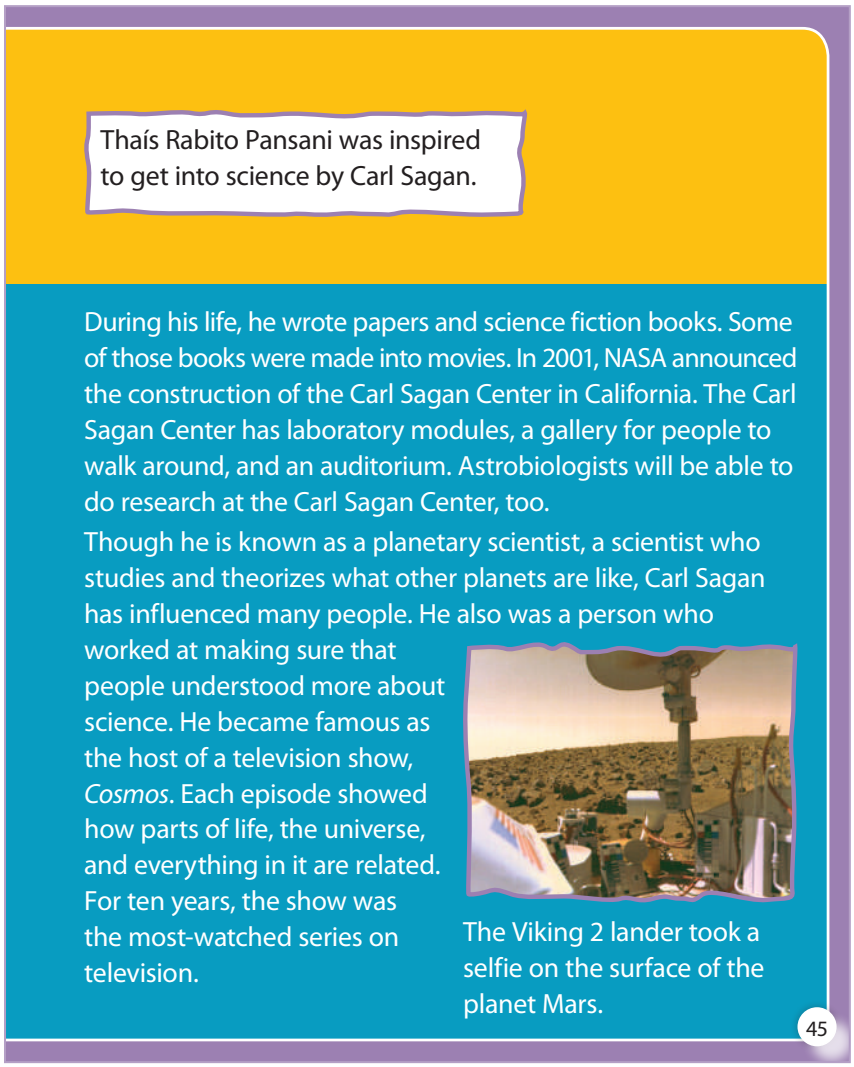
» Carl Sagan

INFERENTIAL—Why do you think Thaís was inspired by Carl Sagan?

» Carl Sagan was curious to learn more, just like Thaís.

Page 45

Ask students to look at the image as you read aloud. Talk about what they notice about the spacecraft and its parts.



INFERENTIAL—How was Carl Sagan like a teacher?

» He made sure that people understood more about science.

3. Connect to lived experience.

Activity Page

AP 4

Invite students to share any details from the chapter that resemble someone or something familiar to them. Ask students to tell details about the chapter that interested them most. Invite students to ask questions about details that might not have been clear to them.

Use AP 4 to reinforce students' reflections on the chapter.

See the Activity Pages Answer Key for correct answers and sample student responses.

EXPERIENCE B

Acting Like a Paleontologist

At a Glance

Learning Objectives

- ✓ Teach a topic.
- ✓ Group by category.
- ✓ Find similarities.

Instructional Activities

- teaching a simple concept
- grouping animals by category
- drawing and explaining similarities of objects

NGSS and CCSS References

NOS2. Scientific Knowledge Is Based on Empirical Evidence: Scientists look for patterns and order when making observations about the world.

