

# Changing Environments

beaver



## Teacher Guide



fire



protecting land



using land for crops



beaver dam





# Changing Environments

## Teacher Guide



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## Changing Environments

### Teacher Guide

Core Knowledge Science™ K

# Introduction

### ABOUT THIS UNIT

#### The Big Idea

This unit focuses on how living things change their environment as they get and consume the things they need to survive.

Plants and animals, including humans, have vital needs that must be met for the organism to live and grow. All living things need water and air. Plants also need light, air, mineral nutrients, and space to grow. Animals, including humans, need food and shelter, much of which they get from plants. In getting what they need, plants and animals change their environments. The effects can be seen in both living and nonliving things. In this unit, students learn about the needs of living things and how plants, animals, including humans, change their environments as they acquire what they need. Humans have had a significant effect on environments as we build shelter, produce food and transport it, and manage water sources. Students will learn about making decisions that protect the environment and reduce the negative effects of the changes humans make to their environment.

The key concept underlying the unit is that all living things change their environments.

In this unit, the guiding phenomenon is to an examination of the before-and-after stories of the effects of living things on the environment to see how the environment is changed. The unit builds on Unit 2, in which students explored the needs of plants and animals (PE K-LS1-1 and K-ESS3.1). In Grade 1, students will develop understanding of plant and animal survival, and in Grade 2, students will explore organisms and their habitats more deeply.

Students explore concepts that include the following:

- Organisms get what they need from the environment.
- Damaging environmental changes can affect organisms.
- Ways in which environmental changes affect the needs of plants, animals, and humans.
- There is evidence of plants, animals, and humans causing changes to an environment.
- There are both negative and positive ways in which humans impact the environment.
- There are practical ways to protect the environment.

Scientists, including biologists, zoologists, geologists, and climatologists, study how living things affect the land, air, and water. This series of lessons incorporates learning goals that support scientific principles and practices, such as asking questions, arguing with evidence, analyzing and interpreting data, recognizing cause and effect, and planning and carrying out investigations.

## Note to Teachers and Curriculum Planners

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This unit introduces Kindergarten students to the changes plants and animals, including humans, make to both living and nonliving things as they acquire and consume what they need to survive. Students build on their understanding of the needs of living things that they developed in Unit 2, *Needs of Plants and Animals*, as they explore both helpful and harmful changes that are made. Students culminate the unit by identifying a way to limit harmful changes in the local environment. The following are preliminary considerations for planning and instruction relative to this unit:

- Students will plant seeds and observe their growth and effect on their environment over the course of a few weeks.
- Students will explore evidence of plants, animals, and humans in their local environment.

Students will investigate ways in which meeting the needs of living things affects the environment. This will help build a foundation for further study of plant and animal survival and habitats in Grades 2, 3, 4, and 5.

## Note to Core Knowledge Teachers

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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](http://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?\*

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This unit, *Changing Environments*, has been informed by the following Kindergarten Performance Expectations for the NGSS topics *Earth’s Systems* and *Earth and Human Activity*. Students who demonstrate understanding can do the following:

**K-ESS2-2** Construct an argument supported by evidence for how plants and animals (including humans) can change the environment to meet their needs.

**K-ESS3-3** Communicate solutions that will reduce the impact of humans on the land, water, air, and/or other living things in the local environment.

### 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](http://www.coreknowledge.org/cksci-online-resources)

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\*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.

### A Special Note to Kindergarten Teachers Before Starting This Unit

#### Why Study Science in Kindergarten?

For many Kindergarten teachers, the suggestion that science should be a part of the Kindergarten curriculum may seem questionable. For many teachers, the instructional time is devoted to teaching reading and math fundamentals to students.

The study of science in Kindergarten, however, is consistent with the Core Knowledge approach to learning. Learning science provides students with the experiences necessary to accelerate an almost innate sense of excitement and wonder about the natural world around them. Now is the time they can grasp a more precise language, one that allows them to describe the living and nonliving environment they encounter every day.

Albert Einstein said, “Curiosity has its own reason for existing.” It is the nature of children to be curious about the world around them, and Kindergarten is the right time to witness, promote, and accelerate that curiosity in a systematic way.

Teaching science to young children affords them the opportunity to take a deeper look at the world around them. Most young students’ scientific knowledge is derived from their personal experiences, that is, from interactions with the air, water, land, and other matter around them. All these lead to a student’s wonder about life, earth, space, and physical science.

#### Before Starting *Changing Environments*

Students come to Kindergarten classrooms across the country with a wide range of prior experiences. Some students have attended preschool, while others have not. Some have grown up in cities away from nature. Others have grown up in the country, intimately involved in nature.

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

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

*Changing Environments* is one of four units in the Kindergarten CKSci series that we encourage teachers to use over the course of the school year. Kindergarten

teachers who begin the year with a unit will have time to complete all four of the Kindergarten CKSci units in an academic year. Additional guidance regarding pacing is provided in each CKSci Teacher Guide.

## 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. Organisms and Their Environments

SEGMENTS 1–4

- Describe what organisms get from the environment.
- Describe how organisms get what they need from the environment.
- Recognize how seasonal changes affect organisms.
- Recognize how some damaging environmental changes affect organisms.

### Lesson 2. Plant Changes in Environments

SEGMENTS 1–4

- Gather evidence of plants causing changes to an environment.
- Relate environmental changes and the effects on living things to the needs of plants.

### Lesson 3. Animal Changes in Environments

SEGMENTS 1–4

- Gather evidence of animals causing changes to an environment.
- Relate environmental changes and the effects on living things to the needs of animals.

### Lesson 4. Human Changes in Environments

SEGMENTS 1–4

- Gather evidence of people causing changes to an environment.
- Relate environmental changes and the effects on living things to human needs.

### Lesson 5. Taking Care of the Environment

SEGMENTS 1–5

- Identify negative and positive ways humans impact the environment.
- Explore ways to protect the environment.
- Propose ways to protect the local environment.



## 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 *Changing Environments* Student Book includes seven 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](http://www.coreknowledge.org/cksci-online-resources)

## Pacing

To meet NGSS Performance Expectations we encourage teachers to complete all Kindergarten 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 15–16, 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 twenty-four days and a maximum of thirty-six days teaching the *Changing Environments* unit so that you have time to teach the other units in the Kindergarten 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.

<b>Unit Opener:</b> <b>Introduction to the Unit Phenomenon and Problem</b>	<b>Unit Opener:</b> Changing Environments	<b>Big Question:</b> How do living things change the environment when they get what they need?
<b>Lesson 1: Organisms and Their Environments</b> (K-ESS2-2)	<b>1.1</b> Meeting Needs	<b>Lesson 1 Guiding Question:</b> What do living things consume from their environments?
		<b>1.1</b> Where do living things get the food and water that they need?
	<b>1.2</b> Seasons	<b>1.2</b> Can living things survive changes in their environments?
	<b>1.3</b> Damaging Changes	<b>1.3</b> What kinds of environmental changes can living things not survive?
	<b>1.4</b> Organisms and Their Environments	<b>1.4</b> What do living things consume from their environments?

<b>Lesson 2: Plant Changes in Environments</b> (K-ESS2-2)	<b>2.1</b> Plants Get What They Need	<b>Lesson 2 Guiding Question:</b> How can plants change their environments?
	<b>2.2</b> Root, Leaves, and Seeds Cause Changes (1 day plus 2 weeks observation time)	<b>2.1</b> Where do plants get what they need?
	<b>2.3</b> Plants Change Environments	<b>2.2</b> How can plants' roots, leaves, and seeds cause changes?
	<b>2.4</b> Plants Change Other Living Things	<b>2.3</b> How can plants change their environments?
<b>Lesson 3: Animal Changes in Environments</b> (K-ESS2-2)	<b>2.4</b> Plants Change Other Living Things	<b>2.4</b> How can plants change their environments?
	<b>3.1</b> Animals Get What They Need	<b>Lesson 3 Guiding Question:</b> How can animals change their environments?
	<b>3.2</b> Animal Behaviors Cause Changes	<b>3.1</b> Where do animals get what they need?
	<b>3.3</b> Animals Change Environments	<b>3.2</b> What animal behaviors can cause changes?
<b>Lesson 4: Human Changes in Environments</b> (K-ESS2-2)	<b>3.4</b> Animals Change Other Living Things	<b>3.3</b> How can animals change their environments?
	<b>4.1</b> Humans Get What They Need	<b>3.4</b> How can animals change their environments?
	<b>4.2</b> Human Behaviors Cause Changes	<b>Lesson 4 Guiding Question:</b> How do people change their environments?
	<b>4.3</b> People Change Environments	<b>4.1</b> Where do people get what they need?
<b>Lesson 5: Taking Care of the Environment</b> (K-ESS3-3)	<b>4.4</b> People Change Other Living Things	<b>4.2</b> What human behaviors can cause changes?
	<b>5.1</b> Being Eco-friendly	<b>4.3</b> How do people change their environments?
	<b>5.2</b> Good and Bad Changes	<b>4.4</b> How do people change their environments?
	<b>5.3</b> Conservation	<b>Lesson 5 Guiding Question:</b> How can people take care of the environment?
	<b>5.4</b> People Can Protect the Environment	<b>5.1</b> What does it mean to be eco-friendly?
<b>Unit Supplement</b>	<b>5.5</b> Environmental Solutions	<b>5.2</b> What human activities can be labeled harmful to the environment?
	Science in Action (two class sessions)	<b>5.3</b> What does it mean to protect the environment?
		<b>5.4</b> How can people take care of the environment?
		<b>5.5</b> How can people take care of the environment?
		Who are some people who work in this type of science, and what do they do?



## Activity Pages

### Activity Pages



AP UO.1

AP 1.1.1

AP 1.1.2

AP 1.2.1

AP 1.3.1

AP 1.4.1

AP 2.1.1

AP 2.2.1

AP 2.3.1

AP 2.4.1

AP 3.1.1

AP 3.2.1

AP 3.3.1

AP 3.4.1

AP 4.1.1

AP 4.2.1

AP 4.3.1

AP 4.4.1

AP 5.1.1

AP 5.2.1

AP 5.3.1

AP 5.4.1

AP 5.5.1

AP US.1

Black-line reproducible masters for Activity Pages, as well as an Answer Key, are included in Teacher Resources on pages 172–198. 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.

Unit Opener—Food I Eat (AP UO.1)

Lesson 1—Living and Nonliving Things (AP 1.1.1)

Lesson 1—Garden Plan (AP 1.1.2)

Lesson 1—Seasons (AP 1.2.1)

Lesson 1—Danger (AP 1.3.1)

Lesson 1—Parts of a Dry Environment (AP 1.4.1)

Lesson 2—Plants Get What They Need (AP 2.1.1)

Lesson 2—Planting Seeds (AP 2.2.1)

Lesson 2—Plants Make Changes (AP 2.3.1)

Lesson 2—Plants Cause Changes (AP 2.4.1)

Lesson 3—Animals Get What They Need (AP 3.1.1)

Lesson 3—Animal Changes (AP 3.2.1)

Lesson 3—Animals Make Changes (AP 3.3.1)

Lesson 3—Animals Change Living and Nonliving Things (AP 3.4.1)

Lesson 4—People Get What They Need (AP 4.1.1)

Lesson 4—Human Needs (AP 4.2.1)

Lesson 4—Humans Make Changes (AP 4.3.1)

Lesson 4—People Change Environments (AP 4.4.1)

Lesson 5—Eco-friendly? (AP 5.1.1)

Lesson 5—Better Changes (AP 5.2.1)

Lesson 5—Eco-friendly Choices (AP 5.3.1)

Lesson 5—Humans Help Environments (AP 5.4.1)

Lesson 5—Solutions (AP 5.5.1)

Unit Supplement—Comparing Soil (AP US.1)

## Online Resources for Science

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### 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](http://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

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### 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.

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.

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 199–200.

<b>Emphasize observation and experience.</b>	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.
<b>Use science practices.</b>	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.
<b>Make frequent connections.</b>	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.
<b>Monitor student progress.</b>	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.

## 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.

<b>Differentiation</b>	<p>Adjustments to instruction appear in the text, indicated by <b>SUPPORT</b>, <b>EXTEND</b>, and <b>CHALLENGE</b> notations.</p> <p><b>SUPPORT</b>—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><b>EXTEND</b>—Extensions are suggested for students with high interest or who have already met the performance expectations.</p> <p><b>CHALLENGE</b>—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>
<b>Teacher Development</b>	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.



<b>Monitor Progress</b>	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.
<b>Math Connection</b>	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.
<b>Language Arts Connection</b>	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.
<b>Building Progressions</b>	Prior expected student learning and how the prior learning will be built upon are 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](http://www.coreknowledge.org/cksci-online-resources)

#### Icon Key:

**DCI ESS2.E** Biogeology

**DCI ESS3.C** Human impacts on Earth systems

**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

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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.

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## Effective and Safe Classroom Activities

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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 201–205, 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](http://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.

### Lesson 1 Organisms and Their Environments

#### Lesson 1.1

- hand lenses (1 per pair)

### Lesson 2 Plant Changes in Environments

#### Lesson 2.1

- hand lenses (1 per pair)
- trowel or small shovel

#### Lesson 2.2

- melon, sunflower, grass, or bean seeds (2 per student)
- transparent plastic cups (1 per student)
- potting soil
- watering can
- access to water
- marker to label plastic cups

### Lesson 3 Animal Changes in Environments

#### Lesson 3.1

- hand lenses (1 per pair)
- trowel or small shovel

#### Lesson 3.2

- hand lenses (1 per pair)

### Lesson 5 Taking Care of the Environment

#### Lesson 5.2

- multiple clean empty glass bottles, water/juice cans, cardboard boxes, paper, plastic water bottles, plastic containers to be recycled, perhaps from the school cafeteria
- sorting containers, such as paper grocery store bags, labeled (cardboard, glass, cans, paper, plastic)
- variety of items made from recycled materials, such as paper, paper towels, trash bags, cardboard packaging
- gloves

#### Lesson 5.3

- water source
- large pan
- measuring cup
- hand soap
- variety of items made from recycled materials: paper, paper towels, trash bags

### Unit Supplement

- trays (1 per group)
- potting mix soil (8-qt bag)
- garden soil (8-qt bag)
- peat moss (8-qt bag)
- craft sticks (1 per student)
- hand lenses (1 per group)
- paper cups (3 per group)
- tweezers (1 per group)

## CHANGING ENVIRONMENTS PACING

\_\_\_\_\_’s Class

**Note to Teacher:** *Changing Environments* is intended to be taught as the first unit of Kindergarten CKSci. As a general rule, we recommend that you spend a minimum of twenty-four days and a maximum of thirty-six days teaching the *Changing Environments* unit so that you have time to teach the other units in the Kindergarten 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**

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**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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## UNIT 3

# Changing Environments

### OVERVIEW

**Big Question:** How do living things change the environment when they get what they need?

**Anchoring Phenomenon/Problem:** There's a before-and-after story about every meal we eat. The driving question we explore in this unit is, "How do living things change the environment when they get what they need?"

To answer this question over the course of the unit, students will determine what plants and animals, including humans, need to survive. In exploring the question, students investigate how plants and animals, including humans, get what they need from their environments and, in the process, change their environments to meet their needs. They discover that the changes humans cause in environments tend to have a greater impact on land, air, water, and other living things than the environmental changes imposed by other organisms. Subsequently students learn what *eco-friendly* means as they consider ways to reduce the impact of human-caused changes on the environment and other living things.

**Student Book storyline:** It's warm for an early spring day, and Alex's classmates are taking their lunches outside for a picnic. Alex sits under a tree alone, unpacks his lunch, and unwraps a granola bar. While he eats, he watches as a squirrel digs up a buried nut and eats it nearby. Alex is amused that he and the squirrel are eating nuts at the same time. Alex doesn't think the squirrel was especially tidy, though. It has left a hole in the ground where it dug up the nut. And it has left a litter of broken walnut shell where it paused to eat the nut. Alex vows to be tidier as he throws his granola bar wrapper into the trash. He didn't dig a hole in the ground to get his lunch like the squirrel did, either. But now he is wondering, how did the squirrel's walnut get into the ground where the squirrel dug it up? And similarly, how did the nuts get into Alex's packaged granola bar? What will happen to the nutshell that the squirrel leaves behind? What will happen to Alex's granola bar wrapper?

Everything that any living thing eats (and drinks) came from somewhere in an environment. Each meal has a "before story." And many meals have an "after story," too, when there is garbage left over. The before and after stories of all meals (and other consumption) affect environments in some way. The before and after stories of humans' meals tend to cause greater changes to environments than the meals of other living things. People can do things to reduce the changes they cause in environments.

**Long-term project:** Students will do a community (school) awareness campaign about the before and after stories of lunchtime. This can touch on sustainable farming, water usage, packaging, recycling, and many other tangents related to changing environments.

### Introductory Class Session Sources of Food

Students find out where food comes from and what happens after it is consumed. Throughout the unit, students will use prior knowledge, observations, and hands-on experience to find ways to make food processing more sustainable.

### Unit Opener Objective

- ✓ Introduce the unit phenomenon of where food comes from and where it goes.

### NGSS References

**Disciplinary Core Idea:** ESS2.E Biogeology

**Science and Engineering Practice:** 7 Engaging in Argument from Evidence

**Crosscutting Concept:** 4 Systems and System Models

Students begin to gather evidence and learn about where food comes from and where trash goes when plants and animals change the environment to get what they need to live.

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

[www.coreknowledge.org/cksci-online-resources](http://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.

**environment**

## Instructional Activities

- teacher Read Aloud
- question generation
- drawing

## Materials and Equipment

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

## Instructional Resources

Student Book



Ch. 1

**Student Book, Chapter 1**  
“Alex’s Nutty Lunch”

Activity Page



AP UO.1

**Activity Page**  
Food I Eat (AP UO.1)

## THE UNIT OPENER

### 1. Introduce the Anchoring Phenomenon.

NGSS Elements



SEP 1

Introduce the unit by writing the Big Question—**How do living things change the environment when they get what they need?**—on the question board.

- Underneath the question, make three columns: Before, Action, After.
- In the Action column, make a class list of all the foods students have eaten today.
  - » Students may say an egg, a muffin, cereal, or a granola bar.
- Assess prior knowledge by listing where their foods came from. Write information in the Before column.
  - » Students may say from a grocery store, a garden, a package, or a refrigerator. Accept all reasonable answers.
- Record where students think the remains of the food will go, including any plates or packaging. Write information in the After column.
  - » Students may say in the trash or in the dishwasher. Accept all reasonable answers.

- Ask students if they can think of any questions about how what is eaten can change the environment. Record their questions on the question board.
  - » For example: how do foods get to the grocery store, what happens to used packaging, or what happens if animals can't find enough to eat?
- Tell students that in this unit they are going to learn more about where foods they and other animals eat come from, where they go, and how it changes the environment. (See **Know the Standards.**)

NGSS Elements



3D Learning

**3D Learning:** In this unit, students will gather evidence about the systems that provide food for humans and animals, where the food comes from, and how the environment changes as a result of consumption. They use this evidence to construct an argument to improve food processing.

## 2. Read together: “Alex’s Nutty Lunch.”

Student Book



Ch. 1

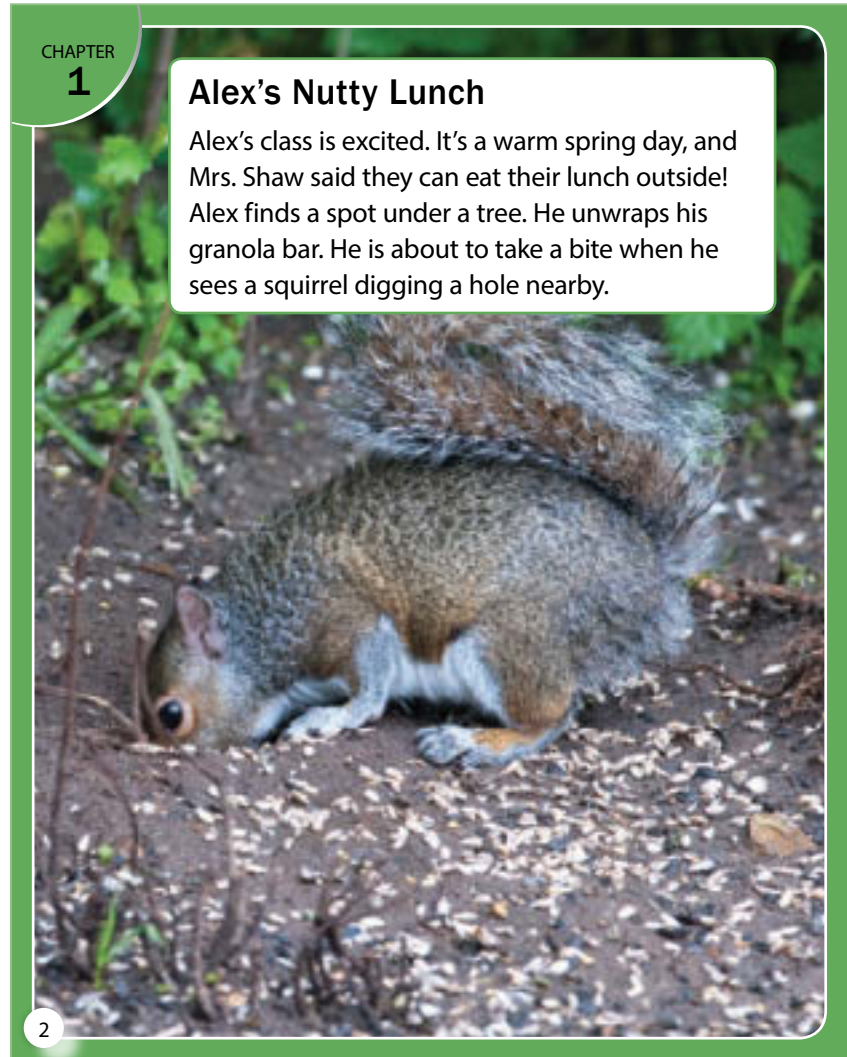
While some advanced students may be able to read words on a given page of the Student Book, as a rule students should not be expected or asked to read aloud the text on the Student Book pages. The text in the Student Book is there so that teachers and parents can read it when sharing the Student Book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

## Know the Standards

## TEACHER DEVELOPMENT

**PE K-ESS2-2: Construct an argument supported by evidence for how plants and animals (including humans) can change the environment to meet their needs.** For this standard, examples of plants and animals changing their environment include many examples beyond searching for and processing food. In addition to food, living things need sunlight, water, air, and shelter to live. Ants build anthills, birds build nests, and rabbits build burrows to meet their needs for shelter. Growing tree roots break sidewalks and underground drainage pipes to meet their needs for growth. Algae cover ponds in search of sunlight. Some of these changes are neutral and others can be harmful to an environment for other living things.

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 “Alex’s Nutty Lunch,” and tell them to pay special attention to where food comes from and where it goes after it is eaten.



### Alex’s Nutty Lunch

Alex’s class is excited. It’s a warm spring day, and Mrs. Shaw said they can eat their lunch outside! Alex finds a spot under a tree. He unwraps his granola bar. He is about to take a bite when he sees a squirrel digging a hole nearby.

- Ask students who are familiar with granola bars to describe what they contain. Supplement responses to clarify that they usually contain crunchy or chewy oatmeal, dried fruit like raisins, sometimes chocolate chips, and often nuts.



The squirrel finds a walnut and begins to nibble. Alex's granola bar has nuts in it, too! He and the squirrel are eating nuts at the same time. Alex thinks this is quite funny.



3

**INFERENTIAL**—How are the nuts Alex is eating the same as what the squirrel is eating?

- » Both are food that will be eaten and digested.

**INFERENTIAL**—How are the nuts different?

- » The squirrel found the nut buried in the ground and has to crack the shell to get the nut inside. Alex is eating a nut from somewhere else that has already been cracked, processed, and packaged.

Alex wonders how the squirrel's nut got there. Where did it come from? How did it get buried? And how did the squirrel know where to find it? Then he looks at his own food. He didn't have to dig a hole in the ground to find his lunch. He knows it came from the grocery store, but where did it come from before that? He is eating nuts just like the squirrel, but how did his get into a granola bar and also inside a plastic wrapper?

Think about your lunch. Where did the parts of it come from?



**LITERAL**—What foods are in the packed lunch in the picture?

» cheese, bread, meat, lettuce, oranges, granola bar, juice

**INFERENTIAL**—Did all these foods come from the same place?

» They came from the grocery store.

**INFERENTIAL**—Which of the foods came from plants, and which came from animals?

» The oranges, juice, bread, lettuce, and granola bar came from plants. The meat and cheese came from animals.

Online Resources



**EXTEND**—Show a video about the ingredients of a simple granola bar. Then show a picture of the sources of each of the ingredients. Discuss where each of the ingredients comes from. Explain that the ingredients come from all over the world:

- almonds from trees
- oats from grain plants
- dates from trees
- peanut butter from legumes underground
- maple syrup from trees

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

[www.coreknowledge.org/cksci-online-resources](http://www.coreknowledge.org/cksci-online-resources)

## Page 5

**Ask students to look at the picture on page 5 as you read aloud.**

Soon, the squirrel finishes eating and runs away. Bits of shell are left behind next to a hole in the ground. It looks a little messy. “How long will that hole and nutshell stay like that?” Alex wonders.

Alex decides that he will be neater than the squirrel. He will throw away his trash. Where does the trash go next?

There is always a story of where a meal came from. After each meal, there is a story of what is left over and what happens to it.



5

**INFERENTIAL**—What will happen to the nutshell?

» It might blow away or be buried.

**INFERENTIAL**—What will happen to Alex’s trash?

» Someone will come and empty the trash can.

### 3. Generate questions.

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NGSS Elements



SEP 1

Activity Page



AP UO.1

- Distribute Food I Eat (AP UO.1), and have students complete it. Have each student show their work. Make a class list of foods from plants and foods from animals. Next to each, record the class discussion of where each food comes from and what remains after it is eaten.
- Ask students to think of a question they have about how eating changes the environment. Ask volunteers to say their question and add these questions to the question board.
  - » How does making food for people change the environment? How does getting rid of food waste change the environment?

### 4. Check for understanding.

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Monitor Progress

#### Formative Assessment

Review the questions recorded so far on the question board. Ask students to summarize what they understand about how animals, including people, change the environment when they get what they need to live.

Review student responses in the discussion and to Food I Eat (AP UO.1) to determine student understanding of the following concepts:

- Foods we eat come from many different places.
- Making food can change the environment.
- Food waste can change the environment.

Activity Page



AP UO.1

#### Tie to the Anchoring Phenomenon

In the next lessons, students will gather evidence about where food they and other animals eat comes from and how food production affects the environment. Students will also gather evidence about how food waste affects the environment. Students will use this growing understanding to develop an argument to improve food processing.

# LESSON 1

## Organisms and Their Environments

### OVERVIEW

**Guiding Question:** What do living things consume from their environments?

Lesson 1 Segments	Segment Questions	Advance Preparation
<b>1.1 Meeting Needs</b> Students identify living things in the local environment and find out how they get what they need to survive.	Where do living things get the food and water that they need?	Gather materials for the activity. See Materials and Equipment. Identify a suitable outdoor environment for student exploration.
<b>1.2 Seasons</b> Students recognize seasonal changes and identify how living things respond.	Can living things survive changes in their environments?	Prepare for outdoor and internet video experiences. See Materials and Equipment.
<b>1.3 Damaging Changes</b> Students recognize changes in ecosystems that living things cannot survive.	What kinds of environmental changes can living things not survive?	Prepare for internet photograph experiences. See Materials and Equipment.
<b>1.4 Lesson 1 Roundup: Organisms and Their Environments</b> Students develop understanding of the relationships between organisms and their environments.	What do living things consume from their environments?	Read Chapter 2 in the Student Book.

### What's the Story?

**Summary:** In Lesson 1 (Segments 1–4), students explore their local environment to learn what living things live there and how they get what they need to live throughout the year.

**Learning Progression:** Lesson 1 builds on student understandings and their experience with living things.

**Guiding Phenomenon:** Understanding where food comes from and what happens to food remains and waste provides a window into learning about how living things get what they need from the environment and how they change that environment. Some changes cause harm to the environment, which leads to the effort at the end of the unit to find ways based on evidence to reduce damaging human environmental impacts.



# Learning Objectives

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

- Describe what organisms get from the environment.
- Describe how organisms get what they need from the environment.
- Recognize how seasonal changes affect organisms.
- Recognize how some damaging environmental changes affect organisms.

# NGSS Standards and Dimensions

**Performance Expectation:** K-ESS2-2 Construct an argument supported by evidence for how plants and animals (including humans) can change the environment to meet their needs.

Science and Engineering Practices	Disciplinary Core Idea	Crosscutting Concept
<p><b>7 Engaging in Argument from Evidence</b></p> <p>Engaging in argument from evidence in K–2 builds on prior experiences and progresses to comparing ideas and representations about the natural and designed world(s).</p> <p>Construct an argument with evidence to support a claim.</p> <p><b>1 Asking Questions and Defining Problems</b></p> <p>Asking questions and defining problems in K–2 builds on prior experiences and progresses to simple descriptive questions.</p> <p>Ask questions based on observations to find more information about the natural and/or designed world(s).</p> <p>Define a simple problem that can be solved through the development of a new or improved object or tool.</p>	<p><b>ESS2.E Biogeology</b></p> <p>Plants and animals can change their environment.</p>	<p><b>4 Systems and System Models</b></p> <p>Systems in the natural and designed world have parts that work together.</p>

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

[www.coreknowledge.org/cksci-online-resources](http://www.coreknowledge.org/cksci-online-resources)

## LESSON 1.1

# Meeting Needs

**Big Question:** How do living things change the environment when they get what they need?

**Lesson Guiding Question:** What do living things consume from their environments?

**Today's Question:** Where do living things get the food and water that they need?

**Tie to the Anchoring Phenomenon:** In this lesson, students will begin to explore the before-and-after story in the system of how living things get what they need from the environment. They'll begin to recognize how living things change the environment to make the system work.

## AT A GLANCE

### Learning Objective

- ✓ Describe what organisms consume from their environments.

### Instructional Activities

- student investigation
- class discussion
- question generation
- drawing

### NGSS References

**Disciplinary Core Idea:** ESS2.E Biogeology

**Science and Engineering Practices:** 1 Asking Questions and Defining Problems; 7 Engaging in Argument from Evidence

**Crosscutting Concept:** 4 Systems and System Models

Students identify living things in the local environment and find out how they get what they need to 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](http://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.

animal    garden    needs    plant

**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.

**ecosystem      environment**

## Instructional Resources

Activity Pages



AP 1.1.1

AP 1.1.2

### Activity Pages

Living and Nonliving Things  
(AP 1.1.1)

Garden Plan (AP 1.1.2)

## Materials and Equipment

- hand lenses (1 per pair)
- question board

## THE CORE LESSON 1.1

### 1. Introduce students to Lesson 1.

NGSS Elements



SEP 8

DCI ESS2.E

- Ask a volunteer to state the Big Question that you'll be answering in this unit, which is posted somewhere in the room—**How do living things change the environment when they get what they need?**
- Briefly review the story of Alex and the squirrel from the Unit Opener by asking these questions:
  - Why were Alex and the squirrel eating?
    - » Living things need to eat to live.
  - How did Alex get his food?
    - » probably from home and from a store
  - How did the squirrel get its food?
    - » from a hole in the ground
  - How did they change the environment by getting food and getting rid of food or food containers?
    - » The squirrel ate a nut that could have grown into a new tree. It left behind a shell. Alex ate a granola bar and added to the trash in the trash can.
- Tell students that, to answer the unit's Big Question about how living things change the environment, they will explore their local environment and compare it to other environments. Write the **Lesson 1 Guiding Question** where students can see it.

**What do living things consume from their environments?**

- Introduce Today's Question—**Where do living things get the food and water that they need?** Remind students of the foods they said they liked to eat. Ask the following questions to prompt students to think about where food comes from:
  - How do you usually get the food and water you need?
    - » from the store, from parents, from the school cafeteria
  - How does a bird get the food and water it needs?
    - » from berry bushes, from ponds or bird baths
- Explain that in this lesson, students will learn a lot more about how living things get what they need to live and how they change the environment as they do that.

### Tie to the Anchoring Phenomenon

Living things, like the squirrel and Alex, change the environment when they get what they need to live.

**3D Learning:** In this lesson, students will gather evidence about the systems that allow living things to get what they need to live.

## 2. Facilitate hands-on interaction.

NGSS Elements



SEP 8  
DCI ESS2.E

- Explain that the class will go outside to explore the living things and the nonliving things in their environment to find organisms that get what they need to survive and how they get it. Explain that when students come back in, they will draw a picture of three living things they saw in their environment and list or draw three nonliving things. Then students will discuss what each living thing needs to live and how those particular living things get what they need.
  - Explain that living things can be plants or animals. Ask students to identify the differences between living and nonliving things. (See **Know the Science.**)
    - » Living things can grow. They need water, sun, air, shelter, and food to survive. Nonliving things do not grow, so they don't have the same needs that living things do.

## Know the Science

## TEACHER DEVELOPMENT

**Ecosystems:** An ecosystem includes all the living and nonliving things in a particular place. This includes plants and animals and nonliving things such as water, rocks, air, soil, and sand. An ecosystem is a system because the living things interact with nonliving things and with other living things to survive. An ecosystem can be as small as a moss-covered rock or as large as a vast hemlock forest.

- Ask students for examples of living things and nonliving things in the environment they explored.
  - » For example, grass, trees, birds, squirrels, people, and dogs are living things. Rocks, soil, water, and air are nonliving things.
- Provide each student or pair of students a hand lens, and allow them to explore an outdoor area for ten minutes looking for living and nonliving things.

