1st Grade Science
Year-at-a-Glance

Patterns of Change in the Sky	Light and Sound Waves	Characteristics and Mimicry of Animals	Characteristics and Mimicry of Plants
September-October	November-December	January-March	April-June
1-ESS1-1 (ESS1.A) 1-ESS1-2 (ESS1.B)	1-PS4-1 (PS4.A) 1-PS4-2 (PS4.B) 1-PS4-3 (PS4.B) 1-PS4-4 (PS4.C) 1-ETS1-3 (ETS1.C)	1-LS1-1 (LS1.A) 1-LS1-2 (LS1.B) 1-LS3-1 (LS3.B) 1-ETS1-1 (ETS1.A) 1-ETS1-2 (ETS1.B)	1-LS1-1 (LS1.A) 1-LS3-1 (LS3.B) 1-ETS1-1 (ETS1.A) 1-ETS1-2 (ETS1.B)

Standards are listed in a numerical order only and may be taught in any order within the unit.

*The standards listed in red are the Disciplinary Core ideas as they relate to the Performance Expectations within the units.

NOTE: The Science and Engineering Practices are interwoven and should be addressed throughout the year in as many different units and tasks as possible in order to stress the natural connections that exist among mathematical concepts.

Science Curriculum - 1st Grade

Unit 1
Patterns of Change in the Sky

Performance Expectation(s)

1-ESS1-1. Use observations of the sun, moon, and stars to describe patterns that can be predicted. [Clarification Statement: Examples of patterns could include that the sun and moon appear to rise in one part of the sky, move across the sky, and set; and stars other than our sun are visible at night but not during the day.] [Assessment Boundary: Assessment of star patterns is limited to stars being seen at night and not during the day.]
1-ESS1-2. Make observations at different times of year to relate the amount of daylight to the time of year. [Clarification Statement: Emphasis is on relative comparisons of the amount of daylight in the winter to the amount in the spring or fall.] [Assessment Boundary: Assessment is limited to relative amounts of daylight, not quantifying the hours or time of daylight.]

Essential Vocabulary	**Essential Question(s)**
cycle sun space moon patterns stars	● What patterns of change can be predicted when observing the sun, moon, and stars? ● What is the relationship between the amount of daylight and the time of year? ● What objects are in the sky and how do they seem to move?

Learning Plan

Science/Engineering Practices	**Disciplinary Core Idea(s)**	**Crosscutting Concept(s)**
Planning and Carrying Out Investigations Planning and carrying out investigations to answer questions or test solutions to problems in K–2 builds on prior experiences and progresses to simple investigations, based on fair tests, which provide data to support explanations or design solutions.	**ESS1:A: The Universe and its Stars** ● Patterns of the motion of the sun, moon, and stars in the sky can be observed, described, and predicted. (1-ESS1-1) **ESS1.B: Earth and the Solar System** ● Seasonal patterns of sunrise and sunset can	**Patterns** ● Patterns in the natural world can be observed, used to describe phenomena, and used as evidence. (1-ESS1-1, 1-ESS1-2) **----------** **Connections to Nature of Science**

● Make observations (firsthand or from media) to collect data that can be used to make comparisons. (1-ESS1-2) **Analyzing and Interpreting Data** Analyzing data in K–2 builds on prior experiences and progresses to collecting, recording, and sharing observations. ● Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions. (1-ESS1-1)	be observed, described, and predicted. (1-ESS1-2)	**Scientific Knowledge Assumes an Order and Consistency in Natural Systems** ● Science assumes natural events happen today as they happened in the past. (1-ESS1-1) ● Many events are repeated. (1-ESS1-1)

Resources and Links

Videos

ESS1.A. The Universe and its Stars – Bozeman Science Video
ESS1.B. Earth and the Solar System – Bozeman Science Video
ESS1.C. The History of the Earth – Bozeman Science Video
BrainPop Jr.: the Moon

Other Resources

Mystery Science-
Mystery 1: Could a statue's shadow move?
Mystery 2: How can the sun help if you're lost?
Mystery 3: Coming September 2017

Observing the Sun: This lesson is an activity where students create a sun tracker and monitor the sun's position over the course of a day. Examples of student journals and connections within a larger unit are provided.
The Ultimate Moon Science Packet- TPT ($12)- Use this packet to teach all about the moon! Have your kids make a fun moon factbook and a moonscape complete with a moon rock to take home!

