

HILLSBOROUGH TOWNSHIP SCHOOL DISTRICT

SCIENCE CURRICULUM

GRADE 1

AUGUST 2021

Grade 1 Science Course Overview

First Graders will continue to build on their kindergarten experiences by exploring their world through collaborative investigations and observations. The first grade science curriculum of Hillsborough Township Public Schools aims to educate students in the areas of Physical Sciences, Life Sciences, as well as Earth and Space Sciences. The performance expectations in first grade help students formulate answers to questions such as: “What happens when materials vibrate? What happens when there is no light? What are some ways plants and animals meet their needs so that they can survive and grow? How are parents and their children similar and different? What objects are in the sky and how do they seem to move?”

Students are expected to develop understanding of the relationship between sound and vibrating materials as well as between the availability of light and ability to see objects. The idea that light travels from place to place can be understood by students at this level through determining the effect of placing objects made with different materials in the path of a beam of light. Students are also expected to develop understanding of how plants and animals use their external parts to help them survive, grow, and meet their needs as well as how behaviors of parents and offspring help the offspring survive. The understanding is developed that young plants and animals are like, but not exactly the same as their parents. Students are able to observe, describe, and predict some patterns of the movement of objects in the sky. The year wraps up with a unit where students analyze how many inventions that are commonly used by people actually originated from ideas in nature. Students will have the opportunity to design their own invention to solve a human problem based on an adaptation from an animal.

The crosscutting concepts of patterns, cause and effect, structure and function, and influence of engineering, technology, and science on society and the natural world are called out as organizing concepts for these disciplinary core ideas.

In the first grade performance expectations, students are expected to demonstrate grade-appropriate proficiency in the practices of science and engineering by planning and carrying out investigations, analyzing and interpreting data, constructing explanations and designing solutions, and obtaining, evaluating, and communicating information. Students are expected to use these practices to demonstrate understanding of the core ideas.

Within each unit, students will have the opportunity to complete at least one design project to solve a specific problem related to the unit. For each project, they will need to rely on their understanding of the science concepts learned in each unit, as well as use technology and math concepts to solve each problem. In addition, students will be assessed on their ability to demonstrate grade-appropriate proficiency in planning and carrying out investigations, analyzing

and interpreting data, constructing explanations and designing solutions, and obtaining, evaluating, and communicating information.

The first grade science curriculum meets the requirements of the New Jersey Student Learning Standards for Science. It also helps to prepare students to meet and exceed the standards assessed by the New Jersey State administered assessments through higher order application of various skills required for complete understanding and sensemaking of science phenomena at the first grade level.

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Unit Title	Time Frame/Pacing
Earth's Patterns	25 days
Phenomena/Anchoring Activity/Anchoring Question/Essential Questions	
<p><u>Essential Questions:</u></p> <ul style="list-style-type: none"> ● What makes day and night? ● How does the Moon move in the sky? ● What makes the seasons? ● How do we see the stars? <p><u>Phenomena/Anchor Activities:</u></p> <ul style="list-style-type: none"> ● Sun and Moon: <ul style="list-style-type: none"> ○ Sun Travel ○ Dubai 24 hour time lapse ● The Seasons: <ul style="list-style-type: none"> ○ Seasons Time Lapse ● Star Patterns: <ul style="list-style-type: none"> ○ Star Trail Time Lapse 	
Enduring Understandings	
<ul style="list-style-type: none"> ● The orbits and rotation of the Sun, Moon, and Earth create observable patterns. ● During the Earth's orbit around the Sun, there is a pattern of seasons. ● Seasons and weather change, but the pattern of the stars stays the same. 	
NJ Standards/NGSS Performance Expectations Taught and Assessed Students who demonstrate understanding can:	
<ul style="list-style-type: none"> ● 1-ESS1-1 Use observations of the Sun, moon, and stars to describe patterns that can be predicted. ● 1-ESS1-2 Make observations at different times of year to relate the amount of daylight to the time of year. ● K-2-ETS-1-2 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. 	
3-Dimensional Learning Components	