#### Differentiation

**SUPPORT**—Some students may need assistance in identifying living things. Guide these students to explore a tree or other plant for insects.

### 3. Guide discussion.

#### Activity Page



AP 1.1.1

- Distribute Living and Nonliving Things (AP 1.1.1) to each student, and ask them to draw a picture of two different living things they saw in their environment.
- When students are finished, make a class list on the question board of all the living things, sorting them by plants and animals.
- Discuss each of the living things by asking the following questions. Have students draw what the living things that they identified consume in the environment:
  - What does each plant need to live?
    - » soil, water, space, sunlight
  - How does the plant get what it needs?
    - » It grows in the sunlight, takes in water from rain, has space to grow, and has roots growing in the soil.
  - What does each animal need to live?
    - » food, water, air, shelter
  - How does the animal get what it needs?
    - » An insect eats leaves, a horse gets water from a pond, and a bird uses a tree for shelter.
  - How does each living thing change the environment?
    - » Accept all reasonable answers. For example, an insect that eats leaves changes the plant. A tree takes up space and blocks sunlight that other plants might need.
  - How can nonliving things change the environment?
    - » Accept all reasonable answers. For example, there can be too much rain or not enough, wind can blow down trees, and there can be too much sun or not enough.



## 4. Plan a garden.

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### Activity Page



AP 1.1.2

- Discuss ways in which human beings change the environment that students previously explored outside by asking this question:
  - **How could you tell that humans have changed the environment?**
    - » The grass was mowed, and the bushes were trimmed. There are sidewalks and a trash can. There are power wires and lights.
- Distribute Garden Plan (AP 1.1.2). Ask students to think about making a space in the environment that would meet their needs for living. Discuss the following elements, and have students draw the elements that appeal to them:
  - What plants would you need?
    - » trees, flowers, favorite food plants
  - How would you get food?
    - » grow plants to eat
  - What kinds of shelter would you need?
    - » a tent, a tree house, a house
  - How would you get water?
    - » a water fountain, a pond, a stream
  - How would making your garden change the environment?
    - » Space would have to be cleared; plants would be planted; a shelter would be built.

## 5. Check for understanding.

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### NGSS Elements



SEP 7

Monitor Progress

### Formative Assessment

Ask students to present their garden plans and explain how the garden will provide food, water, and shelter.

Review student responses in the discussion and to Living and Nonliving Things (AP 1.1.1) and Garden Plan (AP 1.1.2) to determine student understanding of the following concepts:

- Living things get what they need to live from the environment.
- In getting what living things need to live, they change the environment.

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

### Activity Pages



AP 1.1.1

AP 1.1.2

Review the questions and observations made on the question board. Encourage students to suggest additions for you to make to the board of any questions or new observations they have.

### Tie to the Anchoring Phenomenon

In this activity, students recognize that food and water for all living things comes from somewhere in the environment and that living things change the environment when they get and consume what they need. Alex and the squirrel are both consuming food they need to survive. They both change the environment when they get what they need.

## LESSON 1.2

# Seasons

**Big Question:** How do living things change the environment when they get what they need?

**Lesson Guiding Question:** What do living things consume from their environments?

**Today's Question:** Can living things survive changes in their environments?

**Tie to the Anchoring Phenomenon:** In this lesson students expand their understanding of how seasonal changes affect how living things get what they need in an environment.

## AT A GLANCE

### Learning Objectives

- ✓ Describe seasonal changes in environments.
- ✓ Relate plant and animal responses to seasonal changes.

### Instructional Activities

- class discussion
- question generation
- drawing

### NGSS References

**Disciplinary Core Idea:** ESS2.E Biogeology

**Science and Engineering Practices:** 1 Asking Questions and Defining Problems; 7 Engaging in Argument from Evidence

**Crosscutting Concept:** 4 Systems and System Models

Students recognize seasonal changes and identify how living things respond.

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

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## 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.

fall      season      spring      summer      winter

**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.

**ecosystem      environment**

## Instructional Resources

Activity Page



AP 1.2.1

**Activity Page**  
Seasons (AP 1.2.1)

## Materials and Equipment

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

## THE CORE LESSON 1.2

### 1. Focus student attention.

Begin the class by revisiting the local environment where students identified living and nonliving things. Then review the things of both types that students identified in the local environment. Discuss these questions to activate prior knowledge about seasons:

- Is it warm or cold outside?
  - » Answers will vary based on the time of year, current weather, and location.
- Is it sunny, dry, cloudy, rainy, or snowy outside?
  - » Answers will vary based on the time of year, current weather, and location.
- How would we be dressed if it were hotter outside? Colder?
  - » shorts in hotter weather and coats in colder weather
- How would we be dressed if it were raining outside? Snowing?
  - » wearing rain boots and raincoats if it were raining and wearing boots and warm coats if it were snowing
- How do the living things we saw change when it's colder outside?
  - » Some plants might die in cold weather, and some animals might leave to find other shelter.

- How do the living things we saw change when it's raining outside? Snowing?
  - » Some animals find shelter from the rain or snow. Some plants might die when it snows or if there is too much rain.
- Is it spring, summer, winter, or fall right now?
  - » Answers will depend on the time of year.
- Ask students to locate one of the living things they found in the previous segment and think about what will happen to it when the weather gets colder or hotter.
- Explain that today you are going to learn about different seasons and how living things respond to them.

## Tie to the Anchoring Phenomenon

This lesson expands student understanding of how living things get what they need from the environment and change it in different seasons.

**3D Learning:** In this lesson segment, students will gather more evidence about the systems that allow living things to get what they need to live in different seasons.

## 2. Gather evidence.

### Online Resources



- Show a video for a common experience of the four seasons in the temperate zone of the Northern Hemisphere.

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

[www.coreknowledge.org/cksci-online-resources](http://www.coreknowledge.org/cksci-online-resources)

- Discuss the following questions to identify the changes in the seasons:
  - How is winter different from spring?
    - » Winter is usually colder than spring. Spring is usually warmer than winter. There is less daylight in the winter than the spring. Usually there are more flowers in the spring than winter.
  - How is summer different from spring?
    - » Summer is usually hotter than spring. The sun is out longer in the summer than the spring.
  - How is fall different from summer?
    - » In fall, the days get shorter, and the weather is cooler. Plants might lose their leaves in the fall. Summer is much warmer than the fall.

### NGSS Elements



SEP 7  
SEP 1  
CCC 4  
DCI ESS2.E

#### Online Resources



- Show a series of short videos to explain how different living things respond to changes in the seasons. Following each video, ask the following questions with the intention to relate student experience to the different types of animals, behaviors during the seasons: (See **Know the Science**.)

See the Online Resources Guide for a link to the recommended videos.

[www.coreknowledge.org/cksci-online-resources](http://www.coreknowledge.org/cksci-online-resources)

- Where and when have you seen this type of animal in our local environment?
  - » Answers will depend on location.
- How does the animal's behavior change in different seasons?
  - » Answers will depend on the animal and local environment.

**EXTEND**—Take a field trip to a local park, looking for evidence of how living things are getting their needs met during the current season. Return to the same location when the season changes to observe how the living things have responded to the seasonal changes. Have students keep a photo or drawing log for each visit to use later for comparison.

### 3. Check for understanding.

#### Formative Assessment

#### Activity Page



AP 1.2.1

#### Monitor Progress

Distribute Seasons (AP 1.2.1). Tell students to choose a season of the year and then a plant or an animal living during that season. Then have students draw a picture with enough detail that other students can determine the season. Be sure students include nonliving things if possible.

- » Students should be able to show how a living thing responds to a particular season.

Ask each student to show their drawing and ask other students to determine what season it is and describe how the living thing is responding to the season. Ask the artist to confirm or explain.

- » a squirrel curled up in the winter, a tree with colorful leaves in fall, a butterfly flying in summer, baby rabbits in a grassy area in spring

## Know the Science

## TEACHER DEVELOPMENT

**Seasonal Adaptations:** Organisms have many adaptations that enable them to survive during different seasons. During spring weather, many plants grow, and animals are born. This often continues through the summer. As the weather cools in fall and daylight become less, food is harder to find. Some plants die. Others become dormant in preparation for winter. Some animals collect and store food that they can eat throughout the winter. Other animals hibernate, migrate, or grow thicker body coverings in reaction to colder weather.



Review student responses on Seasons (AP 1.2.1) to determine students' understanding of the following concepts:

- Environments change during different seasons.
- Living things respond to seasonal changes in environments.

Review the questions and observations made on the question board. Encourage students to suggest additions for you to make to the board of any questions or new observations they have.

### **Tie to the Anchoring Phenomenon**

In this activity, students recognized that environments change with the seasons. Alex's and the squirrel's eating experiences would be different during different seasons.

## LESSON 1.3

# Damaging Changes

**Big Question:** How do living things change the environment when they get what they need?

**Lesson Guiding Question:** What do living things consume from their environments?

**Today's Question:** What kinds of environmental changes can living things not survive?

**Tie to the Anchoring Phenomenon:** In this lesson, students expand their understanding of how fire, flooding, and droughts affect how living things get what they need in an environment.

## AT A GLANCE

### Learning Objective

- ✓ Recognize ecosystem changes that can lead to death and extinction.

### Instructional Activities

- class discussion
- question generation

### NGSS References

**Disciplinary Core Idea:** ESS2.E Biogeology

**Science and Engineering Practices:** 1 Asking Questions and Defining Problems; 7 Engaging in Argument from Evidence

**Crosscutting Concept:** 4 Systems and System Models

Students recognize changes in ecosystems that living things cannot 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](http://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.

**drought      fire      flood**

**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.

**ecosystem      environment      extinct**

## Instructional Resources

Activity Page



AP 1.3.1

**Activity Page**  
Danger (AP 1.3.1)

## Materials and Equipment

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

## THE CORE LESSON 1.3

### 1. Focus student attention on Today's Question.

- Review changes living things make in response to seasonal changes by having students pantomime a flower throughout the seasons. For example, have students pantomime sprouting in spring, blossoming in summer, fading in fall, and dying in winter.
- Explain that today you are going to learn about some environmental changes that living things have a difficult time surviving or cannot survive.

#### Tie to the Anchoring Phenomenon

This lesson expands student understanding of how living things are affected by environmental damage that could cause an ecosystem to break down so that living things could not get what they need to live.

**3D Learning:** In this lesson segment, students will gather more evidence about how systems can break down so that living things have a difficult time getting or cannot get what they need to live.

### 2. Gather evidence.

NGSS Elements



SEP 8  
CCC 4  
DCI ESS2.E

- Ask students what they know about fire.
  - » Some may have experienced a campfire or bonfire; some may have seen a fire on TV or been aware of a forest or grassland fire.
- Explain that when fires get out of control, they can cause a lot of damage, and the living things that were part of the environment either have to escape or die.

- Display a pair of pictures of only landscape, showing before and after forest fire damage. (See **Know the Science.**)

#### Online Resources



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

[www.coreknowledge.org/cksci-online-resources](http://www.coreknowledge.org/cksci-online-resources)

- Discuss the following questions to identify the changes:
  - How are the pictures the same and different?
    - » The hills and road are the same, but all the plants are burnt.
  - What happened to the plants during the fire?
    - » They were burned and likely died.
  - Did this happen quickly or slowly?
    - » quickly
  - What do you think happened to the animals during the fire?
    - » They ran away or died.
  - When will the animals be able to come back to live?
    - » not until the plants grow back because the animals will not be able to get what they need from the environment to live
- Ask students what experience they have with flooding.
  - » Some may have experienced a flooded basement during a heavy rain; some may have experienced a creek or river flooding.
- Explain that floods can cause a lot of damage and that the living things that were part of the environment either have to escape or die.
- Display a pair of pictures of only landscape showing before and after a flood.

#### Online Resources



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

[www.coreknowledge.org/cksci-online-resources](http://www.coreknowledge.org/cksci-online-resources)

## Know the Science

## TEACHER DEVELOPMENT

**The Benefits of Fires:** There are benefits to a fire. Even a large fire does not kill an entire area. Burnt vegetation can provide nutrients to the soil. Fire can also decrease the population of insects that might damage plants. Burning tall trees allows sunlight to reach the ground and helps shorter plants grow. Some trees are adapted to forest fires. Those with thick bark or protected cones can withstand intense heat. Many grasses are adapted to survive fires; their growing apices are protected underground.

- Discuss the following questions to identify the changes:
  - How are the pictures the same and different?
    - » The roads and building are the same but most of the land is underwater.
  - What happened to the plants during the flood?
    - » They drowned with too much water.
  - Did this happen quickly or slowly?
    - » It might have happened quickly or slowly, depending on the type of flooding.
  - What happened to the animals during the flood?
    - » They ran away.
  - When will the animals be able to come back to live?
    - » not until the plants grow back because the animals will not be able to get what they need from the environment to live
- Ask students what experience they have with drought.
  - » Some may have experienced having to conserve water during the summer.
- Explain that droughts, periods where there is no rain, can cause a lot of damage and that the living things that were part of the environment either have to escape or die.
- Display a pair of pictures of only landscape showing before and after a drought.

#### Online Resources



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

[www.coreknowledge.org/cksci-online-resources](http://www.coreknowledge.org/cksci-online-resources)

- Discuss the following questions to identify the changes:
  - How are the pictures the same and different?
    - » The landscape is the same, but there is a lot of water in one picture and very little water in the other.
  - What happened to the plants during the drought?
    - » They dried up and died.
  - Did this happen quickly or slowly?
    - » slowly
  - What happened to the animals during the drought?
    - » They had to move to a place where they could find enough water to live.
  - When will the animals be able to come back to live?
    - » not until it rains enough and the plants grow back

**EXTEND**—Invite a firefighter to the classroom to talk about fire safety and how fires are fought by the fire department. The firefighter might also discuss controlled fires and how those can help the environment.

### 3. Check for understanding.

Monitor Progress

#### Formative Assessment

Explain that some plants and animals cannot survive changes in the environment and die out entirely, becoming extinct. Ask students if they have ever seen a real dinosaur. Ask what they know about dinosaurs.

Explain that dinosaurs are a type of animal that lived all around the world but died out a long time ago because they could no longer get what they needed to live from the environment. Scientists have different ideas on why the dinosaurs are no longer living.

Distribute Danger (AP 1.3.1). Tell students to circle the reasons that would cause an animal to move from its environment.

Ask students to present the reason for their choice. Emphasize having students use evidence to argue for their decision. Have students discuss the different possibilities or other possibilities.

- » Students should be able to explain in drawings or words that something caused the dinosaurs to not be able to get what they need to live from the environment.

Review student responses to determine student understanding of the following concept:

- Some changes to the environment cause such damage that living things can no longer get what they need to live.

Review the questions and observations made on the question board. Encourage students to suggest additions for you to make to the question board of any questions or new observations they have.

#### Tie to the Anchoring Phenomenon

In this activity, students recognized that some changes to the environment cause living things to die or move to other locations. The squirrel in Alex's story would not be able to find the nut to eat if the environment had been changed by a fire, drought, or flood.

Activity Page



AP 1.3.1



## LESSON 1.4

# Lesson 1 Roundup: Organisms and Their Environments

**Big Question:** How do living things change the environment when they get what they need?

**Lesson Guiding Question:** What do living things consume from their environments?

**Today's Question:** What do living things consume from their environments?

**Tie to the Anchoring Phenomenon:** In this lesson, students expand their understanding of how living things get what they need from their environment.

## AT A GLANCE

### Learning Objective

- ✓ Organize evidence about relationships between organisms and their environments.

### Instructional Activities

- teacher Read Aloud
- class discussion
- question generation

### NGSS References

**Disciplinary Core Idea:** ESS2.E Biogeology

**Science and Engineering Practices:** 1 Asking Questions and Defining Problems; 7 Engaging in Argument from Evidence

**Crosscutting Concept:** 4 Systems and System Models

Students develop understanding of the relationships between organisms and their environments.

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

[www.coreknowledge.org/cksci-online-resources](http://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.

drought  
space

environment  
spring

fall  
summer

fire  
sunlight

flood  
water

food  
winter

season

**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.

**ecosystem    extinct    organism**

## Instructional Resources

Student Book



Ch. 2

Activity Page



AP 1.4.1

**Student Book, Chapter 2**  
“Living Things Have Needs”

**Activity Page**  
Parts of a Dry Environment  
(AP 1.4.1)

## Materials and Equipment

- question board

## THE CORE LESSON 1.4

### 1. Focus student attention on Today’s Question.

NGSS Elements



CCC 4  
DCI ESS2.E

- Review how living things have to respond when the environment changes because of a fire, flood, or drought.
  - » Living things have to move to another location, or they will die.
- Explain that today you are going to read about the different ways in which living things get what they need from their environment.

### Tie to the Anchoring Phenomenon

This lesson organizes student understanding of how living things get what they need to live from the environment. In this lesson segment, students will gather more evidence about how ecosystems work so that plants and animals get what they need to live.

## 2. Read together: “Living Things Have Needs.”

Student Book



Ch. 2

NGSS Elements



DCI ESS2.E

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

Pages 6

**Ask students to turn to page 6 of the Student Book as you read aloud. Remind them that the title of this chapter is “Living Things Have Needs,” and tell them to think about how each animal in the book is getting what it needs to live.**


CHAPTER  
2

### Living Things Have Needs

Alex thinks about how both he and the squirrel got hungry. A hungry feeling means you have a need for food. And a thirsty feeling means you have a need for water. People and other animals need food and water to stay alive. All plants and animals have needs.



6



Animals need food to stay alive.

Animals need water and air to stay alive.

Animals need shelter to stay alive.

7

**LITERAL**—What do animals need to survive?

- » food, water, air, and a safe place to live

**INFERENTIAL**—What do people need to stay alive?

- » food, water, air, and a safe place to live

**INFERENTIAL**—How is the owl meeting its need for a safe place to live?

- » It is living in an open area of a tree.

**EVALUATIVE**—The small rodent is eating a berry. What are some of your favorite foods?

- » Accept reasonable answers. Invite students to give their opinions.



Plants need water to stay alive.

Plants need air and sunlight to stay alive.

Plants need land and space to stay alive.

8

**LITERAL**—What do plants need to survive? (See **Know the Science.**)

» water, sunlight, air, nutrients, and room to grow

**LITERAL**—What types of plants do you see in the pictures?

» trees, grass, flowers

## Know the Science

## TEACHER DEVELOPMENT


**Plants Needs:** Plants need five things to survive: light, air, water, mineral nutrients, and space. Light can come from the sun or artificial lamps. Some plants need more light than others, but all need light to photosynthesize to produce oxygen. They also need water absorbed by the plant roots. Mineral nutrients provide nourishment for plants. Through their roots, plants absorb dissolved nutrients from soil. If a plant can't get the nutrients it needs, chemical fertilizers can provide plants with essential nutrients. Plants also need space to grow. Overcrowded plants are less healthy.

**CORE VOCABULARY**—Explain that both plants and animals need **water** to live. Animals need **food**, which they get from plants and other animals. Plants make their own food using **sunlight**. Animals need a safe place to live, and plants need **space** to grow.


Page 9

Turn to page 9, and read aloud.


Plants and animals live where they can get what they need. The place around a living thing is called an environment. Plants and animals live in many kinds of environments.



The desert is a dry environment.



A pond is a wet environment.



A forest floor is a shady environment.

9

**LITERAL**—What are the different types of environments in the pictures?

» dry desert, wet pond, shady forest

**EVALUATIVE**—Which environment is most likely to have the most living things?

» Students could argue that the pond would have the most because it would have more insects and fish in addition to birds and other animals that might live in the forest. Accept reasonable answers with explanation.

**INFERENTIAL**—Which of these environments has the most sunlight?

» desert



**INFERENTIAL**—Which of these environments has the most water?

» pond

**INFERENTIAL**—Which of these environments has the most food for living things?

» pond or forest

**CORE VOCABULARY**—Discuss the word **environment**. Make a class list of words that are related to *environment*, for example, *nature*, *outdoors*, *Earth*, *wildlife*, and *land*. Have each student complete this sentence: “\_\_\_\_\_ is part of the environment.”

» a bird, a tree, a park, a river

**CHALLENGE**—Challenge students to describe the local environment or environments and how living things find what they need to survive.

## Page 10

**Ask students to look at the picture on page 10 as you read aloud.**

An environment has many parts. The parts work together. Some parts of an environment are alive. Plants and animals are living parts of an environment. Other parts are not alive. Rocks and water are not alive, but they make up parts of environments.

What are some parts of this environment?



10

**LITERAL**—What are the parts of an environment?

» plants, animals, water, rocks, soil

**INFERENTIAL**—How do the living things interact with the nonliving things in an environment?

» They drink or take in water. They find shelter and space on the land.

**Page 11**

**Turn to page 11 as you read aloud.**

Environments can change. Seasons are one kind of change. Fall, winter, spring, and summer happen every year. Weather can change every day. It can get warmer or colder. It can become wet, dry, sunny, or cloudy. Changes affect the living things in an environment. Plants and animals do things that help them survive.

Some trees drop their leaves in the fall. This helps them when there is less sunlight in winter.



Some animals sleep all winter. This helps them when there is less food available.



This fox's fur changes from brown to white in winter. This helps the fox hide when its environment becomes snowy.

11

**INFERENTIAL**—How do animals in our local environment change with the seasons?

» Answers will vary depending on location. For example, some areas may have a greater population of birds in the winter. Other areas may see rabbits throughout the year.

**EVALUATIVE**—Some people travel to see different seasons. For example, people like to see colorful leaves in the fall. Explain which season you like the most.

- » Accept reasonable answers. Invite students to give reasons for their opinions.

**CORE VOCABULARY**—Reinforce the vocabulary by asking students to name the four **seasons**. Discuss students's experiences in **spring** and **summer** when there is more daylight and the temperatures are more warm. Discuss how in **fall** and **winter** there is less daylight and the temperatures are more cold.

Page 12

Turn to page 12, and read aloud.

Some changes happen suddenly. Plants and animals cannot get ready for them. Food and water may be hard to find after a sudden change. Animals can lose their homes. Wildfires are a sudden change. Movement of rock and dirt can be a sudden change.



12

**INFERENTIAL**—How do fires and floods affect an environment?

- » They cause plants to die and animals to leave the area.

**EVALUATIVE**—What do you think is worse for an environment, a flood, drought, or fire?

- » Accept reasonable answers, as long as students base their responses on reasoning and evidence.

**CORE VOCABULARY**—Reinforce the vocabulary asking students to compare **drought**, **fire**, and **flood** by asking these questions:

**INFERENTIAL**—What is the difference between a flood and a drought?

- » A flood is when there is too much water. A drought is when there is not enough water.

**INFERENTIAL**—Why are sudden changes dangerous?

- » Animals and plants cannot get ready for them.

**Page 13**

**Turn to page 13, and read aloud.**

Sometimes an environment changes too much. Living things in the area cannot survive. A change can be so big that it can even kill a whole group of living things. They become extinct. Extinct plants and animals will not live anywhere on Earth again.

A big change may have happened to the environment when dinosaurs lived. A meteor hit the Earth. It caused changes to the air and land. Many living things could not survive this sudden change.



13

**LITERAL**—What happens if an environment changes too quickly?

- » living things cannot survive the change

**LITERAL**—What might have happened to the environment of the dinosaurs?

- » the environment underwent a big change

**INFERENTIAL**—What happened to the dinosaurs?

- » The dinosaurs became extinct.

### 3. Check for understanding.

#### Monitor Progress

#### Activity Page



AP 1.4.1

#### Formative Assessment

Distribute Parts of a Dry Environment (AP 1.4.1). Tell students to circle the pictures that they think would be part of a dry desert environment.

Ask students to present the reasons for their choices. Emphasize using evidence to argue for their decisions. (See **Know the Standards.**)

- » Students should be able to explain that dry environments would not have leafy trees or ponds, although types of snakes and rabbits may be part of different environments.

Review student responses to determine student understanding of the following concepts:

- An environment is a system of living and nonliving things.
- An environment provides what living things need to survive, including food, water, and shelter for animals and sunlight, water, and space for plants.
- Environments change with the seasons and can also experience abrupt changes with a damaging flood, fire, or drought.

Review the questions and observations made on the question board. Encourage students to suggest additions for you to make to the question board of any questions or new observations they have.

## Know the Standards

## TEACHER DEVELOPMENT

**SEP 7 Engaging in Argument from Evidence:** Engaging in argument from evidence is a fundamental science practice that Kindergartners can begin to experience. Instead of basing decisions on preferences, encourage students to listen actively to arguments to indicate agreement or disagreement based on evidence. Prompt students to retell the main points of the argument and to construct an argument with evidence to support a claim. As students make claims about the effectiveness of an object, tool, or solution, prompt them to support their claims with relevant evidence.

## Tie to the Anchoring Phenomenon

In this lesson, students explored what needs the environment that Alex and the squirrel lived in met for them.

Discuss how both Alex and the squirrel changed the environment by asking the following questions:

- What was the school ground like before the lunch break?
  - » It was a space with trees, grass, and a trash can.
- How did the squirrel change the environment?
  - » It dug up a nut, ate it, and left the shell on the ground.
- How did Alex change the environment?
  - » He just sat on the grass, but he added trash to the trash can.



## LESSON 2

# Plant Changes in Environments

### OVERVIEW

**Guiding Question:** How can plants change their environments?

Lesson 2 Segments	Segment Questions	Advance Preparation
<b>2.1 Plants Get What They Need</b> Students observe ways plants change environments when they get what they need.	Where do plants get what they need?	Gather materials for the activity. See Materials and Equipment. Identify a suitable outdoor location for student investigation.
<b>2.2 Root, Leaves, and Seeds Cause Changes</b> (1 day plus 2 weeks observation time) Students engage in growing plants and apply what they observe to plants in the environment.	How can plants' roots, leaves, and seeds cause changes?	Gather materials for the activity. See Materials and Equipment.  Prepare for multimedia experiences.
<b>2.3 Plants Change Environments</b> Students gather evidence that plants cause environmental changes.	How can plants change their environments?	Read Chapter 3 in the Student Book.
<b>2.4 Lesson 2 Roundup: Plants Change Other Living Things</b> Students relate plant needs to environmental changes that affect other living things.	How can plants change their environments?	Gather materials for the activity. See Materials and Equipment.

### What's the Story?

**Summary:** In Lesson 2 (Segments 1–4), students discover ways that plants cause environmental changes as they get the water, sunlight, nutrients, and space they need to live and grow.

**Learning Progression:** In Lesson 1, students engaged in learning how living things get what they need to survive in an environment and how living things move or die if the environment changes and no longer meets those needs. Lesson 2 focuses specifically on plants and how they can change environments.

**Guiding Phenomenon:** Understanding that plants living in an environment provide food for other living things in the environment is central to the phenomenon of where food comes from and what happens to food remains and waste. How plants meet needs in an environment and how they change that environment to meet their needs impacts the other living things in an environment.

# Learning Objectives

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

- Gather evidence of plants causing changes to an environment.
- Relate environmental changes and the effects on living things to the needs of plants.

# NGSS Standards and Dimensions

**Performance Expectation:** K-ESS2-2 Construct an argument supported by evidence for how plants and animals (including humans) can change the environment to meet their needs.

Science and Engineering Practices	Disciplinary Core Idea	Crosscutting Concept
<p><b>7 Engaging in Argument from Evidence</b></p> <p>Engaging in argument from evidence in K–2 builds on prior experiences and progresses to comparing ideas and representations about the natural and designed world(s).</p> <p>Construct an argument with evidence to support a claim.</p> <p><b>1 Asking Questions and Defining Problems</b></p> <p>Asking questions and defining problems in K–2 builds on prior experiences and progresses to simple descriptive questions.</p> <p>Ask questions based on observations to find more information about the natural and/or designed world(s).</p> <p>Define a simple problem that can be solved through the development of a new or improved object or tool.</p>	<p><b>ESS2.E Biogeology</b></p> <p>Plants and animals can change their environment.</p>	<p><b>4 Systems and System Models</b></p> <p>Systems in the natural and designed world have parts that work together.</p>

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

[www.coreknowledge.org/cksci-online-resources](http://www.coreknowledge.org/cksci-online-resources)

## LESSON 2.1

# Plants Get What They Need

**Big Question:** How do living things change the environment when they get what they need?

**Lesson Guiding Question:** How can plants change their environments?

**Today's Question:** Where do plants get what they need?

**Tie to the Anchoring Phenomenon:** In this lesson, students focus on how the needs of plants in an environment result in changes to the environment and thus affect the ability of other living things to get what they need.

## AT A GLANCE

### Learning Objective

- ✓ Observe ways that plants can change environments.

### Instructional Activities

- student investigation
- class discussion
- question generation
- drawing

### NGSS References

**Disciplinary Core Idea:** ESS2.E Biogeology

**Science and Engineering Practices:** 1 Asking Questions and Defining Problems; 7 Engaging in Argument from Evidence

**Crosscutting Concept:** 4 Systems and System Models

Students observe ways plants change environments when they get what they need.

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

[www.coreknowledge.org/cksci-online-resources](http://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.

**plant**

**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.

**ecosystem      environment**

## Instructional Resources

Activity Page



AP 2.1.1

### Activity Page

Plants Get What They Need  
(AP 2.1.1)

## Materials and Equipment

- hand lenses (1 per pair)
- trowel or small shovel
- question board

## THE CORE LESSON 2.1

### 1. Introduce students to Lesson 2.

NGSS Elements



SEP 1

Ask a volunteer to state the Big Question that you'll be answering in this unit, which is posted somewhere in the room—**How do living things change the environment when they get what they need?**

- Briefly review the story of Alex and the squirrel from the Unit Opener by asking these questions:
  - How did Alex get his food?
    - » probably from home or from a store
  - How did the squirrel get its food?
    - » from a hole in the ground
- Briefly review Lesson 1 by asking these questions:
  - What do animals need from their environment to survive?
    - » food, air, shelter, water
  - What do plants need from their environment to survive?
    - » water, air, nutrients, sunlight, space
  - What are some ways that environments change?
    - » seasons, fires, drought, and floods, other living things coming in or leaving

Tell students that, to answer the unit's Big Question about how living things change the environment, they will explore their local environment and compare it to other environments. In this lesson they will focus on plants. Write the Lesson 2 Guiding Question where students can see it:

### How can plants change their environments?

- Introduce Today's Question—**Where do plants get what they need?** Remind students of the foods they said they liked to eat. Ask students to think about the indoor plants they have at home or think about the plants they see indoors at school or in other buildings.
  - How are indoor plants taken care of?
    - » People water them and make sure they have sunlight and nutrients.
  - What would happen to the plants if they didn't get water or sunlight?
    - » They would die.
  - How do these indoor plants change the indoor environment?
    - » They add color. They take up space. They make the room smell nice.

### Tie to the Anchoring Phenomenon

The squirrel, an animal, in Alex's story found its food, a walnut, from the environment. Plants can change the environment and affect whether other living things can get what they need to survive.

**3D Learning:** In this lesson, students will gather evidence about the systems that allow living things to get what they need to live.

## 2. Facilitate hands-on interaction.

NGSS Elements



SEP 7

- Explain that the class will go outside to explore plants in the environment to gather evidence on how plants get what they need to survive. Explain that when students come back in, they will draw a picture of one plant and show how it gets its water, sunlight, nutrients, and space to grow. (See **Know the Science.**)

## Know the Science

## TEACHER DEVELOPMENT

**Plant Parts:** Plants have three main body parts: roots, leaves, and stems. The roots absorb water and nutrients from the soil and anchor the plant in the ground. The stem supports the plant above ground and allows water and nutrients to flow to the leaves. The leaves collect energy from sunlight and make food. To survive, a plant needs water, which is carried from the roots through the stem to the leaves; sunlight; nutrients; air; and space. The flowers, fruits, and seeds are all part of the plant reproduction function.

- Provide each student or pair of students a magnifying lens, and allow them to explore an outdoor area for ten minutes, identifying a plant and how it gets sunlight, water, nutrients, and space. Caution students not to touch or disturb plants. You may wish to use a trowel or small shovel to dig up dandelions, clover, or other abundant plants so students can examine them more closely.

#### Differentiation

**SUPPORT**—Some students may need assistance in deciding on one plant. Guide them to focus on just one plant: a dandelion, a clover, a bush, or a tree. Together talk about how it gets water through roots, where the water comes from, and how it gets sunlight, and describe the space it needs to live.

### 3. Guide discussion.

#### Activity Page



AP 2.1.1

- When you return to the classroom, distribute Plants Get What They Need (AP 2.1.1) to each student. Ask students to draw a picture of the plant they examined. Have students circle the parts that take in water, put a square around the part that takes in sunlight, and draw an arrow to the part that hold the plant up.
- When students are finished, have each student present their drawing and explain how the plant gets water and sunlight.
- Discuss the sources of the plant needs:
  - Where does the water the plant needs come from?
    - » rain, a sprinkler, or a hose
  - How does the plant get sunlight?
    - » It is turned toward the sun.
  - Describe the space your plant has to grow in.
    - » a lawn, a flower bed, between cracks in a sidewalk
  - How does your plant change the environment it is in?
    - » Accept all reasonable answers. For example, the plant takes up space that other plants could use or shades or crowds out other plants. The plant provides a home or food for insects or other organisms.

### 4. Check for understanding.

#### Monitor Progress

#### Formative Assessment

#### Activity Page



AP 2.1.1

Review Plants Get What They Need (AP 2.1.1) by asking the following questions:

- How does the plant you drew survive in the environment?
  - » It gets the air, water, space, nutrients, and sunlight it needs to grow.
- What would happen if the plant didn't get enough sunlight, water, or space?
  - » It would die.

Review students' responses to determine student understanding of the following concepts:

- Plants need water, sunlight, air, nutrients, and space to survive.
- In getting what plants need to live, they change the environment.

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

Review the questions and observations made on the question board. Encourage students to suggest additions for you to make to the question board of any questions or new observations they have.

