Wayne
Township Public Schools

Kindergarten
Science Curriculum

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WAYNE TOWNSHIP PUBLIC SCHOOL DISTRICT
ELEMENTARY SCIENCE CURRICULUM (JULY 2017)

I. COURSE OVERVIEW

The Wayne Township Public School elementary science program supports the philosophy of the New Jersey Science Learning Standards. Our students will develop an understanding of the disciplinary core ideas relative to physical sciences, life sciences, and earth and space sciences. and life science through experiential learning and engineering and technology, and through exposure to rich non-fiction text.

II. FRAMEWORK

Instruction is framed around 3-Dimensional learning as outlined in the Next Generation Science Standards including:

a. Disciplinary Core Ideas

i. Physical Sciences
   1. Matter and its interactions
   2. Motion and stability: Forces and interactions
   3. Energy
   4. Waves and their applications in technologies for information transfer

ii. Life Sciences
   1. From molecules to organisms: Structures and processes
   2. Ecosystems: Interactions, energy, and dynamics
   3. Heredity: Inheritance and variation of traits
   4. Biological evolution: Unity and diversity

iii. Earth and Space Sciences
   1. Earth's place in the universe
   2. Earth's systems
   3. Earth and human activity

iv. Engineering, Technology, and Applications of Science
   1. Engineering design
   2. Links among engineering, technology, science, and society

b. Scientific and Engineering Practices

i. Asking questions (for science) and defining problems (for engineering)
ii. Developing and using models
iii. Planning and carrying out investigations
iv. Analyzing and interpreting data
v. Using mathematics and computational thinking
vi. Constructing explanations (for science) and designing solutions (for engineering)
vii. Engaging in argument from evidence

viii. Obtaining, evaluating, and communicating information

c. Crosscutting Concepts

i. Look for and Analyze Patterns
ii. Cause and Effect
iii. Scale, Proportion, Quantity
iv. Systems and System Models
v. Energy and Matter, Flow, Cycles, Conservation
vi. Structure and Function
vii. Stability and Change

III. COMPONENTS

The curriculum includes the following components:

a. Scope and Sequence

b. Pacing Guide

c. Curricular Units

i. Unit Summary
ii. Student Learning Objectives
iii. Resources and Activities
iv. Background Information
v. Connections
    1. Prior and Future Learning
    2. Language Arts
    3. Mathematics
vi. Unit Sequence
vii. Modifications
viii. Assessment suggestions

IV. PROGRAM RESOURCES

a. National Geographic Exploring Science (Cengage Learning, 2015)

b. Science materials kits

c. Mystery Science online subscription

Unit Summary
During this unit of study, students apply an understanding of the effects of different strengths or different directions of pushes and pulls on the motion of an object to analyze a design solution. The crosscutting concept of *cause and effect* is called out as the organizing concept for this disciplinary core idea. Students are expected to demonstrate grade-appropriate proficiency in *planning and carrying out investigations* and *analyzing and interpreting data*. Students are also expected to use these practices to demonstrate understanding of the core ideas.
Student Learning Objectives
Plan and conduct an investigation to compare the effects of different strengths or different directions of pushes and pulls on the motion of an object. *[Clarification Statement: Examples of pushes or pulls could include a string attached to an object being pulled, a person pushing an object, a person stopping a rolling ball, and two objects colliding and pushing on each other.] [Assessment Boundary: Assessment is limited to different relative strengths or different directions, but not both at the same time. Assessment does not include non-contact pushes or pulls such as those produced by magnets.]* **(K-PS2-1)**
Analyze data to determine if a design solution works as intended to change the speed or direction of an object with a push or a pull. *[Clarification Statement: Examples of problems requiring a solution could include having a marble or other object move a certain distance, follow a particular path, and knock down other objects. Examples of solutions could include tools such as a ramp to increase the speed of the object and a structure that would cause an object such as a marble or ball to turn.] [Assessment Boundary: Assessment does not include friction as a mechanism for change in speed.]* **(K-PS2-2)**
Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs. (K-2-ETS1-3)
See Content Evidence Statements for student performance expectations. **See Evidence Statements for Engineering Design.**

Resources and Activities
Exploring Science: Teacher's Guide Pages P4-P35, **Lab/Investigation/Rubrics* *1-11* **Exploring Science Guided Reading Books:** **Use throughout the unit** *Toys Push and Pull* *Push and Pull Forces* *What Can Pull Wagons* *Vehicles Push and Pull* *People Push and Pull* *Animals Push and Pull* **Mystery Science**: See below **Additional online resources**: Brainpop, Youtube, See ADDITIONAL ACTIVITIES below **Additional Activities**: Resource Folder, **Move it! Motion Forces and You** *by* Adrienne Mason - *book,* See ADDITIONAL ACTIVITIES below for more games and resources **Schoolwide**: N/A **Suggested Reading**: **Move it! Motion Forces and You** *by* Adrienne Mason **Other**: Student "Science Notebook"

Topic Outline Resources and Activities

TOPIC	DISTRICT SCIENCE RESOURCES	ADDITIONAL ACTIVITIES
Understanding Motion	**Exploring Science lesson:** *How Things Move* pages: *P4-P5* **Exploring Science Guided Reading Books:** **Use throughout the unit** *Toys Push and Pull* *Push and Pull Forces* *What Can Pull Wagons* *Vehicles Push and Pull* *People Push and Pull* *Animals Push and Pull* **Mystery Science** -*What's the Biggest Excavator*- Mystery 1 Video/Activities	**Move it! Motion Forces and You** *by* Adrienne Mason - *book* *Forces In Motion Vocabulary Cards* - mini posters Resource Folder Offer students chances to explore pushing and pulling. Student "Science Notebook" page 1
Identify Effects of Strength and Direction on Motion	**Exploring Science lesson:** *Hard Push, Slow Push* pages: *P6-P9* **Lab/Investigation/Rubrics* 1* *Weak Pull, Strong Pull* pages: *P10-P13* **Lab/Investigation/Rubrics* 2	Pushing and Pulling-Force, Work, and Energy Video Student "Science Notebook" pages 2 and 3
Start and Stop of Motion	**Exploring Science lesson:** *Starting and Stopping* pages: *P14-P17* **Lab/Investigation/Rubrics* 3	*Forces In Motion* - game Resource Folder Student "Science Notebook" page 4