NOS4. Scientific Models, Laws, Mechanisms, and Theories Explain Natural Phenomena: Scientists use drawings, sketches, and models as a way to communicate ideas.

NOS5. Science Is a Way of Knowing: Science knowledge helps us know about the world.

For detailed information about the NGSS and CCSS References, follow the links in the Online Resources Guide for this unit:

www.coreknowledge.org/cksci-online-resources

Core Vocabulary and Language of Instruction

The Glossary at the end of this Teacher Guide lists definitions for Core Vocabulary and selected Language of Instruction.

Core Vocabulary terms are those that students should learn to use accurately in discussion. During instruction, expose students repeatedly to these terms but not through isolated drill or memorization.

category **similarity**

Language of Instruction consists of additional terms that you should use when talking about concepts in the lesson. Students benefit from your modeling the use of these words without the expectation that students themselves will use or explain the words.

compare **demonstrate** **environment**

Instructional Resource

Activity Page

AP B

Activity Page
Similar Objects (AP B)

Materials and Equipment

Collect or prepare the following items:

- reference books and other research materials
- internet access and the means to project images/video for whole-class viewing
- images of a variety of different animals

Advance Preparation:

Locate images of animals alive today that have similarities that can be grouped in categories. Share the images digitally or print them out for students.

The Core Lesson

1. Focus attention and preview the investigation.

Remind students that they learned in Chapter 4 that Thaís studies many different dinosaurs and how they ate and interacted in their environment. She worked with other paleontologists and shared what she learned about the past with others. Invite a discussion on how to act like a paleontologist.

Set the stage for the investigations you plan for your students.

Investigation 1—Share information by teaching others about it.

Investigation 2—Group animals living today in categories.

Investigation 3—Compare and explain how two objects are physically similar or have a similar task.

2. Facilitate Investigation 1.

- Remind students that when Thaís was younger, she wanted to be a teacher. Even though she is a paleontologist now, she still teaches others about what she learns about animals and the environment in the past.
- Choose a simple task that can be quickly shared and taught to the class, such as tying shoelaces or washing hands.
- Share with students that you are going to demonstrate a task and how to do it.
- Describe the steps of the task as you demonstrate it to the students. If possible, provide drawings or photos on a step-by-step procedural poster.
- Leave a few minutes at the end of your demonstration for students to ask questions.
- Place students in pairs.

- Have them decide on a topic to teach the class. Remind students that the topic does not have to be completely new to everyone.
- Once pairs have had a chance to practice how they will teach the class about their topic, provide time for each pair to teach in front of the class.
- Once all pairs have taught their topic, have students discuss how they are acting like a paleontologist in this investigation.

3. Facilitate Investigation 2.

- Lead a discussion about the different dinosaurs Thaís studies that are similar to animals living today. Explain that a **similarity** is a trait of an object, such as appearance, that is like, or similar to, another thing.
- Remind students that paleontologists compare animals in the past with animals living today to try to determine what the animals in the past might have eaten or their behaviors.
- Place students in small groups.
- Provide a variety of images of animals that are living today, making sure there are a few animals that can be placed within a specific category. Explain that a **category** is a group of objects or living things that have a similar trait; for example, most birds having wings.
- Assign a category, such as walk on four legs, have wings, have scales, have fins, and so on, to each group.
- Students will write their group's category on a sheet of paper. Then they will write or draw the animals from those shown that fit the category.
- Remind students that paleontologists look at their observations and the way they group animals a few times. This helps make sure that they are grouping accurately.
- Once students are finished with grouping, have them share their category and the animals that fit their category with the class.
- Have students discuss if some animals can fit in more than one category.
- To conclude, have students discuss how they are acting like a paleontologist in this investigation.

SUPPORT—Offer support to groups that need assistance with determining which animals fit in their category. Share one animal at a time and discuss if it matches the category. Do this for each animal.

4. Facilitate Investigation 3.

Activity Page

AP B

- Share that students will work individually on this investigation.
- Lead a class discussion about how Thaís and other paleontologists look for similarities when studying fossils.
- Explain that students are going to draw pairs of things that are similar. The things can look similar or have a similar task. Share an example, such as a lead

pencil and a colored pencil. They look similar. Then show a colored pencil and a crayon. They have a similar task of putting color on a paper.