Earth's Rotation & Revolution-TPT ($9.00)- What is the sun? Why does it rise and set in different locations of the sky? Why do we have the seasons? Teach your students all about the earth's rotation and revolution with this fun packet!
Keep a Moon Journal: The National Wildlife Federation's "Keep a Moon Journal" page allows students to get acquainted with the phases of the moon by keeping a moon journal to record their nightly observations for one month. The page has links to diagrams, a student printable, and activities connecting the journal to other content. The page is set up as a "family activity" and could be used as
nightly homework for students then discussed weekly in class.
Sky Inquiry Unit-Inquiry based unit about the sky and how it changes.
Sky (Four Part Lesson)-Students will learn about objects in the sky, shadows, modeling shadows, and the moon. This lesson also has links for extension.
Daylight Schedule-Shows the amount of daylight each day.

Quirkles "Lindy Light": Lindy Light helps Lucy Lion learn about shadows. You will discover how Lucy is frightened when something lurks behind her.

Books

Ansberry, K., Morgan, E. and Royce, C.A. Teaching Science Through Trade Books

Schuett, Stacy. Somewhere in the World Right Now

Gibbons, Gail. The Moon Book

Rockwell, Anne. Our Stars

Fowler, Allan. So That's How the Moon Changes Shape!

Alberti, Theresa Jarosz. Out and About at the Planetarium

Sasaki, Chris. The Constellations: Stars and Stories

Whitman, Walt. When I Heard the Learn'd Astronomer

Rau, Dana Meachen. Spots of Light: A Book About Stars

Summative/Formative Assessment

Formative

Before

Pre-test – (identifies some key concepts and vocabulary)
KWL charts
Brainstorming

During

Vocabulary quiz
Concept maps Identify pictures/models of moon phases
Construct Cycle diagrams that show: * moon phases *daytime/nighttime *sun positions
Think-pair-shares
Summaries
Foldables (any folded paper or booklet with vocabulary, illustrations, or diagrams)
Observations

Summative
<u>After</u>
Post-test
Presentation/Model report using rubric aligned with essential question

Literacy Standards

NJSLSA.W7. Conduct short as well as more sustained research projects, utilizing an inquiry based research process, based on focused questions, demonstrating understanding of the subject under investigation. (1-ESS1-1), (1-ESS1-2)
NJSLSA.W8. Gather relevant information from multiple print and digital sources, assess the credibility and accuracy of each source, and integrate the information while avoiding plagiarism. (1-ESS1-1), (1-ESS1-2)

Science Example 1: In this unit of study, students need opportunities to participate in shared research and writing projects about patterns of change in the sky. For example, students can use online resources or books to research the patterns of change that are visible over time when we observe the objects in the sky. With guidance from adults, students could create books that describe and illustrate the different patterns of change observed in objects in the sky. They could also describe and illustrate the relative amount of daylight in relation to the season using a sequenced set of journal entries or in a sequence-of-events foldable.

Math Standards

MP.2. Reason abstractly and quantitatively. (1-ESS1-2)
MP.4. Model with mathematics. (1-ESS1-2)
MP.5. Use appropriate tools strategically. (1-ESS1-2)

1.OA.A.1. Use addition and subtraction within 20 to solve word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using objects, drawings, and equations to represent the problem. (1-ESS1-2)
1.MD.C.4. 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. (1-ESS1-2)

- Science Example 1: There were 16 hours of daylight yesterday. On December 21, there were 8 hours of daylight. How many more hours of daylight were there yesterday than on December 21?
- Science Example 2: Based on the data collected and posted on the bulletin board so far, which day has been the longest of the year so far? Which day has been the shortest?

Future Learning

The following disciplinary core ideas are future learning related to concepts in this unit of study.
By the end of Grade 3, students know that:
• Each force acts on one particular object and has both strength and a direction. An object at rest typically has multiple forces acting on it, but these forces add up to give zero net force on the object. Forces that do not sum to zero can cause changes in the object's speed or direction of motion. (Boundary: Qualitative and conceptual, but not quantitative addition of forces are used at this level.)
• The patterns of an object's motion in various situations can be observed and measured; when that past motion exhibits a regular pattern, future motion can be predicted from it. (Boundary: Technical terms, such as magnitude, velocity, momentum, and vector quantity, are not introduced at this level, but the concept that some quantities need both size and direction to be described is developed.)
By the end of Grade 5, students know that:
• The gravitational force of Earth acting on an object near Earth's surface pulls that object toward the planet's center.
• The orbits of Earth around the sun and of the moon around Earth, together with the rotation of Earth about an axis between its north and south poles, cause observable patterns. These include day and night, daily changes in the length and direction of shadows, and different positions of the sun, moon, and stars at different times of the day, month, and year.

