UNIT 1

STRUCTURE, FUNCTION, AND INFORMATION PROCESSING – ANIMALS AND PLANTS

Fourth Grade | Rogers Public Schools
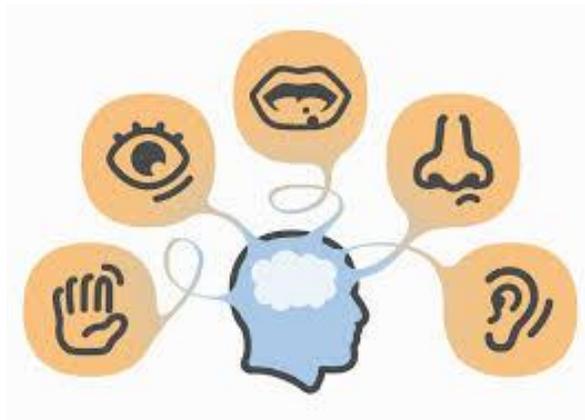
Unit 1: Structure, Function, and Information Processing   9 weeks

In this first unit, students use the concept of systems to understand that every animal has internal and external structures that allow it to take in information from the environment in which it lives, process that information, and respond in ways that increase its chances to grow, reproduce, and survive. A system is made up of structures and processes that interact and help the system to function. Every plant and animal can be described in terms of its internal and external structures and their interactions. Within these structures, there are functions that support survival, growth, behavior, and reproduction.

Students will understand that all animals receive information from their environment through senses or sensory receptors. The information is transferred, processed, and then allows the organism to respond, through instinctive reactions or learned behaviors, in a manner that will help it survive and reproduce. Animals often store this information in their brains as memories and use these memories to guide future actions. Additionally, students will focus on the sense of sight; developing a conceptual understanding of the role that light plays in allowing us to see objects.

Students will observe the structures of an animal or plant, either through direct observations or using text and digital resources. They will understand the function of each structure and describe how they help the animal grow, survive, and/or reproduce. They will use evidence from their observations to construct arguments and support their claims. Students should use models, such as drawings, diagrams, and pictures, to describe ways that animals (including humans) receive, process, store, and respond to information from the environment. Students will also use models to understand and describe that light reflects from objects and enters the eye, allowing objects to be seen.

Unit 1 Performance Expectations

❖ **4-PS4-2   Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen.** [Assessment Boundary: Assessment does not include knowledge of specific colors reflected or seen, the cellular mechanisms of vision, or how the retina works.]

❖ **4-LS1-1   Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.** [**AR** Clarification Statement: Examples of structures for survival could include thorns and teeth. Examples of structures for growth could include stems and the skeleton. Examples of structures for behavior could include roots and the brain. Examples of reproduction could include pistils, stamens, and eggs.] [Assessment Boundary: Assessment is limited to macroscopic structures within plant and animal systems.]

❖ **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. Use of models could include diagrams, computer simulations, and physical models.] [Assessment Boundary: Assessment does not include the mechanisms by which the brain stores and recalls information or the mechanisms of how sensory receptors function.]

In Unit 1, students will understand…

- ❖ Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior and reproduction.
- ❖ Different sense receptors are specialized for particular kinds of information, which may then be processed by the animal's brain.
- ❖ Animals are able to use their perceptions and memories to guide their actions.
- ❖ Some responses to information are instinctive – that is, animals' brains are organized so that they do not have to think about how to respond to certain stimuli.
- ❖ An object can be seen when light reflected from its surface enters the eye.
- ❖ Because lenses bend light beams, they can be used to provide magnified images of objects too small or too far away to be seen with the naked eye.
- ❖ A system can be described in terms of its components and their interactions.
- ❖ Models can be used to describe phenomena and test interactions in the functions of a natural system.

Unit 1 Essential Questions:

- ❖ How do internal and external structures support the survival, growth, behavior, and reproduction of plants and animals?

- ❖ How do animals receive, process, and respond to different types of information?