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Science and Engineering Practices	Disciplinary Core Ideas (DCI)	Crosscutting Concepts
<p>Planning and Carrying out Investigations</p> <ul style="list-style-type: none"> • Make observations (firsthand or from media) to collect data that can be used to make comparisons. (1-ESS1-2) <p>Analyzing and Interpreting Data</p> <ul style="list-style-type: none"> • Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions. (1-ESS1-1) <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>ESS1.A: The Universe and its Stars</p> <ul style="list-style-type: none"> • Patterns of the motion of the Sun, moon, and stars in the sky can be observed, described, and predicted. (1-ESS1-1) <p>ESS1.B: Earth and the Solar System</p> <ul style="list-style-type: none"> • Seasonal patterns of sunrise and sunset can be observed, described, and predicted. (1-ESS1-2) <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>Patterns</p> <ul style="list-style-type: none"> • Patterns in the natural world can be observed, used to describe phenomena, and used as evidence. (1-ESS1-1), (1-ESS1-2) <p style="text-align: center;">Connections to Nature of Science</p> <p>Scientific Knowledge Assumes an Order and Consistency in Natural Systems</p> <ul style="list-style-type: none"> • Science assumes natural events happen today as they happened in the past. (1-ESS1-1) • Many events are repeated. (1-ESS1-1) <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). (K-2-ETS1-2)

Interdisciplinary Connections: Math, ELA, and Computer Science and Design Thinking

Math

- 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)

ELA

- W.1 Participate in shared research and writing projects (e.g., explore a number of "how-to" books on a given topic and use them to write a sequence of instructions). (1-ESS1-1), (1-ESS1-2)

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- W.1.8 With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question. (1-ESS1-1), (1-ESS1-2)

Computer Science and Design Thinking

- 8.1.2.DA.3 Identify and describe patterns in data visualizations.
- 8.1.2.DA.4 Make predictions based on data using charts or graphs.
- 8.2.2.ED.1 Communicate the function of a product or device.
- 8.2.2.ED.2 Collaborate to solve a simple problem, or to illustrate how to build a product using the design process.
- 8.2.2.ED.3 Select and use appropriate tools and materials to build a product using the design process.
- 8.2.2.ITH.3 Identify how technology impacts or improves life.
- 8.2.2.ITH.4 Identify how various tools reduce work and improve daily tasks.

Career Readiness, Life Literacies, and Key Skills

- 9.1.2.CR.1 Recognize ways to volunteer in the classroom, school and community.
- 9.4.2.CI.1 Demonstrate openness to new ideas and perspectives.
- 9.4.2.CI.2 Demonstrate originality and inventiveness in work.
- 9.4.2.CT.2 Identify possible approaches and resources to execute a plan.
- 9.4.2.CT.3 Use a variety of types of thinking to solve problems.

Social-Emotional Learning Competencies

- **Responsible Decision-Making:** Develop, implement, and model effective problem-solving and critical thinking skills.
- **Relationship Skills:**
 - Establish and maintain healthy relationships.
 - Utilize positive communication and social skills to interact effectively with others.
 - Identify who, when, where, or how to seek help for oneself or others when needed.

Learning Targets	Investigations/Resources	Formative Assessment
Model the rotation of Earth to communicate and explain day and night	Using a globe and flashlight/lightbulb, demonstrate how the Earth's rotation creates day and night on different parts of the Earth Video: Night and Day Video: Rotation and Revolution	Journal Entry: Draw/color a picture of Earth to show night and day. Add words/labels to explain your picture.

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Represent and explain the daily apparent motion of the Sun	Draw the Sun at representative positions for sunrise, noon, and sunset	Journal Entry: Why does the Sun appear to move through the sky?
Understand length and direction of shadows in daily patterns	Create a sundial using a pencil and paper plate Students' trace their own shadows at different times throughout the day Video: Sun Dials	Discussion: What did you notice about the shadows cast on the sundial? Why do you think the shadows were in different places throughout the day?
Identify the cyclical phases of the moon	Create a lunar wheel that shows the different phases of the moon Draw images of different moon phases Video: Why can I see the moon during the day?	Dictate different moon phases and have students show each phase on their lunar wheel.
Describe how the Earth orbits the Sun	Using a globe and flashlight/light bulb, demonstrate how the Earth orbits the Sun	Slate Assessment: Draw a model that shows the Earth orbiting the Sun. Use arrows to show how the Earth is moving.
Describe and communicate how the Earth is tilted on its axis	Using a globe and flashlight/light bulb, demonstrate how the Earth rotates on its axis as it revolves around the Sun	Whole Class Activity: Using your body, show the Earth's position on its axis. (Students should lean slightly to one side and not be standing upright.)
Understand that Earth's orbit around the Sun causes the changes in the seasons	Using a globe and flashlight/light bulb, demonstrate how the Earth rotates on its axis as it revolves around the Sun Graph the amount of daylight in each season	Journal Entry: Why do some seasons have more daylight hours than other seasons?
Ask questions and describe some of the differences between the seasons	Sketch themselves wearing seasonal clothing while doing a seasonal activity against a background appropriate for the season	Whole Class Activity: Label each corner of the classroom with a season. Call out different characteristics of each season (clothing, activities, weather, temperature, etc.). Have students move to

