4th Grade Unit 4 - Organism Structure and Function

Content Area: **Science**
Course(s): **Science Grade 4**
Time Period: **MP4**
Length: **35 days**
Status: **Published**

NJSLS - Science

4-PS4-2	Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen.
4-LS1-1	Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.
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.

Science and Engineering Practices

Engaging in Argument from Evidence

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

Developing and Using Models

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

Develop a model to describe phenomena. (4-PS4-2)

Disciplinary Core Ideas

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)

PS4.B: Electromagnetic Radiation

An object can be seen when light reflected from its surface enters the eyes. (4-PS4-2)

Crosscutting Concepts

Systems and System Models

A system can be described in terms of its components and their interactions. (4-LS1-1, 4-LS1-2)

Cause and Effect

Cause and effect relationships are routinely identified. (4-PS4-2)

Rationale and Transfer Goals

In this unit, students explore the connections between the physical world and biological survival. Students will investigate how light allows organisms to see by reflecting off objects and entering the eye. Moving from the physics of light to the biology of organisms, students will discover that plants and animals possess internal and external structures that function together to support survival, growth, behavior, and reproduction.

Students will synthesize these concepts by examining how animal senses receive information from the environment (such as light or sound), transfer that information to the brain via the nervous system, and process it to trigger immediate behavioral responses or store it as memories. Through hands-on investigations, modeling, and analyzing case studies of diverse organisms, students will answer the overarching essential question: How do living things use light, structural adaptations, and their senses to navigate and survive in their environments?

Enduring Understandings

An object can only be seen when light from a source reflects off that object and enters the eye.

Plants and animals have specialized internal and external structures (subsystems) that work together as a larger system to help them survive, grow, behave, and reproduce in their specific environments.

Animals survive by constantly interacting with their environment.

An organism's survival depends on the integration of physical phenomena and biological structures working together.

Essential Questions

How do we actually see the world around us?

How do a plant's or animal's parts help it live and grow?

What happens inside an animal between sensing danger and running away?

Content - What will students know?

- Light must originate from a source (the sun, a lamp, a flashlight) and bounce (reflect) off an object for that object to be visible.
- Sight is a directional process. Light travels in straight lines from a light source, reflects off an object, and enters the eye.
- Without a light source or reflection, objects cannot be seen, regardless of how well an animal's eyes function.
- Organisms have outside parts that serve specific survival functions.
- Organisms have hidden, inside parts that keep them alive.
- These structures do not work in isolation; they function together to support four main life requirements: survival, growth, behavior, and reproduction.
- Animals have specialized structures that detect different types of information from the environment.
- When a sense organ picks up information, that information travels as a signal along nerve pathways directly to the brain.
- The brain acts as the central processing unit. It takes the sensory signal, interprets what it means, and decides on an action.

- The brain's output can result in an immediate behavioral response or it can be stored as a memory for future use.

Skills - What will students be able to do?

- Draw, label, or build a physical model showing the straight-line path of light as it travels from a source, reflects off an object, and enters an eye.
- Explain visually or verbally why an object is invisible in a completely dark room and identify exactly what changes when a light source is introduced.
- Write or present an argument defending how a specific structure (e.g., a cactus's waxy coating or a porcupine's quills) is essential for that organism's survival, growth, or reproduction.
- Explain how an internal structure and an external structure work as a team (e.g., how a bird's external beak helps it catch food, while its internal stomach digests it to provide energy for growth).
- Create a flowchart or diagram that tracks a real-world stimulus from the environment through an animal's body.
- Analyze data or text about different animals to explain how different species use different dominant senses to survive.
- Predict what would happen to an animal's behavior or survival if a part of its sensory loop were disrupted.

Activities - How will we teach the content and skills?