Foundational Knowledge:

Prior to 4th grade, students should have knowledge, understanding of, and experiences with the following ideas:

- ❖ 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 have different parts (roots, stems, leaves, flowers, fruit) that help them survive, grow, and produce more plants.
- ❖ Animals have body parts that capture and convey different kinds of information needed for growth and survival (ex: eyes for light, ears for sounds, and skin for temperature or touch).
- ❖ Animals respond to these inputs with behaviors that help them survive (ex: find food, run from a predator) and plants also respond to some external input (ex: turn leaves toward the sun).
- ❖ All animals and plants need food in order to live and grow. Animals obtain their food from plants or from other animals, while plants need light to produce food and grow.
- ❖ Plants and animals grow and change and have predictable characteristics at different stages of development.
- ❖ Adult plants and animals can have young. In many kinds of animals, parents and the offspring themselves engage in behaviors that help the offspring to survive.
- ❖ Objects can be seen only when light is available to illuminate them.
- ❖ Light travels from place to place (experiences with light sources, mirrors, and shadows).
- ❖ Mirrors and prisms can be used to redirect a light beam.

With the implementation of new standards, students may not have had opportunities to engage in these foundational understandings and ideas before 4th grade. You may need to provide opportunities for students to experience these ideas as you move forward.

Additional Content Connections:

*These connections provide opportunities to score to other content standards with focused instruction.

ELA:

- ❖ Speaking and Listening
    - SL.4.1 Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher led) with diverse partners on grade 4 topics and texts, building on others' ideas and expressing their own clearly.
    - SL.4.2 Paraphrase portions of a text read aloud or information presented in diverse media and formats, including visually, quantitatively, and orally.

Unit Vocabulary:

observe/observation	perceptions	system	growth
interact/interaction	memories	components	survival
organism	information	functions	behaviors
senses	transfer	models	reproduction
sensors	process/processing	internal/external	light
sensory receptors	respond/response	structure	reflect

Structure, Function, and Information Processing

Students who demonstrate understanding can:

4-PS4-2 Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen. [Assessment Boundary: Assessment does not include knowledge of specific colors reflected or seen, the cellular mechanisms of vision, or how the retina works.]

4-LS1-1 Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction. [**AR** Clarification Statement: Examples of structures for survival could include thorns and teeth. Examples of structures for growth could include stems and the skeleton. Examples of structures for behavior could include roots and the brain. Examples of reproduction could include pistils, stamens, and eggs.] [Assessment Boundary: Assessment is limited to macroscopic structures within plant and animal systems.]

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. Use of models could include diagrams, computer simulations, and physical models.] [Assessment Boundary: Assessment does not include the mechanisms by which the brain stores and recalls information or the mechanisms of how sensory receptors function.]

The performance expectations above were developed using the following elements from the NRC document *A Framework for K-12 Science Education*.

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Developing and Using Models Modeling in 3–5 builds on K–2 experiences and progresses to building and revising simple models and using models to represent events and design solutions. ▪ Develop a model to describe phenomena. (4-PS4-2) ▪ Use a model to test interactions concerning the functioning of a natural system. (4-LS1-2) **Engaging in Argument from Evidence** Engaging in argument from evidence in 3–5 builds on K–2 experiences and progresses to critiquing the scientific explanations or solutions proposed by peers by citing relevant evidence about the natural and designed world(s). ▪ Construct an argument with evidence, data, and/or a model. (4-LS1-1)	**PS4.B: Electromagnetic Radiation** ▪ An object can be seen when light reflected from its surface enters the eyes. (4-PS4-2) **LS1.A: Structure and Function** ▪ Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction. (4-LS1-1) **LS1.D: 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. (4-LS1-2)	**Cause and Effect** ▪ Cause and effect relationships are routinely identified. (4-PS4-2) **Systems and System Models** ▪ A system can be described in terms of its components and their interactions. (4-LS1-1, 4-LS1-2)