Additional Information

-NGSS Interactive site: http://www.nextgenscience.org/search-standards

Science Curriculum - 1st Grade

Unit 2
Light and Sound Waves

Performance Expectation(s)

1-PS4-1. Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate. [Clarification Statement: Examples of vibrating materials that make sound could include striking a tuning fork and plucking a stretched string. Examples of how sound can make matter vibrate could include holding a piece of paper near a speaker making sound and holding an object near a vibrating tuning fork.]
1-PS4-2. Make observations to construct an evidence-based account that objects can be seen only when illuminated. [Clarification Statement: Examples of observations could include those made in a completely dark room, a pinhole box, and a video of a cave explorer with a flashlight. Illumination could be from an external light source or by an object giving off its own light.]
1-PS4-3. Plan and conduct an investigation to determine the effect of placing objects made with different materials in the path of a beam of light. [Clarification Statement: Examples of materials could include those that are transparent (such as clear plastic), translucent (such as wax paper), opaque (such as cardboard), or reflective (such as a mirror).] [Assessment Boundary: Assessment does not include the speed of light.]
1-PS4-4. Use tools and materials to design and build a device that uses light or sound to solve the problem of communicating over a distance. [Clarification Statement: Examples of devices could include a light source to send signals, paper cup and string "telephones", and a pattern of drum beats.] [Assessment Boundary: Assessment does not include technological details for how communication devices work.]
1-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.

Essential Vocabulary	**Essential Question(s)**
light sound translucent transparent reflect refract shadow opaque waves vibrate illuminate	● What happens when materials vibrate? ● What happens to a beam of light when different objects are put in front of it? ● How do we use light and sound to communicate?

Learning Plan

Science/Engineering Practices	**Disciplinary Idea**	**Crosscutting Concepts**
Planning and Carrying Out Investigations	**PS4: Wave Properties**	**Cause and Effect**

Planning and carrying out investigations to answer questions or test solutions to problems in K–2 builds on prior experiences and progresses to simple investigations, based on fair tests, which provide data to support explanations or design solutions. ● Plan and conduct investigations collaboratively to produce data to serve as the basis for evidence to answer a question. (1-PS4-1, 1-PS4-3) **Constructing Explanations and Designing Solutions** Constructing explanations and designing solutions in K–2 builds on prior experiences and progresses to the use of evidence and ideas in constructing evidence-based accounts of natural phenomena and designing solutions. ● Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena. (1-PS4-2) ● Use tools and materials provided to design a device that solves a specific problem. (1-PS4-4) **Analyzing and Interpreting Data**	● Sound can make matter vibrate, and vibrating matter can make sound. (1-PS4-1) **PS4.B: Electromagnetic Radiation** ● Objects can be seen if light is available to illuminate them or if they give off their own light. (1-PS4-2) ● Some materials allow light to pass through them, others allow only some light through and others block all the light and create a dark shadow on any surface beyond them, where the light cannot reach. Mirrors can be used to redirect a light beam. (Boundary: The idea that light travels from place to place is developed through experiences with light sources, mirrors, and shadows, but no attempt is made to discuss the speed of light.) (1-PS4-3) **PS4.C: Information Technologies and Instrumentation** ● People also use a variety of devices to communicate (send and receive information) over long distances. (1-PS4-4) **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. (1-ETS1-3)	● Simple tests can be designed to gather evidence to support or refute student ideas about causes. (1-PS4-1, 1-PS4-2,1-PS4-3) ---------- ----**Connections to Engineering, Technology, and Applications of Science** **Influence of Engineering, Technology, and Science, on Society and the Natural World** ● People depend on various technologies in their lives; human life would be very different without technology. (1-PS4-4)

Analyzing data in K–2 builds on prior experiences and progresses to collecting, recording, and sharing observations. ● Analyze data from tests of an object or tool to determine if it works as intended. (1-ETS1-3)		