Changing Direction of Motion	**Exploring Science lesson:** *Changing Direction* pages: *P18-21* **Lab/Investigation/Rubrics* *4*	Another exploration option-Make predictions. Hit one ball with another or play a game of marbles. Student "Science Notebook" page 5
Changing Speed of Motion	**Exploring Science lesson:** *Changing Speed* pages: *P22-25* **Lab/Investigation/Rubrics* *5*	**Brain Pop** - Acceleration Student "Science Notebook" page 6
Compare Strength and Directions of Pushes and Pulls on Motion	**Exploring Science lesson:** *Plan and Conduct an Investigation* pages: *P26-27b* **Lab/Investigation/Rubrics* *6, 7, 8* **Mystery Science** -*How Can You Knock Down a Wall Made of Concrete*- Mystery 2 Video/Activities	Pushes and Pulls Interactive Game Push and Pull Sorting Cards Resource Folder Another exploration option-Make predictions. Use dominoes to show the carry through of one hitting and moving another in the same direction. Student "Science Notebook" page 7
Analyze Data from Explorations	**Exploring Science lesson:** *Analyze Data*: pages: *P28-P29b* **Lab/Investigation/Rubrics* *9, 10, 11*	Push and Pull Tic Tac Toe Interactive Game Student "Science Notebook" page 8
Science Career	OPTIONAL - **Exploring Science lesson:** *Pilot* pages: *P30-P31*	Push and Pull Sorting Cards Resource Folder
Assessment	**Exploring Science Assessment:** pages: *P32-P35*	

Before You Teach
In this unit of study, students plan and carry out investigations in order to understand the effects of different strengths and different directions of pushes and pulls on the motion of an object. Students will also engage in a portion of the ***engineering design process*** to determine whether a design solution works as intended to change the speed or direction of an object. Scientists often design simple tests in order to gather evidence that can be used to understand cause-and-effect relationships. In this unit's progression of learning, kindergarteners need adult guidance to collaboratively plan and conduct simple investigations to discover and compare the effects of pushes and pulls on the motion of an object. Students will need opportunities to push and pull a variety of objects, such as balls, toy cars, pull toys, cans, tops, and boxes. Students should push/pull these objects first with varying strengths, and then in a variety of directions. They should also explore the effects of pushing objects into one another, as well as into walls and other stationary objects. Students should record their observations using pictures and words, and should participate in class discussions on the effects of varying the strength or direction of a push or pull on an object. As students engage in these types of simple force and motion investigations, they will learn that: ● Pushes and pulls can have different strengths and directions. ● Pushing or pulling on an object can change the speed or direction of its motion and can start or stop it. ● When objects touch or collide, the object's motion can be changed. ● The force of the push or pull will make things speed up or slow down more quickly. To enhance students' experiences, teachers can schedule time for students to investigate these force and motion concepts using playground equipment, such as swings, seesaws, and slides. Teachers can also use trade books and multimedia resources to enrich students' understanding. As students participate in discussions, they should be encouraged to ask questions, share observations, and describe cause-and-effect relationships between forces (pushes and pulls) and the motion of objects. As students come to understand the force and motion concepts outlined above, they should engage in the ***engineering design process*** as follows. ● Students are challenged to design a simple way to change the speed or direction of an object using a push or pull from another object. ● As a class, students determine what the design should be able to do (criteria). For example: ○ An object should move a second object a certain distance; ○ An object should move a second object so that the second object follows a particular path; ○ An object should change the direction of the motion of a second object; and/or ○ An object should knock down other specified objects. ● Students determine the objects that will move/be moved (balls, ramps, blocks, poker chips) and the types of structures (ramps or barriers) and materials (rubber bands, paper tubes, cardboard, foam, wooden blocks) that can be used to meet this challenge. ● Groups of students then develop a simple drawing or diagram and use given materials to build their design. Groups should be given a predetermined amount of time to draw and build their designs. ● Groups share their designs with the class, using their drawings or diagrams, and then test their designs.

- Students make and use observations to determine which of the designs worked as intended, based on the criteria determined by the class.

While engaging in this process, students should use evidence from their observations to describe how forces (pushes and pulls) cause changes in the speed or direction of an object.

In this unit of study, students learn that problem situations can be solved through engineering, and that because there is always more than one possible solution to a problem, it is useful to compare and test designs. Students will use what they have learned about the effect of pushes and pulls of varying strength and direction on the motion of an object to determine whether a design solution works as intended. This process is outlined in greater detail in the previous section.

Unit Sequence

Part A: CONTENT

Concepts	**Formative Assessment**
• People use different ways to study the world. • Simple tests can be designed to gather evidence to support or refute student ideas about causes. • Pushes and pulls can have different strengths and directions. • Pushing or pulling on an object can change the speed or direction of its motion and can start or stop it. • When objects touch or collide, they push on one another and can change motion. • A bigger push or pull makes things speed up or slow down more quickly.	*Students who understand the concepts are able to:* ● With guidance, design simple tests to gather evidence to support or refute ideas about cause-and-effect relationships. ● With guidance, plan and conduct an investigation in collaboration with peers. ● With guidance, collaboratively plan and conduct an investigation to compare the effects of different strengths or different directions of pushes and pulls on the motion of an object. *(Assessment is limited to different relative strengths or different directions, but not both at the same time. Assessment does not include noncontact pushes or pulls such as those produced by magnets.)* Some examples of pushes and pulls on the motion of an object could include: ✓ A string attached to an object being pulled. ✓ A person pushing an object. ✓ A person stopping a rolling ball. ✓ Two objects colliding and pushing on each other.

Unit Sequence - DESIGN	
Part B: DESIGN *- How can you design a simple way to change the speed or direction of an object using a push or pull from another object?*	
Concepts	**Formative Assessment**
• Simple tests can be designed to gather evidence to support or refute student ideas about causes. • Pushes and pulls can have different strengths and directions. • Pushing or pulling on an object can change the speed or direction of its motion and can start or stop it. • A situation that people want to change or create can be approached as a problem to be solved through engineering. Such problems may have many acceptable solutions. • Because there is always more than one possible solution to a problem, it is useful to compare and test designs.	*Students who understand the concepts are able to:* • With guidance, design simple tests to gather evidence to support or refute ideas about cause-and-effect relationships. • Analyze data from tests of an object or tool to determine if it works as intended. • Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs. • Analyze data to determine whether a design solution works as intended to change the speed or direction of an object with a push or a pull. • Examples of problems requiring a solution could include having a marble or other object move a certain distance, follow a particular path, and knock down other objects. • Examples of solutions could include tools such as a ramp to increase the speed of the object and a structure that would cause an object such as a marble or ball to turn. *(Assessment does not include friction as a mechanism for change in speed.)*

