

Plant and Animal Survival

Teacher Guide

eating food



animal parts



plant survival



parents and young

Plant and Animal Survival

Teacher Guide



Core Knowledge®

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Plant and Animal Survival

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Plant and Animal Survival Teacher Guide

Core Knowledge Science™ 1



Introduction

ABOUT THIS UNIT

The Big Idea

This unit focuses on the structure, function, growth, and development of plants and animals and how plants and animals process information.

Students understand that certain parts of their body carry out certain functions. The same is true for plants and animals. They will recognize that certain animals have body structures that serve similar functions to our body parts. Students will also explore the connection between structure and function in plants and determine similarities and differences. These various physical and behavioral traits in plants and animals are important for survival. Students will investigate physical traits that enable plants and animals to survive, grow, and meet their needs. They will recognize that certain behaviors of parents and offspring also help offspring survive. Students will learn how young are similar to but not exactly like their parents. Students will use prior and new experiences to design a solution to a human problem by mimicking how plants and animals use their external parts to survive, grow, and meet their needs.

In this unit, students examine physical and behavioral traits for survival as planners of an animal sanctuary and rehab agency. Students will then apply what they learn to determine how an animal rehab agency imitates nature to help animals survive. Students will further investigate traits, parents, offspring, and behaviors in Grade 3 Unit 2 *Life Cycles, Traits, and Variations*. They will further investigate structure, function, and information processing in plants and animals in Grade 5 Unit 2 *Structures and Functions of Living Things*.

Students explore concepts that include the following:

- All organisms have external parts. Different animals use their body parts in different ways to see, hear, grasp objects, protect themselves, move from place to place, and seek, find, and take in food, water and air. Plants also have different parts (roots, stems, leaves, flowers, fruits) that help them survive and grow.
- Adult plants and animals can have young. In many kinds of animals, parents and the offspring themselves engage in behaviors that help the offspring to survive.
- Animals have body parts that capture and convey different kinds of information needed for growth and survival. Animals respond to these inputs with behaviors that help them survive. Plants also respond to some external inputs.

- Young animals are very much but not exactly like their parents. Plants also are very much but not exactly like their parents.
- Individuals of the same kind of plant or animal are recognizable as similar but can also vary in many ways.

Engineers and engineering designers use knowledge of the properties of matter as they use materials in design solutions and make things that are useful to people. This series of lessons incorporates learning goals that support the principles and practices of engineering design, such as defining problems, testing materials, and evaluating possible solutions.

Note to Teachers and Curriculum Planners

This unit introduces Grade 1 students to real-world examples and fundamental concepts of traits and behaviors that help organisms survive, which will be explored in greater depth in later grades. Students will learn about similarities and differences between parents and offspring, behaviors of parents and offspring, and how organisms' parts contribute to their survival.

- While students learn that living things get traits from parents, they do not yet discuss specific inheritance, characteristics of animals that undergo metamorphosis, or hybrids.

Note to Core Knowledge Teachers

Thanks to ongoing research in the field, our understanding of how children learn continues to evolve. In the subject area of science, students benefit not just from reading about concepts and ideas, but from hands-on experiences. Following the release of the Next Generation Science Standards (NGSS), the Core Knowledge Foundation used this opportunity to update and enhance the science portion of the *Core Knowledge Sequence*.

While there have been some shifts in the grade levels at which certain topics are recommended, the fundamental principles of pedagogy inherent to the Core Knowledge approach, such as the importance of building a sequential, coherent, and cumulative knowledge base, have been retained.

Online Resources



To learn more about the changes and to access resources for this unit, please use the links found in the Online Resources Guide.

www.coreknowledge.org/cksci-online-resources

This science unit embodies Core Knowledge's vision of best practices in science instruction and knowledge-based schooling, such as the following:

- building students' knowledge of core ideas in life, physical, and Earth sciences, as well as engineering design
- developing scientific practices that give students firsthand experience in scientific inquiry, engineering, and technology
- connecting scientific learning to concepts across various disciplines, such as mathematics and literacy

What are the relevant NGSS Performance Expectations for this unit?*

This unit, *Plant and Animal Survival*, has been informed by the following Grade 1 Performance Expectations for the NGSS topic *Structure, Function, and Information Processing*. Students who demonstrate understanding can do the following:

1-LS1-1 Use materials to design a solution to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs.

1-LS1-2 Read texts and use media to determine patterns in behavior of parents and offspring that help offspring survive.

1-LS3-1 Make observations to construct an evidence-based account that young plants and animals are like, but not exactly like, their parents.

Online Resources



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

www.coreknowledge.org/cksci-online-resources

*NEXT GENERATION SCIENCE STANDARDS (NGSS) is a registered trademark of Achieve. Neither Achieve 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.

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.

What Students Should Already Know

The concept of progressions, articulated in the National Research Council's *A Framework for K–12 Science Education: Practices, Crosscutting Concepts, and Core Ideas*, is very much aligned to the Core Knowledge principle of building new knowledge on prior knowledge. According to the NRC, students build “progressively more sophisticated explanations of natural phenomena” over the course of many years of schooling. “Because learning progressions extend over multiple years, they can prompt educators to consider how topics are presented at each grade level so that they build on prior understanding and can support increasingly sophisticated learning.” In schools following NGSS recommendations, teachers can build on the “prior understandings” captured in the following summaries of NGSS Disciplinary Core Ideas:

LS1.C: Organization for Matter and Energy Flow in Organisms

- All animals need food in order to live and grow. They obtain their food from plants or from other animals. Plants need water and light to live and grow.

ESS3.A: Natural Resources

- Living things need water, air, and resources from the land, and they live in places that have the things they need. Humans use natural resources for everything they do.

ETS1.A: Defining and Delimiting Engineering Problems

- A situation that people want to change or create can be approached as a problem to be solved through engineering.
- Asking questions, making observations, and gathering information are helpful in thinking about problems.
- Before beginning to design a solution, it is important to clearly understand the problem.

ETS1.B: Developing Possible Solutions

- Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people.

ETS1.C: Optimizing the Design Solution

- Because there is always more than one possible solution to a problem, it is useful to compare and test designs.

What Students Need to Learn

For this unit, the Core Knowledge Science Sequence specifies the following content and skills. Specific learning objectives are provided in each lesson segment throughout the unit. NGSS References, including Performance Expectations, Disciplinary Core Ideas, and Crosscutting Concepts, are included at the start of each lesson segment as appropriate.

Lesson 1. Structure and Function in Plants and Animals

SEGMENTS 1–5

- Identify external parts that plants use to grow and survive.
- Identify external parts that animals use to grow and survive.
- Describe how human objects mimic plant and animal parts.
- Design a solution to a human problem based on plant or animal parts.

Lesson 2. Information Processing: Plant and Animal Stimulus and Response

SEGMENTS 1–5

- Identify how plants sense their surroundings to grow and survive.
- Identify how animals sense their surroundings to grow and survive.
- Describe how human objects mimic plant and animal senses.
- Design a solution to a human problem based on plant or animal senses.

Lesson 3. Parents and Offspring: Traits and Inheritance

SEGMENTS 1–5

- Explain that plant and animal offspring look like, but not exactly like, their parents.
- Describe the traits that adult plants and animals have in common with others in their species.

Lesson 4. Growth and Development

SEGMENTS 1–4

- Describe behaviors of parent animals that help offspring survive.
- Describe behaviors of offspring that help offspring survive.
- Compare and contrast caretaking behaviors of different animals.
- Compare and contrast offspring survival behaviors of different animals.

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, as well as connections to relevant math and reading language arts standards.

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

USING THE STUDENT BOOK

Student Book



The *Plant and Animal Survival* Student Book includes ten chapters, intended to be read aloud by the teacher as the students look at images on each page.

As you will note when you examine the Student Book, minimal text is included on each page. Instead, colorful photos and engaging illustrations dominate the Student Book pages. The design of the Student Book in this way is intentional because students in Kindergarten through Grade 2 are just learning to read. At these grade levels, students are learning how to decode written words, so 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 CKSci lessons is to build students’ understanding and knowledge of science concepts, as well as of associated practices and skills. It is for this very reason that in Grades K–2 CKSci, the core content of each lesson is reinforced to students 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 text 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.

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

Pacing

To meet NGSS Performance Expectations we encourage teachers to complete all Grade 1 CKSci units during the school year. To be sure all NGSS standards and dimensions are addressed, each Core Lesson segment should be completed. Each lesson segment requires thirty to forty-five minutes of instruction time. The time it takes to complete a full lesson depends on class size and individual circumstances.

Within the Teacher Guide, each Core Lesson is composed of multiple numbered segments, generally four to six. Each segment concludes with a Check for Understanding, providing the teacher with an opportunity for formative assessment.

At the end of this unit introduction, you will find a blank Pacing Guide on pages 17–18, which you may use to plan how you might pace the lessons. We strongly recommend that you preview the unit in full before beginning and create your pacing guide before teaching the first lesson segment. As a general rule, we recommend that you spend a minimum of thirty-eight days and a maximum of fifty-seven days teaching the *Plant and Animal Survival* unit so that you have time to teach the other units in the Grade 1 CKSci series.

The Core Lessons

- Lesson time: Most Core Lesson segments constitute one classroom session of thirty to forty-five minutes. However, some segments cover two or three days of instruction, and some single-day activities and performance tasks will require setting aside a longer block of time.
- Lesson order: The lesson segments are coherently sequenced to build from one to the next, linking student engagement across lessons and helping students build new learning on prior knowledge.

Unit Opener: Introduction to the Unit Phenomenon and Problem	Unit Opener: Plant and Animal Survival	Big Question: How is a wildlife center designed to help animals survive?
Lesson 1: Structure and Function in Plants and Animals (1-LS1-1)	1.1 What Parts Do Animals Have?	Lesson 1 Guiding Question: How do the parts of plants and animals help them survive?
	1.2 How Do Animals Use Their Parts? (two class sessions)	1.1 What are some animal body parts, and what do they do?
	1.3 How Do Plant Parts Help the Plant (two class sessions)	1.2 How do different body parts help birds, dogs, and turtles survive?
	1.4 What Things Do We Use That Are Similar to Animal and Plant Parts? (two class sessions)	1.3 How do plant parts help them survive?
	1.5 Lesson 1 Roundup: What Problems Can We Solve? (three class sessions)	1.4 What objects do humans use that look and act like animal and plant parts?
		1.5 How can we mimic plant and animal parts to solve a human problem?

Lesson 2: Information Processing: Plant and Animal Stimulus and Response (1-LS1-1)	2.1 What Sensory Parts Do Animals Have? (two class sessions)	Lesson 2 Guiding Question: How do plant and animal parts allow them to sense and respond to their surroundings? 2.1 What parts help animals sense their surroundings?
	2.2 How Do Animals Sense and Respond to Things? (two class sessions)	2.2 How do animals sense and respond?
	2.3 Plants Have Senses, Too! (two class sessions)	2.3 How do plants respond to their surroundings?
	2.4 Animal and Plant Senses (two class sessions)	2.4 How do plant and animal senses resemble things humans use?
	2.5 Lesson 2 Roundup: Mimicking Animal and Plant Senses (three class sessions)	2.5 How can people build useful things that work the way a plant or an animal responds to its surroundings?
Lesson 3: Parents and Offspring: Traits and Inheritance (1-LS3-1)	3.1 What Are Parents and Offspring? (two class sessions)	Lesson 3 Guiding Question: How alike are plants and animals of the same kind? 3.1 What makes plants or animals belong to the same group?
	3.2 Plant Traits	3.2 How are plants of the same type alike and different?
	3.3 Animal Traits	3.3 How are animals of the same type alike and different?
	3.4 Animals, Plants, and Their Traits (two class sessions)	3.4 How are plants and animals of the same type alike and different?
	3.5 Lesson 3 Roundup: Groups of Plants and Animals (two class sessions)	3.5 What makes plants or animals belong to the same group?
Lesson 4: Growth and Development (1-LS1-2)	4.1 What Behaviors Help Offspring Survive?	Lesson 4 Guiding Question: What kinds of patterns in behavior of parents and offspring help offspring survive? 4.1 How do parent animals take care of their young?
	4.2 Behaviors of Parents and Offspring	4.2 What do different animals do to survive?
	4.3 Parents and Their Behaviors (two class sessions)	4.3 How can we show what parents do to help their offspring survive?
	4.4 Lesson 1 Roundup: Offspring Survival Behaviors (two class sessions)	4.4 How do young animals behave to help themselves survive?
Unit Capstone	Unit Capstone: Plant and Animal Survival	Big Question: How is a wildlife center designed to help animals survive?
Unit Supplement	Science in Action (two class sessions)	Who are some people who work in this type of science, and what do they do?

Activity Pages

Activity Pages



AP 1.1.1

AP 1.2.1

AP 1.3.1

AP 1.3.2

AP 1.3.3

AP 1.4.1

AP 1.5.1

AP 1.5.2

AP 1.5.3

AP 2.1.1

AP 2.1.2

AP 2.1.3

AP 2.1.4

AP 2.2.1

AP 2.3.1

AP 2.3.2

AP 2.3.3

AP 2.4.1

AP 2.4.2

AP 2.5.1

AP 2.5.2

AP 2.5.3

AP 3.1.1

AP 3.1.2

AP 3.1.3

AP 3.2.1

Black-line reproducible masters for Activity Pages, as well as an Answer Key, are included in Teacher Resources on pages 233–274. The icon shown to the left appears throughout the Teacher Guide wherever Activity Pages (AP) are referenced. The Activity Pages can be organized into a learning portfolio for each student to demonstrate their progress relative to NGSS expectations and as student work products.

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

Lesson 1—Animal Museum (AP 1.1.1)

Lesson 1—What We Notice (AP 1.2.1)

Lesson 1—What Makes Up a Plant? (AP 1.3.1)

Lesson 1—Plant Parts (AP 1.3.2)

Lesson 1—Plant Game (AP 1.3.3)

Lesson 1—What Do We Use? (AP 1.4.1)

Lesson 1—Animal and Plant Cards (AP 1.5.1)

Lesson 1—Human Problem Cards (AP 1.5.2)

Lesson 1—Let's Solve a Problem! (AP 1.5.3)

Lesson 2—Seeing Station (AP 2.1.1)

Lesson 2—Detective Sheet (AP 2.1.2)

Lesson 2—Cat Senses (AP 2.1.3)

Lesson 2—Animal Senses (AP 2.1.4)

Lesson 2—How Animals Respond (AP 2.2.1)

Lesson 2—Plant Picture (AP 2.3.1)

Lesson 2—Seeds (AP 2.3.2)

Lesson 2—What Plants Sense (AP 2.3.3)

Lesson 2—What Part Would I Use? (AP 2.4.1)

Lesson 2—What Plants Do (AP 2.4.2)

Lesson 2—Animal and Plant Cards (AP 2.5.1)

Lesson 2—Human Problem Cards (AP 2.5.2)

Lesson 2—Let's Solve a Problem! (AP 2.5.3)

Lesson 3—Animal and Plant Species Cards (AP 3.1.1)

Lesson 3—Animal and Plant Types (AP 3.1.2)

Lesson 3—Parents and Offspring (AP 3.1.3)

Lesson 3—Plants: Same or Different? (AP 3.2.1)

Activity Pages



AP 3.3.1
AP 3.4.1
AP 3.5.1
AP 4.1.1
AP 4.2.1
AP 4.3.1
AP 4.4.1
AP 4.4.2

Lesson 3—Lost Puppy (AP 3.3.1)

Lesson 3—Saguaros (AP 3.4.1)

Lesson 3—Drawing Traits (AP 3.5.1)

Lesson 4—Animal Behaviors (AP 4.1.1)

Lesson 4—Patterns of Behavior (AP 4.2.1)

Lesson 4—Numbers of Examples (AP 4.3.1)

Lesson 4—Write a Statement (AP 4.4.1)

Lesson 4—Describe Patterns (AP 4.4.2)

Online Resources for Science

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

The Online Resources Guide also links to lists of additional recommended children's books that support the content of this unit.

Teaching Strategies

Start with the familiar.

Lead with an experience. Begin each lesson with a demonstration, activity, or question about a phenomenon to engage students and focus their attention on the topic. Start with the familiar. Every science topic introduced to students relates in some way to their known world and everyday experiences. The purpose of every lesson is to build a bridge between what is familiar to students and broader knowledge about the way the world works.

Ask driving questions.

The unit is governed by a Big Question, related to the unifying phenomenon. Each multipart lesson is built around a lesson Guiding Question. And then at the beginning of each Teacher Guide lesson segment, you will find a driving question and Core Lesson segment devoted to encouraging students to think about this question as they are introduced to new science content. Use this opportunity to engage students in conversation, to think about how their own real-world experiences relate to the topic, or to participate in a demonstration that relates to the driving question.

Encourage scientific thinking.

Approach the lessons with students not as learning about science, but as learning about the world with a scientific mind. Science learning models science practice.

Throughout the lessons, encourage students to ask questions about what they observe, do, and read. Record relevant questions in a prominent place in the classroom. Guide students back to these questions as opportunities to answer them emerge from readings, demonstrations, and activities.

Use continuous Core Vocabulary instruction.	<p>During instruction, emphasize Core Vocabulary terms and their meanings in context rather than relying on isolated drill for memorization of definitions. Through scaffolded questioning, encourage students to come up with definitions in their own words and to use the words in their own sentences.</p> <p>Core Vocabulary words for each lesson, as well as Language of Instruction, other key terms teachers are encouraged to use in discussing topics with students, are provided at the start of each lesson. You can find Core Vocabulary and Language of Instruction definitions in the Glossary on pages 275–276.</p>
Emphasize observation and experience.	<p>Lessons employ various ways for students to learn, including watching, listening, reading, doing, discussing, and writing. To meet the NGSS Performance Expectations, which are multidimensional standards, students must not only gain factual knowledge associated with Disciplinary Core Ideas, but also use the content knowledge they acquire.</p>
Use science practices.	<p>Give students opportunities to discover new content knowledge through investigation and to use their new knowledge both in problem-solving exercises and as evidence to support reasoning. Students learn what science and engineering practices are by engaging in those same practices as they learn.</p>
Make frequent connections.	<p>Use a combination of demonstrations and reading materials, rich with examples, to help students recognize how the science concepts they are learning apply in their everyday lives. Prompt students to relate lesson content to their own experiences, to relate the new and unfamiliar to the familiar, and to connect ideas and examples across disciplines. Refer to the Crosscutting Concepts cited in the lessons, often included in the NGSS References listed at the start of each lesson.</p>
Monitor student progress.	<p>Use verbal questioning, student work, the Check for Understanding assessments at the end of each lesson to monitor progress during each lesson and to measure understanding at the conclusion of the unit. Many lessons provide tips to help you support students who need further explanations or clarifications.</p>

Instructional Design

The unit is composed with several integrated features that support three-dimensional learning for all students and development for teachers. Within each lesson, notations appear in the column to the left to indicate certain features in the instructional support.

Differentiation	<p>Adjustments to instruction appear in the text, indicated by SUPPORT, EXTEND, and CHALLENGE notations.</p> <p>SUPPORT—Reading, writing, listening, and/or speaking alternatives appear for students who are English language learners, have special needs, or read below the grade level. Extra support is suggested for students who struggle to meet targeted expectations.</p> <p>EXTEND—Extensions are suggested for students with high interest or who have already met the performance expectations.</p> <p>CHALLENGE—Additional, relevant, and interesting exercises are suggested for students to explore that exercise math, reading, or science skill/comprehension that pushes beyond the grade level.</p>
Teacher Development	Information in the instructional text, Know the Science boxes, and Know the Standards boxes is provided to support ongoing teacher development with regard to both content and the teaching process.
Monitor Progress	Opportunities for formative assessment appear throughout the instructional support. These instances are most consistently noted in a Check for Understanding that concludes each lesson segment.
Math Connection	Connections to math standards are highlighted in the instructional text and in Know the Standards boxes. Where alphanumeric identification codes are shown, they reference connections to the Common Core State Standards.
Language Arts Connection	Connections to reading and language arts standards are highlighted in the instructional text and in Know the Standards boxes. Where alphanumeric identification codes are shown, they reference connections to the Common Core State Standards.
Building Progressions	Prior expected student learning, and how the prior learning will be built upon, is explained throughout the instructional support and in Know the Standards boxes.



DCI
SEP
CCC
PE

Opportunities for students to develop and use specific elements of NGSS Disciplinary Core Ideas (DCI), Science and Engineering Practices (SEP), and Crosscutting Concepts (CCC) are highlighted throughout the instructional support text.

For detailed information about the NGSS References, follow the links in the Online Resources Guide for this unit. Use the following link to download any of the CKSci Online Resources Guides:

www.coreknowledge.org/cksci-online-resources

Icon Key:

DCI LS1.A Structure and function

DCI LS1.B Growth and development of organisms

DCI LS1.D Information processing

DCI LS3.A Inheritance of traits

DCI LS3.B Variation of traits

SEP 1 Asking questions (for science) and defining problems (for engineering)

SEP 2 Developing and using models

SEP 3 Planning and carrying out investigations

SEP 4 Analyzing and interpreting data

SEP 5 Using mathematics and computational thinking

SEP 6 Constructing explanations (for science) and designing solutions
(for engineering)

SEP 7 Engaging in argument from evidence

SEP 8 Obtaining, evaluating, and communicating information

CCC 1 Patterns

CCC 2 Cause and effect

CCC 3 Scale, proportion, and quantity

CCC 4 Systems and system models

CCC 5 Energy and matter: flows, cycles, and conservation

CCC 6 Structure and function

CCC 7 Stability and change

3D Learning

Student performance in a given task, related to making sense of a phenomenon or designing a solution, requires integrated elements of the SEPs, CCCs, and DCIs. At certain points of instruction, the Teacher Guide identifies when all three dimensions are integrated for student learning and as support for the teacher.

Effective and Safe Classroom Activities

Online Resources



Conducting safe classroom demonstrations and activities is essential to successful elementary science education. The following resources provide Core Knowledge's recommendations for developing effective science classroom activities.

These resources, included at the back of the Teacher Guide on pages 277–281, consist of the following:

- Classroom Safety for Activities and Demonstrations
- Strategies for Acquiring Materials
- Advance Preparation for Activities and Demonstrations
- What to Do When Activities Don't Give Expected Results

These resources may also be accessed within the CKSci Online Resources Guide for this unit:

www.coreknowledge.org/cksci-online-resources

MATERIALS AND EQUIPMENT

The unit, like all hands-on science, requires a large variety of materials to support various ways of learning (including doing, discussing, listening, watching, reading, and writing). Prepare in advance by collecting the materials and equipment needed for all the demonstrations and hands-on investigations.

- Roll paper, poster board, or a bulletin board should be dedicated at the beginning of the unit to serve as a question board to cumulatively document and return to student questions. The question board is referred to in the materials for lesson segments in which it is used but is not repeated in the materials listed here.
- Internet access and the means to project images/videos for whole-class viewing is also required in many lesson segments but is not repeated below.

Unit Opener

- animal cards (1 set per group)
- plant cards (1 set per group)
- human cards (1 set per group)
- note cards (1 for each card)
- scissors
- glue
- plastic baggies (1 per group)
- ducklings or chicks (optional)
- animal pen or coop (optional)

Lesson 1 Structure and Function in Plants and Animals

Lesson 1.1

- dog plastic figurine
- turtle plastic figurine
- bird plastic figurine
- assorted animal plastic figurines (8; e.g., zebras, elephants, cats, lions, tigers, horses, bears, giraffes, rabbits, alligators, lizards, or snakes; 1 of each)
- pencils (1 per student)
- timer

Lesson 1.2

- color images of macaw, penguin, roadrunner (1 per group)
- color images of poodle, husky, dachshund (1 per group)
- color images of snapping turtle, box turtle, sea turtle (1 per group)
- stapler
- poster paper (3 sheets)
- assorted colored markers

Lesson 1.3

- black marker
- 3 x 5-inch index card (or card stock)
- glue
- scissors
- plastic baggies (1 per group)

Lesson 1.4

- fabric zippers (1 per group)

Lesson 1.5

- poster boards (1 per group)
- markers (assorted colors per group)
- scrap paper (3–5 sheets per group)
- pencils (1 per student)

Lesson 1.5, continued

- glue (1 bottle per group)
- scissors
- envelopes (7)

Lesson 2 Information Processing: Plant and Animal Stimulus and Response

Lesson 2.1

- small nontransparent containers with lids (9)
- marble
- paper clip
- uncooked rice (half cup)
- water (1 cup)
- playground sand (half cup)
- cotton balls (6)
- vinegar (2 tablespoons)
- orange juice (2 tablespoons)
- vanilla extract (or cinnamon) (1 tablespoon)
- crushed garlic cloves (5, peeled)
- paper plates (3)
- crackers (1 per student)
- lemon drop candies (1 per student)
- peppermint candies (1 per student)
- brown paper bags (4)
- chenille stem
- smooth rock (river rock works well)
- craft pom-poms (3–4)
- craft feather
- timer
- scissors
- black marker (or other dark color)

Lesson 2.2

- paper plates (1 per student)
- plastic baggies (1 per student)
- assorted dry beans (or uncooked rice) (2–3 pounds)
- stapler

Lesson 2.2, continued

- yardsticks (1 per group)
- wooden spoons (1 per group)

Lesson 2.3

- mustard seeds (1 teaspoon)
- petri dishes (3)
- cotton balls (3)
- water
- large cardboard box
- scissors or knife
- packing tape

Lesson 2.5

- poster boards (1 per group)
- markers (assorted colors per group)
- scrap paper (3–5 sheets per group)
- pencils (1 per student)
- glue (1 bottle per group)
- scissors
- envelopes (7)

Lesson 3 Parents and Offspring: Traits and Inheritance

Lesson 3.1

- color pictures of different-looking cats (2)
- envelopes (1 per group)
- scissors
- assorted animal parent and animal baby plastic figurines (8–10, e.g., lion and lion cub, bear and bear cub, horse and foal, chicken and chick, cow and calf, pig and piglet, dog and puppy, cat and kitten, duck and duckling, rabbit and bunny)
- timer

Lesson 3.4

- images of different types of animals (6–10 animals)

Lesson 3.5

- scrap paper (3–5 sheets per group)
- pencils (1 per student)
- poster boards (1 per group)
- markers (assorted colors per group)

Lesson 4 Growth and Development

Lesson 4.2

- computer stations (12)
- timer

Lesson 4.3

- 25 x 30-inch sheets of paper (1 per group, plus 1 for the demonstration)
- markers (assorted colors per group)
- tacks or other tools for hanging paper (1 per group, plus 1 for the demonstration)

Unit Capstone

- poster boards (5–7)
- masking tape

Unit Supplement

- construction paper (2 sheets per group)
- drawing utensils (assortment per group)

PLANT AND ANIMAL SURVIVAL PACING

_____’s Class

Note to Teacher: *Plant and Animal Survival* is intended to be taught as the second unit of Grade 1 CKSci. As a general rule, we recommend that you spend a minimum of thirty-eight days and a maximum of fifty-seven days teaching the *Plant and Animal Survival* unit so that you have time to teach the other units in the Grade 1 CKSci series.

Week 1

Day 1	Day 2	Day 3	Day 4	Day 5

Week 2

Day 6	Day 7	Day 8	Day 9	Day 10

Week 3

Day 11	Day 12	Day 13	Day 14	Day 15

Week 4

Day 16	Day 17	Day 18	Day 19	Day 20

Week 5

Day 21	Day 22	Day 23	Day 24	Day 25

Week 6

Day 26

Day 27

Day 28

Day 29

Day 30

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Week 7

Day 31

Day 32

Day 33

Day 34

Day 35

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Week 8

Day 36

Day 37

Day 38

Day 39

Day 40

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Week 9

Day 41

Day 42

Day 43

Day 44

Day 45

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Week 10

Day 46

Day 47

Day 48

Day 49

Day 50

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Week 11

Day 51

Day 52

Day 53

Day 54

Day 55

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Week 12

Day 56

Day 57

Day 58

Day 59

Day 60

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UNIT 2

Plant and Animal Survival

OVERVIEW

Big Question: How is a wildlife center designed to help animals survive?

Anchoring Phenomenon: Owl rescuers use puppets to feed orphaned owlets. The driving question we explore in this unit is “How is a wildlife center designed to help animals survive?” To answer this question in depth over the course of the unit, students will explore physical and behavioral traits for survival as planners of an animal sanctuary and wildlife center. In exploring the question, students investigate physical traits that enable plants and animals to survive, grow, and meet their needs. They recognize that certain behaviors of parents and offspring also help offspring survive. Students learn how young are similar to but not exactly like their parents. (See **Know the Science**.)

Student Book story line: Luzi lives in the Sonoran Desert region near Tucson, Arizona. She finds a small owl that can’t fly away. She thinks its wings must be injured, so she takes it to a veterinarian for help. Luzi learns from the vet that the owl is not injured; it is just too young to fly. The owl needs to go to the local animal wildlife center so people can take care of it until it is ready to survive back in the wild on its own. Luzi wants to volunteer at the wildlife center to help care for the owl. When she visits to check up on the owl’s progress, she gets to see the owl’s caregivers feeding it with an owl puppet.

Long-term project: Students will plan a wildlife center designed to care for injured, captive/habituated, and orphaned animals.

AT A GLANCE

Introductory Class Session Animals and Plants

Students use their prior personal experiences and understandings of animals and plants to play a game that challenges them to think about how animal and plant parts are used for things that are similar to what humans use.

NGSS References

Disciplinary Core Idea: LS1.A Structure and Function

Science and Engineering Practice: 1 Asking Questions

Know the Science

TEACHER DEVELOPMENT

Survival and Mimicry: The word *mimicry* comes from the Latin *mimicus*, which comes from the Greek *mimikos*. All three versions of the word refer to the act of imitating. The wildlife center Luzi encounters is an imitation of the animals’ natural environment. Later in the unit, students will encounter mimicry in nature as a means for organisms to survive.

Unit Opener Objectives

- ✓ Identify animal and plant parts.
- ✓ Describe what animals and plants use their parts for.

Crosscutting Concept: 6 Structure and Function

Students will be introduced to a variety of living organisms. They will then identify plants, animals, and humans.

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

www.coreknowledge.org/cksci-online-resources

Language of Instruction

The Language of Instruction consists of terms not considered a part of Core Vocabulary that you should use when talking about any concepts in this exercise. Students will benefit from your modeling the use of these words without the expectation that students will use or explain the words themselves. A Glossary at the end of this Teacher Guide lists definitions for both Core Vocabulary and Language of Instruction.

animal describe observe plant

Instructional Activities

- class discussion
- teacher Read Aloud
- question generation

Materials and Equipment

- animal cards (1 set per group)
- plant cards (1 set per group)
- human cards (1 set per group)
- note cards (1 for each card)
- scissors
- glue
- plastic baggies (1 per group)
- ducklings or chicks (optional)
- animal pen or coop (optional)

Instructional Resources

Student Book



Ch. 1

Student Book, Chapter 1
"Luzi Saves an Owl"

Advance Preparation

- Make animal, plant, and human cards for students to play with in groups. Assemble the cards using the following instructions:
 - Find pictures of the following things in magazines, or print them from the internet:
 - airplane in the sky
 - bird flying in the sky

- fish swimming in water
 - scuba diver using scuba gear in the water
 - lily pad floating on water
 - raft floating on water
 - plastic straw in a glass
 - the roots of a plant
 - showerhead spraying water
 - elephant trunk spraying water
- Plan out the number of cards you will need based on the number of students in your class. Each group receives all ten cards. There should be about three students in each group.
 - Make copies of the pictures. Cut and paste the pictures onto cards with a thicker card stock, such as note cards.
 - The cards can be as large or as small as you want them to be, but they should be big enough for students to see the images clearly.
 - It is not necessary for the pictures on the cards to be in color.
 - Place each set of ten cards into plastic baggies, which you will distribute to the groups. Make sure each baggie has exactly one card with each picture.

THE UNIT OPENER

1. Introduce the Anchoring Phenomenon.

Open with a discussion about animals. Explain that we see animals outside all the time.

Ask students, What kinds of animals do you see outside?

» birds, owls, lizards, cats, horses

Ask students to tell you, with a show of hands, how many of them have pets at home. Ask what kind of animals they are. Write the responses down on the board. Point out any patterns, such as which animal is the most common pet among students in the class. Students will likely say that they have dogs, cats, bunnies, hamsters, guinea pigs, or lizards.

2. Read together: “Luzi Saves an Owl.”

Student Book

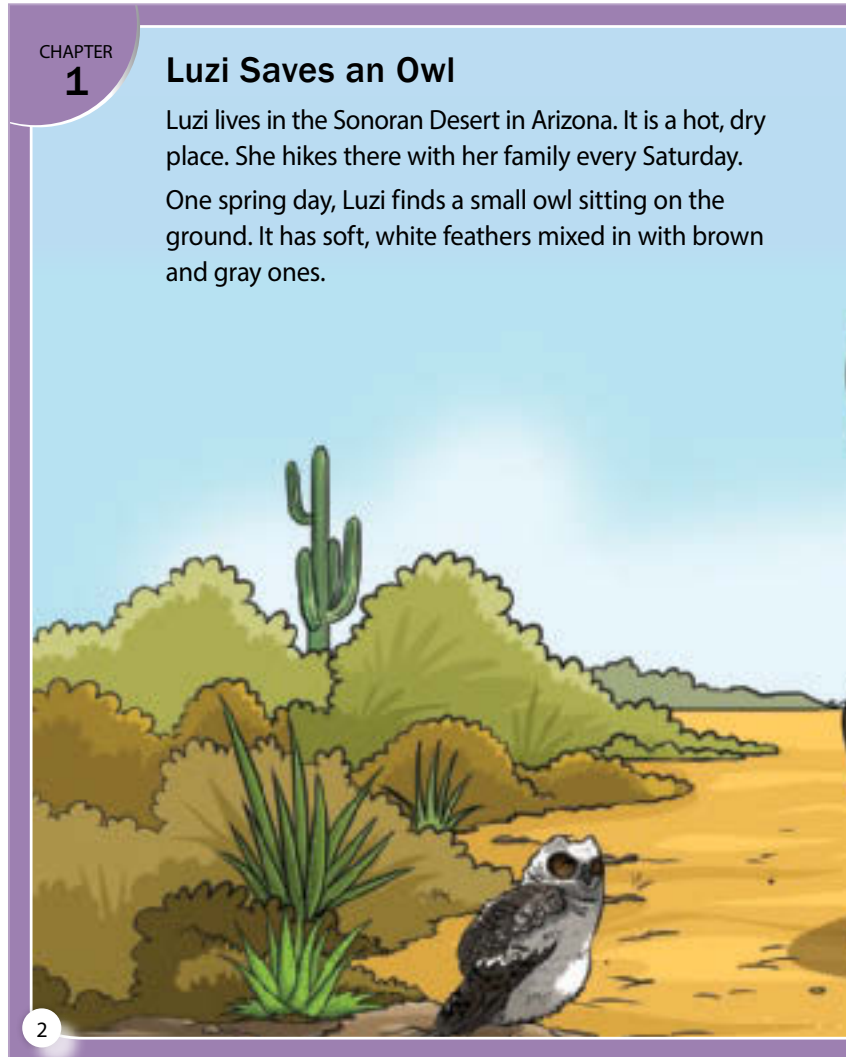


Ch. 1

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 teachers and parents can read it when sharing the Student Book with students.

Pages 2–3

Ask students to turn to page 2 of the Student Book and look at the images as you read aloud. Remind them that the title of this chapter is “Luzi Saves an Owl,” and tell them to pay special attention to what the owl looks like as you read.



Luzi bends down to look at the owl. It raises its wings. It bobs its head. But it does not fly away. Luzi is worried. She thinks it might be hurt.

Luzi's mother decides they should take the owl to a veterinarian. Dr. Moreno is the animal doctor who cares for Luzi's dog and cat.



Ask students to look at the pictures on pages 2 and 3. Explain that this baby owl does not belong alone on the ground. It belongs in its nest. (See **Know the Standards 1.**)

NGSS Elements



DCI LS1.A

LITERAL—What does the owl look like?

- » It is small. It is fluffy. It has big eyes. It has a beak. Its feathers are brownish gray. It has wings. It has claws.

INFERENTIAL—What might this owl be doing on the ground?

- » It might have fallen out of its nest.

Know the Standards

TEACHER DEVELOPMENT

1. DCI LS1.A Structure and Function: Students are asked to discuss what the baby owl looks like. In doing so, they are identifying external body parts and describing them.

Ask students to look at the pictures on pages 4 and 5. Explain that a veterinarian is an animal doctor. A veterinarian is sometimes called a “vet” for short. Clarify that Luzi and her mother are taking the baby owl to the animal doctor and that Luzi’s mother made the decision to take the owl to the vet. Point out that, in most cases, it is better to leave wild animals in the wild. Children should never touch wild animals, and their handling should be undertaken only by wildlife professionals.

Dr. Moreno checks the owl’s legs and wings. She smiles and tells Luzi, “This little owl is not hurt. It is just too young to fly. It is a baby great horned owl. It probably fell from its nest.”

Luzi thinks about where she found the owl. She saw a large saguaro with a hole in it. A woodpecker flew out of the hole. Luzi wonders if owls make their nests in saguaro cactuses.



"What do we do now?" Luzi asks. "Should we take it back to the desert?"

"No," says Dr. Moreno. "We are not sure where its home is. Other animals might hurt an owl this small. We will take it to a place where humans can care for it. It can stay there until it learns to fly and hunt for food. Then we can return it to the desert to make a new home when it can take care of itself."



5

SUPPORT—Explain to students that people take animals to the vet for many reasons, such as if a pet is sick, is injured, or just needs a checkup visit.

LITERAL—What does the vet tell Luzi about the owl?

» It is a baby owl. The owl cannot fly yet. It must have fallen out of its nest.

INFERENTIAL—If the doctor says the owl cannot fly yet, do you think that means owls have to learn how to fly as they get a little older?

» yes

LITERAL—What part of the body does an owl use to fly? (See **Know the Standards 2.**)

» its wings

NGSS Elements



CCC 6

Know the Standards

TEACHER DEVELOPMENT

2. CCC 6 Structure and Function: Students make a connection between the owl's body parts and their uses with the example of using wings to fly.

Ask students to look at the three pictures on page 6. Explain that rescuing an animal means saving it. Sometimes we have to take animals away from their natural environment to keep them safe. This is because wild animals live in places where there might be danger. Other animals might try eating them or fighting with them.

Dr. Moreno takes the owl to a place called the Desert Wildlife Center. Luzi and her mother go to see where the owl will be cared for. There are other animals there. Luzi sees a desert tortoise and a gray fox. She even sees a tarantula!

Most of the animals have been rescued. Some of them had been hurt. People now care for them while they heal. Some young animals were separated from their parents. People are taking the place of their parents until these animals grow up enough to survive on their own.



desert tortoise



gray fox



tarantula

6

SUPPORT—Ask students if they can name an animal that is native to their area.

Differentiation

CHALLENGE—Challenge students to think of things that can be dangerous to the animals that live in their area. For example, if you live in a hot desert, coyotes are dangerous to baby owls, rattlesnakes are dangerous to mice, and hawks are dangerous to tarantulas. Hold a discussion about the parts of their bodies these animals might use to keep them safe. (See **Know the Standards 3.**)

Ask students to look at the picture on page 7. Explain that *volunteering* means “helping out.” Luzi will be able to help out at the center.

The workers show Luzi how they will care for the owl. They show her another owl that is almost old enough to be released back into the desert! It will practice flying in the big yard. It must learn to eat food that it will find in the desert. They ask Luzi if she would like to be a volunteer at the center. She will learn how to help take care of the animals there. Luzi says yes. She is excited to help!



7

INFERENTIAL—Why would someone want to volunteer at a wildlife rescue center?

- » because someone might like animals, want to help them, or want to learn more about caring for them

Know the Standards

TEACHER DEVELOPMENT

3. Differentiation: Students discuss the connection between body parts and their uses for survival, which challenges them to start thinking about the concepts that will be covered in Lesson 1.

3. Generate questions.

NGSS Elements



SEP 1

Show students the question board. Ask students what they wonder about animals after reading the chapter about Luzi and the owl. Record their questions on the question board. (See **Know the Standards 4.**)

Revisit the board throughout the unit, adding student questions and generating answers with students. Tell students that all questions on the board will be addressed.

4. Play the card game.

NGSS Elements



DCI LS1.A

- Place students in groups of three. Explain that you are going to play a card game.
- Distribute the baggies with cards that you prepared. Each group will get one baggie.
- Explain that there are three types of cards in their baggie: plant cards, animal cards, and human cards.
- Go over the steps for the card game:
 - Students will empty the cards onto their desk or table.
 - They will look at all the cards.
 - They will match the two cards that go together. One plant or animal card will be matched to one human card. Students should discuss which cards go together based on how the plant, animal, or human cards are used. (See **Know the Standards 5.**)
- Circulate around the room, and assist as necessary. Use question prompts to help students, such as “How does the plant or animal part act like the thing that humans use?”

Differentiation

SUPPORT—For students who may need less distraction of all the card choices, use the plant and human cards, and walk through the thought process as you choose the correct match. Then have the students use the animal and matching human cards to match in groups.

Know the Standards

TEACHER DEVELOPMENT

4. SEP 1 Asking Questions: Questions are important tools that drive scientific discoveries. Help get students in the habit of asking questions, which is a skill that will be reinforced throughout this unit.

5. DCI LS1.A Structure and Function: This card game allows students to start thinking about how animal or plant parts resemble the things that humans use every day. Making connections between parts and their functions will prepare students for reaching the anchoring phenomenon and answering the Big Question.

SUPPORT—Alternatively, play the card game as a class. Keep students in their groups, but look at the same cards at the same time. Then discuss each card. For instance, start with the lily pad card. **Ask students which thing humans use that is most like a lily pad.** You may need to first explain that lily pads float in water. Then you can ask, “What else floats in water?”

- Tell students that all of the cards must be used. There are no extra cards in the baggie.
- Remind students that the animal and plant cards must be matched to a human card. That means they will not match plant to animal cards, plant to plant cards, animal to animal cards, or human to human cards.
- Tell students that once they have a match, they should set that pair of cards to the side.

Differentiation

EXTEND—If your school allows class pets, you may want to get ducklings or chicks for the classroom. Throughout the unit, students can circle back to the ducklings and observe their body parts and behaviors for firsthand experience. Introduce students to the ducklings, and explain that they will live in the classroom and the class will take care of them. See the Online Resources Guide for a link to helpful information about animals in the classroom:

Online Resources



www.coreknowledge.org/cksci-online-resources

Ask what kinds of things ducklings need to survive.

» water, food, space to walk around, a place to sleep

5. Check for understanding.

Formative Assessment

Monitor Progress

Have students discuss and summarize their findings from the matching card game. Go through each card, and talk about its match. As students explain why they matched the pairs that they did, gauge their level of understanding on why the cards go together or don't go together:

- airplane and bird: flying
- fish and scuba diver: breathing underwater
- lily pad and raft: floating
- plastic straw and plant roots: taking in liquid
- showerhead and elephant trunk: cleaning/spraying water

Tie to the Anchoring Phenomenon

As students participate in the card matching game, they get practice identifying parts (structures) of animals and plants and how those are similar to some things humans use. In doing so, this will help expose them to the concepts that will be covered in the unit, tying back to the phenomenon of why animal wildlife rescuers use puppets to feed baby owls.

LESSON 1

Structure and Function in Plants and Animals

OVERVIEW

Guiding Question: How do the parts of plants and animals help them survive?

Lesson 1 Segments	Segment Questions	Advance Preparation
1.1 What Parts Do Animals Have? Students tour a classroom animal museum and look at different external body parts.	What are some animal body parts, and what do they do?	Gather materials for the observation. See Materials and Equipment.
1.2 How Do Animals Use Their Parts? (2 days) Students learn that animals have external body parts that do things to help them grow and survive.	How do different body parts help birds, dogs, and turtles survive?	Gather materials for student activity. See Materials and Equipment.
1.3 How Do Plant Parts Help the Plant? (2 days) Students play a game to learn that plants have parts that help them grow and survive.	How do plant parts help them survive?	Gather materials for student game. See Materials and Equipment.
1.4 What Things Do We Use That Are Similar to Animal and Plant Parts? (2 days) Students read about animal and plant parts and learn about things that humans use that resemble those parts.	What objects do humans use that look and act like animal and plant parts?	Gather materials for demonstration. See Materials and Equipment. Read Chapters 2 and 3 in the Student Book.
1.5 Lesson 1 Roundup: What Problems Can We Solve? (3 days) Students plan and carry out an investigation in which they are given a human problem and assigned an animal or plant to focus on. They design a solution to a problem that mimics the animal/plant.	How can we mimic plant and animal parts to solve a human problem?	Gather materials for student investigation. See Materials and Equipment.

What's the Story?

Summary: In Lesson 1 (Segments 1–5), students explore the external parts that make up plants and animals. They learn about how plants and animals use those parts to grow and survive, as well as how humans mimic those parts to solve problems (1-LS1-1). The developing understanding of these phenomena in Lesson 1 prepares students for their work in Lesson 2, when they observe how plants and animals sense and process information in the world around them in order to survive.

Learning Progression: Lesson 1 builds on student understandings from Kindergarten, such as KLS1-1: *Use observations to describe patterns of what plants and animals (including humans) need to survive.* Lesson 1 also builds toward the Grade 1 target of 1-LS1-2: *Read texts and use media to determine patterns in behavior of parents and offspring that help offspring survive.*

Guiding Phenomenon: Animals and plants have external parts that help them grow and survive. People mimic these parts by designing objects that are used to solve problems (1-LS1-1). Finding the best way to nurture animals back to health in rehab agencies is a problem that some people have to solve. Studying and understanding the parts that animals use can accomplish this.

Learning Objectives

By the end of Lesson 1, students will do the following:

- Identify external parts that plants use to grow and survive.
- Identify external parts that animals use to grow and survive.
- Describe how human objects mimic plant and animal parts.
- Design a solution to a human problem based on plant or animal parts.

NGSS Standards and Dimensions

Performance Expectation: 1-LS1-1 Use materials to design a solution to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs.

Science and Engineering Practice	Disciplinary Core Idea	Crosscutting Concept
6 Constructing Explanations and Designing Solutions Use materials to design a device that solves a specific problem or a solution to a specific problem.	LS1.A Structure and Function All organisms have external parts. Different animals use their body parts in different ways to see, hear, grasp objects, protect themselves, move from place to place, and seek, find, and take in food, water and air. Plants also have different parts (roots, stems, leaves, flowers, fruits) that help them survive and grow.	6 Structure and Function The shape and stability of structures of natural and designed objects are related to their function(s).

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

www.coreknowledge.org/cksci-online-resources

LESSON 1.1

What Parts Do Animals Have?

Big Question: How is a wildlife center designed to help animals survive?

Lesson Guiding Question: How do the parts of plants and animals help them survive?

Today's Question: What are some animal body parts, and what do they do?

Tie to the Anchoring Phenomenon: Students observe the different external body structures of animals and then come to understand that animals are made up of different parts.

AT A GLANCE

Learning Objectives

- ✓ Identify animal body parts.
- ✓ Talk about what animals use their body parts for.

Instructional Activities

- student observation
- class discussion
- question generation

NGSS References

Disciplinary Core Idea: LS1.A Structure and Function

Science and Engineering Practice: 1 Asking Questions

Crosscutting Concept: 6 Structure and Function

Students compare different structures and functions of animals by asking questions about the functions and needs of the different structures they observe.

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

www.coreknowledge.org/cksci-online-resources

Core Vocabulary and Language of Instruction

Core Vocabulary: Core Vocabulary terms are those that students should learn to use accurately in discussion and in written responses. During instruction, expose students repeatedly to these terms. However, these terms are not intended for isolated drill or memorization.

structure

Language of Instruction: The Language of Instruction consists of additional terms, not considered a part of Core Vocabulary, that you should use when talking about any concepts in this exercise. Students will benefit from your modeling the use of these words without the expectation that students will use or explain the words themselves. A Glossary at the end of this Teacher Guide lists definitions for both Core Vocabulary and Language of Instruction.

animal body part purpose use

Instructional Resources

Activity Page



AP 1.1.1

Activity Page

Animal Museum (AP 1.1.1)

Materials and Equipment

- dog plastic figurine
- turtle plastic figurine
- bird plastic figurine
- assorted animal plastic figurines (8; e.g., zebras, elephants, cats, lions, tigers, horses, bears, giraffes, rabbits, alligators, lizards, or snakes; 1 of each)
- pencils (1 per student)
- timer

Advance Preparation

Set up the classroom with various stations around the room where students will rotate to observe the different animals. Place one or two animal figurines at each station. Label or number the stations so students can easily locate them and rotate to the correct station.