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		the correct corner for each characteristic.
Ask questions and explain why we cannot see stars during the day	Simulation: Cover black construction paper with glow-in-the-dark star stickers; turn off the light (Sun) and notice that you can see the stars Video: What are stars? Video: What is a constellation?	Journal Entry: Draw a daytime picture and nighttime picture. Focus on what the stars look like in each picture. (In daytime, students shouldn't draw the stars since we can't see them. They should draw a Sun.)
Obtain, evaluate and communicate information about why the stars that form constellations seem to change with the seasons	Show constellations and discuss the stories behind them Simulate how the stars appear to move in the sky Make a constellation Video: The North Star and the Big Dipper Interactive Game: Mindy's Constellations	Journal Entry: Why can't you see every constellation every night?
Instructional Modifications and/or Accommodations (ELL, Special Education, Gifted, At-Risk of Failure, 504) When Appropriate		
<ul style="list-style-type: none"> ● Read articles and/or directions to students to help with comprehension ● Teacher provided scaffolding for designing investigations, one-on-one or in small groups ● Provide access to anchor charts and classroom labels relevant to science concepts ● Scribe for students or allow students to use talk-to-text feature on Chromebooks when responding to questions ● Provide access to articles and books further exploring the topic of study ● Any other modification as per student IEP or 504 plan 		
Common Assessment(s)	Assessment Modifications and/or Accommodations (ELL, Special Education, Gifted, At-Risk of Failure, 504) When Appropriate	
<ul style="list-style-type: none"> ● Grandma, Are You There? 	<ul style="list-style-type: none"> ● Provide verbal directions to assessment questions. ● Scribe for students or allow typing / talk to text feature to assist in recording responses. 	

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Unit Title		Time Frame/Pacing
Inspired by Nature		15 days
Phenomena/Anchoring Activity/Anchoring Question/Essential Questions		
<p><u>Essential Questions:</u></p> <ul style="list-style-type: none"> • How does nature help humans solve problems? • How can nature give humans ideas? <p><u>Phenomena/Anchor Activities:</u></p> <ul style="list-style-type: none"> • Biomimicry Phenomena-Observe and discuss natural phenomena to human design in this photo. 		
Enduring Understandings		
<ul style="list-style-type: none"> • Humans look to animal adaptations to solve human problems by mimicking animal behavior. 		
NJ Standards/NGSS Performance Expectations Taught and Assessed		
Students who demonstrate understanding can:		
<ul style="list-style-type: none"> • 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. • 1-LS1-2 Read texts and use media to determine patterns in behavior of parents and offspring that help offspring survive. • K-2-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. • 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. • 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. 		
3-Dimensional Learning Components		
Science and Engineering Practices	Disciplinary Core Ideas (DCI)	Crosscutting Concepts
<p>Constructing Explanations and Designing Solutions</p> <ul style="list-style-type: none"> • Use materials to design a device that solves 	<p>LS1.A: Structure and Function</p> <ul style="list-style-type: none"> • All organisms have external parts. Different animals use their body parts in different 	<p>Patterns</p> <ul style="list-style-type: none"> • Patterns in the natural and human designed

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<p>a specific problem or a solution to a specific problem. (1-LS1-1)</p> <p>Obtaining, Evaluating, and Communicating Information</p> <ul style="list-style-type: none"> ● Obtaining, evaluating, and communicating information in K–2 builds on prior experiences and uses observations and texts to communicate new information. ● Read grade-appropriate texts and use media to obtain scientific information to determine patterns in the natural world. (1-LS1-2) <p style="text-align: center;"><i>Connections to Nature of Science</i></p> <p>Asking Questions and Defining Problems</p> <ul style="list-style-type: none"> ● 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) <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>Analyzing and Interpreting Data</p> <ul style="list-style-type: none"> ● Analyze data from tests of an object or tool to determine if it works as intended. (K-2-ETS1-3) 	<p>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)</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) ● A situation that people want to change or create can be approached as a problem to be solved through engineering. (K-2-ETS1-1) ● Asking questions, making observations, and gathering information are helpful in thinking about problems. (K-2-ETS1-1) ● Before beginning to design a solution, it is important to clearly understand the problem. (K-2-ETS1-1) ● 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) ● Because there is always more than one 	<p>world can be observed, used to describe phenomena, and used as evidence. (1-LS1-2)</p> <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) <p style="text-align: center;"><i>Connections to Engineering, Technology, and Applications of Science</i></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) ● The shape and stability of structures of natural and designed objects are related to their function(s). (K-2-ETS1-2)
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possible solution to a problem, it is useful to compare and test designs. (K-2-ETS1-3)