- Review Similar Objects (AP B) and how students will draw two things in one box and write how the things are similar.
- Point out that there are three boxes. Students will draw two similar things in each box. Only the things in the same box need to be similar.
- Once students have completed their drawings and explanations, have them share with a partner.
- Have students discuss how they are acting like a paleontologist in this investigation.

CHALLENGE—Make the investigation more complex by having students name two things that are different but look similar and have similar tasks.

5. Summarize and discuss.

For Investigation 1, have students share the topic they taught.

- Is it easier to learn something new or something you know a little bit about? Why? (*Possible answer: It is easier to learn something new because there are no changes in what you already know.*)
- Why is it important for paleontologists to teach others what they learn? (*Possible answer: so that others can learn about it, too*)

For Investigation 2, have students share the animals and category their group sorted.

- What animal not shown can also be in your category? (*Possible answer: a cat could be in the category of walking on all four legs; a shark could be in the category of living in water; a kangaroo could be in the category of walking on two legs.*)
- Why do you think paleontologists try to compare dinosaur fossils to animals that are alive today? (*Possible answer: to understand more about the animal*)

For Investigation 3, have students share their drawings from AP B.

- How are the two things you drew in the first box similar? (*Possible answer: They are both foods from the ground.*)
- Why do you think paleontologists share similarities with others? (*Possible answer: so they can compare and find ways things in the past are similar to things that are around us now*)

6. Check for understanding.

Invite students to summarize what they learned about acting like paleontologists. Prompt observations shared earlier as needed.

See the Activity Pages Answer Key for correct answers and sample student responses.

GRADE 1

Teacher Resources

Activity Pages

Name _____ Date _____

Activity Page 1 Use with Lesson 1

Parts for Moving

Daniela learned that whales used to have tiny legs. The legs helped the whales move on land a long time ago.

Think about an animal you like or know a lot about. Draw the animal. Now draw a circle around the part of the animal that helps it move.

Name _____ Date _____

Activity Page 2 Use with Lesson 2

Is It a Bird?

Scientists compare dinosaur skeletons with animals that are alive. This helps them see how animals might be the same or different. Some parts of the Oviraptor were like a bird. Sort the words into two different groups.

Word Bank:

feathers fur paws teeth beaks talons hair scales

Bird	Not a Bird

Name _____ Date _____

Activity Page A Use with Experience A

My Angle Views

Drawing different views of an object is exploring like a paleontologist. Draw each angle view of your object.

Front	Back	Left Side

Top	Bottom	Right Side

Name _____ Date _____

Activity Page 3 Use with Lesson 3

What Is in Nature?

Think about things found in nature. Draw five things found in nature. Think of things not found in nature. Draw five things not found in nature.

Nature	Not Nature

Name _____ Date _____

Activity Page 4 Use with Lesson 4

Different Teeth

Not all animals have teeth. Animals with teeth usually have flat teeth, sharp teeth, or both. Think of the teeth of different animals. Draw an animal that has mostly flat teeth and eats plants. Draw an animal with mostly sharp teeth that eats meat. Draw an animal with flat and sharp teeth that eats plants and meat.

Flat Teeth

Sharp Teeth

Flat and Sharp Teeth

Name _____ Date _____

Activity Page B Use with Experience B

Similar Objects

Looking for similarities is acting like a paleontologist. In the first box, draw two things that have a similarity. Write what is similar in the box. Repeat this for the other two boxes.

1.

2.

3.

Activity Pages Answer Key

This answer key offers guidance to help you assess your students' understanding. Here, you will find descriptions of expectations, reasonable sample responses for open-ended items, and where called for, singularly correct answers for each activity page of this grade level.

Parts for Moving (AP 1) (Page 75)

Students might circle the wings and/or legs of a bird, the legs and/or paws of a rabbit, the fins of a fish, etc. Check to make sure the circled parts of the animal help it move.

Is It a Bird? (AP 2) (Page 76)

Bird: feathers, beaks, talons; Not a Bird: fur, paws, teeth, hair, scales

My Angle Views (AP A) (Page 77)

Student drawings should reflect six different perspectives of the same object.

