

Grade 4: Bundle 1

Bundle

1

Organism Structures and Behavior

Performance Expectations

4-LS1-1, 4-LS1-2, 3-5-ETS1-1, 3-5-ETS1-2

Science and Engineering Practices

Disciplinary Core Ideas

Crosscutting Concepts

Engaging in Argument from Evidence

Developing and Using Models

LS1.A (2): Structure and Function

LS1.D (2): Information Processing

Systems and System Models

Bundle 1: Organism Structures and Behavior is composed of two scopes. Each of these scopes provides the students with an opportunity to build their knowledge and start forming ideas that will help them complete their mission at the end of this bundle and build toward a complete answer to their Anchoring Phenomena question. Students will begin by being introduced to their Anchoring Phenomena, which introduces them to their bundle mission of designing a zoo that is organized by animals with the best sense receptors and describing how having those sense receptors helps animals survive. In addition, students will design a scavenger hunt for students who go on field trips to the zoo.

The students will then move through multiple scopes in which they will learn the following concepts:



- Plants and animals have internal and external structures that help them grow, protect themselves, behave a certain way, and reproduce.
- Animals have sense receptors that include vision, hearing, smell, taste, and touch.
- Sense receptors send information to an animal's brain, which, combined with perceptions and memories, guides their actions.

The students will also engage in the Science and Engineering Practices and Crosscutting Concepts listed above throughout the scopes in this bundle.

Grade 4: Bundle 1 Snapshot

Anchoring Phenomena: How can we group organisms by their best sense receptors and describe how those sense receptors help the animals survive?

Mission Goal: The students’ mission is to design a zoo that is organized by animals with the best sense receptors and to describe how having those sense receptors helps animals survive. In addition, students will design a scavenger hunt for students who go on field trips to the zoo.

Scope	Investigative Phenomena	Instructional Focus	Connection to Bundle Mission
<div>Plant and Animal Parts</div> <div></div>	What do an animal’s unique parts have to do with its survival?	Know plants and animals have internal and external structures that help them grow, protect themselves, behave a certain way, and reproduce.	Group animals that would be found in a zoo together by similar structures that serve the same function.
<div>Sense Receptors</div> <div></div>	How do the senses help organisms respond to different things?	Explain how animals have sense receptors that include vision, hearing, smell, taste, and touch. Understand how sense receptors send information to an animal’s brain, which, combined with perceptions and memories, guides their actions.	Group animals together that have certain excellent sense receptors.

Bundle 1: Scope 1



Plant and Animal Parts

Three-Dimensional Learning

Performance Expectations

4-LS1-1 Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.

Clarification Statement: Examples of structures could include thorns, stems, roots, colored petals, heart, stomach, lung, brain, and skin. **Assessment Boundary:** Assessment is limited to macroscopic structures within plant and animal systems.

Science and Engineering Practices

Disciplinary Core Ideas

Crosscutting Concepts

Engaging in Argument from Evidence

Construct an argument with evidence, data, and/or a model. (4-LS1-1)

LS1.A (2): Structure and Function

Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction.

Systems and System Models

A system can be described in terms of its components and their interactions. (4-LS1-1)

Disciplinary Core Ideas

- **LS1.A (2): Structure and Function**
Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction.

- All the elements found in the Plant and Animal Parts scope are designed to address the subelement for LS1.A (2). Students begin the scope by discussing with their group the three characteristics given for an assigned organism (outer covering, locomotion, and how it gets food). They go on to explore the parts of a plant, parts and structures of animal body systems, and physical traits that support an organism's ability to survive, grow, and reproduce.

Science and Engineering Practices

- **Engaging in Argument from Evidence**
Construct an argument with evidence, data, and/or a model. (4-LS1-1)

- In Explore 1, students conduct an investigation to produce data to serve as the basis for evidence that the function of a plant's stem is to transport water and nutrients throughout the whole plant.
- In Explore 2, students act as a model of how our various internal body structures interact to function as body systems necessary for animal survival, growth, behavior, and reproduction.