Resources and Links

Videos

PS4.A. Wave Properties – Bozeman Science Video
PS4.B. Electromagnetic Radiation – Bozeman Science Video
PS4.C. Informational Technologies and Instrumentation – Bozeman Science Video

What is Sound? Scishow Kids on YouTube
United Streaming- Magic School Bus: In The Haunted House- a great video about bats and sound vibrations.
BrainPop Jr: Sound
BrainPop Jr.: Light

Other Resources

Mystery Science-
Mystery 1: How do they make silly sounds in cartoons?
Mystery 2: What if there were no windows?
Mystery 3: Coming September 2017

Quirkles-Susie Sound: Find out what happens when Spotty Spider and Sarah Seal tell secrets about Sizzly Snake. Enjoy the great illustrations that demonstrate the way sound travels.
Quirkles “Lindy Light”: Lindy Light helps Lucy Lion learn about shadows. You will discover how Lucy is frightened when something lurks behind her.

Kat and Squirrel Go Camping-This is an interactive story with pauses after each ‘chapter’ to allow students and teachers time to research topics, conduct experiments, do demonstrations, discuss vocabulary, record observations and conclusions, and even play a fun game. All materials needed for each of these are included in the unit. $6.99

Sound: First Grade Science-Most of this NGSS aligned unit on sound is explained on the blog. Part of it is for sale on TPT for $6.

Better Lesson Physical Science Lessons- This website lists lessons by standard for each science performance expectation. The site is free but you need to create an account.

Interactive Science Notebook: Sound Waves-TPT ($2.50) The interactive notebooking activities give students a chance to reflect upon what they've learned during science class, review concepts, and record observations and ideas. 7 pages of notebook activities covering the following concepts: sound, vibrations, sound waves, cool sound facts, echolocation, sound is energy.

Waves: Light and Sound-This is an 11 lesson unit that addresses all of the Waves: Light and Sound Performance Expectations. It includes a parent letter, 11 lessons, 5 assessments and multiple, explicit connections to other content areas.
NGSS Grade 1 Engineering Project Build a Communication Device-In this performance assessment, students use tools and materials to design and build a device to solve the problem of communicating over a distance. $4.25

STEM and Light- engineering project to meet PE 1-PS4-4 from betterlesson.com

STEM and Sound- engineering project to meet PE 1-PS4-4 from betterlesson.com

Books
Ansberry, K. and Morgan, E. More Picture Perfect Science Lessons

Bulla, Clyde Robert. What Makes a Shadow?

Schnidel, John. What Did They See?

Cobb, Vicki. I See Myself

Lawrence, Mary. What's That Sound

Pfeffer, Wendy. Sounds All Around

Summative/Formative Assessment

Formative
Before
Pre-test - (identify key concepts and vocabulary)
KWL charts
Brainstorming

During
Vocabulary quiz
Think-pair-shares
Summaries
Foldables (any folded paper or booklet with vocabulary, illustrations, or diagrams)
Observations

Summative
After
Post-test
Presentation/Model report using rubric aligned with essential question

Literacy Standards

NJSLSA.W2. Write informative/explanatory texts to examine and convey complex ideas and information clearly and accurately through the effective selection, organization, and analysis of content. (1-PS4-2)
NJSLSA.W7. Conduct short as well as more sustained research projects, utilizing an inquiry based research process, based on focused questions, demonstrating understanding of the subject under investigation. (1-PS4-1, 1-PS4-2, 1-PS4-3, 1-PS4-4)
NJSLSA.W8. Gather relevant information from multiple print and digital sources, assess the credibility and accuracy of each source, and integrate the information while avoiding plagiarism. (1-PS4-1, 1-PS4-2, 1-PS4-3)
NJSLSA.SL1. Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others' ideas and expressing their own clearly and persuasively. (1-PS4-1, 1-PS4-2, 1-PS4-3)

To integrate the New Jersey Student Learning Standards for English language arts into this unit, students will participate in shared research and writing projects as they engage in engineering design. Students can use text and media resources to first gather information about devices that use light or sound to communicate over a distance. They can demonstrate understanding of key details in a text by asking and answering questions during class and small-group discussions. In addition, students recall information from experiences or gather information from provided sources to support their thinking as they design and build their device. As students complete their devices, they prepare a sketch or drawing of their device, label the components, and describe, in writing, how each component relates to the function of the device and how their communication device works. Students can also write a "how-to" book describing how to use tools and materials to build their design. Students can also use drawings or other visual displays to accompany their writing in order to describe their thought process and clarify their ideas. Adult support should be provided throughout the process.