Interdisciplinary Connections: Math, ELA, and Computer Science and Design Thinking

Math

- 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 a 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)

ELA

- RI.1.1 Ask and answer questions about key details in a text. (1-LS1-2)
- RI.1.2 Identify the main topic and retell key details of a text. (1-LS1-2)
- RI.1.10 With prompting and support, read informational texts appropriately complex for grade. (1-LS1-2)
- W.1.7 Participate in shared research and writing projects (e.g., explore a number of “how-to” books on a given topic and use them to write a sequence of instructions). (1-LS1-1)

Computer Science and Design Thinking

- 8.2.2.ED.1 Communicate the function of a product or device.
- 8.2.2.ED.2 Collaborate to solve a simple problem, or to illustrate how to build a product using the design process.
- 8.2.2.ED.3 Select and use appropriate tools and materials to build a product using the design process.
- 8.2.2.ITH.1 Identify products that are designed to meet human wants or needs.
- 8.2.2.ITH.3 Identify how technology impacts or improves life.

Career Readiness, Life Literacies, and Key Skills

- 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).
- 9.4.2.CI.2 Demonstrate originality and inventiveness in work (e.g., 1.3A.2CR1a).
- 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,

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6.3.2.GeoGI.2).

- 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).
- 9.4.2.CT.3 Use a variety of types of thinking to solve problems (e.g., inductive, deductive).
- 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).

Social-Emotional Learning Competencies

- **Self Management:** Recognize the skills needed to establish and achieve personal and educational goals.
- **Responsible Decision-Making:** Develop, implement, and model effective problem-solving and critical thinking skills.
- **Relationship Skills:**
 - Establish and maintain healthy relationships.
 - Utilize positive communication and social skills to interact effectively with others.

Learning Targets	Investigations/Resources	Formative Assessment
Ask questions and identify unique and specialized external structures that help plants and animals meet their basic needs for survival in their own particular habitat.	Show different animals in their habitats. Brainstorm different features that each animal has that helps them survive in their environment.	Matching Activity: Match animals to their habitats. Choose one animal from the activity and describe how it uses its features to survive. Tell a partner.
Obtain information to understand and communicate the concept of biomimicry and give examples of nature-inspired human technology.	<p>Show a picture of a burdock and velcro. Discuss how the burdock and velcro are similar and how the burdock inspired the idea of velcro. Repeat this process with a water strider and pontoon boat.</p> <p>Show pictures of other natural phenomena and match them to the inventions that they inspired. Identify the specific feature of the natural phenomena that inspired the invention.</p>	Journal Entry: Draw and write about one natural phenomena from today's lesson. Explain how it inspired an invention that people use.
Use the engineering design process to create an original product, based on nature, to solve a human problem.	Complete the common assessment: Nature Design Task	Complete the common assessment: Nature Design Task

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Instructional Modifications and/or Accommodations (ELL, Special Education, Gifted, At-Risk of Failure, 504) When Appropriate	
<ul style="list-style-type: none"> ● Read articles and/or directions to students to help with comprehension ● Teacher provided scaffolding for designing investigations, one-on-one or in small groups ● Provide access to anchor charts and classroom labels relevant to science concepts ● Scribe for students or allow students to use talk-to-text feature on Chromebooks when responding to questions ● Provide access to articles and books further exploring the topic of study ● Any other modification as per student IEP or 504 plan 	
Common Assessment(s)	Assessment Modifications and/or Accommodations (ELL, Special Education, Gifted, At-Risk of Failure, 504) When Appropriate
<ul style="list-style-type: none"> ● Nature Design Task 	<ul style="list-style-type: none"> ● Provide verbal directions to assessment questions. ● Scribe for students or allow typing / talk to text feature to assist in recording responses.