Crosscutting Concepts

- **Systems and System Models**
A system can be described in terms of its components and their interactions. (4-LS1-1)

- In the Hook, students compare the locomotion of plants and animals as well as similar ways animals obtain food.
- In Explore 2, students observe the different parts and structures of a plant. Students then use their models to determine which animal body system they think plays the largest role in overall survival.
- In Explore 3, students describe examples of plant and animal adaptations. In addition, they predict what might happen to the plant or animal if they did not have that adaptation.

The above illustrates how we integrate the three dimensions through the scope. As we know that opportunities naturally occur to model other Crosscutting Concepts and Science and Engineering Practices in many ways, we only call out the ones directly aligned by the NGSS Framework here.

Bundle 1: Scope 1



Plant and Animal Parts

Prior Knowledge and Progression

By the end of Grade 2, students should know that all organisms have external parts. Different animals use their body parts in different ways to see, hear, grasp objects, protect themselves, move from place to place, and seek, find, and take in food, water, and air. Plants also have different parts (roots, stems, leaves, flowers, fruits) that help them survive, grow, and produce more plants.

Category	K-2	3-5	Middle School	High School
LS1.A Structure and Function	All organisms have external parts that they use to perform daily functions.	Organisms have both internal and external macroscopic structures that allow for growth, survival, behavior, and reproduction.	All living things are made up of cells. In organisms, cells work together to form tissues and organs that are specialized for particular body functions.	Systems of specialized cells within organisms help perform essential functions of life. Any one system in an organism is made up of numerous parts. Feedback mechanisms maintain an organism's internal conditions within certain limits and mediate behaviors.

Scope Overview

This scope begins with the introduction to the student Investigative Phenomena in the Engage section. Students will use their Graphic Organizers as their note-taking devices to record the information gained in each section as they begin to form a conceptual model of the content as they move through the scope. The teacher uses the Accessing Prior Knowledge (APK) element to help pull out students' current knowledge levels as well as any preconceptions they have before beginning the scope. In this Plant and Animal Parts APK, students should think about how internal and external structures of plants and animals help meet their basic needs. This will help uncover possible preconceptions students have before beginning the lesson. Teachers can keep any such preconceptions in mind as they move through the scope. The final element in the Engage section is the Hook. Here, the students have their first experience with the content. They will build on their knowledge as they continue moving through the scope.

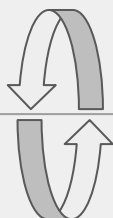
Students then dig deeper into the content through the three Explore activities. In Explore 1, they observe different parts and structures of a plant. In Explore 2, students act as a model of how our various internal body structures interact to function as body systems necessary for animal survival, growth, behavior, and reproduction. In Explore 3, students will match physical traits with how they support an organism's ability to survive, grow, and reproduce. Explore 1 includes a formative CER assessment to help the teacher gauge student understanding at that point. By the end of the Engage and Explore activities, students should be able to explain how plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.

Students will continue to refine their knowledge of the content as they move through the elements in the Explain and Elaborate sections. Teachers can use any or all of the provided elements. We know that most classrooms have limited time, so teachers should choose the Explain and Elaborate elements that best fit the needs of their students. The teacher can then formally assess the students' understanding by using any of the three summative assessments provided in the Evaluate section. If the students require additional help gaining proficiency with the content, resources can be found in the Intervention section. Students who have achieved mastery of the concept can move over to the Acceleration pieces.

Documents are available to help the teacher assess the CCCs and SEPs taught in this scope. These are located in the Home section of each scope. Question prompts or artifacts to look for throughout the scope are provided, as well as sample answers to help the teacher plot students' understanding on the rubric. The information that is gathered on these forms can be used to track progress on the CCC and SEP Segment Inventory of Skills found in each bundle and on the CCC and SEP Yearlong Inventory of Skills document located in the Teacher Toolbox.