### **Tie to the Anchoring Phenomenon**

In this activity, students recognize that plants get what they need to survive from the environment and that as part of the ecosystem, they provide food, like the nut in Alex's story, for other living things. In getting what they need to live, plants change the environment and affect other living things.



## LESSON 2.2

# Roots, Leaves, and Seeds Cause Changes

**Big Question:** How do living things change the environment when they get what they need?

**Lesson Guiding Question:** How can plants change their environments?

**Today's Question:** How can plants' roots, leaves, and seeds cause changes?

**Tie to the Anchoring Phenomenon:** In this lesson, students gather evidence of how plants cause changes in an environment by planting seeds and observing roots, leaves, and seeds, like the squirrel's walnut in Alex's story.

## AT A GLANCE

### Learning Objective

- ✓ Describe evidence that plants can cause environmental changes.

### Instructional Activities

- student investigation
- class discussion
- question generation
- drawing

### NGSS References

**Disciplinary Core Idea:** ESS2.E Biogeology

**Science and Engineering Practices:** 1 Asking Questions and Defining Problems; 7 Engaging in Argument from Evidence

**Crosscutting Concept:** 4 Systems and System Models

Students engage in growing plants and generalize what they observe to plants in the environment.

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

[www.coreknowledge.org/cksci-online-resources](http://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.

leaf      plant      root      space  
stem      sunlight      water

**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.

**ecosystem    environment**

### Instructional Resources

Activity Page



AP 2.2.1

**Activity Page**  
Planting Seeds (AP 2.2.1)

### Materials and Equipment

- melon, sunflower, grass, or bean seeds (2 per student)
- transparent plastic cups (1 per student)
- potting soil
- watering can
- access to water
- marker to label plastic cups
- internet access and the means to project images/video for whole-class viewing
- question board

### Advance Preparation

You may wish to prepare the cups with soil before distributing them. Prepare a space on a windowsill or shelf in which students’ plantings can be undisturbed. Alternatively, depending on the season and your location, you may wish to set the cups outside.

## THE CORE LESSON 2.2

### 1. Focus student attention.

NGSS Elements



SEP 7

Briefly review what students learned about plants’ needs in the last segment by asking these questions.

- What do plants need to live?
  - » sunlight, water, nutrients, air, space
- What would happen if a plant doesn’t get enough sunlight, water, nutrients, or space?
  - » It will die.
- What would happen if you plant a seed but don’t water it?
  - » It won’t grow.

- Explain that today you are going to plant seeds and that over the next few days you will observe how plants can cause changes to an environment when they do or do not get what they need to live.

### Tie to the Anchoring Phenomenon

This lesson gives students evidence of how plants cause changes in an environment.

**3D Learning:** In this lesson segment, students will gather more evidence about the systems that allow plants to get what they need to live in an environment.

## 2. Facilitate the activity.

### Differentiation

- Give each student or pair of students a plastic cup with soil. Have them label the cup with their initials, sticker, or other identifier.
- Distribute seeds. (See **Know the Science.**) Have students plant the seeds about an inch deep in the cups, water them, and then place them in a location where they will be warm and undisturbed. You may wish to help them move the plants first and then water the plants.
- Distribute Planting Seeds (AP 2.2.1). Have students draw the seed they planted in the Day 1 box.

### Activity Page



AP 2.2.1

**EXTEND**—Weather and space permitting, identify a space outside where you can establish a class garden bed. It can be very small, just a meter square, or a larger bed, such as three-by-six meters. Mark the area with stones or lumber strips.

On a first visit, take a picture, or have students draw what plants are growing in the space. Continue to take pictures on subsequent visits to compare how the plants change the environment.

To demonstrate the effect of lack of sunlight on plants, place a wooden box or plastic tub over a section of the space. Visit a week later, and observe what happened to the plants.

You might also use the space to plant a garden so that students can further observe how plants change environments.

## Know the Science

## TEACHER DEVELOPMENT

**Sprouting Seeds:** Some seeds sprout faster than others and are better for class demonstrations. Melons, sunflowers, and beans are good because they have seeds (or fruits) that small hands can handle, and they typically sprout within five to seven days. You can speed up the germination, the emergence of the seedling from a seed, by soaking the seed one or two days before planting. Germination requires a warm environment and the ability to absorb water. Lack of water and warmth will slow down germination. To make the root development and growth easier to see, suggest students plant one seed along the side of the cup.

### 3. Make observations (Days 2–15).

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#### Online Resources



- Show a video for a common experience of time-lapse plant growth.

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

[www.coreknowledge.org/cksci-online-resources](http://www.coreknowledge.org/cksci-online-resources)

- Use the following questions about observations:
  - List in order the parts of the plant that appear from the seed.
    - » roots first and then the stem and then the leaves
  - How does the sprouting of the seed change the environment?
    - » It changes the soil and then shades the ground.
- Show a series of pictures to show how plants affect the environment. After showing each picture, ask the following questions:

#### Online Resources



See the Online Resources Guide for a link to the recommended images.

[www.coreknowledge.org/cksci-online-resources](http://www.coreknowledge.org/cksci-online-resources)

- How does this plant change the environment?
  - » The roots can break up the sidewalk. The leaves can cover the ground, block sunlight, and kill other plants. The plant covers the water and blocks sunlight. The seeds spread and make new plants that crowd out other plants.
- Why are there fewer ground plants in a forest than in a field?
  - » The tree leaves block the sun in a forest, so other plants do not get sunlight.

**Pacing Plan:** Every two days for at least two weeks, have students water their seeds, observe any changes, and record those changes on Planting Seeds (AP 2.2.1). Discuss the observations as a class, and compare the progress of germination and seedlings.

- Discuss why seeds do not sprout at the same time. Consider amount of water, sunlight, and warmth.
- At the end of two weeks, discuss the following questions:
  - How did your plant make changes in its environment?
    - » It pushed the dirt aside as the roots grew. The leaves shaded the dirt.
  - How is your plant like the plants that made changes in the pictures?
    - » Like the tree roots, it pushed the dirt aside. Like the forest, it could shade the ground. When the plant dies, its leaves will cover other plants and block sunlight.

## 4. Check for understanding.

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Monitor Progress

Activity Page



AP 2.2.1

### Formative Assessment

Review student responses and observations in Planting Seeds (AP 2.2.1) to determine students' understanding of the following concept:

- Plant roots, leaves, and seeds cause environmental changes.

As students will continue to observe their seeds develop into plants, which will then start growing, make allowances in the class schedule for observation time.

Review the questions and observations made on the question board. Encourage students to suggest additions for you to make to the board of any questions or new observations they have.

### Tie to the Anchoring Phenomenon

In this activity, students recognized that plants cause environmental changes. The squirrel in Alex's story might not be able to find food if other plants crowded out the walnut tree.

## LESSON 2.3

# Plants Change Environments

**Big Question:** How do living things change the environment when they get what they need?

**Lesson Guiding Question:** How can plants change their environments?

**Today's Question:** How can plants change their environments?

**Tie to the Anchoring Phenomenon:** In this lesson, students expand their understanding of how plants change their environments and thus affect other living things.

## AT A GLANCE

### Learning Objective

- ✓ Summarize evidence that plants can cause environmental changes.

### Instructional Activities

- teacher Read Aloud
- class discussion
- question generation
- drawing

### NGSS References

**Disciplinary Core Idea:** ESS2.E Biogeology

**Science and Engineering Practices:** 1 Asking Questions and Defining Problems; 7 Engaging in Argument from Evidence

**Crosscutting Concept:** 4 Systems and System Models

Students gather evidence that plants cause environmental changes.

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

[www.coreknowledge.org/cksci-online-resources](http://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.

leaf	plant	root	space
stem	sunlight	water	

**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.

**ecosystem      environment**

## Instructional Resources

Student Book



Ch. 3

### **Student Book, Chapter 3**

“Plants Can Change Environments”

Activity Page



AP 2.3.1

### **Activity Page**

Plants Make Changes (AP 2.3.1)

## Materials and Equipment

- question board

## THE CORE LESSON 2.3

### 1. Focus student attention on Today’s Question.

#### **How can plants change their environments?**

- Briefly review students’ evidence that shows that plants change their environments.
  - » Roots grow and push soil. Leaves block sunlight for other plants. Seeds can spread and grow many plants. Plants provide food and attract different living things.
- Explain that today you are going to read more about how plants change the environment.

#### **Tie to the Anchoring Phenomenon**

This lesson organizes students’ understanding of how plants can change an environment, like Alex and the squirrel’s environment.

**3D Learning:** In this lesson segment, students will gather more evidence about how ecosystems change when plants get what they need.



## 2. Read together: “Plants Can Change Environments.”

Student Book



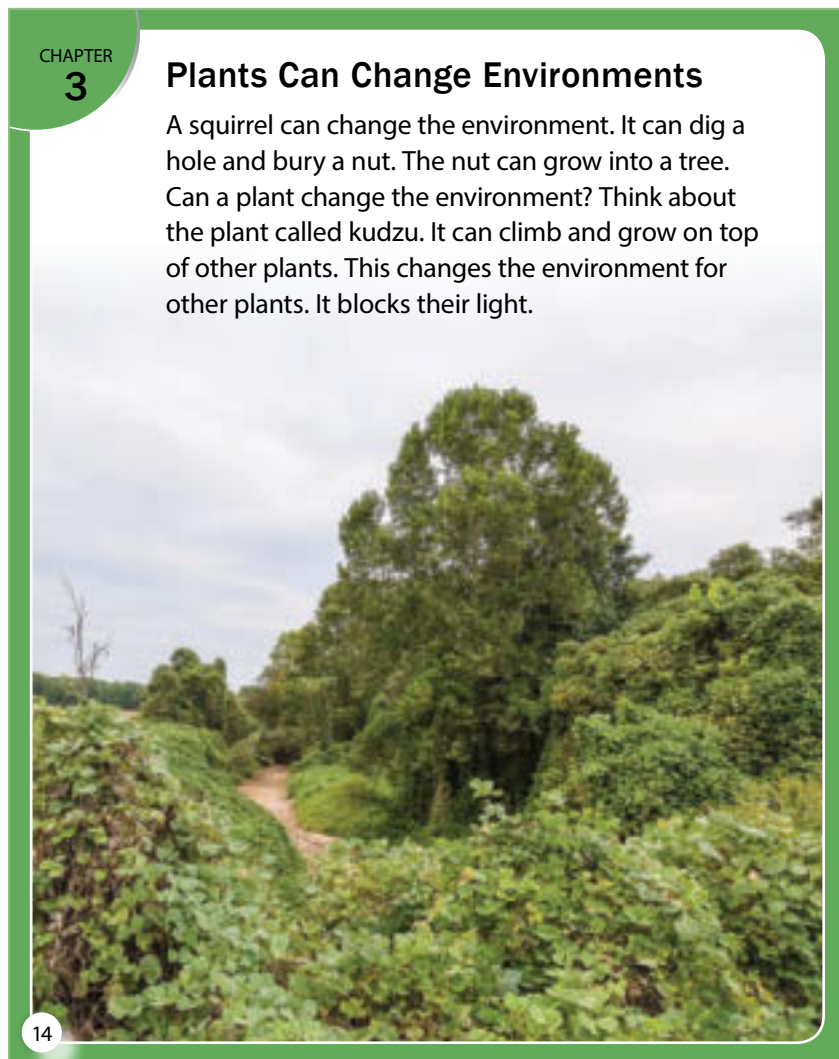
Ch. 3

While some advanced students may be able to read words on a given page of the Student Book, as a 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 as you read aloud. Remind them that the title of this chapter is “Plants Can Change Environments,” and tell them to think about how the plants in the pictures are changing the environment.**



**Ask students to look at the picture on page 14 as you read aloud.**

**LITERAL**—How are the kudzu plants changing the environment?

- » The leaves are covering the tree and other plants, blocking sunlight from other plants and creating a dark environment below.

**INFERENTIAL**—How would kudzu affect animals in the environment?

» If it kills the food for the animals, the animals will go away.

**CORE VOCABULARY**—Have students identify the vegetative body parts of a plant: **leaves, roots, stems**. Flowers and seeds are some of the reproductive body parts. Discuss the function of each part. Roots absorb water and nutrients from the soil. Stems hold the plants up and move water and nutrients from the roots to the leaves. Leaves absorb sunlight. Flowers and seeds make new plants.

**Page 15**

**Turn to page 15, and read aloud.**

Trees can begin growing in small cracks in rocks. When they run out of room, they can grow around the rocks. The roots stretch out into the space they need.



Sometimes the space where a tree is growing does not have enough room for the tree's roots. The tree roots keep pushing. They can break sidewalks apart.



15

**LITERAL**—How are the trees in the pictures changing the environment?

» Their roots are covering the rock in the first picture. In the second picture, the roots are growing and pushing the cement in the sidewalk.

**INFERENTIAL**—How would the trees be different if they had more space?

- » The tree in the first picture wouldn't have to grow over the rock. In the second picture, the roots wouldn't have to push the sidewalk up.

**CORE VOCABULARY**—Explain that plants need **water** and **space** to live.

Discuss how these trees get water. Then have students describe how the trees changed the environment in their struggle to find more space.

**Page 16**

**Turn to page 16, and read aloud.**

Plants need sunlight. Trees that grow large make it shady below them. This changes an environment that used to be sunny. Vines that need sunlight climb to where they can get it. They can shade other plants when they grow on top of them.



16

**LITERAL**—How are the vines growing to get sunlight?

- » They are climbing up the tree.

**INFERENTIAL**—How would the vines grow if the sunlight was in a different place?

- » They would grow toward the sunlight.

**CORE VOCABULARY**—Plants make their own food using air and **sunlight**.

Explain that without sunlight, plants could not grow and would not make food for other living things.

**CHALLENGE**—Challenge students to identify plants that have changed the environment to get more sunlight. For example, trees in an open area, like maples, spread their branches to get the most sunlight. Trees in a forest grow tall so that their tops get more sunlight.

Page 17

**Ask students to look at the pictures on page 17 as you read aloud.**  
(See **Know the Science.**)

Plants that have always lived in an area are called native plants. Other plants can start growing in areas where they are not native. If these plants grow and spread so quickly that they invade the space of native plants, they are called invasive plants. Water hyacinths are invasive plants in this lake. What will happen if they are allowed to continue growing?



17

## Know the Science

## TEACHER DEVELOPMENT

**Invasive Species:** Invasive species are non-native plants that grow and spread quickly. They may displace native or naturalized plants. Invasive species are often spread by people as goods are transported around the world. Sometimes certain plants are introduced to solve one problem but make another problem when they crowd out other native or naturalized plants. The multiflora rose was introduced to make natural fences, but birds spread the seeds and the plant became a problem when it overtook pastureland.

**LITERAL**—How do the plants in the pictures change the environment?

- » They cover other plants and the water. This blocks sunlight, and other plants can't grow.

**INFERENTIAL**—How do invasive plants hurt other plants?

- » They crowd native plants so the native plants can't get the things they need. So, the crowded plants might die.

### 3. Check for understanding.

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Monitor Progress

Activity Page



AP 2.3.1

#### Formative Assessment

Distribute Plants Make Changes (AP 2.3.1). Have students draw one way a plant can change the environment.

Ask students to present their drawings. Emphasize using evidence to argue for their decisions of the plant they drew.

Review student responses to determine student understanding of the following concept:

- Plants cause environmental changes.

Review the questions and observations made on the question board. Encourage students to suggest additions for you to make to the question board of any questions or new observations they have.

#### Tie to the Anchoring Phenomenon

In this lesson, students explored how plants, like those in the environment that Alex and the squirrel live in, can make changes to an environment.



## LESSON 2.4

# Lesson 2 Roundup: Plants Change Other Living Things

**Big Question:** How do living things change the environment when they get what they need?

**Lesson Guiding Question:** How can plants change their environments?

**Today's Question:** How can plants change their environments?

**Tie to the Anchoring Phenomenon:** In this lesson, students show how plant survival affects other living things in an ecosystem, like the squirrel eating a nut in Alex's story.

## AT A GLANCE

### Learning Objectives

- ✓ Associate a plant's changes to an environment with its ability to meet its needs.
- ✓ Identify effects of the changed environment on other living things.

### Instructional Activities

- student investigation
- class discussion
- question generation
- drawing

### NGSS References

**Performance Expectation:** K-ESS2-2

**Disciplinary Core Idea:** ESS2.E Biogeology

**Science and Engineering Practices:** 1 Asking Questions and Defining Problems; 7 Engaging in Argument from Evidence

**Crosscutting Concepts:** 4 Systems and System Models; 2 Cause and Effect

Students relate plant needs to changes in an environment that affect other living things.

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

[www.coreknowledge.org/cksci-online-resources](http://www.coreknowledge.org/cksci-online-resources)

## Core Vocabulary and Language of Instruction

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**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.

leaf      plant      root      space  
stem      sunlight      water

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ecosystem      environment      organism

## Instructional Resources

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Activity Page



AP 2.4.1

### Activity Page

Plants Cause Changes  
(AP 2.4.1)

## Materials and Equipment

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- question board

## THE CORE LESSON 2.4

### 1. Focus student attention.

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Briefly review what students have learned about plant needs by asking these questions:

- What do plants need to live?
  - » sunlight, air, water, nutrients, space
- What would happen if a plant doesn't get enough sunlight, air, water, or space?
  - » It will likely die.
- Make a class list of all the things they can think of that could happen if a plant dies because it couldn't get the air or water it needs. Examples include the following:
  - It stops growing.
  - It doesn't provide food for other living things.
  - Its dead leaves cover the ground and block sunlight.
  - Its dead leaves provide nutrients for other plants to grow.



- Make a class list of all the things they can think of that could happen if a plant grew too big for its space. Examples include the following:
  - It breaks up cement or buildings.
  - It blocks sunlight for other plants so those plants can't grow.
  - It provides shelter for animals to live.
  - It provides extra food to attract more animals.

## Tie to the Anchoring Phenomenon

This lesson applies students' evidence of how plants cause changes in an environment, like the squirrel in Alex's story.

**3D Learning:** In this lesson segment, students will apply the evidence that in getting what plants need to live, they make changes to an ecosystem.

## 2. Facilitate the activity.

NGSS Elements



SEP 7  
SEP 1  
CCC 4  
CCC 2  
DCI ESS2.E

- Select two students to act out the first scenario. Tell one student to act out being a cherry tree. Tell the other student to act out being a bird. Tell the two students to act out in ten seconds what will happen when the cherries become ripe. (See **Know the Science.**)
- Continue selecting pairs of students to act out the following scenarios until everyone has had a chance to participate.
  - The students are a tree and a fish. The tree falls down across a stream in a flood.
    - » After the tree falls, the fish bumps into the tree and can't get past it.
  - The students are an invasive plant and a rabbit. The invasive plant grows and kills the plants the rabbit eats.
    - » After the plant grows, the rabbit sniffs around and then runs away.
  - The students are a bean plant and a butterfly. The bean plant gets enough water and sunlight and flowers.
    - » After the bean plant flowers, the butterfly comes and drinks nectar from the flower.

## Know the Science

## TEACHER DEVELOPMENT

**Plants Provide Needs:** Animals depend on plants for food and shelter. Plants are living things that make their own food and are the primary producers. In later grades, students will study photosynthesis and learn that oxygen is released by plants.

- The students are a blade of grass and an ant. The grass grows outside the entrance to the anthill.
  - » After the grass grows, the ant moves around it.
- The students are a bush and a bird. A thunderstorm starts.
  - » After the storm comes up, the bird takes shelter in the bush.
- The students are a tree and a brick wall. The tree roots grow under the wall.
  - » As the tree roots grow, the brick wall starts to buckle and then falls down.
- The students are a dandelion seed and a sidewalk. The dandelion seed blows into a small crack in the sidewalk.
  - » After the dandelion seed lands, it grows and cracks the sidewalk.
- The students are a tree branch and a squirrel. The branch breaks off, and there is a hollow space in the tree.
  - » After the branch breaks, the squirrel makes a home in the hollow space.
- The students are grass and a deer. A brushfire burns the grass.
  - » After the grass burns, the deer runs away.
- The students are a tree and ivy. The tree grows very tall to get more sunlight.
  - » After the tree grows, the ivy grows up on it to get sunlight.

#### Differentiation

**SUPPORT**—If students struggle, provide prompts that lead them to a logical outcome. Model or pair up with struggling students as necessary.

### 3. Check for understanding.

#### Monitor Progress

#### Formative Assessment

Use the following questions to check for understanding:

- How can plants affect other plants?
  - » They can block sunlight so other plants don't grow well.
- How can plants affect animals?
  - » They can provide or take away food or shelter.
- How can plants affect nonliving things?
  - » They block water flow. They can disrupt soil. They can break up rocks.

#### Activity Page



AP 2.4.1

Distribute Plants Cause Changes (AP 2.4.1), and have students complete a drawing that shows how a plant can change another living or nonliving thing.

Have students present their drawings and discuss the evidence they used in their drawings.

Consider student pantomimes and responses to determine students' understanding of the following concepts:

- Plants need sunlight, air, water, nutrients, and space to live.
- Plants can change living things by providing or not providing food and shelter.

Review the questions and observations made on the question board. Encourage students to suggest additions for you to make to the question board of any questions or new observations they have.

### **Tie to the Anchoring Phenomenon**

In this activity, students recognized that plants cause changes to other living and nonliving things in an ecosystem. The squirrel in Alex's story depends on a plant for food and shelter.

Discuss how plants had changed the environment in the schoolyard where Alex and the squirrel ate by asking the following questions:

- How do the trees change the environment?
  - » They shade the area.
- How do the squirrel's buried nuts change the environment?
  - » Some of them grow into plants if the squirrel doesn't dig them up. The shells that are left after the squirrel eats the nut add back to the soil.

## LESSON 3

# Animal Changes in Environments

### OVERVIEW

**Guiding Question:** How can animals change their environments?

Lesson 3 Segments	Segment Questions	Advance Preparation
<b>3.1 Animals Get What They Need</b> Students observe ways animals change environments when they get what they need.	Where do animals get what they need?	Gather materials for the activity. See Materials and Equipment. Identify a suitable outdoor location for student observations.
<b>3.2 Animal Behaviors Cause Changes</b> Students observe animal behaviors that change environments.	What animal behaviors can cause changes?	Prepare for multimedia experiences. See Materials and Equipment. Identify a suitable outdoor location for student observations.
<b>3.3 Animals Change Environments</b> Students gather evidence that animals cause environmental changes.	How can animals change their environments?	Read Chapter 4 in the Student Book.
<b>3.4 Lesson 3 Roundup: Animals Change Other Living Things</b> Students relate animal needs to environmental changes that affect other living things.	How can animals change their environments?	Gather materials for the activity. See Materials and Equipment.

### What's the Story?

**Summary:** In Lesson 3 (Segments 1–4), students find out how animals cause environmental changes as they struggle to get the water, food, air, and shelter they need to live and grow.

**Learning Progression:** In Lesson 1 students engaged in learning how living things get what they need to survive in an environment. They also learned how living things move locations or possibly die, if the environment changes and no longer provides those needs. Lesson 2 focused specifically on plants and how they can change environments. Lesson 3 focuses on how animals change environments.

**Guiding Phenomenon:** Understanding that animals living in an environment eat food is central to the phenomenon of where food comes from and what happens to food remains and waste. How animals get what they need from the environment and how they might change that environment to make their needs more accessible impacts the other living things in the environment.

# Learning Objectives

By the end of Lesson 3, students will do the following:

- Gather evidence of animals causing changes to an environment.
- Relate environmental changes and the effects on living things to the needs of animals.

# NGSS Standards and Dimensions

**Performance Expectation:** K-ESS2-2 Construct an argument supported by evidence for how plants and animals (including humans) can change the environment to meet their needs.

Science and Engineering Practices	Disciplinary Core Idea	Crosscutting Concept
<p><b>7 Engaging in Argument from Evidence</b></p> <p>Engaging in argument from evidence in K–2 builds on prior experiences and progresses to comparing ideas and representations about the natural and designed world(s).</p> <p>Construct an argument with evidence to support a claim.</p> <p><b>1 Asking Questions and Defining Problems</b></p> <p>Asking questions and defining problems in K–2 builds on prior experiences and progresses to simple descriptive questions.</p> <p>Ask questions based on observations to find more information about the natural and/or designed world(s).</p> <p>Define a simple problem that can be solved through the development of a new or improved object or tool.</p>	<p><b>ESS2.E Biogeology</b></p> <p>Plants and animals can change their environment.</p>	<p><b>4 Systems and System Models</b></p> <p>Systems in the natural and designed world have parts that work together.</p>

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

[www.coreknowledge.org/cksci-online-resources](http://www.coreknowledge.org/cksci-online-resources)

## LESSON 3.1

# Animals Get What They Need

**Big Question:** How do living things change the environment when they get what they need?

**Lesson Guiding Question:** How can animals change their environments?

**Today's Question:** Where do animals get what they need?

**Tie to the Anchoring Phenomenon:** In this lesson, students focus on how the needs of animals in an environment change the environment and affect the ability of other living things to get what they need within the ecosystem.

## AT A GLANCE

### Learning Objective

- ✓ Observe ways that animals can change environments.

### Instructional Activities

- student investigation
- class discussion
- question generation
- drawing

### NGSS References

**Disciplinary Core Idea:** ESS2.E Biogeology

**Science and Engineering Practices:** 1 Asking Questions and Defining Problems; 7 Engaging in Argument from Evidence

**Crosscutting Concept:** 4 Systems and System Models

Students observe ways animals change environments when they get what they need.

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

[www.coreknowledge.org/cksci-online-resources](http://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.

air      food      shelter      water

**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.

**ecosystem      environment**

## Instructional Resources

Activity Page



AP 3.1.1

### Activity Page

Animals Get What They Need  
(AP 3.1.1)

## Materials and Equipment

- hand lenses (1 per pair)
- trowel or small shovel
- question board

## THE CORE LESSON 3.1

### 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 do living things change the environment when they get what they need?**

- Briefly review the story of Alex and the squirrel from the Unit Opener by asking these questions:
  - How do you know the plants in the story were getting what they need from the environment?
    - » They were alive and healthy.
  - How do you know the squirrel and Alex were getting what they need from the environment?
    - » They were alive and healthy.
- Briefly review Lessons 1 and 2 by asking these questions:
  - What do animals need from their environment to survive?
    - » food, air, shelter, water
  - What do plants need from their environment to survive?
    - » water, sunlight, air, nutrients, space

Tell students that, to answer the unit's Big Question about how living things change the environment, they will explore their local environment and compare it to other environments. In this lesson, they will focus on animals.



Write the Lesson 3 Guiding Question where students can see it:

### How can animals change their environments?

Introduce Today's Question—**Where do animals get what they need?** Ask the following questions about dogs or cats that live at home to prompt students to think about animal needs:

- What does a dog or cat need to live?
  - » food, air, shelter, water
- How does a dog or cat get what it needs?
  - » People feed it food, give it water, and make sure it has a safe place to sleep.
- How does a dog or cat change the environment in a home?
  - » It takes up space, and people need to schedule time to feed and take care of it.

### Tie to the Anchoring Phenomenon

The squirrel, as an animal, in Alex's story got its food, a walnut, from the environment. That walnut might have been eaten by a chipmunk or racoon. Animals can change the environment and affect whether other living things can get what they need to survive.

**3D Learning:** In this lesson segment, students will gather evidence about the systems that allow living things to get what they need to live.

## 2. Facilitate hands-on interaction.

NGSS Elements



SEP 7

- Explain that the class will go outside to look for animals in their environment and gather evidence about where animals get what they need to survive. Explain that when students come back in, they will draw a picture of one animal and show how it gets its water, air, food, and shelter. (See **Know the Science.**)
- Provide each student or pair of students a magnifying lens, and allow them to explore an outdoor area for ten minutes, identifying an animal to see how it gets food, water, and shelter from the environment. Caution students not to touch or disturb animals. You may wish to use a trowel or small shovel to dig up the top layer of soil to look for insects or other animals.

## Know the Science

## TEACHER DEVELOPMENT

**Animal Food Needs:** Animals eat many different foods. Some animals, like rabbits and deer, eat only plants, including leaves, flowers, nuts, and seeds. Some animals, like sharks, eat only other animals. Some animals eat both plants and other animals.

**SUPPORT**—Some students may need assistance in deciding on one animal. Guide these students to focus on just one animal: an ant, a bird, a squirrel, or a worm. Discuss together about how the animal gets water, where the water comes from, where it finds food, and what its shelter is like.

### 3. Guide discussion.

#### Activity Page



AP 3.1.1

- When you return to the classroom, distribute *Animals Get What They Need* (AP 3.1.1) to each student. Ask students to draw a picture of the animal they observed. Have students draw what it eats and drinks, as well as its shelter.
- When students are finished, have each student present their drawing and explain how the animal gets water, food, and shelter.
- Discuss the sources of the animal needs:
  - Where does the water the animal needs come from?
    - » a bird bath, a lake, a puddle, moisture from the ground
  - What does the animal eat?
    - » leaves, grass, nuts, berries, nectar
  - How does the animal get food?
    - » It climbs or flies to the food source.
  - Describe your animal's shelter.
    - » A bird finds shelter among leaves in a tree or bush. A rabbit finds shelter in an empty log. An ant finds shelter in an anthill.
  - How does your animal change the environment it is in?
    - » Accept all reasonable answers. For example, the animal digs up the ground or builds nests in trees or grass.

**EXTEND**—It may not be obvious what an animal eats or where it sleeps in a shelter. Assist students in researching online shelters and foods for certain insects, birds, or rodents.

### 4. Check for understanding.

#### Monitor Progress

#### Formative Assessment

#### Activity Page



AP 3.1.1

Review *Animals Get What They Need* (AP 3.1.1) by asking the following questions:

- Why does the animal you drew survive in the environment?
  - » It gets the water, food, air, and shelter it needs to grow.
- What would happen if it didn't get enough water, air, food, or shelter?
  - » It would die or move to another location.

Review student responses to determine student understanding of the following concepts:

- Animals need water, food, air, and shelter to survive.
- In getting what animals need to live, they change the environment.

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

Review the questions and observations made on the question board. Encourage students to suggest additions for you to make to the question board of any questions or new observations they have.

### **Tie to the Anchoring Phenomenon**

In this activity, students recognize that animals get what they need to survive from the environment and as part of the ecosystem, like the squirrel in Alex's story. In getting what they need to live, animals change the environment and affect other living things.

## LESSON 3.2

# Animal Behaviors Cause Changes

**Big Question:** How do living things change the environment when they get what they need?

**Lesson Guiding Question:** How can animals change their environments?

**Today's Question:** What animal behaviors can cause changes?

**Tie to the Anchoring Phenomenon:** In this lesson students gather evidence of how animal behaviors cause changes in an environment, like the squirrel in Alex's story.

## AT A GLANCE

### Learning Objective

- ✓ Describe evidence that animals can cause environmental changes.

### Instructional Activities

- student investigation
- class discussion
- question generation
- drawing

### NGSS References

**Disciplinary Core Idea:** ESS2.E Biogeology

**Science and Engineering Practices:** 1 Asking Questions and Defining Problems; 7 Engaging in Argument from Evidence

**Crosscutting Concept:** 4 Systems and System Models

Students observe animal behaviors that change environments.

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

[www.coreknowledge.org/cksci-online-resources](http://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.

**air    food    shelter    water**

**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.

**ecosystem      environment      organism**

### Instructional Resources

Activity Page



AP 3.2.1

**Activity Page**  
Animal Changes (AP 3.2.1)

### Materials and Equipment

- hand lenses (1 per pair)
- internet access and the means to project images/video for whole-class viewing
- question board

## THE CORE LESSON 3.2

### 1. Focus student attention.

Briefly review what students learned about animal needs in the last segment by asking these questions.

- What do animals need to live?
  - » food, water, air, shelter
- What would happen if an animal didn't get enough water, air, food, or shelter?
  - » It would die or move to another location.
- Explain that today you are going back outside to find evidence of animals and changes animals make to the environment.

### Tie to the Anchoring Phenomenon

This lesson gives students evidence of how animals cause changes in an environment, like the squirrel in Alex's story.

**3D Learning:** In this lesson segment, students will gather more evidence about the living and nonliving systems that allow animals to get what they need to live in an environment.

## 2. Facilitate hands-on interaction.

- Explain that the class will go outside to look for evidence of animals in the environment and changes they make to the environment. Explain that when students come back in, they will draw a picture of the evidence they found. (See **Know the Science**.)
- Give each student or pair of students a hand lens, and take them to an outdoor area.

### Differentiation

**SUPPORT**—If students struggle, guide them to look for soft mounds or holes in the ground that would be evidence of moles, chipmunks, or insects. See if they can find fur or feathers, chewed leaves, woodpecker holes in trees, or mounds of dirt or wood.

## 3. Guide discussion.

### NGSS Elements



SEP 7

SEP 1

CCC 4

DCI ESS2.E

- Distribute Animal Changes (AP 3.2.1). Have students draw one of the pieces of evidence they found that animals make changes in their environment.
- Show a series of videos to show how specific animals change the environment. Start with the squirrel video to relate to the squirrel in the Student Book. After each video, ask questions.

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

[www.coreknowledge.org/cksci-online-resources](http://www.coreknowledge.org/cksci-online-resources)

### Online Resources



- **How does this animal change the environment?**
  - » It digs tunnels underground. It buries nuts. It makes holes in trees. It makes dirt hills. It builds nests in trees. It eats everything and kills the plants.

## Know the Science

## TEACHER DEVELOPMENT

**Animals Affect Environments:** By meeting their needs for food, air, water, and shelter, animals affect their environments in different ways. Underground burrows and mounds are made by animals seeking shelter. Stashes of nuts and acorns in holes in the ground or in trees are made by animals seeking to store food. Some of the changes animals make harm the environment for other living things. Others have neutral or beneficial effects.