What Is in Nature? (AP 3) (Page 78)

Sample answer: Nature: birds, mountains, dolphins, trees, rocks; Not Nature: television, computer, water bottle, couch, building

Different Teeth (AP 4) (Page 79)

Sample answer: Flat Teeth: cows, horses, rabbits; Sharp Teeth: sharks, lions, wolves; Flat and Sharp Teeth: bears, racoons, sea turtles

Similar Objects (AP B) (Page 80)

Sample answer: A basketball and a soccer ball are similar in shape and size. A bird nest and a bed have a similar use. Desks and dining tables both are used to place things on.

Appendix A

Glossary

Purple words and phrases are Core Vocabulary in the lessons, though the terms are not called out with color or bold treatment on the Student Book pages. **Boldface words and phrases** are additional vocabulary terms related to the lessons that you should model for students during instruction. Many of these also appear in the Student Book. Vocabulary words are not intended for use in isolated drill or memorization.

B

biology, n. the study of living plants and animals

C

category, n. a group of things that have something in common

change, v. to become different

claws, n. a curved nail on the digits of some animals

common, adj. belonging to or shared by more than one person or thing, occurring frequently

compare, v. to examine characteristics of two or more things, particularly looking for similarities

country, n. a nation with its own government

D

demonstrate, v. to show how something works

dig site, n. a place where archaeologists bring materials up from under the surface of Earth

digs, n. places where people are excavating

E

environment, n. the living and nonliving elements in an area that affect the things that live there

excavate, v. to dig up something

F

fossil, n. the remains of an organism preserved in rock form

N

nature, n. places, wild plants, and wild animals that are not made by humans

nest, n. the resting place for an animal, especially for young animals

P

paleontologist, n. a scientist who studies fossils

paleontology, n. the study of plants and animals from the past

pieces, n. parts of something

Q

quarry, n. a place from which materials are being dug up

S

scientist, n. a person who investigates using scientific methodology

shore, n. the area where the land and sea meet

similarity, n. a trait of an object that is like, or similar to, another thing

skeleton, n. the internal body structure made up of bones, cartilage, and joints

survey, n. a planned collection of information from a target population

T

teeth, n. hard, bony structures in the mouth used for biting and chewing

tool, n. an instrument that aids in completing a task

tusks, n. long, pointed teeth

Appendix B

Safety

Classroom Safety: In the Core Knowledge Science program (CKSci), activities and demonstrations are a vital part of the curriculum and provide students with active engagement related to the lesson content. The activities and demonstrations in the Science in Action lessons make comparatively modest use of materials and hands-on science experiences. Some activities and demonstrations do make use of materials and equipment that are typically deemed classroom safe and readily available.

Safety should be a priority when engaged in science activities. With that in mind, observe the following safety procedures when the class is engaged in activities and demonstrations:

- Report and treat any injuries immediately.
- Check equipment prior to usage, and make sure everything is clean and ready for use.
- Clean up spills or broken equipment immediately using the appropriate tools.
- Monitor student behavior to ensure they are following proper classroom and activity procedures.
- Do not touch your eyes, ears, face, or mouth while engaging in an activity or demonstration.
- Review each step of the lesson to determine if there are any safety measures or materials necessary in advance.
- Wear personal protective equipment (e.g., safety goggles, aprons, etc.) as appropriate.
- Check for allergies to foods, latex, and other materials that students may have, and take appropriate measures.
- Secure loose clothing, hair, or jewelry.
- Establish storage and disposal procedures for chemicals as per their Safety Data Sheet (SDS), including household substances such as vinegar and baking soda.

Internet Safety: Though online resources present many rich opportunities for student learning, unsupervised online activity for children is not advised. The U.S. Department of Justice provides the following guidelines, Keeping Children Safe Online:

- Discuss internet safety and develop an online safety plan.
- Supervise young children's use of the internet.
- Review games, apps, and social media sites.
- Adjust privacy settings and use parental controls for online games, apps, social medial sites, and electronic devices.
- Tell children to avoid sharing personal information, photos, and videos online.
- Teach children about body safety and boundaries.
- Be alert to potential signs of abuse.
- Encourage children to tell a parent, guardian, or other trusted adult if anyone asks them to engage in sexual activity or other inappropriate behavior.
- Copy and distribute the Student Online Safety Contract, found on the next page. Prior to the start of the first lesson, do a read-along, and have students agree to the expectations for when they engage in computer and online activities.