THE CORE LESSON 1.1

1. Introduce students to Lesson 1.

Ask a volunteer to state the Big Question that you'll be answering in this unit, which is posted in the room—**How is a wildlife center designed to help animals survive?**

Tell students that before they can answer the unit's Big Question about helping animals survive, they first need to understand the different parts of animals and how animals use those parts. In Lesson 1, they will learn about animal and plant parts to apply their understanding to the Big Question. Write the Lesson 1 Guiding Question where students can see it:

How do the parts of plants and animals help them survive?

Tie to the Anchoring Phenomenon

As students work through Lesson 1, they will learn how animals and plants use the different parts or structures of their bodies and how those parts help them survive.

2. Preview the activity.

Activity Page



AP 1.1.1

- **Ask students if they have ever been to a museum.** Have students tell you what they remember seeing at the museum.
- Tell students that today they are going to pretend that the classroom is a museum. Around the room are different exhibits, just like at a museum. Each exhibit shows one or two animals. Students must imagine that they are at a museum and pay close, careful attention to the animals at the exhibits.
- Place students in pairs or small groups. Aim for the same number of groups as there are stations.
- Explain that students will travel in their groups from one station to the next, looking at the animals that are part of the museum.
- Distribute and review Animal Museum (AP 1.1.1) as a class. Explain that students will go to a station and look at the animals that are on display. They will write down the names of the animals and describe the animals' body parts. Give examples of body parts, such as trunks, big ears, or legs. Then explain that students will need to tell how the animals use those parts of their body. For example, birds use their wings to fly. Dogs use their legs to walk and run. (See **Know the Standards 1.**)

Know the Standards

TEACHER DEVELOPMENT

1. Differentiation: Some animals may not be as familiar to students as others. Students who do not speak English as a first language may not know the English names of certain animals or the animal parts. Provide informational books or picture cards with labels that correspond to the animals at each of the stations for students to use.

SUPPORT—If students have a difficult time with spelling or naming the animal parts, provide a word box for guidance.

CHALLENGE—Challenge students to write down how they think certain body parts help the animals survive. Students are already writing down how the animals use those body parts, such as for eating, moving, or hiding. This challenge helps students start thinking about how those behaviors correlate to survival in the wild.

EXTEND—Have students sort body parts based on the uses of the body parts. Remind students that some animal body parts can be sorted into different groups, since they may have more than one use. (See **Know the Science 1.**)

3. Review museum etiquette.

- Explain that a museum is a place where people can go to see things that are special and unique. Often museums have things in them from long ago. It is a good place to go to see things from the past.
- Museums are usually quiet. This is because museums are places where people go to learn.
- People do not touch the things on display at museums unless it specifically states the items can be touched. Tell students that they can look at the animal figurines but should not touch them.

4. Facilitate the activity.

- Assign groups to start at different stations. Tell students that they will have five minutes at each station to make their observations and fill in their tables. Then they will move to the next station. Decide whether students should travel in a clockwise or counterclockwise direction.
- Remind students that they must bring their Activity Page 1.1.1 and pencils with them to each station.

Know the Science

TEACHER DEVELOPMENT

1. Similar Body Parts on Different Animals: Different species of animals have similar body parts that evolved independently over time by a process known as *convergent evolution*. For example, the body shapes of fish, marine mammals such as whales, and ancient marine-based reptiles such as the plesiosaur all have a similar shape to better move through water despite having different ancestors and being in different time periods.



- Circulate around the room, and assist. Prompt students to think of any unusual body parts that they notice. For example, the turtle has a shell. **Ask students if any other animals have a shell.** (See **Know the Standards 2** and **3**.)
- Use the suggested prompts below to help students make connections between body parts and their uses (see **Know the Standards 4**):
 - How many legs does the animal have? What can the animal do with its legs?
 - Does the animal have large ears? What could those be for?
 - What color is the animal? Does it have any stripes or patterns? Do you think the animal uses its patterns for anything?

5. Summarize and discuss.



- Bring the class back together, and summarize students' findings. Call out some of the animals, and **have students name the body parts of that animal. Ask students to tell you how the animal probably uses that body part.**
- Identify unique body parts—such as striped fur, a long trunk, or antlers/horns—and emphasize them with a brief discussion about how animals use those parts of their bodies. (See **Know the Science 2**.)
- **Ask students what else they wonder about animal body parts.** Add their questions to the question board.

Know the Standards

TEACHER DEVELOPMENT

2. DCI LS1.A Structure and Function: Students observe the external structures of animals and come up with ideas for how the animals use their body parts in different ways, such as for moving, eating, seeing, and hearing.

3. CCC 6 Structure and Function: Students observe the body parts of the animal figurines and try to decide how the animals use those structures (their functions).

4. Monitor Progress: See how students progress in terms of their ability to identify body parts and their possible uses from their first stations to their final stations. As students rotate through the stations, they should develop spotting interesting body parts and thinking about the ways the animals use them more quickly.

Know the Science

TEACHER DEVELOPMENT

2. Similar Parts Can Have Different Functions: Different species have similar body parts that have different functions. These body parts evolved over time in a process known as *divergent evolution*. For example, the finches Darwin studied on the Galápagos Islands had different types of beaks. Finches in an area with many hard nuts had developed heavy, thick beaks that worked well for breaking the nuts. Finches in an area with thorny plants had developed thin beaks for snagging insects hiding beneath the thorns.

6. Check for understanding.

Formative Assessment

Review student responses (or drawings) on Activity Page 1.1.1 to determine student understanding of the following concepts:

Monitor Progress

- Animals have different body parts.
- Different body parts help animals do different things.

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

Tie to the Anchoring Phenomenon

This activity helps to heighten student awareness of the different structures of animals. This information serves as a foundation that students will later build on, understanding that body structures work together with different behavioral traits to help animals survive in the wild.

LESSON 1.2

How Do Animals Use Their Parts?

Big Question: How is a wildlife center designed to help animals survive?

Lesson Guiding Question: How do the parts of plants and animals help them survive?

Today's Question: How do different body parts help birds, dogs, and turtles survive?

Tie to the Anchoring Phenomenon: Students observe the different external body structures of birds, dogs, and turtles to learn that their body parts help them survive in different ways, thus building toward understanding why owl rescuers use puppets to feed orphaned owls.

AT A GLANCE

Learning Objective

- ✓ Describe how the external structures of birds, dogs, and turtles perform tasks that help them meet their needs to survive and grow.

Instructional Activities (2 Days)

- student investigation
- class discussion
- student observation

NGSS References

Disciplinary Core Idea: LS1.A Structure and Function

Science and Engineering Practice:
6 Constructing Explanations and Designing Solutions

Crosscutting Concept: 6 Structure and Function

Students observe body structures of different animals and construct explanations for how those adaptations contribute to the survival of that species.

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

www.coreknowledge.org/cksci-online-resources

Core Vocabulary and Language of Instruction

Core Vocabulary: Core Vocabulary terms are those that students should learn to use accurately in discussion and in written responses. During instruction, expose students repeatedly to these terms. However, these terms are not intended for isolated drill or memorization.

structure **survive**

Language of Instruction: The Language of Instruction consists of additional terms, not considered a part of Core Vocabulary, that you should use when talking about any concepts in this exercise. Students will benefit from your modeling the use of these words without the expectation that students will use or explain the words themselves. A Glossary at the end of this Teacher Guide lists definitions for both Core Vocabulary and Language of Instruction.

animal body part purpose safe use

Instructional Resources

Activity Page



AP 1.2.1

Activity Page

What We Notice (AP 1.2.1)

Materials and Equipment

- colored images of macaw, penguin, roadrunner (1 per group)
- colored images of poodle, husky, dachshund (1 per group)
- colored images of snapping turtle, box turtle, sea turtle (1 per group)
- stapler
- poster paper (3 sheets)
- assorted colored markers

Advance Preparation

- Search for appropriate pictures of the animals on the internet. The pictures should clearly show the external body parts of each animal. Print the pictures, and make colored copies for each of the groups. Label each picture with the name of the animal.
- Assemble the pictures of the birds, dogs, and turtles together along the vertical side to make a booklet for students to flip through. You can use staples or binder clips for this. This will help prevent lost pages.

- Make three KLEWS charts using three separate sheets of poster paper. Hang or display the sheets at the front of the class, next to one another. Design them to look as follows (see **Know the Standards 1**):

Essential Question: _____

Type of Animal: _____

K	L	E	W	S
What do we KNOW about (birds/dogs/turtles)?	What we LEARNED .	EVIDENCE from our data—How do we know?	What we WONDER .	SCIENCE words or ideas.

THE CORE LESSON 1.2

1. Day 1: Focus students' attention on Today's Question.

- Challenge students to think of some ways that animals survive in the wild. Examples can include hunting for food, hiding from danger, or finding places to stay safe when it gets too hot or cold.
- Remind students that in the previous class they pretended that they were at a museum and looked at a lot of different animals. Today, they will focus on three types of animals: birds, dogs, and turtles.
- Narrow the focus to Today's Question—**How do different body parts help birds, dogs, and turtles survive?** Ensure that students are familiar with the three animals and have an understanding of the environment in which they live.

Know the Standards

TEACHER DEVELOPMENT

1. KLEWS Chart: A KLEWS chart is a teaching tool that helps facilitate inquiry-based learning in classrooms by prompting students to discuss what they already know (prior knowledge), what they learned, what evidence (data) they have to support what they learned, what they wonder about or want to know more about, and, finally, what kinds of science words or concepts were covered in the lesson. Each chart is intended to focus on one scientific phenomenon or problem. The reason behind making three separate charts for Lesson 1.2 is so that there can be one chart for recording information about birds, a second for recording information about dogs, and a third for recording information about turtles. Keeping this information on separate charts will help keep the information organized by animal.

2. Introduce the KLEWS charts.

- Show students the KLEWS charts. Explain all the columns. Tell students that you made three charts: one for birds, one for dogs, and one for turtles. But they all have the same layout.
- Start with the bird KLEWS chart. **Ask students what they know about birds.** Use question prompts to help stimulate student ideas about what they know, such as the following (see **Know the Science 1**):
 - What is unique about birds?
 - » They have beaks. They have feathers.
 - What kinds of things can some birds do?
 - » They can build nests. They can fly. They can sing songs.
 - What do birds need to live?
 - » They need air. They need food and water. They need homes (shelter).
- Fill in the K column of the bird chart with their responses. Then repeat this process for the dog and turtle, filling in the K column on those charts.
- When you have worked on the K column for all three charts, tell students that they are going to look at pictures of birds, dogs, and turtles. Then they will come back to these charts to fill out the rest of the columns based on what they learn.

3. Preview the investigation.

Activity Page



AP 1.2.1

- Assign students to work in small groups of mixed ability.
- Distribute the animal picture packets that you assembled to each group. Tell students to not flip through the pictures just yet.
- Distribute What We Notice (AP 1.2.1).
- Review the steps of the investigation with students:
 - In their groups, students will start by looking at the pictures of the birds. They will study their external parts. They will compare the birds to one another. They will write down what they notice about the birds' body parts on Activity Page 1.2.1. Then they will do the same thing with the images of the dogs and turtles.

Know the Science

TEACHER DEVELOPMENT

1. Same Species, Different Traits: At this point in the lesson segment, students should be focusing on general traits of animals, but make sure to lead the discussion to avoid overgeneralizations such as “All birds fly.” Penguins swim but cannot fly. Ostriches cannot fly, but unlike most birds, they can run. A class of animals, such as birds or dogs, can have a wide range of traits that some but not all the members of a class have. Students should start to develop an understanding of the diversity within a class of animals.

- Review Activity Page 1.2.1 with the class. Explain that students will write down the external body parts of each animal next to the bullets. They should focus on the parts that all the birds in the images have in common. For example, they all have beaks, wings, feathers, feet/claws, and eyes. Then they will repeat this process for the dog and turtle images. (See **Know the Standards 2.**)
- Tell students that they can add more lines if they need to. They also do not have to use all the lines that are there.

Differentiation

SUPPORT—For students who might need extra help with the names or labels of the animals' external parts, provide word boxes with the names or a labeled image of each type of animal. Then students can look at the animal part and explain how it is used.

CHALLENGE—Challenge students to make comparisons between the animals' body parts and things they have seen humans use by filling out sentence frames. Suggested sentence frames are as follows:

A bird's _____ is like a human _____.

A turtle's shell is like _____. This is something people use for _____.

A dog's _____ keeps them warm. People wear _____ to keep them warm.

EXTEND—Have students go bird-watching in their community. With adult supervision, students can go around their neighborhood or town to look at birds and draw or write down what they notice about their body parts. Then they complete sentence frames to describe how the bird uses those parts to get what it needs. Suggested sentence frames are as follows:

Birds use their _____ to _____.

Birds need their _____ to live, because it helps them _____.

Birds cannot live without their _____. This part lets them _____.

Know the Standards

TEACHER DEVELOPMENT

2. Differentiation: Looking at too many pictures of animals can be overwhelming for some students. Limiting the number of pictures and allowing students to focus on just a couple of them will help make this activity more accessible.

4. Facilitate the investigation.

NGSS Elements



CCC 6
DCI LS1.A

Differentiation

- Remind students that it is important to look at one type of animal at a time—such as just the birds—before moving to the other animals. This will help keep their ideas in order and observations organized.
- Circulate around the room, and assist as needed. Use prompts such as the following:
 - Which external parts do the turtles all have in common?
 - How are all the birds legs the same?
- Encourage students to write down as many similar body parts as they notice.
- Encourage students to talk about the body parts that they notice with their group. Although each student will fill out an individual Activity Page 1.2.1, groups can work together as they view the images and fill in Activity Page 1.2.1.
- Draw attention to things that are different. Ask students why the macaw's beak looks different from the penguin's beak. Explain that this is because even though both birds have beaks, they use their beaks to eat different foods. Some beaks are better for eating certain foods than others. (See **Know the Standards 3** and **Know the Science 2.**)

SUPPORT—Students who don't speak English as their first language will benefit from having a sheet of the external parts of each of the animals in English and translated in their home language.

5. Guide the discussion.

- Bring the class back together.
- **Ask students what body parts birds need to live or survive.**
 - » wings, beaks, claws, feathers
- **Ask students what body parts dogs need to live or survive.**
 - » noses, legs, ears, eyes, tongues
- **Ask students what body parts turtles need to live or survive.**
 - » legs, shells, necks

Know the Standards

TEACHER DEVELOPMENT

3. DCI LS1.A Structure and Function: Students observe the external structures of animals in pictures. Later they will come up with ideas for how the animals use their body parts in different ways, such as for moving, eating, or shelter.

Know the Science

TEACHER DEVELOPMENT

2. Adaptation: Adaptation is responsible for the evolution of different physical traits that animals have. It is not necessary to discuss adaptation and evolved traits.

- Address any misconceptions, such as that all birds use wings to fly or that all birds sleep in trees. (See **Know the Science 3.**)

6. Make connections.

NGSS Elements



CCC 6

- Now it's time to put the external parts together with the things that animals need to live or survive. (See **Know the Standards 4.**)
- Discuss how the parts that students listed help the animals survive.
- Give students verbal sentence frames to complete, such as:
 - Dogs need their noses to help them _____.
 - Turtles need their _____ because it helps them keep safe.
 - Birds need their _____ to _____.
- Tell students that in the next class segment they will continue this investigation and fill out the rest of the KLEWS charts.

7. Check for understanding.

Monitor Progress

Formative Assessment

Review student responses (or drawings) in Activity Page 1.2.1 to determine student understanding of the following concepts:

- Birds have body parts that help them survive.
- Dogs have body parts that help them survive.
- Turtles have body parts that help them survive.

Know the Science

TEACHER DEVELOPMENT

3. Addressing Misconceptions: Not all birds fly. Penguins, ostriches, and dodo birds are examples of flightless birds. Also, not all birds sleep in trees. Flamingos sleep standing on one leg. The now-extinct dodo slept in nests on the ground, which made it easy for predators to raid their nests to eat the dodo birds, their chicks, and their eggs, which, when combined with the hunting of the dodo bird by humans, led to the extinction of the dodo bird.

Know the Standards

TEACHER DEVELOPMENT

4. CCC 6 Structure and Function: Students make connections between the body parts of animals and how animals use, or rely on, those parts to survive.

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

Tie to the Anchoring Phenomenon

As students work toward understanding the different ways animals use their body parts, this activity will help prepare students to understand how feeding an owl with a puppet that has the same external body parts and that looks like a real owl can help the baby owl survive in the wild.

1. Day 2: Focus student attention on Today's Question.

- Remind students that in the previous class session they looked at pictures of birds, dogs, and turtles. They made lists of the body parts and talked about how the animals use those parts to help them survive.
- Show students the three KLEWS charts that you started in the previous class session. Review with students what was written in the three K columns.
- Tell students to think about which animal from the last class session (a bird, a dog, or a turtle) interests them the most. Give students a few minutes to think over their answer. The animal that interests them the most is the animal that they will focus on today.
- Designate three areas in the classroom for students to meet to form groups. Tell students to stand in one area if they are most interested in birds. Tell students to stand in another area if they are most interested in dogs. Finally, tell students to stand in a third area if they are most interested in turtles. Give students time to get up from their desks and form their groups. It is okay if there is not an even number of students at each group. However, if you find that the groups are very unbalanced, try to encourage students to spread out more.

2. Preview the investigation.

- Distribute the following materials to each group:
 - the KLEWS chart for their associated animal
 - markers in assorted colors
- Tell students that they are going to complete the KLEWS charts as a group based on what they learned about their animal.
- Tell students to lay the KLEWS chart down on a flat surface. They can do this on the floor or a work surface.
- Students should gather around the chart and designate one or two students to be the writers (or suggest taking turns writing).
- Model for students how they will complete the KLEWS chart.
 - Remind students that they do not have to write anything else in the K column.

- Students should work on the E column next (even though the L column comes after the K column). This is where students will write down their observations, or evidence, about the animals. For example, students might write that birds have common external parts or that turtles have different kinds of shells. Clarify for students that these are the data that they collected from looking at the images.
- After students fill out column E, they should work on column L. Column L is where they will summarize what they learned about the animal, based on their observations. This is the “why” or the explanation to the data they wrote down in column E. For example, if students wrote down that birds have common external parts in column E, then column L might explain that birds have these common external parts because they help the birds meet their needs or survive. Or if students wrote that turtles have different kinds of shells in column E, then column L might explain that shells are different because turtles use them in different ways.
- After column L, students move on to column W. This is where students write down what else they wonder about their animal.
- Finally, students fill out column S. Here, they will list the words and ideas they learned about in this investigation, such as *survival*.
- Let students know that at the end of the class, each group will present their KLEWS charts to the rest of the students.

Differentiation

SUPPORT—Alternatively, introduce or model one column to students at a time. Then give the students time to complete that column in their groups. When all groups are ready to move on to the next column, introduce or model that next column. (See **Know the Standards 5**.)

3. Facilitate the investigation.

- Circulate around the room, and assist as needed.
- Remind students to fill out column E before column L.
- Remind students that they are only working on the one animal that their group chose. They do not have to work on the other two animals.
- Remind students of what they should write in each column. Offer prompts such as the following:
 - What did you notice about _____ by looking at the pictures?
 - What did all the birds/dogs/turtles have in common?

Know the Standards

TEACHER DEVELOPMENT

5. Differentiation: It may be necessary, depending on the needs and abilities of the students, to work on this activity at a slower pace. Doing so makes the activity more accessible to students, as they do not have to remember what is supposed to go in each column. Rather, they work on the columns as they are taught about them.

- What do _____ use those body parts for?
- What was different about the _____? Why do you think they were different?

NGSS Elements



DCI LS1.A
CCC 6

SUPPORT—Alternatively, write sentence frames in each of the columns for all three KLEWS charts before class starts. Students work with their groups to fill in the sentence frames instead of writing their own sentences. (See **Know the Standards 6.**)

CHALLENGE—Challenge students to write one or two sentences at the bottom of the chart that describe how the structures of animals are related to their functions.

EXTEND—Have students complete a KLEWS chart based on what they know, learned, observed, and wonder about the ducklings, chicks, or another young animal.

4. Discuss questions.

NGSS Elements



SEP 1

- When students are finished with their charts, ask each group what they wrote down in the W column, for what they wonder about. Record their questions on the question board that you started at the beginning of the unit. (See **Know the Standards 7.**)

5. Present the KLEWS charts.

Monitor Progress

- Tell groups to take a couple of minutes to plan what they will say for their chart presentations.
- Call on one group at a time to present their KLEWS charts to the rest of the class. (See **Know the Standards 8.**)

Know the Standards

TEACHER DEVELOPMENT

6. CCC 6 Structure and Function: When completing their charts, students associate the structure or part to their functions, or how they help the animals live.

7. SEP 1 Asking Questions: Carving out time for students to ask questions brings more awareness to the importance of questions in science. This helps get students in the habit of thinking about what else they want to know or what they feel like they are still curious about.

8. Monitor Progress: Use the presentations as an opportunity to gauge group understanding of the animals' body parts and their uses. Students should show understanding of how the KLEWS charts work.

6. Check for understanding.

Monitor Progress

Formative Assessment

Review student responses to What We Notice (AP 1.2.1) and the group KLEWS charts to determine student understanding of the following concepts:

- Animals have external body parts that they use for different things.
- Observations are a form of evidence that can be used to support scientific ideas.

See the Activity Page Answer Key for correct answers and sample student responses. Focus on the KLEWS charts to ensure proper understanding of how to make connections between all the ideas and observations that students have noticed during Lesson 1.2.

Tie to the Anchoring Phenomenon

As students work toward understanding the different ways animals use their body parts, this activity will help prepare students to understand how feeding an owl with a puppet that has the same external body parts and that looks like a real owl can help the baby owl survive in the wild.

LESSON 1.3

How Do Plant Parts Help the Plant?

Big Question: How is a wildlife center designed to help animals survive?

Lesson Guiding Question: How do the parts of plants and animals help them survive?

Today's Question: How do plant parts help them survive?

Tie to the Anchoring Phenomenon: Students observe the different external structures of plants to learn that their structures help them survive in different ways, thus building toward understanding why people who work at wildlife centers must know a lot about body parts and structures of living things to save wildlife.

AT A GLANCE

Learning Objective

- ✓ Describe how the external structures of plants help them meet their needs to survive and grow.

Instructional Activities (2 Days)

- class discussion
- student investigation

NGSS References

Disciplinary Core Idea: LS1.A Structure and Function

Crosscutting Concept: 6 Structure and Function

Students observe the different structures of plants and consider how those structures contribute to the survival of plants. They consider how humans create objects that mimic the function of parts of plants.

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

www.coreknowledge.org/cksci-online-resources

Core Vocabulary and Language of Instruction

Core Vocabulary: Core Vocabulary terms are those that students should learn to use accurately in discussion and in written responses. During instruction, expose students repeatedly to these terms. However, these terms are not intended for isolated drill or memorization.

structure **survive**

Language of Instruction: The Language of Instruction consists of additional terms, not considered a part of Core Vocabulary, that you should use when talking about any concepts in this exercise. Students will benefit from your modeling the use of these words without the expectation that students will use or explain the words themselves. A Glossary at the end of this Teacher Guide lists definitions for both Core Vocabulary and Language of Instruction.

flower leaf plant root
stem

Instructional Resources

Activity Pages



AP 1.3.1
AP 1.3.2
AP 1.3.3

Activity Pages
What Makes Up a Plant?
(AP 1.3.1)
Plant Parts (AP 1.3.2)
Plant Game (AP 1.3.3)

Materials and Equipment

- black marker
- 3 x 5-inch index card (or card stock)
- glue
- scissors
- plastic baggies (1 per group)

Advance Preparation

- Print What Makes Up a Plant? (AP 1.3.1), and increase it to a larger size. Students will need to be able to see the picture from their desks if it is at the front of the room. Alternatively, you can use Activity Page 1.3.1 as a guide to draw a picture of your own flower on the board with leader lines. But do not include labels for the plants on your drawing.
- Print Plant Game (AP 1.3.3), and make enough copies so that each pair of students will receive one copy.
- Cut out the cards. There are six cards total, but the cards have front sides and back sides. So, you will need to cut a total of twelve cards.
- Assemble the cards by gluing the front and back sides onto opposite sides of card stock or index cards.
- After the cards dry, place them into plastic baggies. Each plastic baggie should have one full set of cards (six cards).

THE CORE LESSON 1.3

1. Day 1: Focus student attention on Today's Question.

- **Ask students what plants need to survive.** Record their responses on the board.
 - » air, water, food, soil, sunshine
- Draw a connection that animals need many of the same things to survive, such as air, food, and water.
- Remind students that animals use many of their parts to help them survive. Tell students that today they will look at the parts of different kinds of plants. **Ask students if they think the parts of plants help the plant survive, too.** (See **Know the Science 1.**)

2. Guide the discussion.

Activity Page



AP 1.3.1

- Distribute What Makes Up a Plant? (AP 1.3.1).
- Direct student attention to the enlarged picture of Activity Page 1.3.1 at the front of the room. Tell students that they will work together as a class to label the parts of the plant.
- Call on a volunteer to come up to the picture on the board. Hand the student the marker and tell him or her to label the part of the picture that shows the plant's roots. The volunteer can work with the rest of the class to get this correct. For instance, the student may point to the part on the picture first and ask the class for reassurance. Then, the student writes "roots" on the picture and sits down.
- Repeat this process for the other three parts (stem, leaf, and flower), calling on different volunteers each time.
- Prompt students who are seated to follow along by labeling the parts of the plant on Activity Page 1.3.1.

Differentiation

SUPPORT—Alternatively, make the labeling of the plant parts a matching assignment. This will eliminate misspelling of terms. For students whose first language is not English, have the labels in their home language and English.

Know the Science

TEACHER DEVELOPMENT

1. Differentiation in Plant Parts: Many plants share the similar structures of roots, stems, leaves, and flowers but the degree to which the structures are seen and used can vary a lot. Though they look very different, an oak tree and a dandelion both have roots, a stem, and leaves. A carrot also has the same structures but looks very different. The root system, the carrot people eat, is a much larger portion of the plant and is where the plant stores its energy for survival in the form of sugar. In contrast, the oak uses most of the energy produced in the leaves to make the stem, the trunk, larger.

3. Preview the activity.

Activity Page



AP 1.3.2

- Distribute Plant Parts (AP 1.3.2) to each student, and review it as a class.
- Tell students to look at the pictures in each box. Explain that each box shows a close-up picture of one part of a plant. Students will look at the picture, read the description below it, and then complete the sentence frame that follows.

4. Facilitate the activity.

NGSS Elements



DCI LS1.A

- Assign students in pairs. Tell them that they can work with a partner to discuss the plant parts. However, students will complete their own Activity Page 1.3.2. (See **Know the Standards 1.**)
- Circulate around the room, and provide assistance as needed. Prompt students to look at the labeled picture at the front of the room or at Activity Page 1.3.1 as a reminder of where the different parts are on the plant.

SUPPORT—Read the descriptions of each plant part together as a class. Guide students in labeling two of the four parts of the plants.

SUPPORT—Give students time to look at the pictures and read the descriptions. Then work on the sentence frames together as a class.

Differentiation

CHALLENGE—Challenge students to write a sentence that explains why each of the four plant parts is important or helps the plant live. This can be instead of filling out the sentence frames.

EXTEND—Bring in a live, flowering plant for students to examine. Use it as realia to discuss the different parts and their functions. Then have students complete Activity Page 1.3.2.

5. Check for understanding.

Formative Assessment

Monitor Progress

Have students summarize what they learned about plant parts. Call on volunteers to read a sentence frame, including their response. Ask the rest of the class whether their response sounds right.

Review student responses on Activity Page 1.3.2 to determine student understanding of the following concepts:

- Plants have parts that help them survive.
- Plants need roots to get minerals and water.

Know the Standards

TEACHER DEVELOPMENT

1. DCI LS1.A Structure and Function: Students make connections between plant parts and how plants use those parts to survive.

- Plants need stems to send the minerals and water to other parts of the plant and for support.
- Plants need leaves to make food.
- Plants need flowers to make new plants.

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

Tie to the Anchoring Phenomenon

As students work toward understanding the different things plants use their parts for, this activity will help prepare students to understand that people need to understand structures and functions in order to help wildlife survive in different environments.

1. Day 2: Focus student attention on Today's Question.

- Remind students that in the previous class session they looked at four structures of plants.

Monitor Progress

Ask students to name the parts they learned about.

» roots, stems, leaves, flowers

Ask students to tell what those parts do. (See **Know the Science 2.**)

- » Roots anchor the plant and take up water and minerals.
- » Stems send the water and minerals to other parts of the plant and give the plant support.
- » Leaves help the plant make food.
- » Flowers help the plant make new plants.

Know the Science

TEACHER DEVELOPMENT

2. Photosynthesis and Reproduction: The process of photosynthesis is carried out in the leaves of most plants. Cells within the leaves combine water from the root system, carbon dioxide from the air, and energy from sunlight. The reaction produces water, oxygen, and a small amount of sugar. The process of plant reproduction is aided by the plant's flowers. The colors or scents of the flowers will attract insects and other animals. A small amount of pollen, a fine powder, will rub off on the insects. Over time, the insects will encounter flowers with eggs and a seed will result. In this way, flowers contribute to a plant's survival.

2. Preview the game.

- Tell students that today they will play a game where they match plant parts to some objects that people use to compare how they are similar.
- Place students in pairs. Distribute the baggies with cards in them to each pair. Prompt students to take the cards out and lay them flat on the desk or table.
- Explain that students must match one plant card to one human card. Students will need to look at both sides of each card. The front side of the card shows a picture. The back side of the card has a description.
- When students have a match, they should put the cards next to each other and move them to the side.

3. Facilitate the game.

- Circulate around the room, and provide support as needed.
- Use the following, or similar, prompts:
 - Leaves absorb sunlight and help turn it into food for the plant. What is a leaf similar to?
 - The roots of a plant take in the water and minerals from the soil. What else do we use to take in liquids?
 - What does the stem do? It moves water and minerals from the roots to other parts of the plant. It also gives the plant support. Where else do you see this in everyday life? (See **Know the Standards 2.**)
- Encourage students to reread the backs of the cards as many times as they need to in order to better understand the description for the plant and human parts.

SUPPORT—Provide one-on-one assistance to help students better understand the concept of solar energy. (See **Know the Standards 3.**)

CHALLENGE—Have students complete this activity individually. Alternatively, you could redesign this activity to include distractor cards. Students will need to use all of the plant parts for their matches, but there will be leftover human object cards that do not match with any of the plant parts.

NGSS Elements



DCI LS1.A

Differentiation

Know the Standards

TEACHER DEVELOPMENT

2. DCI LS1.A Structure and Function: Students observe the external structures of plants in pictures. Later they will use this information to talk about how the shape and structure of the parts help carry out their functions.

3. Differentiation: Students are not expected to know what solar energy is, but they should be able to understand the concept of it by reading the description on the card or by having a conversation in class about it.

EXTEND—Have students make a poster that describes—using words and pictures—how one of the plant parts is similar to something that humans use. Students will present their posters in the following class period or post them around the room to conduct a gallery walk.

- Tell students when they have a few minutes left to finish the game.

4. Summarize and discuss.

NGSS Elements



CCC 6

- Bring the class back together to discuss the results of the game.
- **Ask students what human object they matched with the plant's stem.** Discuss the correct answer and why the plant part resembles the human object. Then repeat this with the other plant parts.
- Draw attention to the shape and structure of the parts of the plants. Help students make connections between the structures and their functions. Use the following to guide the discussion (see **Know the Standards 4**):

Tell students to look at the roots card. Ask them to describe the shape and structure of the roots. Ask, Do you think the shape of the roots helps plants survive? Why?

- » Yes, because the roots are small and they spread out in different directions. This helps them get water from the ground.

Tell students to look at the stem card. Ask them to describe the shape and structure of the stem. Ask, Do you think the shape of the stem helps plants survive? Why?

- » Yes, because the stem is long and thin. This helps the plant stand up tall. It also lets water flow up it like a tube to different parts.

Tell students to look at the leaf card. Ask them to describe the shape and structure of the leaf. Ask, Do you think the shape of the leaf helps plants survive? Why?

- » Yes, because the leaf is flat, and that helps it get more sunlight.

Know the Standards

TEACHER DEVELOPMENT

4. CCC 6 Structure and Function: Students understand how the shape and stability of some plant structures can be related to their functions.

5. Check for understanding.

Monitor Progress

Formative Assessment

At the beginning of this two-day lesson segment, students were just learning about plant parts. By the end of the lesson segment, students should show progression in understanding how plants use their parts and how these parts are similar to things that humans use to solve everyday problems.

Review student responses to the plant game and how they matched the plant parts to the human objects to determine student understanding of the following concepts:

- Plants have parts that help them survive.
- There are human objects that act like plant parts.
- The shape and structure of plant parts helps them grow and survive.

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

Tie to the Anchoring Phenomenon

Students develop an understanding that plant parts—including their shapes and structures—help plants survive and also that people use things in everyday life that function similarly to the different parts of plants. This exposes students to early ideas of biomimicry and how plants can serve as models for solving human problems.

LESSON 1.4

What Things Do We Use That Are Similar to Animal and Plant Parts?

Big Question: How is a wildlife center designed to help animals survive?

Lesson Guiding Question: How do the parts of plants and animals help them survive?

Today's Question: What objects do humans use that look and act like animal and plant parts?

Tie to the Anchoring Phenomenon: Students observe the different external structures of animals and plants to learn that people use objects that are similar to those parts to help them accomplish similar things. This introduction to biomimicry will help students learn about how volunteers at wildlife centers often have to mimic animal parts and behaviors to help animals.

AT A GLANCE

Learning Objectives

- ✓ Identify human objects that are similar to animal parts.
- ✓ Identify human objects that are similar to plant parts.

Instructional Activities (2 Days)

- drawing
- teacher Read Aloud
- class discussion

NGSS References

Disciplinary Core Idea: LS1.A Structure and Function

Science and Engineering Practice: 6 Constructing Explanations and Designing Solutions

Crosscutting Concept: 6 Structure and Function

Students continue to observe the different structures of organisms. They construct explanations relating those structures to functions that humans can mimic.

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

www.coreknowledge.org/cksci-online-resources

Core Vocabulary and Language of Instruction

Core Vocabulary: Core Vocabulary terms are those that students should learn to use accurately in discussion and in written responses. During instruction, expose students repeatedly to these terms. However, these terms are not intended for isolated drill or memorization.

structure **survive**

Language of Instruction: The Language of Instruction consists of additional terms, not considered a part of Core Vocabulary, that you should use when talking about any concepts in this exercise. Students will benefit from your modeling the use of these words without the expectation that students will use or explain the words themselves. A Glossary at the end of this Teacher Guide lists definitions for both Core Vocabulary and Language of Instruction.

flower **leaf** **plant** **root** **stem**

Instructional Resources

Student Book



Ch. 2

Ch. 3

Activity Page



AP 1.4.1

Student Book, Chapter 2
“What Parts Do Animals Have?”

Student Book, Chapter 3
“What Parts Do Plants Have?”

Activity Page
What Do We Use? (AP 1.4.1)

Materials and Equipment

- fabric zippers (1 per group)
- internet access and the means to project images/video for whole-class viewing

THE CORE LESSON 1.4

1. Day 1: Focus student attention on Today’s Question.

NGSS Elements



CCC Connection
to Engineering,
Technology,
and
Applications of
Science

What objects do humans use that look and act like animal and plant parts?

Explain to students that sometimes humans want to do the same things that animals can do. Examples include being able to fly or being able to breathe underwater. But instead of being able to do these things naturally, humans have to come up with inventions that make these things possible.

Ask students, Can humans fly like a bird? No, but we can fly in an airplane.

Ask students, Can humans breathe underwater like fish? No, but we can wear equipment that lets us stay underwater for a while. (See **Know the Science 1.**)

Explain that these are human solutions to problems. The problems are ones such as not being able to fly or not being able to breathe underwater. And the solutions are the things people design to let us do these impossible things! (See **Know the Standards 1.**)

2. Preview a game.

Activity Page



AP 1.4.1

- Tell students that they are going to play a game about how people use things to accomplish things that animals can do.
- Distribute What Do We Use? (AP 1.4.1). Review the game together. Draw student attention to the animal pictures and the blank drawing boxes beneath them. Tell students that you will read a statement about each animal. Then the students will draw a picture of an object that people use to accomplish the same thing.
- Model with students how to do the first one on the page. Use the suggested prompt to read to students about elephants:
 - Elephants have long trunks. They use their trunks for many things. One thing they can do with their trunks is take up water and spray it on their bodies. This helps them get clean and cool off.
- Model for students how to think about an object that people use that is similar to an elephant's trunk. Work through the thought process with them. Elephants use their trunks to hose themselves off when they are dirty or hot.

Ask students, What do you use when you are dirty and need to get clean? What does an elephant trunk look like?

» showerhead or water hose

- Now prompt students to draw a picture of a showerhead or a water hose.

Know the Science

TEACHER DEVELOPMENT

1. Mimicry vs. Biomimicry: There is a difference between mimicry and biomimicry. Mimicry refers to a trait or resemblance to another organism for the purposes of survival which has evolved over time. For example, some beetles and flies, which cannot sting, have the same patterns and colors on their bodies as wasps, which can. This helps the beetles and flies survive by warding off predators. Biomimicry is the imitation of nature to solve problems. A scuba system with air tanks would not be biomimicry, but developing a set of artificial gills to pull oxygen from the water would be biomimicry.

Know the Standards

TEACHER DEVELOPMENT

1. CCC Connection to Engineering: Engineers help design objects that humans can use based on things they know about the natural world, such as airplanes and scuba gear.

3. Play a game.

NGSS Elements



CCC 6
SEP 6

- Place students into pairs, and allow them to work together as they fill out their own individual Activity Page 1.4.1. (See **Know the Standards 2** and **3**.)
- Read the following or similar statements for the following animals. After reading each prompt, give students a couple of minutes to discuss with their partners and draw their pictures.
 - Turtle: Turtles have hard shells. Their shells protect their organs on the inside. This helps turtles stay safe.
 - Dog: Dogs have fur coats. Their fur helps them stay warm.
 - Giraffe: Giraffes have long necks. Their necks let them reach leaves that are high up in trees.
- After reading each statement, circulate around the room. Provide assistance to students as needed. Use prompts such as “Think about what the animal uses that body part for” and “Does the animal part remind you of anything that people use?”
- Give students a few minutes to discuss their ideas with their partner and make their drawings. Tell students they will review the answers and drawings at the end of class.

Differentiation

SUPPORT—Instead of having students work in pairs, make this a whole-class activity that all of the students complete together with your guidance.

CHALLENGE—Have students work on this activity individually, instead of in pairs.

EXTEND—After completing this activity, give students a list of additional animals—such as porcupines, bears, and birds—and have them do research on their external body parts and identify the objects that humans use that resemble those parts.

4. Read together: “What Parts Do Animals Have?”

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 teachers and parents can read it when sharing the Student Book with students.

Know the Standards

TEACHER DEVELOPMENT

2. CCC 6 Structure and Function: In this game, students have to think about the external body part being described and make connections to how that part is used and how it resembles something that humans use.

3. SEP 6 Constructing Explanations and Designing Solutions: This game helps prepare students to meet the science and engineering practice by getting them to think about how people use devices to help them solve problems.

Ask students to turn to page 8 of the Student Book and look at the image as you read aloud. Remind them that the title of this chapter is “What Parts Do Animals Have?” and tell them to pay special attention to how animals use those parts as you read.

CHAPTER
2

What Parts Do Animals Have?

Workers at a wildlife center like the one caring for the owl Luzi found must know a lot about animals. Some animals that need help can't take care of themselves because they are hurt. Others can't take care of themselves yet because they are too young.

Wildlife caregivers must know what animals need to live. They must know what the animals eat. They must know how the animals move around. The workers use what they know to care for the animals. In this picture, a wildlife caregiver feeds a baby sloth.



8

Call attention to the picture. Explain that someone is helping feed a baby sloth.

LITERAL—What is the worker doing to the baby sloth?

» feeding it

SUPPORT—Explain that in order for workers to know what they should use to feed the baby sloth, they first have to know some things about the sloth.

INFERENTIAL—What do you think someone has to know about a sloth before it is fed?

» what the sloth eats, how the sloth eats, when the sloth eats, and how much the sloth eats

Ask students to look at the picture on page 9.

All animals have parts. These parts have different purposes. Some parts help an animal find and catch food. Some parts help an animal move from place to place. Some parts help an animal breathe. All of an animal's parts help it grow and survive.

Wings, legs, and eyes are some owl parts. This is an adult great horned owl. What do its parts help it do?



CORE VOCABULARY—Explain that to **survive** means to stay alive, especially when faced with hardship.

Call on volunteers to answer the question in the caption.

LITERAL—What are some of the parts of the owl?

» eyes, beak, wings, feathers, claws, tail

INFERENTIAL—What do you think these parts help it do?

» The owl uses its eyes to see. It uses its beak to eat. It needs its wings to fly. Its claws help it catch food. Its tail is used for flying, too.

SUPPORT—Have students turn and talk to a neighbor about some parts of the human body that we need and use. Prompt them to discuss their mouths, ears, eyes, arms, and legs. Point out that we depend on our body parts to help us carry out certain tasks during the day and that we use our parts without really thinking about it. These parts help us grow and do things that we need to do.



Ask students to look at the three pictures on page 10. Make a list on the board of the ways that animals move that are mentioned on the page: flying, running, swimming, and hopping. (See **Know the Standards 4.**)

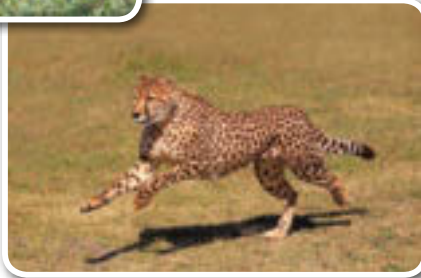
Most animals must move to stay alive. Some animals run. Some animals swim. Some animals hop from place to place. Animals have parts that help them move. The owl that Luzi found in the desert has wings. Wings enable birds to fly.

Fish have parts that help them swim.



A jackrabbit has parts that help it hop quickly in the desert.

A cheetah has parts that help it run fast.



10

LITERAL—What are some other ways that animals can move?

» crawling, slithering, jumping, bouncing

Add student responses to the list on the board.

Look at the first picture on page 10 together as a class. **Ask students what parts on the fish help it swim.** Repeat this with the pictures of the jackrabbit and the cheetah.

INFERENTIAL—Why do you think animals have to move to stay alive?

» so they can catch food, run away, or hide

Know the Standards

TEACHER DEVELOPMENT

4. DCI LS1.A Structure and Function: Students read about the different ways that animals use their external body parts to help them survive, including moving, eating, and breathing.

Ask students to look at the pictures on page 11. Point out that the parts that animals use to eat are all different. The bird has a long beak and the frog has a long tongue. Explain that they are different because these animals eat different kinds of food.

Animals must eat to stay alive. They have parts that help them get and eat food. Some animals have bills that help them eat berries, nuts, and seeds. Some animals have sharp teeth that help them tear and eat meat. Some animals have long tongues that help them catch insects.

A bird's beak helps it gather seeds and berries.



A frog catches insects with its tongue.



11

INFERENTIAL—Why don't birds have a long tongue?

» because they can reach things with their beak

INFERENTIAL—Why don't frogs have long beaks?

» because they don't need to carry seeds or berries

Ask students to look at the two pictures on page 12. Talk about the structures that help the shark and salamander breathe. (See **Know the Science 2.**)

Animals must get oxygen to stay alive. Some animals have parts that help them live and breathe on land. Some animals have parts that help them live and get oxygen that is in water. Some animals can live and breathe both on land and in the water! Sharks have parts that help them get oxygen underwater. Salamanders can breathe in oxygen on land and get oxygen from out of the water!



12

Know the Science

TEACHER DEVELOPMENT

2. Specialized Body Parts: Students have had practice identifying animal body parts and talking about the use of those parts. Here, students have an opportunity to demonstrate their understanding that each animal's external parts are specialized to meet its unique needs. This is why all animals do not look alike, even if they all do the same things to survive, such as eat.



SUPPORT—Play the shark video for students.

See the Online Resources Guide for a link to the recommended video:

www.coreknowledge.org/cksci-online-resources

Discuss what they notice about how sharks breathe. **Ask students what else they wonder about sharks.** (See **Know the Science 3.**)

LITERAL—What parts do humans have that let us breathe?

» lungs, noses, mouths

SUPPORT—**Ask students if they have ever used a snorkel mask when swimming in the water.** Explain that a snorkel mask is a mask that covers your eyes and nose. It also has a tube that goes into your mouth and sticks above the water. You breathe through your mouth through the tube, and all the while your head can be under the water, looking around.

LITERAL—What kind of human problem does a snorkel mask solve?

» being able to breathe when you are under the water

EXTEND—Have students research other inventions that help people breathe in places where humans usually cannot breathe, such as outer space. They can look up how space suits work and the concept of oxygen tanks.

Differentiation

Know the Science

TEACHER DEVELOPMENT

3. Breathing Underwater: Even though sharks live in the water, they still need to breathe. Sharks have gills that allow them to breathe underwater. The gills open and close to move water into and out of the shark's body. They also are covered in very small blood vessels. These vessels are able to take oxygen that is dissolved as oxygen gas in the water. Some sharks have to swim to breathe and stay alive. This is because they use the water that enters their mouths to pass through the gills so they can get the oxygen out of it. Other sharks can still breathe when they rest.

Salamanders have different ways that they breathe. This depends on the type of salamander. Some salamanders breathe mostly through gills. Others can breathe through their skin.

Now ask students to look at the picture on page 13. Discuss how elephants move, how they eat, and how they breathe. **Then ask students to name other animals and answer the same questions about them.**

What parts do these elephants have? What do those parts do that helps the elephants survive? Think about your favorite animal. How does it move? How does it eat? How does it breathe?



13

Differentiation

CHALLENGE—Have students research an animal of their choice and write a report on how that animal moves, eats, and breathes that they will present to the class in the next class session.

5. Check for understanding.

Formative Assessment

Have students summarize what they learned about animal parts and how they are similar to things that people use.

Review student drawings on Activity Page 1.4.1 to determine student understanding of the following concepts:

Monitor Progress

- Animals have parts that help them survive.
- Humans use objects that are similar to the parts of animals.

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

Tie to the Anchoring Phenomenon

As students work toward understanding the different things animals use their parts for, this classroom session helps students to understand how humans mimic certain animal parts or use their parts for ideas on ways to solve human problems.

1. Day 2: Focus student attention on Today's Question.

- Remind students that in the previous class session they talked about the external body parts of animals. Tell students that today they will focus back on plants.

2. Turn and talk.

Monitor Progress

- Remind students that in the previous class session they completed an activity in which the teacher read a description about an animal part and the students had to draw a picture of something humans use that resembles that part. (See **Know the Standards 5.**)
- Review some of the comparisons students made between animals and something humans use that resemble the animal part to refresh their memories.
- Have students work with a classmate to discuss the following questions:
 - What can plants do that people might want to do?
 - What are some objects that humans use that act like plant parts?
- Circulate around the room, and listen for student responses. Correct any misconceptions as necessary.

Know the Standards

TEACHER DEVELOPMENT

5. Monitor Progress: Students have learned in previous class sessions that plant parts act like some of the things we see humans use. Roots resemble straws, stems act like the plumbing system in houses, and leaves act like solar panels on rooftops. This activity encourages students to use what they know about plant parts and their uses to hold a conversation with a peer without any prompts, visuals, or realia.

3. Read together: “What Parts Do Plants Have?”

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 teachers and parents can read it when sharing the Student Book with students.

Read Aloud Support

Page 14

Ask students to turn to page 14 of the Student Book and look at the image as you read aloud. Remind them that the title of this chapter is “What Parts Do Plants Have?” and tell them to pay special attention to how plants use those parts as you read.

CHAPTER 3

What Parts Do Plants Have?

Animals have parts that help them grow and survive. Plants have parts that help them grow and survive, too. Plants can’t move like animals can. But plants can get water and sunlight. Plants can get air. Plants have seeds. Some plants can even “eat” other living things! The desert marigold has parts that help it get what it needs.



14

Call attention to the picture. Explain that even though plants cannot move like animals can, they can still move. Plants grow tall. Growing is a form of movement. Plants can also grow toward the direction of the sun. They can change the way they grow according to where they are getting the most sunlight.

LITERAL—What part of the plant do you see?

» flower, leaves, stem

Page 15

Ask students to look at the three pictures on page 15. Remind students that roots are like a straw. They pull up water that is found in the ground. (See **Know the Science 4.**) Explain that cacti have roots that are close to the surface.

Plants must get water to stay alive. They have parts called roots that take in water. A plant's roots grow under the ground. Roots can be long or short. They can be thick or thin. They can grow deep into soil or stay close to the surface. But they all help a plant get the water it needs to survive.

This prickly pear cactus lives in the Sonoran Desert. Its roots are short and close to the surface. They can take in water right after a short rainfall.



You can see the roots of this fallen tree, which grew deep into the soil.