### 3. Check for understanding.

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Monitor Progress

Activity Page



AP 3.2.1

#### Formative Assessment

Review student responses and observations in Animal Changes (AP 3.2.1) to determine student understanding of the following concept:

- Animals cause environmental changes.

Review the questions and observations made on the question board. Encourage students to suggest additions for you to make to the question board of any questions or new observations they have.

#### Tie to the Anchoring Phenomenon

In this activity, students recognized that animals cause environmental changes. The squirrel in Alex's story probably has a nest in the tree and a place to store nuts.



## LESSON 3.3

# Animals Change Environments

**Big Question:** How do living things change the environment when they get what they need?

**Lesson Guiding Question:** How can animals change their environments?

**Today's Question:** How can animals change their environments?

**Tie to the Anchoring Phenomenon:** In this lesson, students expand their understanding of how animals change their environments and thus affect other living things.

## AT A GLANCE

### Learning Objective

- ✓ Summarize evidence that animals can cause environmental changes.

### Instructional Activities

- teacher Read Aloud
- class discussion
- question development
- drawing

### NGSS References

**Disciplinary Core Idea:** ESS2.E Biogeology

**Science and Engineering Practices:** 1 Asking Questions and Defining Problems; 7 Engaging in Argument from Evidence

**Crosscutting Concept:** 4 Systems and System Models

Students gather evidence that animals cause environmental changes.

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

[www.coreknowledge.org/cksci-online-resources](http://www.coreknowledge.org/cksci-online-resources)

## Core Vocabulary and Language of Instruction

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**food      shelter      water**

**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.

**ecosystem      environment      organism**

## Instructional Resources

Student Book



Ch. 4

### Student Book, Chapter 4

"Animals Can Change Environments"

Activity Page



AP 3.3.1

### Activity Page

Animals Make Changes  
(AP 3.3.1)

## Materials and Equipment

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

## THE CORE LESSON 3.3

### 1. Focus student attention.

- Briefly review what evidence students have gathered that shows that animals change their environments.
  - » Some animals dig tunnels and holes in trees. Some animals eat plants or cover leaves with webs.
- Explain that today you are going to read more about how animals change the environment. (See **Know the Standards.**)

### Tie to the Anchoring Phenomenon

This lesson organizes student understanding of how animals can change an environment, like the one Alex and the squirrel are in.

## Know the Standards

## TEACHER DEVELOPMENT

**DCI ESS2.E Biogeology:** The word *biogeology* includes the roots for "life" and "Earth." This reflects the study of the interactions among Earth's spheres (biosphere, geosphere, hydrosphere, and atmosphere). Life only exists within the system that includes the land, water, and atmosphere. The interactions among living things and Earth's land, water, and air is biogeology.

**3D Learning:** In this lesson segment, students will gather more evidence about how ecosystems work when animals get what they need and change an environment.

## 2. Read together: “Animals Can Change Environments.”

Student Book



Ch. 4

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

### Read Aloud Support

Pages 18–19

**Ask students to turn to page 18 of the Student Book as you read aloud. Remind them that the title of this chapter is “Animals Can Change Environments,” and tell them to think about how the animals in the pictures are changing the environment.**

CHAPTER  
4

### Animals Can Change Environments

Animals can change environments as they live to meet their needs. Do you remember the squirrel Alex saw when he was eating lunch? Squirrels bury nuts so that they can always find food. Nuts contain seeds that can grow into new trees if they are left in the ground. Squirrels don't mean to plant new trees. It is just a change that can happen.



18

Other animals change their environments on purpose to help them meet their needs. For example, birds build nests to lay eggs in. Ants hollow out wood so they can live in large groups. Inside, the ants build many rooms.



19

**Ask students to look at the pictures on pages 18 and 19 as you read aloud.**

**LITERAL**—How does the squirrel change the environment?

- » The squirrel digs a hole and buries the nut.

**LITERAL**—What can happen to the nut if the squirrel doesn't eat it?

- » It can grow into a tree.

**INFERENTIAL**—How does a new tree change the environment where it grows for animals?

- » Birds build nests in trees. Animals make hollow spaces to live in. Insects lay eggs on tree leaves. Insects eat tree leaves.

**EVALUATIVE**—Do you think it's good or bad for a tree for animals to live in it?

- » Accept reasonable answers. Some effects are positive for the tree; others are negative. Invite students to give reasons for their opinions.

**CORE VOCABULARY**—Explain that a **shelter** is a place that gives protection from bad weather or danger. Make a class list of different types of shelters and the animals that live in them, including nests, caves, dens, and hives. Then make a class list of different types of shelters for humans: apartments, houses, tents, hotels, and cabins. Ask students to explain how all of the shelters provide protection from weather and danger.

**Pages 20–21**

**Turn to pages 20 and 21, and read aloud.**

The beaver is one animal that changes its environment to meet its needs. Beavers chew through trees to cut them down. They drag the trees into piles in streams. The pile in the stream is called a beaver dam. The dam blocks the stream water.

The blocked water floods the surrounding land. It makes a deep pond. The beaver swims and finds food in the pond. From beneath the water, the beaver can climb up inside a pile of trees and sticks and make a room inside. The room inside the pile is called a lodge. It is the beaver's home.



20

**LITERAL**—How can a beaver change the environment?

- » It cuts down trees that other animals live in. It builds dams as a shelter that change how water flows.



When a beaver changes the environment to meet its needs, it does not mean to harm other living things. However, a beaver dam changes a stream environment so much that some other living things can't survive there anymore.

Certain fish need the running water of a stream to lay their eggs. They cannot survive in the still water of a beaver pond. Many plants that live near a stream cannot survive the change when the land is flooded with water.



21

**INFERENTIAL**—How does a beaver get what it needs to live?

- » It cuts down trees to build shelter. It collects and stores food to eat. It gets all the water it needs.

**EVALUATIVE**—In what ways do beaver dams change the environment?

- » Accept reasonable answers. Invite students to give reasons for their answers.

- Show a video about beavers to show how they change the environment.

Online Resources



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

[www.coreknowledge.org/cksci-online-resources](http://www.coreknowledge.org/cksci-online-resources)

**CORE VOCABULARY**—Explain that animals need **water**, **air**, and **food** to live. Discuss how beavers get food from trees and other animals, such as caterpillars. Have students describe where different animals get water to drink.

### 3. Check for understanding.

---

Monitor Progress

Activity Page



AP 3.3.1

#### Formative Assessment

Distribute Animals Make Changes (AP 3.3.1). Have students draw one way an animal can change the environment.

Ask students to present their drawings. Emphasize that students use evidence to argue for their decisions.

- » Students should be able to demonstrate that by making a shelter or finding food or water, an animal changes the environment.

Review students' responses to determine student understanding of the following concept:

- Animals cause environmental changes as they get what they need to live.

Review the questions and observations made on the question board. Encourage students to suggest additions for you to make to the question board of any questions or new observations they have.

#### Tie to the Anchoring Phenomenon

In this lesson, students explored how animals, like the squirrel in Alex's story, can make changes to an environment.



## LESSON 3.4

# Lesson 3 Roundup: Animals Change Other Living Things

**Big Question:** How do living things change the environment when they get what they need?

**Lesson Guiding Question:** How can animals change their environments?

**Today's Question:** How can animals change their environments?

**Tie to the Anchoring Phenomenon:** In this lesson, students show how animal survival affects other living things in an ecosystem, like the squirrel eating a nut in Alex's story.

## AT A GLANCE

### Learning Objectives

- ✓ Associate animals' changes to environments with their ability to meet their needs.
- ✓ Identify effects of animals' changes to environments on other organisms.

### Instructional Activities

- student investigation
- class discussion
- question generation
- drawing

### NGSS References

**Performance Expectation:** K-ESS2-2

**Disciplinary Core Idea:** ESS2.E Biogeology

**Science and Engineering Practices:** 1 Asking Questions and Defining Problems; 7 Engaging in Argument from Evidence

**Crosscutting Concepts:** 4 Systems and System Models; 2 Cause and Effect

Students relate animal needs to changes in an environment that affect other living things.

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

[www.coreknowledge.org/cksci-online-resources](http://www.coreknowledge.org/cksci-online-resources)

## Core Vocabulary and Language of Instruction

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**air   food   shelter   water**

**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.

**ecosystem      environment      organism**

## Instructional Resources

Activity Page



AP 3.4.1

### Activity Page

Animals Change Living and Nonliving Things (AP 3.4.1)

## Materials and Equipment

- question board

## THE CORE LESSON 3.4

### 1. Focus student attention.

- Briefly review what students learned about animal needs by asking these questions:
  - What do animals need to live?
    - » food, water, shelter
  - What would happen if an animal didn't get enough food or water or didn't have shelter?
    - » It would die or move to another location.
- Make a class list of all the things students can think of that could happen if an animal couldn't get the water it needed and moved away. For example:
  - It wouldn't eat any plants or other animals in the environment. Those uneaten plants and animals could take over the environment.
  - It wouldn't provide food for other living things.
  - It wouldn't make a shelter that might provide a home for other living things.
- Make a class list of all the things students can think of that could happen if an animal didn't have shelter in an environment. For example:
  - It would move.
  - It could get eaten by other animals.
  - Other living things might move in.
- Explain that today, pairs of students will take turns acting out how animals make changes in the environment and affect other living things from the evidence students have encountered.

## Tie to the Anchoring Phenomenon

This lesson applies students' evidence of how animals cause changes in an environment, like the squirrel in Alex's story.

**3D Learning:** In this lesson segment, students will apply the evidence that in getting what they need to live, animals make changes to an ecosystem.

## 2. Facilitate the activity.

NGSS Elements



SEP 7

SEP 1

CCC 4

CCC 2

DCI ESS2.E

- Select two students to act out the first scenario. Tell one student to act out being a squirrel. Tell the other student to act out being an acorn. Tell the students to act out in ten seconds what will happen when the squirrel hides the acorn in the ground. For example, the acorn will sprout and grow into a tree.
- Continue selecting pairs of students to act out the following scenarios until everyone has had a chance:
  - The students are a bird and a worm. The bird flies around looking for food.
    - » When the bird flies and sees the worm, it eats the worm.
  - The students are an ant and a berry bush. The ant crawls along looking for food.
    - » After the ant smells the berry, it eats it.
  - The students are a groundhog and a worm. The groundhog builds a new tunnel.
    - » As the groundhog digs, the worm gets pushed aside.
  - The students are a bird and some grass. The bird builds a nest in a tree.
    - » The bird picks the grass and takes it to its nest.
  - The students are a deer and a wolf. The wolf is looking for food.
    - » When the deer sees the wolf, it runs away.
  - The students are a woodpecker and a tree. The woodpecker wants to go to sleep.
    - » The woodpecker pecks a hole in the tree for a shelter.
  - The students are a frog and a fly. The frog is looking for food.
    - » As the fly goes by, the frog eats it.
  - The students are a fish and a pond plant. The fish is looking for food.
    - » As the fish swims by, it stops and nibbles on the plant.
  - The students are a coyote and a pond. The coyote needs water every day.
    - » The coyote makes a path in the land to the pond.

- The students are a rabbit and a lettuce plant. The rabbit is looking for food.
  - » Once the rabbit smells the lettuce, it eats it.

**SUPPORT**—If students struggle, provide prompts that lead them to a logical outcome. Model or pair up with struggling students as necessary.

### 3. Check for understanding.

Monitor Progress

#### Formative Assessment

Use the following questions to check for understanding:

- How can animals affect plants?
  - » They can eat them. They can step on them. They can use them for shelter.
- How can animals affect other animals?
  - » They can eat them. They can eat their food. They can move into or destroy their shelters.
- How can animals affect nonliving things?
  - » They drink water. They can dig up soil.

Distribute Animals Change Living and Nonliving Things (AP 3.4.1), and have students complete drawings that show how an animal can change another living thing and a nonliving thing. (See **Know the Science.**)

Have students present their drawings and discuss the evidence they used in their drawings.

Consider students' pantomimes and responses to determine student understanding of the following concepts:

- Animals need food, air, water, and shelter to live.
- Animals can change living things by eating them or using them for shelter.

Review the questions and observations made on the question board. Encourage students to suggest additions for you to make to the question board of any questions or new observations they have.

Activity Page



AP 3.4.1

## Know the Science

## TEACHER DEVELOPMENT

**Animals Getting Water:** Animals need water to live. Some animals, like insects, are small, so morning or evening dew meets their needs. Many animals, like deer, rely on ponds and streams. Since water in the desert is so scarce, many desert animals get water from the plants and animals they eat. During dry seasons, some animals dig waterholes.

## Tie to the Anchoring Phenomenon

In this activity, students recognized that animals cause changes to other living and nonliving things in an ecosystem. The squirrel in Alex's story depends on a plant for food and shelter.

Discuss how animals had changed the environment in the schoolyard where Alex and the squirrel ate. **Ask the following questions:**

- How do squirrels change the environment?
  - » They dig holes in the ground. They store nuts in trees and other places. They chew holes in things.
- What other animals have an effect on the environment?
  - » Birds have nests in trees. Insects eat tree leaves and other plants. Moles, rabbits, and groundhogs may build tunnels and spaces to live underground.

## LESSON 4

# Human Changes in Environments

### OVERVIEW

**Guiding Question:** How do people change their environments?

Lesson 4 Segments	Segment Questions	Advance Preparation
<b>4.1 Humans Get What They Need</b> Students observe ways humans change environments when they get what they need.	Where do people get what they need?	
<b>4.2 Human Behaviors Cause Changes</b> Students observe human behaviors that change environments.	What human behaviors can cause changes?	Prepare for multimedia experiences. See Materials and Equipment.
<b>4.3 People Change Environments</b> Students gather evidence that humans cause environmental changes.	How do people change their environments?	Read Chapter 5 in the Student Book.
<b>4.4 Lesson 4 Roundup: People Change Other Living Things</b> Students relate human needs to changes in an environment that affect other living things.	How do people change their environments?	

### What's the Story?

**Summary:** In Lesson 4 (Segments 1–4), students find out ways that humans cause environmental changes as they struggle to get the water, food, air, and shelter they need to live and grow.

**Learning Progression:** In Lesson 1, students engaged in learning how living things get what they need to survive in an environment and how living things move or die off if the environment changes and no longer provides those needs. Lesson 2 focused specifically on plants and how they can change environments. Lesson 3 focused on how animals change environments. In Lesson 4, students will explore how humans change environments.

**Guiding Phenomenon:** Understanding that humans living in an environment eat food that comes from plants is central to the phenomenon of where food comes from and what happens to food remains and waste. How humans get what they need from the environment and how they might change that environment to make their needs more accessible impacts the other living things in the environment.

# Learning Objectives

By the end of Lesson 4, students will do the following:

- Gather evidence of people causing changes to an environment.
- Relate environmental changes and the effects on living things to human needs.

# NGSS Standards and Dimensions

**Performance Expectation:** K-ESS2-2 Earth’s Systems: Construct an argument supported by evidence for how plants and animals (including humans) can change the environment to meet their needs.

Science and Engineering Practices	Disciplinary Core Idea	Crosscutting Concept
<p><b>7 Engaging in Argument from Evidence</b></p> <p>Engaging in argument from evidence in K–2 builds on prior experiences and progresses to comparing ideas and representations about the natural and designed world(s).</p> <p>Construct an argument with evidence to support a claim.</p> <p><b>1 Asking Questions and Defining Problems</b></p> <p>Asking questions and defining problems in K–2 builds on prior experiences and progresses to simple descriptive questions.</p> <p>Ask questions based on observations to find more information about the natural and/or designed world(s).</p> <p>Define a simple problem that can be solved through the development of a new or improved object or tool.</p>	<p><b>ESS2.E Biogeology</b></p> <p>Plants and animals can change their environment.</p>	<p><b>4 Systems and System Models</b></p> <p>Systems in the natural and designed world have parts that work together.</p>

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

[www.coreknowledge.org/cksci-online-resources](http://www.coreknowledge.org/cksci-online-resources)



## LESSON 4.1

# Humans Get What They Need

**Big Question:** How do living things change the environment when they get what they need?

**Lesson Guiding Question:** How do people change their environments?

**Today's Question:** Where do people get what they need?

**Tie to the Anchoring Phenomenon:** In this lesson, students focus on how humans can change their environment to meet their needs and affect the ability of other living things to get what they need within the ecosystem.

## AT A GLANCE

### Learning Objective

- ✓ Observe ways that humans change environments.

### Instructional Activities

- student investigation
- class discussion
- question generation
- drawing

### NGSS References

**Disciplinary Core Idea:** ESS2.E Biogeology

**Science and Engineering Practices:** 1 Asking Questions and Defining Problems; 7 Engaging in Argument from Evidence

**Crosscutting Concept:** 4 Systems and System Models

Students observe ways humans change environments when they get what they need.

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

[www.coreknowledge.org/cksci-online-resources](http://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.

**air    food    shelter    water**

**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.

**ecosystem      environment**

## Instructional Resources

Activity Page



AP 4.1.1

### Activity Page

People Get What They Need  
(AP 4.1.1)

## Materials and Equipment

- question board

## 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 do living things change the environment when they get what they need?**

- Briefly review the story of Alex and the squirrel from the Unit Opener by asking these questions:
  - What's the difference between the way Alex and the way the squirrel got their nuts to eat?
    - » The squirrel got it from the environment. Alex brought his granola bar from another place, and it was made with ingredients from many different environments.
- Briefly review Lessons 2 and 3 by asking these questions:
  - What do animals need from their environment to survive?
    - » food, air, shelter, water
  - What do plants need from their environment to survive?
    - » water, air, nutrients, sunlight, space

Tell students that, to answer the unit's Big Question about how living things change the environment, they will explore their local environment and compare it to other environments. In this lesson, they will focus on people. Write the Lesson 4 Guiding Question where students can see it:

### **How do people change their environments?**

- Introduce Today's Question—**Where do people get what they need?** Remind students of the foods they said they liked to eat. Ask the following questions to prompt students to think about human needs:
  - What do you need to live?
    - » food, water, air, shelter
  - How do you get what you need to live?
    - » from my family or the store
  - How have you changed the environment in your home?
    - » I have a place where I sleep and eat.
- Ask students to look around the room for evidence of human changes to the environment. Make a class list of their observations.
  - » The room and school are changes to the environment to make shelter. A sink or water fountain or water bottles are evidence of human changes to the environment to have water.

### **Tie to the Anchoring Phenomenon**

In the story, Alex ate a granola bar. He probably got it from his family, who got it from a store. But the nuts, the oats, and all the other ingredients came from some plant or animal source. Each of these came from sources that were grown or raised and thus caused changes in the environments they came from. They did not come from the immediate environment, but they are examples of how humans have changed the environment to meet our needs to survive.

**3D Learning:** In this lesson, students will gather evidence about the living and nonliving systems that allow humans to get what they need to live.

## 2. Facilitate hands-on interaction.

- Explain that the class will look outside for ways that humans have changed the environment to get what we need to survive. Explain that students will draw a picture of one way humans have changed the environment. (See **Know the Science**.)
- Allow students to explore an outdoor area for ten minutes, looking for evidence of human effects on the environment.

### Differentiation

**SUPPORT**—Some students may need assistance in deciding on one way that humans have changed the environment. Encourage these students to look for ways people have changed the environment to meet our needs for water, shelter, or food.

## 3. Guide discussion.

### NGSS Elements



SEP 7

SEP 1

CCC 4

DCI ESS2.E

### Activity Page



AP 4.1.1

- When you return to the classroom, distribute People Get What They Need (AP 4.1.1) to each student. Ask students to draw a picture of one change to the environment that has been made by humans in an effort to meet their need for food, water, air, or shelter.
- When students are finished, have each student present their drawing. After each presentation, ask these questions:
  - Is this change to meet the need for shelter, air, water, or food or for some other reason?
    - » Many changes will not specifically be for shelter, food, or water. For example, playground equipment is for recreation. Landscaping is for attractiveness. And many changes, like power lines, are for improvements to shelter.
  - Could an animal have made this change?
    - » probably not
  - How does this change affect plants in the environment?
    - » People may have cut down other plants or planted different kinds of plants.

## Know the Science

## TEACHER DEVELOPMENT

**Human Effect on Environments:** Even though around 71% of Earth is water-covered and around 95% of the world's human population inhabits only about 10% of the land, humans have had a significant effect on environments around the globe. Uninhabited areas are still often near roads and highways. Air and water travel make all areas of the world accessible. Human food production and needs for water and shelter, including energy and materials, affect air and water quality around the world.

- How does this change affect other animals in the environment?
  - » Birds or insects may like the new plants. Other animals, like deer, may stay away because they cannot find what they need to survive. Some animals, like birds and raccoons, may find food, water, or shelter in the changes humans made.
- Discuss the natural resources that meet human needs in the environment.
  - How are the ways humans meet their water needs different from the ways other animals and plants meet their water needs?
    - » Humans can drink from a water fountain, a water bottle, or a canned drink after it has been filtered and processed. When they have to, people can drink rainwater or from a stream or pond.

## 4. Check for understanding.

### Monitor Progress

#### Activity Page



AP 4.1.1

### Formative Assessment

Review People Get What They Need (AP 4.1.1) by asking the following questions:

- What types of changes do people make to the environment for food?
  - » make gardens, farms, orchards, food processing plants, and grocery stores
- What types of changes do people make to the environment for shelter?
  - » build houses, apartment buildings, and office buildings

Review student responses to determine student understanding of the following concepts:

- Humans need water, food, air, and shelter to survive.
- In getting what humans need to live, they change the environment.

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

Review the questions and observations made on the question board. Encourage students to suggest additions for you to make to the question board of any questions or new observations they have.

### Tie to the Anchoring Phenomenon

In this activity, students recognize that people get what they need to live and survive from the environment. In Alex's story, he eats a granola bar that represents many different human changes to the environment to produce food. For example, the ingredients were grown in different farms, they were transported on roads, and they were packaged in a processing plant and delivered to a grocery store. In getting what they need to live, humans change the environment and affect other living things.

## LESSON 4.2

# Human Behaviors Cause Changes

**Big Question:** How do living things change the environment when they get what they need?

**Lesson Guiding Question:** How do people change their environments?

**Today's Question:** What human behaviors can cause changes?

**Tie to the Anchoring Phenomenon:** In this lesson, students gather evidence of how human behaviors cause changes in an environment, like the environment in Alex's story.

## AT A GLANCE

### Learning Objective

- ✓ Associate humans' changes to environments with their ability to meet their needs.

### Instructional Activities

- class discussion
- question generation
- drawing

### NGSS References

**Disciplinary Core Idea:** ESS2.E Biogeology

**Science and Engineering Practices:** 1 Asking Questions and Defining Problems; 7 Engaging in Argument from Evidence

**Crosscutting Concept:** 4 Systems and System Models

Students observe human behaviors that change environments.

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

[www.coreknowledge.org/cksci-online-resources](http://www.coreknowledge.org/cksci-online-resources)

## Core Vocabulary and Language of Instruction

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air    food    shelter    water

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**ecosystem      environment      organism**

## Instructional Resources

Activity Page



AP 4.2.1

### Activity Page

Human Needs (AP 4.2.1)

## Materials and Equipment

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

## THE CORE LESSON 4.2

### 1. Focus student attention.

Briefly review what students learned about human needs in the last segment by asking these questions:

- What do people need to live?
  - » food, water, air, shelter
- What would happen if you didn't get enough water, food, or shelter?
  - » You might get sick and need help.
- How is the help people need different from what would happen if another animal didn't get what it needs to live?
  - » Other animals don't have the same help and resources people have.
- Explain that today you are going to explore where your food, air, water, and shelter come from and how your needs are met differently from the way an animal, like a squirrel, meets its needs because people have changed the environment.

### Tie to the Anchoring Phenomenon

This lesson gives students evidence of how humans cause changes in an environment to meet our needs, like the way Alex got the granola bar.

**3D Learning:** In this lesson segment, students will gather more evidence about the systems that allow people to get what they need to live in an environment.



## 2. Guide the discussion.

### Activity Page



AP 4.2.1

NGSS Elements



SEP 7

SEP 1

CCC 4

DCI ESS2.E

- Distribute Human Needs (AP 4.2.1). Have students draw their favorite food, drink, and place to be. Then ask students to share their drawings.
- On the board with the class, categorize the foods into these groups:
  - Fruits from Trees (for example, apples, oranges, cherries)
  - Fruits from Vines or Bushes (for example, grapes, watermelons, berries)
  - Vegetables (for example, broccoli, carrots, cauliflower)
  - Grains (for example, wheat, rice)
  - Foods from Animals (for example, cheese, eggs, yogurt)
  - Meat (for example, beef, pork, chicken, fish)
  - Combinations (for example, bread, macaroni and cheese, spaghetti and meatballs, pizza, hamburger, cake)
- Discuss how cooking combinations are made. There are lots of ingredients, including flour, oil, milk, eggs, vanilla, and sugar, that come from all over. Ask these questions:
  - How are the foods you like to eat different from the foods a squirrel eats?
    - » Many are from a lot of different ingredients. They come from many different places, not from the local environment. They are prepared and sometimes packaged in plastic or cans.
  - How is the way you get food different from the way an animal gets its food?
    - » We buy it from a grocery store. Unless we have a garden or a farm, we don't pick the food ourselves. Animals have to find their own food.

### Online Resources



- Show a video of how one type of food gets to the grocery store, and then discuss these questions.

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

[www.coreknowledge.org/cksci-online-resources](http://www.coreknowledge.org/cksci-online-resources)

- What are some of the changes people made to the environment to get the food, like eggs, to the grocery store?
  - » People had to make sure the chickens have food and water.
  - » People had to build cages for the chickens and a way to collect the eggs.
  - » People had to build a factory to wash the eggs and put them in cartons and boxes.
  - » People had to build roads and trucks to get the boxes to the grocery store.
  - » People had to build a grocery store where the eggs can be kept cool and safe so people can buy them.

- How did all these changes make the environment change?
  - » Trees were cut down, land was cleared, and electricity was provided. The animals and plants that lived on the land were eliminated or moved to another location.

**EXTEND**—Ask a local farmer to come and discuss the process of growing the food that we buy at a grocery store.

- Have students share their favorite drink they drew on Human Needs (AP 4.2.1).
- On the board with the class, categorize the drinks into these groups:
  - Water
  - Milk
  - Juice
  - Other
- Ask these questions: (See **Know the Science**.)
  - How are the drinks you like different from what a deer or dog drinks?
    - » Animals mostly just drink water. We drink a lot of different drinks.
  - How is the way you get your drinks different from the way an animal gets its drinks?
    - » We buy them from a grocery store or get them from a machine or water fountain. Animals must find natural sources of water.
- Show a video of how a drink, like orange juice, gets to the grocery store, and then discuss these questions.

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

[www.coreknowledge.org/cksci-online-resources](http://www.coreknowledge.org/cksci-online-resources)

- What are some of the changes people made to the environment to get the drink, like orange juice, to the grocery store?
  - » People had to grow an orchard.
  - » People had to get crates and trucks to collect the oranges.
  - » People had to build a factory to squeeze the oranges and pour the juice into bottles.

#### Online Resources



## Know the Science

## TEACHER DEVELOPMENT

**Water Needs:** Although there are a variety of liquids people drink, they are all composed mostly of water. Flavored drinks and water are just water with flavoring. Fruits used to make juices, like oranges, are also mostly water. So, people have many choices to meet their need for water.

- » People had to build roads and trucks to get the bottles to the grocery store.
- » People had to build a grocery store where the juice can be kept cool and safe so people can buy it.
- How did all these buildings change the environment?
  - » Trees were cut down, land was cleared, and electricity was provided. The animals and plants that lived on the land were eliminated or moved.

**EXTEND**—Choose a food and conduct internet research on where the ingredients come from.

- Have students share their favorite place to be from Human Needs (AP 4.2.1).
- Ask these questions:
  - How are the shelters you like different from animal shelters?
    - » They are mostly buildings made by people, not underground or in trees.
  - What are buildings made of?
    - » bricks, cement, wood

#### Online Resources



- Show a video of different types of homes.  
See the Online Resources Guide for a link to the recommended video:

[www.coreknowledge.org/cksci-online-resources](http://www.coreknowledge.org/cksci-online-resources)

- What are some of the changes people made to the environment to build the houses?
  - » People had to clear land and dig foundations.
  - » People had to bring building materials to build the houses.
  - » People had to get electricity and water to the houses.
- How did all these homes change the environment?
  - » Trees were cut down, land was cleared, and electricity was provided. The animals and plants that lived on the land were eliminated or moved.

### 3. Check for understanding.

#### Monitor Progress

#### Formative Assessment

Discuss the following question to assess students' understanding of how people change the environment when they get what they need to live:

- Do you think people, animals, or plants cause the most changes to the environment?
  - » Accept reasonable answers with evidence.

Review student responses and observations to determine student understanding of the following concepts:

- People have needs for water, food, air, and shelter to live.
- People cause environmental changes in their effort to get what they need to live.

Review the questions and observations made on the question board. Encourage students to suggest additions for you to make to the question board of any questions or new observations they have.

### **Tie to the Anchoring Phenomenon**

In this activity, students recognized that people cause environmental changes.

## LESSON 4.3

# People Change Environments

**Big Question:** How do living things change the environment when they get what they need?

**Lesson Guiding Question:** How do people change their environments?

**Today's Question:** How do people change their environments?

**Tie to the Anchoring Phenomenon:** In this lesson, students expand their understanding of how people change their environments and affect other living things.

## AT A GLANCE

### Learning Objective

- ✓ Summarize human changes that affect land, air, water, and other organisms.

### Instructional Activities

- teacher Read Aloud
- class discussion
- question generation
- drawing

### NGSS References

**Disciplinary Core Idea:** ESS2.E Biogeology

**Science and Engineering Practices:** 1 Asking Questions and Defining Problems; 7 Engaging in Argument from Evidence

**Crosscutting Concept:** 4 Systems and System Models

Students gather evidence that humans cause environmental changes.

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**ecosystem      environment      organism**

## Instructional Resources

Student Book



Ch. 5

**Student Book, Chapter 5**  
“Humans Can Change  
Environments”

Activity Page



AP 4.3.1

**Activity Page**  
Humans Make Changes  
(AP 4.3.1)

## Materials and Equipment

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

## THE CORE LESSON 4.3

### 1. Focus student attention on Today’s Question.

- Briefly review what evidence students have gathered showing that people, when they are getting their needs met, change their environments.
  - » People build buildings and gardens. They build roads and machines to clear land and move food to grocery stores.
- Explain that today you are going to read more about how people change the environment.

#### Tie to the Anchoring Phenomenon

This lesson organizes students’ understanding of how people can change an environment, like the one Alex and the squirrel are in.

**3D Learning:** In this lesson segment, students will gather more evidence about how ecosystems work when people get what they need and change an environment.

## 2. Read together: “Humans Can Change Environments.”

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 22

Activity Page



AP 4.2.1


**Ask students to turn to page 22 of the Student Book as you read aloud. Remind them that the title of this chapter is “Humans Can Change Environments,” and tell them to think about how the people have changed the environment when looking at the pictures.**

CHAPTER  
5

### Humans Can Change Environments

Alex now knows how plants and animals can change environments. Maybe by making things like granola bars, people can change environments, too. Changes that people make can have big impacts on other living things.

What do you think was here before these houses?



22

**Ask students to look at the picture on page 22 as you read aloud.**

**LITERAL**—What living things are in the picture?

» trees, bushes, and likely insects



**INFERENTIAL**—What living things were there before the houses were built?

» birds, insects, grass, bushes, more trees

**INFERENTIAL**—What did people do to change the environment?

» They cleared the land. They brought in materials. They built roads.

**CORE VOCABULARY**—Explain that a **shelter** is a place that gives protection from bad weather or danger. Make a class list of different types of shelters for people, including apartments, tents, huts, lodges, and cabins. Ask students to explain how all of the shelters provide protection from weather and danger.

**Page 23**

**Ask students to look at the picture on page 23 as you read aloud.**

Alex thinks about the granola bar. He wonders about how the granola bar came to be inside a package.

Foods like granola bars are packaged in factories. Stores have foods in boxes, metal cans, glass jars, and plastic bottles. The materials used to package food came from the environment.

Paper, plastic, and glass come from natural materials. Plants and oil are some natural materials used to make these packages. Humans gather these materials to package things like granola bars.



23

**INFERENTIAL**—Where do all the parts needed to package food come from?

» They come from paper, glass, and plastic from other factories.

**INFERENTIAL**—What would happen if foods were not packaged?

» They would spill and spoil.

Humans change environments to meet their need for food. Humans farm. Farmers grow crops like corn, soybeans, wheat, and oats. When some farms are built, they use a lot of land. Huge areas of land are cleared. Animals that lived on the land cannot live there anymore. Trees and other plants that lived there naturally are replaced with crop plants. In meeting our need for food, people change the environment.



24

**LITERAL**—How did the people who built the farm change the environment?

- » They cut down all the trees and dug up the ground to plant crops. They cleared the land for the buildings.

**INFERENTIAL**—What kinds of food come from farms? (See **Know the Science.**)

- » fruits, like strawberries, oranges, and apples; vegetables, like broccoli and lettuce; eggs, milk, and meat; grains, like corn and wheat

## Know the Science

## TEACHER DEVELOPMENT

**Grain Crops for Support:** In the United States, many farms grow soybeans, wheat, and field corn. Sweet corn is the type that people eat, but most of the corn grown anywhere in the world is field corn, which is dried and used for livestock feed. These grain crops are sold around the world.

**EVALUATIVE**—What would people do for food if there weren't farms?

- » Everyone would need to produce food for themselves. They would have to have their own gardens, chickens, and cows if they wanted milk, eggs, fruits, and vegetables.

**CORE VOCABULARY**—Explain that people need **water**, **air**, and **food** to live. Discuss how most people get food and water and how people have changed the environment to make it accessible.