Assessments
Formative: See formative assessment options above **Benchmark**: Exploring Science Assessments (after completion of each discipline). Note: Benchmark for Physical Science after Unit 1 on pages P32-P35 of the Exploring Science Teacher Manual. **Summative**: Mystery Science Unit and/or Mystery Assessments **Alternative**: Science journal/notebook and digital notebook entries, labs, Stem Gauge Assessments (Google Folder), student self-evaluation rubrics (Exploring Science teacher manual at the conclusion of each lesson)

Connecting with English Language Arts/literacy and Mathematics
English Language Arts In order to integrate English Language Arts into this unit, students need the opportunity to participate in shared research that will enhance their understanding of the effect of forces (pushes and pulls) on objects. This could include exploring simple books and other media or digital resources. With prompting and support, students should ask and answer questions about key details in texts in order to seek help, get information, or clarify something that they do not understand. With support from adults, students will also recall information from experiences to answer questions and clarify their thinking. With support and/or collaboration, they can use digital tools to produce and publish simple informative writing or to document their observations of the simple force and motion systems they design and build. ***Mathematics*** During this unit of study, students will make connections to Mathematics in a number of ways. Kindergartners can use simple nonstandard units to measure the distances that two different objects travel when pushed or pulled or the distances that an object travels when varying the strength of a push or a pull. If using two objects, students can compare them using a measurable attribute, such as weight, to see which object has "more of" or "less of" the attribute, and describe the effect that increased weight has on the distance that an object travels. As students conduct multiple trials with the two objects (or with a single object, varying the strength of the push or pull), they can document the distance traveled in a simple graph. Then they can analyze the data in order to describe the cause-and-effect relationship between forces and motion of objects. As students collect and analyze data, they are learning to reason abstractly and quantitatively and use appropriate tools strategically.

Modifications
(Note: Teachers identify the modifications that they will use in the unit. See NGSS Appendix D: All Standards, All Students/Case Studies for vignettes and explanations of the modifications.) ● Structure lessons around questions that are authentic, relate to students' interests, social/family background and knowledge of their community. ● Provide students with multiple choices for how they can represent their understandings (e.g. multisensory techniques-auditory/visual aids; pictures, illustrations, graphs, charts, data tables, multimedia, modeling). ● Provide opportunities for students to connect with people of similar backgrounds (e.g. conversations via digital tool such as SKYPE, experts from the community helping with a project, journal articles, and biographies). ● Provide multiple grouping opportunities for students to share their ideas and to encourage work among various backgrounds and cultures (e.g. multiple representation and multimodal experiences). ● Engage students with a variety of Science and Engineering practices to provide students with multiple entry points and multiple ways to demonstrate their understandings. ● Use project-based science learning to connect science with observable phenomena. ● Structure the learning around explaining or solving a social or community-based issue. ● Provide ELL students with multiple literacy strategies. ● Collaborate with after-school programs or clubs to extend learning opportunities. ● Restructure lesson using UDL principles (http://www.cast.org/our-work/about-udl.html#.VXmoXcfD_UA).

- Differentiation Strategies
  - Differentiation Strategies for Special Education Students
  - Differentiation Strategies for Gifted and Talented Students
  - Differentiation Strategies for ELL Students
  - Differentiation Strategies for At Risk Students
  - Differentiation Strategies for Students with a 504

Future Learning

Grade 3: Forces and Motion

- 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 they add 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.)
- Each force acts on one particular object and has both strength and direction. An object at rest typically has multiple forces acting on it, but they add 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 is 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.)
- Objects in contact exert forces on each other.
- Electric and magnetic forces between a pair of objects do not require that the objects be in contact. The sizes of the forces in each situation depend on the properties of the objects and their distances apart and, for forces between two magnets, on their orientation relative to each other.

Grade 4: Transfer of Energy

- Energy can be moved from place to place by moving objects or through sound, light, or electric currents.

By the end of the 3–5 grade span, students will know that:

- Possible solutions to a problem are limited by the available materials and resources (constraints) identified. 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 the 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.

List of Additional Education Resources
Mystery Science

Appendix A: NGSS and Foundations for the Unit
Plan and conduct an investigation to compare the effects of different strengths or different directions of pushes and pulls on the motion of an object. *[Clarification Statement: Examples of pushes or pulls could include a string attached to an object being pulled, a person pushing an object, a person stopping a rolling ball, and two objects colliding and pushing on each other.]* [Assessment Boundary: Assessment is limited to different relative strengths or different directions, but not both at the same time. Assessment does not include non-contact pushes or pulls such as those produced by magnets.*]* **(K-PS2-1)**
Analyze data to determine if a design solution works as intended to change the speed or direction of an object with a push or a pull. *[Clarification Statement: Examples of problems requiring a solution could include having a marble or other object move a certain distance, follow a particular path, and knock down other objects. Examples of solutions could include tools such as a ramp to increase the speed of the object and a structure that would cause an object such as a marble or ball to turn.]* [Assessment Boundary: Assessment does not include friction as a mechanism for change in speed.*]* **(K-PS2-2)**
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-ETS1-1)
The performance expectations above were developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Planning and Carrying Out Investigations • With guidance, plan and conduct an investigation in collaboration with peers. (K-PS2-1) **Analyzing and Interpreting Data** • Analyze data from tests of an object or tool to determine if it works as intended. (K-PS2-2) **Asking Questions and Defining Problems** • Ask questions based on observations to find	**PS2.A: Forces and Motion** • Pushes and pulls can have different strengths and directions. (K-PS2-1), (K-PS2-2) • Pushing or pulling on an object can change the speed or direction of its motion and can start or stop it. (K-PS2-1), (K-PS2-2) **PS2.B: Types of Interactions** • When objects touch or collide, they push on one another and can change motion.	**Cause and Effect** • Simple tests can be designed to gather evidence to support or refute student ideas about causes. (K-PS2-1), (K-PS2-2) **Structure and Function** • The shape and stability of structures of natural and designed objects are related to their function(s). (K-2-ETS1-1) -