Scope Snapshot: Plant and Animal Parts

Section	Element	Description
ENGAGE	Investigative Phenomena	What do an animal's unique parts have to do with its survival?
	APK	Students think about how internal and external structures of plants and animals help meet their basic needs.
	Graphic Organizer	The Graphic Organizer is a note-taking device students can use as they move through this scope.
	Hook	Students discuss with their groups the three characteristics given for their organism (outer covering, locomotion, and how it gets food) and create clues for their chart.
EXPLORE	Explore 1: Activity	Plant Guts Students observe the different parts and structures of a plant.
	Explore 2: Activity	Interactive Model of Body Systems Students act as a model of how our various internal body structures interact to function as body systems necessary for animal survival, growth, behavior, and reproduction.
	Explore 3: Adaptation	Adaptation Matchup Students match physical traits with how they support an organism's ability to survive, grow, and reproduce.
EXPLAIN	Picture Vocabulary	A slide presentation of important vocabulary terms along with a picture and definition as well as a vocabulary activity in which students use vocabulary words to create an illustration
	STEMscopedia	Expository text to support science content, which can be used as reference material in conjunction with Linking Literacy activities
	Linking Literacy	Strategies to help students comprehend the informational text in the STEMscopedia, including pre-, during-, and post-reading activities
	Communicate Science	Students use different forms of communication to discuss scientific topics connected to the content of this scope.
	Concept Review Game	An interactive game that can be played as a class or individually to help students review the science concepts in the module
	Content Connections Video	An inquiry video that engages students and provides meaning



ELABORATE	Math Connections	A practice that uses grade-level-appropriate math activities to address the concept
	Reading Science: Three Lexile Levels (A, B, and C)	Putting the Pieces Together: Plants This provides additional expository text that supports real-world application of the content, including five to eight comprehension questions. Teachers can choose which level to assign each student based on students’ reading Lexile levels.
	Science Today: See It!	A Camel’s Hump Students explore real-world connections and applications of science content through interactions with an engaging video provided by Associated Press.
	Career Connections	Zoo Education Program Specialist A video that introduces students to STEM careers and the 21st Century Skills needed to succeed in those fields
	Scientist Spotlight	Yoshiki Sasai – Biologist
EVALUATE	Claim-Evidence-Reasoning	The lion was breathing fast. Her heart was racing as she chased after the wildebeest. She caught up to it, took one giant leap, grabbed the back of the wildebeest with her sharp claws, and pulled it down to the ground. The wildebeest fought back. It swung its horns at the lion and tried to stomp on her with its hooves. The lion eventually won the battle and ate her prey. Write a scientific explanation describing how the lion’s internal and external structures were useful.
	Open-Ended Response Assessment	A short-answer and essay assessment to evaluate students’ mastery of the concept
	Multiple Choice Assessment	A standards-based assessment designed to gauge students’ understanding of the science concept by using their selections of the best possible answers from a list of choices
INTERVENTION	Guided Practice	Students discuss the structures and functions of different plants and animals as well as brainstorm examples.
	Independent Practice	A short-answer and essay assessment to evaluate students’ mastery of the concept
	Concept Attainment Quiz	A standards-based assessment designed to gauge students’ understanding of the science concept by using their selections of the best possible answers from a list of choices
ACCELERATION	Extensions	A set of ideas and activities that can help further elaborate on the concept
	Books on Topic	A list of trade books for the scope
	Science Art	Students create a plant headdress that represents adaptations plants would need for a given environment.



Three-Dimensional Learning

Performance Expectations

4-LS1-2 Use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways.

Clarification Statement: Emphasis is on systems of information transfer. **Assessment Boundary:** Assessment does not include the mechanisms by which the brain stores and recalls information or the mechanisms of how sensory receptors function.

3-5-ETS1-1 Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.

3-5-ETS1-2 Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.

Science and Engineering Practices

Disciplinary Core Ideas

Crosscutting Concepts

Developing and Using Models

Use a model to test interactions concerning the functioning of a natural system. (4-LS1-2)

LS1.D (2): Information Processing

Different sense receptors are specialized for particular kinds of information, which may be then processed by the animal's brain. Animals are able to use their perceptions and memories to guide their actions.