Online Resources

For additional support concerning internet safety and online instruction, follow the links in the Online Resources Guide for this unit:

www.coreknowledge.org/cksci-online-resources

Student Safety Contract

Dear Parent or Guardian,

During science class, we want to create and maintain a safe classroom. With this in mind, we want students to be aware of the behavior expectations for engaging in online science activities. Please review the safety rules below with your student and sign this contract. If you have any questions, please feel free to contact me.

For important safety information about children, computers, and the internet, consider resources at these sites:

https://protectyoungeyes.com/

https://sharedhope.org/

https://www.justice.gov/coronavirus/keeping-children-safe-online

---

Teacher signature and date

_____ _____/_____/_____/

Parent or guardian signature and date

_____ _____/_____/_____/

When doing online activities, I will do the following:

- Only do online activities with the supervision of an adult.
- Only visit websites and use apps that I am guided to by my teacher, parent, or trusted adult guardian.
- Never use my real name or reveal personal information if I communicate with others online.
- Tell a trusted adult right away if anyone online asks questions about my name, where I live, or where I go to school.
- Be careful around electronic devices and only plug them in or unplug them when an adult is supervising.

I understand and agree to the safety rules in this contract.

Student signature and date

_____ _____/_____/_____/

Print name

_____

Appendix C

Strategies for Acquiring Materials

The materials used in the Core Knowledge Science in Action program are readily available and can be acquired through both retail and online stores. Some of the materials are reusable and are meant to be used repeatedly. This includes items such as plastic cups that can be safely used again. Often, these materials are durable and will last for more than one activity or even one school year. Other materials are classified as consumable and cannot be used more than once.

Online Resources

The Material Supply List for this unit's activities can be found online. Follow the links in the Online Resources Guide for this unit:

www.coreknowledge.org/cksci-online-resources

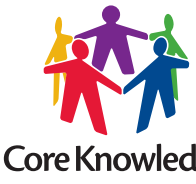
Ways to Engage with Your Community

The total cost of materials and technology can add up for an entire science program, even when the materials required for activities and demonstrations have been selected to be individually affordable. The time needed to acquire the materials adds up, too. Reaching out to your community to help support STEM education is a great way to engage parents, guardians, and others in the teaching of science as well as reduce the cost and time of collecting the materials. With that in mind, the materials list can be distributed or used as a reference for the materials teachers will need to acquire to teach the unit.

Consider some of the following as methods for acquiring the science materials:

- School Supply Drive—If your school has a supply drive at any point in the year, consider distributing materials lists as wish lists for the science department.
- Open Houses—Have materials lists available during open houses. Consider having teams of volunteers perform an activity to show attendees how the materials will be used throughout the year.
- Parent-Teacher Organizations—Reach out to the local PTO for assistance with acquiring materials.
- Science Fair Drive—Consider adding a table to your science fair as part of a science materials drive for future units.
- College or University Service Project—Ask service organizations affiliated with your local higher education institutions to sponsor your program by providing materials.
- Local Businesses—Some businesses have discounts for teachers to purchase school supplies. Others may want to advertise as sponsors for your school/programs. Usually, you will be asked for verifiable proof that you are a teacher and/or for examples of how their sponsorship will benefit students.

Remember: If your school is public, it will be tax-exempt, so make sure to have a Tax Identification Number (TIN) when purchasing materials. If your school is private, you may need proof of 501(c)(3) status to gain tax exemption. Check with your school for any required documentation.



CKSci™

Core Knowledge SCIENCE™

Editorial Director

Daniel H. Franck

Subject Matter Expert

Martin Rosenberg, PhD
Teacher of Physics and Computer Science
SAR High School
Riverdale, New York