15

Know the Science

TEACHER DEVELOPMENT

4. Getting to the Root of Roots: Not all plants grow in soil. Therefore, not all roots are underground. Some plants, like orchids, have roots that are exposed to the air. Other plants can be grown in water. The thing that all of these plants have in common is that they need water to survive. Roots are usually the part of plants that take in water, whether a plant grows underground, above ground, or in water.

SUPPORT—Explain that **roots** are plant parts that take up water and minerals, typically underground.

SUPPORT— Help make a connection for students between the cactus's roots and the environment of a desert. Explain that a desert is a dry place and that it does not rain very much there. When it does rain, cacti need to be able to soak up water quickly. If their roots are short and close to the surface of the ground, the plant can get the water it needs.

INFERENTIAL—Why do you think a cactus's roots are close to the surface?

» It can get water more quickly.

Page 16

Ask students to look at the two pictures on page 16. Explain that stems have to support the plant. This is why different plants have different types of stems. For instance, the tree trunk has to be thicker and bigger because trees grow so tall and big.

When roots take in water, where does it go? It moves through a part called a stem. A stem helps get water to the plant's other parts. It also helps hold a plant upright. Stems can be thick or thin. They can be hard or soft.

A tree trunk is a kind of stem. It is thick and rough.



This desert plant has many stems.



LITERAL—What do you notice about the stems on the desert plant compared to the tree trunk?

» The desert plant stems are smaller, thinner, and green.

INFERENTIAL—Why do you think the flower stem is not as big as a tree trunk?

» because flowers are smaller and shorter than a tree

Differentiation

SUPPORT—Remind students that tubes inside of plant stems are like plumbing pipes in their home. They move water from one place to another. However, that is not the only function of plant stems. Stems also help plants stand up tall. The stem gives the plant support.

Page 17

Now ask students to look at the two pictures on page 17.

Plants need sunlight to stay alive. Leaves are the part of a plant that take in sunlight. They use sunlight and water to make food for the plant. Leaves come in many shapes and sizes.

Plants in shady places often have large leaves so they can take in more sunlight.



17

Explain that **leaves** are plant parts that help the plant make food. Plants need food to live. The leaves absorb sunlight.

SUPPORT—Draw student attention to the caption for the second image. **Ask students if they think plants that grow in sunny areas have large leaves or smaller leaves.**

» Plants that grow in places with a lot of sunshine, like the desert, do not have to have giant leaves because they get sunlight all the time.

Page 18

Ask students to look at the two pictures on page 18. Explain that the flower is the colorful part of a plant. Flowers come in many different colors. They are colorful so that bees and other insects can see them easily.

Colorful flowers are probably the first thing you notice about a plant. Insects notice flowers, too! They land on the flowers. They pick up pollen with their legs and wings. Then they carry it to other plants. This pollen is necessary for plants to make seeds. Seeds grow new plants.

Can you see the yellow pollen on the bee's body?



Seeds fall to the ground. New plants grow.



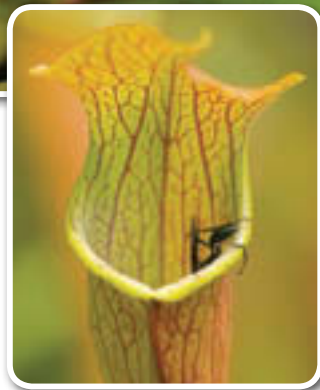
18

LITERAL—Where does the bee get the pollen?

» from the flower

Now ask students to look at the two pictures on page 19. Explain that plants that “eat” insects are rare. However, these plants still do exist. Clarify that plants that “eat” cannot eat large animals. They can only take in small insects, like bees or flies.

Plants can't bite or chew like animals can. But did you know that some plants can still “eat” other living things? An insect lands on the plant. It smells something sweet and crawls inside. Then the plant snaps shut! The Venus flytrap closes to trap insects. The plant then gets some of the nutrients it needs to survive.



A pitcher plant traps bugs in a leaf that is a tube. These plants are unusual. Most plants do not consume animals in this way.

19

LITERAL—What does the first picture look like that is similar to an animal part?

» a mouth; teeth

Explain that the plant in the second picture does not have the same teeth-looking parts. This plant traps the insect inside the tube where it drowns in the liquid at the bottom of the tube.

SUPPORT—Ask students if there are things that people use that are similar to these plants. Help students think of examples, such as a claw digger. The claw part of the digger is used to open and close up to move dirt or other materials to another location. The bottom picture looks similar to a cup or a pitcher, both used by humans to hold liquids.

4. Demonstrate examples and guide the discussion.

- Have students form pairs, and distribute one zipper to each group.
- Tell students to examine the zipper. Have them move the slider up and down to close and open it.

Ask students what a zipper is used for.

» to fasten things together; to close things

Ask students where they see zippers being used.

» clothing, backpacks

NGSS Elements



DCI LS1.A

- Review the parts of the zipper with students, modeling your own at the front of the class. Emphasize the fact that the parts of the zipper that actually connect together are called the teeth.
- Discuss the reasons for why this part of the zipper would be called teeth. Students should be able to make a connection between the teeth of a zipper and the look and function of human teeth. (See **Know the Standards 6.**)

Ask students whether the zipper and its teeth also look like any of the plants they read about in Chapter 3.

» yes, the Venus flytrap

- Discuss the fact that zippers solve a human problem: to close clothing, backpacks, or other fabric objects. Emphasize that it's possible that zippers were designed based on natural structures—like teeth.

5. Check for understanding.

Formative Assessment

Monitor Progress

Discuss and summarize what students learned in the class session about how animal and plant parts inspire people to design human objects that help solve a type of problem.

Students should show progression in understanding how plants use their parts and being able to make connections to how these parts are similar to things that humans use to solve everyday problems.

Know the Standards

TEACHER DEVELOPMENT

6. DCI LS1.A Structure and Function: Students make connections between the parts of a plant and human products that have special uses. Make a clear point that humans often design things that mimic, or copy, what we see in nature.

As you listen for student responses, gauge their understanding of the following concepts:

- Plants have parts that help them survive.
- Animals have parts that help them survive.
- There are human objects that act like plant parts.
- There are human objects that act like animal parts.

Tie to the Anchoring Phenomenon

Students build on the concept of biomimicry by learning more examples of how humans use animal and plant parts as inspiration to design solutions to human problems.

LESSON 1.5

Lesson 1 Roundup: What Problems Can We Solve?

Big Question: How is a wildlife center designed to help animals survive?

Lesson Guiding Question: How do the parts of plants and animals help them survive?

Today's Question: How can we mimic plant and animal parts to solve a human problem?

Tie to the Anchoring Phenomenon: Students design a solution to a human problem by mimicking (or being inspired by) how plants and/or animals use their external parts to help them survive, grow, and meet their needs. This introduction to biomimicry will help students learn about how volunteers at wildlife centers have to often mimic animal parts and behaviors in order to help animals.

AT A GLANCE

Learning Objectives

- ✓ Identify a human problem.
- ✓ Design a solution to a human problem.

Instructional Activities (3 Days)

- student investigation
- class discussion
- drawing

NGSS References

Performance Expectation: 1-LS1-1

Disciplinary Core Idea: LS1.A Structure and Function

Science and Engineering Practice:
6 Constructing Explanations and Designing Solutions

Crosscutting Concept: 6 Structure and Function

Connections to Engineering, Technology, and Applications of Science: Influence of Engineering, Technology, and Science on Society and the Natural World

Students identify a human problem and develop a solution to that problem by mimicking a structure of an organism.

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

www.coreknowledge.org/cksci-online-resources

Core Vocabulary and Language of Instruction

Core Vocabulary: Core Vocabulary terms are those that students should learn to use accurately in discussion and in written responses. During instruction, expose students repeatedly to these terms. However, these terms are not intended for isolated drill or memorization.

mimic problem solution

Language of Instruction: The Language of Instruction consists of additional terms, not considered a part of Core Vocabulary, that you should use when talking about any concepts in this exercise. Students will benefit from your modeling the use of these words without the expectation that students will use or explain the words themselves. A Glossary at the end of this Teacher Guide lists definitions for both Core Vocabulary and Language of Instruction.

biomimicry

Instructional Resources

Activity Pages



AP 1.5.1

AP 1.5.2

AP 1.5.3

Activity Pages

Animal and Plant Cards
(AP 1.5.1)

Human Problem Cards
(AP 1.5.2)

Let's Solve a Problem!
(AP 1.5.3)

Materials and Equipment

- poster boards (1 per group)
- markers, assorted colors (1 box per group)
- scrap paper (3–5 sheets per group)
- pencils (1 per student)
- glue (1 bottle per group)
- scissors
- envelopes (7)

Advance Preparation

- Print Animal and Plant Cards (AP 1.5.1) and Human Problem Cards (AP 1.5.2). Cut out the cards along the dashed edges. Place the cards that go together into an envelope. Each envelope should contain an animal/plant picture card, an animal/plant description card, and a human problem card.
- Match the animal/plant cards with the human problem cards as follows:
 - pangolin – keeping body parts safe when roller skating
 - turtle – keeping heads safe when riding bicycles
 - rose – keeping intruders away
 - bat – finding your way around in the dark
 - tree – making a tall building
 - bear – staying warm in the cold winter

THE CORE LESSON 1.5

1. Day 1: Focus student attention on Today's Question.

- Hold a brief discussion about what students have learned so far in this lesson, touching on the following topics:
 - Animals and plants have external parts that help them survive.
 - Humans use objects that are like animal and plant parts to help solve a problem.

NGSS Elements



3D Learning

3D Learning: In this session, students use what they know about how animal and/or plant parts work to figure out a way to solve a human problem by mimicking natural processes and functions. (See **Know the Science.**)

- Tell students that today they will design a solution to a human problem by mimicking how plants and/or animals use their external parts to survive.

2. Preview the investigation.

Activity Page



AP 1.5.3

- Place students in small groups of mixed ability. If possible, try to have six groups total, so that each group gets a different animal and plant to focus on for the investigation.
- Randomly distribute one envelope with the animal and plant and human problem cards inside of it to each group. Tell students not to open their envelopes until you say so. Explain that inside the envelope they will find three cards.
- Describe the cards to students. The animal and plant cards have a picture and description of the living thing. The human problem card explains the problem that students will try to solve.

NGSS Elements



DCI LS1.A
PE 1-LS1-1

- Let students know that they will need to look at the pictures and read the descriptions carefully.
- After reviewing the cards, they will talk—as a group—about how they can mimic the animal or plant part to solve the given problem. (See **Know the Standards 1.**)

Know the Science

TEACHER DEVELOPMENT

Biomimicry: To mimic means to imitate. Biomimicry is therefore the people employing some form of imitation of biological elements for the purpose of solving a problem or designing a solution to something.

Know the Standards

TEACHER DEVELOPMENT

1. DCI LS1.A Structure and Function: Animals and plants use their external parts in different ways. All of the animals and plants that students will be looking at on the cards have unique external parts that lend themselves to solving a given human problem.

SUPPORT—Help define the word *mimic* for students. Act as an animal, such as a cat, dog, or rabbit, and have students mimic the action.

CHALLENGE—Explain that students are participating in biomimicry for this investigation. Challenge students to look up two or three inventions or solutions that are based on biomimicry and share what they find.

EXTEND—Students will choose an animal or a plant to make a working model of a tool based on a part of the animal or plant. For example, pinchers for picking up items could be based on a crab's pinchers. Suggest students give their tools unique names that incorporate the animal or plant they based the tool on. Have students present their models to the class.

- Distribute Let's Solve a Problem! (AP 1.5.3), and go over it together. Draw student attention to the questions. Explain that they will need to answer questions 1 through 4. Then they will draw their designs on poster board. There is scrap paper and pencils available to each group so that they can sketch out their drawings before they draw it onto the big poster board. After they draw their designs, students will answer questions 5 and 6.
- Distribute scrap paper and pencils to the groups.

3. Facilitate the investigation.

NGSS Elements



CCC 6
SEP 6

- Circulate around the room, and provide assistance as needed. In Day 1, students should have read over the descriptions and human problems and studied the pictures of the animals and plants to come up with ideas for the devices they will design. They should also be able to respond to the first set of questions in Activity Page 1.5.3. In Day 2, students will start drawing the designs and answering the remaining questions on Activity Page 1.5.3. On Day 3, students will present their posters. (See **Know the Standards 2** and **3**.)
- Help students respond to the questions on Activity Page 1.5.3.
 - For the first question, students should write down the problem they need to solve.
 - For the second question, students should write down the idea for their design.
 - For the third question, students should describe the external animal or plant part that the design mimics.
 - For the fourth question, students should describe the design's features, such as whether it needs to have an adjustable strap, a circular base, or a cover on the top.

Know the Standards

TEACHER DEVELOPMENT

2. CCC 6 Structure and Function: In this investigation, students have to look at and read about the external part being described and make connections to how those parts can be used to solve the given human problem.

3. SEP 6 Constructing Explanations and Designing Solutions: In this investigation, students draw designs of devices that solve a given human problem based on biomimicry.

- Use prompts such as the following to help students make connections between the animal or plant part and the human problem:
 - What is the problem? What are we, as humans, trying to do?
 - How does the external part function?
 - Does the external part resemble anything we use in our day-to-day lives?

SUPPORT—Instead of having students work in small groups, make this a whole-class activity that all of the students complete together with your guidance.

CHALLENGE—Have students do this activity individually, instead of in groups. Allow students to pick the animal or plant they want to work with.

- Check to ensure that students are on the right track with their ideas for their designs. The designs should be related to the given human problem and should mimic an external part of the animal or plant that they have been assigned. If necessary, help students identify the animal or plant part that they should focus on, or help them understand how that part could be used as a human object.
- Remind students that they will work on drawing their designs in the next class session.
- Tell students that if they have not finalized their ideas for their designs by the time class is over, they can take a few minutes to continue this exercise in the next class session.

1. Day 2: Focus student attention on Today's Question.

- Remind students that in the previous class session they worked with their groups to come up with a design solution to a human problem that mimics an animal or plant part. Let students know that today they will get to finish this investigation.

2. Continue the investigation.

NGSS Elements



SEP 6

- Have students get back into the same groups. Give groups a couple of minutes to review where they left off. (See **Know the Standards 4.**)
- Distribute poster board, markers, and glue to the groups. Tell students that in today's class session, they will decide on their final designs and draw it on the poster board. Encourage them to use colorful markers to make the different parts of their designs stand out.
- Tell students to write the human problem at the top of the poster board. Have them glue the animal or plant card on the poster board next to the human problem.
- Tell students that their designs should be drawn big and bright so others will be able to see them when they do a gallery walk at the end.

Know the Standards

TEACHER DEVELOPMENT

4. SEP 6 Constructing Explanations and Designing Solutions: Day 2 is when students will draw their final designs to the given problem. They will use poster board, markers, glue, and cards to make their designs.



- Circulate around the room, and provide assistance. Remind students that they need to leave enough time to answer the rest of the questions on Activity Page 1.5.3.
- Help groups answer the questions if they are unsure of what to put down for answers.
- Tell them that they need to describe how or why their design mimics the part of the animal or plant. This explanation should show a similarity between how the part works and how the design works. Then, students tell how the animal or plant uses that part. The final question on Activity Page 1.5.3 is where students explain how the design is intended to work. (See **Know the Standards 5** and **6**.)
- Let students know when they have five minutes left to wrap up their designs and answers.

3. Do a gallery walk.

- Have students bring their poster boards to designated areas around the room.
- Conduct a gallery walk so students walk around the classroom—in their same groups—and look at each other's work. As they walk, use the following question prompts to spark discussion among group members:
 - What is that group's human problem?
 - What is that group's design solution?
 - Do you think the design solves the problem? Why or why not?
- Tell students that you will pass out their posters again in the next class session and that each group will present its design.

1. Day 3: Focus student attention on Today's Question.

- Remind students that in the previous class session they finished their designs and did a gallery walk to see each other's work.
- Have students form their groups. Pass out each group's poster, and give them time to review their design and how it solves the human problem.

Know the Standards

TEACHER DEVELOPMENT

5. CCC Influence of Science, Engineering, and Technology on Society and the Natural World:

Students experience how to apply knowledge of the natural world (animal and plant parts) to the design of a human product to solve a problem. Humans are often faced with obstacles that they need to overcome or problems that need to be solved. All human products are designed by applying some level of knowledge about natural phenomena.

6. Language Arts Connection: Students satisfy a connection to the ELA standard CCSS.ELA-LITERACY.W.1.7 by participating in group work where they write about how to use objects that mimic animal and plant parts to solve a human problem.

2. Present the designs.

- Call on one group at a time to present their posters, responding to the following prompts:
 - What was your human problem?
 - What was your animal or plant?
 - What did you design?
 - Describe your design.
 - Explain how the design solves the problem.
- **Ask the rest of the class whether they think the group's design solves the human problem.**

3. Check for understanding.

Formative Assessment

Have students summarize what they learned about animal and plant parts and how people make things that mimic those parts to solve problems. Students apply what they learned throughout this lesson about animal and plant parts to identify ways to mimic those parts in order to solve a human problem.

Review student responses on Activity Page 1.5.3 and their designs to determine student understanding of the following concepts:

Monitor Progress

- Animals and plants have parts that help them survive.
- Humans mimic animal and plant parts to solve problems.

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

Tie to the Anchoring Phenomenon

As students complete Lesson 1, they understand that people study things in the natural world to help them come up with ways to solve problems. This is an example of how workers at wildlife centers solve the problem of helping animals survive.

LESSON 2

Information Processing: Plant and Animal Stimulus and Response

OVERVIEW

Guiding Question: How do plant and animal parts allow them to sense and respond to their surroundings?

Lesson 2 Segments	Segment Questions	Advance Preparation
2.1 What Sensory Parts Do Animals Have? (2 days) Students use their senses to explore different materials.	What parts help animals sense their surroundings?	Gather materials for the observation. See Materials and Equipment.
2.2 How Do Animals Sense and Respond to Things? (2 days) Students learn that animals have the ability to sense things in their surroundings that help them grow and survive.	How do animals sense and respond?	Gather materials for student activity. See Materials and Equipment.
2.3 Plants Have Senses, Too! (2 days) Students start an in-class experiment to grow mustard seeds.	How do plants respond to their surroundings?	Gather materials for growing the seeds. See Materials and Equipment.
2.4 Animal and Plant Senses (2 days) Students read about animal and plant senses and learn about things that humans use that resemble those senses.	How do plant and animal senses resemble things humans use?	Gather materials for demonstration. See Materials and Equipment. Read Chapters 4 and 5 in the Student Book.
2.5 Lesson 2 Roundup: Mimicking Animal and Plant Senses (3 days) Students plan and carry out an investigation in which they are given a human problem and assigned an animal or a plant to focus on. They design a solution to a problem that mimics the animal or plant sense.	How can people build useful things that work the way a plant or an animal responds to its surroundings?	Gather materials for student investigation. See Materials and Equipment.

What’s the Story?

Summary: In Lesson 2 (Segments 1–5), students explore the parts that allow animals and plants to sense and respond to the world around them. These are the parts that help animals and plants survive. Students then apply their knowledge of sensory parts to design a device that mimics the way an animal or a plant senses the environment (1-LS1-1). The developing understanding of these phenomena in Lesson 2 prepares students for their work in Lesson 3, when they learn about the types of behaviors of parents and offspring that help offspring survive.

Learning Progression: Lesson 2 builds on student understandings from Lesson 1, 1-LS1-1: *Use materials to design a solution to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs.* Lesson 2 also builds toward the Grade 1 target of 1-LS1-2: *Read texts and use media to determine patterns in behavior of parents and offspring that help offspring survive.*

Guiding Phenomenon: Animals and plants have external parts that help them sense the world around them, thus helping them survive. People mimic these parts by designing objects that are used to solve problems (1-LS1-1). Finding the best way to nurture animals back to health in wildlife centers is a problem that some people have to solve. Studying and understanding the sensory parts that animals use can accomplish this.

Learning Objectives

By the end of Lesson 2, students will do the following:

- Identify how plants sense their surroundings to grow and survive.
- Identify how animals sense their surroundings to grow and survive.
- Describe how human objects mimic plant and animal senses.
- Design a solution to a human problem based on plant or animal senses.

NGSS Standards and Dimensions

Performance Expectation: 1-LS1-1 Use materials to design a solution to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs.

Science and Engineering Practice	Disciplinary Core Idea	Crosscutting Concept
6 Constructing Explanations and Designing Solutions Use materials to design a device that solves a specific problem or a solution to a specific problem.	LS1.D Information Processing Animals have body parts that capture and convey different kinds of information needed for growth and survival. Animals respond to these inputs with behaviors that help them survive. Plants also respond to some external inputs.	6 Structure and Function The shape and stability of structures of natural and designed objects are related to their function(s).

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

www.coreknowledge.org/cksci-online-resources

LESSON 2.1

What Sensory Parts Do Animals Have?

Big Question: How is a wildlife center designed to help animals survive?

Lesson Guiding Question: How do plant and animal parts allow them to sense and respond to their surroundings?

Today's Question: What parts help animals sense their surroundings?

Tie to the Anchoring Phenomenon: Students observe the sensory structures of animals to learn that animals have different ways of sensing and responding to their surroundings, which helps them to survive.

AT A GLANCE

Learning Objectives

- ✓ Identify animal sensory structures.
- ✓ Talk about what animals use their sensory parts for.

Instructional Activities (2 Days)

- student observation
- class discussion

NGSS References

Disciplinary Core Idea: LS1.A Structure and Function

Science and Engineering Practice: 1 Asking Questions

Crosscutting Concept: 6 Structure and Function

Students are introduced to the five senses through an investigation. They then ask questions about how the structure and function of animal senses allow them to sense and respond to their surroundings.

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

www.coreknowledge.org/cksci-online-resources

Core Vocabulary and Language of Instruction

Core Vocabulary: Core Vocabulary terms are those that students should learn to use accurately in discussion and in written responses. During instruction, expose students repeatedly to these terms. However, these terms are not intended for isolated drill or memorization.

sense **structure**

Language of Instruction: The Language of Instruction consists of additional terms, not considered a part of Core Vocabulary, that you should use when talking about any concepts in this exercise. Students will benefit from your modeling the use of these words without the expectation that students will use or explain the words themselves. A Glossary at the end of this Teacher Guide lists definitions for both Core Vocabulary and Language of Instruction.

animal

Instructional Resources

Activity Pages



AP 2.1.1
AP 2.1.2
AP 2.1.3
AP 2.1.4

Activity Pages

Seeing Station (AP 2.1.1)
Detective Sheet (AP 2.1.2)
Cat Senses (AP 2.1.3)
Animal Senses (AP 2.1.4)

Materials and Equipment

- small nontransparent containers with lids (9)
- marble
- paper clip
- uncooked rice (half cup)
- water (1 cup)
- playground sand (half cup)
- cotton balls (6)
- vinegar (2 tablespoons)
- orange juice (2 tablespoons)
- vanilla extract (or cinnamon) (1 tablespoon)
- crushed garlic cloves (5, peeled)
- paper plates (3)
- crackers (1 per student)
- lemon drop candies (1 per student)
- peppermint candies (1 per student)
- brown paper bags (4)
- chenille stem
- smooth rock (river rock works well)
- craft pom poms (3–4)
- craft feather
- timer
- scissors
- black marker (or other dark color)

Advance Preparation

SAFETY NOTE: Use proper precautions regarding students with food allergies.

Note that students should be taught emphatically that they should *never* taste or deeply smell unknown materials in a science lab. However, because this lesson specifically deals with senses that students experience firsthand, and only with the direct guidance of an adult, students may optionally smell and taste food items in this session.

Make sure students do not have allergies to the samples that they will be tasting in this investigation. Send home permission slips a few days before this investigation, and tell parents/caregivers the names of each food that students will be tasting to make sure they are not allergic to any of them.

Day 1:

Set up the five stations around the classroom that students will visit for the investigation.

- **Hearing Station:** Place the marble, paper clip, rice, water, and sand into separate containers. Seal the lids securely on the containers. Label the containers 1–5.
- **Smelling Station:** Place two cotton balls into each of three containers. Add the vinegar to one container. Add the orange juice to another container. Add the vanilla extract to a third container. Be sure to saturate the cotton balls with the liquids. For the fourth container, add the crushed garlic. Seal the lids tightly. Use a pair of scissors to poke holes into the lids. Label the containers 1–4.
- **OPTIONAL: Tasting Station:** Place the crackers, lemon drops, and peppermints onto separate paper plates. Label the plates 1–3.
- **Touching Station:** Fill one paper bag with the chenille stem. Fill a second paper bag with the rock. Fill the third paper bag with the craft pom-poms, and fill the fourth with the feather. Label the bags 1–4.
- **Seeing Station:** Cut out the pictures along the dashed edges on Activity Page 2.1.1. Optional: place the paper cutouts into laminated protection sleeves so the pictures do not get ruined by students handling them.

Day 2:

Print Cat Senses (AP 2.1.3), and make a poster-sized copy of it so students can see it and will be able to write on it. Have a marker ready for the activity. Alternatively, you can use Activity Page 2.1.3 to draw a large version of the picture onto the board and have students label it directly on the board.

THE CORE LESSON 2.1

1. Day 1: Introduce students to Lesson 2.

Ask a volunteer to state the **Big Question** that you'll be answering in this unit, which is posted somewhere in the room—**How is a wildlife center designed to help animals survive?**

Tell students that, before they can answer the unit's Big Question about helping animals survive, they first need to understand the different parts that animals use to sense the world around them and how those parts help them survive. In Lesson 2, they will learn about plant and animal sensory parts in order to apply their understanding to the Big Question. Write the **Lesson 2 Guiding Question** where students can see it:

How do plant and animal parts allow them to sense and respond to their surroundings?

Tie to the Anchoring Phenomenon

As students work through Lesson 2, they will learn how animals and plants use the different sensory parts or structures of their bodies to help them receive information from and respond to their environments.

2. Preview the activity.

Activity Page



AP 2.1.2

Differentiation

- **Ask students what they notice when they wake up in the morning. Have students tell what they hear, see, smell, and touch.**
- Explain that these are all things that students sense. Tell students that just like us, animals have ways to sense the world around them.

SUPPORT—It may be necessary to spend more time discussing examples of things that students see, hear, taste, touch, and smell throughout the day. Work as a whole class to identify things that students can sense. For instance, bang on a musical drum to discuss what students hear, bring in samples of different fabric to discuss what students feel, and show students color swatches to discuss what students see.

- Let students know that today they will do an investigation to explore how their senses help them know more about what is around them. They will work in pairs and visit five different stations around the room: one for tasting, one for hearing, one for seeing, one for touching, and one for smelling. They will work as detectives to see if they can figure out what kinds of things they are sensing.
- Model for students what to do at each station. For the hearing station, model shaking or moving around the containers and putting your ear up to them. For the seeing station, model comparing the two columns of pictures. For the tasting station, model tasting the food samples and thinking about their flavors.

For the touching station, model reaching into the paper bags and feeling the objects inside them. For the smelling station, model holding a container up and waving your hand toward your face while inhaling.

- Pair up students. Distribute and review Detective Sheet (AP 2.1.2) as a class. Draw student attention to the different parts of Activity Page 2.1.2, letting them know which section to fill out for which station. Emphasize that students will record what they notice at each station on Activity Page 2.1.2.

3. Facilitate the activity.

NGSS Elements



DCI LS1.D

- Remind students that they must bring their Activity Page 2.1.2 and pencils with them to each station.
- Allow students to pick which station they want to start at. Remind students that they must visit each station once for this activity. If too many pairs of students are at a station, assign pairs to start at other stations so the areas do not become too crowded. (See **Know the Standards 1.**)
- Encourage students to work together and talk about what they observe at the stations. However, make sure each student gets a chance to make their own observations. Intervene if the investigation materials are not being used by everyone.
- Use a timer to make sure students only spend a certain number of minutes at each station. Remind students that they need to save time to record their findings on Activity Page 2.1.2.
- Circulate around the room, and aid students at the different stations. Use the suggested prompts below for each station:
- Hearing station: At this station, you will find five containers. They are sealed, and each one holds a different object. Look at Activity Page 2.1.2. It says that one container has a marble in it, another has a paper clip, another has rice, another has water, and another has sand. **Ask students if they can tell which one is in each container. Ask students what body part they use to hear.** (See **Know the Science 1.**)

» our ears

Know the Standards

TEACHER DEVELOPMENT

1. DCI LS1.D Information Processing: Students gain firsthand experience processing information by using their senses at each of the stations. They become aware of the different body parts that they use at each station to sense the things around them.

Know the Science

TEACHER DEVELOPMENT

1. Human vs. Animal Senses: Hearing: Humans can hear sound in a range from approximately 31 hertz (Hz), which is equivalent to the low rumble from a freight train in the distance, to 19 kilohertz (kHz), which is a higher sound than a mosquito buzzing as it flies. In the animal world, the lowest tested sound an animal can hear is 7 Hz, which whales in water can hear. The highest tested sound an animal can hear is around 100 kHz, which some dolphins and porpoises can hear.

- Seeing station: For this station, you will be looking at pairs of pictures. **Ask students if they can tell if the pictures in each pair are the same. Are the pictures different? What is different about them? Ask students what body part they use to see.** (See **Know the Science 2.**)
 - » our eyes
- Smelling station: In this station, you will find four containers. Each container has something inside of it. Hold the container up to your nose, and breathe in. **Ask students what they smell. Ask students what body part they use to smell.** (See **Know the Science 3.**)
 - » our noses
- Tasting station: You will find three plates. Each plate has a different sample for you to taste. Taste one sample from each plate. Then record what you notice about how the samples taste. **Ask students if they taste things that are salty, sweet, sour, or minty.** Remind students that each person only gets to eat one sample of the food so that there is enough to go around. **Ask students what body part they use to taste.** (See **Know the Science 4.**)
 - » our mouths; our tongues
- Touching station: At this station, you will reach your hand inside a brown paper bag—without looking—and try to see if you can guess what you are touching. Tell students not to worry; everything inside the bag is safe for them to touch. Nothing is sharp, dangerous, or hot. **Ask students what they can feel in the bags.** Prompt them to describe what they feel, such as if the object is soft, hard, rough, or smooth. **Ask students what body part they use to touch.** (See **Know the Science 5.**)
 - » our fingers; our hands; our skin

Know the Science

TEACHER DEVELOPMENT

2. Human vs. Animal Senses: Seeing: Not all animals see the same range of colors humans see. Dog eyes do not have cells for sensing the red wavelength, so everything they see lacks red. Snails do not see colors and cannot focus, but they can locate dark spaces, which is where they are found. Other animals are able to see light in spectra humans cannot. For example, reindeer can see ultraviolet light, which allows them to find food in the dark as well as avoid predators that hunt them in the dark.

3. Human vs. Animal Senses: Smelling: The human nose contains 400 smell receptors, which may be able to detect up to one trillion different odors. Dogs have about 220 million smell receptors and can sense smells differently than humans, but humans and dogs appear to be able to detect the same odors.

4. Human vs. Animal Senses: Tasting: The animal with the fewest taste buds is the chicken, which has 30 or fewer taste buds. The animal with the most taste buds is the catfish with 175,000, which help it sense food in the murky waters where it lives. A human might have between 2,000 and 8,000 taste buds.

5. Human vs. Animal Senses: Touching: The sense of touch works when receptors in the skin sense vibrations or pressure. Humans usually use touch through their hands. Animals, however, have to use touch to survive and so have a more refined sense of touch. Spiders sense vibrations through the hairs that cover their body. They can sense air movements when people walk into rooms and run before they are found. Catfish rely on their sense of touch to find prey in the murky waters in which they live.

Differentiation

- When conducting the investigation at the tasting station, make sure students understand that it is safe for them to taste the foods because you know that everything is okay to eat. If you sent home a permission slip to parents/ caregivers, let students know that their parents/caregivers approved them to taste the samples so they know it's okay.

SUPPORT—Alternatively, you can conduct this investigation as a whole class by passing around the samples to students and talking about each one. Then students can record their findings on Activity Page 2.1.2 as you discuss them.

SUPPORT—Alter this activity for students with sensory impairments, such as hearing or vision impairments.

CHALLENGE—Challenge students by offering more samples for them to investigate and observe. For instance, put out more samples at the smelling and hearing stations.

EXTEND—Have students do a sensory walk outside of class time and record their findings. They can walk around their home, neighborhood, or community with a parent or adult and write down what they see, hear, smell, taste, and touch.

4. Summarize and discuss.

- Bring the class back together, and help students summarize their findings at each station.
- Review with students which sense they used at each station. For instance, they used their sense of hearing at the station with the containers to tell what was inside each one. They used their sense of touch to figure out what was inside the paper bag.
- Ask questions about body parts so students can identify the body part they used at each station. **For example, ask students what body part they used to tell if the container had sand or water in it. Then ask students how they could tell the container with water apart from the container with sand.** Continue asking questions about a few of the samples at each station to gauge student understanding of how to sense things they encounter.
- Ask students what other questions they have about what they can see, hear, smell, taste, and touch. Add these questions to the question board. (See **Know the Standards 2.**)

NGSS Elements



SEP 1

Know the Standards

TEACHER DEVELOPMENT

2. SEP 1 Asking Questions: Allowing students to ask questions about the investigation and their senses can serve as a foundation to what students will learn about how animals and plants sense the world around them.

5. Check for understanding.

Formative Assessment

Review student responses on Activity Page 2.1.2 to determine student understanding of the following concepts:

Monitor Progress

- People have different senses, like seeing, hearing, touching, tasting, and smelling.
- People use their senses to learn about the world around them.

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

Tie to the Anchoring Phenomenon

This activity helps to excite and engage students for learning about the different ways that humans (and animals) can sense what is going on around them. This information serves as a foundation that students will later build on, in terms of understanding that animals have body structures that sense things and allow them to process and respond to information so they can survive in the wild.

1. Day 2: Focus student attention on the Big Question.

Ask a volunteer to state the **Big Question** that you'll be answering in this unit, which is posted somewhere in the room—**How is a wildlife center designed to help animals survive?**

Remind students that in the previous class session they acted as sensory detectives and went around to different stations to use their senses to identify materials.

Make a connection between human senses and animal senses. **Ask students if animals have ways to sense their surroundings, like people do.**

» yes

2. Turn and talk.

- Have students work with a neighbor to discuss what kinds of senses they think animals have. Offer question prompts such as “Do you think animals can see? Can they hear? How do you know?”
- Circulate around the room as students talk to each other, and listen for evidence of student understanding. See whether students form their opinions based on things they have observed animals do. For instance, students may say that they know dogs can see because their pet dog at home can chase after a ball. Or they may say that they know cats can hear because every time their cat hears loud noises, it runs to hide.

3. Facilitate a whole-class activity.

NGSS Elements



DCI LS1.D

Monitor Progress

- Turn student attention to the front of the room, where you posted the diagram of the cat from Activity Page 2.1.3.
- Tell students that they are looking at the face of a cat. Ask: **Do you think a cat can receive information from the world around it?**
- Explain that cats have different senses that they use to survive. Point to the leader lines on the picture. Tell students that each of these parts is something the cat can use to sense things.
- Call on a volunteer to come up to the large cat image. **Ask the class what part of the cat lets the cat hear.** Have the volunteer write the word *hearing* on the leader line that points to the ears. Relate the cat's ears to the students' ears. Explain that students used their ears to hear what was in a container in the last class. They use their ears to hear things throughout the day. They are using their ears to listen to you speak right now. (See **Know the Standards 3.**)
- Call on another volunteer to work on the next sensory part. **Ask the class what part of the cat lets the cat see.** Have the volunteer write the word *seeing* on the leader line that points to the eyes. Repeat this process until the diagram is complete. Continue to make connections between the body parts on the cat and the body parts that students used in their investigation in the last class. Emphasize the body parts as you discuss them. (See **Know the Standards 4.**)
- Summarize what students know about cat senses. Cats can hear, see, smell, taste, and touch things.

4. Give students more examples.

Activity Page



AP 2.1.4

- Distribute Animal Senses (AP 2.1.4) to students. Tell students that they are going to look at the picture of the horse and follow the instructions for identifying the parts that help the horse sense the world around it. (See **Know the Standards 5.**)

Know the Standards

TEACHER DEVELOPMENT

3. DCI LS1.D Information Processing: This activity shows students that cats have different body parts that capture and convey different types of information that the cat needs to survive. Ask questions to make sure students understand the importance of these sensory parts, such as “What do you think would happen if the cat could not hear?” Use sensitivity when discussing senses, as some students may have sensory impairments.

4. Monitor Progress: Ask questions to give students a chance to practice identifying the body parts (e.g. eyes, ears, whiskers) that let cats sense things around them. Gauge their understanding from the activity.

5. CCC 6 Structure and Function: Students practice identifying the parts of animals that help them sense the world around them by their shapes, structures, and locations on their bodies. They begin to associate certain body parts with their functions.



- Allow students to work in pairs for this activity. Encourage them to discuss their answers as they fill out Activity Page 2.1.4.

SUPPORT—Do this activity as a whole class. Read the prompts for students, and give them a couple of minutes to fill in their Activity Page 2.1.4.

CHALLENGE—Challenge students to describe a difference in how humans and horses feel or touch.

EXTEND—Have students write or draw about an animal they see outside of school, such as a pet at home, a bird at the park, or a squirrel in a tree. They should describe the parts of the animal that help it see, hear, smell, taste, and touch.

5. Check for understanding.

Formative Assessment

Review student responses on Activity Page 2.1.4 to determine student understanding of the following concepts:

Monitor Progress

- Animals have different senses, like seeing, hearing, touching, tasting, and smelling.
- Animals use their senses to learn about the world around them.

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

Tie to the Anchoring Phenomenon

This activity helps to excite and engage students for learning about the different body parts that animals use to sense things. This information serves as a foundation that students will later build on, in terms of understanding that animals have body structures that sense things and allow them to process information so they can survive in the wild.

LESSON 2.2

How Do Animals Sense and Respond to Things?

Big Question: How is a wildlife center designed to help animals survive?

Lesson Guiding Question: How do plant and animal parts allow them to sense and respond to their surroundings?

Today's Question: How do animals sense and respond?

Tie to the Anchoring Phenomenon: Students learn about how animals use their senses to grow and survive, which students will be able to apply to the concept of nursing baby owls back to health using puppets and other means in wildlife centers.

AT A GLANCE

Learning Objectives

- ✓ Describe how animal sensory structures capture information that animals need for growth and survival.
- ✓ Explain how animals respond to external inputs from the environment.

Instructional Activities (2 Days)

- student observation
- class discussion
- role play

NGSS References

Disciplinary Core Idea: LS1.A Structure and Function

Science and Engineering Practice: 1 Asking Questions

Crosscutting Concept: 6 Structure and Function

Students will investigate how animals use their senses to experience and respond to their surroundings. They will then relate specific sense functions of animals to the responses they provide.

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

www.coreknowledge.org/cksci-online-resources

Core Vocabulary and Language of Instruction

Core Vocabulary: Core Vocabulary terms are those that students should learn to use accurately in discussion and in written responses. During instruction, expose students repeatedly to these terms. However, these terms are not intended for isolated drill or memorization.

sense

Language of Instruction: The Language of Instruction consists of additional terms, not considered a part of Core Vocabulary, that you should use when talking about any concepts in this exercise. Students will benefit from your modeling the use of these words without the expectation that students will use or explain the words themselves. A Glossary at the end of this Teacher Guide lists definitions for both Core Vocabulary and Language of Instruction.

sight sound vibration

Instructional Resources

Activity Page



AP 2.2.1

Activity Page

How Animals Respond
(AP 2.2.1)

Materials and Equipment

- paper plates (1 per student)
- plastic baggies (1 per student)
- assorted dry beans (or uncooked rice) (2–3 pounds)
- stapler
- yardsticks (1 per group)
- wooden spoons (1 per group)

Advance Preparation

- Scoop one or two handfuls of beans into each baggie. Make enough of these baggies so that each student has one. Staple each baggie to a paper plate.
- Leave some paper plates without plastic baggies stapled to them.
- Prepare the classroom so that students have a wide, safe area to perform the activity.

1. Day 1: Focus on Today's Question.

Ask students to identify an animal and a special way the animal uses its senses, such as a cat being able to see well in the dark or an elephant which can smell a water source from over ten miles away. Make a list of the animals and the sense students mention.

2. Turn and talk.

- Have students turn to a neighbor and talk about what kind of response the animal would have when they use the sense listed.
- Give students a few minutes to pick an animal and discuss how the sense might help the animal respond to their environment with a classmate. Then bring the class back together, and have the class discuss their answers to how the animal would respond as a result of their sense. Give students some examples:
 - Eagles have super eyesight. They can see things clearly from miles away! That is a really far distance.
 - Bloodhounds are a type of dog. They have super smelling powers. Their sense of smell is one million times stronger than a person's sense of smell! That is a lot!
- **Ask students what they think it would be like to have such powerful senses.**
 - » Accept all reasonable responses.
- Tell students that today they will explore how some animals sense things around them.

3. Facilitate the activity.

- Place students in small groups of mixed ability. Distribute the following materials to each group:
 - paper plates with bag of beans stapled to them
 - paper plates without bag of beans stapled to them



- Introduce the activity to students. Tell them that in this activity they will play the parts of bats and mosquitoes. Explain that some bats eat mosquitoes. Emphasize that bats have to eat to stay alive. This means they have to find food. They use echolocation to do this. Give students a general idea of how echolocation works. Explain that this is like a superpower! (See **Know the Science 1.**)
- Tell students that for the activity one person in the group will play the part of a bat. The other students in the group will play the part of mosquitoes. The student who is the bat gets the paper plate without any beans. The students who are mosquitoes get the paper plates with the beans. (See **Know the Standards 1.**)
- Review the instructions for the activity with students.
 - Tell the “mosquitoes” to stand in a line.
 - Tell the “bat” to stand in front of the line and place the paper plate in front of their face so that the mosquitoes cannot be seen.
 - The bat will make a squeak sound. Each time the bat makes a squeak sound, the mosquitoes shake their plates.
 - The goal of the game is for the bat to catch a mosquito, but they can only find and catch them using their sense of sound to figure out where the mosquitoes are standing. Once the bat locates a mosquito, that mosquito is out and sits down.
 - Tell students to see how many mosquitoes the bat can catch.
- As they play the game, emphasize that the students acting like mosquitoes should not move away from the bat. Otherwise the different groups will end up bumping into each other and overlapping.
- If time permits, allow groups to play another round of the game, this time with a new student being the bat.

Know the Science

TEACHER DEVELOPMENT

1. Echolocation: Explain that bats fly around mostly at night, looking for food. Bats actually have good eyesight, but since it is dark at night, some kinds of bats have to use other senses to find their food. They use something called echolocation to do this. This involves their sense of hearing. Bats send out sound signals and listen for how those sounds bounce off of other objects around them. This lets them tell how close or how far away things are or where things are positioned. Then they can catch their food.

Know the Standards

TEACHER DEVELOPMENT

1. DCI LS1.D Information Processing: Students gain firsthand experience processing information by using their senses to catch the mosquitoes. They become aware of the world around them by listening closely for where the sounds from the mosquitoes are coming from. This gives them an idea of how some animals use their senses to navigate the environment in the dark or when they cannot rely on their eyesight to do things such as locate food.

4. Summarize and discuss.

NGSS Elements



SEP 1

Monitor Progress

- Bring the class back together, and help students summarize their findings.
- Talk to students about what they noticed when playing the game. Re-explain that this is how animals, such as bats, locate food and find their way around in the dark. Animals need to be able to find food in order to eat and survive.
- Ask students what else they wonder about echolocation and how animals like bats sense things around them. Add their questions to the question board. (See **Know the Standards 2** and **3**.)

1. Day 2: Focus on the Big Question.

Remind students that in the previous class session they did an activity where they played bats and mosquitoes to see how some animals, such as bats, sense things around them. They learned about echolocation.

Tell them that today they will learn about other ways that animals sense things in their surroundings.

2. Facilitate the activity.

NGSS Elements



DCI LS1.D

- Have students form small groups of mixed ability.
- Distribute the following materials to each group:
 - yardstick
 - wooden spoon
- Assign groups to go to an area of the room with a work surface, such as a table or desk.
- Review the instructions for the activity with students. (See **Know the Standards 4**.)
 - Tell students that in this activity one student will gently pat the table with the wooden spoon while another student listens.
 - Then they will do this again, only this time the student who listens will hold one end of a yardstick against the table and the other end of the yardstick up against their ear.

Know the Standards

TEACHER DEVELOPMENT

2. SEP 1 Asking Questions: Giving students a chance to ask questions about animal senses will help them think about the things they want to discover later on.

3. Monitor Progress: As students discuss what they notice from doing the activity, listen for clues that tell their level of understanding about how animals can use sound as a sense that helps them survive.

4. DCI LS1.D Information Processing: This activity exposes students to a different way that some animals sense and respond to the external environment.

- Then they will describe what they notice. Students will be able to hear the banging sound of the wooden spoon on the table much more loudly, and they will feel the yardstick vibrate from the sound.
- Have students in the group rotate and take turns so each student gets a chance to listen with the yardstick.
- Circulate around the room, and remind students that they should not bang on the table too loudly. They only need to do a soft pat with the wooden spoon.
- Talk about vibrations. Explain that a vibration is something that you can feel. It makes a shaky feeling. Tell students that many animals pick up on vibrations as a way of sensing the world. Animals can also communicate using vibrations.

3. Summarize and discuss.

Activity Page



AP 2.2.1

NGSS Elements



DCI LS1.D

Monitor Progress

Differentiation

- Talk to students about what they noticed when playing the game. Explain that using vibrations is how animals, such as elephants, sense things around them, like if predators are coming their way.
- Hold a brief discussion about how animals use their senses to pick up on external inputs from the environment. Animals use their senses to find food and shelter, to get away from danger, and to find their way around their surroundings.
- Distribute How Animals Respond (AP 2.2.1). Have students work in pairs to complete the sentences.
- Circulate around the room as students complete the sentences. Listen and gauge student understanding of how animals use their senses. Remind students that animals need to use their senses to stay safe, to find food and shelter, and so on. (See **Know the Standards 5.**)

SUPPORT—Do this activity as a whole class. Read the sentence starters for students, and discuss your answers to them as a class. Record the answers on the board. Pause to talk about the different ways that animals respond to external inputs.

CHALLENGE—Challenge students to write their own sentence about an animal and how it uses its senses to survive.

EXTEND—Have students write or draw about an animal they see outside of school, such as a pet at home, a bird at the park, or a squirrel in a tree. They should describe what they notice about how the animal acts and what it does when it hears, sees, or senses things around it. For instance, a dog that smells its food might come running to its food dish. A bird that hears a loud sound might fly away. This is because the bird thinks it could be in danger. These are all ways that animals respond to their surroundings.

Know the Standards

TEACHER DEVELOPMENT

5. DCI LS1.D Information Processing: Students understand that animals need to be able to sense the world around them in order to grow and survive.

4. Check for understanding.

Formative Assessment

Review student responses on Activity Page 2.2.1 to determine student understanding of the following concepts:

Monitor Progress

- Animals have different senses, like seeing, hearing, touching, tasting, and smelling.
- Animals use their senses to survive.

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

Tie to the Anchoring Phenomenon

This activity helps to excite and engage students for learning about the different ways that animals sense and respond to things around them to survive. This information serves as a foundation that students will later build on, in terms of understanding how animals can be rehabilitated when they cannot survive on their own in the wild.

LESSON 2.3

Plants Have Senses, Too!

Big Question: How is a wildlife center designed to help animals survive?

Lesson Guiding Question: How do plant and animal parts allow them to sense and respond to their surroundings?

Today's Question: How do plants respond to their surroundings?

Tie to the Anchoring Phenomenon: Students learn about how plants use their senses to grow and survive, which helps students understand that animals are not the only living things that can respond to their surroundings.

AT A GLANCE

Learning Objective

- ✓ Describe how plants sense and respond to external inputs from the environment.

Instructional Activities (2 Days)

- student observation
- student investigation
- class discussion

NGSS References

Disciplinary Core Idea: LS1.A Structure and Function

Science and Engineering Practice: 1 Asking Questions

Crosscutting Concept: 6 Structure and Function

Students will investigate how plants respond to their surroundings through growing plants from seeds. They will then relate plant tropisms to their investigation and experiences.