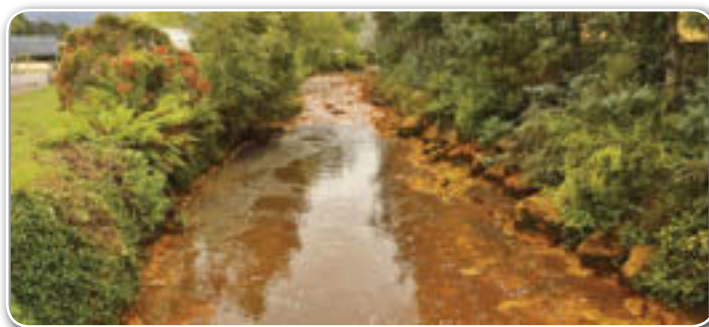
Page 25

**Ask students to look at the pictures on page 25 as you read aloud.**

Some farmers spray crops with materials that help their crops grow or kill bugs that might harm the plants. When it rains, some of the spray can run into nearby streams. The streams can become dirty. Then animals that live in the streams might become sick. Some may even die. Meeting our need for food can sometimes create important changes in our environment.



How can you tell this stream is not healthy?



25

**INFERENTIAL**—Why do people spray crops?

- » to eliminate pests, such as insects, that would eat the crops or diseases that would kill the crops

**EVALUATIVE**—Do you think it is a good or bad thing to spray crops?

- » Accept reasonable answers. Invite students to give reasons for their opinions.

- Show a video about pollution.

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

[www.coreknowledge.org/cksci-online-resources](http://www.coreknowledge.org/cksci-online-resources)

## Page 26

**Ask students to look at the pictures on page 26 as you read aloud.**

Some things grown on farms are used to make food in factories. Like farms, factories are built on land that was once home to living things. Land is cleared to make room for both farms and factories. If we are not careful, our factories can pollute the air and water around them. Pollution can make nearby environments unsafe for plants and animals.



26

**INFERENTIAL**—What kinds of foods are made in factories?

- » foods that have to be made from many ingredients, for example bread and granola bars

What happens when food leaves the factories? Trucks and trains transport it to stores all around the country. Highways and train tracks run through environments. This affects the places where animals live. Sometimes animals cannot safely cross busy roads. They can have a hard time getting what they need to survive.



27

**LITERAL**—How do the foods from the factories get to the stores?

» Trucks and trains take food from the factories to the stores.

**INFERENTIAL**—How can roads be bad for animals?

» Animals won't be able to go across the roads safely to get what they need to survive.



### 3. Check for understanding.

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#### Monitor Progress

#### Activity Page



AP 4.3.1

#### Formative Assessment

Distribute Humans Make Changes (AP 4.3.1). Have students draw one way a human can change the environment.

Ask students to present their drawings. Emphasize using evidence to argue for their decisions.

- » Students should be able to demonstrate that by building shelter, growing food, or providing methods for getting water, people change the environment.

Discuss how the changes affected the environment and other living things.

- » Some changes may have cleared away plants so that animals had to find new homes. Some may cause pollution.

Review student responses to determine student understanding of the following concept:

- People cause environmental changes as they get what they need to live.

Review the questions and observations made on the question board. Encourage students to suggest additions for you to make to the question board of any questions or new observations they have.

#### Tie to the Anchoring Phenomenon

In this lesson, students explore how humans make changes in the environment, like building factories to make food, like the granola bar in Alex's story.

## LESSON 4.4

# Lesson 4 Roundup: People Change Other Living Things

**Big Question:** How do living things change the environment when they get what they need?

**Lesson Guiding Question:** How do people change their environments?

**Today's Question:** How do people change their environments?

**Tie to the Anchoring Phenomenon:** In this lesson, students show how people affect other living things in an ecosystem, like the ecosystem Alex and the squirrel are in.

## AT A GLANCE

### Learning Objective

- ✓ Describe evidence that human changes to environments affect land, air, water, and other organisms.

### Instructional Activities

- class discussion
- question generation
- drawing

### NGSS References

**Performance Expectation:** K-ESS2-2

**Disciplinary Core Idea:** ESS2.E Biogeology

**Science and Engineering Practices:** 1 Asking Questions and Defining Problems; 7 Engaging in Argument from Evidence

**Crosscutting Concepts:** 4 Systems and System Models; 2 Cause and Effect

Students relate human needs to changes in an environment that affect other living things.

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

[www.coreknowledge.org/cksci-online-resources](http://www.coreknowledge.org/cksci-online-resources)



## Core Vocabulary and Language of Instruction

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**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.

**air    food    shelter    water**

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**ecosystem    environment    organism**

### Instructional Resources

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Activity Page



AP 4.4.1

#### **Activity Page**

People Change Environments  
(AP 4.4.1)

### Materials and Equipment

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- question board

## THE CORE LESSON 4.4

### 1. Focus student attention.

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- Briefly review what students learned about human needs by asking this question:
  - What do people need to live?
    - » food, water, air, and shelter
- Make a class list of all the ways students can think of that people change the environment to make sure people have enough to eat. For example:
  - They build farms.
  - They build roads and bridges to move the food to stores.
  - They build factories to process food.
  - They build grocery stores.
- Make a class list of all the ways students can think of that people change the environment to make sure people have shelter. For example:
  - They build stand-alone houses.
  - They build apartments, townhomes, and condos.
  - They build hotels and motels.
  - They build shelters for people who don't have their own homes.

- Explain that today, pairs of students will take turns acting out how people make changes in the environment and affect other living things from the evidence the students have collected to this point.

## Tie to the Anchoring Phenomenon

This lesson applies students' evidence of how people cause changes in an environment like the squirrel in Alex's story.

**3D Learning:** In this lesson segment, students will apply the evidence that in getting what we need to live, people make changes to an ecosystem.

## 2. Facilitate the activity.

### NGSS Elements



SEP 7

SEP 1

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- Select three students to pantomime the first scenario. Tell one student to act out a person building a house in the woods. Tell one other student to act out being a tree and another student to act out being a deer. Tell the students to act out in twenty seconds what will happen when the house is being built. For example, the tree will be cut down, and the deer will run away.
- Continue selecting groups of students to act out the following scenarios until everyone has had a chance:
  - The students are a gardener, a dandelion, and a raccoon. The gardener plants a garden.
    - » The dandelion is pulled, and the raccoon runs away. Then the raccoon comes back to eat from the garden.
  - The students are a farmer, an insect, and a fish in a stream. The farmer sprays the crops to get rid of insects.
    - » After the crops are sprayed, the insect dies, and then the fish in the stream gets sick.
  - The students are a factory worker, a potato, and a bird in the sky. The factory makes potato chips from the potato, and this makes smoke when they are cooked.
    - » As the potato chips cook, smoke comes out of the factory and makes the bird cough.
  - The students are a construction worker, a tree, and a beaver. The construction worker builds a bridge across a lake.
    - » The tree is cut down and removed when the bridge is built, and the beaver leaves its dam.
  - The students are a construction worker, a wild goose, and a wildflower. The construction worker is building an apartment building close to a pond.
    - » The construction worker pushes dirt into the pond. The flower dies. The goose flies away.

- The students are a construction worker, a groundhog, and grass. The construction worker is building a grocery store.
  - » As the construction worker starts digging, the groundhog runs away, and the grass is removed.
- The students are a well digger, a worm, and a tree. The well digger digs a well to get water.
  - » After the well digger cuts down the tree and as the digging starts, the worm moves.
- After each pantomime, discuss these questions: (See **Know the Science**.)
  - What human need is being met?
    - » the need for food, shelter, or water
  - How does meeting the human need affect other living things?
    - » Plants are removed; animals move or get sick.
  - How does meeting the human need affect land, air, and water?
    - » Water may be polluted or redirected, air may be polluted, and land may be cleared.

#### Differentiation

**SUPPORT**—If students struggle, provide prompts that lead them to a logical outcome. You may have to explain each scenario. Model for or pair up with struggling students as necessary.

### 3. Check for understanding.

#### Monitor Progress

#### Formative Assessment

Use the following questions to check for understanding:

- **How can people affect plants in an environment?**
  - » They can cut them down to make buildings. They can replace them with crops. They can kill them with pesticides.

## Know the Science

## TEACHER DEVELOPMENT

**Humans Change Environments:** As humans have developed in industrial and technological societies, they have had a dramatic effect on environments around the world. Habitats are destroyed by removing trees, changing the flow of water, or changing forests or grasslands into farms. Without effective agriculture practices, soil quality can be degraded. In erecting factories and cities, many plants and animals are displaced, and there is an increase in pollution of air, land, and water. Invasive species, which can cause great damage to their new environment, are moved around the world with traded goods. Factory farms that produce meat, fish, or other foods create unnatural populations of animals. Humans change environments, too, by overhunting, overfishing, logging, or burning forests.



- **How can people affect other animals in an environment?**
  - » They can make them move, kill them, or make them sick.
- **How can people affect nonliving things in an environment?**
  - » They change water flow. They dig up soil.

Distribute People Change Environments (AP 4.4.1), and have students complete a drawing that shows how people can change another living or nonliving thing in an environment.

Have students present their drawings and discuss the evidence they used in their drawings. Ask students what kind of environment they drew.

Consider student pantomimes and responses to determine student understanding of the following concepts:

- People need food, water, air, and shelter to live.
- People change environments when they meet their needs.
- People have an effect on other living and nonliving things when they change environments to meet their needs.

Review the questions and observations made on the question board. Encourage students to suggest additions for you to make to the question board of any questions or new observations they have.

### Tie to the Anchoring Phenomenon

In this activity, students recognize that people cause changes to other living and nonliving things in an ecosystem. Humans changed the environment when they built the schoolyard where Alex and the squirrel eat their nuts.

Discuss how humans had changed the environment in the schoolyard where Alex and the squirrel ate by asking the following questions:

- **What evidence of human changes to the environment are there?**
  - » Humans built the school, mowed the grass, built a sidewalk, and installed a trash can.
- **Are the human changes friendly to the environment?**
  - » It depends. By landscaping, other plants and animals were displaced, but there is no obvious pollution or harmful effects.

## LESSON 5

# Taking Care of the Environment

### OVERVIEW

**Guiding Question:** How can people take care of the environment?

Lesson 5 Segments	Segment Questions	Advance Preparation
<b>5.1 Being Eco-friendly</b> Students identify local examples of changes to the environment.	What does it mean to be eco-friendly?	Identify a suitable outdoor location.
<b>5.2 Good and Bad Changes</b> Students compare negative and positive human changes to the environment.	What human activities can be labeled harmful to the environment?	Prepare for multimedia experiences. Gather materials for the activity. See Materials and Equipment.
<b>5.3 Conservation</b> Students explore conservation of resources.	What does it mean to protect the environment?	Prepare for multimedia experiences. Gather materials for the activity. See Materials and Equipment.
<b>5.4 People Can Protect the Environment</b> Students learn more about ways that people can protect the environment.	How can people take care of the environment?	Read Chapter 6 in the Student Book.
<b>5.5 Environmental Solutions</b> Students propose solutions to reduce the negative human effects on the local environment.	How can people take care of the environment?	Gather materials for the activity. See Materials and Equipment.

### What's the Story?

**Summary:** In Lesson 5 (Segments 1–5), students learn about ways to reduce harmful impacts on the environment that are caused by the effort of plants and animals, including people, to get what they need to live.

**Learning Progression:** In Lesson 1, students engaged in learning how living things get what they need to survive in an environment and how living things move or die off if the environment changes and no longer provides for those needs. Lesson 2 focused specifically on plants and how they can

change environments. Lesson 3 focused on how animals change environments. In Lesson 4, students learned how humans change environments. In Lesson 5, students explore ways that harmful effects can be reduced.

**Guiding Phenomenon:** Understanding that humans and other living things make changes to an environment to get what is needed to live leads to the importance of protecting the environment so that it can continue to provide shelter, food, and water. Using ways to get food, water, and shelter and dispose of waste, as Alex did in the story, that cause the least amount of harm to other living things will ensure a healthier environment now and in the future.

## Learning Objectives

**By the end of Lesson 5, students will do the following:**

- Identify negative and positive ways humans impact the environment.
- Explore ways to protect the environment.
- Propose ways to protect the local environment.

## NGSS Standards and Dimensions

**Performance Expectation:** K-ESS3-3 Communicate solutions that will reduce the impact of humans on the land, water, air, and/or other living things in the local environment.

Science and Engineering Practice	Disciplinary Core Idea	Crosscutting Concept
<p><b>8 Obtaining, Evaluating, and Communicating Information</b></p> <p>Obtaining, evaluating, and communicating information in K–2 builds on prior experiences and uses observations and texts to communicate new information.</p> <p>Communicate solutions with others in oral and/or written forms using models and/or drawings that provide detail about scientific ideas.</p>	<p><b>ESS3.C Human Impacts on Earth Systems</b></p> <p>Things that people do to live comfortably can affect the world around them. But they can make choices that reduce their impacts on the land, water, air, and other living things.</p>	<p><b>2 Cause and Effect</b></p> <p>Events have causes that generate observable patterns.</p>

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## LESSON 5.1

# Being Eco-friendly

**Big Question:** How do living things change the environment when they get what they need?

**Lesson Guiding Question:** How can people take care of the environment?

**Today's Question:** What does it mean to be eco-friendly?

**Tie to the Anchoring Phenomenon:** In the story, Alex throws the packaging material left over from the granola bar into the trash. Students learn ways to be eco-friendly.

## AT A GLANCE

### Learning Objective

- ✓ Specify local examples of human changes to the environment.

### Instructional Activities

- class discussion
- question generation
- drawing

### NGSS References

**Disciplinary Core Idea:** ESS3.C Human Impacts on Earth Systems

**Science and Engineering Practice:** 8 Obtaining, Evaluating, and Communicating Information

**Crosscutting Concept:** 2 Cause and Effect

Students identify local examples of changes to the environment.

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## Core Vocabulary and Language of Instruction

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conserve    litter    pollution    recycle  
reduce    reuse



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**eco-friendly    ecosystem    environment**

## Instructional Resources

Activity Page



AP 5.1.1

### Activity Page

Eco-friendly? (AP 5.1.1)

## Materials and Equipment

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

## THE CORE LESSON 5.1

### 1. Introduce students to Lesson 5.

Ask a volunteer to state the Big Question that you'll be answering in this unit, which is posted somewhere in the room—**How do living things change the environment when they get what they need?**

- Briefly review the story of Alex and the squirrel from the Unit Opener by asking this question:
  - What happened after Alex and the squirrel finished eating their snack?
    - » The squirrel left the shell in the dirt. Alex threw his wrapper in the trash can.
- Briefly review Lessons 2 and 3 by asking these questions:
  - How do animals change the environment when they get the water, food, air, and shelter they need to live?
    - » They dig burrows in the ground, they eat plants, and they build nests in trees.
  - How do plants change the environment when they get the sunlight, air, water, nutrients, and space they need to live?
    - » They take up space that other plants might use, they block sunlight for other plants, and they spread seeds.

- Review Lesson 4 with this question:
  - Compare how humans change the environment to the changes made by other living things.
    - » Human changes are more widespread. Humans build farms, factories, and houses to provide food and shelter. Humans build machines and roads to transport food, drinks, and building materials all over the world. In meeting human needs, air, water, and land become polluted.

Write the Lesson 5 Guiding Question where students can see it:

How can people take care of the environment?

- Introduce Today's Question—What does it mean to be eco-friendly? Ask the following questions to prompt them to think about making good choices for the environment:
  - What does it mean to be friendly?
    - » to be kind, to reach out, to help other people, to smile and talk to other people
  - What's a way to be friendly to the environment?
    - » Accept all reasonable answers, which may include throw away trash in trash cans; plant trees; don't waste gasoline or electricity; don't waste water.

Tell students that in this lesson, they will identify ways that people can get what they need to live while protecting the environment.

### Tie to the Anchoring Phenomenon

In the story, Alex and the squirrel gathered food, ate it, and then dealt with the waste. The schoolyard was developed by humans to provide an outdoor environment for people and other living things to live. The environmental choices people make can have either positive, neutral, or negative effects.

**3D Learning:** In this lesson, students obtain, evaluate, and communicate the causes and effects of choices that people make about the environment.

## 2. Facilitate hands-on interaction.

- Explain that the class will look outside for ways that humans have changed the environment. Students' job is to evaluate what human need was met in making the change and how the environment was affected. Explain that they will draw a picture of what they see. (See **Know the Standards.**)
- Allow students to explore an outdoor area for ten minutes, looking for evidence of human effects on the environment.

**EXTEND**—Consider taking students on a bus tour of local sites, such as local parks, water towers or treatment facilities, farms, rivers, lakes, or factories. This will give students a much broader view of human effects on the environment.

## 3. Guide discussion.

### Online Resources



- Show a video about the 3 R's (reduce, reuse, recycle). Ask students to look around the classroom and identify any items they think are eco-friendly, for example, reusable lunch bags or recycled paper. Make a class list.

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

[www.coreknowledge.org/cksci-online-resources](http://www.coreknowledge.org/cksci-online-resources)

### Activity Page



AP 5.1.1

- Then distribute Eco-friendly? (AP 5.1.1) to each student. Ask students to draw a picture of a change to the environment that humans made.
- Have each student present their drawing of a change. Make a class list of each of the changes students identified. After each presentation, ask these questions:

### NGSS Elements



SEP 8

CCC 2

DCI ESS3.C

- Did this change happen to meet a need for shelter, for water, for air, for food, or for some other reason?
  - » Many changes will not specifically be for shelter, food, or water. For example, playground equipment is for recreation. Landscaping is for attractiveness. And many changes, like electric wires, are for improvements to shelter.
- How does this change affect plants in the environment?
  - » People may have cut or mowed down other plants or planted different kinds of plants.

## Know the Standards

## TEACHER DEVELOPMENT

**PE K-ESS3-3:** Examples of human impact on the land can include cutting trees, making gardens or fences, developing parks, building stores, or making yard waste or other trash. Examples of solutions can include reusing paper or packaging, refilling water bottles, recycling cans, or using less electricity or water.

- How does this change affect other animals in the environment?
  - » Birds or insects may like the plantings. Other animals, like deer, may stay away because they cannot find what they need to survive. Some animals, like birds or raccoons, may find food, water, or shelter in the changes humans made.
- Is it eco-friendly?
  - » It is eco-friendly if it is not harmful to the environment, even if it caused changes. The change may be beneficial if it doesn't hurt other living things and is sustainable in that it won't damage living things in the future.

## 4. Check for understanding.

Monitor Progress

### Formative Assessment

Review responses to Eco-friendly? (AP 5.1.1) to determine students' understanding of the following concept:

- People make choices that can harm or hurt the environment when they meet their needs for shelter, food, and water.

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

Review the questions and observations made on the question board. Encourage students to suggest additions for you to make to the question board of any questions or new observations they have.

Activity Page



AP 5.1.1

### Tie to the Anchoring Phenomenon

In this activity, students recognized that people make choices, like they did when they built the schoolyard where Alex and the squirrel ate their snacks. Those choices can be eco-friendly if they do no damage to the environment.

## LESSON 5.2

# Good and Bad Changes

**Big Question:** How do living things change the environment when they get what they need?

**Lesson Guiding Question:** How can people take care of the environment?

**Today's Question:** What human activities can be labeled harmful to the environment?

**Tie to the Anchoring Phenomenon:** In this lesson, students gather evidence in comparing good and bad human choices that affect an environment, like the one in Alex's story.

## AT A GLANCE

### Learning Objective

- ✓ Classify ways that people change environments as positive or negative.

### Instructional Activities

- teacher demonstration
- class discussion
- question generation

### NGSS References

**Disciplinary Core Idea:** ESS3.C Human Impacts on Earth Systems

**Science and Engineering Practice:** 8 Obtaining, Evaluating, and Communicating Information

**Crosscutting Concept:** 2 Cause and Effect

Students compare negative and positive human changes to the environment.

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reduce    reuse

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**eco-friendly    ecosystem    environment**

## Instructional Resources

Activity Page



AP 5.2.1

### Activity Page

Better Changes (AP 5.2.1)

## Materials and Equipment

- multiple clean empty glass bottles, water/juice cans, cardboard boxes, paper, plastic water bottles, plastic containers to be recycled, perhaps from the school cafeteria
- sorting containers, such as paper grocery store bags, labeled (cardboard, glass, cans, paper, plastic)
- variety of items made from recycled materials, such as paper, paper towels, trash bags, cardboard packaging
- gloves
- internet access and the means to project images/video for whole-class viewing
- question board

## THE CORE LESSON 5.2

### 1. Focus student attention on Today's Question.

#### What human activities can be labeled harmful to the environment?

- Briefly review what students learned about eco-friendly changes people make in the last segment by asking these questions:
  - What does *eco-friendly* mean?
    - » making choices that cause less harm to the environment
  - Why is recycling good for the environment?
    - » Instead of making new things and just throwing them away to take up space as trash, recycled goods can be made into new products.
  - Why is reusing things good for the environment?
    - » Reusing causes less trash and less waste of materials.
  - Why is reducing things, like the amount of water or electricity, you use good for the environment?
    - » so resources aren't wasted

- Explain that today you are going to compare human choices that are better or worse for the environment.

### Tie to the Anchoring Phenomenon

This lesson gives students evidence of how human changes to an environment, like the one in Alex's story, can be positive or negative.

**3D Learning:** In this lesson segment, students will obtain and evaluate more evidence about the causes and effects of human changes to the environment that can be good or bad.

## 2. Facilitate the activity.

NGSS Elements



SEP 8

CCC 2

DCI ESS3.C

- Gather the class around a pile of clean trash that can be recycled.
- Using gloves, show students a cardboard box out of the pile.
- Explain that cardboard can be recycled and made into other cardboard boxes. Ask students to look for a recycling symbol and show the class. Explain that this sign means something can be recycled.
- Then, flatten the cardboard and put it in the recycle container labeled *CARDBOARD*.
- Repeat the process for *CANS* and *GLASS*.
- At students' direction, sort all of the materials into the correct container.
- Explain that paper we write on does not have a recycling symbol but that it can be recycled. Have students put the written papers they no longer need throughout the school year in the *PAPER* container.
- When all that is left is plastic, explain that plastic can be recycled and has a recycling symbol but that it is harder to recycle than other materials. That's why you've used paper grocery bags for sorting instead of plastic. Then repeat the process for the plastic materials. (See **Know the Science.**)

## Know the Science

### TEACHER DEVELOPMENT

**Plastic Pollution:** More than half the plastic now on Earth has been made since 2002, and plastic pollution is projected to double by 2030. Plastics, made from fossil fuels, are manufactured into bottles, bags, containers, textiles, and toys. Some of these are single-use items and are thrown away. Over ninety percent of plastics have never been recycled. Unlike aluminum and paper, which can be recycled again and again, plastic degrades in reprocessing and is almost never recycled more than once. A plastic bottle, for example, might get downcycled into a park bench. And most plastics do not decompose like paper products do, so they are around for decades. Plastic has now polluted our oceans and every area of land and is found in animals' waste and stomachs.



### 3. Guide discussion.

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#### Online Resources



- Show a video about what happens at a recycling plant.  
See the Online Resources Guide for a link to the recommended video:  
[www.coreknowledge.org/cksci-online-resources](http://www.coreknowledge.org/cksci-online-resources)
- After the video, allow students to examine a variety of items that are made from recycled materials, such as paper towels, plastic bags, notebook paper, and pencils.
- Make a class list of things thrown away.
  - » paper, plastic bags, plastic bottles, tissues, cans, cardboard boxes, broken toys or pencils
- Sort them into those items that can and cannot be recycled.
  - » Paper, plastic bags, plastic bottles, cans, and cardboard can be recycled.
- Discuss whether recycling or throwing things away is more eco-friendly.
- Discuss reusing materials, and generate ideas for reusing plastic bags and bottles that are not as eco-friendly as other materials. Make a class list of ideas for how plastic products can be reused.
  - » Some plastic water bottles can be refilled. Plastic grocery bags can be used as trash bags or drawer liners.

**EXTEND**—Invite the school custodian to visit the class and discuss how the trash and recycled materials are handled at your school.

### 4. Check for understanding.

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#### Monitor Progress

##### Activity Page



AP 5.2.1

#### Formative Assessment

Distribute Better Changes (AP 5.2.1). Ask students to circle the pictures that show the items that they think are most eco-friendly. When finished, review student responses as a class. Tally the number who thought each item was eco-friendly.

Ask students to argue why each item is or is not eco-friendly.

Discuss the products that can be recycled. Explain that plastic water bottles and plastic bags can be recycled under certain conditions but that they are not as eco-friendly as other materials. There are no truly right or wrong answers. The point is for students to think about eco-friendliness as they make choices.

Review student responses and observations to determine student understanding of the following concepts:

- People make choices that affect the environment.
- Some of the choices are better for the environment than others.

Review the questions and observations made on the question board. Encourage students to suggest additions for you to make to the question board of any questions or new observations they have.

### **Tie to the Anchoring Phenomenon**

In this activity, students obtained and evaluated evidence for how the choices people make, like Alex's choice to throw his trash away in the story, can be more eco-friendly.

## LESSON 5.3

# Conservation

**Big Question:** How do living things change the environment when they get what they need?

**Lesson Guiding Question:** How can people take care of the environment?

**Today's Question:** What does it mean to protect the environment?

**Tie to the Anchoring Phenomenon:** In this lesson, students gather evidence about human choices that affect an environment, like the one in Alex's story.

## AT A GLANCE

### Learning Objective

- ✓ Explain the concept of conservation.

### Instructional Activities

- teacher demonstration
- class discussion
- question generation

### NGSS References

**Performance Expectation:** K-ESS3-3

**Disciplinary Core Idea:** ESS3.C Human Impacts on Earth Systems

**Science and Engineering Practice:** 8 Obtaining, Evaluating, and Communicating Information

**Crosscutting Concept:** 2 Cause and Effect

Students explore conservation of resources.

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**eco-friendly    ecosystem    environment**

## Instructional Resources

Activity Page



AP 5.3.1

### Activity Page

Eco-friendly Choices (AP 5.3.1)

## Materials and Equipment

- water source
- large pan
- measuring cup
- hand soap
- variety of items made from recycled materials: paper, paper towels, trash bags
- internet access and the means to project images/video for whole-class viewing
- question board

## THE CORE LESSON 5.3

### 1. Focus student attention.

- Briefly review what students learned about eco-friendly choices people make in the last segment by asking these questions:
  - What does *eco-friendly* mean?
    - » making choices that cause less harm to the environment
  - What materials can be recycled? (See **Know the Science.**)
    - » cardboard, paper, glass, and some plastics
- Explain that today you are going to compare human choices that are better or worse for the environment.

## Know the Science

### TEACHER DEVELOPMENT

**Recycled Glass:** Glass produced from recycled glass products makes much less air and water pollution than making glass from raw materials. Each ton of recycled glass saves a ton of natural resources, like sand and limestone, and requires lower furnace temperatures. “Green glass” usually contains about seventy percent recycled materials.

## Tie to the Anchoring Phenomenon

This lesson gives students evidence of how human choices about how they interact with an environment, like the one in Alex's story, can be positive or negative.

**3D Learning:** In this lesson segment, students will obtain and evaluate more evidence about the causes and effects of human changes to the environment that can be good or bad.

## 2. Facilitate the activity.

- Gather the class around a sink. Place a large bowl or pan under the faucet.
- Demonstrate washing your hands with soap for twenty seconds. Start the water, and allow it to run while the washing and rinsing take place.
- When finished, measure the amount of water in the bowl.
- Empty the water in the bowl. Prepare to wash your hands again. This time, turn the water off as you lather and wash. Turn it on for rinsing.
- Measure the water in the bowl, and compare it to the amount of water in the first experience.
- Discuss which way of washing hands is more eco-friendly.
- Show a video about washing hands. Discuss how some faucets automatically turn off. Others could be turned off when you are washing.

### Online Resources



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

[www.coreknowledge.org/cksci-online-resources](http://www.coreknowledge.org/cksci-online-resources)

## 3. Guide discussion.

### NGSS Elements



SEP 8  
CCC 2  
DCI ESS3.C

- Write the word *conserve* on the board. Explain that to conserve is to protect something from harm or destruction. Discuss questions such as these:
  - When have you had a limited amount of something?
    - » a limited number of crackers left, a limited amount of milk left, not enough gas left in the car
  - What choices do you make when there is a limited amount of something left?
    - » You give everyone a little bit, you save it for later, you use less, and you don't waste anything.
  - Is conserving more like recycling, reusing, or reducing?
    - » Reducing. When you conserve something, you don't use as much.

- Discuss different ways to conserve each of the following:
  - **Water**
    - » Don't let the water run. Don't water things if they don't need it.
  - **Electricity**
    - » Turn off lights, radios, air conditioning, heat, or fans if you are not there.
  - **Gasoline**
    - » Walk or ride a bike instead of riding in a car.
  - **Packaging materials**
    - » Eat apples or other fruit instead of individually packaged things.
  - **Wasted food**
    - » Don't take more than you can eat.

Differentiation

**SUPPORT**—Demonstrate examples of each way to conserve materials for a hands-on experience. For example, practice turning off lights when you leave the room.

## 4. Check for understanding.

Monitor Progress

Activity Page



AP 5.3.1

### Formative Assessment

Distribute Eco-friendly Choices (AP 5.3.1). Ask students to circle the pictures that show the more eco-friendly practices. When finished, discuss why those practices are more eco-friendly.

Review responses and observations to determine students' understanding of the following concepts:

- People make choices that change the environment.
- Some of the choices are better for the environment than others.

Review the questions and observations made on the question board. Encourage students to suggest additions for you to make to the question board of any questions or new observations they have.

### Tie to the Anchoring Phenomenon

In this activity, students obtained and evaluated evidence about how the choices people make, like Alex's choice to throw his trash away in the story, can be more eco-friendly.

## LESSON 5.4

# People Can Protect the Environment

**Big Question:** How do living things change the environment when they get what they need?

**Lesson Guiding Question:** How can people take care of the environment?

**Today's Question:** How can people take care of the environment?

**Tie to the Anchoring Phenomenon:** In this lesson, students show how people's choices harm or protect the environment, like the choices made in Alex's story.

## AT A GLANCE

### Learning Objective

- ✓ Summarize ways that people change environments.

### Instructional Activities

- teacher Read Aloud
- class discussion
- question generation
- drawing

### NGSS References

**Disciplinary Core Idea:** ESS3.C Human Impacts on Earth Systems

**Science and Engineering Practice:** 8 Obtaining, Evaluating, and Communicating Information

**Crosscutting Concept:** 2 Cause and Effect

Students learn more about ways that people can protect the environment.

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

[www.coreknowledge.org/cksci-online-resources](http://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.

conserve    litter    pollution    recycle  
reduce    reuse

**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.

**eco-friendly    ecosystem    environment**

## Instructional Resources

Student Book



Ch. 6

**Student Book, Chapter 6**  
“Humans Can Help  
Environments”

Activity Page



AP 5.4.1

**Activity Page**  
Humans Help Environments  
(AP 5.4.1)

## Materials and Equipment

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

## THE CORE LESSON 5.4

### 1. Focus student attention on Today’s Question.

- Briefly review what evidence students have gathered about eco-friendly choices.
  - » Recycling, reusing, and reducing/conserving are better because they cause less pollution and waste.
- Explain that today you are going to read more about how people can help the environment. (See **Know the Standards.**)

## Know the Standards

## TEACHER DEVELOPMENT

**DCI ESS3.C Human Impacts on Earth Systems:** Humans impact all four of Earth’s systems. Humans change the geosphere (the soil) by mining and farming. They change the hydrosphere (water) by polluting water with chemicals and plastics. They change the atmosphere by releasing air pollution. And humans change the biosphere (living things) by overfishing and farming and by cutting trees, particularly in rain forests. Conserving natural resources, recycling, and reusing all are eco-friendly choices that help our environment rather than hurt it.



## Tie to the Anchoring Phenomenon

This lesson organizes students' understanding of how people can help an environment, like the one Alex and the squirrel are in.

## 2. Read together: "Humans Can Help Environments."

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 28

**Ask students to turn to page 28 of the Student Book as you read aloud. Remind them that the title of this chapter is "Humans Can Help Environments," and tell them to think about how the people in the pictures are making choices which help the environment.**

CHAPTER  
6

### Humans Can Help Environments

People change environments to meet their needs. But people can make choices that help environments too! You probably help the environment in small ways every day. You help when you throw away your trash after lunch, like Alex did. You help when you walk or ride your bike someplace instead of riding in a car. Alex met his need for food. Then he protected the environment from damage.



28

- **Ask students to look at the picture on page 28 as you read aloud.**

**INFERENTIAL**—How does riding your bike instead of riding in a car help the environment?

» It conserves gas.

**INFERENTIAL**—How else can you conserve gas?

» Instead of driving from place to place, like a grocery store or a store very close, walk. Sharing rides to the same place helps, too.

**CORE VOCABULARY**—Explain that to **conserve** is to protect the environment from harm or destruction. Ask students to give examples of different things they can conserve to protect the environment, for example, water, food, electricity, and gasoline.

**Page 29**

**Turn to page 29, and read aloud.**

People can help the environment by saving water. If you turn the water off while you brush your teeth, less clean water goes down the drain. Then your city has less dirty water to clean. This helps the environment.



Another way to save water is to do a few full loads of laundry instead of many small loads.



29

**LITERAL**—What are the two ways shown on the page to conserve water?

- » Turn the water off when you brush your teeth. Do full loads of laundry.

**INFERENTIAL**—What are some other ways to conserve water?

- » Do a full load of dishes in the dishwasher, or don't run the water while washing dishes. Don't water the grass if you don't need to.