- Mystery Science Human Body, Vision, & The Brain Anchor Phenomenon
- Mystery Science Human Body, Vision, & The Brain Lesson 1
- Mystery Science Human Body, Vision, & The Brain Lesson 2
- Mystery Science Human Body, Vision, & The Brain Lesson 3
- Mystery Science Human Body, Vision, & The Brain Lesson 4
- Mystery Science Animal & Plant Adaptations Anchor Phenomenon
- Mystery Science Animal & Plant Adaptations Lesson 1
- Mystery Science Animal & Plant Adaptations Lesson 2
- Mystery Science Animal & Plant Adaptations Lesson 3

Formative Assessments

- Mystery Science Human Body, Vision, & The Brain Lesson 1 Assessment
- Mystery Science Human Body, Vision, & The Brain Lesson 2 Assessment
- Mystery Science Human Body, Vision, & The Brain Lesson 3 Assessment
- Mystery Science Human Body, Vision, & The Brain Lesson 4 Assessment
- Mystery Science Animal & Plant Adaptations Lesson 1 Assessment
- Mystery Science Animal & Plant Adaptations Lesson 2 Assessment
- Mystery Science Animal & Plant Adaptations Lesson 3 Assessment
- Daily Exit Tickets
- Daily Formative Assessment

Summative Assessments

- Mystery Science Human Body, Vision, & The Brain Performance Assessment
- Mystery Science Animal and Plant Adaptations Performance Assessment
- Mystery Science Human Body, Vision, & The Brain Unit Assessment
- Mystery Science Animal and Plant Adaptations Unit Assessment
- Grade 4 Unit 4 Benchmark

Spiraling for Mastery

Content or Skill for this Unit	Spiral Focus from Previous Unit	Instructional Activity
• External parts of organisms. • Needs of living things. • How animals process	• Grade 1: All organisms have external parts. Different animals use their body parts in different ways to see, hear, grasp objects, protect themselves,	• 1-LS1-1 Activities • 1-LS1-2 Activities • 1-PS4-2 Activities

information. • How objects can be seen. • Opacity of various objects. • Mirrors.	move from place to place, and seek, find, and take in food, water, and air. • Grade 1: Plants also have different parts to help them survive and grow. • Grade 1: Animals have body parts that capture and convey different kinds of information needed for growth and survival. • Grade 1: Animals respond to these inputs with behaviors that help them survive. Plants also respond to some external inputs. • Grade 1: Objects can be seen if light is available to illuminate them or if they give off their own light. • Grade 1: Some materials allow light to pass through them, others allow only some light through and others block all light and create a dark shadow on any surface beyond them, where the light cannot reach. • Grade 1: Mirrors can be used to redirect a light beam.	

Key Resources

Mystery Science

Animal Mouth Structures

Pinhole Cameras

Time to Think

Career Readiness, Life Literacies, & Key Skills

9.4.5.CI.1	Use appropriate communication technologies to collaborate with individuals with diverse perspectives about a local and/or global climate change issue and deliberate about possible solutions (e.g., W.4.6, 3.MD.B.3,7.1.NM.IPERS.6).
9.2.5.CAP.1	Evaluate personal likes and dislikes and identify careers that might be suited to personal likes.
9.1.5.CR.1	Compare various ways to give back and relate them to your strengths, interests, and other personal factors.
9.4.5.CI.2	Investigate a persistent local or global issue, such as climate change, and collaborate with individuals with diverse perspectives to improve upon current actions designed to address the issue (e.g., 6.3.5.CivicsPD.3, W.5.7).
9.2.5.CAP.3	Identify qualifications needed to pursue traditional and non-traditional careers and occupations.
9.2.5.CAP.4	Explain the reasons why some jobs and careers require specific training, skills, and certification (e.g., life guards, child care, medicine, education) and examples of these requirements.
9.4.5.DC.4	Model safe, legal, and ethical behavior when using online or offline technology (e.g., 8.1.5.NI.2).
9.4.5.DC.8	Propose ways local and global communities can engage digitally to participate in and promote climate action (e.g., 6.3.5.GeoHE.1).
9.4.5.IML.2	Create a visual representation to organize information about a problem or issue (e.g., 4.MD.B.4, 8.1.5.DA.3).
9.4.5.IML.3	Represent the same data in multiple visual formats in order to tell a story about the data.
9.4.5.TL.2	Sort and filter data in a spreadsheet to analyze findings.
9.4.5.TL.3	Format a document using a word processing application to enhance text, change page formatting, and include appropriate images graphics, or symbols.

Interdisciplinary Connections

W.AW.4.1	Write opinion pieces on topics or texts, supporting a point of view with reasons and information.
4.G.A.1	Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures.
4.G.A.3	Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded along the line into matching parts. Identify line-symmetric

	figures and draw lines of symmetry.
SL.UM.4.5	Add audio recordings and visual displays to presentations when appropriate to enhance the development of main ideas or themes.