1st Grade Unit 3 - Mimicking Organisms to Solve Problems

Content Area: **Science**
Course(s):
Time Period: **MP3**
Length: **22 days**
Status: **Published**

NJSLS - Science

SCI.K-2-ETS1-1	Ask questions, make observations, and gather information about a situation people want to change (e.g., climate change) to define a simple problem that can be solved through the development of a new or improved object or tool.
SCI.K-2-ETS1-2	Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.
SCI.K-2-ETS1-3	Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.
SCI.1-LS1-1	Use materials to design a solution to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs.

Science and Engineering Practices

Constructing Explanations and Designing Solutions

Use materials to design a device that solves a specific problem or a solution to a specific problem. (1-LS1-1)

Developing and Using Models

Develop a simple model based on evidence to represent a proposed object or tool. (K-2-ETS1-2)

Asking Questions and Defining Problems

Ask questions based on observations to find more information about the natural and/or designed world(s). (K-2-ETS1-1)

Define a simple problem that can be solved through the development of a new or improved object or tool. (K-2-ETS1-1)

Analyzing and Interpreting Data

Analyze data from tests of an object or tool to determine if it works as intended. (K-2-ETS1-3)

Disciplinary Core Ideas

LS1.A: Structure and Function

All organisms have external parts. Different animals use their body parts in different ways to see, hear, grasp objects, protect themselves, move from place to place, and seek, find, and take in food, water and air. Plants also have different parts (roots, stems, leaves, flowers, fruits) that help them survive and grow. (1-LS1-1)

LS1.D: Information Processing

Animals have body parts that capture and convey different kinds of information needed for growth and survival. Animals respond to these inputs with behaviors that help them survive. Plants also respond to some external inputs. (1-LS1-1)

ETS1.A: Defining and Delimiting Engineering Problems

A situation that people want to change or create can be approached as a problem to be solved through engineering. (K-2-ETS1-1)

Ask questions, make observations, and gather information about a situation people want to change (e.g., climate change) to define a simple problem that can be solved through the development of a new or improved object or tool. (K-2-ETS1-1)

Before beginning to design a solution, it is important to clearly understand the problem. (K-2-ETS1-1)

ETS1.B: Developing Possible Solutions

Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people. (K-2-ETS1-2)

ETS1.C: Optimizing the Design Solution

Because there is always more than one possible solution to a problem, it is useful to compare and test designs. (K-2-ETS1-3)

Crosscutting Concepts

Structure and Function

The shape and stability of structures of natural and designed objects are related to their function(s). (1-LS1-1, K-2-ETS1-2)

Influence of Engineering, Technology, and Science on Society and the Natural World

Every human-made product is designed by applying some knowledge of the natural world and is built using materials derived from the natural world. (1-LS1-1)

Rationale and Transfer Goals

In this unit of study, students develop an understanding of how plants and animals use their parts to help them survive, grow, and meet their needs. Students also need opportunities to develop possible solutions. As students develop possible solutions, one challenge will be to keep them from immediately implementing the first solution they think of and to instead think through the problem carefully before acting. Having students sketch their ideas or make a physical model is a good way to engage them in shaping their ideas to meet the requirements of the problem. The crosscutting concept of Patterns and Structure and Function is called out as an organizing concept for the disciplinary core ideas. Students are expected to demonstrate grade-appropriate proficiency in constructing explanations and designing solutions, and in developing and using models. Students are expected to use these practices to demonstrate an understanding of the core ideas.

Enduring Understandings

Individuals of the same kind of plant or animal are recognizable as similar but can also vary in many ways.

Patterns in the natural world can be observed, used to describe phenomena, and used as evidence.

Every human-made product is designed by applying some knowledge of the natural world and is built using

materials derived from the natural world.

The shape and stability of structures of natural and designed objects are related to their function(s).

Essential Questions

How can humans mimic how plants and animals use their external parts to help them survive and grow?

Content - What will students know?

- Every human-made product is designed by applying some knowledge of the natural world and is built using materials derived from the natural world.
- The shape and stability of structures of natural and designed objects are related to their function(s).
- All organisms have external parts. Different animals use their body parts in different ways to see, hear, grasp objects, protect themselves, move from place to place, and seek, find, and take in food, water, and air. Plants also have different parts (roots, stems, leaves, flowers, fruits) that help them survive and grow.
- Animals have body parts that capture and convey different kinds of information needed for growth and survival. Animals respond to these inputs with behaviors that help them survive. Plants also respond to some external inputs.
- Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people.