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) **Developing and Using Models** • Develop a simple model based on evidence to represent a proposed object or tool. (K-2-ETS1-2)	(K-PS2-1) **PS3.C: Relationship Between Energy and Forces** • A bigger push/pull makes things speed up/slow down more quickly. **ETS1.A: Defining Engineering Problems** • A situation that people want to change or create can be approached as a problem to be solved through engineering. Such problems may have many acceptable solutions. *(secondary to K-PS2-2)* **ETS1.A: Defining and Delimiting Engineering Problems** • A situation that people want to change or create can be approached as a problem to be solved through engineering. (K-2-ETS1-1) • 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)	***Connections to the Nature of Science*** **Scientific Investigations Use a Variety of Methods** • Scientists use different ways to study the world. (K-PS2-1)

English Language Arts	Mathematics
With prompting and support, ask and answer questions about key details in a text. (K-PS2-2) **RI.K.1** Participate in shared research and writing projects (e.g., explore a number of books by a favorite author and express opinions about them). (K-PS2-1) **W.K.7** Ask and answer questions in order to seek help, get information, or clarify something that is not understood. (K-PS2-2) **SL.K.3**	Reason abstractly and quantitatively. (K-PS2-1), (K-2-ETS1-1), (K-2-ETS1-3) **MP.2** Model with mathematics. (K-2-ETS1-1), (K-2-ETS1-3) **MP.4** Use appropriate tools strategically. (K-2-ETS1-1), (K-2-ETS1-3) **MP.5** Describe measurable attributes of objects, such as length or weight. Describe several measurable attributes of a single object. (K-PS2-1) **K.MD.A.1** Directly compare two objects with a measurable attribute in common, to see which object has “more of”/”less of” the attribute, and describe the difference. (K-PS2-1) **K.MD.A.2**
WIDA	**Computer Science & Design Thinking**
ELD Standard 1: The Language of Social and Instructional Language ELD Standard 4: The Language of Science	8.1.2.AP.4: Break down a task into a sequence of steps. 8.2.2.ED.1: Communicate the function of a product or device.
Career Readiness, Life Literacies, and Key Skills	
CRP3. Consider the environmental, social and economic impacts of decisions. CRP4. Demonstrate creativity and innovation. CRP5. Utilize critical thinking to make sense of problems and persevere in solving them. CRP9. Work productively in teams while using cultural/global competence.	

Unit Summary
During this unit of study, students apply an understanding of the effects of the sun on the Earth's surface. The crosscutting concepts of *cause and effect* and *structure and function* are called out as organizing concepts for this disciplinary core idea. Students are expected to demonstrate grade-appropriate proficiency in *developing and using models*; *planning and carrying out investigations*; *analyzing and interpreting data*; and *designing solutions*. Students are also expected to use these practices to demonstrate understanding of the core ideas. This unit is based on K-PS3-1, K-PS3-2, K-2-ETS1-1, K-2-ETS1-2, and K-2-ETS1-3.
Student Learning Objectives
Make observations to determine the effect of sunlight on Earth's surface. *[Clarification Statement: Examples of Earth's surface could include sand, soil, rocks, and water.]* [Assessment Boundary: Assessment of temperature is limited to relative measures such as warmer/cooler.*]* **(K-PS3-1)**
Use tools and materials provided to design and build a structure that will reduce the warming effect of sunlight on Earth's surface.* *[Clarification Statement: Examples of structures could include umbrellas, canopies, and tents that minimize the warming effect of the sun.]* **(K-PS3-2)**
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-ETS1-1)
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-ETS1-2)
See Content Evidence Statements for student performance expectations. **See Evidence Statements for Engineering Design.**

Resources and Activities
Exploring Science: Teacher's Guide Pages E4-E9b, **Lab/Investigation/Rubrics* *20-22* **Exploring Science Guided Reading Books:** **Use throughout the unit** *Working in Snowy Weather* *Weather Fun* *Weather on a Trip* *People Work in All Kinds of Weather* *People Play in All Kinds of Weather* *People Travel in All Kinds of Weather* **Mystery Science**: See below **Additional online resources**: Discovery Education, Brainpop, Youtube, See ADDITIONAL ACTIVITIES below **Additional Activities**: Resource Folder, See ADDITIONAL ACTIVITIES below for more games and resources **Schoolwide**: Books: *Shapes in the Sky, What will the Weather Be?, Weather Words, I Face the Wind, Weather, Weather -Poems for All Seasons* **Suggested Reading**: *"Sun"* -- book by Marion Dane Bauer **Other**: Catch a Ray of Sunlight Activity-Use a mirror to reflect the sunlight., Student "Science Notebook"

Topic Outline Resources and Activities

TOPIC	DISTRICT SCIENCE RESOURCES	ADDITIONAL ACTIVITIES
Understanding the Sun	**Exploring Science lesson:** *The Sun Warms the Earth* pages: *E4-E5* **Lab/Investigation/Rubrics* *20*	**Schoolwide:** *Weather - Poems For All Seasons* Selected by Lee Bennett Hopkins (can be used throughout Unit 2 and Unit 3) *Sun* by Marion Dane Bauer - book *Sun Song* - Scratch Garden Video from Youtube **Brain Pop Jr.** - Sun
Understanding the Effects of the Sun	**Exploring Science lesson:** *The Warmth from the Sun* pages: *E6-E7*	*Here Comes the Sun Video -Here Comes the Sun: Crash Course* Kids Video from Youtube Catch a Ray of Sunlight Activity-Use a mirror to reflect the sunlight. *Why Is There Day and Night* - little non-fiction book Resource Folder *Sun Effects*- Discovery Education Video Student "Science Notebook" pages 9 and 10
Create a Model	**Exploring Science lesson:** *Design a Structure* pages: *E8-E9b* **Lab/Investigation/Rubrics* *21, 22*	

Before You Teach

In this unit of study, students investigate the effects of the sun on the surface of the Earth. Throughout the unit, students make observations in order to describe patterns of change. With adult support, they design and build a structure that will reduce the warming effect of sunlight, and then conduct tests to determine if the structure works as intended.

Scientists use different ways to study the world. In this unit's progression of learning, students work like scientists to investigate the warming effect of sunlight on the surface of the Earth. They will conduct simple investigations in order to make observations and collect data that can be used to make comparisons. Students should test a variety of materials that are found naturally on the surface of the Earth, including sand, soil, rocks, and water. Samples of each of these materials can be placed on two separate paper plates or shallow plastic containers; one container can be placed in direct sunlight, and the other can be placed out of direct sunlight. After a period of time, students should compare the relative temperature of each. Students should record their observations, then analyze and compare the data to determine if there is a pattern. They should draw the conclusion that the sun has the same warming effect on all the materials found on the surface of the Earth.