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

www.coreknowledge.org/cksci-online-resources

Core Vocabulary and Language of Instruction

Core Vocabulary: Core Vocabulary terms are those that students should learn to use accurately in discussion and in written responses. During instruction, expose students repeatedly to these terms. However, these terms are not intended for isolated drill or memorization.

sense

Language of Instruction: The Language of Instruction consists of additional terms, not considered a part of Core Vocabulary, that you should use when talking about any concepts in this exercise. Students will benefit from your modeling the use of these words without the expectation that students will use or explain the words themselves. A Glossary at the end of this Teacher Guide lists definitions for both Core Vocabulary and Language of Instruction.

phototropism thigmotropism tropism

Instructional Resources

Activity Pages



AP 2.3.1
AP 2.3.2
AP 2.3.3

Activity Pages
Plant Picture (AP 2.3.1)
Seeds (AP 2.3.2)
What Plants Sense (AP 2.3.3)

Materials and Equipment

- mustard seeds (teaspoon)
- petri dishes (3)
- cotton balls (3)
- water
- large cardboard box
- scissors or knife
- packing tape

Advance Preparation

- Print Activity Page 2.3.1. Make an enlarged copy of the picture so students can see it from the front of the classroom.
- Prepare the cardboard box that will be used for the mustard seed experiment.
 1. Use packing tape to seal the box shut.
 2. Cut a large square or rectangle out of the top of the box on one end.
 3. Cut a medium-sized square or rectangle out of the side of the box on the other end.
- Label the petri dishes A, B, and C.

THE CORE LESSON 2.3

1. Day 1: Focus student attention on Today’s Question.

- Remind students that they have been talking about animal senses for the past few classroom sessions.
- Show students the picture of the plant from Activity Page 2.3.1. **Ask students to describe what they notice.**
 - » It is leaning to the side. It is growing to one side.

2. Turn and talk.

- Have students turn to a neighbor and talk about if they think plants have senses, like animals, and why or why not. Prompt them to look at the picture of the plant and think about what the plant is doing, but do not give them the answer yet.
- Give students a few minutes to discuss their answers with each other. Then bring the class back together.

Ask students what they think the plant in the picture is doing.

» It is growing toward the sunlight.

- Which way does gravity pull on things?
 - » down
- Which direction do plant roots grow?
 - » down
- Where is the sun during the day?
 - » up
- Which direction do plants grow?
 - » up

Tell students that plants can sense certain stimuli. They can sense sunlight, gravity, water, and even touch. (See **Know the Science 1.**)

- Explain that plants are unable to uproot and change their locations, like animals can. Most stay located in one spot. But they can still respond to the things they sense around them in important ways.
- Draw students' attention back to the picture. Explain that the plant in the picture sensed that the sunlight was coming from one direction. This is why the plant is growing to one side. Tell students that plants have ways to sense light. (See **Know the Standards 1.**)

Know the Science

TEACHER DEVELOPMENT

1. Tropisms: Plant tropisms are the ways in which plants respond to the environment that occur around them. A tropism is a mechanism that allows a plant to grow toward or away from a stimulus, such as gravity, water, light, and touch. When a plant grows toward the stimulus, it is called positive tropism. When a plant grows away from the stimulus, it is called negative tropism.

Know the Standards

TEACHER DEVELOPMENT

1. PE 1-LS1-1: This Performance Expectation does not require students to know about the detailed biological processes involved with plant tropisms, such as how the accumulation of auxins in a plant affects cellular growth. For Grade 1, provide general ideas of how tropisms work.

3. Set up the phototropism experiment.

Activity Page



AP 2.3.2

NGSS Elements



DCI LS1.D

- **Ask students to give ideas on how to test if a plant grows toward the sunlight.** Guide students toward the answer of placing one plant in the sunlight and another not in the sunlight and seeing how they grow.
- Distribute Seeds (AP 2.3.2) to students. Tell students that now they will set up an experiment to test whether plants really grow toward sunlight. They will use Activity Page 2.3.2 to record and document how the plants grow by drawing how the seeds look for the next two weeks. (See **Know the Standards 2.**)
- Draw student attention to the front of the room, where you have your materials for the phototropism box.
- Call on three volunteers to help you perform each of the steps.
 - Have one student pull apart and flatten one cotton ball into each petri dish.
 - Have the second student scatter several mustard seeds onto the cotton balls in each dish.
 - Have a third student pour some water onto the cotton balls in each dish. Make sure the cotton balls get wet but not flooded or overly saturated.
- Let all the students in the classroom look at the petri dishes, or pass out the three petri dishes to groups of students in their seats. Then give students a few minutes to draw what the petri dishes look like on Activity Page 2.3.2.
- As students draw, remind them that what they are doing is recording information. This is the starting information that will be used to make comparisons later so that they can see how the plants change over the course of one to two weeks.
- Call on three new volunteers to help you finish setting up the investigation. Give each of the three volunteers one petri dish, and tell them where to place the dishes:
 - The petri dish labeled A goes into the side of the box that has the opening at the top.
 - The petri dish labeled B goes into the middle of the box that is completely dark and has no openings.
 - The petri dish labeled C goes into the part of the box that has an opening on the side.
- Explain to the class that you are going to set the box next to a window. You will all get to see how the mustard seeds grow over the course of ten to fourteen days in response to light (or lack thereof). You will be checking on the seeds on Day 3,

Know the Standards

TEACHER DEVELOPMENT

2. DCI LS1.D Information Processing: Students learn how plants respond to their surroundings based on external stimuli, such as sunlight. Although plants cannot respond to inputs the same way that animals can, they can still demonstrate behaviors that prove they can sense the things around them.



Day 7, and Day 10. On those days, you will see whether the seeds need more water, and students will get to draw pictures of what they look like so far. (See **Know the Science 2.**)

- Encourage students to ask questions about the experiment. Write down the questions on the question board. (See **Know the Standards 3.**)
- **Ask students what they think will happen to each petri dish.**
 - » The seeds in petri dish A will grow straight up.
 - » The seeds in petri dish B will not grow well.
 - » The seeds in petri dish C will grow toward the side with the opening.

SUPPORT—Alternatively, prepare the box and petri dishes with the mustard seeds ahead of time (approximately 10 days in advance), and show students the results during this class session.

CHALLENGE—Challenge students to write a prediction about what they think will happen to each petri dish. Give students the following sentence starters:

I think the seeds in dish A will _____ because _____.

I think the seeds in dish B will _____ because _____.

I think the seeds in dish C will _____ because _____.

EXTEND—Have students look for evidence of plants that have grown toward the direction of sunlight around their community. Students can take pictures or draw images of what they find. They will bring their pictures/images in to share with the class.

4. Continue the mustard seed experiment on Days 3, 7, and 10.

- Schedule your lesson plans for Days 3, 7, and 10 in advance, leaving time at the end of those class sessions to check on the status of the mustard seeds. Take the petri dishes out of the box, and give students time to draw their observations

Know the Science

TEACHER DEVELOPMENT

2. Plant Tropisms: The four common tropisms are gravitropism, a response to gravity such as roots growing down and stems growing up; hydrotropism, a response to water such as roots growing sideways to find more water; phototropism, a response to light such as sunflowers turning throughout the day to face the sun; and thigmotropism, a response to touch such as vines growing along walls.

Know the Standards

TEACHER DEVELOPMENT

3. SEP 1 Asking Questions: Part of being a scientist and studying scientific phenomena is learning how to ask questions that guide exploration and discovery. Help students think about the types of things they wonder about how plants grow and respond to their surroundings.

of the seeds. If more water is necessary, make sure to give all the seeds the same amount of water. Then put the petri dishes back into the box, in the same positions. (See **Know the Standards 4.**)

- Fill out the dates below for when you will plan to check on the seeds.

I will check on the seeds on the following dates:

Day 3 _____

Day 7 _____

Day 10 _____

- After Day 10, hold a discussion about the mustard seeds. Let students observe all three dishes and talk about the findings. Tell students to look at the pictures they drew on the three different days. Have them tell what is different or similar about the dishes. Use question prompts:

What do you notice about the seeds in dish A?

What do you notice about the seeds in dish B?

What do you notice about the seeds in dish C?

- Students should identify that the seeds in the dish that got no sunlight did not grow, the seeds in the dish that had sunlight on the side grew toward the direction of the opening in the box, and the seeds in the dish that had direct sunlight above grew straight up.

1. Day 2: Refocus on Today's Question.

Remind students in that in the previous class session they started an investigation with mustard seeds to see how plants grow and respond to sunlight.

Tell them that today they will learn another way that plants respond to their surroundings: through touch.

Ask students if they think plants can sense when they touch other objects.

Explain that plants can grow in response to touch, such as when they contact a solid structure, like a wall. This is called thigmotropism.

Ask students if they have ever seen vines climbing against a wall. Tell them that this is an example of how a plant can sense that the wall is there and that in response the plant grows along the wall. This is why we sometimes see vines that spread out and climb up high.

Know the Standards

TEACHER DEVELOPMENT

4. Monitor Progress: As students observe the seeds in the petri dishes over the course of this investigation, gauge their level of understanding that the plants are growing in the direction of the sunlight because they can sense the light. Growing toward the light is an example of a response, or a behavior, that the plants can do. This behavior is like how animals can run or fly away from danger when they sense it or find food when they smell it.

Explain that there is another example of how plants grow in response to touch. This other way has to do with the roots. When the roots that are underground sense objects in their way that they can't break through, such as underground pipes, they tend to grow away from the structure or around it. Avoiding these objects helps the roots spread out and grow to support the plant. (See **Know the Science 3.**)

2. Turn and talk.

Monitor Progress

- Have students turn to a neighbor and talk about the following questions (see **Know the Standards 5**):
 - Why does a plant grow up a wall?
 - Why would the roots of a plant grow away from things underground? How does this help the plant survive?
- Circulate around the room, and listen for student responses and reasoning.

3. Facilitate the activity.

Activity Page



AP 2.3.3

NGSS Elements



CCC 6

- Place students in pairs.
- Distribute What Plants Sense (AP 2.3.3) to each student. Explain that there are two boxes for drawing. The top box is for drawing what it looks like when a plant senses that a wall or pole is there. The bottom box shows a tree growing to the side of a small pond. This is where students can draw roots growing in the direction of the pond (to the left). (See **Know the Standards 6 and 7.**)
- Allow students to work together to discuss what to draw for their pictures.

Know the Science

TEACHER DEVELOPMENT

3. Thigmotropism: Positive thigmotropism is where plants grow toward the structure or object that they touch. An example of this is vines climbing up a wall or twining around a post or pole. Negative thigmotropism is where plants grow away from a structure or object that they touch. An example of this is when plant roots grow around a rock or other obstacle blocking their path.

Know the Standards

TEACHER DEVELOPMENT

5. Monitor Progress: As you circulate around the room while students discuss their answers to the questions in pairs, gauge whether students are applying what they learned about phototropism in the previous class session to their understanding of how plants can respond to touch.

7. CCC 6 Structure and Function: Students are not expected to understand the structural parts and chemical mechanisms that play a role in a plant's ability to respond to external stimuli, but they need to understand that this is one way that plants respond to their surroundings.

- Circulate around the room, and use question prompts, if necessary. Gauge student understanding of how plants respond to things that they can feel or touch by reviewing their drawings. Guide students if they are having difficulties knowing what to draw. Explain that the plant's stem and leaves should grow from the ground up and can either grow straight on the wall or wrap around the pole. And the plant's roots grow down into the ground.

Differentiation

SUPPORT—Bring in pictures that demonstrate thigmotropism in plants. One picture should show roots growing around a rock or other obstacle that blocks their path. The other picture should show vines climbing up a wall. Allow students to visualize how this looks in order to better understand it.

CHALLENGE—Challenge students to draw their images for Activity Page 2.3.3 individually and write a sentence explaining what is happening in their images.

EXTEND—Do a thigmotropism scavenger hunt around the school, or have students do it around the community with a parent or caregiver. During the scavenger hunt, students will look for examples of plants responding to touch by climbing up walls, coiling around gates, climbing on other plants, and so on. Students can draw pictures of what they find or take pictures of it. Then they will bring them into class to share with classmates.

4. Summarize and discuss.

Bring the students back together at the end of class, and discuss what their drawings show. Call on volunteers to share their drawings and discuss the idea behind each one. Students should not be assessed on their artistic abilities.

5. Check for understanding.

Formative Assessment

Review student responses on Activity Page 2.3.3 to determine student understanding of the following concepts:

Monitor Progress

- Plants can sense things that they feel or touch.
- Plants can grow away from objects or toward objects, depending on what they need to survive.

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

Tie to the Anchoring Phenomenon

As students learn about the different ways that plants can sense and respond to things in their surroundings, they begin to understand how living things in nature find ways to grow and survive. This concept is important for understanding how to rehabilitate animals that are not able to survive in the wild on their own.

LESSON 2.4

Animal and Plant Senses

Big Question: How is a wildlife center designed to help animals survive?

Lesson Guiding Question: How do plant and animal parts allow them to sense and respond to their surroundings?

Today's Question: How do plant and animal senses resemble things humans use?

Tie to the Anchoring Phenomenon: Students learn about how animals and plants sense and respond to their surroundings, which prepares students for understanding how to accommodate the sensory needs of baby owls that are being rehabilitated.

AT A GLANCE

Learning Objectives

- ✓ Describe how animal sensory structures capture information that animals need for growth and survival.
- ✓ Explain how animals respond to external inputs from the environment.
- ✓ Describe how plants respond to external inputs from the environment.

Instructional Activities (2 Days)

- teacher Read Aloud
- class discussion
- student observation

NGSS References

Disciplinary Core Idea: LS1.A Structure and Function

Science and Engineering Practice: 1 Asking Questions

Crosscutting Concept: 6 Structure and Function

Students learn about how plants and animals respond to their surroundings and identify plant responses to different stimuli.

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

www.coreknowledge.org/cksci-online-resources

Core Vocabulary and Language of Instruction

Core Vocabulary: Core Vocabulary terms are those that students should learn to use accurately in discussion and in written responses. During instruction, expose students repeatedly to these terms. However, these terms are not intended for isolated drill or memorization.

blooming **environment** **respond/response** **sense**
wilt

Language of Instruction: The Language of Instruction consists of additional terms, not considered a part of Core Vocabulary, that you should use when talking about any concepts in this exercise. Students will benefit from your modeling the use of these words without the expectation that students will use or explain the words themselves. A Glossary at the end of this Teacher Guide lists definitions for both Core Vocabulary and Language of Instruction.

safe

Instructional Resources

Student Book



Ch. 4
Ch. 5

Student Book, Chapter 4
“How Do Animals Use Their Senses?”

Student Book, Chapter 5
“How Do Plants Respond to the Environment?”

Activity Pages



AP 2.4.1
AP 2.4.2

Activity Pages
What Part Would I Use?
(AP 2.4.1)
What Plants Do (AP 2.4.2)

Materials and Equipment

- internet access and the means to project images and video for whole-class viewing

THE CORE LESSON 2.4

1. Day 1: Focus on the Big Question.

- Remind students that they have been talking about animal and plant senses for the past few classroom sessions.
- Explain that today they will get to see demonstrations and read about some of the things they observed.

2. Read together: “How Do Animals Use Their Senses?”

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.

Student Book

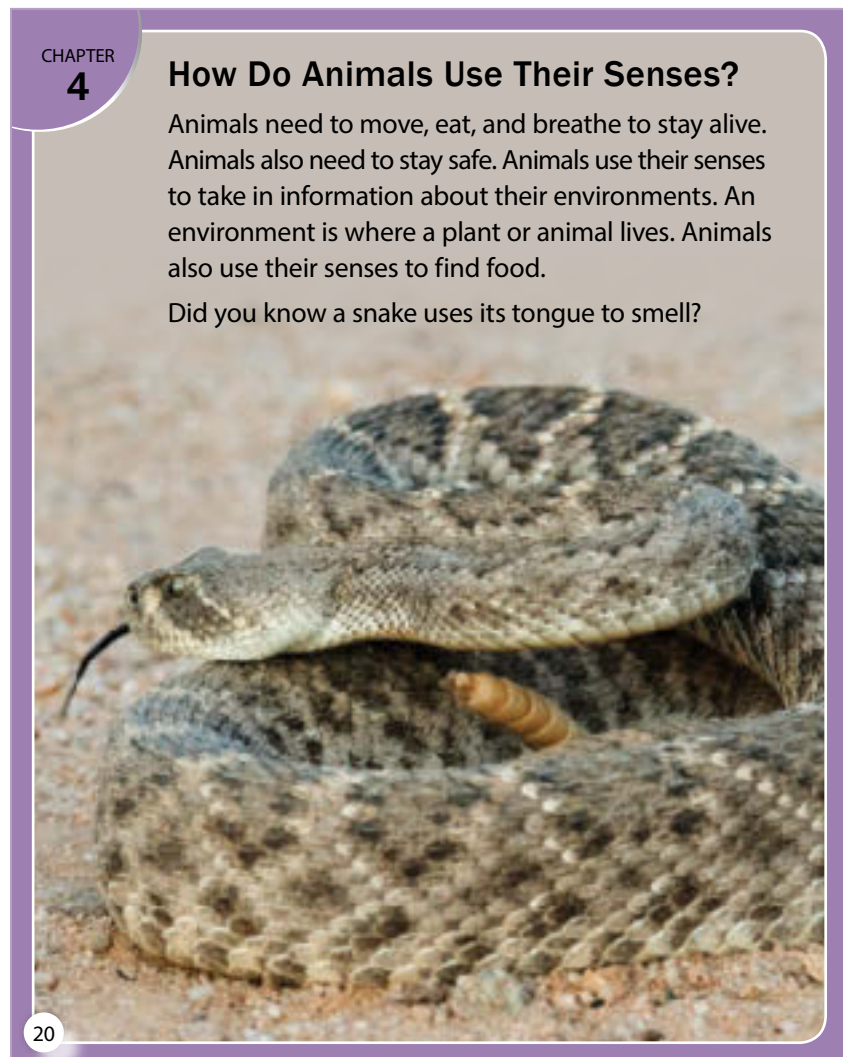


Ch. 4

Page 20

Read Aloud Support

Ask students to turn to page 20 of the Student Book and look at the image as you read aloud. Remind them that the title of this chapter is “How Do Animals Use Their Senses?” and tell them to pay special attention to what animals can do with their senses as you read.



Call attention to the picture. Explain that the rattlesnake uses its tongue to smell. **Ask students what body part we use to smell.**

» our noses



CORE VOCABULARY—Explain that an **environment** is the place and conditions that surround a living thing. **Ask students to describe their environment.**

SUPPORT—Discuss with students how they have used their own senses at the beginning of this lesson, when they used their eyes to compare pictures, their ears to listen for objects placed in containers, their nose to smell objects placed in containers, their hands to touch objects placed in paper bags, and their mouths to taste food samples. Call on volunteers to tell you how they use their senses. Use the following or similar prompts:

- When you wake up in the morning, what do you use your sense of smell for?
- When you go to school, what do you use your sense of sight for?
- When you eat lunch, what do you use your sense of taste to do?
- When you play outside, what do you use your sense of touch for?
- When you are at home, what do you use your sense of hearing to do?

Now ask students to look at the three pictures on page 21. Emphasize that this page has to do with the sense of sight. **Ask students to point to the part of their body that helps them see.** Remind students of the activity they did with the bat and the mosquito. Talk about how they acted out how bats can locate food by sending out signals instead of using their eyes. (See **Know the Science.**)

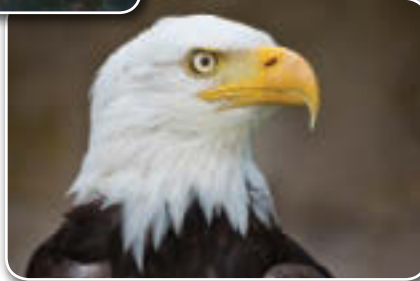
Most animals use their eyes to see their environments. But some animals don't have eyes or cannot see well. They must use other parts to detect what is around them.

Bats send out sound waves. They sense how the waves bounce off of things around them. This is how they find food. It also helps them detect threats.



A star-nosed mole's eyes do not see well. But it has a nose to feel its surroundings. It can touch twelve objects in one second!

An eagle has large eyes and excellent sight. It can see food from almost two miles away.



21

LITERAL—Which animal can see food from miles away?

» eagle

INFERENTIAL—Why do you think having good eyesight can help animals survive?

» It lets them see food to eat; it lets them see water to drink; it lets them see danger; it lets them find places to sleep or hide

Know the Science

TEACHER DEVELOPMENT

Misconception Alert: Some students may think that bats are blind. This is a misconception. Students may have heard the expression “blind as a bat,” but this is not accurate. Bats can see and actually have very good eyesight. Some bats such as fruit bats have fully functional eyes. However, many kinds of bats usually fly around and hunt at night in the dark. Because of this, they do not necessarily use their sense of sight for finding food.

SUPPORT—Remind students that in the last lesson they came up with designs for things that people use that are based on plant and animal parts, like airplanes, straws, and heavy coats. Now guide students to think about how eyesight is a sense that can be mimicked to make objects that humans can use to see better. Start off with the example of a telescope. **Ask students if they have used or seen a telescope.** Talk about how a telescope is an object that lets people see things better if they are far away. People can use telescopes to see things like stars in the sky. Compare this to the eyesight of an eagle.

Page 22

NGSS Elements



DCI LS1.D

Ask students to look at the two pictures on page 22. Emphasize that this page has to do with the sense of hearing. **Ask students to point to the part of their body that lets them hear.** (See **Know the Standards 1.**)

Animals use hearing to stay safe and find food. Some animals have very large ears. They can hear things that are far away. Other animals do not have ears at all. They can feel when things move. They sense the air and the ground vibrate around them. A fennec fox's large ears can hear food moving underground.



A drum fish has a sac filled with air inside its body. The sac shakes when other animals swim nearby.



22

Know the Standards

TEACHER DEVELOPMENT

1. DCI LS1.D Information Processing: Students learn about the body parts that animals use to see and hear. Not all animals have eyes to see or ears to hear, but they have other body parts that allow them to sense their surroundings.

LITERAL—Which animal on the page has large ears?

» the fox

INFERENTIAL—Why do you think having large ears and being able to hear food moving underground are good for the fox?

» It helps the fox find and eat food.

LITERAL—How does the drum fish hear?

» It has sacs that shake when other animals swim by.

SUPPORT—Remind students that they did an experiment where they listened for vibrations with the use of yardsticks. Explain that this is like how the drum fish hears.

INFERENTIAL—Do you think sensing other animals helps the drum fish? How?

» yes, because the drum fish can tell if danger is nearby

SUPPORT—Guide a brief discussion about how humans have mimicked the way animals hear to make things that they can use. Start off with the example of musical instruments. Talk about how musical instruments make vibrations that turn into sounds that we hear. Explain that people may have mimicked how some animals hear in order to come up with the idea for instruments.

Ask students to look at the four pictures on page 23. Emphasize that this page has to do with the senses of smell and touch. **Ask students to point to the parts of their body that let them smell and touch.**

Have you ever been bitten by a mosquito? Mosquitoes can find you because they smell your sweat or breath. Then, as they get closer, they can feel the heat from your body, too. Many animals rely on their senses of touch and smell to survive.



A snake smells with its tongue. It also has a part on its head that can feel heat.



A grasshopper has tiny hairlike parts all over its body. It can feel when the air around it moves.



23

LITERAL—Which animal can smell your sweat?

» mosquito

LITERAL—Which animal uses its tongue to smell?

» snake

INFERENTIAL—Why do you think being able to sense the heat is helpful to the snake?

» The snake can tell if it is getting too hot or too cold outside.

SUPPORT—Guide a brief discussion about how humans have mimicked the way animals smell and sense things around them to make objects that people use. Start off with the example of the snake. Explain that the snake has a part on its head that can sense heat. Compare this to how a thermometer works in the way that it can sense heat. **Ask students if they have used a thermometer when they felt sick.**

NGSS Elements

DCI LS1.D
CCC 6

Animals respond to what they feel, hear, and smell around them. What does an animal do when it senses danger? What does it do when it senses food?

An octopus squirts ink to escape from a threat.



An eagle spies a fish from the sky. It swoops down quickly to catch it.

24

CORE VOCABULARY—Explain that a **response** is a reaction to something.

SUPPORT—Guide a brief discussion about how students respond to things. Use the following or similar discussion prompts:

- What do you do when you get too cold?
- What do you do when you get hungry or thirsty?
- What do you do when you feel scared?

Explain that these are all ways that we respond to things that we sense. Animals can respond to things, too.

Know the Standards

TEACHER DEVELOPMENT

2. CCC 6 Structure and Function: Certain structures on animals are used for sensory processing. Eyes, ears, noses, and other structures are body parts that animals rely on to sense the world around them and respond accordingly. As such, these parts have a structure that supports their function.

LITERAL—Which animal squirts ink when it escapes from enemies?

» octopus

INFERENTIAL—Why does squirting ink help the octopus respond to danger?

» The ink makes it hard for enemies to see the octopus, so the octopus can get away.

Page 25

Now ask students to look at the three pictures on page 25. Explain that all of these animals sense and respond to things in their surroundings.

An iguana feels that the sand in its nest is finally warm enough. Then it lays its eggs inside.



A scallop has many tiny eyes. It closes its shell and swims away when it sees a threat.

A cricket rubs its legs together to make a sound. The cricket's body has the most energy when it is warm. That is why you hear the most cricket chirping in the summer.



25

INFERENTIAL—Why do you think the iguana lays its eggs when it senses that the sand is warm enough?

» so the eggs will hatch

INFERENTIAL—What do you think would happen if the scallop did not have as many tiny eyes?

» It might not be able to sense danger and get away in time.

3. Show video examples.

Online Resources



- Play a video for students to watch about an octopus and an eel, beginning at 0:48. See the Online Resources Guide for a link to the recommended video:

www.coreknowledge.org/cksci-online-resources

- Play the video a second time for students. This time tell them to pay attention to the body parts that the video mentions and how the eel and the octopus sense things in their surroundings and respond to them.
- **Ask students the following questions after watching the video a second time, calling on volunteers to answer:**

What sense does the eel rely on to find the octopus?

» sense of smell

What body part does the eel use to find the octopus?

» four nostrils

How does the octopus get away from the eel?

» It uses ink.

- Show another video, this one about snakes, ending at 1:59. Tell students to pay attention to how the snake senses its food. See the Online Resources Guide for a link to the recommended video:

www.coreknowledge.org/cksci-online-resources

- **Ask students the following questions after watching the video, calling on volunteers to answer (see Know the Standards 3):**

What sense does the snake rely on to find its food?

» sense of smell

What body part that you also have does the snake use to smell?

» tongue

Know the Standards

TEACHER DEVELOPMENT

3. SEP 1 Asking Questions: Part of being a scientist and studying scientific phenomena is learning how to ask questions that guide exploration and discovery. Help students think about the types of things they wonder about how plants grow and respond to their surroundings.



What is the name of the organ that helps the snake know if there is food around?

» Jacobson's organ

- Encourage students to ask questions about what they read and watched. **Ask what they wonder about with how animals smell, hear, or see.** Add their questions to the question board. (See **Know the Standards 4.**)

4. Work with a partner.

Activity Page



AP 2.4.1

- Place students in pairs, and distribute What Part Would I Use? (AP 2.4.1) to each student.
- Tell students that they can work in pairs to complete the sentence starters. Have them write about an animal that they read about or saw in one of the videos.
- Read the sentences as a class. Talk about each of the blank lines where students will write. The first blank line is for students to write the name of the animal they pick. The second blank line is for students to write the body part. The third blank line is for students to write how that body part helps the animal grow or survive. Remind students that animals grow and survive by eating and drinking, finding shelter, avoiding temperatures that are too hot or too cold, and running away or hiding from enemies.

Differentiation

SUPPORT—Alternatively, complete the sentence starters together as a class. Call on different volunteers to help fill in the different blanks. If time permits, do this a few times using different animals and different body parts.

SUPPORT—Assign students the animal to write about.

CHALLENGE—Challenge students to write about an animal that was not in the reading or the videos. Students can use the internet to look up information about animal senses.

EXTEND—Have students write or draw about an animal that they see outside of the classroom—such as a pet at home, a neighborhood dog, a bird outside, or an animal at the zoo. They should write about the sense that the animal uses to survive and the body part that makes it possible.

Know the Standards

TEACHER DEVELOPMENT

4. DCI LS1.D Information Processing: Students learn how animals respond to their surroundings to find food or hide from predators based on external stimuli, such as the hormones (pheromones) that other animals give off.

5. Check for understanding.

Formative Assessment

Monitor Progress

- Circulate around the room as students work together to complete their sentences. Tell pairs that they can either work on the same animal or pick different animals to write about. Listen for evidence of understanding, and provide support as necessary.
- Review student responses on Activity Page 2.4.1 to determine student understanding of the following concepts:
 - Animals use body parts to sense the world around them.
 - Animals need to sense things in order to survive.

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

Tie to the Anchoring Phenomenon

As students learn about the different parts that let animals sense and respond to things in their surroundings, they begin to understand how living things in nature find ways to grow and survive. This concept is important for understanding how to rehabilitate animals that are not able to survive in the wild on their own.

1. Day 2: Refocus on Today's Question.

Remind students that in the previous class session they read and watched videos about animal senses.

Call on students to name some of the interesting things they learned about, such as that snakes can smell with their tongues and an octopus can sense danger and squirt ink into the water.

Tell students that today they will read about plants and the parts that help them sense things in their surroundings.

2. Read together: “How Do Plants Respond to the Environment?”

Student Book



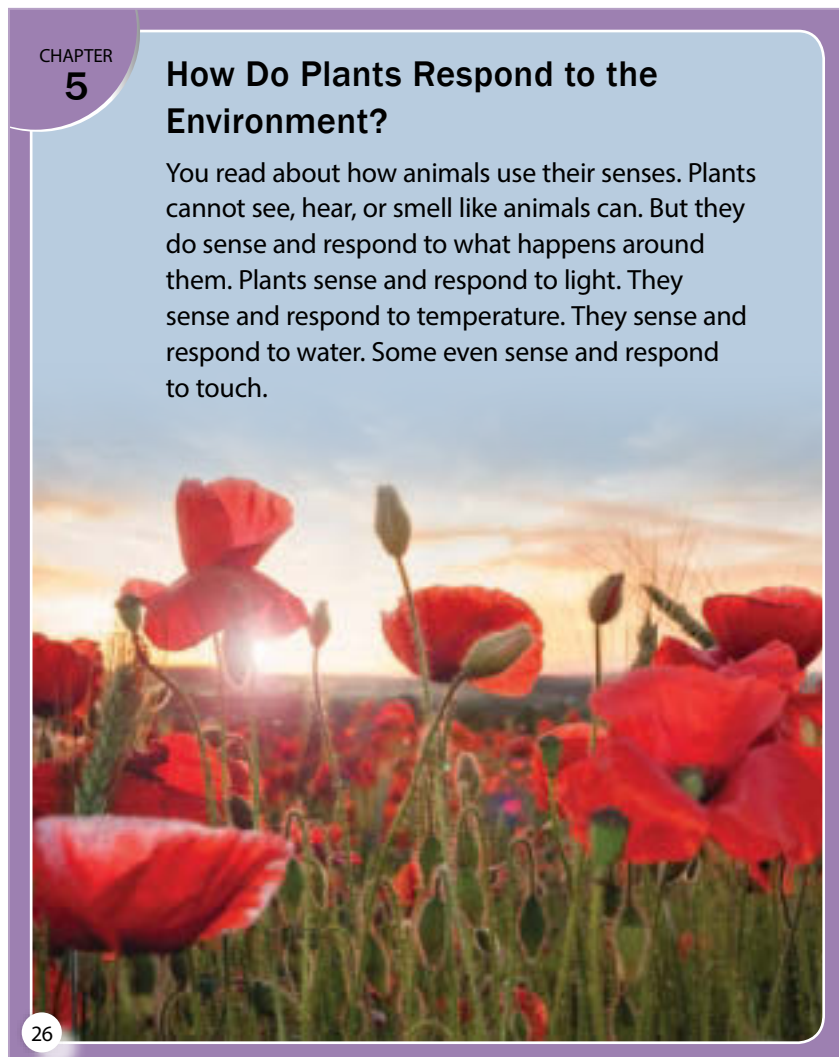
Ch. 5

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.

Read Aloud Support

Page 26

Ask students to turn to page 26 of the Student Book and look at the image as you read aloud. Remind them that the title of this chapter is “How Do Plants Respond to the Environment?” and tell them to pay special attention to what plants can do with their senses as you read.



Call attention to the picture. Explain that poppies grow up toward the sun. This is because they can sense the sunshine.

LITERAL—What are some things plants can respond to?

» light, temperature, water, touch

LITERAL—What can plants NOT do?


» They can't see, hear, or smell.

Page 27


Ask students to look at the three pictures on page 27. Remind students that they learned about how plants turn toward the light in a previous class.

Plants need sunlight to grow and survive. Some plants need more light than others. Plants respond to light in many ways.


All plants use sunlight to make the food they need to grow.



Some plants turn themselves toward sunlight.



Some plants bloom based on the changing length of daylight.



27

CORE VOCABULARY—Explain that **blooming** describes plants that produce flowers.

LITERAL—What does sunlight let plants do?

» make food, grow, turn toward the light, and bloom if they produce flowers



Now ask students to look at the three pictures on page 28. Remind students that animals respond to how hot or how cold it is outside. They can burrow, find shelter, or huddle together. Plants cannot do these things because plants cannot relocate on their own. However, plants still respond to temperature. (See **Know the Standards 5.**)

Plants respond to how hot or cold it is outside.

Some plants wilt when it is too hot. Wilting makes a plant's leaves droop away from sunlight.



You sweat when you're hot. Plants release water through their leaves to cool off.

Many trees lose their leaves when it becomes cold in the fall and days have less sunlight.



28

CORE VOCABULARY—Explain that to **wilt** means to collapse or droop because of lack of water, too much heat, or other damage.

LITERAL—What happens when plants get too hot?

» They can wilt.

LITERAL—How can plants cool themselves off?

» They can release water through their leaves.

Know the Standards

TEACHER DEVELOPMENT

5. DCI LS1.D Information Processing: Wilting and blooming are responses that plants have after sensing the temperature and the sunlight.

LITERAL—What happens when trees sense colder temperature?

» They lose their leaves.

SUPPORT—Show a picture of rhododendrons in very cold weather. Explain that these are evergreen plants and the plants will roll or fold their leaves down to protect the inner parts of the leaves from the cold. The colder the temperature, the more these leaves droop. When it reaches below freezing, the leaves look like dangling green beans!

Page 29

NGSS Elements



DCI LS1.D

Monitor Progress

Ask students to look at the pictures on page 29. Before you read the page, compare the plants in the pictures. **Ask students which plant they think has enough water and which one does not have enough water.** (See **Know the Standards 6.**)

Plants need water to grow and survive. The plant here is standing up straight. It has enough water moving through its stems and leaves.



The plant here is wilting. Its stems and leaves have become soft and droopy. It needs more water.



29

Know the Standards

TEACHER DEVELOPMENT

6. Monitor Progress: Students learned about plant parts, like stems and leaves, in Lesson 1 of this unit. Use this opportunity to check for their understanding of what those parts do and how they are important to the plant's survival.

LITERAL—Which plant is wilting? How do you know?

- » The one on the bottom is wilting. Its leaves are drooping down. It does not look healthy and alive.

Now read the page with students.

SUPPORT—Guide a brief discussion about the plant parts mentioned on the page: stems and leaves. **Ask students to tell what the stems do. Ask students to tell what the leaves do.** Discuss why these parts are important for keeping the plant alive.

Page 30

NGSS Elements



DCI LS1.D
CCC 6

Ask students to look at the two pictures on page 30. Discuss the Venus flytrap that is mentioned. Remind students that the Venus flytrap is a plant that can open and shut its “mouth” to trap insects inside of it. This behavior of the plant is made possible by the plant’s ability to sense and respond to touch. (See **Know the Standards 7** and **8**.)

Do you remember the Venus flytrap plant from Chapter 3? It has spiky hairs on the surface of its leaves. When something touches the hairs, the leaves snap shut. Plants respond to touch in other ways, too.

Some plants grow toward things that they touch. They can wrap around or climb objects that are nearby.



A plant’s roots can grow away from rocks and other objects under the ground.



30

Know the Standards

TEACHER DEVELOPMENT

7. DCI LS1.D Information Processing: Plants use different parts to sense the world around them.

8. CCC 6 Structure and Function: Plants have structures on them that serve certain functions. The tiny hairs on the Venus flytrap sense when something touches the plant so that it can shut close. Discuss with students how the size of the hairs may play a role in the plant’s ability to sense things.

Remind students that they recently learned about how plants can climb walls, wrap around objects, or grow their roots away from things underground.

LITERAL—What part of the Venus flytrap senses when something touches it?

» tiny hairs

INFERENTIAL—Why do plants grow up on walls? What are they trying to do?

» They want to get more sunlight. They are trying to get the most sunlight they can.

INFERENTIAL—Why do plant roots grow around objects underground?

» They want to get more water, and the other objects might get in their way.

Page 31

NGSS Elements



SEP 1

Ask students to look at the picture on page 31. Talk about tools that students can use to observe plants. (See **Know the Standards 9.**)

What are some plants around your home? You can observe them. You can see how they respond to sunlight. You can see how they respond to temperature. You can see how they respond to water. You can see how they respond to touch.



31

Know the Standards

TEACHER DEVELOPMENT

9. SEP 1 Asking Questions: Scientists ask questions to observe the natural and human-made worlds around them. Students can ask questions when they study things, such as plants. Questions can help focus their observations and narrow down what they want to study.

LITERAL—What are the children in the picture doing to study the plants?

- » They are drawing pictures. They are writing about the plants.

INFERENTIAL—What are some other things you can do to study plants?

- » Take pictures of plants. Get a houseplant and watch it grow every day. Measure plants to see how much they grow.

INFERENTIAL—What are some more things you wonder about plants and how they sense the world around them?

3. Show video examples.

Online Resources



- Play the Venus flytrap video for students. See the Online Resources Guide for a link to the recommended video:

www.coreknowledge.org/cksci-online-resources

- Ask students questions when they are done watching, such as the following:
What part of the Venus flytrap triggers the plant to close its trap?

- » the hairs

Can the trap tell the difference between rainwater and other things?

- » yes

How much time is needed for the hairs to be touched?

- » The hairs must be touched within twenty seconds of each other.

- Play a second video for students. This video shows the time lapse of how vines sense the objects near them and begin to wrap around them to grow. Explain to students that the vines do not move around this quickly. The video speeds up the process to show what it looks like in a shortened amount of time. Normally, this process would take days or weeks. Emphasize that this is evidence that plants can move. See the Online Resources Guide for a link to the recommended video:

www.coreknowledge.org/cksci-online-resources

4. Preview the activity.

Activity Page



AP 2.4.2

- Place students in small groups of two or three. Tell them that they will get to work with each other to do an activity on plant senses.
- Distribute What Plants Do (AP 2.4.2) to each student. Go over the activity together as a class so students know what to do. Explain that each row has pictures. Students need to look closely at the pictures and then circle the picture that matches the question.

In the first row, students circle the plant that is getting enough sunlight.

In the second row, students circle the plant that looks like it is too cold.

In the third row, students circle the plant that does not have enough water.

In the fourth row, students circle the plant that is sensing touch.
- Students should work with their group members to figure out the correct pictures to circle. Inform students that there is more than one correct answer in each row.

5. Facilitate the activity.

NGSS Elements



DCI LS1.D

- Circulate around the room as students work on Activity Page 2.4.2. Assist with prompts as needed. Use questions to prompt students' memories, such as "What do plants do when they are cold?" and "Do you remember what *wilting* means? Which plant looks like it is wilting?" (See **Know the Standards 10.**)

SUPPORT—Limit the number of pictures that students look at. Give students two pictures to choose from for each row, and have them circle the picture that is correct.

Differentiation

CHALLENGE—Challenge students to draw their own pictures according to the prompts on Activity Page 2.4.2. For instance, students would draw a picture of a plant that has enough sunlight, a plant that is cold, a plant that does not have enough water, and a plant that is touching an object.

EXTEND—Have students imagine that they found a wilted plant outside and want to help it. Students write a plan that tells how they can possibly help the wilted plant, such as by keeping it warm, making sure it has enough water, and making sure it has enough sunlight.

Know the Standards

TEACHER DEVELOPMENT

10. DCI LS1.D Information Processing: Students look for signs (evidence) of plants that are responding to certain external inputs from their surroundings. The inputs are related to temperature, touch, water, and light.

6. Check for understanding.

Formative Assessment

Summarize the answers for Activity Page 2.4.2. Invite students to tell which pictures they circled for each row and why.

Review student responses on Activity Page 2.4.2 to determine student understanding of the following concepts:

Monitor Progress

- Plants have structures that help them sense the world around them.
- Plants have ways to respond to external stimuli.

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

Tie to the Anchoring Phenomenon

As students learn about the different ways that plants can sense and respond to things in their surroundings, they begin to understand how living things in nature find ways to grow and survive. This concept is important for understanding how to rehabilitate animals that are not able to survive in the wild on their own.

LESSON 2.5

Lesson 2 Roundup: Mimicking Animal and Plant Senses

Big Question: How is a wildlife center designed to help animals survive?

Lesson Guiding Question: How do plant and animal parts allow them to sense and respond to their surroundings?

Today's Question: How can people build useful things that work the way a plant or animal responds to its surroundings?

Tie to the Anchoring Phenomenon: Students design a solution to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs. This introduction to biomimicry will help students learn about how volunteers at wildlife centers have to often mimic animal parts and behaviors in order to help animals.

AT A GLANCE

Learning Objectives

- ✓ Design a device that mimics the way a plant or animal senses or responds to the environment.
- ✓ Determine and describe whether designs meet required features

Instructional Activities (3 Days)

- student investigation
- class discussion

NGSS References

Performance Expectation: 1-LS1-1

Disciplinary Core Idea: LS1.A Structure and Function

Science and Engineering Practice: 6 Constructing Explanations and Designing Solutions

Crosscutting Concept: 6 Structure and Function

Connections to Engineering, Technology, and Applications of Science: Influence of

Engineering, Technology, and Science on Society and the Natural World

Students will determine which plant or animal senses mimic things that people use to solve a problem.

Students design something that solves a human problem by mimicking how a plant or animal senses or responds to the environment. They will determine parameters to tell whether their device meets the criteria.

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

www.coreknowledge.org/cksci-online-resources

Core Vocabulary and Language of Instruction

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mimic problem solution

Language of Instruction: The Language of Instruction consists of additional terms, not considered a part of Core Vocabulary, that you should use when talking about any concepts in this exercise. Students will benefit from your modeling the use of these words without the expectation that students will use or explain the words themselves. A Glossary at the end of this Teacher Guide lists definitions for both Core Vocabulary and Language of Instruction.

biomimicry

Instructional Resources

Activity Pages



AP 2.5.1
AP 2.5.2
AP 2.5.3

Activity Pages
Animal and Plant Cards
(AP 2.5.1)
Human Problem Cards
(AP 2.5.2)
Let's Solve a Problem!
(AP 2.5.3)

Materials and Equipment

- poster boards (1 per group)
- markers, assorted colors (1 box per group)
- scrap paper (3–5 sheets per group)
- pencils (1 per student)
- glue (1 bottle per group)
- scissors
- envelopes (7)

Advance Preparation

- Print Animal and Plant Cards (AP 2.5.1) and Human Problem Cards (AP 2.5.2). Cut out the cards along the dashed edges. Place the cards that go together into an envelope. Each envelope should contain an animal/plant picture card, an animal/plant description card, and a human problem card. (See **Know the Science 1.**)
- There are seven different animal or plant senses to focus on for the investigation, so the class may be grouped into seven different working groups.

Know the Science

TEACHER DEVELOPMENT

1. Adaptation Can Take a Long Time: The organisms and traits in this activity are the result of evolutionary processes that occurred over millions of years. Adaptation, also known as *evolutionary adaptation*, results in traits becoming widespread in a population. For example, cacti store water to survive in the dry desert. Millions of years ago, those cacti that stored little to no water were less likely to survive and produce offspring, so the cacti with the water-storing trait would live longer and produce more offspring. In this way the trait increased in the population.

- Match the animal/plant cards with the human problem cards as follows:
 - Venus flytrap – trapping something
 - vine – needing to reach something up high
 - bat – finding something in the dark
 - elephant – predicting an earthquake
 - eagle – seeing things that are far away
 - octopus – hiding from danger
 - owl – seeing things that are behind you

THE CORE LESSON 2.5

1. Day 1: Focus on Today's Question.

- Remind students that they have been talking about animal and plant senses for the past few classroom sessions.
- Hold a brief discussion about what students have learned so far in this lesson, touching on the following topics:
 - Animals and plants have structures that let them sense and respond to the world around them.
 - Animals and plants need to sense things in their surroundings to survive.
 - Humans use objects that mimic animal and plant senses to help solve problems.
- Tell students that today they will design a solution to a human problem by mimicking how plants and/or animals use their senses to survive.

NGSS Elements



3D Learning

3D Learning: In this session, students will use what they know about how animal and/or plant senses work to figure out a way to solve a human problem by mimicking natural processes and functions.

2. Preview the investigation.

Activity Page



AP 2.5.3

- Place students in small groups of mixed ability. If possible, try to have seven groups total so that each group gets a different animal or plant sense to focus on for the investigation.
- Remind students that they did a similar investigation for the last lesson but with external animal and plant parts. Tell them that today they will do the investigation based on animal and plant senses. Make sure students are clear on the difference.
- Randomly distribute one envelope with the animal or plant and human problem cards inside of it to each group. Tell students not to open their envelopes until they are told. Explain that inside the envelope they will find three cards.
- Describe the cards to students. The animal or plant cards have a picture and description of the living thing. The human problem card explains the problem that students will try to solve.

Differentiation

- Let students know that they will need to look at the pictures and read the descriptions carefully.
- After reviewing the cards, they will talk—as a group—about how they can mimic the animal or plant sense to solve the given problem.

SUPPORT—Remind students of the definition of *mimic*. (See **Know the Standards 1**.)

CHALLENGE—Explain that students are participating in biomimicry for this investigation. Challenge students to look up two or three inventions and/or solutions that are based on biomimicry of animal or plant senses and share what they find.

EXTEND—Have students work together in a pair or group to design a game in which the players use biomimicry to play the game.

- Distribute Let's Solve a Problem! (AP 2.5.3), and go over it together. Draw students' attention to the questions. Explain that they will need to answer questions 1–4. Then they will draw their designs on poster board. Remind students that there are scrap paper and pencils available to each group so that they can sketch out their drawings before they draw it onto the big poster board. After they draw their designs, students will answer questions 5–6.
- Distribute scrap paper and pencils to the groups.

3. Facilitate the investigation.

NGSS Elements



CCC 6
SEP 6
PE 1-LS1-1

- Circulate around the room, and provide assistance as needed. In Day 1, students should have just enough time to read over the descriptions and human problems and study the pictures of the animals or plants to come up with ideas for the devices they will design. They should also be able to respond to the first set of questions in Activity Page 2.5.3. In Day 2, students will start drawing the designs on their poster boards and answering the remaining questions on Activity Page 2.5.3. On Day 3, students will present their posters. (See **Know the Standards 2** and **3**.)

Know the Standards

TEACHER DEVELOPMENT

1. Differentiation: To mimic means to imitate. Biomimicry is therefore the imitation of biological elements for the purpose of solving a problem or designing a solution to something. In this investigation, students are focusing on animal and plant senses for biomimicry ideas.

2. CCC 6 Structure and Function: In this investigation, students have to look at and read about sensory structures and the senses being described and make connections to how they can be used to solve the given human problem.

3. SEP 6 Constructing Explanations and Designing Solutions: Students draw designs of devices that solve a given human problem based on biomimicry.

- Help students respond to the questions on Activity Page 2.5.3:
 - For the first question, students should write down the problem they need to solve.
 - For the second question, students should write down the idea for their design.
 - For the third question, students should describe the external animal or plant sense(s) that the design mimics.
 - For the fourth question, students should describe the design's features, such as whether it needs to have an adjustable strap, a circular base, or a cover on the top.
- Use prompts such as the following to help students make connections between the animal or plant senses and the human problem:
 - How does the sense work?
 - How does that sense help the animal or plant survive in its environment?
 - What is the animal or plant able to sense with that sensory structure? Light? Food? Shelter?
 - What is the problem? What are we, as humans, trying to do?
 - Does the sense resemble anything we use in our daily lives?
- For the group that is working on the elephant card, help them understand what an earthquake is and what happens during one. Explain that earthquakes are when the ground shakes and vibrates. These come on suddenly. They can be very dangerous.

Differentiation

SUPPORT—Instead of having students work in small groups, make this a whole-class activity that all of the students complete together with your guidance.

CHALLENGE—Have students do this activity individually, instead of in groups. Allow students to pick the animal or plant they want to investigate.

Monitor Progress

- Check to ensure that students are on the right track with their ideas for their designs. The designs should be related to the given human problem and should mimic one of the animal or plant senses that they have been assigned. If necessary, help students identify the animal or plant sense that they should focus on, or help them understand how that sense could be used to inspire a human object.
- Remind students that they will work on drawing their designs for their posters in the next class session.
- Tell students that if they have not finalized their ideas for their designs by the time class is over, they can take a few minutes to continue this exercise in the next class session.

1. Day 2: Focus student attention on Today's Question.

- Remind students that in the previous class session they worked with their groups to come up with a design solution to a human problem that mimics animal or plant senses. Let students know that today they will get to finish this investigation.