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Unit Title	Time Frame/Pacing
Parents & Heredity	100 days
Phenomena/Anchoring Activity/Anchoring Question/Essential Questions	
<p><u>Essential Questions:</u></p> <ul style="list-style-type: none"> ● What are ways that animals and plants grow and develop? ● What is a generation? ● How do animals work together to help each other survive? ● How are animal groups like a family? ● What kind of adaptations do animals have to help survive in different seasons? <p><u>Phenomena/Anchor Activities:</u></p> <ul style="list-style-type: none"> ● The Circle of Life - Animal Life Cycles: <ul style="list-style-type: none"> ○ Generations Activity Photo: Generations Photo ● The Circle of Life- Plant Life Cycles: <ul style="list-style-type: none"> ○ Plant Lifecycle Time Lapse Video: Video: Sunflower Life Cycle Time Lapse ● Getting Together - Animals that Live in Groups: <ul style="list-style-type: none"> ○ Baby Elephant Stuck in the Mud Video Video: Baby Elephant Gets Stuck in the Mud ● Ready? Set? Snow! Winter Survival Behaviors: <ul style="list-style-type: none"> ○ Canadian Geese flying in V Video: Canadian Geese Flying 	
Enduring Understandings	
<ul style="list-style-type: none"> ● Animals develop and grow in different ways, including hatching from eggs, live birth, and metamorphosis. ● Plants and animals have predictable characteristics at different stages of development. ● Plants and animals grow and change and can have young. ● Many kinds of plants, parents and their seedlings look alike. ● Some animals have certain adaptations that help them to better survive, including living in groups, or migrating/hibernating during colder months. 	
NJ Standards/NGSS Performance Expectations Taught and Assessed Students who demonstrate understanding can:	
<ul style="list-style-type: none"> ● 1-LS3-1 Make observations to construct an evidence-based account that young plants and animals are like, but not exactly like, their parents. ● K-2-ETS1-1 Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be 	

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solved through the development of a new or improved object or tool.

- 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.

3-Dimensional Learning Components

Science and Engineering Practices	Disciplinary Core Ideas (DCI)	Crosscutting Concepts
<p>Constructing Explanations and Designing Solutions</p> <ul style="list-style-type: none"> ● Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena. (1-LS3-1) ● Ask questions based on observations to find more information about the natural and/or designed world(s). (K-2-ETS1-1) 	<p>LS3.A: Inheritance of Traits</p> <ul style="list-style-type: none"> ● 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) <p>LS3.B: Variation of Traits</p> <ul style="list-style-type: none"> ● Individuals of the same kind of plant or animal are recognizable as similar but can also vary in many ways. (1-LS3-1) <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>Patterns</p> <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-LS3-1) <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). (K-2-ETS1-2)

Interdisciplinary Connections: Math, ELA, and Computer Science and Design Thinking

Math

- MP.2 Reason abstractly and quantitatively. (1-LS3-1)
- MP.5 Use appropriate tools strategically. (1-LS3-1)
- 1.MD.A.1 Order three objects by length; compare the lengths of two objects indirectly by using a third object. (1-LS3-1)

ELA

- 1.RI.1 Ask and answer questions about key details in a text. (1-LS3-1)
- W.1.7 Participate in shared research and writing projects (e.g., explore a number of "how-to" books on a given topic and use them to write a sequence

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of instructions). (1-LS3-1)

- W.1.8 With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question. (1-LS3-1)

Computer Science and Design Thinking

- 8.2.2.WITH.1 Identify products that are designed to meet human wants or needs.
- 8.2.2.ITH.2 Explain the purpose of a product and its value.

Career Readiness, Life Literacies, and Key Skills

- 9.1.2.CR.1 Recognize ways to volunteer in the classroom, school and community.
- 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).
- 9.4.2.CI.2 Demonstrate originality and inventiveness in work (e.g., 1.3A.2CR1a).
- 9.4.2.CT.3 Use a variety of types of thinking to solve problems (e.g., inductive, deductive).

Social-Emotional Learning Competencies

- **Responsible Decision-Making:** Develop, implement, and model effective problem-solving and critical thinking skills.
- **Relationship Skills:**
 - Establish and maintain healthy relationships.
 - Utilize positive communication and social skills to interact effectively with others.
 - Identify who, when, where, or how to seek help for oneself or others when needed.

Learning Targets	Investigations/Resources	Formative Assessment
Ask questions and identify life cycle stages common to all living things	Compare human photos for observable physical traits and label each stage of the human life cycle Compare and contrast life cycles of different animals	What We Know/What We Wonder Chart or shared Jam Board for questions and comparisons. List in chart format similarities and differences.
Obtain, evaluate and communicate information to describe, sequence, and compare life cycles of various animals	Observe live caterpillars as they transition to butterflies (order live butterfly kit) Build a model of the life cycle of a butterfly, frog, and chicken	Keep a log or notebook and record observations