## Page 30

**Ask students to look at the pictures on page 30 as you read aloud.**

People can help environments by producing less trash. The trash we put into garbage cans is collected and taken to garbage dumps. Trash from many, many people piles up there. It changes the environment. We can do things to make less trash. For example, we can take our own bags to the grocery store. We can reuse bags instead of throwing them away.



We can find ways to reuse other containers instead of throwing them away.

We can recycle plastic, paper, cardboard, metal, and glass. Recycling means turning the material into something new.



**LITERAL**—What are the examples of reusing on this page?

- » reusing grocery bags and reusing plastic cartons

**INFERENTIAL**—What are other ways to reduce, reuse, and recycle?

- » Buy larger sizes to reduce the number of bottles. Don't use single-use water bottles. Reuse plastic bags as garbage bags. Recycle cardboard and glass.

**EXTEND**—Show a video about the 3 R's. After each section, stop and discuss the ideas in the video:

- From 2:00 to 2:47, talk about ideas for reducing trash and conserving energy sources.
- From 2:48 to 4:07, talk about reducing use of gasoline and water.
- From 4:08 to 5:28, talk about reusing materials, conserving electricity, and using renewables.
- From 5:29 to 6:47, talk recycling and waste disposal.

Online Resources



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

[www.coreknowledge.org/cksci-online-resources](http://www.coreknowledge.org/cksci-online-resources)

**CORE VOCABULARY**—Have students explain the differences among the words **reduce**, **reuse**, and **recycle**. To reduce is to use less packaging, energy, or products so you reduce waste. To reuse is to use what you have again or in another way instead of throwing it away. To recycle is to donate certain materials to a recycling center so they can be made into something else. All three words represent ways to protect the environment.

People can help environments in big ways, too. They can replant trees or prairies on large areas of land that have been changed by human activity. When old buildings or farmland are no longer used, people can return the land to what it was like before.



**INFERENTIAL**—Why is planting trees eco-friendly?

- » Trees provide food and shelter for many animals. Trees restore the environment to how it was before human changes.



Farmers can care for the environment. They can find ways to use less water. They can allow other plants and animals to use the land to make the soil healthy. They can avoid using materials that cause pollution. Some farmers grow food indoors and without soil. This way of growing food means less harm to the environment.



Some farmers use hay or straw to control weeds. This way they do not need to use sprays that can wash into streams when it rains.



32

**INFERENTIAL**—Why do we need farms?

- » Almost all of our food comes from different kinds of farms in different places in the world.

**INFERENTIAL**—Why might growing plants inside be helpful to the environment?

- » Weeds and bugs would be more controllable, so farmers wouldn't need to spray crops to kill weeds and bugs.

**CORE VOCABULARY**—Explain that **pollution** is the introduction of a substance or thing into the environment that can cause harm to living and nonliving things. Ask students to give examples of different types of pollution, including air, water, soil, noise, and light pollution. Discuss how each type of pollution harms the environment.

Alex wonders what he could do to help the environment where he lives. Perhaps he will plant a garden for bees and butterflies. This kind of garden can help replace lost homes for these animals. They lose their homes whenever people clear land to build buildings and roads. Or maybe Alex's class can set up recycling bins at school during lunch.



Alex can also pick up litter around his neighborhood. You can, too!

33

**INFERENTIAL**—Why is planting a garden eco-friendly?

» It provides food for us and other living things.

**CORE VOCABULARY**—Ask students to think of other words for **litter**, such as *trash*, *waste*, and *garbage*. Discuss how litter refers to trash or garbage that is not put into a trash can or recycling bin.

### 3. Check for understanding.

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Monitor Progress

Activity Page



AP 5.4.1

#### Formative Assessment

Distribute Humans Help Environments (AP 5.4.1). Have students draw one way they can help the environment.

Ask students to present their drawings. Emphasize using evidence to argue for their decisions.

- » Students should be able to show one way to help the environment and explain why it will help.

Review responses to determine students' understanding of the following concept:

- Human choices can help the environment.

Review the questions and observations made on the question board. Encourage students to suggest additions for you to make to the question board of any questions or new observations they have.

#### Tie to the Anchoring Phenomenon

In this lesson, students explored how humans, like themselves and Alex, can help the environment.



## LESSON 5.5

# Environmental Solutions

**Big Question:** How do living things change the environment when they get what they need?

**Lesson Guiding Question:** How can people take care of the environment?

**Today's Question:** How can people take care of the environment?

**Tie to the Anchoring Phenomenon:** In this lesson, students communicate ways to take care of environments like the one in Alex's story.

## AT A GLANCE

### Learning Objective

- ✓ Describe solutions that reduce negative effects of humans on the local environment.

### Instructional Activities

- class discussion
- question generation
- presentations

### NGSS References

**Performance Expectation:** K-ESS3-3

**Disciplinary Core Idea:** ESS3.C Human Impacts on Earth Systems

**Science and Engineering Practice:** 8 Obtaining, Evaluating, and Communicating Information

**Crosscutting Concept:** 2 Cause and Effect

Students propose solutions to reduce the negative human effects on the local environment.

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

[www.coreknowledge.org/cksci-online-resources](http://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.

conserve    litter    pollution    recycle  
reduce    reuse

**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.

**eco-friendly    ecosystem    environment**

## Instructional Resources

Activity Pages



AP 5.4.1  
AP 5.5.1

### Activity Pages

Humans Help Environments  
(AP 5.4.1)  
Solutions (AP 5.5.1)

## Materials and Equipment

- question board

## THE CORE LESSON 5.5

### 1. Focus student attention on Today's Question.

Activity Page



AP 5.4.1

- Have students take out Humans Help Environments (AP 5.4.1) from the last segment, in which they suggested how they could help the environment.
- Explain that today you are going to choose one or more of the solutions as a class project.

### Tie to the Anchoring Phenomenon

This lesson applies what students have learned about how animals, plants, and humans change the environment, like the one in Alex's story.

**3D Learning:** In this lesson segment, students will communicate the solutions they have come up with about the environment through obtaining and evaluating information about the causes and effects of environmental change.

### 2. Facilitate the activity.

- Make a class list of the different solutions students presented.
- Discuss the list, and consolidate any ideas that are similar. Then ask these questions of each solution:
  - How will this choice help the environment?
  - Is this something we can do as a class, as a school, or individually?
  - What materials would we need to do this?
  - How much time do we need to do this?

- Do we need permission to do this?
- How can we tell other people we want to do this?
- How can we convince other people that this will help the environment?

#### Activity Page



AP 5.5.1

- Distribute Solutions (AP 5.5.1), and have students draw their idea of what they want to do.
- When students have completed their drawings, have them present their ideas to the class. (See **Know the Standards.**)

### 3. Guide discussion.

#### NGSS Elements



SEP 8

CCC 2

DCI ESS3.C

- Ask the class to vote on a solution they want to apply. Students may choose more than one to implement.
- Review the answers to the questions for the selected solution, and develop a plan. Some solutions may be individual and simple, like turning off the water while washing hands. Others may be involved, like planting a garden.
- Make a class list of what needs to be done to implement the solution, and then encourage students to volunteer or assign tasks.
- As a class, develop a presentation about the solution that students will present to the school's principal, another class, or parents. The presentation should have these elements:
  - what the students learned about environmental changes
  - what the students learned about how they can help the environment
  - why students decided on this solution
  - when students' solution will be implemented
  - how students' solution will be implemented
  - any requests from other people
- Determine how and when the presentation will be made. Then determine who will present.
- Practice the presentation.
- Invite the audience.
- Implement the solution.
- Assess its effect.

## Know the Standards

## TEACHER DEVELOPMENT

**SEP 8 Obtaining, Evaluating, and Communicating Information:** Communicating is a critical part of scientific practices because it allows the sharing of explanations and solutions. Scientists do research, but when they are done, they communicate to others who provide feedback and replicate results.

**SUPPORT**—Most Kindergarten students will need teachers to organize and direct their presentations. Discuss each step, and encourage students to generate ideas and volunteer for specific tasks. An admirable goal would be for each student to have some responsibility for the presentation.

## 4. Check for understanding.

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### Formative Assessment

Activity Page



AP 5.5.1

Review responses and engagement in the discussion and students' work on Solutions (AP 5.5.1) to determine students' understanding of the following concepts:

- People make choices that change the environment.
- Some of the choices are better for the environment than others.

Review the questions and observations made on the question board. Review questions that have been answered over the course of the unit, and identify questions that remain unanswered. Discuss the research that needs to be done to answer the unanswered questions.

### Tie to the Anchoring Phenomenon

In this activity, with the example of Alex and the squirrel, students decided on an eco-friendly solution to improve the environment. Students consider ways in which animals, plants, and humans make positive and negative changes to an environment to get what they need to survive.

# Science in Action: Meeting a Soil Tester

**Tie to the Anchoring Phenomenon:** Students join Alex as he learns about ways to take care of the environment and how scientists test the soil to see if it is healthy.

## AT A GLANCE

### Learning Objectives

- ✓ Read about how scientists test the soil.
- ✓ Compare samples of soil.

### Instructional Activities (2 Days)

- teacher Read Aloud
- student investigation

### NGSS References

**Understandings About the Nature of Science:** Scientific Investigations Use a Variety of Methods; Science Models, Laws, Mechanisms, and Theories Explain Natural Phenomena; Science Addresses Questions About the Natural and Material World; Science Is a Way of Knowing; Science Is a Human Endeavor

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

Students read about soil scientists and the work they do to make soil healthy and productive. Students then observe different soil samples using a hand lens and tweezers.

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

[www.coreknowledge.org/cksci-online-resources](http://www.coreknowledge.org/cksci-online-resources)

### Language of Instruction

The Language of Instruction consists of terms 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.

<b>chemical</b>	<b>compare</b>	<b>crop rotation</b>	<b>environment</b>
<b>fertilizer</b>	<b>lab</b>	<b>nutrient</b>	<b>recycling</b>
<b>sample</b>	<b>soil</b>		

## Instructional Resources

Student Book



Ch. 7

**Student Book, Chapter 7**  
“Science in Action: Meeting a Soil Tester”

Activity Page



AP US.1

**Activity Page**  
Comparing Soil (AP US.1)

## Materials and Equipment

- trays (1 per group)
- potting mix soil (8-qt bag)
- garden soil (8-qt bag)
- peat moss (8-qt bag)
- craft sticks (1 per student)
- hand lenses (1 per group)
- paper cups (3 per group)
- tweezers (1 per group)
- marker

### Advance Preparation

Prepare the soil samples in advance to save class time. Put a scoop of the potting mix, the garden soil, and the peat moss in separate cups. Label the cups as follows:

- potting mix = A
- garden soil = B
- peat moss = C

## 1. Day 1: Introduce the topic.

Remind students that they learned about how plants and animals need a healthy environment in order to grow well and thrive.

## 2. Read together: “Science in Action: Meeting a Soil Tester.”

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.

Ask students to turn to page 34 of the Student Book and look at the images as you read aloud. Remind them that the title of this chapter is “Science in Action: Meeting a Soil Tester,” and tell them to pay special attention to the different things you can see in the pictures as you read.

CHAPTER  
7

## Science in Action Meeting a Soil Tester

Since Alex saw the squirrel while he was eating his lunch, he learned more about the needs of plants and animals. He knows that people and animals get what they need from their environments. He also knows that he shares his environment with other living things.

Alex now tries to take care of the environment. He always throws away his trash. He picks up litter in the park with his family every Saturday. He got other families interested in recycling. He even convinced his teacher to create a classroom recycling bin.



34

NGSS Elements



Science  
Addresses  
Questions  
About the  
Natural and  
Material World

**Ask students to look at the picture on page 34.** Explain that the picture shows a recycling bin with plastic water bottles in it. Tell students that plastic water bottles are things that can be recycled. (See **Know the Standards 1.**)

## Know the Standards

## TEACHER DEVELOPMENT

**1. Science Addresses Questions About the Natural and Material World:** Scientists who study the environment understand the impact that waste reduction has on keeping the land and water healthy. Recycling is a human-made process that has been designed to help reuse materials to reduce waste and keep environments cleaner.

**CORE VOCABULARY**—Remind students that the **environment** is the surroundings where a person, animal, or plant lives.

**LITERAL**—How does Alex try to take care of the environment?

- » by throwing away his trash, picking up litter, and getting his teacher to make a classroom recycling bin

Remind students that recycling means to turn old products into new products instead of throwing them away as trash.

## Page 35

NGSS Elements



Science Is a Way  
of Knowing

**Ask students to look at the two pictures on page 35.** Explain that the first picture shows a scientist who is testing the soil. He is taking soil samples and is writing down everything he does. (See **Know the Standards 2.**)

One day in class, Alex asks his teacher how people know whether the land and water are healthy. She explains that scientists test the water to find out what is in it. They test soil, too. They find out if soil or water contains chemicals that could hurt living things. Scientists test soil to find out whether it has the nutrients that plants need to grow.



35

## Know the Standards

## TEACHER DEVELOPMENT

**2. Science Is a Way of Knowing:** Scientists come up with ways to know more about Earth. Testing soil to see what it is composed of (e.g., chemicals, nutrients) can give scientists more information about the land and how it affects plants and animals.



**LITERAL**—How do people know if the land and water are healthy?

- » Scientists can test the water and the soil.

Explain that chemicals are substances that are used for something. Give students examples of chemicals, such as cleaning products, shampoo, and soap.

**LITERAL**—What can scientists tell about the land from the soil?

- » They can tell if the soil has chemicals in it that could hurt the plants or animals. They can tell if the soil has the nutrients it needs to grow.

Explain that nutrients are things that give plants, animals, and people what they need to grow and live.

**INFERENTIAL**—Look at the second picture on the page. Does it look like that soil is healthy or unhealthy? How can you tell?

- » It looks healthy. The plants are green, and they are growing well.

**Ask students to look at the picture on page 36.** Explain that the picture shows a farmer using a giant machine to add nutrients to the soil. (See **Know the Standards 3.**)

The students want to know more. Alex's teacher takes them to a farm. A soil scientist will show them how he tests the soil. He collects data about what he finds. His data help farmers know whether the soil needs more nutrients. If the soil is missing nutrients that plants need, farmers can add them. Plant fertilizers can help plants grow better.



36

NGSS Elements



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

**INFERENTIAL**—The farmer in the picture is adding nutrients to the soil. Is this helping the soil?

» yes

**INFERENTIAL**—Why do you think the farmer wants to help the soil?

» so plants can grow better there

## Know the Standards

## TEACHER DEVELOPMENT

**3. Influence of Engineering, Technology, and Science on Society and the Natural World:** Scientists have to know what plants need from soil in order to grow. Once they know this information, then they can make chemicals, like fertilizers or nutrients, to add to the soil. Scientists apply knowledge of the natural world in order to make products that help the environment.

Explain that fertilizers are things that help plants grow. Fertilizers can be natural, or they can be in the form of chemicals.

## Page 37

**Ask students to look at the two pictures on page 37.** Talk about what students notice in the first picture. Explain that a scientist is using a tool to collect a sample of soil. Talk about what students see in the second picture and what they think it shows. Explain that this is a science lab where soil samples are being tested. (See **Know the Standards 4.**)

The scientist uses a sharp tool to take soil samples from deep in the ground. Then he takes the samples to a lab. In the lab, special equipment looks for metals, nutrients, and other chemicals in the soil. The scientist collects data again and again over time. He compares the data. He shares his results with farmers.



37

## Know the Standards

## TEACHER DEVELOPMENT

**4. Scientific Investigations Use a Variety of Methods:** There are different ways for scientists to study nature. Some scientists make observations or collect samples in the field. Experiments and tests can be performed outside in the environment, or they can be done indoors in controlled areas. Labs are equipped with materials and tools that scientists can use to carry out tests that they may not be able to do as well in the field.



Explain that a lab is a special place where scientists perform tests and experiments.

**LITERAL**—What kinds of things are the tests looking for in the soil?

» The tests are looking for metals, nutrients, and chemicals in the soil.

**INFERENTIAL**—Why is it a good idea for the scientist to collect data again and again and to compare the data?

» It is good to compare the data so the scientist can see if anything changes in the soil.

## Page 38

**Ask students to look at the picture on page 38.** Explain that the picture shows a scientist in a field of crops. The crops in this picture look very healthy.

How do these data help farmers? Sometimes soil does not have enough nutrients. Sometimes it has too much. This scientist will use the data to balance the nutrients in soil. He will use data to find out whether soil has enough water. Data will help him find out if the level of any chemicals in the soil is too high or too low. Data from soil samples help farmers grow healthy plants.



38

**LITERAL**—What can scientists use the data for?

» They can use the data to balance the nutrients in the soil; they can use the data to tell if the soil has enough water in it or if the soil has chemicals in it.

**INFERENTIAL**—Why does this information help farmers?

» Knowing this information can help them grow healthy crops.

**Page 39**

**Ask students to look at the pictures on page 39.** Explain that the picture shows George Washington Carver and the chemistry laboratory at the Tuskegee Institute where he taught and developed methods to improve the soil for crops. (See **Know the Standards 5** and **6**.)

**George Washington Carver**

Alex asks the scientist how he got interested in studying soils. He tells Alex that when he was a boy he learned about a man named George Washington Carver.

Professor Carver was a scientist who studied plants and soil. He used the data he collected to develop ways to keep soil healthy. He taught farmers a method called crop rotation. He showed them how planting different crops each year could keep the soil from losing nutrients. As a result, farmers grew healthier plants.



39

**Know the Standards**

**TEACHER DEVELOPMENT**

**5. Science Is a Human Endeavor:** George Washington Carver was an African American scientist who studied plants and soil in the early 1900s. People of all backgrounds and genders have studied soil for a long time.

**6. Science Models, Laws, Mechanisms, and Theories Explain Natural Phenomena:** George Washington Carver is an example of a scientist who studied cause-and-effect relationships in nature to discover the effect that nutrient-deficient soil was having on plants. His observations led him to come up with the method of crop rotation, which helps use the nutrients in the soil to grow healthier crops.



**CORE VOCABULARY**—Explain that **crop rotation** is a special farming technique. It involves planting different types of crops each year to keep the soil from losing nutrients.

**LITERAL**—How does crop rotation help farmers?

» It helps them grow healthier plants.

## 1. Day 2: Facilitate the activity.

### Activity Page



AP US.1



- Remind students that they previously learned about how scientists can test soil to see if it is healthy. Tell students that today they will work on an activity where they get to act like a scientist! (See **Know the Standards 7.**)
- Have students form small groups. Explain that each group will act as a team of scientists studying three samples of soil.
- Distribute the materials to each group, along with Comparing Soil (AP US.1). Go over the materials with students, and let them know how they will use them:
  - Explain that there are three different types of soil placed into three cups. Students will pour the soil onto their trays to study them more closely, but they should be careful to not let the soil mix together.
  - The craft stick is to move the soil around without students having to touch the soil.
  - The hand lens is for taking a closer look at what is in the soil.
  - The tweezers are for taking things out of the soil and putting them into the small bowls to look at them more carefully.
- Tell students that once they are done looking at the soil, they will draw what they see on Activity Page US.1. Clarify that they will draw a picture of each type of soil on the inside of the circles.
- Circulate around the room as students work on their activity. As students pour their soil onto the trays, prompt them to move the soil around with the craft stick to get a better idea of what the soil looks like. Encourage students to take turns using the hand lens and tweezers. Remind students to take care that they do not mix the soils together on the trays and that they need to remember which pile of soil is sample A, B, and C.

## Know the Standards

## TEACHER DEVELOPMENT

**7. Science Is a Way of Knowing:** Studying soil is an important part of science. The soil can tell us a lot about the health of the land and whether or not plants will be able to grow there. Students gain hands-on practice with studying three different soil samples and drawing their observations.



- Tell students that they should compare the soils. Explain that this means talking about what is different and the same about the three types of soil.
- When students are ready to draw their pictures on Activity Page US.1, prompt them to pay attention to the labels on the drawing spaces and to make sure they draw the correct pictures for sample A, sample B, and sample C.

**SUPPORT**—Work with students individually to model for them what they should do with the soil, the craft stick, the hand lens, the tweezers, and the bowl.

**CHALLENGE**—Challenge students to find at least three different things that are in each type of soil, such as tiny pebbles or twigs.

**EXTEND**—With permission from the school, allow students to go outside and dig up their own sample of soil from the yard. Students can use shovels to put their samples of soil into trays, which they carry back to the classroom and use for investigation.

## 2. Check for understanding.



Review the drawings on Activity Page US.1. Check that students draw a picture of what they saw in the soil when looking at it through the hand lens. Ensure students drew the correct pictures for samples A, B, and C.



# Teacher Resources

## Activity Pages

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<b>Activity Pages Answer Key: <i>Changing Environments</i></b>	<b>196</b>
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Name \_\_\_\_\_

Date \_\_\_\_\_

**Food I Eat**

**Draw a picture of a food you like to eat in the middle row. Draw a picture of where it comes from in the top row. Draw a picture of what is left over in the bottom row.**


Name \_\_\_\_\_

Date \_\_\_\_\_

**Living and Nonliving Things**

**Draw two nonliving things. Draw two living things. Draw what each living thing needs.**

<b>Nonliving Things</b>
<b>Living Things</b>
<b>What Living Things Need</b>

Name \_\_\_\_\_

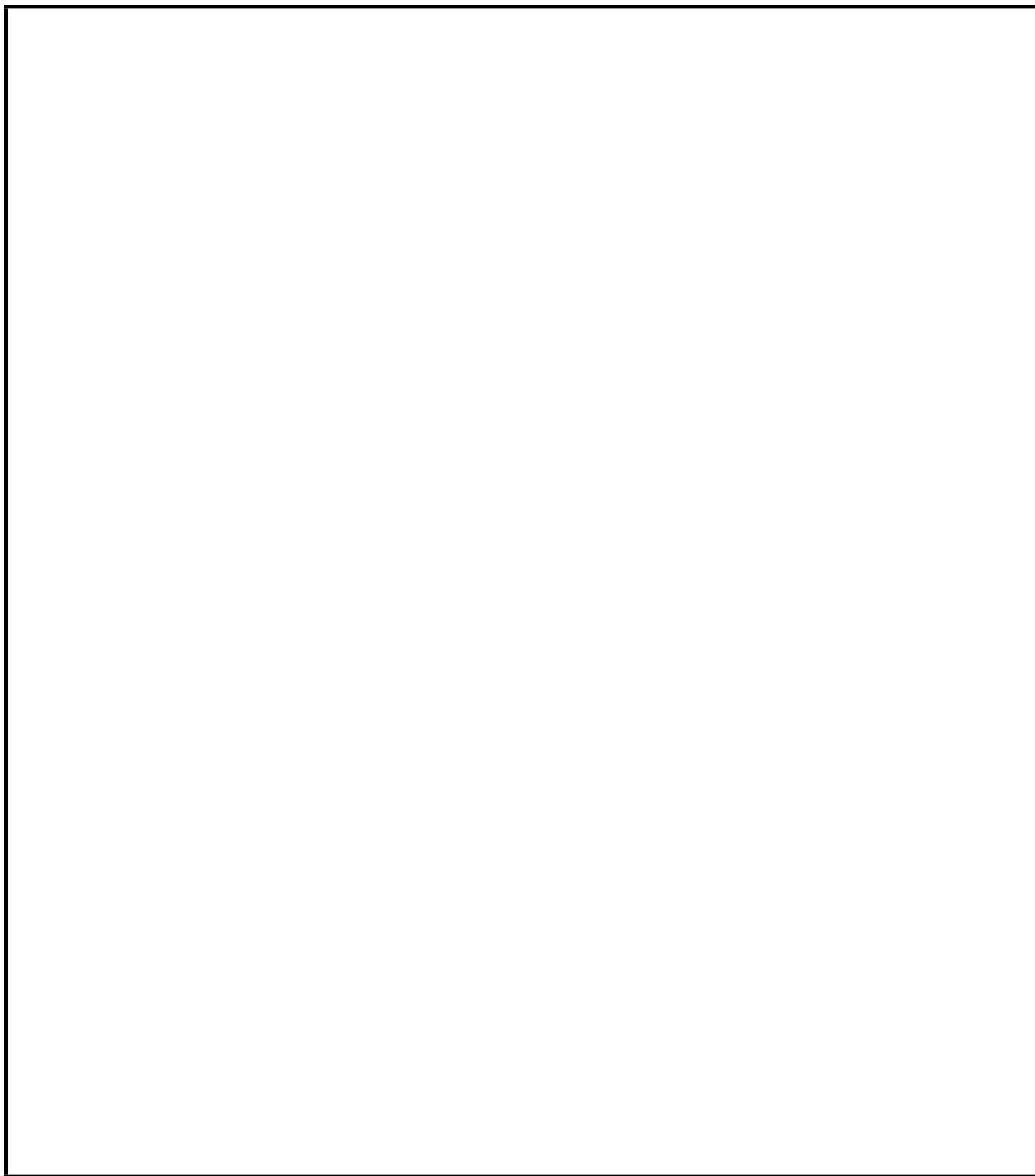
Date \_\_\_\_\_

Activity Page 1.1.2

Use with Lesson 1.1

## Garden Plan

**Draw a plan for a class garden.**

A large, empty rectangular box with a black border, intended for students to draw a plan for a class garden.

Name \_\_\_\_\_

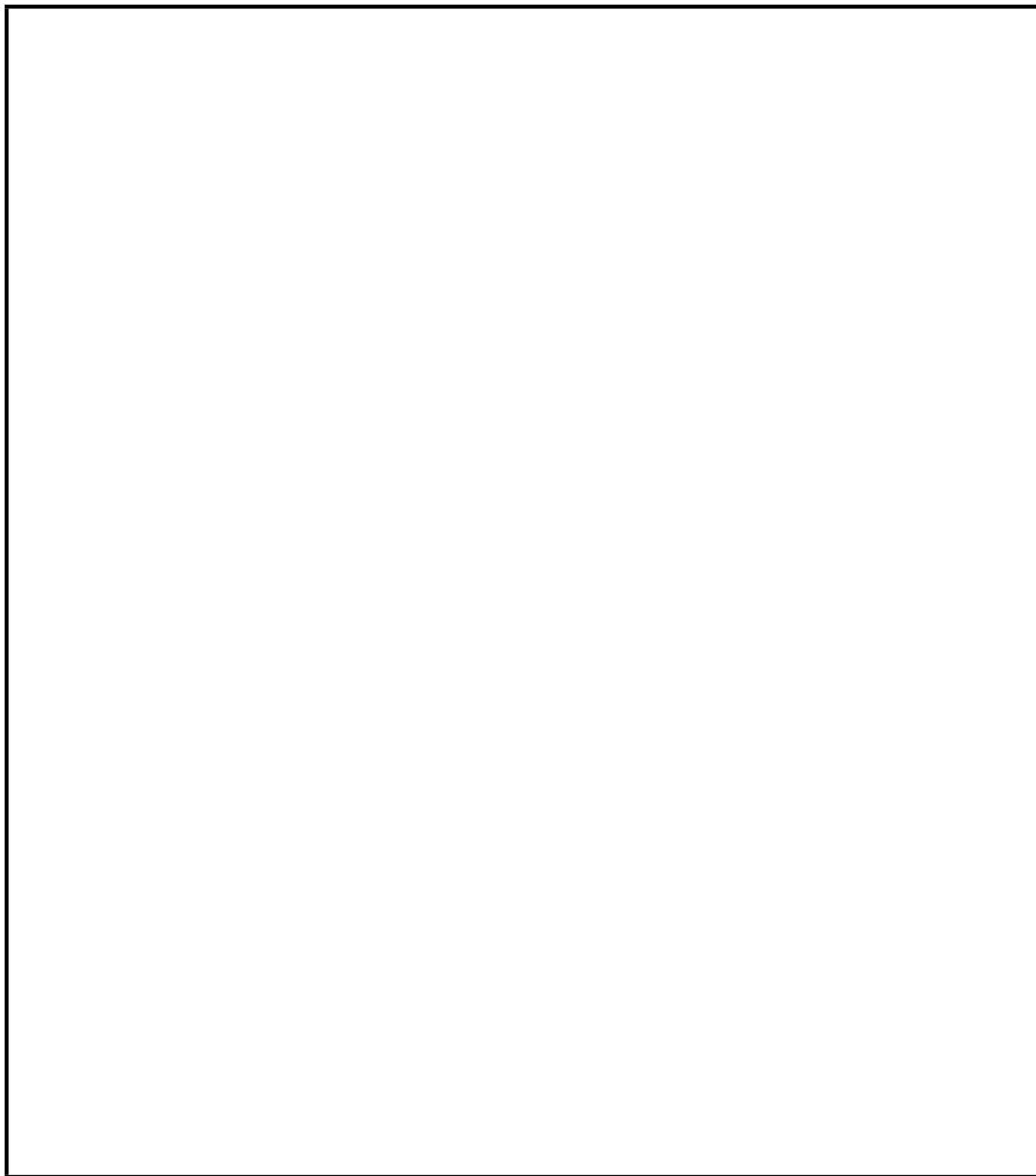
Date \_\_\_\_\_

Activity Page 1.2.1

Use with Lesson 1.2

## Seasons

**Draw a living thing and show nonliving things during a season of the year.**

A large, empty rectangular box with a black border, intended for a student to draw a living thing and show nonliving things during a season of the year.

Name \_\_\_\_\_

Date \_\_\_\_\_

Activity Page 1.3.1

Use with Lesson 1.3

## Danger

Circle the reasons that would cause an animal to move from its environment.



Name \_\_\_\_\_

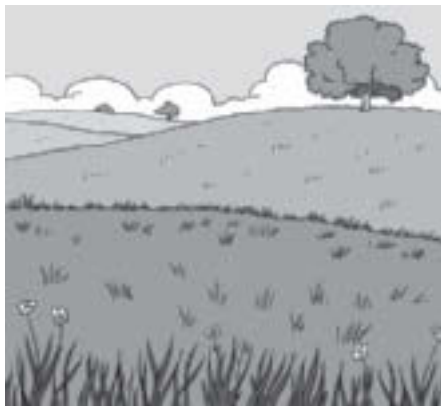
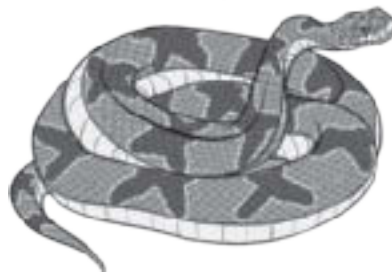
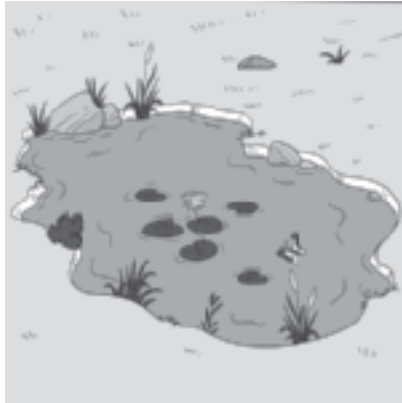
Date \_\_\_\_\_

Activity Page 1.4.1

Use with Lesson 1.4

## Parts of a Dry Environment

Circle the parts of a dry environment.



Name \_\_\_\_\_

Date \_\_\_\_\_

Activity Page 2.1.1

Use with Lesson 2.1

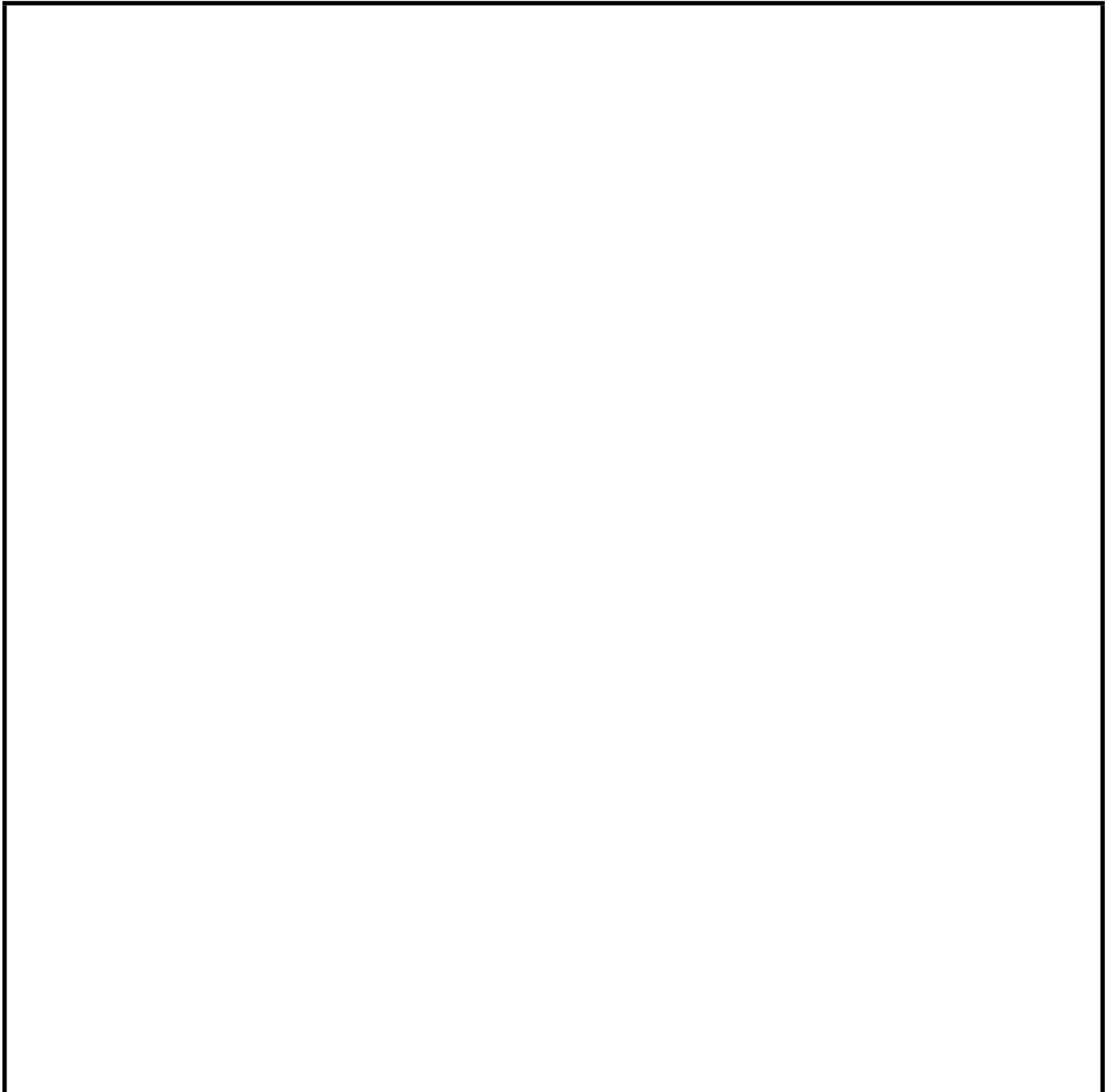
## Plants Get What They Need

**Draw a picture of the plant you looked at.**

**Circle the part that takes in water.**

**Put a box around the part that takes in sunlight.**

**Draw an arrow to the part that holds the plant up.**



Name \_\_\_\_\_

Date \_\_\_\_\_

Activity Page 2.2.1

Use with Lesson 2.2

## Planting Seeds

Draw a picture of your plant every other day.