2. Continue the investigation.

NGSS Elements



SEP 6
Influence
of Science,
Engineering,
and Technology
on Society and
the Natural
World

- Have students get back into the same groups. Give groups a couple of minutes to review where they left off. (See **Know the Standards 4** and **5**.)
- Distribute poster board, markers, and glue to the groups. Tell students that in today's class session, they will decide on their final designs and draw them onto the poster board. Encourage them to use colorful markers to make the different parts of their designs stand out.
- Tell students to write the human problem at the top of the poster board. Have them glue the animal or plant card on the poster board next to the human problem.
- Tell students that their designs should be drawn big and bright so others will be able to see them when they do a gallery walk at the end.
- Circulate around the room, and provide assistance. Offer some ideas for designs if groups are unable to come up with any. For instance, you might say, "Is there something that people can wear to solve this problem?" or, "Is there something people can stand on to solve this problem?" (See **Know the Science 2**.)
- Remind students that they need to leave enough time to answer the rest of the questions on Activity Page 2.5.3. Help groups answer the questions if they are unsure of what to put down for answers. (See **Know the Standards 6**.) Tell them that they need to describe how or why their design mimics the animal or plant

Know the Standards

TEACHER DEVELOPMENT

4. SEP 6 Constructing Explanations and Designing Solutions: Day 2 is when students will draw their final designs to the given problem. They will use poster board, markers, glue, and cards to make their designs.

5. CCC Influence of Science, Engineering, and Technology on Society and the Natural World: Students experience how to apply knowledge of the natural world (animal and plant sensory structures and senses) to the design of a human product to solve a problem. Humans are often faced with obstacles that they need to overcome or problems that need to be solved. All human products are designed by applying some level of knowledge about natural phenomena.

6. Language Arts Connection: Students satisfy a connection to the ELA standard CCSS.ELA-LITERACY.W.1.7 by working in groups and writing about how to use objects that mimic animal and plant senses to solve a human problem.

Know the Science

TEACHER DEVELOPMENT

2. The Importance of Materials Scientists: In this lesson segment, students will be acting like materials scientists. Materials science is the branch of science that concerns itself with the properties of matter and how they can be applied in science and engineering. The work of materials scientists can be varied, such as finding the best fluid to go inside the shock absorber of a car, refining the chemical structure of medicine so the human body absorbs more of the chemical, or developing a microstructure to lighten and strengthen the carbon fiber used in artificial limbs.

sense. This explanation should show a similarity between how the sense works and how the design works. Then, students tell how the animal or plant uses that sense to survive in its environment. The final question on Activity Page 2.5.3 is where students explain how the design is intended to work.

- Let students know when they have five minutes left to wrap up their designs and answers for the day. Remind them that they will present their posters to the rest of the class on the following day.

1. Day 3: Focus student attention on the Big Question.

- Have students form their groups. Give them time to review their poster design and talk about how it solves the human problem.

2. Present the designs.

- Call on one group at a time to present their posters, responding to the following prompts. You might suggest that each member answer a prompt for the group's design.
 - What was your human problem?
 - What did you design?
 - Describe your design.
 - What was your animal or plant?
 - Explain how the design solves the problem.
- **Ask the rest of the class whether they think the group's design solves the human problem.**

3. Check for understanding.

Formative Assessment

Have students summarize what they learned about animal and plant senses and how people make things that mimic those parts to solve problems.

Monitor Progress

Review student responses on Activity Page 2.5.3 and their designs to determine student understanding of the following concepts:

- Animals and plants have senses that help them survive.
- Humans mimic animal and plant senses to solve problems.

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

Tie to the Anchoring Phenomenon

As students complete Lesson 2, they understand that people study things in the natural world to help them come up with ways to solve problems. This is an example of how workers at animal rehab agencies solve the problem of helping animals survive.

LESSON 3

Parents and Offspring: Traits and Inheritance

OVERVIEW

Guiding Question: How alike are plants and animals of the same kind?

Lesson 3 Segments	Segment Questions	Advance Preparation
3.1 What Are Parents and Offspring? (2 days) Students observe animal figurines to compare parents to their offspring.	What makes plants or animals belong to the same group?	Gather materials for the observation. See Materials and Equipment.
3.2 Plant Traits Students learn that plants of the same type have similarities and differences, too.	How are plants of the same type alike and different?	Prepare for student activity.
3.3 Animal Traits Students try to solve the mystery of a lost puppy by comparing physical traits of different kinds of dogs.	How are animals of the same type alike and different?	Prepare for student activity.
3.4 Animals, Plants, and Their Traits (2 days) Students read about animal and plant traits and learn that even if traits are similar, animals and plants are never the same as others of the same kind.	How are plants and animals of the same type alike and different?	Gather materials for demonstration. See Materials and Equipment. Read Chapters 6 and 7 in the Student Book.
3.5 Lesson 3 Roundup: Groups of Plants and Animals (2 days) Students make posters with drawings of plants or animals to compare parents and their offspring, as well as adults of the same species, to show that traits are similar but not exactly alike.	What makes plants or animals belong to the same group?	Gather materials for student investigation. See Materials and Equipment.

What’s the Story?

Summary: In Lesson 3 (Segments 1–5), students explore the physical traits of living things and compare them to other living things of the same species. Students then apply their knowledge and observations to draw pictures of plants and animals and articulate a statement that supports the fact that plants and animals of the same type are not exactly like one another (including adults and their offspring) (1-LS3-1). The developing understanding of these phenomena in Lesson 3 prepares students for their work in Lesson 4, when they learn about the types of behaviors of parents and offspring that help offspring survive.

Learning Progression: Lesson 3 builds on student understandings from Lessons 1 and 2, 1-LS1-1: *Use materials to design a solution to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs.* Lesson 3 also builds toward the Grade 1 target of 1-LS1-2: *Read texts and use media to determine patterns in behavior of parents and offspring that help offspring survive.*

Guiding Phenomenon: Animals and plants have specific traits that are unique both to their species and to themselves as individual organisms. These traits help animals survive. Organisms can look like other organisms of the same species but with slight variations. Traits can also be inherited, or passed down from parent to offspring. Even so, traits are not identical between parents and their young. Understanding the traits that plants and animals have can help wildlife center workers solve problems when it comes to helping animals.

Learning Objectives

By the end of Lesson 3, students will do the following:

- Explain that plant and animal offspring look like, but not exactly like, their parents.
- Describe the traits that adult plants and animals have in common with others of their species.

NGSS Standards and Dimensions

Performance Expectation: 1-LS3-1 Make observations to construct an evidence-based account that young plants and animals are like, but not exactly like, their parents.

Science and Engineering Practice	Disciplinary Core Ideas	Crosscutting Concept
6 Constructing Explanations and Designing Solutions Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena.	LS3.A Inheritance of Traits Young animals are very much, but not exactly like, their parents. Plants also are very much, but not exactly, like their parents. LS3.B Variation of Traits Individuals of the same kind of plant or animal are recognizable as similar but can also vary in many ways.	1 Patterns Patterns in the natural and human designed world can be observed, used to describe phenomena, and used as evidence.

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

www.coreknowledge.org/cksci-online-resources

LESSON 3.1

What Are Parents and Offspring?

Big Question: How is a wildlife center designed to help animals survive?

Lesson Guiding Question: How alike are plants and animals of the same kind?

Today's Question: What makes plants or animals belong to the same group?

Tie to the Anchoring Phenomenon: Students learn that animals and plants have different traits that make them similar to other animals of the same species (or kind). These traits are what help animals survive in their surroundings.

AT A GLANCE

Learning Objectives

- ✓ Define *parent* and *offspring*.
- ✓ Use visible traits to sort organisms by species.

Instructional Activities (2 Days)

- student observation
- class discussion
- question generation

NGSS References

Disciplinary Core Ideas: LS3.A Inheritance of Traits; LS3.B Variation of Traits

Science and Engineering Practice: 1 Asking Questions

Crosscutting Concept: 1 Patterns

Students compare plants and animals of the same type to identify patterns of characteristics that help delineate different species. They will develop the skill to identify parent and offspring.

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

www.coreknowledge.org/cksci-online-resources

Core Vocabulary and Language of Instruction

Core Vocabulary: Core Vocabulary terms are those that students should learn to use accurately in discussion and in written responses. During instruction, expose students repeatedly to these terms. However, these terms are not intended for isolated drill or memorization.

offspring parent species trait

Language of Instruction: The Language of Instruction consists of additional terms, not considered a part of Core Vocabulary, that you should use when talking about any concepts in this exercise. Students will benefit from your modeling the use of these words without the expectation that students will use or explain the words themselves. A Glossary at the end of this Teacher Guide lists definitions for both Core Vocabulary and Language of Instruction.

compare contrast describe observe

Instructional Resources

Activity Pages



AP 3.1.1
AP 3.1.2
AP 3.1.3

Activity Pages

Animal and Plant Species
Cards (AP 3.1.1)

Animal and Plant Types
(AP 3.1.2)

Parents and Offspring
(AP 3.1.3)

Materials and Equipment

- colorful pictures of different-looking cats (2)
- envelopes (1 per group)
- scissors
- assorted animal parent and animal baby plastic figurines (8–10, e.g., lion and lion cub, bear and bear cub, horse and foal, chicken and chick, cow and calf, pig and piglet, dog and puppy, cat and kitten, duck and duckling, rabbit and kit) *
- timer

*Note: When selecting animal figurines to use, avoid animals that undergo metamorphosis, such as butterflies, frogs, newts, salamanders, and toads.

Advance Preparation

Day 1:

Find and copy or print two colorful pictures of cats that you can show to the class. The cats should be different colors.

Print Animal and Plant Species Cards (AP 3.1.1), and make enough copies such that students can work in small groups of three or four and each group receives one copy of all the cards. Cut out the cards along the dashed lines. Then place one full deck of cards into each of the envelopes.

Day 2:

Set up the animal parent and baby figurines around the classroom at different stations. Match the parents to the babies at each station.

1. Day 1: Introduce students to Lesson 3.

Ask a volunteer to state the **Big Question** that you'll be answering in this unit, which is posted somewhere in the room—**How is a wildlife center designed to help animals survive?**

Tell students that, before they can answer the unit's Big Question about helping animals survive, they first need to understand that animals have characteristics—or traits—that let us tell them apart from other types of animals. In Lesson 3, they will learn about plant and animal traits that can be used to sort them into groups. Write the **Lesson 3 Guiding Question** where students can see it:

How alike are plants and animals of the same kind?

Tie to the Anchoring Phenomenon:

As students work through Lesson 3, they will learn how animals and plants have traits specific to their species. This is how scientists tell one species (or kind) of animals and plants apart from other species of animals and plants.

2. Turn and talk.

- Place students in pairs, and have them discuss their answers to the following questions:
 - Do all animals look alike?
 - Do all plants look alike?
- Circulate around the room while students take a few minutes to share their answers with each other. Then bring the class back together, and ask volunteers to share their answers with the whole class.
- Now have students give examples that support their ideas for why all animals and all plants do not look alike. Students may explain that some dogs are brown and others are black. Encourage students to give examples of animals as well as plants.
- Explain that animals and plants can be similar in many ways and different in other ways. This means that they are not identical, even if they are the same type of animal or the same type of plant. However, they may look similar enough to be put into the same groups.

3. Talk about animal and plant types.

- Tell students that there are different types of animals and different types of plants. Circulate around the room, and ask students to tell you some different types of animals, such as dog, cat, monkey, snake, fish, and bird. Then have them tell you some different types of plants, such as oak tree, palm tree, cactus,

rosebush, and grass. Write down all the different types of animals and plants on the board where students can see.

- Show students the two pictures of the cats. **Ask students if the cats look the same.**
 - » no
- **Ask students to tell what is different about them.**
 - » Example: One cat is orange. The other is brown.
- Restate that the cats are different colors. **Ask students,** But are they both cats?
 - » yes

4. Preview the activity.

Activity Page



AP 3.1.2

NGSS Elements



DCI LS3.B

- Tell students that today they will practice sorting animal cards and plant cards into groups.
- Place students in small groups of three or four. Distribute Animal and Plant Types (AP 3.1.2) along with one envelope that contains the animal and plant cards that you have already printed and cut out. (See **Know the Standards 1.**)
- Model for students how to do the activity. Begin by looking at Activity Page 3.1.2. Read the first type of animal out loud. Now show students how to look through the cards to identify the correct ones. Finally, place the cards onto the empty box in Activity Page 3.1.2. Tell students that they will stack their piles of cards in the correct boxes on Activity Page 3.1.2. (See **Know the Science 1.**)
- Students may need a good amount of space to lay out all the cards while they search and sort them.
- Circulate the room while students work. Provide prompts to help students problem solve. **Ask,** Which of the animals or plants look alike? What makes them similar? What makes them different?

Differentiation

SUPPORT—Some students may need teacher assistance with making a chart that compares similarities and differences of two animal or plants at a time.

CHALLENGE—Challenge students by making a card game that includes matching animals or plants that belong in the same group.

Know the Standards

TEACHER DEVELOPMENT

1. DCI LS3.B Variation of Traits: Students practice identifying and sorting animals and plants according to type (species) based on visible traits. They learn that animals and plants of the same type can look similar but also be different.

Know the Science

TEACHER DEVELOPMENT

1. Types of Animals and Plants: In Grade 1, students do not need to learn about all the organizational levels of organisms, such as order, family, and genus. For this activity, students are working on identifying the “type” of animal and plant, which is really the species. A species is a group of organisms that is made up of individuals that have similar traits and can reproduce with one another.

EXTEND—Have students keep a science journal where they record when they see a certain type of animal or plant in their community, neighborhood, or home. Have students keep this log for the duration of Lesson 3. Then they can turn in their journals and discuss their findings.

5. Summarize and discuss.

NGSS Elements



SEP 1

- Bring the class back together, and summarize how students sorted the cards. (See **Know the Standards 2.**)
- **Ask students to tell how they knew whether an animal was a dog, fish, bird, or snake.**
 - » We looked at the pictures. We could tell by how they look.
- **Ask students to tell you what the different types of animals look like.**
 - » dogs: fur, four legs, tails, whiskers
 - » snakes: no legs, scales
 - » birds: feathers, beaks, wings, tails
 - » fish: fins, tails
- Explain that what students are describing are the traits of the animals. Discuss the meaning of the word *trait*. Students may be familiar with words that are like *trait*, which you can use to help define it, such as *characteristics* or *qualities*. Emphasize that all living things have traits. These traits can be visible (what animals and plants look like both inside and outside), and they can be behavioral (what animals and plants do).
- Clarify that what students did in this activity was sort animals according to their traits. Give examples of the traits looked for by students. The snake has no legs. This is a trait. The bird has feathers and a beak. These are traits, too.
- **Ask students what other questions they have about how to sort animals and plants according to the traits that we can see.** Add these questions to the question board.

6. Check for understanding.

Formative Assessment

Review the stacks of cards in Animal and Plant Types (AP 3.1.2) to determine student understanding of the following concepts:

Monitor Progress

- Animals and plants can be sorted according to their type.
- Animals and plants have different traits that make them different types.

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

Know the Standards

TEACHER DEVELOPMENT

2. SEP 1 Asking Questions: Allowing students to ask questions about plant and animal traits serves as a foundation to understanding the similarities and differences between parents and offspring, which students will learn about later.

Tie to the Anchoring Phenomenon

This activity helps to excite and engage students for learning about the different traits that animals and plants have and how their traits vary among individuals and between parents and offspring. This information serves as a foundation that students will later build on, in terms of understanding that animals have certain traits that make them able to survive in certain environments.

1. Day 2: Focus on the Big Question.

Ask a volunteer to state the **Big Question** that you'll be answering in this unit, which is posted somewhere in the room—**How is a wildlife center designed to help animals survive?**

Remind students that in the previous class session they sorted picture cards of animals and plants according to their type. They also learned about a new science word: *trait*.

Call on a volunteer to describe traits. Show the students a stuffed animal or other familiar toy. Ask students to state a physical trait of the stuffed toy. Make sure to correct any traits that aren't physical.

2. Preview the activity.

Activity Page



AP 3.1.3

- Explain to students that on the previous day, they looked at the traits of different animals and plants and sorted them according to their type of living thing. Remind students that they concluded that not all animals of the same type look exactly the same and not all plants of the same type look exactly the same.
- Tell students that for today's activity, they will be answering this new question: Do all animal babies look exactly like their parents?

Differentiation

SUPPORT—Some students may be confused with understanding how two things can be alike but not exactly alike. Show the students two exactly alike pencils. Then show them a colored pencil. Point out the pencils that are exactly alike, and explain how they are exactly alike. Then explain how the colored pencil is like, but not exactly like, the other two pencils. They are all pencils and can be used to write or draw.

- Tell students that you have set up stations around the classroom with animal figurines. At each station, students will find the parent and its offspring. Take a moment to define *parent* and *offspring* for students. (See **Know the Science 2**.) Write the words on the front board.

Know the Science

TEACHER DEVELOPMENT

2. Parents and Offspring: A parent organism can be a mother or father. Offspring are the organisms that come as a result of the parent reproducing. If a parent duck has three ducklings, all the ducklings are considered the offspring.

- Distribute Parents and Offspring (AP 3.1.3). Go over Activity Page 3.1.3 together as a class. Tell students that they will take Activity Page 3.1.3 with them to each station as they observe what the animal parents and offspring look like. Explain that in the first column, students will write the name of the animal they are observing. In the second column, they will write down what is similar about the parent and the offspring. In the third column, they will write down what is different about the parent and the offspring. Then they will answer *Yes* or *No* in the final column.
- If necessary, remind students of what it means to observe and describe. They can observe the figurines by looking at them and touching them. However, make sure students understand that they should not move the figurines from one station to another.

3. Facilitate the activity.

NGSS Elements



DCI LS3.A
CCC 1

Differentiation

- Place students in small groups. Aim for the same number of groups as there are stations. That way one group is at each station at a time.
- Number the stations, and then assign groups to begin at different stations. Tell the groups they will go in sequential order. When finishing the station with the greatest number, the group of students will move to Station 1.
- Give students a few minutes at each station. Use a timer to keep track of the minutes so students have an equal amount of time at each of the stations.
- Circulate around the room, and prompt students to make their observations of the parents and offspring animals. (See **Know the Standards 3** and **4**.) Repeat the question that they are trying to answer: Do all animal babies look exactly like their parents? Guide students to notice different things that could be similar or different about them, such as the following:
 - size
 - shape
 - color
- Remind students that they need to fill out the charts on Activity Page 3.1.3 for each of the animal pairs.

SUPPORT—Limit the number of animal and plant stations that students go through. Instead of eight to ten, have students observe two or three parent and offspring pairs.

Know the Standards

TEACHER DEVELOPMENT

3. DCI LS3.A Inheritance of Traits: Students learn that young animals are very much like their parents but are not identical. In this activity, students will observe that parents and animals are different sizes but may be the same shape and color or have the same basic structural parts.

4. CCC 1 Patterns: As students observe the parent and offspring animal figurines, they become aware of similarities, which can be recognized as patterns. Animals of the same type will have certain similarities that can be identified.

4. Check for understanding.

Formative Assessment

Call the class back together, and summarize the investigation. Allow groups to share their observations, and discuss the groups' answers to the question under investigation: Do all animal babies look exactly like their parents?

Students should note that babies (offspring) are not identical to their parents, although they share similarities in how they look, such as shapes and structures. (See **Know the Standards 5**.)

Monitor Progress

Look for student responses on Activity Page 3.1.3 to see that students understand that there is a difference between being like something and exactly like something. Review student responses on Activity Page 3.1.3 to determine student understanding of the following concepts:

- Offspring are like their parents but not exactly like them.

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

Tie to the Anchoring Phenomenon

This activity helps to excite and engage students for learning about animal and plant traits and how traits vary from organism to organism. This information serves as a foundation that students will later build on, in terms of understanding that animal wildlife workers need to know what kinds of traits animals have so they can better work with the animals to nurture them back to health.

Know the Standards

TEACHER DEVELOPMENT

5. PE 1-LS3-1: To achieve this Performance Expectation, students must make observations to construct a statement that claims young plants and animals are like but not exactly like their parents. However, the assessment boundary for this PE does not include animals that undergo metamorphosis or plants that are hybrids.

LESSON 3.2

Plant Traits

Big Question: How is a wildlife center designed to help animals survive?

Lesson Guiding Question: How alike are plants and animals of the same kind?

Today's Question: How are plants of the same type alike and different?

Tie to the Anchoring Phenomenon: Students learn that plants of the same kind can have traits that are different than their parents or offspring. These traits are what help plants survive in their surroundings.

AT A GLANCE

Learning Objective

- ✓ Investigate how plants of the same kind are alike and different, including similarities and differences between parents and offspring.

Instructional Activities

- student observation
- class discussion

NGSS References

Disciplinary Core Idea: LS3.B Variation of Traits

Science and Engineering Practice: 1 Asking Questions

Crosscutting Concept: 1 Patterns

Students start to develop the ability to identify patterns of structures of organisms within one species. They will learn to identify differences between members of the same species.

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www.coreknowledge.org/cksci-online-resources

Core Vocabulary and Language of Instruction

Core Vocabulary: Core Vocabulary terms are those that students should learn to use accurately in discussion and in written responses. During instruction, expose students repeatedly to these terms. However, these terms are not intended for isolated drill or memorization.

offspring **parent** **species** **trait**

Language of Instruction: The Language of Instruction consists of additional terms, not considered a part of Core Vocabulary, that you should use when talking about any concepts in this exercise. Students will benefit from your modeling the use of these words without the expectation that students will use or explain the words themselves. A Glossary at the end of this Teacher Guide lists definitions for both Core Vocabulary and Language of Instruction.

compare contrast describe observe

Instructional Resources

Activity Page



AP 3.2.1

Activity Page

Plants: Same or Different?
(AP 3.2.1)

Materials and Equipment

none needed

THE CORE LESSON 3.2

1. Focus on Today's Question.

Remind students that in the last class they learned that plants and animals have certain traits. Call on a volunteer to explain traits. Call on other volunteers to give examples of traits that humans, animals, or plants have.

2. Preview the activity.

Activity Page



AP 3.2.1

- Tell students that today they are going to work on answering an important question: Do the same kind of plants look exactly alike? To do this, they will look at pictures of the same kind of plant and see what is the same or different.
- Place students in pairs, and distribute Plants: Same or Different? (AP 3.2.1). Go over Activity Page 3.2.1 together as a class. Draw students' attention to the pictures. Explain that they will need to look very closely and carefully at the plant pictures. They will need to circle the things that are the same. Then they will finish the sentence starters to tell what is different about the plants.

3. Facilitate the activity.

NGSS Elements



DCI LS3.B

- Circulate around the room as students work together in pairs to analyze the pictures. As you walk through the room, explain to students that they are comparing and contrasting. Remind them that comparing means to look at things that are similar. Contrasting means to look at what is different. Comparing and contrasting is a form of *analyzing* what they observe. (See **Know the Standards 1.**)
- Remind students of the question they are trying to answer in today's class: Do the same type of plants look exactly alike?
- Guide students to notice certain things about the pictures. For instance, prompt them to look at the size, structures, shape, colors, patterns, and so on of the plants.

Differentiation

SUPPORT—Some students may have difficulty interpreting the differences by finishing the sentences. For the section on Activity Page 3.2.1 about what is different between the plants, allow students to draw an X on the differences, instead of completing the sentences.

CHALLENGE—Challenge students by having them research and print or copy four different types of flowers. Have the students compare and contrast the four flowers.

EXTEND—Have students keep a science journal where they record a variety of plants of the same type in their community, neighborhood, or home. Have students keep a log about what they see that is similar or different about the same kinds of plants.

4. Complete a Venn diagram.

NGSS Elements



CCC 1

- Bring the class back together. Explain that now you are going to make a diagram based on the pictures of the plants from Activity Page 3.2.1.
- Draw a Venn diagram where all students can see it. Go over how a Venn diagram works. Explain that a Venn diagram is a tool that compares and contrasts things by writing their similarities and differences. Decide which plant will be assigned which circle in the diagram. (See **Know the Standards 2.**)
- Call on volunteers to come up to the diagram to help record the information to complete the diagram.

Know the Standards

TEACHER DEVELOPMENT

1. DCI LS3.B Variation of Traits: Traits are passed down from one organism to the next, in a process called heredity. Offspring plants receive a mixture of traits from their parents. This makes the offspring plants have their own set of traits that are unique, and it is why offspring are not identical to their parents (or to other kinds of the same plant, such as siblings or cousins).

2. CCC 1 Patterns: Students look for patterns in nature by identifying what is similar about the two plants being compared.



- **Ask students to tell what traits only the first plant on Activity Page 3.2.1 has.**
 - » It is tall. It has five leaves. It has a lot of petals.
- Prompt the volunteer to write the answers in the first outer circle on the diagram.
- **Ask students to tell what traits only the second plant on Activity Page 3.2.1 has. (See Know the Standards 3.)**
 - » It is short. It has two leaves. It does not have a lot of petals.
- Prompt the volunteer to write the answers in the second outer circle on the diagram.
- Explain that these traits are unique to the individual plant. Point out that the other plant on Activity Page 3.2.1 does not have these traits. This is how the plants are different.
- **Now ask students to tell what is similar about the plants. In other words, what do both plants have that is the same?**
 - » Both plants have stems. The shapes of the leaves are the same. The shapes of the petals are the same.
- Prompt the volunteer to write the answers in the middle where the two circles overlap. Then have the volunteer sit down.
- Review the Venn diagram together one last time. Read through the similarities. Go over the differences. **Then ask the whole class to answer today's question:** How are plants of the same type alike and different?
 - » Almost all plants have roots, a stem, and leaves. Those parts of plants can differ in size.
- **Ask students which plant they think is the parent and which one they think is the offspring.**
 - » The tall one is the parent. The short one is the offspring.
- Discuss why students came to this conclusion. Explain that it is likely that the parent is the taller plant because the parent has been around longer than the offspring and therefore has had more time to grow. The offspring plant is just starting to grow. That is why it's not as tall and does not have as many leaves as the taller plant. (See **Know the Standards 4.**)
- **Ask students what other questions they have about plants looking like other plants, and record them on the question board.**

Monitor Progress

Know the Standards

TEACHER DEVELOPMENT

3. SEP 1 Asking Questions: Allowing students to ask questions about plant traits serves as a foundation to understanding the similarities and differences between parents and offspring, which students will learn about later.

4. Monitor Progress: Gauge student understanding by how students analyze the two plants. Make sure students understand how to tell the ways in which the plants are similar and the ways in which they are different.

5. Check for understanding.

Formative Assessment

Monitor Progress

Review Plants: Same or Different? (AP 3.2.1) to determine student understanding of the following concepts:

- Plants of the same type can look alike but are not exactly alike.

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

Tie to the Anchoring Phenomenon

This activity helps to excite and engage students for learning about the different traits that plants have and how their traits vary among individuals and between parents and offspring. This information serves as a foundation that students will later build on, in terms of understanding that all living things have certain traits that make them more or less able to survive in certain environments.

LESSON 3.3

Animal Traits

Big Question: How is a wildlife center designed to help animals survive?

Lesson Guiding Question: How alike are plants and animals of the same kind?

Today's Question: How are animals of the same type alike and different?

Tie to the Anchoring Phenomenon: Students learn that animals of the same kind can have traits that are different from their parents or offspring. These traits are what help animals survive in their environments.

AT A GLANCE

Learning Objective

- ✓ Investigate how animals of the same kind are alike and different, including similarities and differences between parents and offspring.

Instructional Activities

- student observation
- class discussion

NGSS References

Disciplinary Core Ideas: LS3.A Inheritance of Traits; LS3.B Variation of Traits

Science and Engineering Practice: 1 Asking Questions

Crosscutting Concept: 1 Patterns

Students continue to develop the ability to identify patterns of structures of organisms with one species. They will learn how to apply traits to identify the parent with their offspring.

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

www.coreknowledge.org/cksci-online-resources

Core Vocabulary and Language of Instruction

Core Vocabulary: Core Vocabulary terms are those that students should learn to use accurately in discussion and in written responses. During instruction, expose students repeatedly to these terms. However, these terms are not intended for isolated drill or memorization.

offspring parent species trait

Language of Instruction: The Language of Instruction consists of additional terms, not considered a part of Core Vocabulary, that you should use when talking about any concepts in this exercise. Students will benefit from your modeling the use of these words without the expectation that students will use or explain the words themselves. A Glossary at the end of this Teacher Guide lists definitions for both Core Vocabulary and Language of Instruction.

compare contrast describe observe
sibling

Instructional Resources

Activity Page



AP 3.3.1

Activity Page
Lost Puppy (AP 3.3.1)

Materials and Equipment

none needed

THE CORE LESSON 3.3

1. Focus on Today’s Question.

Open the class with a fictional scenario. Explain that a puppy got separated from its parents and siblings (brothers and sisters). Now the puppy is lost! The class must help the puppy find its family.

2. Preview the activity.

Activity Page



AP 3.3.1

- Distribute Lost Puppy (AP 3.3.1) to students. Draw students’ attention to the picture of the puppy. Call on volunteers to describe the traits of the puppy that they notice.
- Instruct students to look at the three pictures of the dog families on Activity Page 3.3.1. Explain that one of these is the puppy’s family. But which one is it? Tell students that they will work in groups to figure out which family is the puppy’s family.

3. Facilitate the activity.

NGSS Elements



DCI LS3.A

- Place students in small groups of three or four.
- Circulate around the room as students work together to study the pictures. As you walk through the room, explain to students that they are comparing. Explain that they must look at all the pictures to see what is similar about the dogs and what is different about them. (See **Know the Standards 1.**)
- Remind students that they are acting like scientists now. Even if they can visibly see which family the lost puppy should go home to, they need to show how they can tell this. This means they should go through the processes of asking questions, making observations, and recording what they notice.
- Guide students to pay attention to certain things about the pictures. For instance, prompt them to look at details like ear shape, structure, fur length, fur color, fur patterns, and size. Ask students which family the lost puppy most closely resembles. However, remind them that the lost puppy may or may not look exactly like its family.

Differentiation

SUPPORT—Do this activity as a whole class, instead of in groups. Walk students through the process of comparing the various dogs to the puppy so they can see how the dogs are similar and different.

CHALLENGE—Challenge students to research animals that have offspring that look different from both parents when they are young. A few examples are flamingos, wild boars, gray seals, king penguins, and silvered leaf monkeys.

EXTEND—Have students keep a science journal where they record animals of the same type in their community, neighborhood, or home, such as dogs, cats, reptiles, or birds. They can keep a log about what they see that is similar or different about the same kinds of animals.

Know the Standards

TEACHER DEVELOPMENT

1. DCI LS3.A Inheritance of Traits: Traits are passed down from one organism to the next, in a process called heredity. Offspring animals receive traits from their parents. Therefore, young animals never look exactly like one parent or another. They also do not look exactly like other animals of the same type.

4. Summarize and discuss.

NGSS Elements



SEP 1
CCC 1

Monitor Progress

- Bring the class back together, and summarize the findings. Have the groups tell which family the lost dog should return home to. (See **Know the Standards 2 and 3.**)
- Solicit from the class what evidence will support their answer. Students should be able to cite details that are similar between the lost puppy and the dog family of the same type. Record the evidence on the board. (See **Know the Standards 4.**)
- Hold a brief discussion about which dogs in the pictures are the parents. Students should identify that the biggest dog in the group is the parent. **Ask students to tell what makes them think that.**
 - » It is bigger than the other dog.
- Use this opportunity to discuss with students that the parent is older and has had more time to grow. This is why parent animals are usually larger than their young.
- **Ask students whether they think animals of the same type look alike or look exactly alike.**
 - » They look alike.
- Prompt students to tell why the dogs in the same family do not look exactly alike. Students should be able to cite physical trait differences among the dogs in Activity Page 3.3.1.
- **Ask students what other questions they have about animals looking like (or not looking like) other animals, and record them on the question board.**

5. Check for understanding.

Formative Assessment

Monitor Progress

Review the lines that students drew on Lost Puppy (AP 3.3.1) to determine student understanding of the following concept:

- Animals of the same type can look alike but are not exactly alike.

Know the Standards

TEACHER DEVELOPMENT

2. SEP 1 Asking Questions: Allowing students to ask questions about animal traits serves as a foundation to understanding the similarities and differences between parents and offspring, which students will learn about later.

3. CCC 1 Patterns: Students look for patterns in nature by identifying what is similar about the dogs being compared.

4. Monitor Progress: Gauge student understanding that animals can look similar to other types of animals in their species but are not identical.

Students should be able to see that the dogs are similar in certain ways, such as ear shape, but are not exactly alike.

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

Tie to the Anchoring Phenomenon

This activity helps to excite and engage students for learning about the different traits that animals have and how their traits vary among individuals and between parents and offspring. This information serves as a foundation that students will later build on, in terms of understanding that all living things—even baby owls—have traits that make them able to survive in their surroundings.

LESSON 3.4

Animals, Plants, and Their Traits

Big Question: How is a wildlife center designed to help animals survive?

Lesson Guiding Question: How alike are plants and animals of the same kind?

Today's Question: How are plants and animals of the same type alike and different?

Tie to the Anchoring Phenomenon: Learning about animal and plant traits and how they vary among individuals of the same kind (including parents and offspring) is important for understanding how animal rehab workers find ways to best work with different kinds of animals.

AT A GLANCE

Learning Objectives

- ✓ Compare traits of several individuals of the same plant species, including parents and offspring.
- ✓ Compare traits of several individuals of the same animal species, including parents and offspring.

Instructional Activities (2 Days)

- teacher Read Aloud
- student observation
- class discussion

NGSS References

Disciplinary Core Ideas: LS3.A Inheritance of Traits; LS3.B Variation of Traits

Science and Engineering Practice: 1 Asking Questions

Crosscutting Concept: 1 Patterns

Students will develop their understanding of traits of different organisms. They will apply pattern recognition skill to identify similarities and differences between adult and young organisms.

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

www.coreknowledge.org/cksci-online-resources

Core Vocabulary and Language of Instruction

Core Vocabulary: Core Vocabulary terms are those that students should learn to use accurately in discussion and in written responses. During instruction, expose students repeatedly to these terms. However, these terms are not intended for isolated drill or memorization.

offspring parent species trait

Language of Instruction: The Language of Instruction consists of additional terms, not considered a part of Core Vocabulary, that you should use when talking about any concepts in this exercise. Students will benefit from your modeling the use of these words without the expectation that students will use or explain the words themselves. A Glossary at the end of this Teacher Guide lists definitions for both Core Vocabulary and Language of Instruction.

compare contrast describe observe

Instructional Resources

Student Book



Ch. 6
Ch. 7

Student Book, Chapter 6
“Plants Are Alike and Different”

Student Book, Chapter 7
“Animals Are Alike and Different”

Activity Page



AP 3.4.1

Activity Page
Saguaros (AP 3.4.1)

Materials and Equipment

- pictures of different types of animals (6–10 animals)
- internet access and the means to project images/video for whole-class viewing

Advance Preparation

- Use the internet to look for pictures of different kinds of animals. Put together a slideshow of the animals.

THE CORE LESSON 3.4

1. Day 1: Focus on Today’s Question.

Invite students to talk about plants that they see. Perhaps they have a tree in their yard or flowers that grow in their neighborhood. Prompt students to think about any plants that you have growing around the school, such as bushes or grass.

Explain that all living things have traits. Plants have a lot of different traits that make them stand out. **Ask students**, How do you know when you see a plant?

» It is green. It is alive. It has leaves.

2. Read together: “Plants Are Alike and Different.”

Student Book



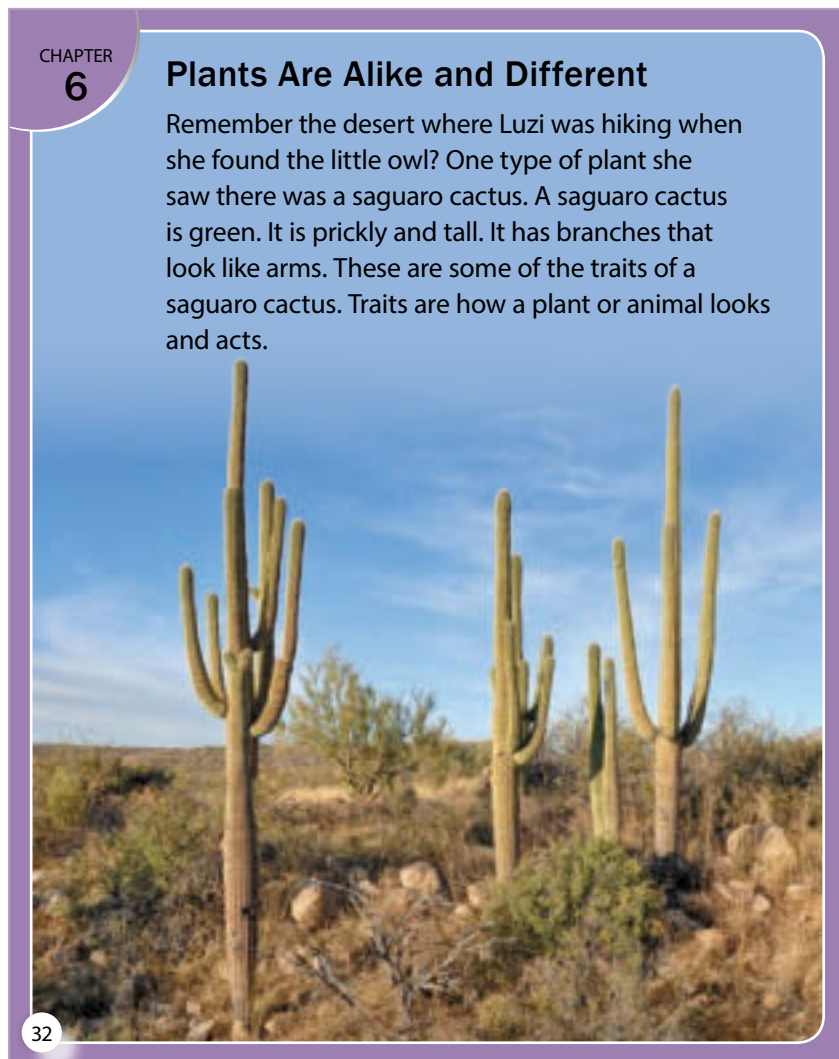
Ch. 6

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.

Read Aloud Support

Page 32

Ask students to turn to page 32 of the Student Book and look at the image as you read aloud. Remind them that the title of this chapter is “Plants Are Alike and Different,” and tell them to pay special attention to how the plants are similar to each other and different from each other as you read.



Call attention to the picture. Explain that a saguaro cactus is a plant. It may not look like a regular plant that students are used to seeing, depending on your geographic region. Tell students that this kind of cactus grows in deserts in the southwest United States.

CORE VOCABULARY—Explain that a **trait** is a specific characteristic seen in an organism. Students have learned about traits of plants and animals.

LITERAL—Name one trait of the saguaro cactus that you can see.

» It is green. It has spines. It is tall. It has arms.

Page 33

NGSS Elements



CCC 1

Ask students to look at the three pictures on page 33. Tell them to take a couple of minutes to closely look at the three trees. (See **Know the Standards 1.**)

You can tell types of plants by their traits. For example, trees are larger than most plants. They have trunks. They grow leaves from their branches. They spread out to capture sunlight.

How are these trees alike?



33

LITERAL—What is the same about all three trees?

» They have big trunks. They have leaves. They are tall. They have branches.

LITERAL—Even though these trees have similar traits, can you still tell them apart?

» yes

Know the Standards

TEACHER DEVELOPMENT

1. CCC 1 Patterns: Students observe similar patterns among trees based on observable traits.

Ask students to look at the three pictures on page 34. Tell them to take a couple of minutes to closely look at the three trees. Explain that although these are all trees, they are different types of trees. This is why they look different. (See **Know the Standards 2.**)

Trees are alike in some ways, but they are different in other ways. Some trees are tall and thin. Some trees are wide. Some are extremely tall. How are these trees different?



34

LITERAL—What is different about the three trees?

- » They have different shapes. They have different leaves. They are different sizes. Some have darker green leaves, and some have lighter green leaves. One has a thicker trunk, and one has a thinner trunk.

Know the Standards

TEACHER DEVELOPMENT

2. Monitor Progress: Students have had experience observing traits in the past few class sessions. As students look at the pictures of the trees, gauge their understanding of how to recognize traits.



Now ask students to look at the pictures on page 35. Explain that each parent plant has a picture of its offspring (baby) plant next to it. (See **Know the Standards 3.**)

Offspring of living things get traits from their parents. They will look and act mostly the same. A young plant looks similar to its parent. But it looks different in some ways, too.

young tomato

adult tomato



How are these young plants like their parents?
How are they different?

young sunflower

adult sunflower



35

CORE VOCABULARY—Explain that **offspring** are young organisms that come from parents. The offspring get traits from their parents.

SUPPORT—**Have students identify which tomato plant is the parent and which one is the young tomato plant. Ask them to explain how they know.** Students should be able to tell that the adult tomato plant is bigger and has tomatoes on it. The young tomato plant is smaller because it is still growing. It does not have any tomatoes on it yet, but it will.

LITERAL—What is similar about the parent and the young plant?

- » They are both green. They have the same type of leaves. They have a similar shape.

Know the Standards

TEACHER DEVELOPMENT

3. DCI LS3.A Inheritance of Traits: Students observe that baby plants and parent plants do not look exactly alike, even though they have traits that are similar.

LITERAL—What is different about the parent and the young plant?

- » One is bigger than the other. The parent has tomatoes (fruit), and the young plant does not. The parent plant has more leaves than the young plant.

SUPPORT—Have students identify which sunflowers are the parent and which one are the young sunflower plants. Ask them to explain how they know. Students should be able to tell that the adult sunflower is bigger and has a yellow flower. The young sunflower plant is smaller because it is still growing. It does not have any flowers on it yet, but it will.

LITERAL—What is similar about the parents and the young plants?

- » They are both green. They have the same type of leaves. They have a similar shape.

LITERAL—What is different about the parents and the young plants?

- » The parent has a flower, and the young plant does not. The parent plant has more leaves than the young plant.

3. Show examples and guide discussion.

Activity Page



AP 3.4.1

NGSS Elements



DCI LS3.B

- Distribute Saguaros (AP 3.4.1). Remind students that they saw a picture of a saguaro cactus in Chapter 6. Now, there are three different pictures of saguaros. (See **Know the Standards 4**.)
- Draw a T-chart on the board. Explain that you will discuss, as a class, what is similar and different about the saguaros and record them in the two columns. Tell students that for this activity, they will need to focus on the physical traits that they see.
- Give students a couple of minutes to study the pictures. Call on volunteers to name traits that are different about the three saguaros. Record their responses on the chart. Students should be able to identify the following differences:
 - The saguaros are different sizes.
 - Some saguaros have more spines than others.
 - The saguaros have a different number of arms.
 - One saguaro has a flower blooming on it.
- Now call on volunteers to name traits that are similar about the three saguaros. Record their responses on the chart. Students should be able to identify the following similarities:
 - They all have spines.
 - They have a similar shape.
 - They are all a type of cactus.
 - They have the same thick structure.

Monitor Progress

Know the Standards

TEACHER DEVELOPMENT

4. DCI LS3.B Variation of Traits: Students observe that plants of the same type (saguaros) are alike and different.

SUPPORT—Limit the number of pictures that students compare and contrast from three to two. Guide students through the activity by discussing the differences and having the students place a circle around the things that are alike and an X on the things that are different.

CHALLENGE—Provide students with their own copy of a T-chart. Have them research three different types of fruit trees. Then tell them to write down how the three fruit trees are alike and different on the T-chart.

EXTEND—Bring students on a nature walk around the school campus to look for plants of the same type. When you come across plants of the same type, have students study them and look to see what is alike and different about them. Prompt students to record their findings in a science log.

4. Check for understanding.

Formative Assessment

Monitor Progress

Ask students what other questions they have about plants that look alike or different. Record their questions on the question board. Review the questions that are on the question board so far and see whether any of them can be answered with today's reading.

Look for student responses during the whole-class activity to see that students know how to tell the similarities and differences between the saguaros. Students should be able to see that the saguaros are similar in certain ways, such as shape, but are not exactly alike.

Call on students to answer the following question: Do plants of the same type look alike or different or both? Check student understanding of the following concepts:

- Plants of the same type can look alike but are not exactly alike.
- Plants can look like their parents, but there are differences between parents and offspring.

Tie to the Anchoring Phenomenon

Through reading and comparing and contrasting pictures of plants, students should come to the conclusion that not all plants look exactly alike and that each plant has its own traits.

1. Day 2: Focus on Today's Question.

- Show students the slideshow of animals. **Ask students**, "What kind of animal is this?" after each new animal appears in the slideshow.
- Emphasize that there are so many different types of animals. Repeat the names of the types of animals shown in the slideshow.
- **Ask**, What are some ways you can tell animals apart?
 - » from how they look

2. Read together: “Animals Are Alike and Different.”

Student Book



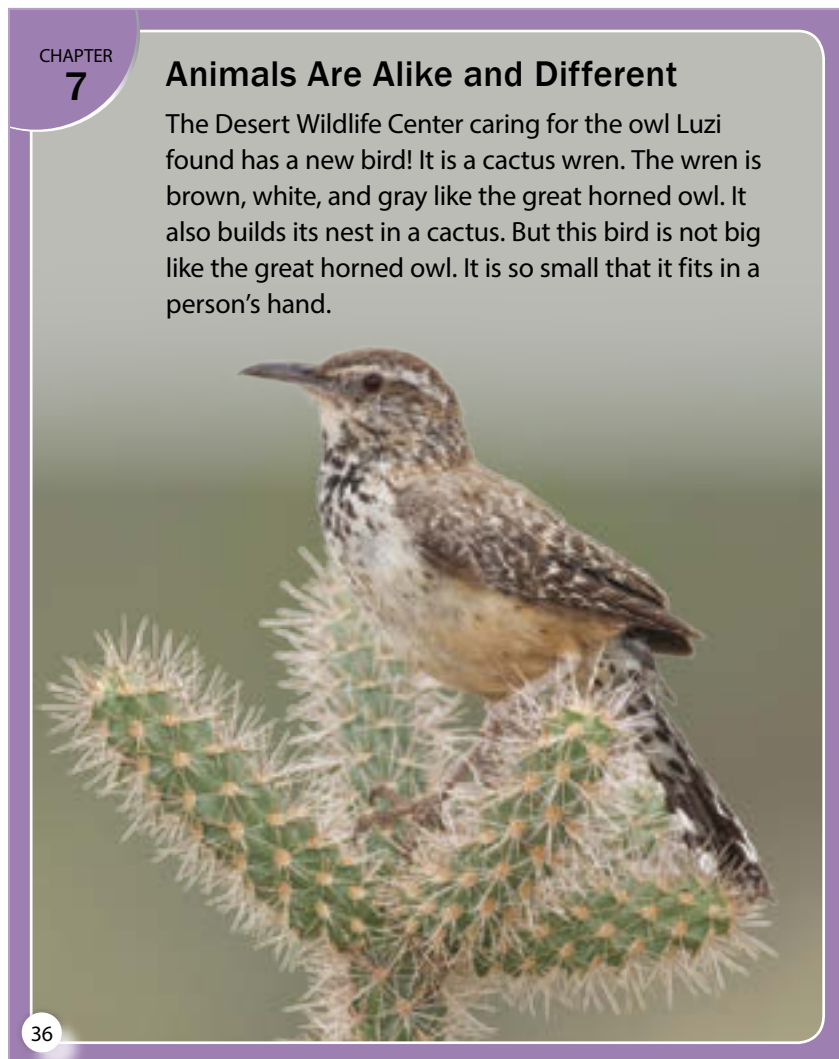
Ch. 7

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.

Read Aloud Support

Page 36

Ask students to turn to page 36 of the Student Book and look at the image as you read aloud. Remind them that the title of this chapter is “Animals Are Alike and Different,” and tell them to pay special attention to how the animals are similar to each other and different from each other as you read.



Call attention to the picture. Explain that a cactus wren is a type of bird. It lives in a hot desert.

LITERAL—Where does a cactus wren build its nest?

» inside a cactus

SUPPORT—Invite students to share stories of birds' nests that they may have seen in nature. **Ask**, Where did you see the nest? Was it in a tree branch? A cactus? A bush? What was the nest made out of? Encourage students to focus on details that they may have observed when seeing a bird's nest.