As students come to understand that the sun warms the surface of the Earth, they should engage in the engineering design process as follows:

- Students are challenged to design and build a structure that will reduce the warming effects of the sun.
- Students brainstorm a list of objects that reduce the warming effects of the sun (e.g., shade trees, umbrellas, large hats, canopies).
- As a class, students determine what the design should be able to do (criteria). For example:
    - ✓ The structure must reduce the warming effects of the sun.
    - ✓ The structure should be built using materials provided by the teacher.
    - ✓ The structure should be easy to carry and fit through the doorway of the classroom.
- Groups of students then use simple drawings or diagrams to design a structure, and use given tools and materials to build their design. Groups should be given a predetermined amount of time to draw and build their designs.
- Groups share their designs with the class, using their drawings or diagrams, and then test their designs outside. (Groups can place their structures in a sunny area, then compare the relative temperature of the ground under the structure and the ground in direct sunlight.).
- Students make and use observations to determine if the designs worked as intended, then compare the strengths and weaknesses of how each design performed.

While engaging in this process, students should use evidence from their observations to describe how their structures reduced the warming effect of sunlight.

Through this process, students learn that the shape and stability of structures of designed objects are related to their function. They will use tools and materials to design and build their structures. Because there is always more than one possible solution to a problem, students will test and compare their designs, then analyze data to determine if their structures work as intended.

Unit Sequence - CONTENT	
Part A: CONTENT - *How does sunlight affect the playground?*	
Concepts	**Formative Assessment**
• Scientists use different ways to study the world. • Events have causes that generate observable patterns. • Sunlight warms Earth's surface.	*Students who understand the concepts are able to:* ● Observe patterns in events generated by cause-and-effect relationships. ● Make observations (firsthand or from media) to collect data that can be used to make comparisons. ● Make observations to determine the effect of sunlight on Earth's surface. (Assessment of temperature is limited to relative measures such as warmer/cooler.) ● Examples of Earth's surface could include: ✓ Sand ✓ Soil ✓ Rocks ✓ Water

Unit Sequence - DESIGN	
Part B: DESIGN - *Imagine that we have been asked to design a new playground. How would we keep the sand, soil, rocks, and water found on the playground cool during the summer?*	
Concepts	**Formative Assessment**
• Events have causes that generate observable patterns. • The shape and stability of structures of natural and designed objects are related to their function(s). • 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. • Sunlight warms Earth's surface.	*Students who understand the concepts are able to:* • Observe patterns in events generated by cause-and-effect relationships. • Describe how the shape and stability of structures are related to their function. • Use tools and materials provided to design and build a device that solves a specific problem or a solution to a specific problem. • Use tools and materials to design and build a structure (e.g., umbrellas, canopies, tents) that will reduce the warming effect of sunlight on an area.

	• Develop a simple model based on evidence to represent a proposed object or tool. • Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem. • Analyze data from tests of an object or tool to determine if it works as intended. • Analyze data from tests of two objects designed to solve the same problem to compare the strengths

Assessments

Formative: See formative assessment options above
Benchmark: Exploring Science Assessments (after completion of each discipline).
Note: Benchmark for Earth and Space Science after Unit 3 on pages E32-E36 of the Exploring Science Teacher Manual.
Summative: Mystery Science Unit and/or Mystery Assessments
Alternative: Science journal/notebook and digital notebook entries, labs, Stem Gauge Assessments (Google Folder), student self-evaluation rubrics (Exploring Science teacher manual at the conclusion of each lesson)

Connecting with English Language Arts/literacy and Mathematics

English Language Arts
With guidance and support from adults, students recall information from experiences and gather information from books (read-alouds, big books) and other resources about the warming effects of the sun. Strategies such as Think-Pair-Share can be used to encourage students to think about and use information from books to answer questions and share their thinking. Kindergartners can add drawings or other visual displays to descriptions to provide additional detail about the structures they built to reduce the warming effects of the sun. With guidance and support from adults, students produce and publish their descriptions and observations of the structures they designed and built.

Mathematics
Students make comparisons of objects using relative temperature [hotter, colder, warmer, cooler] and describe the objects as warmer or cooler. Students can classify the objects into categories (warmer/cooler), then count and compare the number of objects in each category. Data should be organized and compared so that students understand that placing objects in the sun generates an observable pattern of change (i.e., the objects get warmer). Kindergarteners attend to the meaning of various quantities using a variety of measurement tools, such as thermometers without scale markings, to determine if an object has gotten warmer when placed in the sun. They mathematically represent real-world information by organizing their data into simple graphs or charts or by diagramming the situation mathematically.

Modifications

(Note: Teachers identify the modifications that they will use in the unit. See NGSS Appendix D: All Standards, All Students/Case Studies for vignettes and explanations of the modifications.)
● Structure lessons around questions that are authentic, relate to students' interests, social/family background and knowledge of their community.
● Provide students with multiple choices for how they can represent their understandings (e.g. multisensory techniques-auditory/visual aids; pictures, illustrations, graphs, charts, data tables, multimedia, modeling).
● Provide opportunities for students to connect with people of similar backgrounds (e.g. conversations via digital tool such as SKYPE, experts from the community helping with a project, journal articles, and biographies).
● Provide multiple grouping opportunities for students to share their ideas and to encourage work among various backgrounds and cultures (e.g. multiple representation and multimodal experiences).
● Engage students with a variety of Science and Engineering practices to provide students with multiple entry points and multiple ways to demonstrate their understandings.
● Use project-based science learning to connect science with observable phenomena.
● Structure the learning around explaining or solving a social or community-based issue.
● Provide ELL students with multiple literacy strategies.
● Collaborate with after-school programs or clubs to extend learning opportunities.
● Restructure lesson using UDL principles (http://www.cast.org/our-work/about-udl.html#.VXmoXcfD_UA).
● Differentiation Strategies
  ● Differentiation Strategies for Special Education Students
  ● Differentiation Strategies for Gifted and Talented Students
  ● Differentiation Strategies for ELL Students
  ● Differentiation Strategies for At Risk Students
  ● Differentiation Strategies for Students with a 504

Future Learning
Grade 1: Light and Sound ● Objects can be seen if light is available to illuminate them or if they give off their own light. ● 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. **Grade 2: Relationships in Habitats** ● 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.*(secondary)*

Grade 3: Weather and Climate

- Scientists record patterns of the weather across different times and areas so that they can make predictions about what kind of weather might happen next.
- Climate describes a range of an area's typical weather conditions and the extent to which those conditions vary over years.