Math Standards

MP.5. Use appropriate tools strategically. (1-PS4-4)
1.MD.A.1. Order three objects by length; compare the lengths of two objects indirectly by using a third object. (1-PS4-4)
1.MD.A.2. Express the length of an object as a whole number of length units, by layering multiple copies of a shorter object (the length unit) end to end; understand that the length measurement of an object is the number of same-size length units that span it with no gaps or overlaps. (1-PS4-4)

To integrate the New Jersey Student Learning Standards for mathematics into this unit, students need opportunities to use tools to for a variety of purposes as they design and build devices for communicating with light or sound. They can use objects such as interlocking cubes or paper clips to measure length in nonstandard units, expressing their measurements as whole numbers. Students can also use indirect measurement (i.e., compare the lengths of two objects indirectly by using a third object) to order three objects by length. For example, they might compare the lengths of string used for paper-cup telephones and observe and describe the relative effectiveness of each length of string. Students can also use graphs to organize data, such as the number of drumbeats, and then analyze the data to find a pattern. Students will reason abstractly and quantitatively as they organize data into graphs, analyze the data, and use it to solve simple put-together, take-apart, and compare problems.

Future Learning

The following disciplinary core ideas are future learning related to concepts in this unit of study.

By the end of Grade 2, students know that:

• Different kinds of matter exist and many of them can be either solid or liquid, depending on temperature. Matter can be described and classified by its observable properties.
• Different properties are suited to different purposes.
• A great variety of objects can be built up from a small set of pieces.
• A situation that people want to change or create can be approached as a problem to be solved through engineering.
• Asking questions, making observations, and gathering information are helpful in thinking about problems.
• Before beginning to design a solution, it is important to clearly understand the problem.
• 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.
• Because there is always more than one possible solution to a problem, it is useful to compare and test designs

By the end of 3-5 Grade Span, students know that:

• An object can be seen when light reflected from its surface enters the eyes.
• Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account.
• Research on a problem should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions.
• At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs.
• Tests are often designed to identify failure points or difficulties, which suggest the elements of a design that need to be improved.
• Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints.

Additional Information

-NGSS Interactive site: http://www.nextgenscience.org/search-standards

Science Curriculum - 1st Grade

Unit 3
Characteristics and Mimicry of Animals

Performance Expectation(s)

1-LS1-1. Use materials to design a solution to a human problem by mimicking how 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 or ears.]
1-LS1-2. Read texts and use media to determine patterns in behavior of parents and offspring that help offspring survive. [Clarification Statement: Examples of patterns of behaviors could include the signals that offspring make (such as crying, cheeping, and other vocalizations) or the responses of the parents (such as feeding, comforting, and protecting the offspring).]
1-LS3-1. Make observations to construct an evidence-based account that young animals are like, but not exactly like, their parents. [Clarification Statement: Examples of patterns could include features plants or animals share. Examples of observations could include leaves from the same kind of plant are the same shape but can differ in size; and, a particular breed of dog looks like its parents but is not exactly the same.] [Assessment Boundary: Assessment does not include inheritance, animals that undergo metamorphosis or hybrids.]
1-ETS1-1. Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.
1-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.

Essential Vocabulary		**Essential Question(s)**
adaptation	animals	● What are some ways animals meet their needs so that they can survive and grow?
behavior	habitat	
growth	needs	
offspring	parent	● How are some parents and their children similar and different?
pattern	survive	
trait		● How can humans mimic how animals use their external parts to help them survive and grow?