Page 37

NGSS Elements

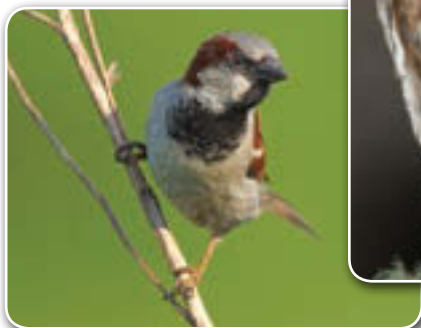
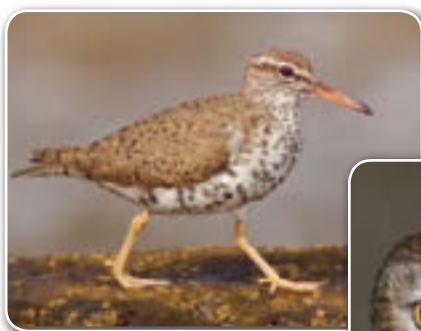


DCI LS3.B

Ask students to look at the three pictures on page 37. Have students compare and contrast the birds in the pictures. (See **Know the Standards 5.**)

How are birds similar and different? Animals of the same type can have many of the same traits. For example, most birds fly. All birds have feathers, wings, and beaks. All birds lay eggs. Sometimes it can be hard to tell birds apart.

How are these birds alike?



37

LITERAL—What is similar about all the birds on the page?

- » They are all small. They have beaks, feathers, wings, tails, and eyes. They have claws.

Know the Standards

TEACHER DEVELOPMENT

5. DCI LS3.B Variation of Traits: Students observe that different kinds of birds share similar traits that all birds have in common.

LITERAL—What is different about all the birds on the page?

- » They have different patterns. They have different colors. They are different sizes and shapes.

INFERENTIAL—How do you think scientists use these traits to study birds?

- » They use the traits to tell the birds apart and to know what they need to survive and grow.

SUPPORT—Explain that traits can also help scientists know more about a certain type of animal. For instance, the shape of a bird's beak can tell a scientist what that bird most likely eats for food. The size of a bird can tell a scientist where that bird most likely lives. For instance, the cactus wren is small enough to fit inside a cactus, but not all birds are small enough to do this.

Page 38

Now ask students to look at the four pictures on page 38. Read the page together as a class, and form students into pairs. Tell them to look closely at the pictures on page 38 and talk about what is similar and different about all four birds. As students discuss with their partners, circulate around the room, and gauge for understanding. Then bring the class back together, and invite students to share their responses about how these birds are similar and different.

But birds can be different, too. Some birds are very small. Others are large. Some birds eat meat. Others eat seeds and berries, or drink nectar from flowers. Some birds make nests in the ground. Others make nests in trees and cacti. Different birds have parts that differ to help them survive in different places. How are these birds alike and different?



LITERAL—Which birds have beaks?

» They all have beaks.

Which birds have feathers?

» They all have feathers.

Which birds have wings?

» They all have wings.

LITERAL—Which bird has yellow eyes?

» the owl

Which bird has the longest, thinnest beak?

» the hummingbird



Ask students to look at the four pictures on page 39. Remind students that baby animals and baby plants are called offspring. Explain that babies do not always look like their parents when they are born. However, they look more like their parents when they get bigger and grow older. Some animals, on the other hand, do look like their parents when they are born. (See **Know the Standards 6.**)

Animals get traits from their parents. They look and act mostly the same. Baby animals become more and more like their parents as they grow.

Some types of baby animals look like their parents as soon as they are born. Other types of baby animals look different at first. They change as they grow. They start to look more like their parents.

Which of these baby animals look like their parents?



39

LITERAL—Which baby animals look most like their parents when they are born?

» the giraffe and the panda

LITERAL—Which baby animals do not look like their parents when they are born?

» the eaglets and the puppies

Know the Standards

TEACHER DEVELOPMENT

6. DCI LS3.A Inheritance of Traits: Students observe that animals do not look exactly like their parents when they are born. However, they learn that offspring can look more and more like their parents as they get older. Still, they will not be identical to their parents.

INFERENTIAL—What do you think will happen to the baby animals when they grow up?

» They will look more like their parents than they do now.

INFERENTIAL—Do you think the baby animals will look exactly like their parents when they grow up?

» no

3. Play an animal video.

Online Resources



- Show students a video of lion cubs and their mom. See the Online Resources Guide for a link to the recommended video:
www.coreknowledge.org/cksci-online-resources
- Pause the video throughout, and stop to ask students to compare the cubs to each other and to compare the cubs to the mom. Explain that the cubs are baby lions. Even though they are all lions, they do not look exactly the same. Invite students to call out similarities and differences that they see between the cubs and other cubs and between the cubs and the mom.

4. Check for understanding.

Formative Assessment

Monitor Progress

Ask students what other questions they have about animals that look alike or different. Record their questions on the question board. Review the questions that are on the question board so far, and see whether any of them can be answered with today's reading.

Look for student responses during the reading and while watching the video to see that students know how to tell the similarities and differences among animals of the same kind. Students should be able to see that animals are similar in certain ways but are not exactly the same.

Call on students to answer the following question: Do animals of the same type look alike or different or both? Check student understanding of the following concepts:

- Animals of the same type can look alike but are not exactly alike.
- Animals can look like their parents, but there are differences between parents and offspring.

Tie to the Anchoring Phenomenon

Through reading, comparing and contrasting pictures, and watching a video of animals, students should come to the conclusion that animals of the same kind look alike, but can also have differences.

LESSON 3.5

Lesson 3 Roundup: Groups of Plants and Animals

Big Question: How is a wildlife center designed to help animals survive?

Lesson Guiding Question: How alike are plants and animals of the same kind?

Today's Question: What makes plants or animals belong to the same group?

Tie to the Anchoring Phenomenon: In understanding that no two animals are exactly the same, students see why animal wildlife workers must pay attention to each individual animal's specific traits.

AT A GLANCE

Learning Objective

- ✓ Describe patterns in traits shared by similar kinds of plants and animals (including comparisons of parents and offspring).

Instructional Activities (2 Days)

- student investigation
- class discussion

NGSS References

Performance Expectation: 1-LS3-1

Disciplinary Core Ideas: LS3.A Inheritance of Traits; LS3.B Variation of Traits

Science and Engineering Practice:
6 Constructing Explanations and Designing Solutions

Crosscutting Concept: 1 Patterns

Students describe patterns shared by organisms. They will apply these patterns to construct explanations to identify the similarities and differences between parent and offspring.

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

www.coreknowledge.org/cksci-online-resources

Core Vocabulary and Language of Instruction

Core Vocabulary: Core Vocabulary terms are those that students should learn to use accurately in discussion and in written responses. During instruction, expose students repeatedly to these terms. However, these terms are not intended for isolated drill or memorization.

offspring parent species trait

Language of Instruction: The Language of Instruction consists of additional terms, not considered a part of Core Vocabulary, that you should use when talking about any concepts in this exercise. Students will benefit from your modeling the use of these words without the expectation that students will use or explain the words themselves. A Glossary at the end of this Teacher Guide lists definitions for both Core Vocabulary and Language of Instruction.

compare contrast describe observe

Instructional Resources

Activity Page



AP 3.5.1

Activity Page

Drawing Traits (AP 3.5.1)

Materials and Equipment

- scrap paper (3–5 sheets per group)
- pencils (1 per student)
- poster boards (1 per group)
- markers (assorted colors per group)

Advance Preparation

Write a list of animals and plants on the board that students can select from to draw on their posters. Include animals and plants that they studied in this lesson so far, such as cacti, sunflowers, dogs, cats, and so on.

THE CORE LESSON 3.5

1. Day 1: Focus on the Big Question.

Remind students that throughout this lesson they have been learning about the traits of plants and animals and comparing them to the traits of other plants and animals of the same kind.

Ask students to explain what traits are.

» They are characteristics that can be used to describe something.

Invite students to share the plant comparisons that they found the most interesting, such as when they looked at the parent and offspring sunflowers or compared the three saguaro cacti to each other. Then repeat this for the animal comparisons.

2. Preview the investigation.

Activity Page



AP 3.5.1

- Tell students that today they are going to use what they learned about plant and animal traits to make a group poster. On the poster they will draw two different pictures:
 - The first picture will show a parent plant or animal and its baby.
 - The second picture will show an adult plant or animal next to another adult plant or animal of the same kind.
- Draw students' attention to the board. Explain that this is a list of the different plants or animals that students can choose from to draw for their posters. Once they get into groups, each group will choose which plant or animal they want to focus on. It's okay for more than one group to choose the same plant or animal, but the gallery walk will be more interesting if groups select different organisms.
- Distribute Drawing Traits (AP 3.5.1). Go over it together as a class. Explain that Activity Page 3.5.1 will help guide students as they decide what to draw. Each student must write their answers individually, even though they will be making their posters as a group.

3. Facilitate the investigation.

NGSS Elements



DCI LS3.A
DCI LS3.B

- Place students in small groups. Give them a few minutes to decide as a group which organism they want to draw for their posters. (See **Know the Standards 1 and 2.**)
- While groups are selecting their organisms, distribute scrap paper, pencils, poster boards, and markers. Let students know that they should practice their drawings on the scrap paper first before drawing on the poster.
- Tell students to work on their answers to Activity Page 3.5.1 first, before they start drawing. They should brainstorm the answers to these questions with their groups. This will help them plan what to draw.
- Circulate around the room, and remind students that their drawings need to show the traits of the plants or animals.
 - Remind students that the traits for plants include things like stem thickness, leaf shape, petal shape, whether there are leaves or spines or flowers, body plan, size, and so on.

Know the Standards

TEACHER DEVELOPMENT

1. DCI LS3.A Inheritance of Traits: Students demonstrate understanding of this standard by drawing pictures of parents and their offspring (e.g., dogs, sunflowers) that look similar but are not identical.

2. DCI LS3.B Variation of Traits: Students demonstrate understanding of this standard by drawing pictures of plants or animals of the same kind that look like, but not exactly like, each other.

NGSS Elements



CCC 1
PE 1-LS3-1

Differentiation

- Remind students that the traits for animals include things like body shape, coloring, fur/skin/feather patterns, ear shape, eye shape, the presence of a tail or wings, whether the animal has nails, size, and so on.
- Prompt students to include as many detailed traits as they can for their drawings.
- As you circulate around the room, guide students with the following questions:
 - Do all plants of the same kind look alike?
 - Do all animals of the same kind look alike?
 - Do baby plants and animals look exactly like their parents?
- Remind students that they must show these differences in their drawings.
- Gauge student understanding that plants and animals of the same type—and parents and their offspring—can look like each other but do not look exactly like each other. Check the drawings as you circulate around the room. Offer support if you see students drawing pictures of parents and offspring (or adults and adults) that are identical. (See **Know the Standards 3.**)

SUPPORT—Assign groups the plant or animal that they will focus on for their drawings, making sure the animal or plant is one that has been discussed often in the unit. Provide groups with pictures of those plants or animals for visual support.

CHALLENGE—Have students design and make a matching card game of parent and offspring cards.

EXTEND—If students conducted a nature walk or kept a science log about plants or animals they saw outside of school with certain traits, allow students to draw pictures of those plants or animals.

- Tell students that they will have time in the next class session to complete their posters. Then groups will talk about their posters with the class.
- Cue students when they have a few minutes left in class to finish up their work.

1. Day 2: Refocus on the Big Question.

- Have students form their same groups, and distribute the posters and markers back to students.
- If groups still need to finish their posters, give them a few minutes to do so now.

Know the Standards

TEACHER DEVELOPMENT

3. CCC 1 Patterns: Students demonstrate awareness that there are patterns when it comes to plant and animal traits. These patterns make it possible for people to tell the difference between organisms, such as between a fish and a dog or between a cactus and a sunflower.

2. Present the posters.

NGSS Elements



SEP 6

3D Learning

Language Arts
Connection

NGSS Elements



CCC 1

- Tell students that they will now present their posters to the rest of the class. Each group will share the name of the plant or animal they picked and talk about their drawings. For the first picture, they should describe what traits the plants or animals have as babies and as adults. For the second picture, they should describe what traits the plants or animals have as adults that make them similar to and different from other adults. (See **Know the Standards 4.**)
3D Learning: Students give presentations on plants and animals and explain that young plants and animals are like, but not exactly like, their parents. They use evidence to support their statements taken from their own observations/drawings.
- As each group presents, guide students to articulate a statement that young plants or animals are like, but not exactly like, their parents. Tell students that they can use their drawings to help answer the questions.
- **Ask,** What traits does the young plant or animal share with its parents? How are they similar? Do you see any patterns? (See **Know the Standards 5.**)
- **Ask,** Do adult plants or animals look exactly like each other? Why or why not?
- **Ask,** What makes your plant or animal belong to that group? (For example: What makes a dog a dog? What makes a cactus a cactus? Do all cacti have to have spines? Do all dogs have tails and ears?)
- Encourage different students within the group to answer the different questions, to give each student a chance to demonstrate understanding. (See **Know the Standards 6 and 7.**)
- Continue the presentations until all groups have had a chance to present and answer your series of questions.

Know the Standards

TEACHER DEVELOPMENT

4. SEP 6 Constructing Explanations and Designing Solutions: Students use their drawings as firsthand observations to demonstrate understanding that young plants or animals look like, but not exactly like, their parents.

5. CCC 1 Patterns: Students use their drawings as firsthand observations to demonstrate understanding that there are patterns among the physical traits of organisms of the same type (e.g., coloring, size, shape, structure). When asking about patterns, students should understand that this has to do with recognizable traits or a set of repeating details that they see in certain types of plants or animals. For instance, they should be able to tell the traits that distinguish a dog from a bird or a cactus from a sunflower.

6. Monitor Progress: As groups respond to the questions, pay attention to student participation so that you can gauge all students' understanding of the concepts.

7. Language Arts Connection: Students satisfy a connection to the ELA standard by working together in groups to recall information about plant or animal traits, using their posters as evidence to help them describe key details (CCSS.ELA-LITERACY.W.1.8).

3. Check for understanding.

Formative Assessment

Monitor Progress

Look for student responses on Activity Page 3.5.1 and during the poster presentations to see that students drew pictures of plants or animals that have similar traits but not identical ones.

Review student posters and responses to Drawing Traits (AP 3.5.1) to determine mastery of the following concepts:

- Plants and animals of the same kind can look like their parents but not exactly like them.
- Plants and animals of the same kind can look like each other as adults but not exactly like each other.
- Plants and animals of the same kind have traits that are similar enough to establish natural patterns in their physical features.

Tie to the Anchoring Phenomenon

In drawing pictures of plants or animals, students demonstrate understanding that plant and animal traits are similar but not identical. There are traits and features that plants and animals share that make them recognizable and distinguish them from other plants and animals, but individual plants and animals are still different enough.

LESSON 4

Growth and Development

OVERVIEW

Guiding Question: What kinds of patterns in behavior of parents and offspring help offspring survive?

Lesson 4 Segments	Segment Questions	Advance Preparation
4.1 What Behaviors Help Offspring Survive? Students observe parent animals caring for their young.	How do parent animals take care of their young?	Gather materials for the observation. See Materials and Equipment.
4.2 Behaviors of Parents and Offspring Students investigate how different animals behave to help offspring survive by rotating through computer stations and using media.	What do different animals do to survive?	Gather materials for student investigation. See Materials and Equipment.
4.3 Parents and Their Behaviors (2 days) Students use the information from their investigation to record and put together models that show how animals help offspring survive.	How can we show what parents do to help their offspring survive?	Gather materials for student investigation. See Materials and Equipment.
4.4 Lesson 4 Roundup: Offspring Survival Behaviors (2 days) Students read about the behaviors of offspring to learn how they communicate their needs and how their parents respond.	How do young animals behave to help themselves survive?	Read Chapters 8 and 9 in the Student Book. Gather materials for student observation.

What's the Story?

Summary: In Lesson 4 (Segments 1–4), students use media and informational texts to describe the ways in which adult animals behave when helping offspring survive and the behaviors of offspring to help themselves survive in their environments (1-LS1-2). The developing understanding of these phenomena in Lesson 4 gives students the background and understanding they need to complete the Unit Capstone.

Learning Progression: Lesson 4 builds on student understandings from Lesson 1, 1-LS1-1: *Use materials to design a solution to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs*; and Lesson 3, 1-LS3-1: *Make observations to construct an evidence-based account that young plants and animals are like, but not exactly like, their parents*.

Guiding Phenomenon: Animals have patterns in their behavior when it comes to helping offspring survive. When offspring need something, they use certain behaviors to let their parents know. Adult or parent animals understand how to pick up on those cues and respond to help meet those needs, such as by feeding, protecting, carrying, cleaning, and comforting their young. Understanding how animals behave to help offspring survive is important for rehab workers who want to help rescued animals grow and develop.

Learning Objectives

By the end of Lesson 4, students will do the following:

- Describe behaviors of parent animals that help offspring survive.
- Describe behaviors of offspring that help offspring survive.
- Compare and contrast caretaking behaviors of different animals.
- Compare and contrast offspring survival behaviors of different animals.

NGSS Standards and Dimensions

Performance Expectation: 1-LS1-2 Read texts and use media to determine patterns in behavior of parents and offspring that help offspring survive.

Science and Engineering Practice	Disciplinary Core Idea	Crosscutting Concept
8 Obtaining, Evaluating, and Communicating Information Read grade-appropriate texts and use media to obtain scientific information to determine patterns in the natural world.	LS1.B Growth and Development of Organisms Adult plants and animals can have young. In many kinds of animals, parents and the offspring themselves engage in behaviors that help the offspring to survive.	1 Patterns Patterns in the natural and human designed world can be observed, used to describe phenomena, and used as evidence.

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

www.coreknowledge.org/cksci-online-resources

LESSON 4.1

What Behaviors Help Offspring Survive?

Big Question: How is a wildlife center designed to help animals survive?

Lesson Guiding Question: What kinds of patterns in behavior of parents and offspring help offspring survive?

Today's Question: How do parent animals take care of their young?

Tie to the Anchoring Phenomenon: Students learn that parent animals care for their young in different ways to help them survive. This information is important to know for helping young animals, like the owl that Luzi rescued, survive in wildlife centers.

AT A GLANCE

Learning Objective

- ✓ Describe behaviors of parent animals that help offspring survive.

Instructional Activities

- student observation
- class discussion
- question generation

NGSS References

Disciplinary Core Idea: LS1.B Growth and Development of Organisms

Science and Engineering Practice: 1 Asking Questions

Students learn about animal behaviors that help offspring survive. They will observe several examples of parent animals doing something that helps their offspring.

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

www.coreknowledge.org/cksci-online-resources

Core Vocabulary and Language of Instruction

Core Vocabulary: Core Vocabulary terms are those that students should learn to use accurately in discussion and in written responses. During instruction, expose students repeatedly to these terms. However, these terms are not intended for isolated drill or memorization.

behavior **communicate** **offspring** **parent**
survive

Language of Instruction: The Language of Instruction consists of additional terms, not considered a part of Core Vocabulary, that you should use when talking about any concepts in this exercise. Students will benefit from your modeling the use of these words without the expectation that students will use or explain the words themselves. A Glossary at the end of this Teacher Guide lists definitions for both Core Vocabulary and Language of Instruction.

describe **observe**

Instructional Resources

Activity Page



AP 4.1.1

Activity Page

Animal Behaviors (AP 4.1.1)

Materials and Equipment

- internet access and the means to project images and/or video for whole-class viewing

Advance Preparation

Do an internet search to find pictures of the following:

- parent chimpanzee carrying its young
- adult bird feeding its baby bird
- lioness licking her cub
- elephant adult hugging a young elephant with its trunk
- zebra (or horse, giraffe, or similar animal) teaching its young to walk

Put a slideshow of the pictures together.

THE CORE LESSON 4.1

1. Introduce students to Lesson 4.

Ask a volunteer to state the **Big Question** that you'll be answering in this unit, which is posted somewhere in the room—**How is a wildlife center designed to help animals survive?**

Tell students that, before they can answer the unit's Big Question about helping animals survive, they first need to understand that animals have certain behaviors that help them survive or help their offspring survive. Parent animals have to help their offspring along in early stages of life, to protect them from harm and support their growth and development. Offspring have ways that they can let their parents know when they need help. In Lesson 4, students will learn about animal behaviors that are used for survival. Write the **Lesson 4 Guiding Question** where students can see it:

What kinds of patterns in behavior of parents and offspring help offspring survive?

Tie to the Anchoring Phenomenon

As students work through Lesson 4, they will learn how parent animals take care of their young and how young animals behave in certain ways that communicate a need for help. Scientists study these behaviors to learn how to better help animals that are rescued. (See **Know the Science**.)

2. Turn and talk.

- Place students in groups of two to three.
- **Ask**, Do you think adult animals take care of baby animals? How so? Give students time to discuss their answers with their partners.
- Explain that animals respond to their environments. Tell students that these responses are called behaviors. Behaviors are actions. They are things animals do to protect themselves and to communicate with or help each other.

Know the Science

TEACHER DEVELOPMENT

Innate and Learned Behaviors in Animals: Animal behavior can be innate (instinctive) or learned. Innate behaviors are those that a newborn or very young animal knows how to do without instruction, such as spiders spinning webs, birds building nests, and squirrels building nests. Learned behaviors are passed on from adult animals to offspring, such as a cougar learning how to hunt, a cat cleaning itself, and a crow learning to wait until the traffic light is red before walking in the street. Both methods of acquiring behaviors increase the survivability of an animal.

3. Show media.

Online Resources



- Tell students that they are going to watch a slideshow of things that parent animals do to care for their young. See the Online Resources Guide for a link to the recommended pictures for the slideshow:

www.coreknowledge.org/cksci-online-resources

- Start the slideshow. Pause after each picture, and discuss what it shows. Allow time for students to ask questions and make observations. Then explain that the picture shows the parent animal teaching, feeding, cleaning, protecting, helping, or comforting the young animal.

4. Write down observations.

Activity Page



AP 4.1.1

NGSS Elements



DCI LS1.B

Differentiation

SEP 1

- Distribute Animal Behaviors (AP 4.1.1). Tell students to write down what they observed about how animal parents teach, feed, clean, and comfort their young. (See **Know the Standards 1**.)

SUPPORT—Have students draw pictures in the boxes that represent the same thing. Some students may find it easier to express their ideas of how animals show they care for one another through pictures instead of words. Allow students to take this visual approach using drawings to communicate their understanding of how parent animals help their young survive.

CHALLENGE—Challenge students to research other ways that parent animals care for their young, besides the ways they saw in the slideshow.

EXTEND—Have students start a science journal where they record evidence of parent animals caring for their young that they observe in their community, neighborhood, or home. Students record information about their observation—as text or a drawing—and then present it in a later class session.

- **Ask students what other questions they have about how parents help their young survive.** Add these questions to the question board. (See **Know the Standards 2**.)

Know the Standards

TEACHER DEVELOPMENT

1. DCI LS1.B Growth and Development of Organisms: Students observe ways that parent animals take care of their young and help them survive.

2. SEP 1 Asking Questions: Allowing students to ask questions about animal behaviors serves as a foundation to understanding how to nurture animals back to health in rehab agencies.

5. Check for understanding.

Formative Assessment

Review student responses on Animal Behaviors (AP 4.1.1) to determine student understanding of the following concepts:

Monitor Progress

- Animal parents use different behaviors to show they care.
- Animal parents can help their young survive in different ways.

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

Tie to the Anchoring Phenomenon

This activity helps to excite and engage students for learning about the different behaviors that parent animals exhibit for helping their young survive. This information serves as a foundation that students will later build on, in terms of understanding that animals have special ways that they communicate to stay alive and depend on one another.

LESSON 4.2

Behaviors of Parents and Offspring

Big Question: How is a wildlife center designed to help animals survive?

Lesson Guiding Question: What kinds of patterns in behavior of parents and offspring help offspring survive?

Today's Question: What do different animals do to survive?

Tie to the Anchoring Phenomenon: Students learn that parent animals respond to the needs of their offspring in different ways, such as by teaching them new skills, feeding them, cleaning them, and protecting them. Luzi's rescued owl has needs that the wildlife workers need to meet, since the baby owl does not have its parents around to help it. Wildlife workers must understand the behaviors of baby animals to give them what they need.

AT A GLANCE

Learning Objective

- ✓ Compare parent caretaking behaviors of different animals.

Instructional Activities

- student investigation
- class discussion
- student observation

NGSS References

Disciplinary Core Idea: LS1.B Growth and Development of Organisms

Science and Engineering Practice: 8 Obtaining, Evaluating, and Communicating Information

Crosscutting Concept: 1 Patterns

Students observe different parent animals caring for their young and identify patterns in the care that explain how caring contributes to the survival of their species.

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

www.coreknowledge.org/cksci-online-resources

Core Vocabulary and Language of Instruction

Core Vocabulary: Core Vocabulary terms are those that students should learn to use accurately in discussion and in written responses. During instruction, expose students repeatedly to these terms. However, these terms are not intended for isolated drill or memorization.

behavior **communicate** **offspring** **parent** **pattern**
survive

Language of Instruction: The Language of Instruction consists of additional terms, not considered a part of Core Vocabulary, that you should use when talking about any concepts in this exercise. Students will benefit from your modeling the use of these words without the expectation that students will use or explain the words themselves. A Glossary at the end of this Teacher Guide lists definitions for both Core Vocabulary and Language of Instruction.

media

Instructional Resources

Activity Page



AP 4.2.1

Activity Page

Patterns of Behavior (AP 4.2.1)

Materials and Equipment

- computer stations (12)
- timer
- internet access and the means to project images/video for whole class viewing

Advance Preparation

- Set up computer stations, up to twelve, around the classroom. If your classroom does not have computers available in it, reserve class time at the school's computer lab. Alternatively, project the videos sequentially for the whole class to view together.

Online Resources



See the Online Resources Guide for links to the specific video resources:

www.coreknowledge.org/cksci-online-resources

- For each station, have the video clip cued up (with sound set to a low level) so that all students need to do is press the play button. At each station, there should be enough room for students to sit or stand around the computer screen to watch the videos. Use the links, one for each computer station (the order in which students view the videos does not matter for this investigation). Label the stations 1–12.
- Show students how to rewind the video in case they need to see additional viewings. Once students have seen a video and are ready to rotate to the next station, ask the students to rewind the video so it will be ready for the next set of viewers.

THE CORE LESSON 4.2

1. Focus on the Big Question.

- Tell the class that there are many different types of animals. Each animal has its own unique shape, structure, and abilities. Animals have different body parts that allow them to do things that other animals are not able to do.
- Give an example. Kangaroos give birth to offspring that are about the size of a bean. This is too small to survive without protection. So baby kangaroos live in a pouch in their mother's belly until they are large enough to survive outside on their own. Animals rely on their body parts to help them do things to survive and to meet the needs of their babies.

2. Turn and talk.

- Emphasize the word *survive*. Have students work with a partner to share what they think that word means. (See **Know the Science 1** and **2**.)
- **Ask**, What do baby animals need to survive?
 - » food, water, shelter
- **Ask**, Why might a parent keep their offspring close to them after they are born?
 - » to keep them warm, to keep them safe from predators

3. Preview the investigation.

Activity Page



AP 4.2.1

- Tell students that today they will work at computer stations to see video demonstrations of animal parents helping offspring survive.
- Students will work in groups to move from one station to the next. Explain that at each station, the video will be ready to watch. Students only press play and watch the video. Students will have enough time to watch the video more than once before they then move on to the next computer station.

Know the Science

TEACHER DEVELOPMENT

1. Survival: In Grade 1, students should focus on survival as it refers to the immediate needs of animals, such as food, water, shelter, and protection/safety.

2. Offspring: The term *baby* is commonly used to refer to young offspring of animals but students may think this refers only to human offspring. For this reason, scientists use the term *offspring* to refer to the young born from living organisms.

Differentiation

- Distribute Patterns of Behavior (AP 4.2.1). Explain that students will bring Activity Page 4.2.1 with them to each station and use it to record their observations. Tell them that it is important they take good notes because they will use their observations later to make a visual presentation of what they saw. (See **Know the Standards 1.**)
- Go over Activity Page 4.2.1 together as a class. Make sure students understand how to fill it out. Explain that on the first line, students name the animal in the video. On the second line, students circle what the parent is doing in the video, such as if the parent is feeding its baby, teaching its baby a skill, comforting its baby, or protecting its baby. On the third line, students describe the behavior that the parent does to help its baby survive. Finally, there is a section where students can write down other notes. Tell students that they do not have to fill this line in. It's there only if they want to use it.

4. Facilitate the investigation.

Online Resources



- Place students in twelve groups. Assign each group a different starting computer station. (See **Know the Standards 2** and **3.**) See the Online Resources Guide for a link to the recommended video resources:

www.coreknowledge.org/cksci-online-resources

NGSS Elements



DCI LS1.B
SEP 8

- Tell students they will have a couple of minutes at each station. Tell them that you will use a timer to let students know when to change stations.
- Remind students to bring their Activity Page 4.2.1 with them to each station, along with a pencil to record their observations.
- Briefly review computer lab etiquette. Remind students that since they will all be watching videos at the same time, it is important to keep the volume of the videos low. It is also important to keep their voices low when they discuss their observations with group mates.

Know the Standards

TEACHER DEVELOPMENT

1. Differentiation: Make sure students understand the meaning of *patterns*. A pattern is something that repeats itself in nature. Patterns can be used as evidence to support scientific observations. If necessary, give examples of patterns in nature, such as that sunlight helps plants grow or patterns on seashells or leaves.

2. DCI LS1.B Growth and Development of Organisms: Students observe ways that different kinds of parent animals help their offspring survive. In seeing examples of different animals, students recognize a pattern for which parent animals are concerned with the survival and well-being of their offspring and behave in similar ways to make sure their offspring's needs are met.

3. SEP 8 Obtaining, Evaluating, and Communicating Information: Students use media (videos) to observe how parent animals behave to help offspring survive. In viewing a variety of animals, students begin to see patterns in behaviors that fulfill the basic needs of animals, such as food and shelter/protection.



- Circulate around the room, and provide technical assistance as needed. Help students troubleshoot any issues with the video players and computers.
- Prompt students to write down as many details as they notice. Use the following questions to guide thinking (see **Know the Standards 4**):
 - What do you see the parent doing?
 - How is the parent trying to help its baby?
 - Do you notice different animals doing similar things?
 - Do you notice any patterns on how parents care for their young?
- Let students know how to rotate to the different stations, such as clockwise or counterclockwise. You may want to number the stations and have students go in sequential order. Those at Station 12 will go to Station 1.
- Ensure all groups have had a chance to travel to six computer stations. Let students know that they will hold on to their Activity Page 4.2.1 and use it again in the next class session.

Differentiation

SUPPORT—Tell students what the parent animal is doing in the video instead of having students identify the behavior (e.g., feeding, protecting, cleaning, and so on). (See **Know the Standards 5**.)

SUPPORT—Limit the number of videos that students watch so that they only see five videos: one video for each of the behaviors of teaching, cleaning, comforting, feeding, and protecting.

CHALLENGE—Challenge students to research other ways that parent animals care for their young, besides the ones they saw in the videos. Suggest they make a poster with their research.

EXTEND—Have students add to their science journal to include observations they make during their computer lab. They can add this information as supplementation to the evidence they have collected so far of parent animals caring for their young in their community, neighborhood, or home.

Know the Standards

TEACHER DEVELOPMENT

4. CCC 1 Patterns: Students watch videos of different animals behaving in ways that help their offspring survive. Although the videos show different animals, students will notice similarities among the behaviors and that these similarities establish patterns. Students will be able to conclude that there are patterns in the ways that parents take care of their offspring, such as feeding them, protecting them, and caring for them.

5. Differentiation: Watching the behavior of animals does not rely heavily on the ability to speak English fluently. In many cultures and languages, people can observe universal behaviors of animals to know what animals are doing and why. For this investigation, it may be necessary to help English language learners verbalize what they already recognize from observing the videos.

5. Check for understanding.

Formative Assessment

Monitor Progress

Review student responses on Patterns of Behavior (AP 4.2.1) as you circulate around the room to determine student understanding of the following concepts:

- Animal parents help their young survive.
- Different kinds of animal parents do similar things to help their young survive.

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

Tie to the Anchoring Phenomenon

Students use media to make observations about animal behaviors that help offspring survive. The baby owl that Luzi rescued has specific needs, and by studying the ways that animals help their young, rehab workers can better understand how to meet those needs to keep the baby owl alive and well.

LESSON 4.3

Parents and Their Behaviors

Big Question: How is a wildlife center designed to help animals survive?

Lesson Guiding Question: What kinds of patterns in behavior of parents and offspring help offspring survive?

Today's Question: How can we show what parents do to help their offspring survive?

Tie to the Anchoring Phenomenon: Students analyze the observations they made from videos to categorize and organize animal behaviors that help offspring survive. Animals in rescue and wildlife centers can survive with the help of workers who study and understand their needs.

AT A GLANCE

Learning Objective

- ✓ Use models to compare parent caretaking behaviors of different animals.

Instructional Activities (2 Days)

- modeling
- class discussion

NGSS References

Performance Expectation: 1-LS1-2

Disciplinary Core Idea: LS1.B Growth and Development of Organisms

Science and Engineering Practice: 8 Obtaining, Evaluating, and Communicating Information

Crosscutting Concept: 1 Patterns

Students make and complete a web diagram as a group to establish patterns of parent care for offspring. They then develop their own Venn diagrams for a different animal to identify how the parent cares for the offspring.

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

www.coreknowledge.org/cksci-online-resources

Core Vocabulary and Language of Instruction

Core Vocabulary: Core Vocabulary terms are those that students should learn to use accurately in discussion and in written responses. During instruction, expose students repeatedly to these terms. However, these terms are not intended for isolated drill or memorization.

behavior communicate offspring parent
pattern survive

Language of Instruction: The Language of Instruction consists of additional terms, not considered a part of Core Vocabulary, that you should use when talking about any concepts in this exercise. Students will benefit from your modeling the use of these words without the expectation that students will use or explain the words themselves. A Glossary at the end of this Teacher Guide lists definitions for both Core Vocabulary and Language of Instruction.

media model

Instructional Resources

Activity Page



AP 4.3.1

Activity Page

Patterns of Behavior (AP 4.2.1)
Numbers of Examples
(AP 4.3.1)

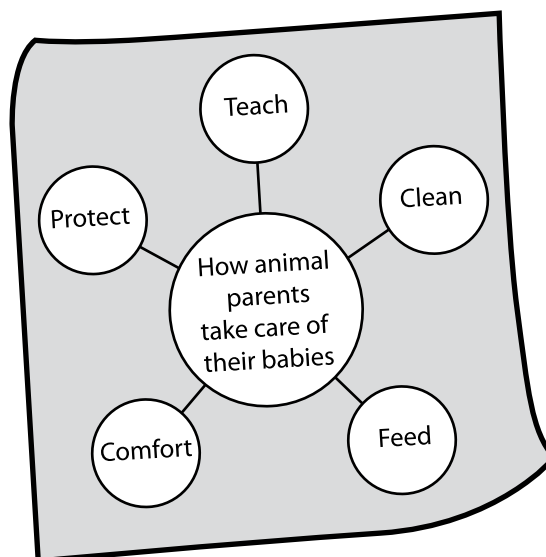
Materials and Equipment

- 25 x 30-inch sheets of paper (1 per group, plus 1 for the demonstration)
- markers (assorted colors per group)
- tacks or other tools for hanging paper (1 per group, plus 1 for the demonstration)

Advance Preparation

On one big sheet of paper, draw a web diagram with one center circle and five smaller circles extending from it. In the center circle, write the title “How animal parents take care of their babies.”

Label the outer circles “Protect,” “Teach,” “Feed,” “Comfort,” and “Clean.”



THE CORE LESSON 4.3

1. Day 1: Focus on Today's Question.

- Remind the class that in the previous session they watched videos showing how parents take care of their offspring.
- **Ask volunteers to share examples of what they observed.**
- Tell the class that today they will use what they observed to make a diagram that shows how parent animals take care of their young.

2. Preview the diagram.

- Show students the diagram that you prepared. Talk about each of the circles and why the diagram looks the way it does. Explain the relationship between the middle circle and outer circles. Tell students that they will make diagrams on large sheets of paper that look just like this one. Then they will fill in each of the outer circles with examples of what they saw from the videos (or pictures).

3. Facilitate the activity.

Activity Page



AP 4.2.1

NGSS Elements



DCI LS1.B

- Place students in groups of three or four. Prompt them to take their Activity Page 4.2.1 with them to their groups, as they will use their notes to help with their activity today.
- Distribute the following materials to each group:
 - 1 large sheet of paper
 - markers in assorted colors
- Conduct this part of the activity together as a class. Have each group select a scribe in the group to draw the diagram on the paper using the steps below (See **Know the Standards 1.**):
 1. Draw the empty diagram on the paper. Tell students to make sure they draw the diagrams big enough to fill up the page. Each circle should be big enough for them to write their examples down. Warn students against making the diagrams too small.
 2. Write "How animal parents take care of their babies" in the center circle.
 3. Label each of the circles with the categories "Protect," "Teach," "Feed," "Comfort," and "Clean."

Know the Standards

TEACHER DEVELOPMENT

1. DCI LS1.B Growth and Development of Organisms: Students draw upon their observations to diagram ways that different kinds of parent animals help their offspring survive.

- Explain that students will do the rest of the activity in their groups. They will complete the diagram by writing examples of what they saw from the videos (media) in each outer circle. Tell students that they watched examples of animal parents doing each of these things in the videos. Students should include as many examples as they can in the diagram circles where they belong for that category.
- If necessary, model for students how to fill in an example in one of the outer circles.

Differentiation

SUPPORT—Limit the number of examples students include on the diagram so that they only cite one example for each outer circle category. (See **Know the Standards 2.**)

CHALLENGE—Rather than providing students with a diagram, have groups come up with their own organization for modeling the examples of how parent animals take care of their offspring.

EXTEND—If students have been keeping a science journal for the past few class sessions, have them use the real-life examples they observed and include those on the diagram.

NGSS Elements



CCC 1
SEP 8

- Tell groups to begin by brainstorming. They should review and compare their notes from the videos so that they agree about which examples demonstrate which types of behaviors. (See **Know the Standards 3** and **4.**)
- Then, groups should decide in which circles to write the examples on the diagram. They can have one writer for the whole group, or students can take turns writing into the different circles.
- Circulate around the room, and provide support and prompting questions. Ask students the following:
 - Which videos showed examples of parents feeding their offspring?
 - What are some examples that you saw of parents protecting their offspring?
- Let students know when they have a few minutes left to finish up their diagrams. Tell them that they will review and discuss their posters in the next class session.

Monitor Progress

Know the Standards

TEACHER DEVELOPMENT

2. Differentiation: Limiting the number of videos that students watch in the previous class session and the number of examples that students include on the diagram makes this activity more accessible to all students at different English language levels.

3. CCC 1 Patterns: As students place the examples of different animals behaving in certain ways, they recognize that many animals do the same things to help offspring survive.

4. Monitor Progress: This activity builds upon students' ability to recognize the correct category of animal behavior, as well as their ability to use the model correctly. If students did not complete Activity Page 4.2.1 correctly when it came to choosing the animals' behaviors, then they may have errors in the diagram. Check to ensure proper understanding of the types of behaviors animals exhibit and why they do certain things to help their young.

1. Day 2: Refocus on the Big Question.

- Remind the class that in the previous session they made posters. Have students form their same groups. Pass the posters out to the groups.

2. Summarize and discuss.

NGSS Elements



CCC 1
SEP 8

3D Learning
PE 1-LS1-2

3D Learning: Students use observations they made from videos (media) to talk about patterns of parent animal behaviors to help offspring survive.

- Summarize the activity by discussing the examples that students used for each category. Allow groups to share the examples they put in each circle, and invite other groups to agree or disagree. If groups disagree, talk about why, and come to a class consensus on the issue. (See **Know the Standards 5** and **6**.)
- Use the following questions for students to discuss:
 - Did you notice different animals doing similar things? Which ones?
 - Describe some patterns you saw in how parents help their babies survive.
 - What do the different parent animals do that is similar?
 - Do baby animals need similar things?

3. Count the numbers

Activity Page



AP 4.3.1

- Distribute Numbers of Examples (AP 4.3.1) to each student in the groups. Review Activity Page 4.3.1 together as a class. Tell students that they will use the information on their diagrams—and work in their same groups—to fill in the lines.
- Go over both sections of Activity Page 4.3.1. In the top section, students need to count the total number of examples from their diagrams and put the numbers onto the lines. In the bottom section, students will do subtraction to figure out how many more or less there are of certain examples.

Know the Standards

TEACHER DEVELOPMENT

5. CCC 1 Patterns: Students talk about what they observed from media (videos) of different animals behaving in ways that help their offspring survive. Students should be able to notice similarities among the behaviors and that these similarities establish patterns. Students will be able to conclude that there are patterns in the ways that parents take care of their offspring, such as feeding them, protecting them, and caring for them.

6. SEP 8 Obtaining, Evaluating, and Communicating Information: Students recall what they observed from media (videos) to observe how parent animals behave to help offspring survive. In viewing a variety of animals, students begin to see patterns in behaviors that include feeding their young when they are hungry, protecting offspring in dangerous or threatening situations, and keeping them safe and cared for.

Math Connection

- Circulate around the room, and provide support if students need help with the math. If necessary, model for students how to complete the first line of the second section of Activity Page 4.3.1. (See **Know the Standards 7** and **8**.)
- When students are finished using their diagrams for the numbers, invite them to hang their diagrams at the front of the classroom.

4. Check for understanding.

Formative Assessment

Review students' diagrams from Day 1, along with their responses on Numbers of Examples (AP 4.3.1), as you circulate around the room to determine student understanding of the following concepts:

Monitor Progress

- Animal parents help their young survive in different ways.
- Different kinds of animal parents do similar things to help their young survive.
- Young animals have similar needs as other young animals.

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

Tie to the Anchoring Phenomenon

Students use their observations from media to diagram information about animal behaviors that help offspring survive. The baby owl that Luzi rescued has specific needs, and by studying the ways that animals help their young, rehab workers can better understand how to meet those needs to keep the baby owl alive and well.

Know the Standards

TEACHER DEVELOPMENT

7. Math Connection: Students satisfy a connection to the math standard by counting up to twelve to find the total number of different kinds of examples from media (CCSS.MATH.CONTENT.1.NBT.A.1).

8. Math Connection: Once students have their total numbers for the examples, they satisfy a connection to the math standard by interpreting the information to tell how many more or less are in one category than in another (CCSS.MATH.CONTENT.1.MD.C.4).

LESSON 4.4

Lesson 4 Roundup: Offspring Survival Behaviors

Big Question: How is a wildlife center designed to help animals survive?

Lesson Guiding Question: What kinds of patterns in behavior of parents and offspring help offspring survive?

Today's Question: How do young animals behave to help themselves survive?

Tie to the Anchoring Phenomenon: In reading Chapters 8 and 9, students learn how the owl that Luzi rescued is growing and developing thanks to the help of workers at the wildlife center. Students can identify that the owl is getting what it needs to survive from the workers who know how to meet those needs.

AT A GLANCE

Learning Objectives

- ✓ Compare and contrast parent caretaking behaviors of different animals.
- ✓ Describe behaviors of offspring that help them survive.
- ✓ Compare and contrast offspring survival behaviors of different animals.
- ✓ Determine patterns of parent and offspring behaviors that contribute to offspring survival.

Instructional Activities (2 Days)

- teacher Read Aloud
- class discussion
- role play
- student observation

NGSS References

Performance Expectation: 1-LS1-2

Disciplinary Core Ideas: LS1.A Structure and Function; LS1.B Growth and Development of Organisms

Science and Engineering Practice: 8 Obtaining, Evaluating, and Communicating Information

Crosscutting Concepts: 1 Patterns; 2 Cause and Effect

Students learn how young animals respond to their environment and behave to get their needs met to establish patterns of cause and effect between needs and survival. They then identify similar patterns in other animals.

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

www.coreknowledge.org/cksci-online-resources

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behavior communicate offspring parent
pattern survive

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media puppet

Instructional Resources

Student Book



Ch. 8
Ch. 9

Student Book, Chapter 8
“How Do Adult Animals Care for Their Young?”

Student Book, Chapter 9
“Surviving Young”

Activity Pages



AP 4.4.1
AP 4.4.2

Activity Pages
Write a Statement (AP 4.4.1)
Describe Patterns (AP 4.4.2)

Materials and Equipment

- internet access and the means to project images/video for whole class viewing

THE CORE LESSON 4.4

1. Day 1: Focus on Today’s Question.

- Remind the class that in the previous sessions they focused on what parent animals do to help their offspring survive.
- Explain that offspring have ways of helping themselves survive. This has to do with how offspring behave and communicate their needs to their parents.

2. Act it out.

- Ask,** What are some things that you do when you are hungry? Invite the class to stand up and act out their cues for hunger without talking, such as rubbing their bellies, pointing to their mouths, or crying.

- **Ask,** What are some things that you do when you are tired? Invite the class to act out their cues for feeling sleepy without talking, such as rubbing their eyes, yawning, or crying.
- **Ask,** What are some things that you do when you are hurt or sick? Invite the class to act out their cues for feeling hurt or sick without talking, such as crying, pointing to where they got hurt, limping, sneezing, coughing, and so on.
- Conclude that these are all behaviors that tell our parents or caregivers we need something.
- Tell students that animal babies have their own behaviors that they do when they feel these things (e.g., hungry, scared, tired, and so on). Explain that when parent animals see their babies doing these things, they respond in certain ways. (See **Know the Science.**)
- **Ask,** What are some ways that animal parents respond when their babies show them that they need something?
» feeding, protecting, cleaning, teaching, comforting

3. Read together: “How Do Adult Animals Care for Their Young?”

Student Book



Ch. 8

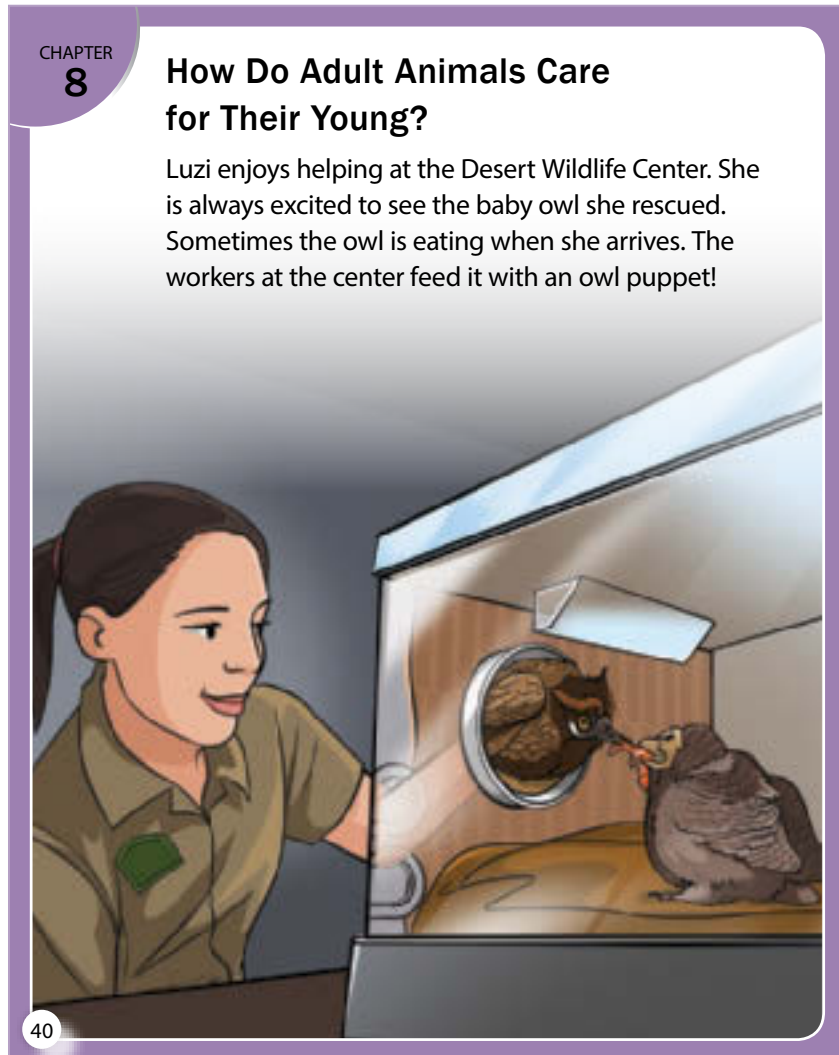
While some advanced students may be able to read words on a given page of the Student Book, as a general rule students should not be expected or asked to read aloud the text on the Student Book pages. The text in the Student Book is there so that teachers and parents can read it when sharing the Student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

Know the Science

TEACHER DEVELOPMENT

When Parents Stop Raising Offspring: The earliest parents will stop caring for their offspring is before birth, as in some fish that lay eggs or sea turtles. In these species, the young will herd together for survival. The longest period of time a parent raises offspring is humans. Many factors contribute to how long a parent will raise their offspring. Frequently in the wild, offspring will only be cared for until the next birthing season when the parent has to raise the next batch of offspring. Frequently offspring will be driven out because, as adults, they will be competing for the same resources as their parents and thus represent a threat to the survival of the parents.