Systems and System Models

A system can be described in terms of its components and their interactions. (4-LS1-2)



Three-Dimensional Learning

Disciplinary Core Ideas

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| <ul style="list-style-type: none"> ● LS1.D (2): Information Processing
Different sense receptors are specialized for particular kinds of information, which may be then processed by the animal's brain. Animals are able to use their perceptions and memories to guide their actions. | <ul style="list-style-type: none"> ● All the elements found in the Sense Receptors scope are designed to address the subelement for LS1.D (2). Students begin the scope by experiencing how people react to smell differently. They go on to explore how different forms of communication help animals survive, and they design and construct an animal and identify ways it will sense and respond to danger. |
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Science and Engineering Practices

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| <ul style="list-style-type: none"> ● Developing and Using Models <ul style="list-style-type: none"> ○ Use a model to test interactions concerning the functioning of a natural system. (4-LS1-2) | <ul style="list-style-type: none"> ● In Explore 2, students design and construct an animal drawing and model as well as identify ways it will sense and respond to danger. |
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Crosscutting Concepts

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| <ul style="list-style-type: none"> ● Systems and System Models <ul style="list-style-type: none"> ○ A system can be described in terms of its components and their interactions. (4-LS1-2) | <ul style="list-style-type: none"> ● In Explore 1, students take on the role of meerkat gangs to observe how different forms of communication help animals survive. They discuss observations they made while playing their roles. ● In Explore 2, students analyze their models by discussing how their animals' sense receptors protect them from danger. |
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ETS (Engineering, Technology and the Application of Science)

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| <ul style="list-style-type: none"> ● 3-5-ETS1-1 Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost. ● 3-5-ETS1-2 Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem. | <ul style="list-style-type: none"> ● In Explore 2, students use the scientific knowledge they have gained as well as the 21st Century Skill of collaboration to design and construct an animal and identify ways it will sense and respond to danger. |
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The above illustrates how we integrate the three dimensions through the scope. As we know that opportunities naturally occur to model other Crosscutting Concepts and Science and Engineering Practices in many ways, we only call out the ones directly aligned by the NGSS Framework here.

Bundle 1: Scope 2



Sense Receptors

Prior Knowledge and Progression

Category	K-2	3-5	Middle School	High School
LS1.D Information Processing	Animals sense and communicate information and respond to inputs with behaviors that help them grow and survive.	Different sense receptors are specialized for particular kinds of information. Animals use their perceptions and memories to guide their actions.	Each sense receptor responds to different inputs, transmitting them as signals that travel along nerve cells to the brain; The signals are then processed in the brain, resulting in immediate behavior or memories.	N/A

Scope Overview

This scope begins with the introduction to the student Investigative Phenomena in the Engage section. Students will use their Graphic Organizers as their note-taking devices to record the information gained in each section as they begin to form a conceptual model of the content as they move through the scope. The teacher uses the Accessing Prior Knowledge (APK) element to help pull out students' current knowledge levels as well as any preconceptions they have before beginning the scope. In this Sense Receptors APK, students will think about which sense would be the most important to have if they were a bat. This will help uncover possible preconceptions students have before beginning the lesson. Teachers can keep any such preconceptions in mind as they move through the scope. The final element in the Engage section is the Hook. Here, the students have their first experience with the content. They will build on their knowledge as they continue moving through the scope.

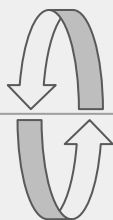
Students then dig deeper into the content through the two Explore activities. In Explore 1, they take on the role of meerkat gangs to observe how different forms of communication help animals survive. In Explore 2, students use the engineering design process to design and construct an animal and identify ways it will sense and respond to danger. Explore 1 includes a formative CER assessment to help the teacher gauge student understanding at that point. By the end of the Engage and Explore activities, students should be able to describe that animals receive different types of information through their senses, process information in their brains, and respond to information in different ways.