Grade 4: Using Engineering Design with Force and Motion Systems

- 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. *(secondary)*

Connections to Other Units

In **Unit 1, Pushes and Pulls, Unit 3, Weather;** and **Unit 5, Humans;** students will use the following engineering principles:

- 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.

Sample of Open Education Resources

Casting Shadows Across Literacy and Science: This lesson introduces shadows by taking students on a shadow walk. Ideally this should be done on a sunny day in the schoolyard or neighborhood, but it can be a simple walk around the classroom.
A Big Star: This reading passage that explains what the sun is and that it provides heat to the Earth. This activity comes with comprehension and critical thinking questions.
The Warmth of the Sun: This lesson helps students broaden their understanding of the sun, particularly its critical role in warming the land, air, and water around us.
The Sun Lesson Plan: This lesson plan is adaptable to several grade band levels. The adjustments are included in the lesson plan along with suggestions for extension activities.
Cooler in the Shadows: This lesson includes several activities where students observe, explore, and analyze shadows. Students will make inferences about the cause of shadows, The lesson is linked to NASA's MESSENGER spacecraft in its voyage to and around Mercury. This lesson is designed to last 4 or more days. There are four different activities within the lesson. The teacher will need to gather some materials prior to beginning the lesson.
Shadow Smile! - Part 6 | Sid the Science Kid: In this song, Miss Susie teaches the class about shadows and the necessary shade they provide for people and animals in the heat! Learn how shadows are a result of an object getting in the way of the path of the sun and that the shadow it casts over the ground provides shade.

Appendix A: NGSS and Foundations for the Unit		
Make observations to determine the effect of sunlight on Earth's surface. *[Clarification Statement: Examples of Earth's surface could include sand, soil, rocks, and water.]* [Assessment Boundary: Assessment of temperature is limited to relative measures such as warmer/cooler.*]* **(K-PS3-1)**		
Use tools and materials provided to design and build a structure that will reduce the warming effect of sunlight on Earth's surface.* *[Clarification Statement: Examples of structures could include umbrellas, canopies, and tents that minimize the warming effect of the sun.]* **(K-PS3-2)**		
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-ETS1-1)		
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-ETS1-2)		
Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs. (K-2-ETS1-3)		
The performance expectations above were developed using the following elements from the NRC document *A Framework for K-12 Science Education*:		
Science and Engineering Practices	**Disciplinary Core Ideas**	**Crosscutting Concepts**
Planning and Carrying Out Investigations • Make observations (firsthand or from media) to collect data that can be used to make comparisons. (K-PS3-1) **Constructing Explanations and Designing Solutions** • Use tools and materials provided to design and build a device that solves a specific problem or a solution to a specific problem. (K-PS3-2) **Asking Questions and Defining Problems** • Ask questions based on observations to find more information about the natural and/or designed world(s). (K-2-ETS1-1)	**PS3.B: Conservation of Energy and Energy Transfer** • Sunlight warms Earth's surface. (K-PS3-1),(K-PS3-2) **ETS1.A: Defining and Delimiting Engineering Problems** • A situation that people want to change or create can be approached as a problem to be solved through engineering. (K-2-ETS1-1) • 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.	**Cause and Effect** • Events have causes that generate observable patterns. (K-PS3-1),(K-PS3-2) **Structure and Function** • The shape and stability of structures of natural and designed objects are related to their function(s). (K-2-ETS1-2) - ***Connections to Nature of Science*** **Scientific Investigations Use a Variety of Methods** • Scientists use different ways to study the

• Define a simple problem that can be solved through the development of a new or improved object or tool. (K-2-ETS1-1) **Developing and Using Models** • Develop a simple model based on evidence to represent a proposed object or tool. (K-2-ETS1-2) **Analyzing and Interpreting Data** • Analyze data from tests of an object or tool to determine if it works as intended. (K-2-ETS1-3)	(K-2-ETS1-1) **ETS1.B: Developing Possible Solutions** • Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people. (K-2-ETS1-2) **ETS1.C: Optimizing the Design Solution** • Because there is always more than one possible solution to a problem, it is useful to compare and test designs. (K-2-ETS1-3)	world. (K-PS3-1)

English Language Arts	Mathematics
Participate in shared research and writing projects (e.g., explore a number of books by a favorite author and express opinions about them). (K-PS3-1),(K-PS3-2) **W.K.7** Directly compare two objects with a measurable attribute in common, to see which object has "more of"/"less of" the attribute, and describe the difference. (K- PS3-1) **K.MD.A.2** Ask and answer such questions as who, what, where, when, why, and how to demonstrate understanding of key details in a text. (K-2-ETS1-1) **RI.2.1** With guidance and support from adults, use a variety of digital tools to produce and publish writing, including in collaboration with peers. (K-2-ETS1-1),(K-2-ETS1-3) **W.2.6** Recall information from experiences or gather information from provided sources to answer a question. (K-2-ETS1-1),(K-2-ETS1-3) **W.2.8** Create audio recordings of stories or poems; add drawings or other visual displays to stories or recounts of experiences when appropriate to clarify ideas, thoughts, and feelings. (K-2-ETS1-2) **SL.2.5**	Directly compare two objects with a measurable attribute in common, to see which object has "more of"/"less of" the attribute, and describe the difference. (K-PS3-2) **K.MD.A.2** Reason abstractly and quantitatively. (K-2-ETS1-1),(K-2-ETS1-3) **MP.2** Model with mathematics. (K-2-ETS1-1),(K-2-ETS1-3) MP.4 Use appropriate tools strategically. (K-2-ETS1-1),(K-2-ETS1-3) MP.5 Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems using information presented in a bar graph. (K-2-ETS1-1),(K-2-ETS1-3) **2.MD.D.10**

WIDA	Computer Science & Design Thinking
ELD Standard 1: The Language of Social and Instructional Language ELD Standard 4: The Language of Science	8.1.2.AP.4: Break down a task into a sequence of steps. 8.2.2.ED.1: Communicate the function of a product or device.
Career Readiness, Life Literacies, and Key Skills	
CRP3. Consider the environmental, social and economic impacts of decisions. CRP4. Demonstrate creativity and innovation. CRP5. Utilize critical thinking to make sense of problems and persevere in solving them. CRP9. Work productively in teams while using cultural/global competence.	