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<p>Ask questions and obtain information to give examples of animals that grow from eggs or live birth.</p>	<p>Brainstorm many different animals; sort them into 2 groups based on how they are born: live births and eggs</p>	<p>Share egg/live birth sort with group members</p>
<p>Obtain information and communicate to explain the relationship of parents and offspring of various animals.</p>	<p>Brainstorm how babies differ from kids and how they differ from adults</p> <p>Discuss the different roles that babies, kids, and adults play in a family; compare this to other animals</p> <p>Draw/write about how family members take care of each other; discuss the role that each family member has in a family</p> <p>Discuss some ways that living in a group (family) benefit you (always have someone to play with; always have someone to protect you when you're scared; it's easier to get food, etc.)</p>	<p>Journal Entry: Draw and write about one way your family takes care of you.</p>
<p>Identify the stages of a green plant, trees, and other plants' life cycles.</p>	<p>Show pictures of plant offspring and plant parents; discuss how they look different</p> <p>Match different seeds to the adult plant</p> <p>Draw and label the life cycle of a dandelion, corn, oak tree, and conifer tree</p>	<p>Matching Activity: Match different seeds to the adult plant</p>
<p>Ask questions and identify general reasons for living in a group</p>	<p>Compare and contrast the benefits of working/living in a group versus independently.</p>	<p>Class Discussion: What is one way that living in a group (family) is beneficial to you?</p>
<p>Obtain information to describe the basic group structure and function of wolves, elephants, dolphins, and honeybees, including roles, communication, and caring for offspring</p>	<p>Practice walking like an elephant, play "trunk tag" Imitate wolf behavior, play "wolf leadership"</p> <p>Have a "safety in numbers" demonstration to</p>	<p>Journal Entry: Which animal family would you like to be a part of? Why? Encourage students to focus on the animals' behavior in the groups (rather than on cuteness, etc.)</p>

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	<p>emphasize why dolphins and other water animals swim in schools</p> <p>Demonstrate how honeybees have roles by playing the "waggle dance activity"</p>	
<p>Ask questions and associate basic needs with winter behaviors</p>	<p>Brainstorm ways that we get ready for winter (get blankets, wear warm clothes, heat our homes, etc.)</p> <p>Brainstorm ways that animals get ready for winter</p> <p>Compare/contrast how animals and people get ready for winter</p>	<p>Give each student a paper plate; have them write "yes" on one side and "no" on the other side. Call out different statements; if the statement describes one way people or animals get ready for winter, students hold up the "yes" side. If it does not describe a winter prep activity, students hold up the "no" side.</p>
<p>Engage in argument from evidence to explain what happens to animals that hibernate, migrate, and remain active during the winter months</p> <p>Ask questions, obtain information to communicate examples of animals that engage in each type of winter behavior</p>	<p>Students gather in a "V" shape to act out "migration" of geese</p> <p>Simulate hibernation activity</p> <p>Participate in "foraging for food" activity</p>	<p>Journal Entry: Write and draw about how one animal survives the winter.</p>
<p>Instructional Modifications and/or Accommodations (ELL, Special Education, Gifted, At-Risk of Failure, 504) When Appropriate</p>		
<ul style="list-style-type: none"> ● Read articles and/or directions to students to help with comprehension ● Teacher provided scaffolding for designing investigations, one-on-one or in small groups ● Provide access to anchor charts and classroom labels relevant to science concepts ● Scribe for students or allow students to use talk-to-text feature on Chromebooks when responding to questions ● Provide access to articles and books further exploring the topic of study ● Any other modification as per student IEP or 504 plan 		
<p>Common Assessment(s)</p>	<p>Assessment Modifications and/or Accommodations (ELL, Special Education, Gifted, At-Risk of Failure, 504) When Appropriate</p>	
<ul style="list-style-type: none"> ● Survivor 	<ul style="list-style-type: none"> ● Provide verbal directions to assessment questions. ● Scribe for students or allow typing / talk to text feature to assist in recording responses. 	

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Unit Title	Time Frame/Pacing
Light & Sound	40 days
Phenomena/Anchoring Activity/Anchoring Question/Essential Questions	
<p><u>Essential Questions:</u></p> <ul style="list-style-type: none"> ● Where does light come from? ● How does light help us see? ● How does light bounce and bend? ● How does sound change? ● How does sound travel through matter? ● How do people communicate using light or sound? <p><u>Phenomena/Anchor Activities:</u></p> <ul style="list-style-type: none"> ● Light All Around: (first lesson) <ul style="list-style-type: none"> ○ What's in the cave teacher directions ○ What's in the cave student recording sheet ● Science of Sound: <ul style="list-style-type: none"> ○ Exploring sound/vibrations: <ul style="list-style-type: none"> ■ Video of Bumblebee Buzzing ■ Video of rubber band vibration ○ Exploring sound traveling through matter: <ul style="list-style-type: none"> ■ Video Underwater whale sounds 	
Enduring Understandings	
<ul style="list-style-type: none"> ● Light and sound are all around us and interact with matter in different ways. ● Light and sound are incorporated into technology and used to communicate with other people. 	
NJ Standards/NGSS Performance Expectations Taught and Assessed Students who demonstrate understanding can:	
<ul style="list-style-type: none"> ● 1-PS4-1 Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate. ● 1-PS4-2 Make observations to construct an evidence-based account that objects can be seen only when illuminated. ● 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. 	

