

UNIT 3: Mimicking Organisms to Solve Problems

Unit Summary:

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.

Concepts & Vocabulary:

Key vocabulary may include but are not limited to: Structure and Function, Human problem, Human solution (e.g. device), Biomimicry, External structures, Plant and animal needs, Human needs

Stage 1 – Desired Results

Performance Expectations: (PE) (Established Goals / Content Standards)

- 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.* **Clarification Statement: 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; and, detecting intruders by mimicking eyes and ears.**
- 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.

Enduring Understandings (1-3 max)

Students will understand that:

- Humans can meet their needs by mimicking how plants and animals use their external parts.
- How to use materials to illustrate or build a model of a solution to a human problem.

Essential Questions (1-2 EQ per EU)

- What can humans learn from watching plants and animals?
- How can an object be used to solve a problem?
- What is an object that can be used to solve a problem?

Science & Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Analyzing and Interpreting Data <ul style="list-style-type: none"> ● Analyze and interpret data to make sense of phenomena using logical reasoning. (3-LS3-1) Constructing Explanations and Designing Solutions	LS1.A: Structure and Function <ul style="list-style-type: none"> ● 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 	Patterns <ul style="list-style-type: none"> ● Patterns in the natural and human designed world can be observed, used to describe phenomena, and used as evidence. (1-LS1-2)

<ul style="list-style-type: none"> ● Use materials to design a device that solves a specific problem or a solution to a specific problem. (1-LS1-1) <p>Developing and Using Models</p> <ul style="list-style-type: none"> ● Develop a simple model based on evidence to represent a proposed object or tool. (K-2-ETS1-2) 	<p>food, water and air. Plants also have different parts (roots, stems, leaves, flowers, fruits) that help them survive and grow. (1-LS1-1)</p> <p>LS1.B: Growth and Development of Organisms</p> <ul style="list-style-type: none"> ● 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. (1-LS1-2) <p>LS1.D: Information Processing</p> <ul style="list-style-type: none"> ● 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) <p>ETS1.B: Developing Possible Solutions</p> <ul style="list-style-type: none"> ● 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) 	<p>Structure and Function</p> <ul style="list-style-type: none"> ● The shape and stability of structures of natural and designed objects are related to their function(s). (1-LS1-1) ● The shape and stability of structures of natural and designed objects are related to their function(s). (K-2-ETS1-2) <p>-----</p> <p>Connections to Engineering, Technology, and Applications of Science</p> <p>Influence of Science, Engineering and Technology on Society and the Natural World</p> <ul style="list-style-type: none"> ● 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)
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<p align="center">Stage 2 – Model Assessments</p>	
<p>Transfer Task(s)</p> <ul style="list-style-type: none"> ● Pose a human problem to the students. Students will design a solution by mimicking how plants or animals use their external body parts to help them survive, grow, or meet their needs. <ul style="list-style-type: none"> ○ Example ● Wonders of Science Mythical Animal <ul style="list-style-type: none"> ○ Similar to Monster Activity 	<p>Formative Evidence:</p> <ul style="list-style-type: none"> ● Slide Diagnostic Questions ● Oral Comprehension Checks ● Teacher Observation ● Class Discussion/Anecdotal Notes ● NJCTL - Formative Tasks ● Mystery Science End of Mystery Assessments

Audience:

- Peer, self-reflection, teachers observation.

- [Mystery 1 Assessment](#)
- [Mystery 3 Assessment](#)
- [Mystery 6 Assessment](#)

Stage 3 – Learning Plan Resources and Activities

Suggested Resources for Planning:

[Grade 1 Mystery Science Website](#)

[Grade 1 Mystery Science Planning Guide](#)

[Mystery Science Supply List](#)

[New Jersey Center for Teaching & Learning \(NJCTL\)](#): Free sign-up for more resources

[NJCTL Literacy Resources List](#)

[Wonders of Science](#)

[Pebble Go](#)

Standard Based Grading:

[1-LS1-1 Analysis Cart](#)

Learning Activities:**1-LS1-1:**

- [Mystery 1: Why do birds have beaks?](#)
- [Mystery 3: Why are polar bears white?](#)
- [Mystery 6 Read Along: What do sunflowers do when you're not looking?](#)
- [Animal Booklet](#)- Students use [Pebble Go](#) to research animals' external body parts and functions for survival.
- [Nature that inspired inventions slideshow](#)
(Recommend the first 5 slides - velcro, reflectors and robots)
- [STEM: Plants and Biomimicry - Day 1](#)
- [STEM: Plants and Biomimicry - Day 2](#)
- [NJCTL Activity: Build Your Own Monster](#) (K-2-ETS1-2)
- Insect STEM Challenge-
[Super Strong or Just Super Tiny Video](#)
Students will use what they learned about ants to create a light weight model that can hold more than its own body weight. (example: ants can hold more than 50 times their body weight.) Student can use popsicle sticks, plastic spoons and pipe cleaners to replicate ant body parts. Students will test and evaluate their models. They will see how many snap cubes their structure can hold. Students will test their models with other groups. (K-2-ETS1-2, K-2-ETS1-3)

Additional Phenomena Videos:

- [Desert Beetle Harvests Water](#)
- [Polar Bears are actually Black](#)

Suggested Methods:

- Phenomena based learning

- Problem Based Learning (PBL)
- Inquiry-Based Learning
- Case studies
- Engaging in Argument w/ evidence