Skills - What will students be able to do?

- Observe and describe how the shape and stability of structures of natural and designed objects are related to their functions.
- Use materials to design a device that solves a specific problem or [design] a solution to a specific problem.
- Use materials to design a solution to a human problem that mimics how plants and/or animals use their external parts to help them survive, grow, and meet their needs: Examples of human problems that can

be solved by mimicking plant or animal solutions could include: Designing clothing or equipment to protect bicyclists by mimicking turtle shells, acorn shells, and animal scales, stabilizing structures by mimicking animal tails and roots on plants, keeping out intruders by mimicking thorns on branches and animal quills, or detecting intruders by mimicking eyes and ears.

- Develop a simple model based on evidence to represent a proposed object or tool.
- Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.

Activities - How will we teach the content and skills?

- Mystery Science Plant Superpowers Anchor Phenomenon
- Mystery Science Plant Superpowers Lesson 1
- Mystery Science Plant Superpowers Lesson 2
- Mystery Science Plant Superpowers Lesson 3
- Read Alouds
- Participate in shared research to find examples of human-made products that have been designed and built by applying knowledge of the natural world. For each example, students identify the human problem(s) that the product solves and how that solution was designed using an understanding of the natural world.
- Students use sketches, drawings, or physical models to convey a design that solves a problem by mimicking one or more external structures of plants and/or animals.

Formative Assessments

- Mystery Science Plant Superpowers Lesson 1 Assessment
- Mystery Science Plant Superpowers Lesson 2 Assessment
- Mystery Science Plant Superpowers Lesson 3 Assessment
- Mystery Science Plant Superpowers Performance Task
- Teacher Observation
- Student projects/models
- Individual and Group Participation

- Exit Tickets

Summative Assessments

- Tests/Quizzes
- Plants Performance Based Assessment
- Grade 1 Science Unit 3 Benchmark

Spiraling for Mastery

Content or Skill for this Unit	Spiral Focus from Previous Unit	Instructional Activity
Identify how organisms stay warm outside during the winter and protect against any unsafe people or things. Use charts and create a monster with characteristics to protect itself. Use magazines and books of animals to brainstorm and identify ways animals solve problems for themselves. Observe how plants respond to sunlight.	Kindergarten: Asking questions, making observations, and gathering information are helpful in thinking about problems.	Read-Alouds Modeling/Think Alouds Experimentation

Career Readiness, Life Literacies, & Key Skills

PFL.9.1.2.CR.1	Recognize ways to volunteer in the classroom, school and community.
PFL.9.1.2.CR.2	List ways to give back, including making donations, volunteering, and starting a business.
WRK.9.1.2.CAP.1	Make a list of different types of jobs and describe the skills associated with each job.
TECH.9.4.2.CI.1	Demonstrate openness to new ideas and perspectives (e.g., 1.1.2.CR1a, 2.1.2.EH.1, 6.1.2.CivicsCM.2).
TECH.9.4.2.CI.2	Demonstrate originality and inventiveness in work (e.g., 1.3A.2CR1a).

TECH.9.4.2.CT.1	Gather information about an issue, such as climate change, and collaboratively brainstorm ways to solve the problem (e.g., K-2-ETS1-1, 6.3.2.GeoGI.2).
TECH.9.4.2.CT.2	Identify possible approaches and resources to execute a plan (e.g., 1.2.2.CR1b, 8.2.2.ED.3).
TECH.9.4.2.CT.3	Use a variety of types of thinking to solve problems (e.g., inductive, deductive).
TECH.9.4.2.IML.3	Use a variety of sources including multimedia sources to find information about topics such as climate change, with guidance and support from adults (e.g., 6.3.2.GeoGI.2, 6.1.2.HistorySE.3, W.2.6, 1-LSI-2).

Interdisciplinary Connections/Companion Standards

NJSLS ELA

W.WR.1.5. With prompting and support, generate questions through shared research about a topic and determine possible sources to obtain information on that topic. (1-LS1-1)

NJSLS Math

1.DL.A.1 Organize, represent, and interpret data with up to three categories; ask and answer questions about the total number of data points, how many in each category, and how many more or less are in one category than in another.