Learning Plan		
Science/Engineering Practices	**Disciplinary Idea**	**Crosscutting Concepts**
Constructing Explanations and Designing Solutions Constructing explanations and designing solutions in K–2 builds on prior experiences and progresses to the use of evidence and ideas in constructing evidence-based accounts of natural phenomena and designing solutions. ● Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena. (1-LS3-1) ● Use materials to design a device that solves a specific problem or a solution to a specific problem. (1-LS1-1) **Obtaining, Evaluating, and Communicating Information** Obtaining, evaluating, and communicating information in K–2 builds on prior experiences and uses observations and texts to communicate new information. ● Read grade-appropriate	**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.B: Growth and Development of Organisms** ● 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) **LS1.D: Information Processing** ● Animals have body parts that capture and convey different kinds of information needed	**Patterns** ● Patterns in the natural world can be observed, used to describe phenomena, and used as evidence. (1-LS1-2, 1-LS3-1) **Structure and Function** ● The shape and stability of structures of natural and designed objects are related to their function(s). (1-LS1-1, 1-ETS1-2) ----------**Connections to Engineering, Technology, and Applications of Science** **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 by built using materials derived from the natural world. (1-LS1-1)

texts and use media to obtain scientific information to determine patterns in the natural world. (1-LS1-2) **Asking Questions and Defining Problems** Asking questions and defining problems in K–2 builds on prior experiences and progresses to simple descriptive questions. ● Ask questions based on observations to find more information about the natural and/or designed world. (1-ETS1-1) ● Define a simple problem that can be solved through the development of a new or improved object or tool. (1-ETS1-1) **Developing and Using Models** Modeling in K–2 builds on prior experiences and progresses to include using and developing models (i.e., diagram, drawing, physical replica, diorama, dramatization, or storyboard) that represent concrete events or design solutions. ● Develop a simple model based on	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) **LS3.A: Inheritance of Traits** ● Young animals are very much, but not exactly, like their parents. Plants also are very much, but not exactly, like their parents. (1-LS3-1) **LS3.B: Variation of Traits** ● Individuals of the same kind of plant or animal are recognizable as similar but can also vary in many ways. (1-LS3-1) **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. (1-ETS1-1) ● Asking questions, making observations, and gathering information are helpful	

evidence to represent a proposed object or tool. (1-ETS1-2) ---------- --- **Connections to Nature of Science** **Scientific Knowledge is Based on Empirical Evidence** ● Scientists look for patterns and order when making observations about the world. (1-LS1-2)	in thinking about problems. (1-ETS1-1) ● Before beginning to design a solution, it is important to clearly understand the problem. (1-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. (1-ETS1-2)	

Resources and Links

Videos
LS1.A. Structure and Function – Bozeman Science Video
LS1.B. Growth and Development – Bozeman Science Video
LS1.D. Information Processing – Bozeman Science Video
LS3.A. Inheritance of Traits – Bozeman Science Video
LS3.B. Variation of Traits – Bozeman Science Video
BrainPop Jr. -Camouflage

Other Resources
Mystery Science-
Mystery 1: Why do birds have beaks?
Mystery 2: Why are polar bears white?
Mystery 3: Coming September 2017

Solving Problems by Mimicking Nature {Biomimicry}-TPT unit ($8.50) that covers NGSS -LS1-1
Animals and Their Young-TPT unit ($6.00) Use this packet to teach students about some of the most unbelievable and fascinating ways mothers in the animal kingdom ensure the survival of their young.

Quirkles-Underwater Utley: Join Underwater Utley as he rescues his friend, Uzzy Umbrella bird, from drowning in the ocean. Discover why birds cannot live in water while fish can.

Eat Like a Bird! January: This lesson and activity is one of several lessons about birds. In this lesson, students learn that bird beaks come in many different sizes and shape. Each beak has a specific shape and function to help the bird to get and eat food.

Why So Yummy: In this lesson students will investigate how fruits help some plants survive. The background information is important to the overall goals of this lesson. It states, "fruit-bearing plants can be distinguished from other plants, because they contain a reproductive structure that develops into an edible fruit.

Books

Ansberry, K. and Morgan, E. More Picture Perfect Science Lessons

Berkes, Marianne. Over in the Ocean: In a Coral Reef

Gibbons, Gail. Coral Reefs

Galko, Francine. Coral Reef Animals (Animals in Their Habitats Series)

Swinburne, Stephen R. Unbeatable Beaks

Collard III, Sneed B. Beaks!

Pederson, Janet. Houdini The Amazing Caterpillar

Heiligman, Deborah. From Caterpillar to Butterfly

Carle, Eric. The Very Hungry Caterpillar

Ansberry, K., Morgan, E. and Royce, C.A. Teaching Science Through Trade Books

Stockland, Patricia. Red Eyes or Blue Feathers: A Book About Animal Colors

Helman, Andrea. Hide and Seek: Nature's Best Vanishing Acts

Kaner, Etta. Animal Defenses: How Animals Protect Themselves

Jenkins, Martin. The Emperor's Egg

Gibbons, Gail. Penguins!