<b>Day 1</b>	<b>Day 9</b>
<b>Day 3</b>	<b>Day 11</b>
<b>Day 5</b>	<b>Day 13</b>
<b>Day 7</b>	<b>Day 15</b>



Name \_\_\_\_\_

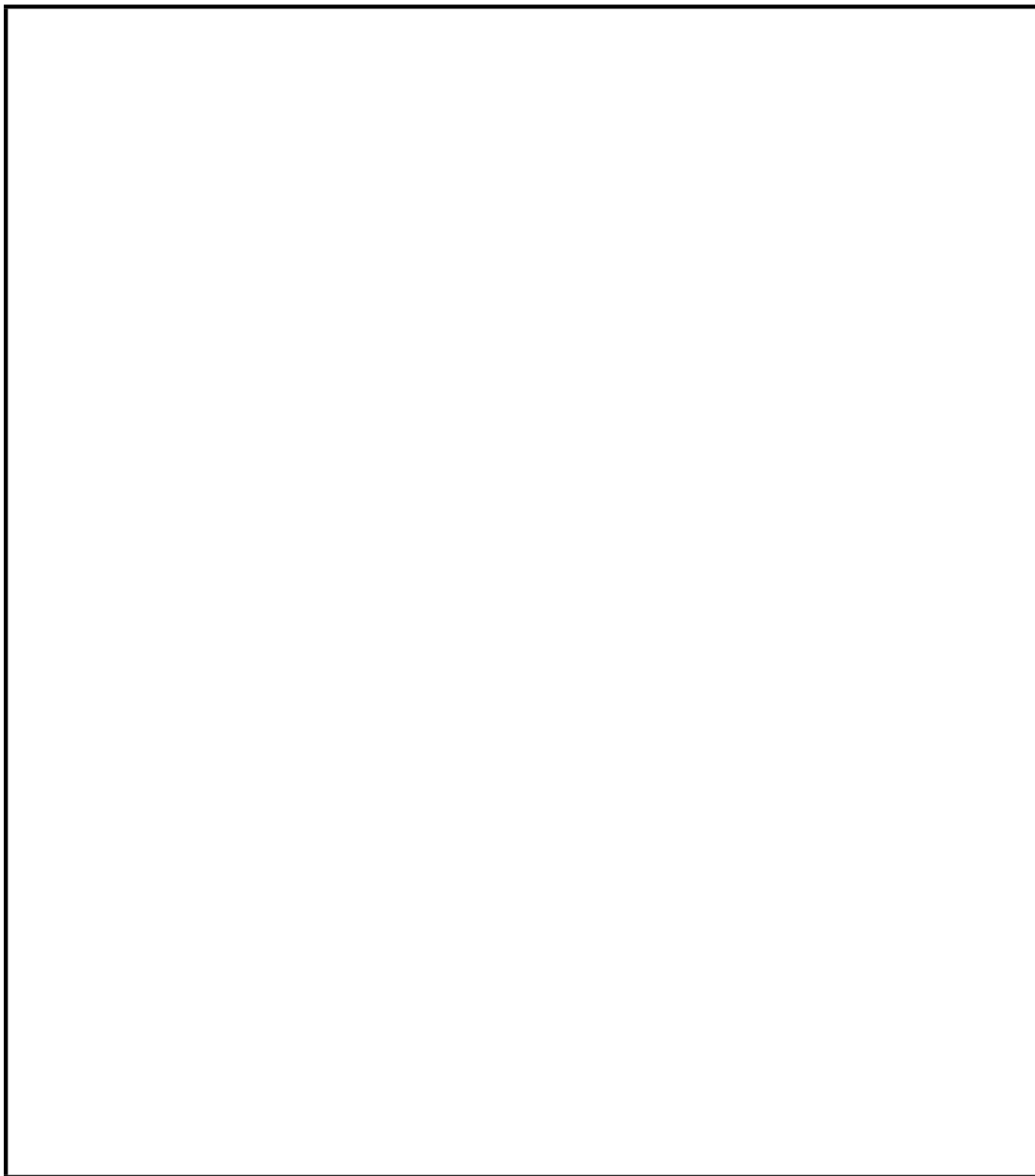
Date \_\_\_\_\_

Activity Page 2.3.1

Use with Lesson 2.3

## Plants Make Changes

**Draw a picture of a plant making a change to the environment.**

A large, empty rectangular box with a black border, intended for a student to draw a picture of a plant making a change to the environment.

Name \_\_\_\_\_

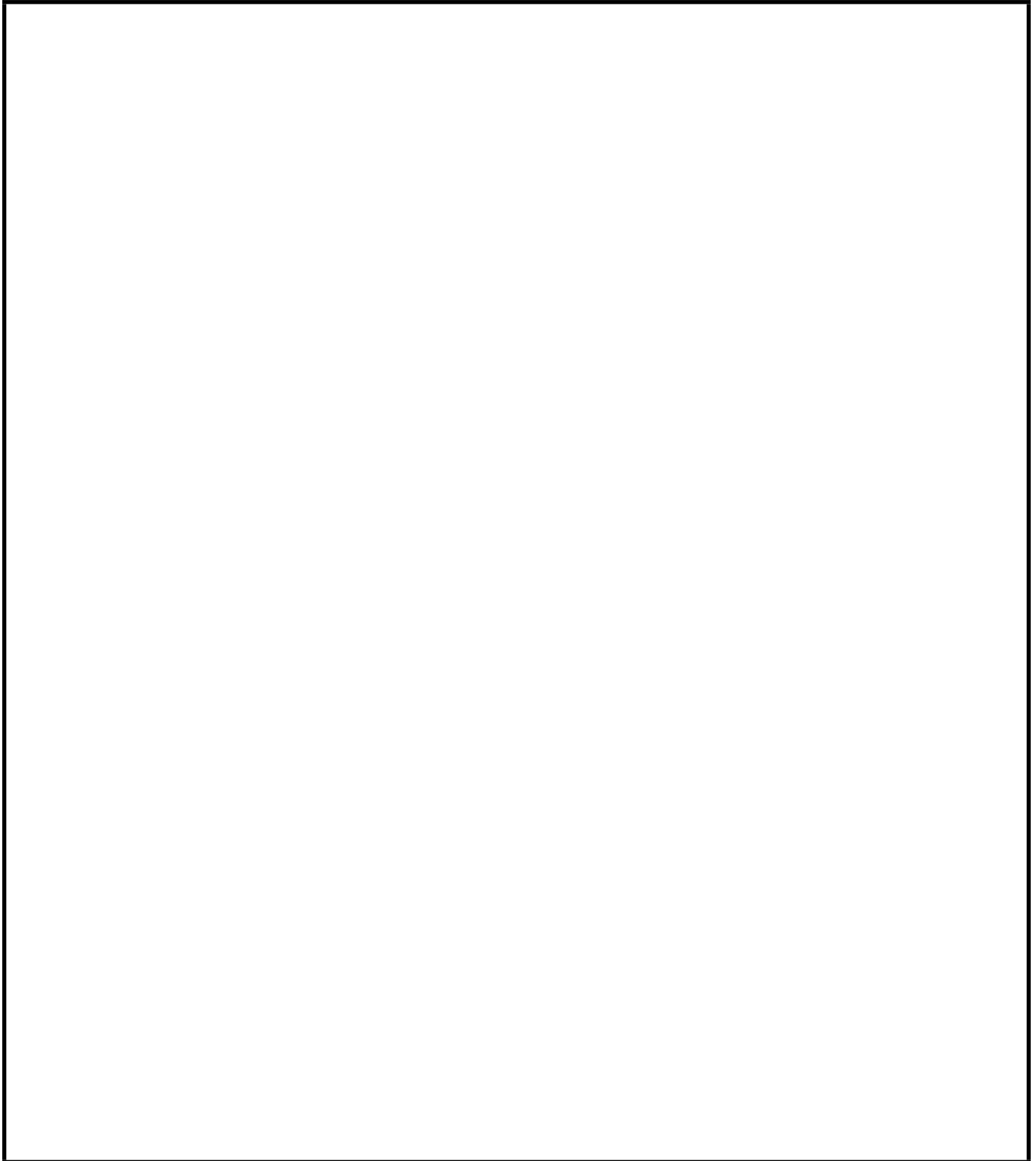
Date \_\_\_\_\_

Activity Page 2.4.1

Use with Lesson 2.4

## Plants Cause Changes

**Draw a picture of a way a plant causes a change.**

A large, empty rectangular box with a black border, intended for a student to draw a picture of a way a plant causes a change.

Name \_\_\_\_\_

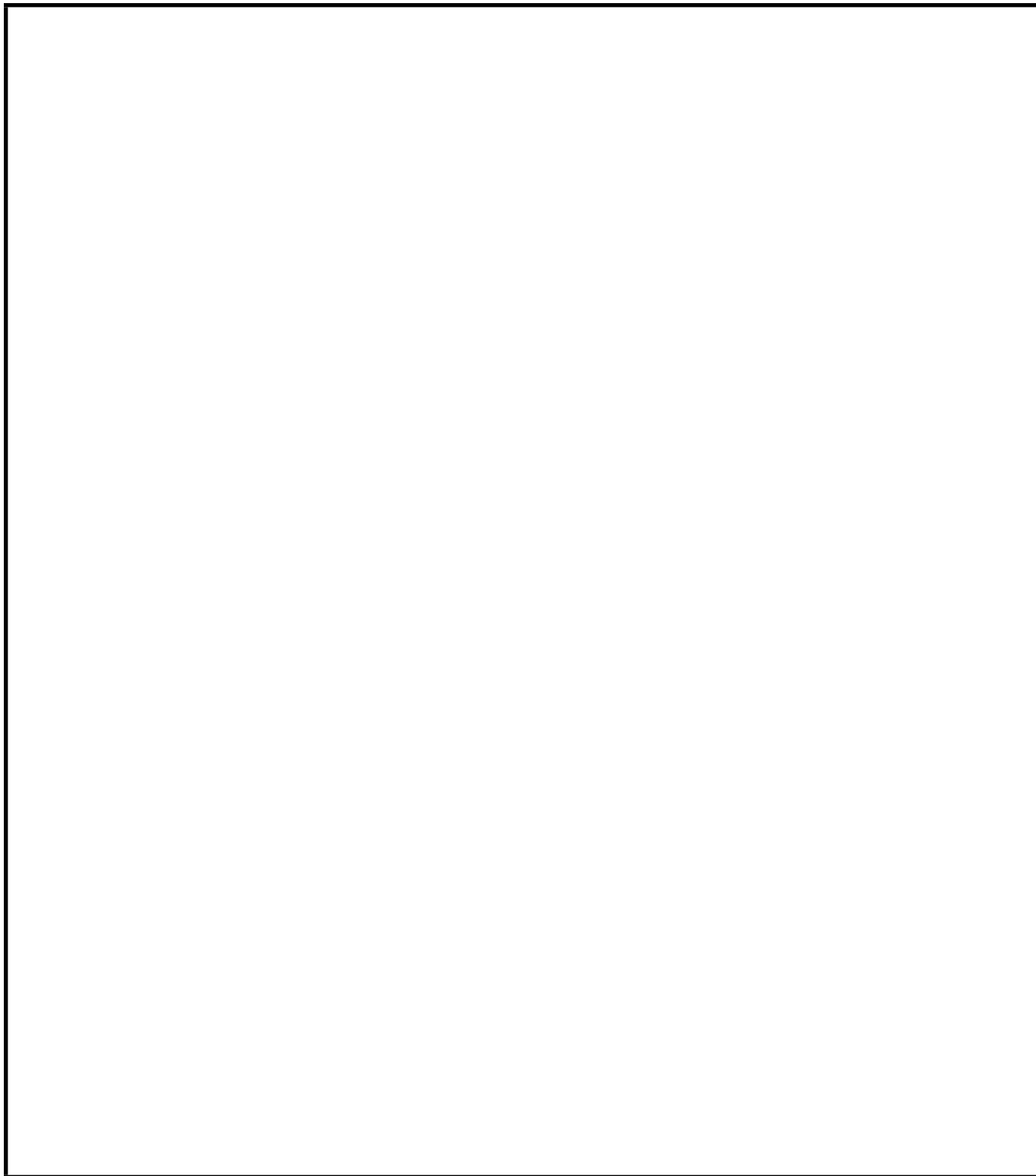
Date \_\_\_\_\_

Activity Page 3.1.1

Use with Lesson 3.1

## **Animals Get What They Need**

**Draw a picture of the animal you saw. Then draw what it eats and where it lives.**

A large, empty rectangular box with a black border, intended for a student to draw a picture of an animal, its food, and its habitat.

Name \_\_\_\_\_

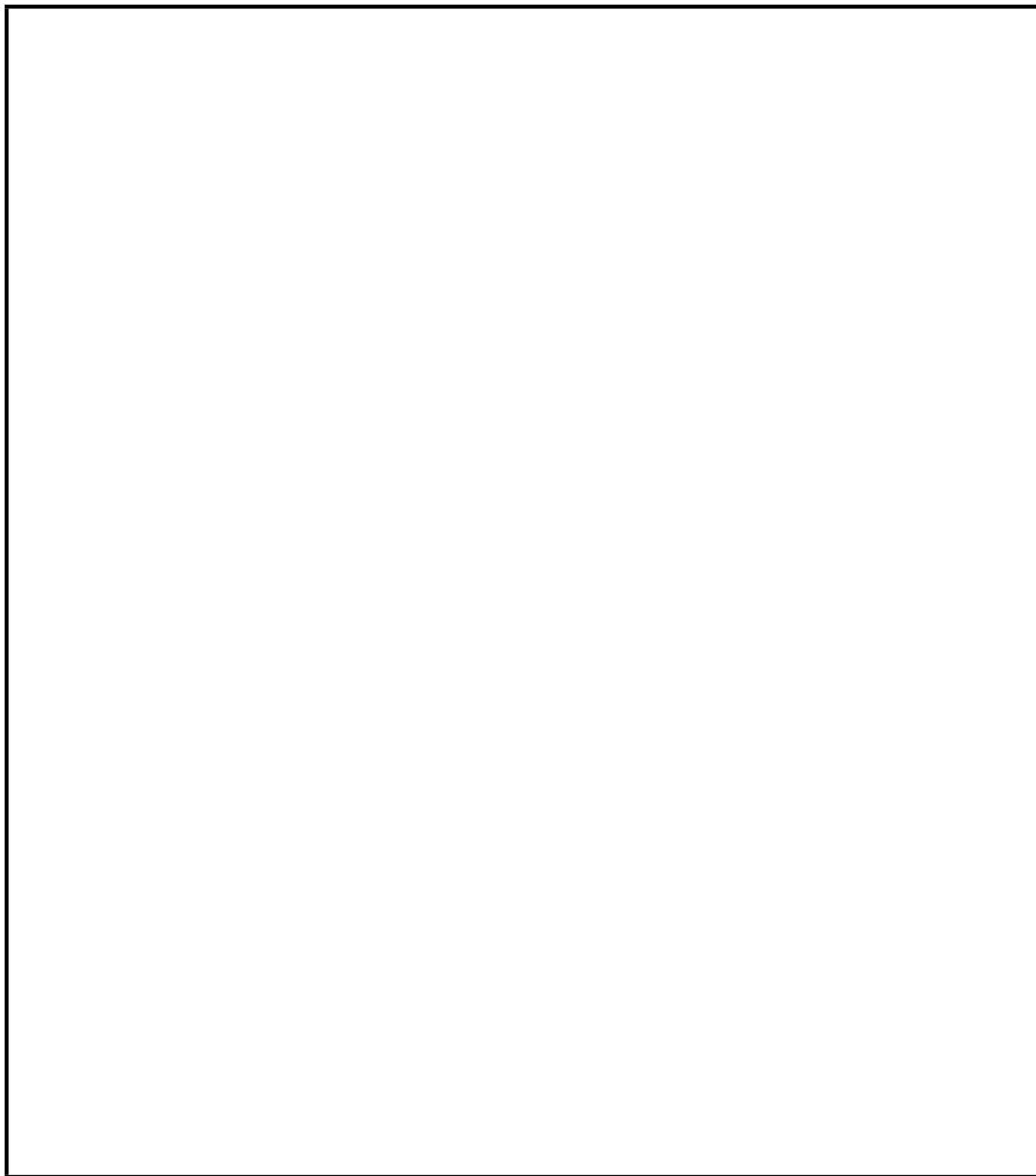
Date \_\_\_\_\_

Activity Page 3.2.1

Use with Lesson 3.2

## Animal Changes

**Draw a picture of animal changes.**

A large, empty rectangular box with a black border, intended for a student to draw a picture of animal changes.

Name \_\_\_\_\_

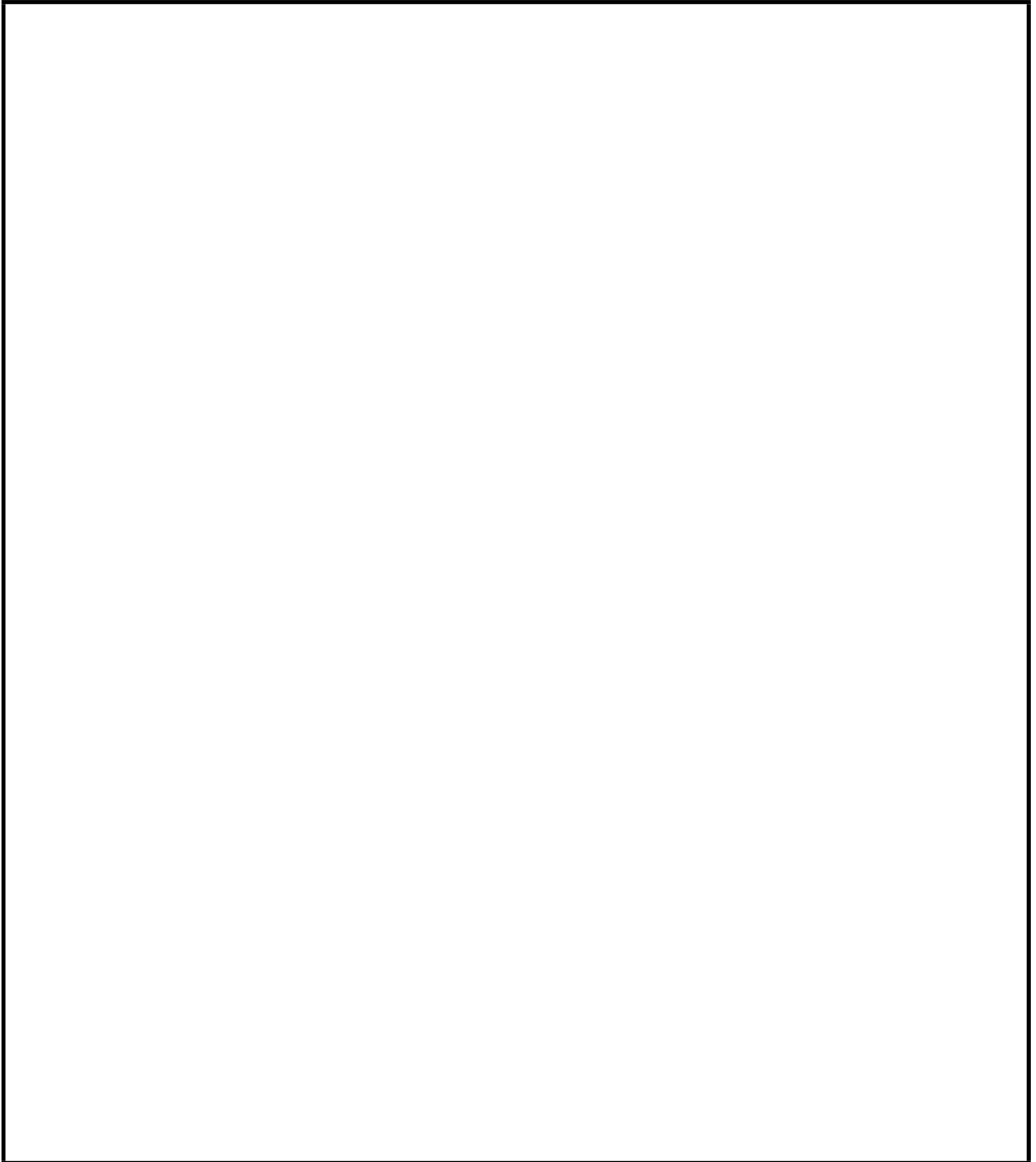
Date \_\_\_\_\_

Activity Page 3.3.1

Use with Lesson 3.3

## **Animals Make Changes**

**Draw a picture of an animal making changes to the environment.**

A large, empty rectangular box with a black border, intended for a student to draw a picture of an animal making changes to the environment.

Name \_\_\_\_\_

Date \_\_\_\_\_

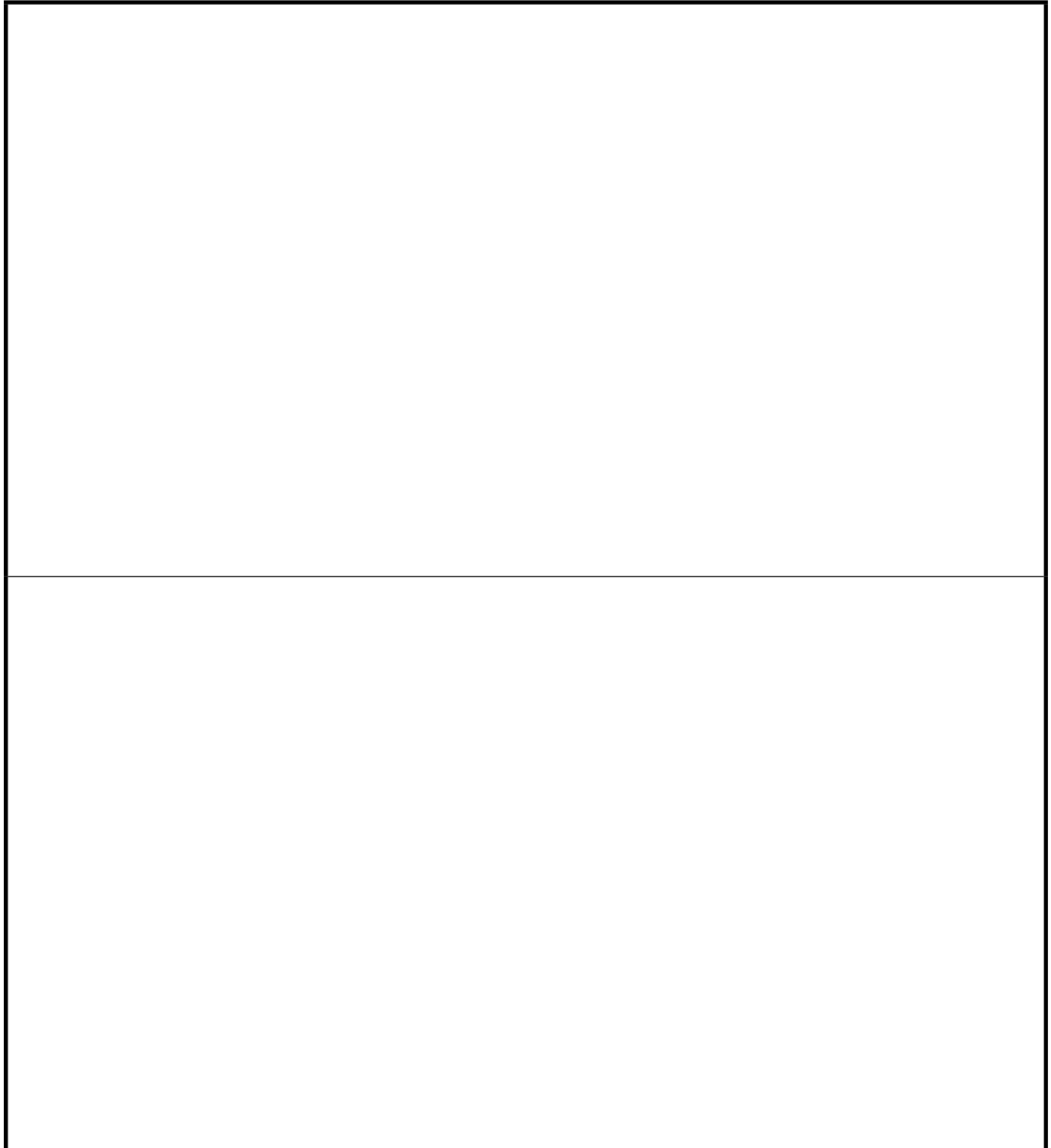
Activity Page 3.4.1

Use with Lesson 3.4

## **Animals Change Living and Nonliving Things**

**Draw a picture of one way an animal changes another living thing.**

**Draw another picture of an animal changing a nonliving thing.**

A large rectangular box with a black border, divided into two equal horizontal sections by a single line. This box is intended for students to draw their observations of animals changing living or nonliving things.

Name \_\_\_\_\_

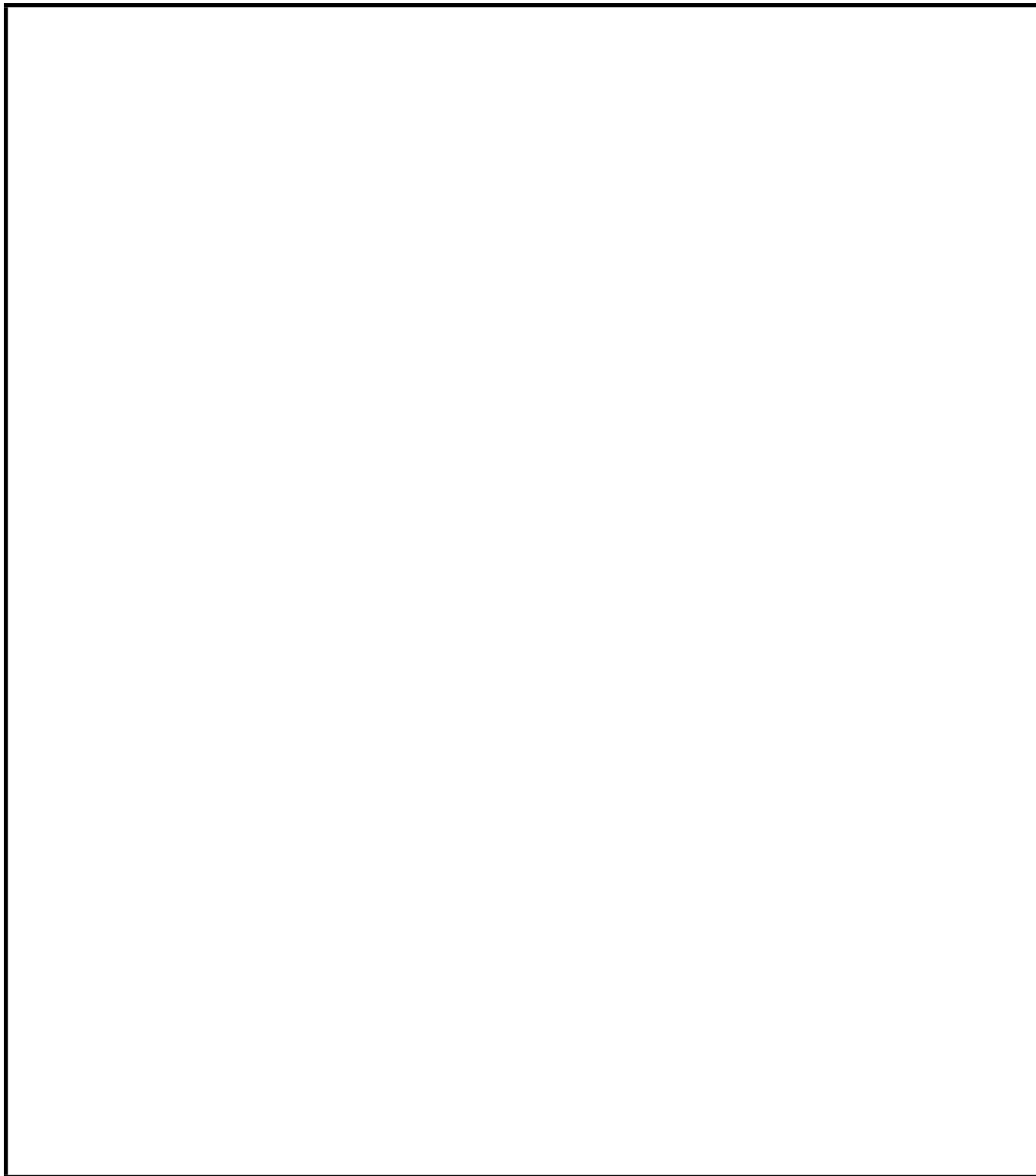
Date \_\_\_\_\_

Activity Page 4.1.1

Use with Lesson 4.1

## People Get What They Need

**Draw a picture of a human change to the environment.**

A large, empty rectangular box with a black border, intended for a student to draw a picture of a human change to the environment.

Name \_\_\_\_\_

Date \_\_\_\_\_

Activity Page 4.2.1

Use with Lesson 4.2

## Human Needs

**Draw pictures of your favorite food, drink, and shelter.**

**Favorite Food**

**Favorite Drink**

**Favorite Shelter**



Name \_\_\_\_\_

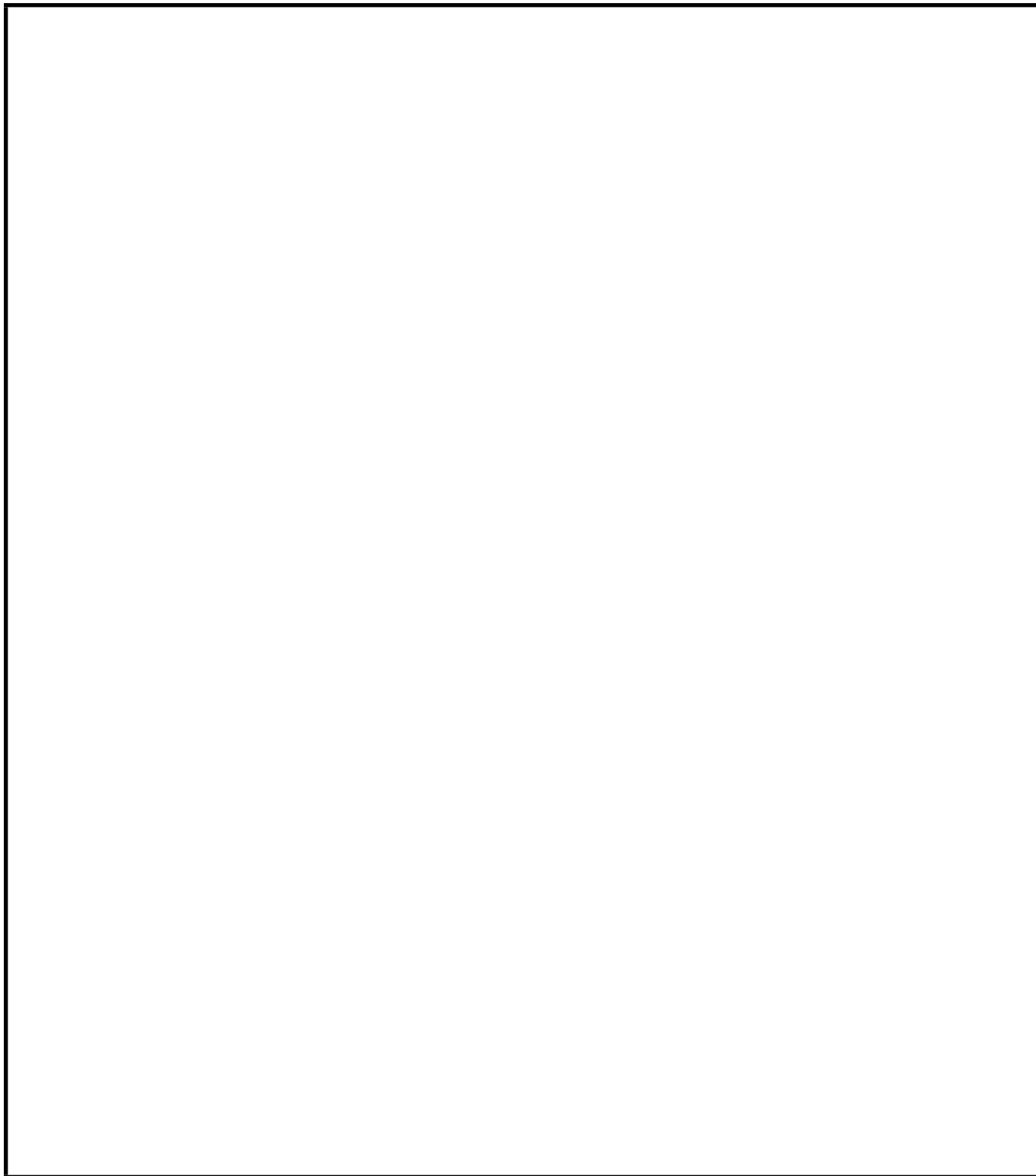
Date \_\_\_\_\_

Activity Page 4.3.1

Use with Lesson 4.3

## Humans Make Changes

**Draw a picture that shows a person making a change to the environment.**

A large, empty rectangular box with a black border, intended for a student to draw a picture showing a person making a change to the environment.