Illustrations and Photo Credits

Alfonso Fabio Iozzino / Alamy Stock Photo: Cover B, 34e
Anton Ivanov / Alamy Stock Photo: 63b
Book Worm / Alamy Stock Photo: 65f
CBW / Alamy Stock Photo: 69
Cinematic / Alamy Stock Photo: 63e
Corbin17 / Alamy Stock Photo: 34b
Corey Ford / Alamy Stock Photo: 34c, 37b
Daniel Cole / Alamy Stock Vector: 68b
Daniela Barrera Guevara: 27a, 30, 31a–c, 32a–b, 36a–e
Dody Xio / Alamy Stock Photo: 35a
Esteban De Armas / Alamy Stock Photo: Cover C, i, iii, 61, 65e
Julian Pottage / Alamy Stock Photo: 65d
mark Turner / Alamy Stock Photo: 34a
NASA Photo / Alamy Stock Photo: 68a
Pep Roig / Alamy Stock Photo: 28a
Reading Room 2020 / Alamy Stock Photo: 63d
Rick Rudnicki / Alamy Stock Photo: 29
Robert Malone / Alamy Stock Photo: 63f
Sabena Jane Blackbird / Alamy Stock Photo: 59
Sandra Foyt / Alamy Stock Photo: 60a
simon evans / Alamy Stock Photo: 60b
Stocktrek Images, Inc. / Alamy Stock Photo: 35b, 63c, 65c
Thais Rabito Pansani: 58, 66, 67
The Natural History Museum / Alamy Stock Photo: Cover A, 37a, 65b
Universal Images Group North America LLC / Alamy Stock Photo: 63a
Universal Images Group North America LLC / DeAgostini / Alamy Stock Photo: 65a
Xavier Fores - Joana Roncero / Alamy Stock Photo: 34d

Within this publication, the Core Knowledge Foundation has provided hyperlinks to independently owned and operated sites whose content we have determined to be of possible interest to you. At the time of publication, all links were valid and operational, and the content accessed by the links provided additional information that supported the Core Knowledge curricular content and/or lessons. Please note that we do not monitor the links or the content of such sites on an ongoing basis and both may be constantly changing. We have no control over the links, the content, or the policies, information-gathering or otherwise, of such linked sites.

By accessing these third-party sites and the content provided therein, you acknowledge and agree that the Core Knowledge Foundation makes no claims, promises, or guarantees about the accuracy, completeness, or adequacy of the content of such third-party websites and expressly disclaims liability for errors and omissions in either the links themselves or the contents of such sites. If you experience any difficulties when attempting to access one of the linked resources found within these materials, please contact the Core Knowledge Foundation:

www.coreknowledge.org/contact-us/

Core Knowledge Foundation
801 E. High St.
Charlottesville, VA 22902

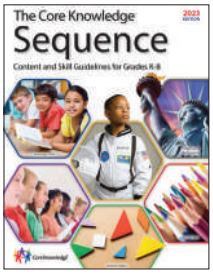
Core Knowledge Curriculum Series™

CKSci™

Core Knowledge SCIENCE™

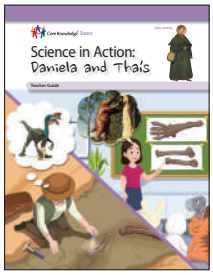
Science in Action: Daniela and Thaís

Core Knowledge Science 1



What is the Core Knowledge Sequence?

The *Core Knowledge Sequence* is a detailed guide to specific content and skills to be taught in Grades K–8 in language arts, history, geography, mathematics, science, computer science, and the fine arts. In the domain of computer science, the *Core Knowledge Sequence* outlines topics that build systematically grade by grade to support student learning progression coherently over time.



For which grade levels is this book intended?

In general, the content and presentation of this book are appropriate for students in the early elementary grades. For teachers and schools following the *Core Knowledge Sequence*, this book is intended for Grade 1 and is part of a series of **Core Knowledge SCIENCE** units of study.

For a complete listing of resources in the
Core Knowledge SCIENCE series,
visit **www.coreknowledge.org**.

CKSci™

Core Knowledge Science™

A comprehensive program in science, integrating topics
from Earth and Space, Life, and Physical Sciences
with concepts specified in the Core Knowledge Sequence
(content and skill guidelines for Grades K–8)

CK Science in Action™
units in this series include:

Grade K: Kyle and Jamie
Grade 1: Daniela and Thaís
Grade 2: Laura and Sandra
Grade 3: Christian and Skylar
Grade 4: Pearl, Dan, and Ken
Grade 5: Rowan and Gianna

www.coreknowledge.org

Core Knowledge Curriculum Series™

ISBN: 979-8-88970-559-8