Ryder, Joanne. The Snail's Spell

Jenkins, Steve. What Do You do with a Tail Like This?

Wilson, Karma. A Frog in the Bog

Schaefer, Lola. Just One Bite

Lionni, Leo. Swimmy

Jenkins, Steve. What Do You Do When Something Wants to Eat You?

Hatkoff, J., Hatkoff, I., and Hatkoff, C. Winter's Tale: How One Little Dolphin Learned to Swim Again

Wood, Douglas. What Dads Can't Do

Markle, Sandra. Little Lost Bat

Buzzeo, Toni. Just Like My Papa

Kirby, Pamela F. What Bluebirds Do

Gravett, Emily. Dogs

Baker, Keith. No Two Alike

Summative/Formative Assessment

Formative
Before
Pre-test - (identify key concepts and vocabulary)
KWL charts
Brainstorming

During
Vocabulary quiz
Summaries
Observations

Summative
After
Post-test

Literacy Standards

RL.1.1. Ask and answer questions about key details in a text. (1-LS1-2, 1-LS3-1)

RL.1.2. Retell stories, including key details, and demonstrate understanding of their central message or lesson. (1-LS1-2)
RL.1.10. With prompting and support, read and comprehend stories and poetry at grade level text complexity or above. (1-LS1-2)
NJSLSA.W7. Conduct short as well as more sustained research projects, utilizing an inquiry based research process, based on focused questions, demonstrating understanding of the subject under investigation. (1-LS1-1, 1-LS3-1)
NJSLSA.W8. Gather relevant information from multiple print and digital sources, assess the credibility and accuracy of each source, and integrate the information while avoiding plagiarism.
(1-LS3-1)

To integrate the New Jersey Student Learning Standards for English Language Arts into this unit, students need opportunities to read informational texts to gather information about traits and behaviors of organisms. With adult guidance, they identify the main topic, retell key details from texts, and ask and answer questions about key details. Students should also participate in shared research and writing projects. They can gather information from a variety of preselected, grade-level-appropriate texts and resources and use that information to answer questions about traits and behaviors of organisms. In pairs or small groups, students can use pictures and words to create simple books that describe features that parents and offspring share or behaviors that parents and offspring exhibit that help offspring survive.

Math Standards

MP.2. Reason abstractly and quantitatively. (1-LS3-1) MP.5. Use appropriate tools strategically. (1-LS3-1)
1.NBT.B.3. Compare two two-digit numbers based on the meanings of the tens and one digits, recording the results of comparisons with the symbols >, =, and <. (1-LS1-2)
1.NBT.C.4. Add within 100, including adding a two-digit number and a one-digit number, and adding a two-digit number and multiple of 10, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning uses. Understand that in adding two-digit numbers, one adds tens and tens, ones and ones; and sometimes it is necessary to compose a ten. (1-LS1-2)
1.NBT.C.5. Given a two-digit number, mentally find 10 more or 10 less than the number, without having to count; explain the reasoning used. (1-LS1-2)
1.NBT.C.6. Subtract multiples of 10 in the range 10-90 from multiples of 10 in the range 10-90 (positive or zero differences), using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.
(1-LS1-2)
1.MD.A.1. Order three objects by length; compare the lengths of two objects indirectly by using a third object. (1-LS3-1)

To integrate the New Jersey Student Learning Standards for mathematics into this unit, students reason abstractly and quantitatively and use appropriate tools strategically as they collect and organize data, and use it to solve problems. For example, when students gather information about the shape, size, and color, of animals, they can:
• Use grade-level-appropriate tools and strategies to measure, compare, and order animals by length.
• Organize data into simple graphs or tables, and then use strategies based on place value, properties of operations, and/or the relationship between addition and subtraction to make comparisons.
• Use drawings and equations as they solve problems (e.g., more or less, total amount, how many in each).

Future Learning

Grade 3 Unit 6: Organisms and the Environment

- Being part of a group helps animals obtain food, defend themselves, and cope with changes. Groups may serve different functions and vary dramatically in size.

Grade 4 Unit 3: Structures and Functions

- Animals have internal and external structures that serve various functions in growth, survival, behavior, and reproduction.

Grade 4 Unit 4: How Organisms Process Information

- 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.