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- 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.
- K-2-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.
- 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.
- 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.

3-Dimensional Learning Components Crosscutting Concepts

Science and Engineering Practices	Disciplinary Core Ideas (DCI)	Cause and Effect
<p>Planning and Carrying out Investigations</p> <ul style="list-style-type: none"> ● Plan and conduct investigations collaboratively to produce evidence to answer a question. (1-PS4-1), (1-PS4-3) <p>Constructing Explanations and Designing Solutions</p> <ul style="list-style-type: none"> ● 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) <p>Scientific Investigations Use a Variety of Methods</p> <ul style="list-style-type: none"> ● Science investigations begin with a question. (1-PS4-1) ● Scientists use different ways to study the world. (1-PS4-1) <p>Asking Questions and Defining Problems</p> <ul style="list-style-type: none"> ● Ask questions based on observations to find 	<p>PS4.A: Wave Properties</p> <ul style="list-style-type: none"> ● Sound can make matter vibrate, and vibrating matter can make sound. (1-PS4-1) <p>PS4.B: Electromagnetic Radiation</p> <ul style="list-style-type: none"> ● 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) <p>PS4.C: Information Technologies and Instrumentation</p> <ul style="list-style-type: none"> ● People also use a variety of devices to 	<p>Cause and Effect</p> <ul style="list-style-type: none"> ● 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) <p style="text-align: center;"><i>Connections to Engineering, Technology, and Applications of Science</i></p> <p>Influence of Engineering, Technology, and Science, on Society and the Natural World</p> <ul style="list-style-type: none"> ● People depend on various technologies in their lives; human life would be very different without technology. (1-PS4-4) <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). (K-2-ETS1-2)

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<p>more information about the natural and/or designed world(s). (K-2-ETS1-1)</p> <ul style="list-style-type: none"> Define a simple problem that can be solved through the development of a new or improved object or tool. (K-2-ETS1-1) <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>Analyzing and Interpreting Data</p> <ul style="list-style-type: none"> Analyze data from tests of an object or tool to determine if it works as intended. (K-2-ETS1-3) 	<p>communicate (send and receive information) over long distances. (1-PS4-4)</p> <p>ETS1.A: Defining and Delimiting Engineering Problems</p> <ul style="list-style-type: none"> A situation that people want to change or create can be approached as a problem to be solved through engineering. (K-2-ETS1-1) Asking questions, making observations, and gathering information are helpful in thinking about problems. (K-2-ETS1-1) Before beginning to design a solution, it is important to clearly understand the problem. (K-2-ETS1-1) <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>ETS1.C: Optimizing the Design Solution</p> <ul style="list-style-type: none"> Because there is always more than one possible solution to a problem, it is useful to compare and test designs. (K-2-ETS1-3) 	
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Interdisciplinary Connections: Math, ELA, and Computer Science and Design Thinking

Math

- 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. Limit to contexts

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where the object being measured is spanned by a whole number of length units with no gaps or overlaps. (1-PS4-4)

ELA

- W.1.2 Write informative/explanatory texts in which they name a topic, supply some facts about the topic, and provide some sense of closure. (1-PS4-2)
- W.1.7 Participate in shared research and writing projects (e.g., explore a number of “how-to” books on a given topic and use them to write a sequence of instructions). (1-PS4-1), (1-PS4-2), (1-PS4-3), (1-PS4-4)
- W.1.8 With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question. (1-PS4-1), (1-PS4-2), (1-PS4-3)
- SL.1.1 Participate in collaborative conversations with diverse partners about grade 1 topics and texts with peers and adults in small and larger groups. (1-PS4-1), (1-PS4-2), (1-PS4-3)

Computer Science and Design thinking

- 8.1.2.DA.3 Identify and describe patterns in data visualizations.
- 8.1.2.DA.4 Make predictions based on data using charts or graphs.
- 8.2.2.ED.1 Communicate the function of a product or device.
- 8.2.2.ED.2 Collaborate to solve a simple problem, or to illustrate how to build a product using the design process.
- 8.2.2.ED.3 Select and use appropriate tools and materials to build a product using the design process.
- 8.2.2.ITH.3 Identify how technology impacts or improves life.
- 8.2.2.ITH.4 Identify how various tools reduce work and improve daily tasks.