Ask students to turn to page 40 of the Student Book and look at the image as you read aloud. Remind them that the title of this chapter is “How Do Adult Animals Care for Their Young?” and tell them to pay special attention to how the adult animals are giving the young animals what they need to survive as you read.



Call attention to the picture. Explain that a puppet is a type of doll or toy that people can operate with their hands. It is a physical model of a thing that can be manipulated to move.

LITERAL—What does the puppet on the page look like?

» an owl

INFERENTIAL—Why do you think the worker is feeding the baby owl with a puppet?

» because the puppet looks like the owl’s mom or dad

EVALUATIVE—Would you like to be fed with a puppet or use a puppet to eat?

» Accept reasonable answers. Invite students to give reasons for their opinions.

Page 41

Ask students to look at the picture on page 41. Explain why the baby owl is more likely to take food from a puppet that looks like its parent. Emphasize that feeding is a skill that animals need to learn how to do on their own to survive in the wild.

A wildlife caregiver explains to Luzi that the young owl needs food to grow. The little owl is more likely to take food from a puppet that looks like its mother or father. It is used to getting its food from a parent. Its parents cared for it while it was in the nest. The workers do not want to teach the owl that it gets food from humans. Adult owls catch food to feed its young.



41

LITERAL—How does an adult owl feed its young?

» It goes out to get the food and brings it back to the young owl in the nest.

INFERENTIAL—Why do you think the workers do not want to teach the owl to get its food from humans?

» because then it might not learn to get its own food by itself

Now ask students to look at the three pictures on page 42. Explain that all animals need to eat, even if they eat different things. **Ask,** What animals do you see on the page?

» penguins, foxes, and hummingbirds

Living things can produce young. Many baby animals need help from their parents to survive. They are too young to find and catch their own food. Their parents help feed them.

A red fox mother's body makes milk for her young.



An adult penguin catches fish for its chick.

An Anna's hummingbird gets nectar from plants. It returns to the nest to feed the nectar to its offspring.



42

LITERAL—What are all of the parent animals in the pictures doing?

» feeding their young

LITERAL—Do these animals all eat the same thing?

» no

INFERENTIAL—Even if they do not eat the same thing, what do all of the baby animals have in common?

» They all have to eat.

EVALUATIVE—What types of food do you like to eat?

» Accept reasonable answers. Invite students to give reasons for their opinions.



Ask students to look at the two pictures on page 43. Talk about the different ways that students stay clean. They brush their teeth, wash their hair, take baths or showers, change and wash their clothes, and so on. Explain that animals have to do similar things to stay clean. (See **Know the Standards 1** and **2**.)

Adult animals also help their babies stay clean. An adult monkey picks bugs and dirt from its baby's fur. A mother cheetah licks its cub to help it stay clean.



43

LITERAL—What are all of the parent animals in the pictures doing?

» cleaning their young

Know the Standards

TEACHER DEVELOPMENT

1. DCI LS1.A Structure and Function: Students learned in Lesson 1 that animals have body parts that let them carry out certain functions. Cleaning and caring for their young are some ways that adult animals use their body parts.

2. CCC 1 Patterns: Students identify patterns by looking at how different parent animals respond to the needs of their young by feeding and cleaning them.

SUPPORT—Draw attention to the different body parts that the parent animals are using to clean the offspring. The adult monkey uses its hands, and the cheetah uses its tongue. Make a connection between body parts and their functions. Explain that animals use the body parts they have to carry out certain tasks. Since cheetahs do not have hands, they cannot pick dirt out of their cubs' fur.

Page 44

Ask students to look at the three pictures on page 44.

Many baby animals are too young and too small to stay safe on their own. Their mothers and fathers protect them until they get bigger and stronger.

Adult crocodiles carry their babies in their mouths to keep them safe.



A mother kangaroo keeps her baby safe in a pouch on her belly.

A group of adult elephants will surround a calf to keep it safe.



44

LITERAL—How do elephants protect their young?

» They surround the calf to keep it safe.

LITERAL—What does a mother kangaroo do to keep her baby safe?

» She puts it in a pouch in her belly.

LITERAL—How do alligators keep their young safe?

» They carry their babies around in their mouths.

INFERENTIAL—How are all of these behaviors similar?

» They keep the baby animals close to the parents.



Ask students to look at the picture on page 45. Explain that all of the students in the class were once this small. Invite students to share all the things they can now do on their own that they could not do when they were babies. (See **Know the Standards 3.**) **Ask,** Were you able to eat on your own as a baby?

» no

Can you eat on your own now?

» yes

What are some other things you can do now that you could not do when you were so little?

» Accept all reasonable responses.

You were a baby once, too! Human babies need a lot of special care. Human babies cannot do anything for themselves when they are born. They cannot talk when they are born. They cannot move on their own. They rely on their parents for food and safety. Unlike most animals, humans stay with their parents for a long time.



45

Know the Standards

TEACHER DEVELOPMENT

3. DCI LS1.B Growth and Development of Organisms: Human and animal babies have ways that they can communicate with adults to let them know that they need something. This is something that helps offspring survive.

4. Show a video and complete a statement.

Online Resources



Activity Page



AP 4.4.1

NGSS Elements



DCI LS1.B
CCC 2

- Show students a video of baby birds in their nest. See the Online Resources Guide for a link to the recommended video:
www.coreknowledge.org/cksci-online-resources
- **Ask**, What are the birds doing?
 - » They are chirping. They are keeping their mouths wide open.
- **Ask**, What do you think the baby birds are trying to tell their parents?
 - » They are hungry.
- Distribute Write a Statement (AP 4.4.1) to students. Go over it together as a class. Explain that students will write about what happens when a mother bird sees her baby birds chirping and holding their mouths open in the nest. (See **Know the Standards 4** and **5**.)
- Circulate around the room while students work on their statements. Use questions to prompt students if they get stuck. **Ask**, What will a parent animal do if its baby needs food?

5. Check for understanding.

Formative Assessment

Monitor Progress

Review students' responses on Write a Statement (AP 4.4.1) as you circulate around the room. Look for student responses on Activity Page 4.4.1 to see that students understand the cause-and-effect relationship between offspring and parent behaviors. Students should be able to tell that when the birds chirp and open their mouths because they are hungry, their parents will respond by getting them food.

Check responses to determine student understanding of the following concepts:

- Animal parents respond to the behaviors of their offspring.
- Offspring have behaviors that help them survive.

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

Know the Standards

TEACHER DEVELOPMENT

4. DCI LS1.B Growth and Development of Organisms: Students see in the video that birds have ways of telling their parents that they are hungry and ready to eat.

5. CCC 2 Cause and Effect: After seeing multiple examples of adult animals feeding their young, students should be able to identify a pattern and predict that the mother bird in this scenario will bring her baby birds back some food to eat. This is an example of a cause-and-effect relationship. The cause is the baby birds chirping, and the effect is the mother feeding them.

Tie to the Anchoring Phenomenon

Students read about how offspring and their parents help offspring survive. Wildlife workers find creative ways to help baby animals take food and other things they need when their parents are absent.

1. Day 2: Refocus on the Big Question.

- Tell students that in this class session they will close out Lesson 4 by reading the final chapter about Luzi and the owl.

2. Read together: “Surviving Young.”

Student Book



Ch. 9

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.

Ask students to turn to page 46 of the Student Book and look at the image as you read aloud. Remind them that the title of this chapter is “Surviving Young” and tell them to pay special attention to the things that baby animals do or need to do in order to survive as you read.



Call attention to the picture.

LITERAL—How did the owl change?

» It is bigger. It can do more things.

LITERAL—What can the owl do now that it could not do before?

» It can fly. It is learning to find and catch food.

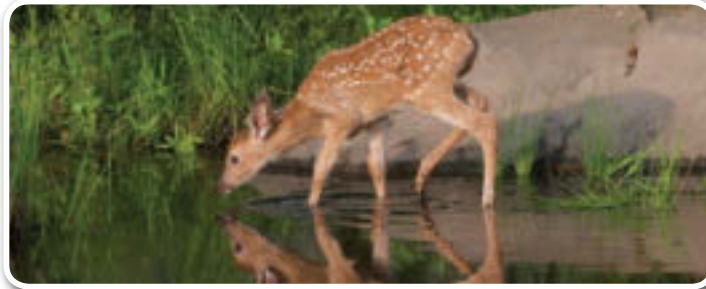
INFERENTIAL—When do you think the owl will be able to return to its home?

» when it can find and catch food on its own

Ask students to look at the two pictures on page 47. Explain what it means to “avoid enemies.” Clarify that enemies are animals that can hurt or that want to eat other animals. Enemies can also be humans. Sometimes animals of the same kind can be enemies, such as if they are competing for food or shelter to make their home.

As baby animals grow, they learn to care for themselves. They can find food. They can avoid danger. They do not need their parents as much. Many baby animals can survive on their own after a few months. Some animals stay with their parents for many years.

A young white-tailed deer stops drinking milk from its mother after two months.



Baby monkeys begin to climb trees when they are very young.



47

LITERAL—When do young deer stop drinking milk from their mothers?

» after two months

INFERENTIAL—What do you think happens after the deer stops feeding from its mother?

» The deer searches for and finds its own food.

LITERAL—What can baby monkeys do when they are very young?

» They can climb trees.

INFERENTIAL—Do you think knowing how to climb a tree is important for the monkey to survive? Why?

» yes, because then the monkey can get away from enemies and can reach food

EVALUATIVE—Which behavior do you think is more important for humans, finding food or climbing a tree?

» Accept reasonable answers. Invite students to give reasons for their opinions.

Page 48

NGSS Elements



DCI LS1.B
CCC 1

Ask students to look at the three pictures on page 48. Talk about what it means for animals to survive on their own. Explain that sometimes animals can do certain things on their own but not others. For instance, some baby animals may be able to walk right away but not hunt for their own food. This means they still need their parents to help them. (See **Know the Standards 6** and **7**.)

Some baby animals do not need their parents at all! They are able to survive on their own from birth.

Most snake babies slither away to find food as soon as they leave the egg.



A baby brush turkey digs its own way out of the nest. It can walk, run, and fly right away.

Baby sea turtles know how to get to the ocean as soon as they hatch.



48

Know the Standards

TEACHER DEVELOPMENT

6. DCI LS1.B Growth and Development of Organisms: Students use media to get information about the ways that baby animals are able to survive on their own in their environments.

7. CCC 1 Patterns: Students use pictures and text from their reading to talk about what young animals do to help themselves survive. Different kinds of animals are more independent than others when they are born.

LITERAL—Why do baby snakes slither away as soon as they are born?

» They have to find food.

LITERAL—What do all of the animal babies on this page have in common?

» They do not need their parents to survive when they are born.

Page 49

Ask students to look at the three pictures on page 49. Ask students if they have any pets at home. Then ask, What does your pet do when it is hungry?

» My dog barks. My cat meows. My dog taps me with its paw. My cat starts crying and whining.

People in a wildlife center take care of animals in the hope that the animals can one day take care of themselves. Some animals that live with people will always need human care. Pets are different from wild animals. Both baby and adult pets depend on humans for food, water, and shelter. They might not survive on their own, even when they are fully grown.

Pets rely on humans for food.



Some pets rely on humans to stay clean.

When pets are sick, humans give them medicine.



49

Discuss ways animals communicate when they are hungry.

SUPPORT—Explain that crying, whining, and other vocalizations (like birds chirping, pigs squealing, and horses whinnying) are ways animals tell others that they need something. Animals can also use other body parts, like their heads, noses, and paws, to say that they need something. A dog might nuzzle its parent or owner with its head or nose if it is hungry or if it wants comfort. Dogs and cats might tap something with their paws to signal that they want something.

LITERAL—What is similar about all of the pets on this page?

» Their owners are doing things for them.

3. Describe patterns.

NGSS Elements



3D Learning

PE 1-LS1-2

CCC 1

SEP 8

Activity Page



AP 4.4.2

3D Learning: Students use information that they read about in Chapters 8 and 9 and observed in videos to describe how an adult animal responds to the needs of offspring in order for them to survive based on prompts. (See **Know the Standards 8 and 9.**)

- Have students form small groups of three or four. Distribute Describe Patterns (AP 4.4.2) to each student. Explain that students can work in small groups to write their responses on Activity Page 4.4.2.
- Review Activity Page 4.4.2 together as a class before students break into groups. Explain that students will read the first line of each scenario. Then they will write their responses. The responses should what the offspring does in response. On the third line, students tell how they know this. This is where students call upon the information they read about or watched in the lesson. For example, students might write, “I know this because I saw a mother elephant rescue her baby in a video.”
- Give students examples or model for them how to fill out the prompts.
- Tell students that their responses need to be factually correct. For instance, baby snakes do not cry for food. Students read in Chapter 9 that baby snakes can slither away from their eggs when they hatch and then find food on their own. Therefore, they should not say that parent snakes find food for baby snakes. Let students know that you will be checking to see that they are using correct information and examples.
- As students work in groups, circulate around the room, and monitor their progress. Students should be able to identify these patterns in behaviors to show that they know the following:
 - When a baby animal cries, its mother feeds it.
 - When a baby animal is in danger, its parent protects it.
 - When a baby animal nuzzles, its parent responds.

Monitor Progress

Know the Standards

TEACHER DEVELOPMENT

8. SEP 8 Obtaining, Evaluating, and Communicating Information: Students describe what would happen in a scenario based on patterns that they recognize in the natural world. They base their descriptions off of what they observed from media (videos) and informational texts (Chapters 8 and 9).

9. Monitor Progress: By now students should be familiar with describing how adult animals respond to the needs of offspring. They should have a lot of examples to draw upon to support their statements from the videos they watched and the chapters they read. Ensure students understand not only how adult animals respond, but also when certain animals do not have the same needs as others, such as those animals that are more independent from birth.

- Encourage students to discuss their ideas and answers with each other in the group. Also encourage them to include as many details as they can on the “I know this because” line.

Differentiation

SUPPORT—Complete the statements and descriptions as a whole-class activity.

CHALLENGE—Challenge students to research an animal that they did not read about or watch in a video. They should learn how the offspring communicate their needs and what the adult animals do in response to help the offspring survive.

EXTEND—If students have been keeping a science journal for the past few class sessions, have them use the real-life examples they observed as part of their evidence for Activity Page 4.4.2.

4. Check for understanding.

Formative Assessment

Review student responses on Activity Pages 4.4.1 and 4.4.2 to gauge understanding of the following concepts:

Monitor Progress

- Animal parents help their young survive in different ways.
- Animal parents respond to the needs of their young.
- Offspring have ways of telling their parents what they need to survive.

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

Tie to the Anchoring Phenomenon

Students use what they learned about animal behaviors from the videos and reading selection to describe patterns in animal behaviors that help offspring—like the baby owl—survive.

Plant and Animal Survival

Big Question: How is a wildlife center designed to help animals survive?

Tie to the Anchoring Phenomenon: Students use what they learned throughout the unit about animal body parts, traits, and survival behaviors to complete an activity that reinforces understanding of how wildlife centers can help animals in different ways.

AT A GLANCE

Learning Objective

- ✓ Write a story about animal parts, traits, and survival behaviors.

Instructional Activities

- class discussion
- student investigation

NGSS References

Performance Expectations: 1-LS1-1; 1-LS3-1; 1-LS1-2

Disciplinary Core Ideas: LS1.A Structure and Function; LS1.B Growth and Development of Organisms; LS1.D Information Processing; LS3.A Inheritance of Traits; LS3.B Variation of Traits

Science and Engineering Practices: 8 Obtaining, Evaluating, and Communicating Information; 6 Constructing Explanations and Designing Solutions

Crosscutting Concepts: 1 Patterns; 6 Structure and Function

Students will complete sentence frames that illustrate they have learned traits that organisms use to survive, as well as behaviors parent animals use to help their offspring survive.

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

www.coreknowledge.org/cksci-online-resources

Core Vocabulary and Language of Instruction

Core Vocabulary: Core Vocabulary terms are those that students should learn to use accurately in discussion and in written responses. During instruction, expose students repeatedly to these terms. However, these terms are not intended for isolated drill or memorization.

behavior **communicate** **offspring** **parent**
pattern **survive**

Language of Instruction: The Language of Instruction consists of additional terms, not considered a part of Core Vocabulary, that you should use when talking about any concepts in this exercise. Students will benefit from your modeling the use of these words without the expectation that students will use or explain the words themselves. A Glossary at the end of this Teacher Guide lists definitions for both Core Vocabulary and Language of Instruction.

volunteer **wildlife**

Materials and Equipment

- poster cards (5–7)
- masking tape

Advance Preparation

- Select an animal that is from your region to focus on for the activity.
- Prepare poster cards. On each card, write one or two sentence frames about your chosen animal. The first two cards should focus on body parts (or senses). Cards 3 and 4 should focus on traits that the animal inherited or traits that make the animal similar to other animals of the same type. Cards 5 and 6 should focus on behaviors for survival. When put all together, the sentences on the cards tell a story. The story line should be similar to the story from the Student Book (Luzi and the rescued owl). Students will fill in the sentence frames with written words or pictures that they draw. When they are done, students will put the sentence frames in order based on the logical sequence of the story.
- Use the following sentence frames as a guide. Switch out the people involved, and use an animal specific to your region. The blanks are where students should complete the sentence frames either by writing words or drawing pictures. Do not label the cards 1, 2, 3, and so on, because this will clue students on the order in which they should sequence the cards.

Card 1: One day, a boy and his grandpa found a baby raccoon outside. Its toes were injured. It uses its toes to eat. This means the raccoon could not _____. The boy's grandpa wrapped it in a cloth, and they took it to the wildlife center.

Card 2: The baby raccoon will go to a wildlife center. It will recover there. The people there will help the raccoon _____ until its toes are better.

Card 3: The boy visited the wildlife center. He saw an adult raccoon there, too. It looked like the baby raccoon. But they were not exactly alike. The adult raccoon was different because it was _____.

Card 4: The boy saw the baby raccoon at the wildlife center. The raccoon made a noise when it was hungry. Each time it made the noise, a worker gave it food. The workers are acting like the raccoon's _____.

Card 5: The boy said goodbye to the raccoon. The workers at the wildlife center said they would take good care of the baby raccoon. They said they will teach it new things, like how to _____.

1. Focus student attention on the Big Question.

- Remind students that they read about Luzi and the rescued owl. Explain that the story focused on the Sonoran Desert environment. Tell students that similar situations can happen in any region, including their own.
- Let students know that today they will be working together as a class to put together their own story of an animal that is native to their region.

2. Preview the activity.

- Show students the poster cards that you prepared before class. Explain how the poster cards will work. On each card is a different sentence frame that you started. You will pass out one card to each group. Students will work in groups to finish the sentence. Each group will get a different card to work on. When they put all of the cards together, it makes a story.
- Tell students that they will have to use what they learned throughout the unit to complete the sentences.
- Tell the class what animal they will be focusing on for the activity. Make sure students are familiar with the animal. Show them pictures of the animal.
- Introduce important information that students need to know in order to work through the sentence frames about the animal. For example, tell them that raccoons have five toes on their front paws. The toes act like fingers. They help raccoons hold their food. If a raccoon's toes are injured, it will not be able to eat. Thus, it cannot survive if its toes are injured.

3. Facilitate the activity.

NGSS Elements



DCI LS1.A
DCI LS1.B

- Place students in five to seven groups. There should be as many groups as there are cards so that each group receives a different card.
- Allow students to move to different areas of the classroom to work on the activity, including pushing desks and tables together or finding other space in the classroom.
- Distribute the poster cards to the groups, one card for each group.
- Tell students to read the poster card carefully. They may need to read it several times.
- Explain that they need to fill in the blank line in the sentence. They can either write words on the blank line or draw a picture that represents the same idea. (See **Know the Standards 1** and **2**.)
- Circulate around the room as groups work together to make sense of their cards and how to complete the sentence frames. If students appear stuck, use the following as a guide to support them:

Monitor Progress

- Card 1: This card is leading students to write or draw in something about survival, such as the fact that the animal needs its body part to eat, find shelter, escape predators, hide, and so on. All of these are survival behaviors.
- Card 2: This card is leading students to write or draw in something about how the people at the wildlife center will help the raccoon eat until its toes are better.
- Card 3: This card is leading students to write or draw in something about how animals of the same type are alike but not exactly alike. Students should be able to tell that the adult raccoon would be bigger or that it could have different colors or patterns on its fur.
- Card 4: This card is leading students to write or draw in something about how these are things that an animal's parents usually do to help offspring survive.
- Card 5: This card is leading students to write or draw in something that animals can learn how to do to survive, such as hunt for food, gather food, eat with their paws, fly, find shelter, build nests, and so on.

Know the Standards

TEACHER DEVELOPMENT

1. DCI LS1.A Structure and Function: Some groups will use what they learned in this unit about how animal body parts help them survive to make sense of the story line by completing sentence frames. They will need to demonstrate understanding that animals cannot perform certain functions without those body parts.

2. DCI LS1.B Growth and Development of Organisms: Some groups will use what they learned in this unit about how animals (offspring and parents) have certain behaviors that help offspring survive. They will need to demonstrate understanding that young animals communicate what they need in different ways and depend on their parents to help them get what they need.

SUPPORT—Alternatively, limit the number of words on each card by writing poster cards with shorter sentences to match the abilities of students in your classroom. (See **Know the Standards 3**.)

CHALLENGE—Alter the activity so that students start by doing research on an animal. Then provide them with poster cards that have sentence frames on them, with places for them to write in their animal and the body part that the story will focus on. This allows students to have more control over the story line.

EXTEND—If students kept a science journal about animals over the course of this unit, allow them to write a story using words or pictures about the animal and its body parts, methods for survival, traits, and so on.

- When groups are finished filling in their sentence frames, move on to the second part of this activity.
- Go around the room, and have groups read their poster card sentences, one group at a time. Tell students to listen carefully to the sentences. They will need to figure out the order to put these in to make a complete story.
- After each group reads their poster card, have someone from the group come up to the front of the classroom, get a piece of tape, and tape the poster card to the wall or board in the order in which they think the sentences go to tell the story. The first group to go will tape their card to the center of the wall. The groups that follow will tape their cards to the left or to the right.
- Tell groups that they can move other groups' cards around if they need space to insert their cards to the left or right of other cards.
- After all groups have posted their cards, read the cards out loud from left to right. Decide as a class whether the cards are in correct order. If they are not, invite students to come up and change what they think needs to be fixed.

4. Check for understanding.

Formative Assessment

Monitor Progress

Review student responses on the poster cards, and check to see how they filled out the sentence frames. Gauge student understanding of concepts covered throughout the unit based on their ability to comprehend the sentence frames and complete the missing words (or pictures) on the poster cards. Students should be able to demonstrate knowledge of what they learned by applying the primary

Know the Standards

TEACHER DEVELOPMENT

3. Differentiation: Limiting words and providing shorter sentences can help make this activity more accessible to all students while still requiring them to use and apply what they learned throughout the unit.

concepts to a story. Regardless of whether they used words or drawings on the poster cards, make sure students understand the following concepts:

- Plants and animals have parts that help them survive
- Living things get their parts from their parents, and they are alike but not exactly alike.
- Parents and offspring both have behaviors that help the young survive.

Tie to the Anchoring Phenomenon

The story line that students work on in this activity mirrors that of the anchoring phenomenon. Students apply what they learned about the wildlife center and the orphaned owl to an animal that is more closely tied with their own region.

Science in Action: Meeting an Ocean Naturalist

Tie to the Anchoring Phenomenon: Students join Luzi as she learns about ocean naturalists and the types of things they do and study.

AT A GLANCE

Learning Objectives

- ✓ Read about what an ocean naturalist does.
- ✓ Draw a tool that solves a problem.

Instructional Activities (2 Days)

- student observation
- student investigation
- teacher Read Aloud

NGSS References

Science and Engineering Practice: 6
Constructing Explanations and Designing Solutions

Understandings About the Nature of Science: Science Is a Way of Knowing; Scientific Investigations Use a Variety of Methods

Connection to Engineering, Technology, and Applications of Science: Influence of Engineering, Technology, and Science on Society and the Natural World

Students read about ocean naturalists and how they solve problems the animals in the ocean experience. They then brainstorm ways to design a solution to a problem an animal in its natural habitat might experience.

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

www.coreknowledge.org/cksci-online-resources

Language of Instruction

The Language of Instruction consists of additional terms, not considered a part of Core Vocabulary, that you should use when talking about any concepts in this exercise. Students will benefit from your modeling the use of these words without the expectation that students will use or explain the words themselves. A Glossary at the end of this Teacher Guide lists definitions for both Core Vocabulary and Language of Instruction.

conservationist	design	filter	invent
marine	naturalist	problem	pump
scuba	solve	survive	tank
virtual			

Instructional Resources

Student Book



Ch. 10

Student Book, Chapter 10
“Science in Action: Meeting an Ocean Naturalist”

Materials and Equipment

- construction paper (2 sheets per group)
- drawing utensils (assortment per group)

Advance Preparation

- Prepare cards to distribute to each group. Each card should tell the student the animal they are studying and its habitat and provide some clue as to the “problem” with studying that animal. Below are suggestions:
 - You are studying a dangerous lion in the grasslands.
 - You are studying a very fast rabbit in the woods.
 - You are studying a poisonous rattlesnake in the desert.
 - You are studying an octopus that can hide behind its ink underwater.
 - You are studying a parrot that flies high into the trees of the jungle.
- Prepare enough cards so that each group gets one card.

1. Day 1: Introduce the topic.

Remind students that they read about Luzi, who rescued a baby owl and took it to a wildlife center where it was being rehabilitated. Explain that today they will read more about what Luzi learns about wildlife.

2. Read together: “Science in Action: Meeting an Ocean Naturalist.”

Student Book



Ch. 10

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.

Ask students to turn to page 50 of the Student Book and look at the image as you read aloud. Remind them that the title of this chapter is “Science in Action: Meeting an Ocean Naturalist,” and tell them to pay special attention to the different underwater animals in the pictures as you read.


CHAPTER
10

Science in Action

Meeting an Ocean Naturalist

Luzi has been volunteering at the Desert Wildlife Center for many months now. Her owl friend has grown bigger and stronger. The naturalists at the center believe it is now ready to survive on its own!

At school, Luzi shares her story about the owl. She tells her teacher and classmates about the people who helped her at the wildlife center. Luzi’s teacher, Mrs. Croft, tells the class that the people who work at the Desert Wildlife Center can help desert animals because they know a lot about how desert animals survive.



50

Call attention to the picture. Explain that the picture shows an owl.

LITERAL—What kind of habitat is this?

» This is the desert.

Explain that a **naturalist** is someone who studies plants and animals in their natural environment.

Remind students that **survive** means to stay alive or to continue to keep the species alive.

Ask students to look at the picture on page 51. Explain that now the story has taken the students to a new habitat.

Mrs. Croft tells her students, “We have been studying the desert. There are rescue centers where naturalists help hurt or orphaned animals in all kinds of habitats. I know an ocean naturalist who can talk with us about what he does to help marine wildlife. He helps ocean wildlife just like Luzi’s friends help desert animals.”



51

LITERAL—What kind of habitat is shown in the picture?

» This is the ocean.

Explain that **marine** is a word that refers to the ocean. Marine animals and plants can live in oceans.

SUPPORT—Elicit a discussion about the types of parts that living things have in the ocean that help them survive there, such as fins, tails, gills, and scales. Emphasize that animals and plants have parts that help them survive in specific environments but not in other ones. For instance, the parts that help fish survive in the ocean would not help them survive in the desert.

Ask students to look at the two pictures on page 52. Explain that the first picture shows a sea turtle swallowing plastic. In the second picture, students can see a sea turtle being cut free from entangled netting.

Today, Luzi's class has a virtual visitor. Mrs. Croft has set up a video call with an ocean naturalist named Josue. Josue works at a sea turtle rescue center. He helps sea turtles that have been injured.



Sometimes sea turtles can get caught in fishing nets or hit by boat motors. Sometimes turtles mistake plastic garbage in the ocean for food. They eat the plastic and get sick. If the turtles are hurt or sick, people take care of them in tanks at the rescue center until the turtles can survive on their own again.



52

NGSS Elements



Science is a Way
of Knowing

INFERENTIAL—What can you tell about the ocean by looking at these pictures?

- » There are things in the ocean that are not good for the animals that live there.

LITERAL—What kind of visitor does Luzi's class have? (See **Know the Standards 1.**)

- » They have a virtual visitor.

Know the Standards

TEACHER DEVELOPMENT

1. Science Is a Way of Knowing: The best way to know more about why so many sea turtles are getting sick or injured is to study the conditions of their habitat. Ocean naturalists, like Josue, study animals in their natural habitats in order to see what kinds of things the animals do or eat from day to day. From this, they are able to get information about possible threats and dangers to animals.

Explain that **virtual** means that someone or something is not physically there but appears to be there through a medium, like a video screen.

LITERAL—What does Josue do?

» He helps sea turtles that have been injured.

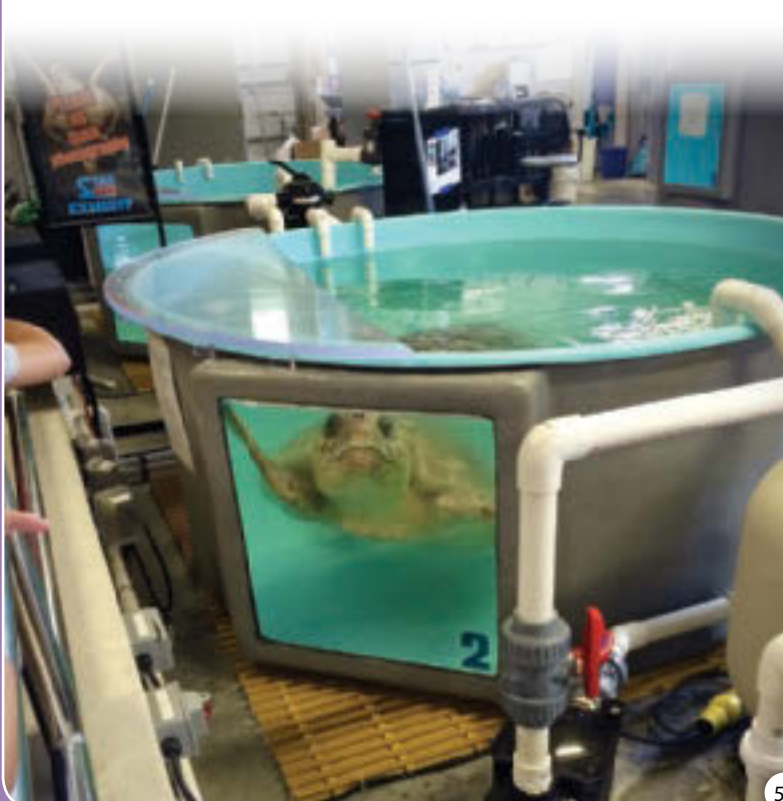
LITERAL—Why is it dangerous for sea turtles to be out in the ocean?

» They can get caught in nets or hit by boats. They can eat plastic bags by mistake.

Page 53

Ask students to look at the picture on page 53. Explain that the picture shows sea turtles that have been taken out of the ocean and put somewhere safe. Here, the turtles can be rehabilitated after they were sick or injured.

Scientists at the sea turtle rescue center solve some problems to help the turtles survive. Scientists at the rescue center design and build tanks to hold the turtles in water. The water in the tanks must run through pumps and filters to keep it clean.



53

Know the Standards

TEACHER DEVELOPMENT

2. Influence of Engineering, Technology, and Science on Society and the Natural World: Water tanks—along with their pumps and filters—are human-made products that are designed to solve the problem of simulating ocean habitats for the sea turtles. Scientists and engineers develop these kinds of products by applying what they understand about the natural world.



Explain that a **tank** is like a cage for animals but is filled with water. (See **Know the Standards 2.**)

Explain that **pumps** are gadgets that move water through them. This helps make sure that the tank is always filled with water.

Explain that **filters** are tools that help keep the water clean and remove impurities.

INFERENTIAL—Why do you think it is important to keep tanks clean for sea turtles and other marine animals?

- » so the sea turtles have fresh/clean water to swim in and so they don't get sick

Page 54

Ask students to look at the picture on page 54. Explain that the picture shows a diver going underwater to study what is down there.

Josue learns a lot about sea turtles. One way he studies turtles is by observing them where they naturally live. But the sea turtles live in the ocean. How can Josue stay underwater to study the turtles? People need to breathe air to survive.

Josue is a trained diver. He uses scuba gear to breathe underwater. Josue tells the class that he uses breathing equipment invented by an ocean scientist named Jacques Cousteau. /zhahk*coo*stow/

"In fact," Josue says, "Jacques Cousteau inspired me to work to save sea turtles!"





LITERAL—What kind of equipment does Josue use that allows him to go observe sea turtles in the ocean? (See **Know the Standards 3.**)

» He uses scuba gear and breathing equipment.

Explain that **scuba** is a word that refers to a type of underwater diving. People who scuba dive have to wear packs of oxygen on their backs, connected to a breathing apparatus, so they have a constant supply of oxygen to breathe while they are underwater.

LITERAL—Who invented breathing equipment for underwater use?

» Jacques Cousteau

Ask students to look at the two pictures on page 55. Explain that the pictures show Jacques Cousteau.

Jacques Cousteau

Jacques Cousteau was a French scientist. He designed a breathing tool that allowed people to spend long periods of time underwater. Scientists used his invention to collect information from below the ocean's surface. Cousteau made underwater films about the ocean, too. He wanted to show people how human activities were affecting living things there. He inspired people around the world to care about the ocean and Earth's other environments, too.



55

Know the Standards

TEACHER DEVELOPMENT

3. Scientific Investigations Use a Variety of Methods: There are different ways for scientists to study living things. One such way is to go out in nature and make firsthand observations, which is what Josue does to learn more about sea turtles.

LITERAL—Who was Jacques Cousteau?

- » He was a French scientist and conservationist.

Explain that a **conservationist** is a person who is concerned with saving Earth's resources and helping out the planet. Talk briefly about the types of things conservationists do, such as helping save forests from being torn down, helping save animals from being hunted or fished, and advocating for people to use more energy from the sun.

INFERENTIAL—Why do you think Jacques Cousteau designed a breathing tool?

- » so people could spend a long time under the water

LITERAL—What did Jacques Cousteau hope to do by filming the ocean?

- » He wanted to show people how human activities were affecting the living things there. He wanted people to care more about the ocean.

1. Day 2: Facilitate the activity.

NGSS Elements



SEP 6
Scientific
Investigations
Use a Variety of
Methods

- Remind students that they previously read about how scientists study and help sea turtles that got hurt or sick from the ocean. Tell them that today they will work on an activity where they get to act like a scientist!
- Talk about what it means to solve a problem. Explain that scientists and engineers need to first know a lot about the problem in order to come up with ways to solve it. Sometimes this involves designing and inventing something new! Remind students that one of the problems that Jacques Cousteau solved was that of not being able to breathe underwater. It's important to be able to stay underwater for a long period of time if scientists want to study the life down there.
- Have students form small groups. Explain that each group will receive a card. On the card will be the name of an animal and its habitat. Tell the class that they will work in their groups to design a tool or product that will help them study the animal in its natural habitat. They will draw their idea for the tool on construction paper and share it with the class at the end. (See **Know the Standards 4.**)

Know the Standards

TEACHER DEVELOPMENT

4. SEP 6 Constructing Explanations and Designing Solutions: Students come up with ideas to design a tool that helps them study an animal in its habitat.

- Distribute the cards randomly to the groups, along with construction paper and drawing utensils. Circulate around the room, and provide assistance as necessary. Remind students that they should begin by asking themselves a question, such as “How can I study a rabbit that moves very fast?” (See **Know the Standards 5.**)
- Prompt students to think about the problem that is involved in studying their assigned animal in its habitat. If necessary, use question prompts to guide students toward identifying the problem, such as the following:
 - What is the problem with studying a lion out in the tall grasses? Can you get close to a lion? Do you have to stand far away from the lion? If so, then what will you need in order to get a good look at it?
- It’s okay if student designs are based on tools that already exist, but encourage students to try to add something new or unique to their tools.
- When the drawings are complete, invite groups to share what they came up with. Have students name the animal they are studying and its habitat and tell the class the problem. Then have them talk about the design.

NGSS Elements



Differentiation

SUPPORT—Some students may find it difficult to make connections related to the problems associated with studying certain animals in their habitats. Offer these students an alternate assignment, where they are given a list of animals and a list of different human-made tools. Students have to match the tool to the animal it is best suited to study.

CHALLENGE—Challenge students to come up with a list of criteria and constraints for their designs.

EXTEND—Have students research other tools and instruments that have been used to study animals in their habitats and report on those tools and how they work.

2. Check for understanding.

Review the designs that students draw. Ensure they understand the concept of addressing a problem in order to study the natural world, but do not score students on their artistic ability.

Know the Standards

TEACHER DEVELOPMENT

5. Scientific Investigations Use a Variety of Methods: Students come up with a question that will spark their ideas for a design that addresses the problem. The question should focus on figuring out a way to overcome the challenge with studying their assigned animal in its habitat.

Teacher Resources

Activity Pages

• Animal Museum (AP 1.1.1)	233
• What We Notice (AP 1.2.1)	234
• What Makes Up a Plant? (AP 1.3.1)	235
• Plant Parts (AP 1.3.2)	236
• Plant Game (AP 1.3.3)	237
• What Do We Use? (AP 1.4.1)	238
• Animal and Plant Cards (AP 1.5.1)	239
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• Let's Solve a Problem! (AP 1.5.3)	242
• Seeing Station (AP 2.1.1)	243
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• Lost Puppy (AP 3.3.1)	262
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• Animal Behaviors (AP 4.1.1)	265
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• Numbers of Examples (AP 4.3.1)	269
• Write a Statement (AP 4.4.1)	270
• Describe Patterns (AP 4.4.2)	271

Activity Pages Answer Key: *Plant and Animal Survival*

272–274

Name _____

Date _____

Animal Museum

Animal	Body Part	What Is the Part For?

Name _____

Date _____

What We Notice

External Parts of Birds

- | | |
|---------|---------|
| • _____ | • _____ |
| • _____ | • _____ |
| • _____ | • _____ |
| • _____ | • _____ |

External Parts of Dogs

- | | |
|---------|---------|
| • _____ | • _____ |
| • _____ | • _____ |
| • _____ | • _____ |
| • _____ | • _____ |

External Parts of Turtles

- | | |
|---------|---------|
| • _____ | • _____ |
| • _____ | • _____ |
| • _____ | • _____ |
| • _____ | • _____ |

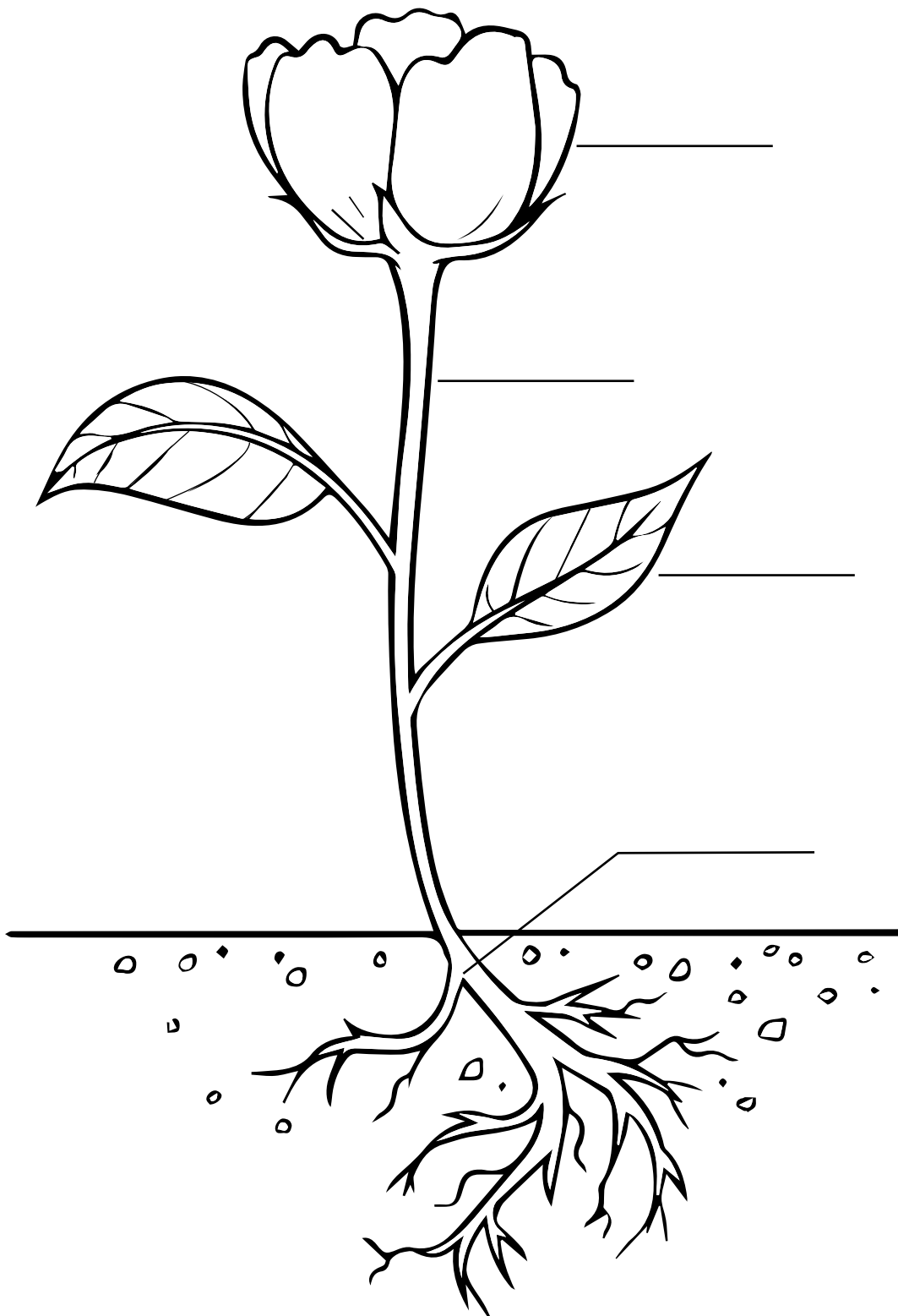
Name _____

Date _____

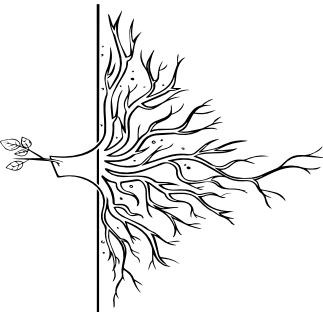


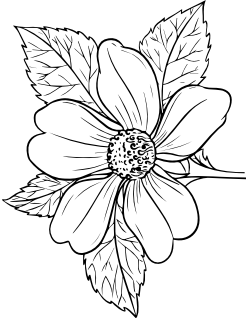
Activity Page 1.3.1

Use with Lesson 1.3

What Makes Up a Plant?



Plant Parts

Roots	Stem	Leaf	Flower
			
The roots get water and minerals from the soil. They also hold the plant in the ground.	The stem gets water and minerals from the roots. It sends them to different parts of the flower. The stem also supports the plant.	The leaf takes in sunlight. This helps it make food.	The flower helps make other plants.
I think that a plant would _____ if it did not have roots.	If a plant did not have a stem, it would not be able to _____.	Plants could not _____ if they did not have leaves.	Flowers are important because they help plants _____.

Name _____

Date _____

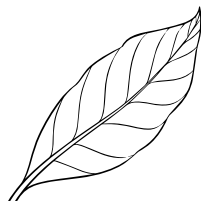
Activity Page 1.3.3

Use with Lesson 1.3

Plant Game

Front of card

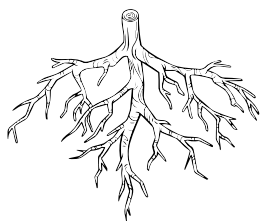
Back of card



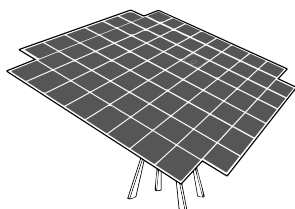
The leaf takes in sunlight. It helps the plant make food.



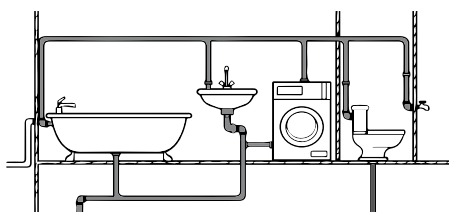
The stem helps move water to different parts of the plant and gives the plant support.



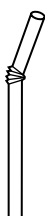
The roots soak up water from the soil. They anchor the plant.



A solar panel helps get energy from the sun. You can put it on a roof of a house or a building. It uses sunlight for electricity.

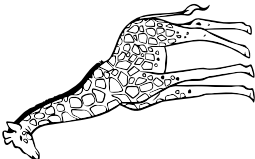
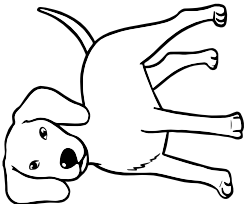
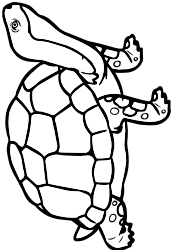
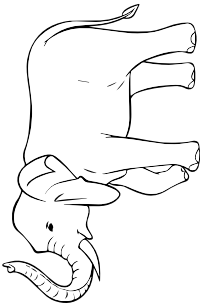


Pipes are like tubes or tunnels. They help water flow to and from different parts of a home.



People use straws to sip their drinks.

What Do We Use?

<div>Giraffe</div> <div></div>	
<div>Dog</div> <div></div>	
<div>Turtle</div> <div></div>	
<div>Elephant</div> <div></div>	

Name _____

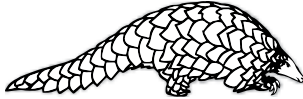
Date _____

Activity Page 1.5.1 (Page 1 of 2)

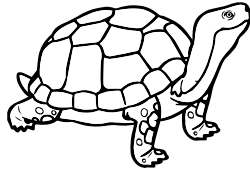
Use with Lesson 1.5

Animal and Plant Cards, page 1

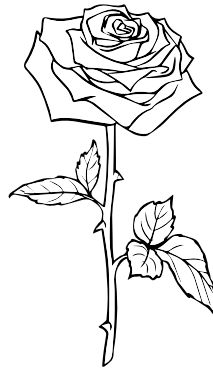
Pangolin



Turtle



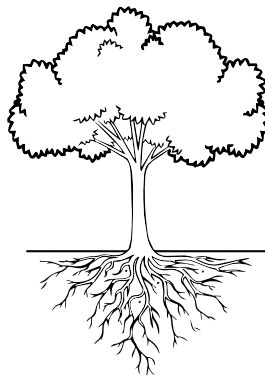
Rose



Bat



Tree



Bear



Animal and Plant Cards, page 2

Pangolin The pangolin is an animal. It has scales on the outside of its body. The scales act like armor. It helps the pangolin stay safe.	Turtle Turtles are reptiles. They have hard outer shells . The shells protect their other body parts. The turtle can also use its shell to hide.	Rose The rose is a flower. Its stem has thorns . The thorns keep the rose safe. This way insects cannot eat the stem.	Bat The bat is an animal that flies at night. It has good ears that it uses to hear things that are near or far. Bats use their ears to get around in the dark.
Tree This tree has a lot of roots . It also has a thick, strong stem , called a trunk . This helps the tree stand up tall and straight.	Bear The bear is an animal. It has a lot of fur . The fur covers its body. This helps the bear stay warm. It lets bears survive cold, snowy winters.		

Human Problem Cards

finding your way around in the dark	
keeping intruders away	staying warm in the cold winter
keeping heads safe when riding bicycles	making a tall building
keeping body parts safe when roller- skating	

Name _____

Date _____

Activity Page 1.5.3

Use with Lesson 1.5

Let's Solve a Problem!

Plan your design.

1. We are solving the human problem of _____
_____.
2. We can solve the problem by making a _____
_____.
3. Our design mimics the animal or plant's _____
_____.
4. The design needs to have _____
_____.

Draw your design on poster board.

Answer the questions.

5. Our design mimics the animal or plant's part because it _____, and the animal or plant uses that part to _____.
6. We think the design will work by _____.

Name _____



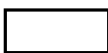



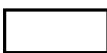











Date _____

Activity Page 2.1.1

Use with Lesson 2.1

Seeing Station

Print the cards below. Make several copies so that several groups can view these at the same time.