Students will continue to refine their knowledge of the content as they move through the elements in the Explain and Elaborate sections. Teachers can use any or all of the provided elements. We know that most classrooms have limited time, so teachers should choose the Explain and Elaborate elements that best fit the needs of their students. The teacher can then formally assess the students' understanding by using any of the three summative assessments provided in the Evaluate section. If the students require additional help gaining proficiency with the content, resources can be found in the Intervention section. Students who have achieved mastery of the concept can move over to the Acceleration pieces.

Documents are available to help the teacher assess the CCCs and SEPs taught in this scope. These are located in the Home section of each scope. Question prompts or artifacts to look for throughout the scope are provided, as well as sample answers to help the teacher plot students' understanding on the rubric. The information that is gathered on these forms can be used to track progress on the CCC and SEP Segment Inventory of Skills found in each bundle and on the CCC and SEP Yearlong Inventory of Skills document located in the Teacher Toolbox.

Scope Snapshot: Sense Receptors

Section	Element	Description
ENGAGE	Investigative Phenomena	How does an animal hunt for and find food?
	APK	Students think about which sense would be the most important to have if they were a bat.
	Graphic Organizer	The Graphic Organizer is a note-taking device students can use as they move through this scope.
	Hook	Students experience how people react to smell differently.
EXPLORE	Explore 1: Activity	Reactive Senses Students take on the role of gangs of meerkats to observe how different forms of communication help animals survive.
	Explore 2: Engineering Solution	Sensing Danger Students use the scientific knowledge they have gained as well as the 21st Century Skill of collaboration to design and construct an animal and to identify ways it will sense and respond to danger.
EXPLAIN	Picture Vocabulary	A slide presentation of important vocabulary terms along with a picture and definition as well as a vocabulary activity in which students use vocabulary words to create an illustration
	STEMscopedia	Expository text to support science content, which can be used as reference material in conjunction with Linking Literacy activities
	Linking Literacy	Strategies to help students comprehend the informational text in the STEMscopedia, including pre-, during-, and post-reading activities
	Communicate Science	Students use different forms of communication to discuss scientific topics connected to the content of this scope.
	Concept Review Game	An interactive game that can be played as a class or individually to help students review the science concepts in the module
	Content Connections Video	An inquiry video that engages students and provides meaning



ELABORATE	Math Connections	A practice that uses grade-level-appropriate math activities to address the concept
	Reading Science: Three Lexile Levels (A, B, and C)	A Visit to the Zoo This provides additional expository text that supports real-world application of the content, including five to eight comprehension questions. Teachers can choose which level to assign each student based on students’ reading Lexile levels.
	Science Today: Watch It!	Dolphins Students will explore real-world connections and applications of science content through interactions with an engaging video provided by the Associated Press.
	Career Connections	Zoo Education Program Specialist A video that introduces students to STEM careers and the 21st Century Skills needed to succeed in those fields
	Scientist Spotlight	Santiago Ramón y Cajal – Neurologist
EVALUATE	Claim-Evidence-Reasoning	Liam opened his pet frog’s cage to put some crickets inside for the frog to eat. The frog became very still once the crickets were inside his cage. As soon as one came close enough, the frog shot out his tongue and gulped it up! Write a scientific explanation describing the mental process of the frog and what caused it to act.
	Open-Ended Response Assessment	A short-answer and essay assessment to evaluate students’ mastery of the concept
	Multiple Choice Assessment	A standards-based assessment designed to gauge students’ understanding of the science concept by using their selections of the best possible answers from a list of choices
INTERVENTION	Guided Practice	Students observe how an animal interacts with its environment by using sense receptors.
	Independent Practice	A short-answer and essay assessment to evaluate students’ mastery of the concept
	Concept Attainment Quiz	A standards-based assessment designed to gauge students’ understanding of the science concept by using their selections of the best possible answers from a list of choices
ACCELERATION	Extensions	A set of ideas and activities that can help further elaborate on the concept
	Books on Topic	A list of trade books for the scope
	Science Art	Students create a poster depicting an animal's response to an environmental event.