Name \_\_\_\_\_

Date \_\_\_\_\_

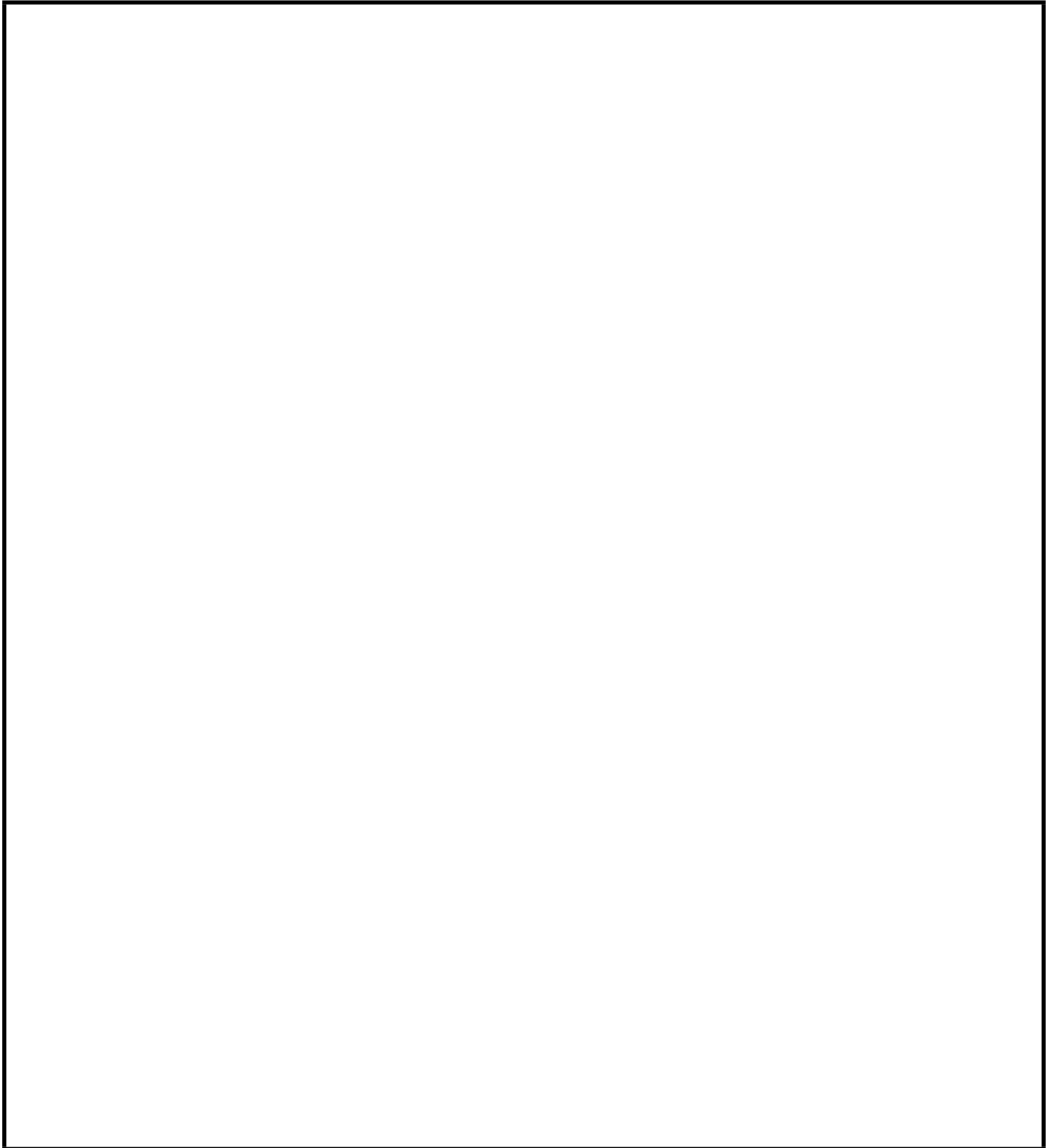
Activity Page 4.4.1

Use with Lesson 4.4

## People Change Environments

**Draw a picture of a way people change environments.**

**Then draw how an animal and a plant are affected.**

A large, empty rectangular box with a black border, intended for a student to draw a picture of a way people change environments and how an animal and a plant are affected.

Name \_\_\_\_\_

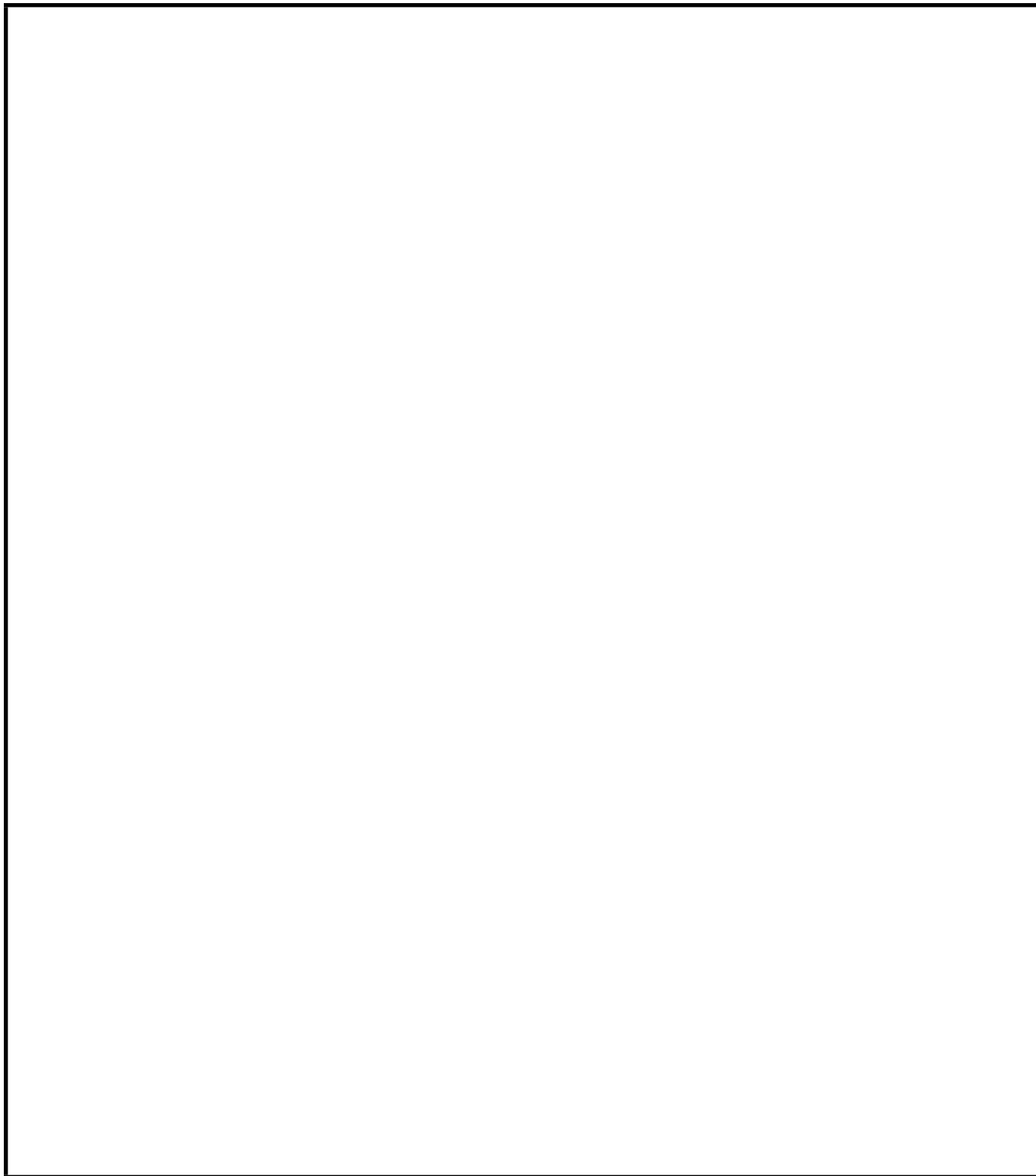
Date \_\_\_\_\_

Activity Page 5.1.1

Use with Lesson 5.1

### Eco-friendly?

**Draw a picture of the human change to the environment.**

A large, empty rectangular box with a black border, intended for a student to draw a picture of human change to the environment.

Name \_\_\_\_\_


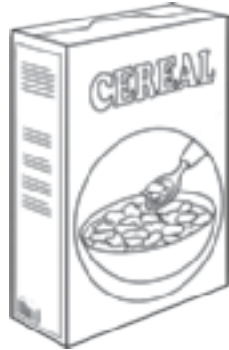






Date \_\_\_\_\_

Activity Page 5.2.1

Use with Lesson 5.2

### Better Changes

**Circle the materials that you think are most eco-friendly.**

Name \_\_\_\_\_

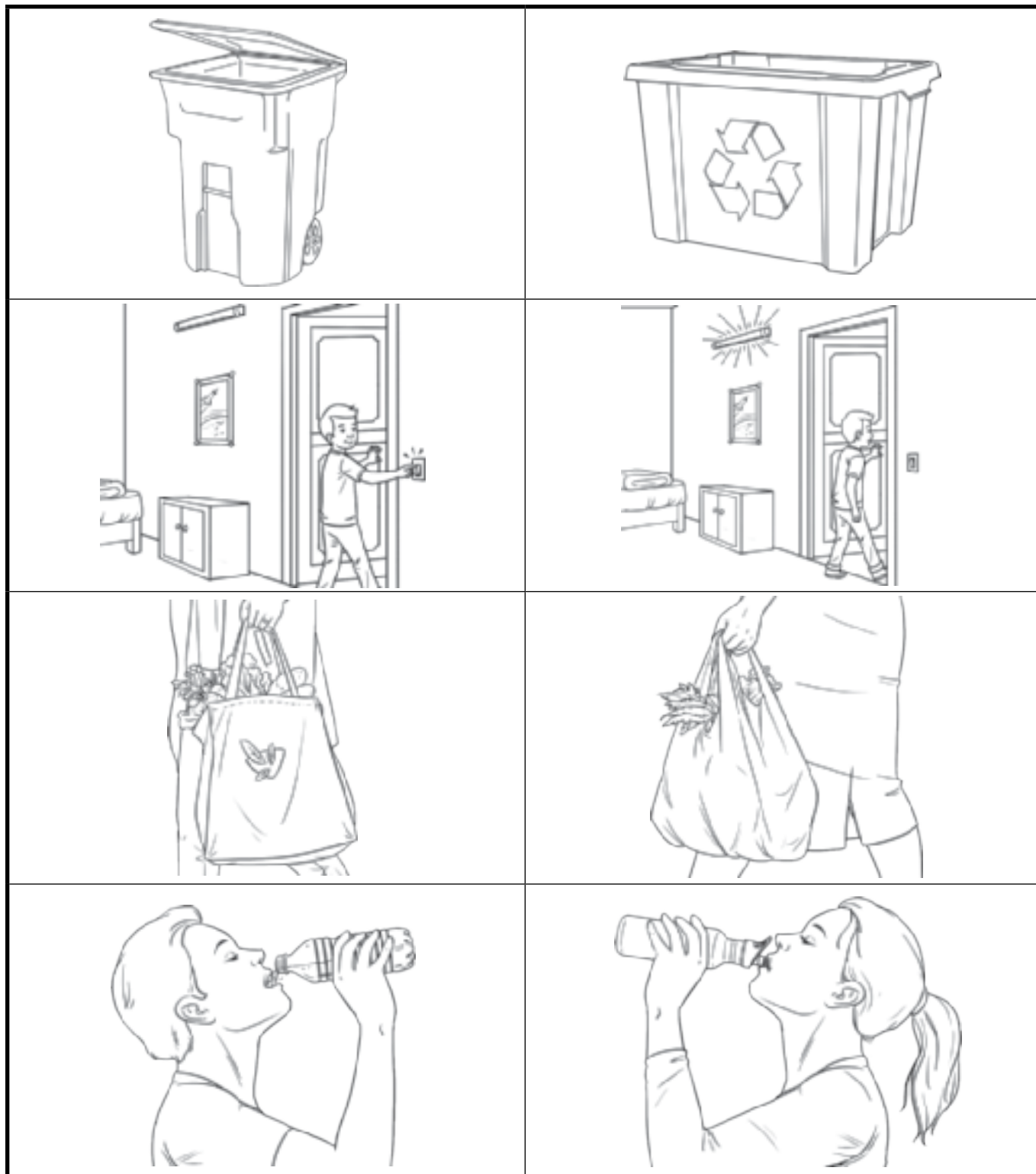
Date \_\_\_\_\_

Activity Page 5.3.1

Use with Lesson 5.3

### Eco-friendly Choices

Circle the things that are more eco-friendly.



Name \_\_\_\_\_

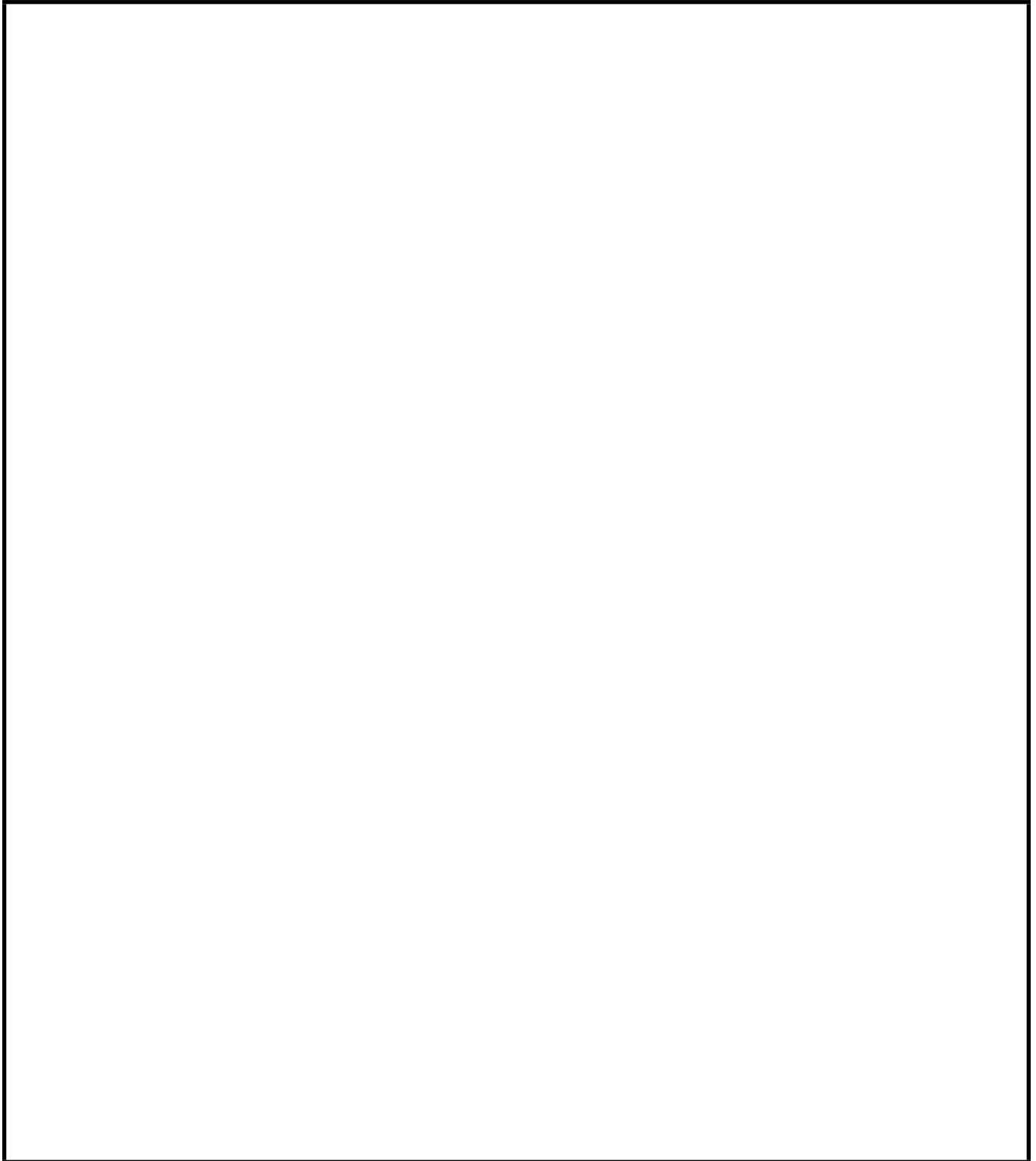
Date \_\_\_\_\_

Activity Page 5.4.1

Use with Lesson 5.4

## Humans Help Environments

**Draw one thing you can do to help the environment.**

A large, empty rectangular box with a black border, intended for a student to draw an illustration of one thing they can do to help the environment.

Name \_\_\_\_\_

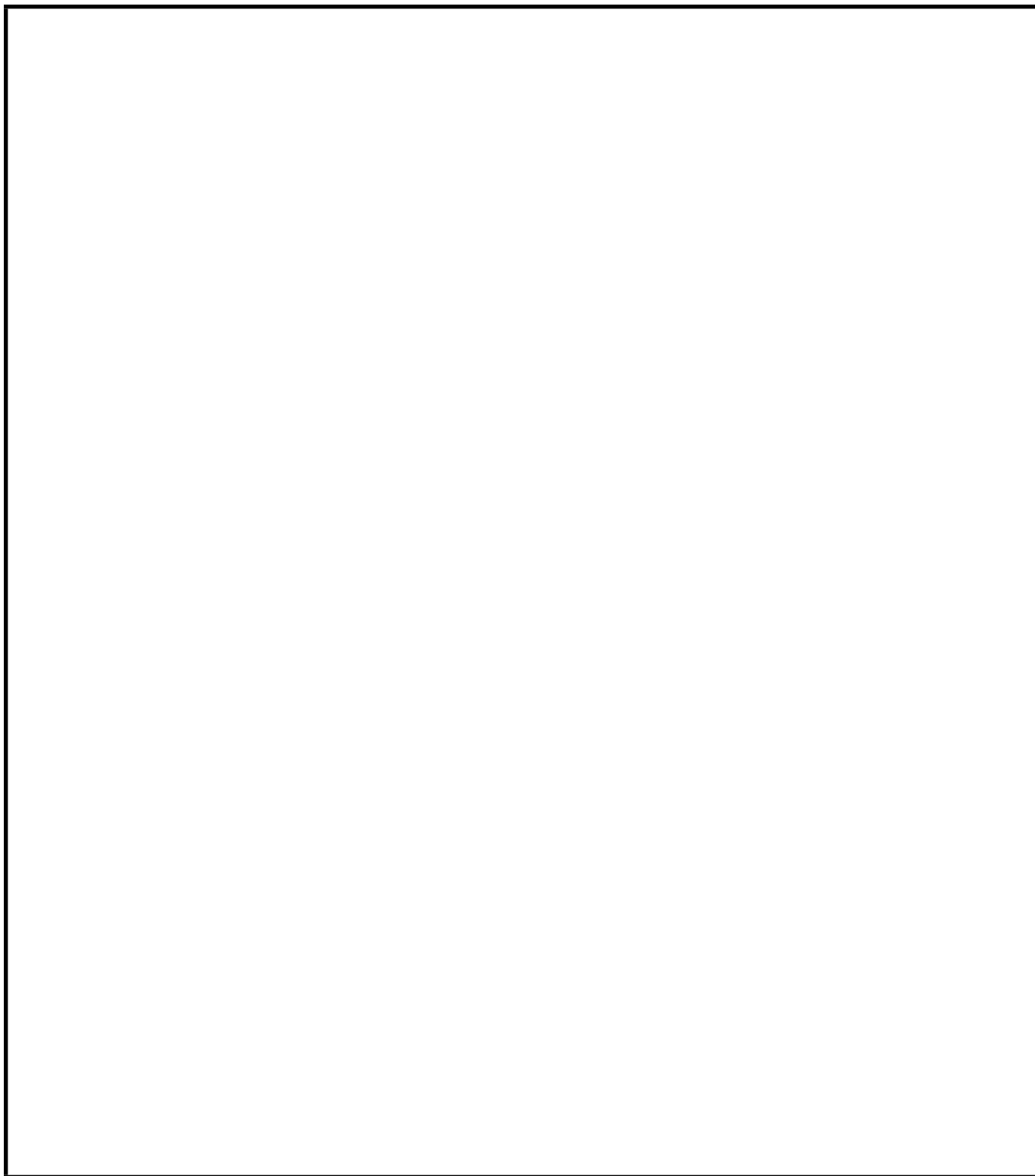
Date \_\_\_\_\_

Activity Page 5.5.1

Use with Lesson 5.5

## Solutions

**Draw a picture of the solution you want.**



Name \_\_\_\_\_

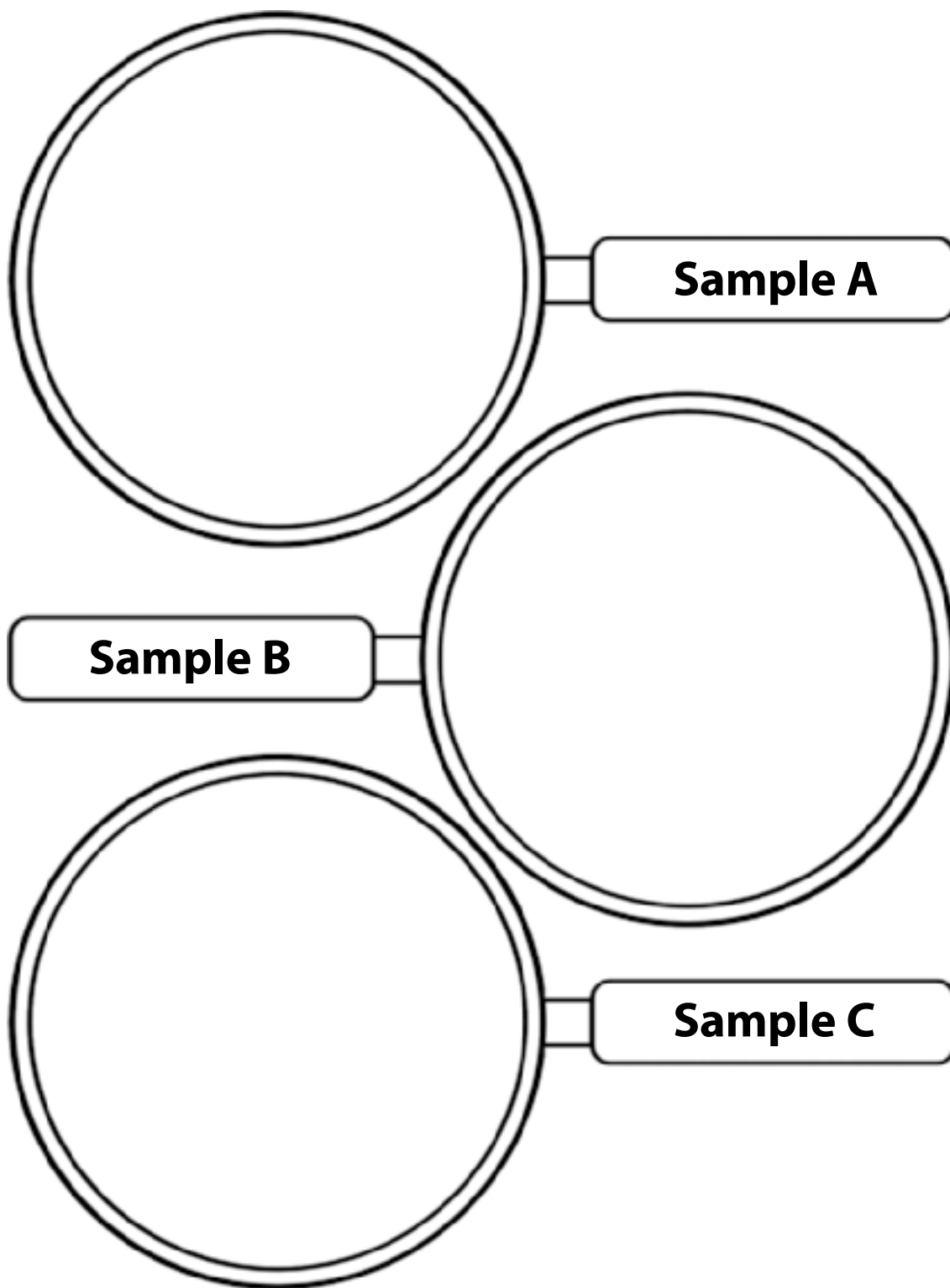
Date \_\_\_\_\_

Activity Page US.1

Use with Unit Supplement

## Comparing Soil

Draw what the soil looks like in the hand lens.





## Activity Pages Answer Key: *Changing Environments*

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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.

### **Food I Eat (AP UO.1) (page 172)**

Students should show they understand that they have an effect on other living things and understand there is a before and after story by drawing where food comes from and what happens after they consume it. For example: apple tree, apple, apple core; cow, glass of milk, empty glass.

### **Living and Nonliving Things (AP 1.1.1) (page 173)**

Student drawings should show two nonliving things, for example, rocks and water, and two living things, like an animal and a plant. For each living thing, students should draw one thing it needs, for example, water or sunlight. Accept all reasonable responses.

### **Garden Plan (AP 1.1.2) (page 174)**

Student drawings should show a garden plan with plants that can be a source of food, water, and shelter. For example, tomato plant, bird bath, bench. Accept all reasonable responses.

### **Seasons (AP 1.2.1) (page 175)**

Students should show they understand how living things respond to seasonal changes. For example, a drawing could show a squirrel curled up in the winter, a tree with colorful leaves in fall, a butterfly flying in summer, baby rabbits in a grassy area in spring. Accept all reasonable responses.

### **Danger (AP 1.3.1) (page 176)**

Three pictures should be circled: fire, drought, flood.

### **Parts of a Dry Environment (AP 1.4.1) (page 177)**

Four pictures should be circled: cactus, snake, petrified rock, rabbit.

### **Plants Get What They Need (AP 2.1.1) (page 178)**

Student drawings should show a plant with roots circled, a square around the leaves, and an arrow pointing to the stem. Accept all reasonable responses.

### **Planting Seeds (AP 2.2.1) (page 179)**

Students should draw a series of pictures of the seed they planted, the seedling, and emerging leaves and stem to demonstrate that the plant has changed its environment. Accept all reasonable responses.

### **Plants Make Changes (AP 2.3.1) (page 180)**

Student drawings should show a plant making a change to the environment, for example, tree roots breaking through a sidewalk or leaves covering the ground. Accept all reasonable responses.

### **Plants Cause Changes (AP 2.4.1) (page 181)**

Students should draw a picture of a plant causing a change to another living or nonliving thing, for example, a tree falling across a creek and changing the direction of water. Accept all reasonable responses.

### **Animals Get What They Need (AP 3.1.1) (page 182)**

Student drawings should show the animal students investigated in its environment, showing what it eats and where it lives, for example, an ant near an anthill with a crumb or a bird in its nest with a worm. Accept all reasonable responses.

### **Animal Changes (AP 3.2.1)** **(page 183)**

Student drawings should show evidence of an animal they found in their exploration, for example, a molehill, a bird nest, or a nutshell. Accept all reasonable responses.

### **Animals Make Changes (AP 3.3.1)** **(page 184)**

Student drawings should show an animal making a change to the environment, for example, an ant building a hill or a worm working through the ground. Accept all reasonable responses.

### **Animals Change Living and Nonliving Things (AP 3.4.1)** **(page 185)**

The first drawing should show an animal making a change to another living thing, for example, a woodpecker pecking a hole in a tree. The second drawing should show an animal making a change to a nonliving thing, for example, a squirrel burying a nut in the ground. Accept all reasonable responses.

### **People Get What They Need (AP 4.1.1)** **(page 186)**

Student drawings should show a human change to the environment to get food, water, or shelter, for example a garden, a house, or a soda machine or drinking fountain. Accept all reasonable responses.

### **Human Needs (AP 4.2.1)** **(page 187)**

Students should draw a picture of a favorite food (e.g., pizza), a favorite drink (e.g., a juice box), and a favorite shelter (e.g., a cabin) to demonstrate the differences between the needs of humans and the needs of animals. Accept all reasonable responses.

### **Humans Make Changes (AP 4.3.1)** **(page 188)**

Student drawings should show a human making a change to the environment, for example, mowing the grass, plowing a field, or building a house. Accept all reasonable responses.

### **People Change Environments (AP 4.4.1)** **(page 189)**

Student drawings should show a human change and the other living things that are affected, for example, a flower garden and a butterfly coming to a flower and a pile of weeds that have been pulled. Accept all reasonable responses.

### **Eco-friendly? (AP 5.1.1)** **(page 190)**

Student drawings should show a change to the environment, for example, bushes planted around a house, a school driveway, a trash can, or outdoor light. The purpose is to discuss whether the change is eco-friendly. Accept all reasonable responses.

### **Better Changes (AP 5.2.1)** **(page 191)**

Students should circle paper grocery bag, cereal box, dinner plate and silverware, and reusable bottle as more eco-friendly choices.

### **Eco-friendly Choices (AP 5.3.1)** **(page 192)**

Students should circle recycling can, turning lights off, reusable shopping bags, and reusable bottle as more eco-friendly choices.

### **Humans Help Environments (AP 5.4.1)** **(page 193)**

Student drawings should represent one way that a student could help the environment, for example, conserving water, picking up litter, recycling, or turning lights out. Accept all reasonable responses.

### **Solutions (AP 5.5.1)** **(page 194)**

Student pictures should reflect a chosen solution from those presented. This will be used to discuss the class project.

### **Comparing Soil (AP US.1)** **(page 195)**

Student drawings should show the potting mix soil to be dark in color and have tiny bits of soil, peat moss, sticks, and possibly leaves. The garden soil should have a larger amount of black soil with larger sticks in it. The peat moss should be browner and have a lot of longer fibers of peat in it.

## Glossary

**Green words and phrases** are Core Vocabulary for the unit, and Student Book page numbers are listed in parentheses. **Bold-faced words and phrases** are additional vocabulary terms related to the unit that you should model for students during instruction and that are often used within the Student Book, and these latter terms do not have specific page numbers listed. Vocabulary words are not intended for use in isolated drill or memorization.

### A

**air, n.** a mix of invisible gases that are all around us and that animals and plants breathe in

**animal, n.** a living thing that eats plants or other animals and can move around

### C

**conserve, v.** to protect or save

### D

**drought, n.** a long period of unusually dry weather

### E

**eco-friendly, adj.** posing minimal harm to the natural environment

**ecosystem, n.** organisms and their environment together as an interrelated system

**environment, n.** the place and conditions that surround a living thing

**extinct, adj.** describing an organism of which there are no more living individuals

### F

**fall, n.** the season of the year between summer and winter when temperature starts to cool

**fire, n.** the light, flames, and heat that occur when something burns

**flood, n.** an event of too much water collecting in an area that is normally dry (also v. to cover or be covered by overflowing water)

**food, n.** a substance that a living thing's body processes for nutrition to grow and stay alive

### G

**garden, n.** an area of land used to grow a collection of plants

### L

**leaf, n.** the plant part that is attached to the stem and collects light for the plant

**litter, n.** trash that is not disposed of properly

### N

**needs, n.** conditions that must be met for a living thing's survival

### O

**organism, n.** a living thing that can reproduce, grow, adapt, and respond to its environment

### P

**plant, n.** a living thing that needs light, water, and air to grow

**pollution, n.** the act of leaving harmful things in a natural environment

### R

**recycle, v.** to use old material to produce something new

**reduce, v.** to lessen the amount of something

**reuse, v.** to use over again

**root, n.** the plant part that takes up water and minerals, typically underground

### S

**season, n.** a three-month part of the year determined by the weather and daylight hours

**shelter, n.** a place to get protection from bad weather or from danger

**space, n.** the empty area between objects

**spring, n.** the season of the year between winter and summer when temperature starts to warm

**stem, n.** the central part of a plant that provides support

**summer, n.** the season of the year between spring and fall when days are longer and temperature is warm or hot

**sunlight, n.** light from the sun

---

## W

**water, n.** a clear, tasteless, odorless liquid that covers most of Earth's surface and on which living organisms depend

**winter, n.** the season of the year between fall and spring when days are shorter and temperature is cooler or cold

### Classroom Safety for Activities and Demonstrations

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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](http://www.coreknowledge.org/cksci-online-resources)

## Student Safety Contract

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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](http://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

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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 guiding them through the problem 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™**

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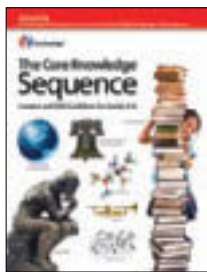
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CKSci™

Core Knowledge SCIENCE™

## Changing Environments

Core Knowledge Science K



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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 Kindergarten and is part of a series of **Core Knowledge SCIENCE** units of study.

For a complete listing of resources in the  
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