<p>1</p> <p>triangle </p> <p>square </p> <p>rectangle </p> <p>circle </p>	<p>triangle </p> <p>square </p> <p>rectangle </p> <p>oval </p>
<p>2</p> <p>star </p> <p>octagon </p> <p>circle </p> <p>square </p>	<p>star </p> <p>hexagon </p> <p>circle </p> <p>square </p>
<p>3</p> <p>1 2 3 4 3 2 1</p>	<p>1 2 3 4 5 2 1</p>
<p>4</p> 	

Name _____

Date _____

Activity Page 2.1.2 (Page 1 of 2)

Use with Lesson 2.1

Detective Sheet

Record what you notice at each station.

Seeing Station

Look at each picture. Are they the same? Are they different?

1. Circle: Same or Different. What is different?

2. Circle: Same or Different. What is different?

3. Circle: Same or Different. What is different?

4. Circle: Same or Different. What is different?

Hearing Station

Shake one container at a time. What does it sound like? Write what you think is inside.

marble paper clip rice water sand

1. _____

2. _____

3. _____

4. _____

5. _____

Name _____

Date _____

Activity Page 2.1.2 (Page 2 of 2)

Use with Lesson 2.1

Detective Sheet

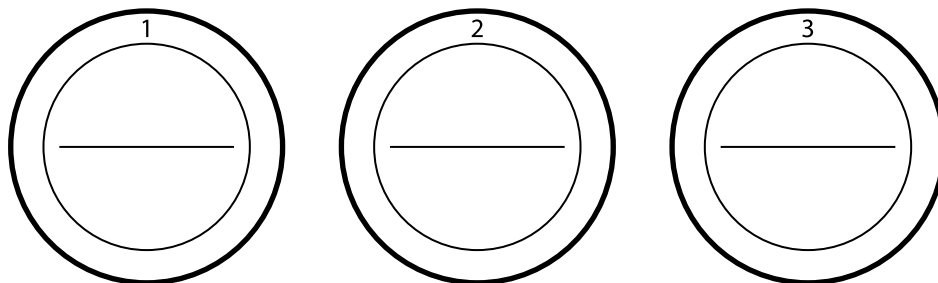
Smelling Station

Smell each container. What does it smell like? Write what you think the smell is in the jar.



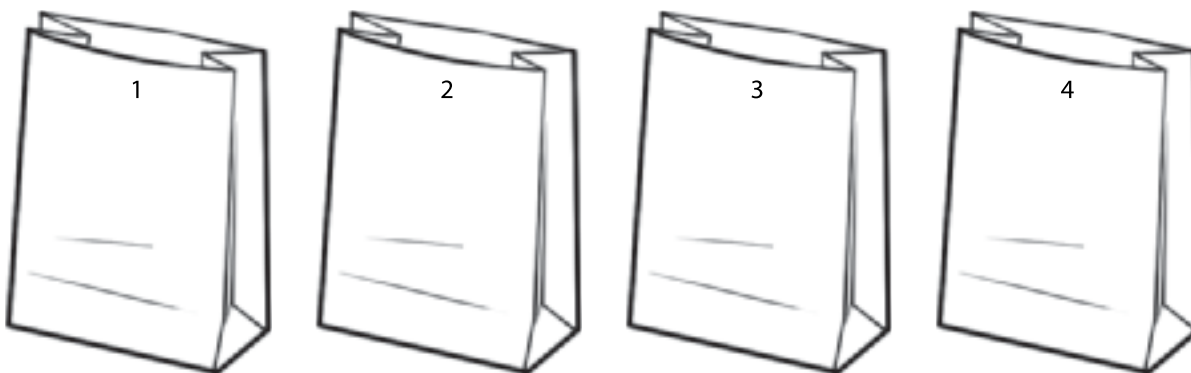
Tasting Station

Taste each sample. What does it taste like? How would you describe each one? Is it salty? Sweet? Sour? Write on the plates below.



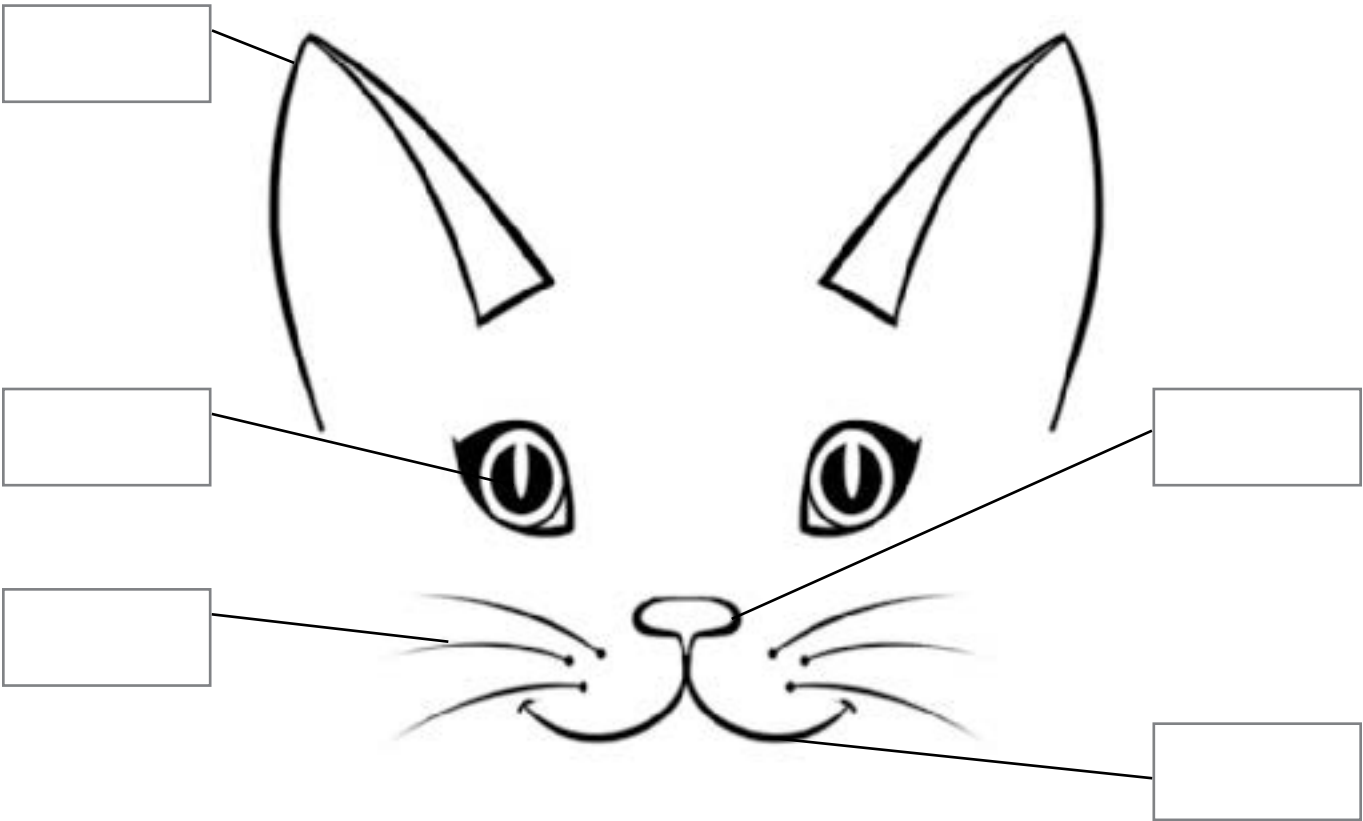
Touching Station

Put your hand into one bag at a time. Close your eyes. Feel the object inside. Can you tell what is inside each bag? Write what is inside below each bag.



Cat Senses

Listen to your teacher for instructions.



Name _____

Date _____

Activity Page 2.1.4

Use with Lesson 2.1

Animal Senses

Look at the picture of the horse.

- Circle the part of the horse that it uses to see.
- Draw a star next to the part of the horse it uses to hear.
- Color in the part of the horse it uses to smell.
- Draw a square around the part of the horse it uses to taste.



Name _____

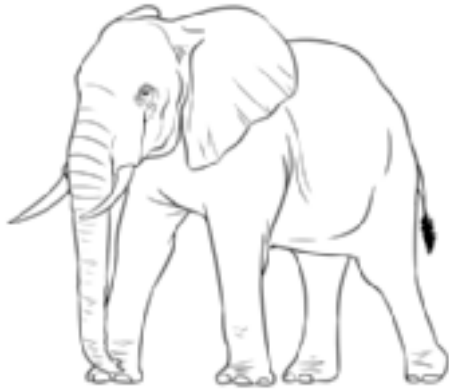
Date _____

Activity Page 2.2.1

Use with Lesson 2.2

How Animals Respond

Complete the sentences.



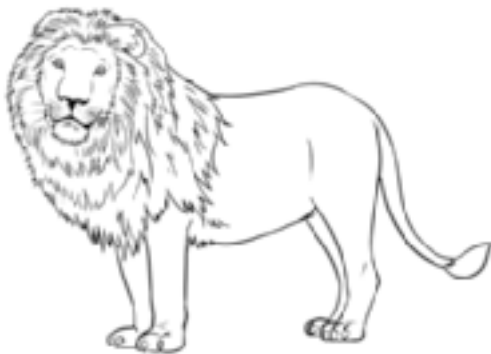
If an elephant could not hear, it would not be able to

_____.



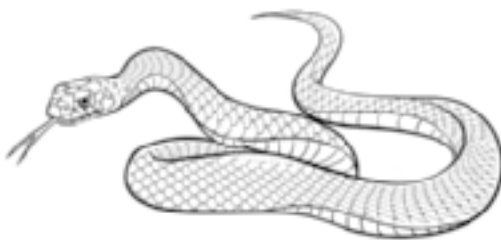
A zebra needs to be able to see so that it can

_____.



A lion uses its sense of smell to _____

_____.



A snake can use its tongue to smell. This lets the snake

know where to find _____.

Name _____

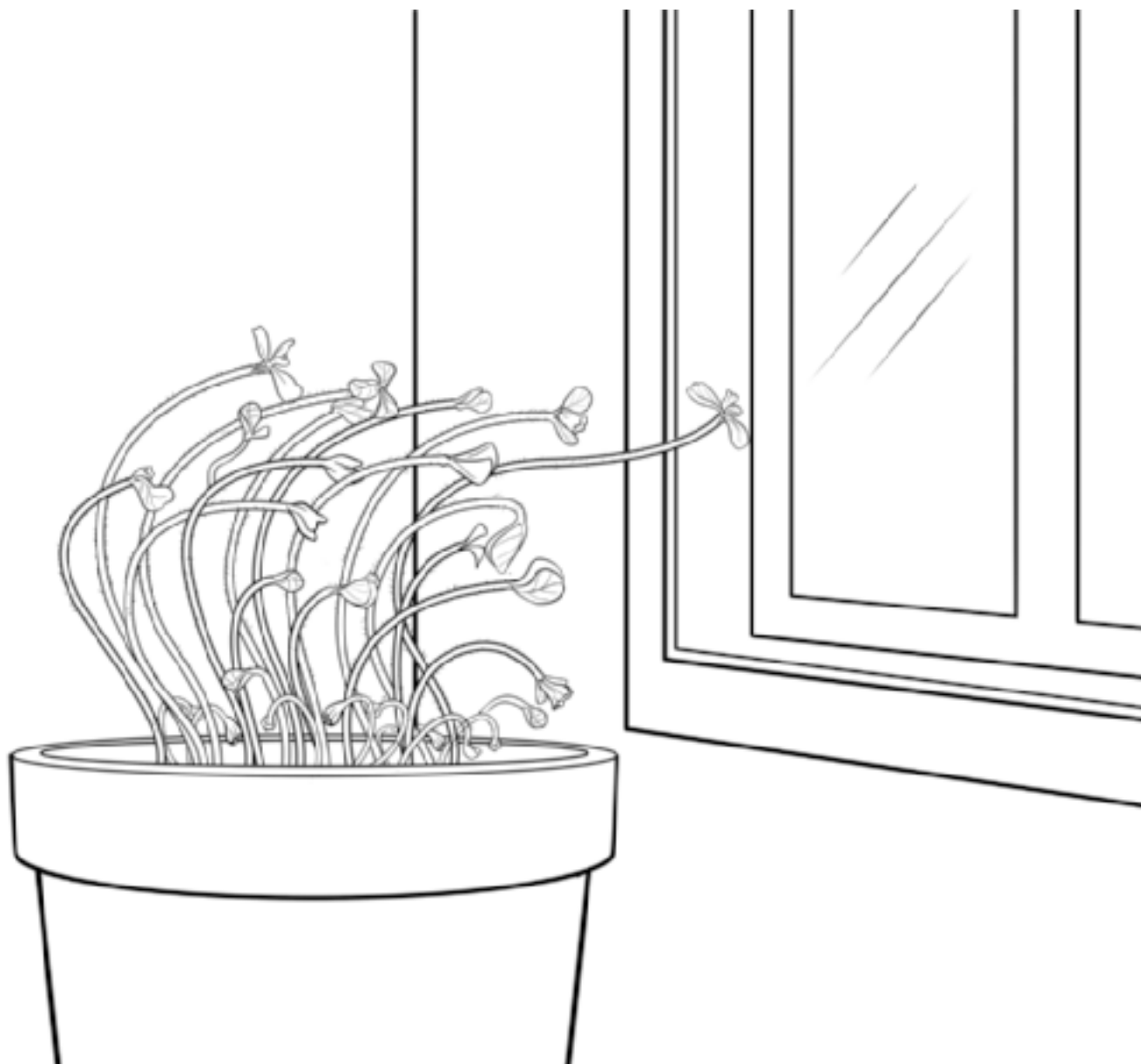
Date _____

Activity Page 2.3.1

Use with Lesson 2.3

Plant Picture

Print a copy of this picture, and enlarge it for use in the classroom.



Name _____

Date _____

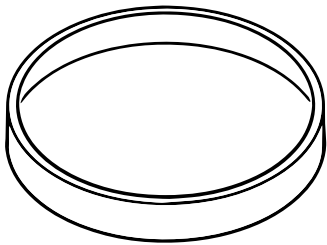
Activity Page 2.3.2

Use with Lesson 2.3

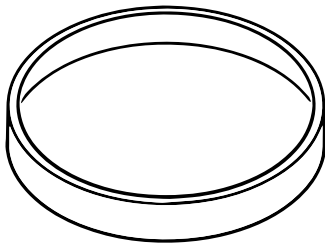
Seeds

Draw what you notice about the plants.

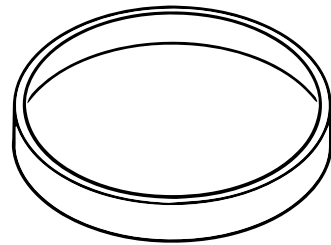
Day 1



A

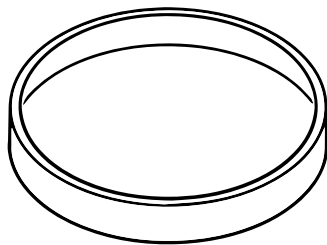


B

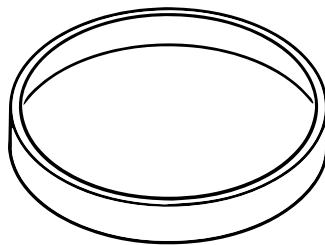


C

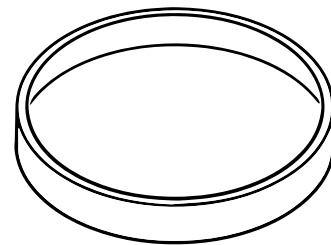
Day 3



A

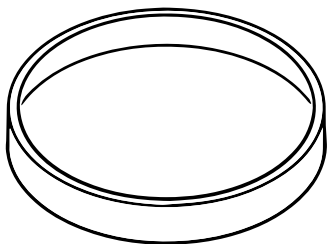


B

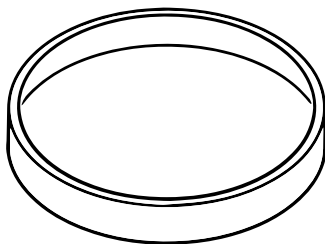


C

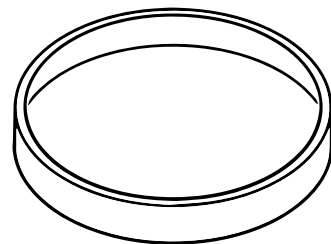
Day 7



A

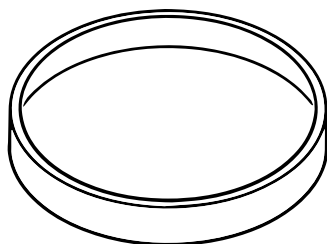


B

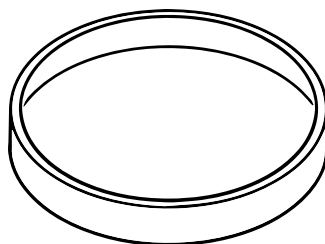


C

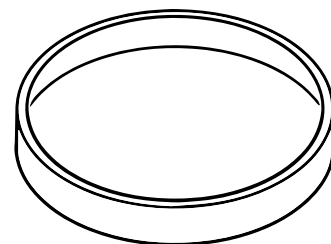
Day 10



A



B



C

Name _____

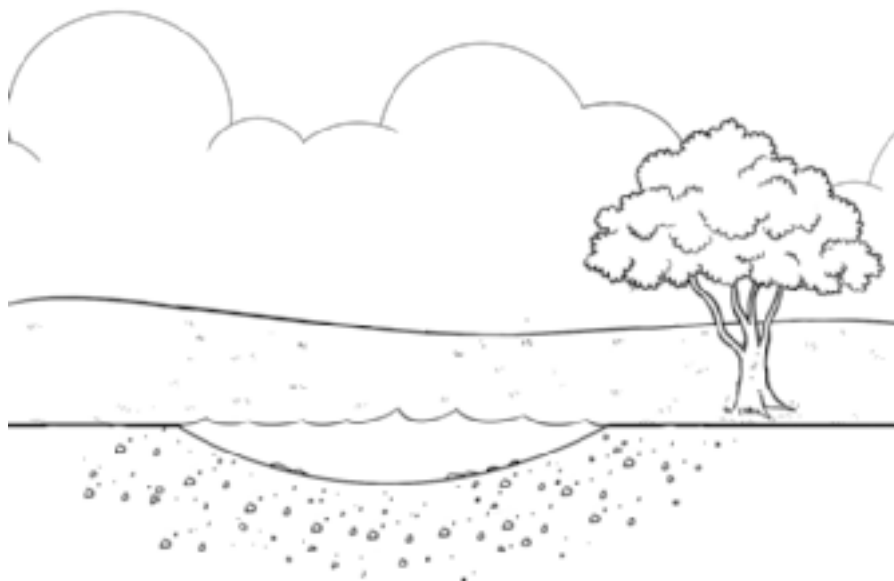
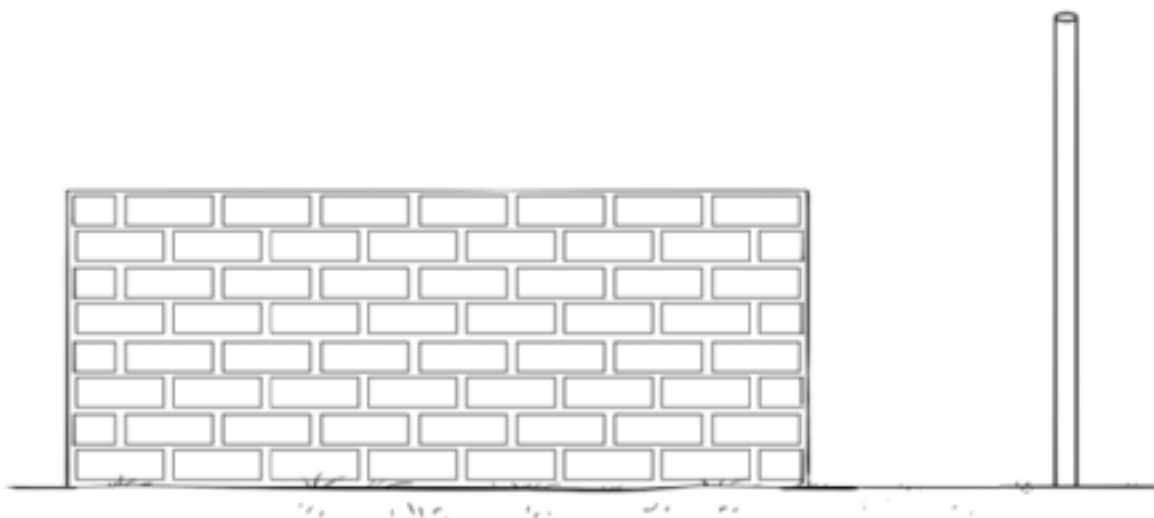
Date _____

Activity Page 2.3.3

Use with Lesson 2.3

What Plants Sense

Draw what plants do.



Name _____

Date _____

Activity Page 2.4.1

Use with Lesson 2.4

What Part Would I Use?

Complete the sentences.

I am a(n) _____.

I use my _____ to sense things around me.

This part helps me _____.

This is why I can survive.

Name _____

Date _____














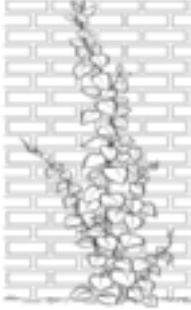


Activity Page 2.4.2

Use with Lesson 2.4

What Plants Do

Circle the picture.

Which plant . . .

has enough sunlight?				
is cold?				
does not have enough water?				
is responding to touch?				

Name _____

Date _____

Activity Page 2.5.1 (Page 1 of 2)

Use with Lesson 2.5

Animal and Plant Cards, page 1

Venus flytrap



Vine



Elephant



Bat



Eagle



Octopus



Owl



Name _____

Date _____

Activity Page 2.5.1 (Page 2 of 2)

Use with Lesson 2.5

Animal and Plant Cards, page 2

Venus flytrap The Venus flytrap is a plant. The top of the plant is shaped like a mouth. It looks like the mouth has teeth. It has hairs inside. The hairs sense touch. When a bug touches the inside of the flower, it starts to close and traps bugs inside. Then it uses the bug for nutrients.	Vine Vines are plants. They sense touch . When they feel an object, they can grow toward it. Then they can continue growing up it.	Elephant The elephant is a big animal. It uses vibrations in the ground to sense things. Vibrations are how elephants communicate. Different vibrations mean different things.	Bat The bat is an animal that flies at night. It sends out signals. The signals bounce off of things. Then the bat picks up on the signal. It uses this to know where food is in the dark. This is called echolocation .
Eagle The eagle is a bird. It has super sight . Eagles use their eyes. They can spot food from two miles away.	Octopus This octopus lives in the ocean. It sprays ink when it is in danger. The ink is like a fog. Other animals cannot see through it. This lets the octopus get away.	Owl The owl is an animal. It can turn its head all the way around. This lets the owl see from the front, the sides, and the back. It can see when something is behind it, like an enemy.	

Name _____

Date _____

Human Problem Cards

trapping something	needing to reach something up high	finding something in the dark	predicting an earthquake
seeing things that are far away	hiding from danger	seeing things that are behind you	

Name _____

Date _____

Activity Page 2.5.3

Use with Lesson 2.5

Let's Solve a Problem!

Plan your design.

















1. We are solving the human problem of _____
_____.
2. We can solve the problem by making a _____
_____.
3. Our design mimics the animal or plant's _____
_____.
4. The design needs to have _____
_____.

Draw your design on poster board.

Answer the questions.

5. Our design mimics the animal or plant sense because it _____, and the animal or plant uses that sense to _____.
6. We think the design will work by _____
_____.

Animal and Plant Species Cards

Name _____

Date _____

Activity Page 3.1.2

Use with Lesson 3.1

Animal and Plant Types

Place the cards in the correct boxes.

Dog	Snake
Bird	Fish
Mouse	Cactus
Rose	Bunny

Name _____

Date _____

Parents and Offspring

Complete the table.

Animal	Alike	Different	Are they exactly alike?

Name _____

Date _____

Activity Page 3.2.1

Use with Lesson 3.2

Plants: Same or Different?

Look at the plants. Circle what is the same for both.



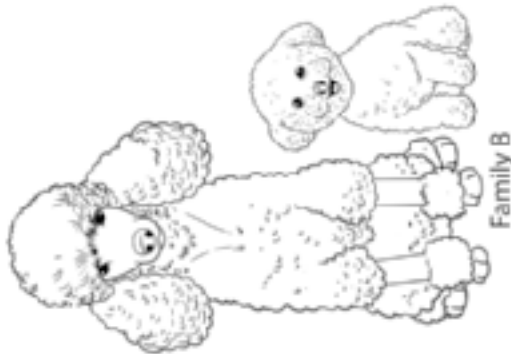
Complete the sentences.

These plants have different _____.

They are also different because _____.

Lost Puppy

Look at the pictures. Draw a line from the puppy to its family.



Answer the questions.

The puppy belongs to Family _____

I know this because _____

Name _____

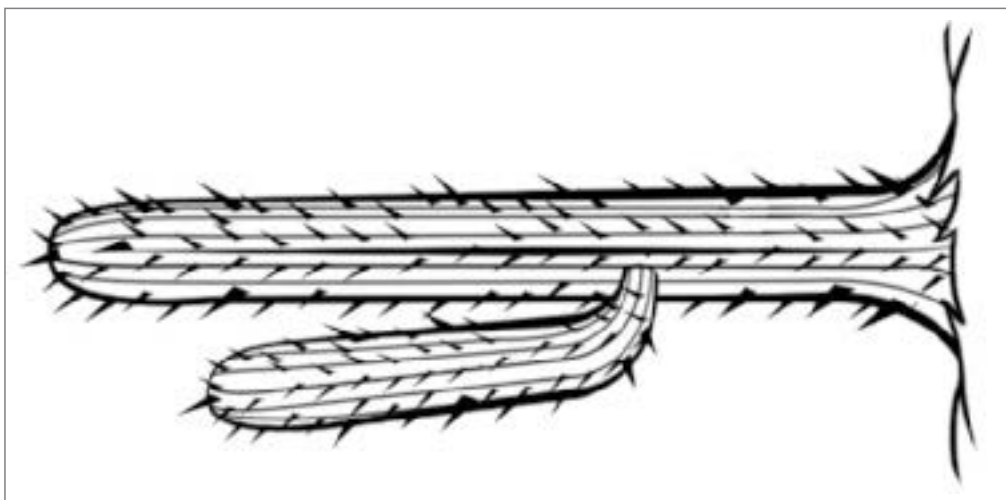
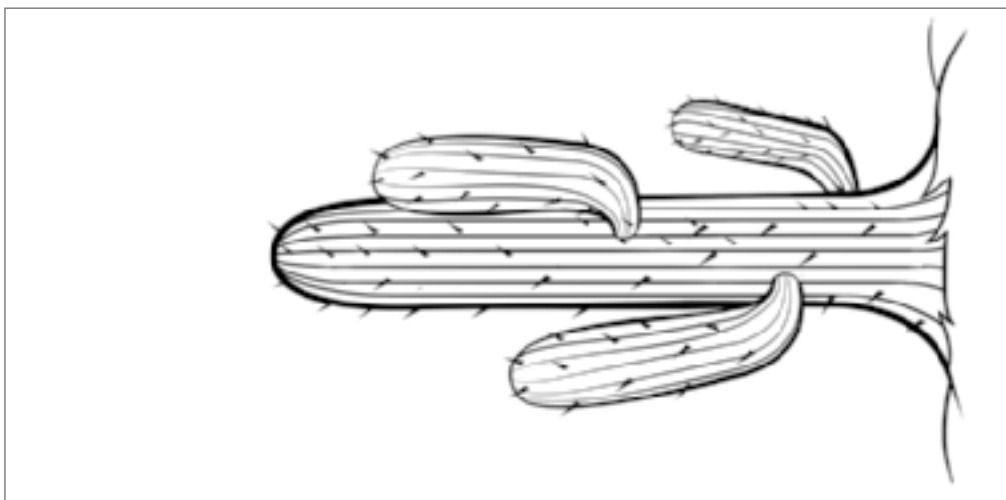
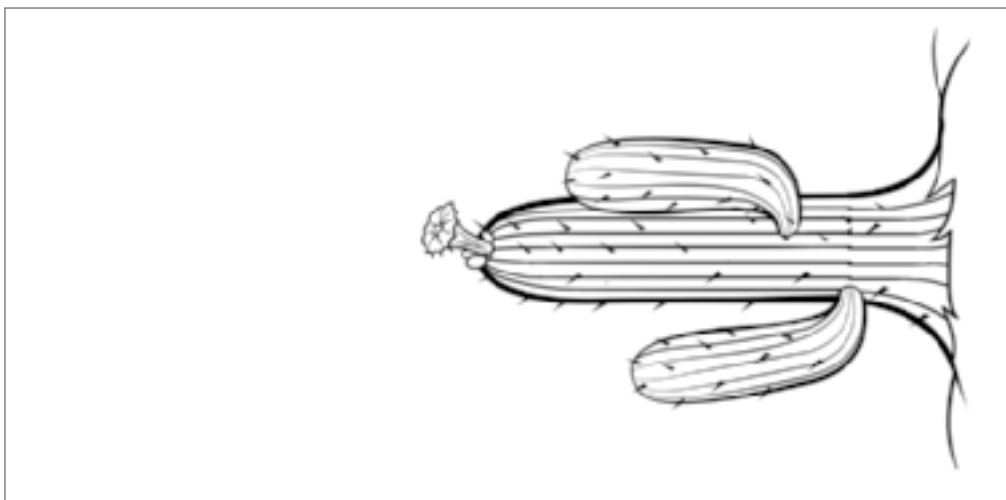
Date _____

Activity Page 3.4.1

Use with Lesson 3.4

Saguaros

Look at the pictures of the saguaros.



Name _____

Date _____

Activity Page 3.5.1

Use with Lesson 3.5

Drawing Traits

Answer the questions to help plan your drawing.

1. What plant or animal did your group choose?

2. Will the young plant or animal look exactly like its parent?

3. Will the young plant or animal look similar to its parent?

4. What will your young plant or animal look like? Name the traits you will draw.

5. What will your parent plant or animal look like? Name the traits you will draw.

6. In the second picture, will the adult plant or animal look exactly like the other adult?

7. What will both adult plants or animals look like? How will they be different?

Name _____

Date _____

Activity Page 4.1.1

Use with Lesson 4.1

Animal Behaviors

Write an example for each box.

Teaching	Feeding
Cleaning	Comforting

Name _____

Date _____

Activity Page 4.2.1 (Page 1 of 3)

Use with Lesson 4.2

Patterns of Behavior

Write down what you notice from the videos.

Video 1

The animal is a _____.

What is the parent doing for its offspring? Circle one.

teaching cleaning feeding comforting protecting

How does the parent do this? _____

Other notes: _____

Video 2

The animal is a _____.

What is the parent doing for its offspring? Circle one.

teaching cleaning feeding comforting protecting

How does the parent do this? _____

Other notes: _____

Video 3

The animal is a _____.

What is the parent doing for its offspring? Circle one.

teaching cleaning feeding comforting protecting

How does the parent do this? _____

Other notes: _____

Video 4

The animal is a _____.

What is the parent doing for its offspring? Circle one.

teaching cleaning feeding comforting protecting

How does the parent do this? _____

Other notes: _____

Name _____

Date _____

Activity Page 4.2.1 (Page 2 of 3)

Use with Lesson 4.2

Patterns of Behavior

Video 5

The animal is a _____.

What is the parent for doing its offspring? Circle one.

teaching cleaning feeding comforting protecting

How does the parent do this? _____

Other notes: _____

Video 6

The animal is a _____.

What is the parent for doing its offspring? Circle one.

teaching cleaning feeding comforting protecting

How does the parent do this? _____

Other notes: _____

Video 7

The animal is a _____.

What is the parent for doing its offspring? Circle one.

teaching cleaning feeding comforting protecting

How does the parent do this? _____

Other notes: _____

Video 8

The animal is a _____.

What is the parent for doing its offspring? Circle one.

teaching cleaning feeding comforting protecting

How does the parent do this? _____

Other notes: _____

Name _____

Date _____

Activity Page 4.2.1 (Page 3 of 3)

Use with Lesson 4.2

Patterns of Behavior

Video 9

The animal is a _____.

What is the parent for doing its offspring? Circle one.

teaching cleaning feeding comforting protecting

How does the parent do this? _____

Other notes: _____

Video 10

The animal is a _____.

What is the parent for doing its offspring? Circle one.

teaching cleaning feeding comforting protecting

How does the parent do this? _____

Other notes: _____

Video 11

The animal is a _____.

What is the parent for doing its offspring? Circle one.

teaching cleaning feeding comforting protecting

How does the parent do this? _____

Other notes: _____

Video 12

The animal is a _____.

What is the parent for doing its offspring? Circle one.

teaching cleaning feeding comforting protecting

How does the parent do this? _____

Other notes: _____

Name _____

Date _____

Activity Page 4.3.1

Use with Lesson 4.3

Numbers of Examples

Write the numbers on the lines.

How many videos showed examples of

Teaching: _____

Comforting: _____

Cleaning: _____

Protecting: _____

Feeding: _____

Use the numbers above to complete the sentences.

We saw _____ more cleaning examples than teaching examples.

We saw _____ more protecting examples than cleaning examples.

We saw _____ fewer comforting examples than protecting examples.

We saw _____ fewer teaching examples than protecting examples.

Name _____

Date _____

Activity Page 4.4.1

Use with Lesson 4.4

Write a Statement



Read the sentences. Then complete the statement.

The baby birds are chirping in their nest. They hold their mouths open wide.
The mother bird sees this. Now the mother bird will

Name _____

Date _____

Activity Page 4.4.2

Use with Lesson 4.4

Describe Patterns

Write how the parent animal responds in each scenario. Use examples from what you watched in the videos and read about.

A baby animal cries when

I know this because _____.

A baby animal is in danger when

I know this because _____.

A baby animal needs to learn how to walk to

I know this because _____.

A baby animal is dirty when

I know this because _____.

A baby animal nuzzles its parent when

I know this because _____.

Activity Pages Answer Key: *Plant and Animal Survival*

This answer key offers guidance to help you assess your students' learning progress. Here you will find descriptions of the expected key understandings, correct answers, and desired observations for each Activity Page of this unit. At this grade level, students' written responses are not expected to reflect the specificity shown here, and students should not be evaluated on refined drawing ability. Use the answers below, not as direct models for ideal student responses, but as keys to what to look for in evidence of student learning.

Animal Museum (AP 1.1.1) **(page 233)**

Students should write down the names of the animals they see, identify a body part, and explain what the body part is used for. Accept all reasonable explanations.

What We Notice (AP 1.2.1) **(page 234)**

Students should list body parts of each animal they view. Accept all body parts they have noticed.

What Makes Up a Plant? (AP 1.3.1) **(page 235)**

Students should label the flower at the top of the plant; the stem, which holds the flower up; a leaf; and the roots, which hold the plant in the ground.

Plant Parts (AP 1.3.2) **(page 236)**

Students should complete the sentences to read as follows:

I think that a plant would wash away if it did not have roots.

If a plant did not have a stem, it would not be able to stand up.

Plants could not make food if they did not have leaves.

Flowers are important because they help plants make other plants.

What Do We Use? (AP 1.4.1) **(page 238)**

Students should make a connection between a body part on each animal and a way humans mimic similar functioning, such as using straws like an elephant uses

its trunk, a helmet to protect their head like a turtle's shell, a coat to keep warm like a dog's coat, and a grasping tool to reach up like a giraffe's neck.

Let's Solve a Problem! (AP 1.5.3) **(page 242)**

Students should use the plant and animal cards and human problem card to brainstorm and design a solution to a human problem. They should identify how the problem is solved, what animal or plant trait the design mimics, and things the design must have (criteria).

Detective Sheet (AP 2.1.2) **(pages 244–245)**

(Seeing Station)

Students should note: Card 1 has a circle on one side and an oval on the other; Card 2 has an octagon on one side and a hexagon on the other; Card 3 counts up and then down in order on one side and on the other the second "3" has been replaced by a "5"; Card 4 has the same scene but one side has one tree and the other side has two trees.

(Hearing Station)

Students should note what they hear in each container and attempt to identify the item based on the sound they hear.

(Smelling Station)

Students should note what they smell in each container and attempt to identify the item based on that smell. Note that sense of smell can vary greatly from person to person.

(Tasting Station)

Students should note what they taste and attempt to identify the item based on that taste.

(Touching Station)

Students should note what they feel in each container and attempt to identify the item based on their sense of touch.

Cat Senses (AP 2.1.3) **(page 246)**

Students should note cats hear with their ears, see with their eyes, smell with their nose, feel with their whiskers, and taste with their mouths.

Animal Senses (AP 2.1.4) **(page 247)**

Students should circle the horse's eyes, put a star near the horse's ears, color in the horse's nose, and draw a square around the horse's mouth.

How Animals Respond (AP 2.2.1) **(page 248)**

Students should complete the sentences to read as follows:

If an elephant could not hear, it would not be able to hear other elephants or hear danger.

A zebra needs to be able to see so that it can find other zebras or see danger.

A lion uses its sense of smell to hunt for food.

A snake can use its tongue to smell. This lets the snake know where to find food or avoid danger.

Seeds (AP 2.3.2) **(page 250)**

Student drawings should show most if not all mustard seeds getting larger and then opening up as the plant inside starts to grow. Seeds in petri dish B may not grow at all, and seeds in petri dish C may grow to the side.

What Plants Sense (AP 2.3.3) **(page 251)**

Students should draw plants growing toward the objects or away from them.

What Part Would I Use? (AP 2.4.1) **(page 252)**

Students should complete the sentences based on what they read or saw in the video. Accept all reasonable student responses.

What Plants Do (AP 2.4.2) **(page 253)**

In the first row, students circle the two plants that are standing tall. In the second row, students circle the plant that is wilting and the plant that has lost its leaves. In the third row, students circle the wilting plant and the plant with no leaves. In the fourth row, students circle the two drawings of the vines.

Let's Solve a Problem! (AP 2.5.3) **(page 257)**

Students should use the plant and animal cards and human problem card to brainstorm and design a solution to a human problem. They should identify how the problem is solved, what animal or plant sense the design mimics, and things the design must have (criteria).

Parents and Offspring (AP 3.1.3) **(page 260)**

Students should note that the parent and offspring are alike in body form and rough structures but different in size. They should note that none of the offspring are exactly alike.

Plants: Same or Different? (AP 3.2.1) **(page 261)**

Students should circle the seeded part of the sunflower and the stem. They should note the two plants have different numbers of leaves and petals as well as being different heights.

Lost Puppy (AP 3.3.1) **(page 262)**

Students should note the puppy belongs to Family C and they can tell because the puppy and the dogs from Family C have similar bodies and facial features.

Drawing Traits (AP 3.5.1) **(page 264)**

Student responses should match to their work on their posters and should accurately reflect similarities and differences between parents and offspring. Students may note the similarities and differences between the two parent animals as well.

Animal Behaviors (AP 4.1.1)
(page 265)

Student responses should match to the teaching, feeding, cleaning, and comforting behaviors as seen in the slideshow.

Patterns of Behavior (AP 4.2.1)
(pages 266–268)

Student responses should match to the teaching, feeding, cleaning, and comforting behaviors as seen in the videos.

Numbers of Examples (AP 4.3.1)
(page 269)

Students should organize their data from Patterns of Behavior (AP 4.2.1) and complete the cloze sentences.

Write a Statement (AP 4.4.1)
(page 270)

Students should note that the mother bird will now feed the baby birds in response to their chirping.

Describe Patterns (AP 4.4.2)
(page 271)

Accept all supported student responses to the cloze sentences. Examples may include the following:

- A baby animal cries when it is alone.
I know this because there was no parent near it.
- A baby animal is in danger when it is alone.
I know this because it is too small to take care of itself.
- A baby animal needs to learn how to walk to get food.
I know this because baby rabbits have to start eating food.
- A baby animal is dirty when it has been playing.
I know this because the parent starts to lick it clean.
- A baby animal nuzzles its parent when it is cold.
I know this because the parent covers the baby up.

Glossary

Purple words and phrases are Core Vocabulary for the unit. **Bold-faced words and phrases** are Language of Instruction, additional vocabulary terms related to the unit that you should model for students during instruction. Vocabulary words are not intended for use in isolated drill or memorization.

A

animal, n. a living thing that eats plants or other animals and can move around

B

behavior, n. actions taken by living things

biomimicry, n. the imitation of natural biological structures, systems, and processes

blooming, adj. describing plants that produce flowers

body part, n. any internal or external piece of an organism

C

communicate, v. to give information to someone

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

conservationist, n. a person who works to protect and preserve the environment and wildlife

contrast, v. to look for differences between two things

D

describe, v. to express details about something

design, n. a plan to show how something is made or how a process should work (v. to develop a plan for a device or a solution to a problem)

E

environment, n. the place and conditions that surround a living thing

F

filter, n. a device that removes materials from a solid or liquid

flower, n. the bloom of a plant where pollination occurs

I

invent, v. to create something that did not exist before

L

leaf, n. the plant part that is attached to the stem and collects light for the plant

M

marine, adj. found in, of, or produced by the ocean

media, n. means of conveying messages (singular, **medium**)

memory, n. recalled information, or the capacity to retain information

mimic, v. to copy or imitate another organism or object

model, n. a representation of something that can help people learn about the real thing

N

naturalist, n. a person who studies the history of nature

O

observe, v. to watch something and notice details about it (**observation, n.** the process of noticing details, or a specific detail that is noticed)

offspring, n. the young plant or animal produced by parents

P

parent, n. an organism that has produced offspring

pattern, n. a reliable system of traits or a set of repeating details

phototropism, n. the growth of a plant in response to the location of a light source

plant, n. a living thing that needs light, water, and air to grow

problem, n. a condition that falls short of satisfying a want or a need

pump, n. a device that moves liquids or gases from one location to another

puppet, n. a physical model of a thing that can be manipulated to move

purpose, n. the reason why something is done

R

respond, v. to react to something (**response, n.** a reaction to something)

root, n. the plant part that takes up water and minerals, typically underground

S

safe, adj. protected from harm or danger

scuba, n. a device used for breathing while underwater

sense, n. to see, hear, taste, smell, or feel something from one's environment (to detect stimulus)

sibling, n. an offspring that share one or both parents

sight, n. the sense of vision, the ability to detect objects with eyes by sensing light

solution, n. a process, action, or device that fixes a problem

sound, n. vibrations detected by the sense of hearing

species, n. a group of living things that share common traits and can make young of their kind

stem, n. the central part of a plant that provides support

structure, n. the way in which something is made and the parts it is made of

survive, v. to stay alive, especially when faced with hardship

T

tank, n. a large container for holding, storing, or transporting liquids

thigmotropism, n. the growth of a plant in response to touch

trait, n. a specific characteristic seen in an organism

tropism, n. the growth of a plant in response to something it detects in its environment

U

use, v. to handle or employ something for a specific purpose

V

vibration, n. rapid back-and-forth motion

virtual, adj. occurring through software and technology, but not physically present

volunteer, v. to do work purely by choice and without being paid

W

wildlife, n. organisms that live naturally in a place, not bred or tended or planted by people

wilt, v. to collapse or droop (plants) because of lack of water, too much heat, or other damage

Classroom Safety for Activities and Demonstrations

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 this unit have been selected and designed to engage students in a safe manner. The activities and demonstrations 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:

- Be aware of students who have food allergies, and adjust related activities or make materials substitutions as necessary. Check the ingredients of all food to make sure known allergies are not listed. Students with food allergies can still be affected even if they do not ingest the food item. Some common food allergies are peanuts, tree nuts (e.g., almonds, walnuts, hazelnuts, etc.), and cow's milk (rice milk is a good nut-free alternative).
- 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 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.

Copy and distribute the Student Safety Contract, found on the next page. Have a read-along, and have students agree to the expectations for students when engaged in science activities prior to the start of the first unit.

Online Resources



For additional support for safety in the science classroom, follow the links in the Online Resources Guide for this unit:

www.coreknowledge.org/cksci-online-resources

Student Safety Contract

When doing science activities, I will do the following:

- Report spills, breakages, or injuries to the teacher right away.
- Listen to the teacher for special instructions and safety directions. If I have questions, I will ask the teacher.
- Avoid eating or drinking anything during the activity unless told to by my teacher.
- Review the steps of the activity before I begin. If I have questions, I will ask the teacher.
- Wear safety goggles when working with liquids or things that can fly into my eyes.
- Be careful around electric appliances, and unplug them, just by pulling on the plug, when a teacher is supervising.
- Keep my hands dry when using tools and devices that use electricity.
- Be careful to use safety equipment like gloves or tongs when handling materials that may be hot.
- Know when a hot plate is on or off and let it cool before touching it.
- Roll or push up long sleeves, keep my hair tied back, and secure any jewelry I am wearing.
- Return unused materials to the teacher.
- Clean up my area after the activity and wash my hands.
- Treat all living things and the environment with respect.

I have read and agree to the safety rules in this contract.

_____ / ____ / ____ / ____

Student signature and date

Print name

Dear Parent or Guardian,

During science class, we want to create and maintain a safe classroom. With this in mind, we are making sure students are aware of the expectations for their behavior while engaged in science activities. We are asking you to review the safety rules with your student and sign this contract. If you have any questions, please feel free to contact me.

_____ / ____ / ____ / ____

Parent or guardian signature and date

Strategies for Acquiring Materials

The materials used in the Core Knowledge Science program (CKSci) are readily available and can be acquired through both retail and online stores. Some of the materials will be reusable and are meant to be used repeatedly. This includes equipment such as scales, beakers, and safety goggles, but also items such as plastic cups that can be safely used again. Often these materials are durable, can be cleaned, and will last for more than one activity or even one school year. Other materials are classified as consumable and are not able to be used more than once, such as glue, baking soda, and aluminum foil.

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 can add up for an entire unit, even when the materials required for activities and demonstrations have been selected to be individually affordable. And 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 with the teaching of science, as well as to 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.

Advance Preparation for Activities and Demonstrations

Being properly prepared for classroom activities and demonstrations is the first step to having a successful and enriching science program. Advance preparation is critical to effectively support student learning and understanding of the content in a lesson.

Before doing demonstrations and activities with the class, do the following:

- Familiarize yourself with the activity by performing the activity yourself or with a team, and identify any issues or talking points that could be brought up.
- Gather the necessary materials for class usage. Consider if students will gather their materials at stations or if you will preassemble the materials to be distributed to the students and/or groups.
- Identify safety issues, such as food allergies, that could occur during an activity or demonstration, and plan and prepare how to address them.
- Review the Teacher's Guide before teaching, and identify opportunities for instructional support during activities and demonstrations. Consider other Support and/or Challenge opportunities that may arise as you work to keep students engaged with the content.
- Prepare a plan for postactivity collection and disposal of materials/equipment.

While engaged in the activity or demonstration, do the following:

- Address any emergencies immediately.
- Check that students are observing proper science safety practices as well as wearing any necessary safety gear, such as goggles, aprons, or gloves.
- When possible, circulate around the room, and provide support for the activity. Return to the Teacher Guide as students work, to utilize any Support and Challenge opportunities that will make the learning experience most meaningful for your students.

After the activity or demonstration, do the following:

- Use your plan for students to set aside or dispose of their materials as necessary.
- Have students wash their hands after any activity in which they could come in contact with any potentially harmful substances.

When engaging students in activities and demonstrations, model good science practices, such as wearing proper safety equipment, never eating during an investigation, etc. Good science practices at a young age will lead to students observing good science practices themselves and being better prepared as they move into upper-level science classes.

What to Do When Activities Don't Give Expected Results

Science activities and experiments do not always go according to plan. Microwave ovens, super glue, and X-rays are just some of the discoveries made when people were practicing science and something did not go according to plan. In your classroom, however, you should be prepared for what to do when activities don't give the expected results or when an activity doesn't work.

When going over an activity with an unexpected result, consider these points in discussion with your students:

- Was there an error in following the steps in order? You or the student may have skipped a step. To help control for this, have students review the steps to an investigation in advance and make a check mark next to each step as they complete it.
- Did students design their own investigation? Perhaps their steps are out of sequence, or they missed a step when performing the activity. Review and provide feedback on students' investigation plan to ensure the work is done in proper sequence and that it supports the lesson segment's guiding question.
- When measurements were taken, were they done correctly? It is possible a number was written down incorrectly; a measurement was made in error, such as a wrong unit of measure or quantity; or the starting or ending point of a measurement was not accurate.
- Did the equipment or materials contribute to the situation? For example, chemicals that have lost their potency or a scale that is not measuring accurately can contribute to the success or failure of an activity.

One of the greatest gifts a student can learn when engaged in science is to develop a curiosity for *why something happened*. Students may find it challenging or frustrating to work through a problem during an activity, but a teacher guiding them through the problem and to figure out why something happened will help them to develop a better sense of how to do science.



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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, and the fine arts. In the domains of science, including Earth and space, physical, and life sciences, the *Core Knowledge Sequence* outlines topics that build systematically grade by grade to support student learning progressions coherently and comprehensively over time.



For which grade levels is this book intended?

In general, the content and presentation 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.

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