Career Readiness, Life Literacies, and Key Skills

- 9.1.2.CR.1 Recognize ways to volunteer in the classroom, school and community.
- 9.4.2.CI.1 Demonstrate openness to new ideas and perspectives.
- 9.4.2.CI.2 Demonstrate originality and inventiveness in work.
- 9.4.2.CT.1 Gather information about an issue, such as climate change, and collaboratively brainstorm ways to solve the problem.
- 9.4.2.CT.2 Identify possible approaches and resources to execute a plan.
- 9.4.2.CT.3 Use a variety of types of thinking to solve problems.

Social-Emotional Learning Competencies

- **Self Management:** Recognize the skills needed to establish and achieve personal and educational goals.
- **Responsible Decision-Making:** Develop, implement, and model effective problem-solving and critical thinking skills.
- **Relationship Skills:**
 - Establish and maintain healthy relationships.
 - Utilize positive communication and social skills to interact effectively with others.

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Learning Targets	Investigations/Resources	Formative Assessment
Identify and communicate how light is a form of energy that helps us to see objects	Compare what we see with the lights on/lights off Use photos to identify sources of light	Journal Entry: Draw 3 sources of light.
Plan and carry out an investigation to demonstrate that light travels in a straight line called a ray or beam	Draw arrows to show the path of light rays Bend a straw. Shine a laser beam through the straw. Notice how the light does not bend to come out the other end of the straw.	Journal Entry: Draw and write about what happened to the laser beam when it was pointed through the straw.
Analyze the effect light has on objects made of different materials.	Give examples of objects or materials that are opaque, transparent, and translucent Shine a flashlight through opaque, transparent, and translucent surfaces.	Exit Ticket: Sort pictures of opaque, transparent, and translucent objects.
Compare and contrast how light interacts with surfaces (reflections, shadows, refractions, etc.)	Compare shadows and reflections Create shadows using a flashlight Shine a laser beam through air and then through water. Compare and contrast. How does light travel?	Journal Entry: Draw and write about what happened when the laser beam went through the air and then through the water. Optional Journal: Light and Shadows Journal
Identify sources of sound	Play "I Spy" to identify all the sounds we hear outside our classroom Take a listening walk and record sounds that are heard	Discussion/Create a Class Chart: Have students share some of the sounds they heard on their listening walk.
Ask questions and communicate how sound is produced when matter vibrates	Feel, see and hear vibrations by stretching and plucking a string Compare the difference between sounds and vibrations that come from thick vs. thin rubber bands Pluck a string and have students observe	Exit Ticket: Match the type of sound that is made when different rubber bands and strings are plucked.

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	<p>movement/sound.</p> <p>Hold your hand over your throat while talking or humming.</p>	
<p>Plan and carry out an investigation to explain how sound waves produced by one object may cause another object to vibrate</p>	<p>Experiment with ways sound waves or vibrations can travel through a desk even though it's a solid object</p> <p>Experiment with making sugar "dance" without touching it</p> <p>Video: Tuning Fork</p>	<p>Discussion/Journal Entry (Making Sugar Dance): How were you able to make the sugar dance?</p> <p>Journal Entry (Tuning Fork Video): Why was the ball able to move?</p>
<p>Ask questions and give examples of communication technology using sound</p>	<p>Build and test different designs for cup and string phones</p> <p>Identify ways people can communicate without using words</p>	<p>Journal Entry: Which phone worked the best? Why?</p>
<p>Ask questions and obtain information to understand and explain how communication technology has changed</p>		
<p>Plan and carry out an investigation by using an engineering design process</p>		
<p>Instructional Modifications and/or Accommodations (ELL, Special Education, Gifted, At-Risk of Failure, 504) When Appropriate</p>		
<ul style="list-style-type: none"> ● Read articles and/or directions to students to help with comprehension ● Teacher provided scaffolding for designing investigations, one-on-one or in small groups ● Provide access to anchor charts and classroom labels relevant to science concepts ● Scribe for students or allow students to use talk-to-text feature on Chromebooks when responding to questions ● Provide access to articles and books further exploring the topic of study ● Any other modification as per student IEP or 504 plan 		
<p>Common Assessment(s)</p>	<p>Assessment Modifications and/or Accommodations (ELL, Special Education, Gifted, At-Risk of Failure, 504) When Appropriate</p>	
<ul style="list-style-type: none"> ● No, Not the Dark 	<ul style="list-style-type: none"> ● Provide verbal directions to assessment questions. 	

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| | <ul style="list-style-type: none">• Scribe for students or allow typing / talk to text feature to assist in recording responses. |
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