Additional Information

-NGSS Interactive site: http://www.nextgenscience.org/search-standards

Science Curriculum - 1st Grade

Unit 4
Characteristics and Mimicry of Plants

Performance Expectation(s)

1-LS1-1. Use materials to design a solution to a human problem by mimicking how plants 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 or ears.]
1-LS3-1. Make observations to construct an evidence-based account that young plants are like, but not exactly like, their parents. [Clarification Statement: Examples of patterns could include features plants or animals share. Examples of observations could include leaves from the same kind of plant are the same shape but can differ in size; and, a particular breed of dog looks like its parents but is not exactly the same.] [Assessment Boundary: Assessment does not include inheritance, animals that undergo metamorphosis or hybrids.]
1-ETS1-1. Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.
1-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.

Essential Vocabulary	**Essential Question(s)**
survive leaves stems flower similar mimic root fruit	● What are some ways that plants meet their needs so that they can survive and grow? ● How can humans mimic how plants use their external parts to help them survive and grow?

Learning Plan

Science/Engineering Practices	**Disciplinary Idea**	**Crosscutting Concepts**

Constructing Explanations and Designing Solutions Constructing explanations and designing solutions in K–2 builds on prior experiences and progresses to the use of evidence and ideas in constructing evidence-based accounts of natural phenomena and designing solutions. ● Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena. (1-LS3-1) ● Use materials to design a device that solves a specific problem or a solution to a specific problem. (1-LS1-1) **Asking Questions and Defining Problems** Asking questions and defining problems in K–2 builds on prior experiences and progresses to simple descriptive questions. ● Ask questions based on observations to find more information about the natural and/or designed world. (1-ETS1-1)	**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.B: Growth and Development of Organisms** ● 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) **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	**Patterns** ● Patterns in the natural world can be observed, used to describe phenomena, and used as evidence. (1-LS3-1) **Structure and Function** ● The shape and stability of structures of natural and designed objects are related to their function(s). (1-LS1-1, 1-ETS1-2) --- **Connections to Engineering, Technology, and Applications of Science** **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 by built using materials derived from the natural world. (1-LS1-1)

● Define a simple problem that can be solved through the development of a new or improved object or tool. (1-ETS1-1) **Developing and Using Models** Modeling in K–2 builds on prior experiences and progresses to include using and developing models (i.e., diagram, drawing, physical replica, diorama, dramatization, or storyboard) that represent concrete events or design solutions. ● Develop a simple model based on evidence to represent a proposed object or tool. (1-ETS1-2)	inputs with behaviors that help them survive. Plants also respond to some external inputs. (1-LS1-1) **LS3.A: Inheritance of Traits** ● Young animals are very much, but not exactly, like their parents. Plants also are very much, but not exactly, like their parents. (1-LS3-1) **LS3.B: Variation of Traits** ● Individuals of the same kind of plant or animal are recognizable as similar but can also vary in many ways. (1-LS3-1) **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. (1-ETS1-1) ● Asking questions, making observations, and gathering information are helpful in thinking	

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

Resources and Links

Videos
LS1.A. Structure and Function – Bozeman Science Video
LS1.B. Growth and Development – Bozeman Science Video
LS1.D. Information Processing – Bozeman Science Video
LS3.A. Inheritance of Traits – Bozeman Science Video
LS3.B. Variation of Traits – Bozeman Science Video

Other Resources
NGSS Heredity Pack by Science School Yard-TPT ($3.00)

Quirkles-Botanist Bert: Discover what happens when Bennie Bear thinks a head of broccoli is a basketball!

STEM, Plants and Biomimicry-engineering activity from betterlesson.com

Books
Ansberry, K. and Morgan, E. More Picture Perfect Science Lessons

Zweibel, Alan. Our Tree Named Steve

Lauber, Patricia. Be a Friend to Trees

Bodach, Vijaya K. Seeds

Robbins, Ken. Seeds

Levenson, George. Pumpkin Circle: The Story of a Garden

McNamara, Margaret. How Many Seeds in a Pumpkin?

Ehlert, Lois. Planting a Rainbow

Heller, Ruth. The Reason for a Flower

Stewart, M. and Chesley, N. Perfect Pairs: How a Plant's Parts Help It Survive

Cole, Henry. Jack's Garden

Goodman, Emily. Plant Secrets

Beaty, Andrea. Iggy Peck

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