Unit Summary
In this unit of study, students develop an understanding of patterns and variations in local weather and the use of weather forecasting to prepare for and respond to severe weather. The crosscutting concepts of *patterns*; *cause and effect*; *interdependence of science, engineering, and technology*; and *the influence of engineering, technology, and science on society and the natural world* are called out as organizing concepts for the disciplinary core ideas. Students are expected to demonstrate grade-appropriate proficiency in *asking questions*, *analyzing and interpreting data*, and *obtaining, evaluating, and communicating information*. Students are also expected to use these practices to demonstrate understanding of the core ideas. This unit is based on K-ESS2-1, K-ESS3-2, and K-2-ETS1-1.
Student Learning Objectives
Use and share observations of local weather conditions to describe patterns over time. *[Clarification Statement: Examples of qualitative observations could include descriptions of the weather (such as sunny, cloudy, rainy, and warm); examples of quantitative observations could include numbers of sunny, windy, and rainy days in a month. Examples of patterns could include that it is usually cooler in the morning than in the afternoon and the number of sunny days versus cloudy days in different months.]* [Assessment Boundary: Assessment of quantitative observations limited to whole numbers and relative measures such as warmer/cooler.*]* **(K-ESS2-1)**
Ask questions to obtain information about the purpose of weather forecasting to prepare for, and respond to, severe weather.* *[Clarification Statement: Emphasis is on local forms of severe weather.]* **(K-ESS3-2)**
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-ETS1-1)
See Content Evidence Statements for student performance expectations. **See Evidence Statements for Engineering Design.**

Resources and Activities
Exploring Science: Teacher's Guide Pages E10-E36, **Lab/Investigation/Rubrics* *23-24* **Exploring Science Guided Reading Books:** **Use throughout the unit** *Working in Snowy Weather* *Weather Fun* *Weather on a Trip* *People Work in All Kinds of Weather* *People Play in All Kinds of Weather* *People Travel in All Kinds of Weather* **Mystery Science**: See below **Additional online resources**: Brainpop, Youtube, See ADDITIONAL ACTIVITIES below **Additional Activities**: Resource Folder, See ADDITIONAL ACTIVITIES below for more games and resources **Schoolwide**: Books: *Shapes in the Sky, What will the Weather Be?, Weather Words, I Face the Wind, Weather, Weather -Poems for All Seasons* **Other**: Student "Science Notebook"

Topic Outline Resources and Activities		
TOPIC	**DISTRICT SCIENCE RESOURCES**	**ADDITIONAL ACTIVITIES**
Understanding Weather	**Exploring Science lesson:** *The Weather* pages: *E10-E11* **Exploring Science Guided Reading Books:** **Use throughout the unit** *Working in Snowy Weather* *Weather Fun* *Weather on a Trip* *People Work in All Kinds of Weather* *People Play in All Kinds of Weather* *People Travel in All Kinds of Weather*	**Schoolwide:** *Weather - Poems For All Seasons* Selected by Lee Bennett Hopkins *Weather Words* by Gail Gibbons Create a KWL chart. Student "Science Notebook" pages 10 and 11
Describe Weather	**Exploring Science lesson:** *Sunny and Cloudy* pages: *E12-E13* *Windy Weather* pages: *E14-E15* *Wet Weather* pages: *E16-E17* *Thunderstorms and Tornadoes* pages: *E24-E25* *Blizzards and Hurricanes* pages: *E26-E27*	**Schoolwide:** *Weather* by Kristin Baird Rattini *Shapes In The Sky* by Josepha Sherman *I Face The Wind* by Vicki Cobb *Weather Unit Chart, Pictures, and Poem* - activity pages Resource Folder Student "Science Notebook" pages 12 and 15

Observe and Describe Weather Patterns	**Exploring Science lesson:** Weather pages: *E18-E19* **Lab/Investigation/Rubrics* *23* Weather Patterns pages: *E20-E23* **Lab/Investigation/Rubrics* *24* **Mystery Science** *Have You Ever Watched a Storm?* Video/Activities	**Schoolwide:** *What Will The Weather Be?* by Lynda Dewitt **Brain Pop Jr.** - Seasons Student "Science Notebook" pages 13 and 14
Predict Weather	**Exploring Science lesson:** *Predicting Weather* pages: *E28-E29b*	*Weather Unit Chart, Pictures, and Poem* - activity pages Resource Folder
Science Career	OPTIONAL - **Exploring Science lesson:** *Weather Expert* pages: *E30-E31*	
Assessment	**Exploring Science Assessment:** pages: *E32-E36*	

Before You Teach
In this unit of study, students are expected to develop an understanding of patterns and variations in local weather and the use of weather forecasting to prepare for and respond to severe weather. Throughout the unit, students will look for patterns and cause-and-effect relationships as they observe and record weather events. Students will have opportunities to ask scientific questions, analyze and interpret data, and communicate their findings to others. In this unit of study, students learn that problem situations can be solved through engineering, and that in order to design a solution, we must first define the problem. As described in the narrative above, students define problems caused by severe weather events by asking specific questions, making observations, and gathering information that will help them understand the types of problems they might face when severe weather conditions exist in and around their homes, schools, and communities. In this unit's progression of learning, students first develop an understanding that patterns in the natural world can be observed and documented, and that, like scientists, they can use these patterns as evidence to describe phenomena and make predictions. In order to observe patterns in weather, kindergartners will learn that weather is the combination of sunlight, wind, precipitation, and temperature in a particular region at a particular time. By observing and recording daily weather events—such as sunny, cloudy, rainy, and windy— students can analyze both qualitative and quantitative data. Recording and analyzing data over time will reveal recognizable weather patterns that can be used to make predictions. Examples of weather patterns may include: ✓ Snow and colder temperatures generally occur in the winter. ✓ Clouds may bring rain or snow. ✓ Rain occurs more often in the spring. ✓ Warmer/hotter temperatures occur in the summer. ✓ It is generally cooler in the morning and warmer in the afternoon. At this grade level, it is developmentally appropriate to describe temperature in relative terms; therefore, vocabulary words such as hot, warm, cool, cold, and warmer/cooler should be used to describe temperature, rather than accurately measuring and describing temperature in degrees Celsius. Students also learn that weather events have causes that generate observable patterns over time, and that these patterns help weather scientists predict severe weather. Kindergarteners need opportunities to learn about severe weather, especially those types that tend to occur in the local region in which they live. By using a variety of media and technology, such as computers, radio, and television, and by reading grade-appropriate texts about weather and weather events, students can learn about types of severe weather that are common to their region. In addition, they come to understand that people depend on technology to help us predict and solve problems, and without it, our lives would be very different. In order to apply their learning, students need opportunities to ask questions about weather forecasting and how it can help us prepare for and respond to different types of severe weather. When kindergartners ask questions, make observations, gather weather information, and look for patterns of change in the weather, it prepares them to think about how to best prepare for and respond to local severe weather. As part of this unit of study, students are challenged to investigate how people prepare for and solve problems caused by severe weather. With adult guidance, students should define weather problems by asking questions, making observations, and gathering information about severe weather situations. Some questions students might want to consider include the following:

- ✓ What kinds of severe weather events tend to occur in New Jersey (e.g., thunderstorms, hurricanes, flooding, snow storms)?
- ✓ What do people do in response to these types of severe weather events?
- ✓ What kinds of tools can people use to solve problems caused by severe weather conditions (e.g., umbrellas, sandbags, salt, gravel, shovels, snow blowers)?
- ✓ What other solutions might people use for problems caused by severe weather (e.g., closing schools and businesses; sending out emergency workers to restore utilities; sending out early warnings; stockpiling food, water, and other supplies; having a portable generator)?
- ✓ What kinds of problems would we face if we had a lot of rain in a short period of time?
- ✓ What problems might we have if our community experienced flooding?
- ✓ What kinds of problems might occur if strong winds caused damage (e.g., knocked over trees, damaged power lines, damaged homes and businesses)?
- ✓ What kinds of precautions do people take during a hurricane? A tornado? A Nor'easter? Why?

Unit Sequence - CONTENT	
Part A: CONTENT - *What types of patterns can be observed in local weather conditions?*	
Concepts	**Formative Assessment**
• Scientists look for patterns and order when making observations about the world. • Patterns in the natural world can be observed, used to describe phenomena, and used as evidence. • Weather is the combination of sunlight, wind, snow, or rain and temperature in a particular region at a particular time. • People measure these conditions to describe and record the weather and to notice patterns over time.	*Students who understand the concepts are able to:* ● Observe and use patterns in the natural world as evidence and to describe phenomena. ● Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions. ● Use and share observations of local weather conditions to describe patterns over time. *(Assessment of quantitative observations limited to whole numbers and relative measures such as warmer/cooler.)* ✓ Examples of qualitative observations could include descriptions of the weather, such as sunny, cloudy, rainy, and warm. ✓ Examples of quantitative observations could include numbers of sunny, windy, and rainy days in a month. ✓ Examples of patterns could include that it is usually cooler in the morning than in the afternoon.

Unit Sequence - DESIGN	
Part B: DESIGN - *How does weather forecasting help us to prepare for and respond to severe weather?*	
Concepts	**Formative Assessment**
• Events have causes that generate observable patterns. • People encounter questions about the natural world every day. • Some kinds of severe weather are more likely than others in a given region. • Weather scientists forecast severe weather so that communities can prepare for and respond to these events. • People depend on various technologies in their lives; human life would be very different without technology. • Before beginning to design a solution, it is important to clearly understand the problem. • Asking questions, making observations, and gathering information are helpful in thinking about problems. • A situation that people want to change or create can be approached as a problem to be solved through engineering.	*Students who understand the concepts are able to:* • Observe patterns in events generated by cause-and-effect relationships. • Read grade-appropriate texts and/or use media to obtain scientific information to describe patterns in the natural world. • Ask questions based on observations to find more information about the designed world. • Ask questions to obtain information about the purpose of weather forecasting to prepare for and respond to severe weather. (Emphasis is on local forms of severe weather.) • Define a simple problem that can be solved through the development of a new or improved object or tool. • Ask questions, make observations, and gather information about a situation people want to change in order to define a simple problem that can be solved through the development of a new or improved object or tool.

Assessments
Formative: See formative assessment options above **Benchmark**: Exploring Science Assessments (after completion of each discipline). Note: Benchmark for Earth and Space Science after Unit 3 on pages E32-E36 of the Exploring Science Teacher Manual. **Summative**: Mystery Science Unit and/or Mystery Assessments **Alternative**: Science journal/notebook and digital notebook entries, labs, Stem Gauge Assessments (Google Folder), student self-evaluation rubrics (Exploring Science teacher manual at the conclusion of each lesson)

Connecting with English Language Arts/Literacy and Mathematics
English Language Arts With adult support, students use trade books (read-alouds, big books) to learn about and discuss severe weather. Strategies, such as Think-Pair-Share, can be used to encourage students to think about information from books and to use that information to ask and answer questions about key details. With guidance, students use online media resources to view examples of severe weather. They can ask questions in order to understand how severe weather affects people and communities and to determine how communities prepare for and respond to severe weather. ***Mathematics*** With adult support, students measure and record various types of weather (e.g., rainfall or snow amounts, relative temperature at different times of the day and over a period of time). They mathematically represent real-world information by organizing their data into simple weather charts and graphs. Kindergarteners attend to the meaning of various quantities using a variety of units of measure and use counting to analyze data and determine patterns in charts and graphs. By using media resources, students explore how weather scientists represent real-world weather data with picture representations, charts, and graphs. They can use this information to think about how weather scientists use tools to collect and record weather data in order to determine patterns of change. Students will attend to the meaning of various quantities used in simple weather charts and graphs, both from classroom observations and from media sources, by counting and comparing severe weather data with daily weather data (e.g., relative amounts of rainfall, snowfall). By analyzing data from weather graphs and charts, young students begin to understand how severe weather affects people and communities and that weather scientists play an important role in predicting severe weather conditions.

Modifications
(Note: Teachers identify the modifications that they will use in the unit. See NGSS Appendix D: All Standards, All Students/Case Studies for vignettes and explanations of the modifications.) ● Structure lessons around questions that are authentic, relate to students' interests, social/family background and knowledge of their community. ● Provide students with multiple choices for how they can represent their understandings (e.g. multisensory techniques-auditory/visual aids; pictures, illustrations, graphs, charts, data tables, multimedia, modeling). ● Provide opportunities for students to connect with people of similar backgrounds (e.g. conversations via digital tool such as SKYPE, experts from the community helping with a project, journal articles, and biographies). ● Provide multiple grouping opportunities for students to share their ideas and to encourage work among various backgrounds and cultures (e.g. multiple representation and multimodal experiences). ● Engage students with a variety of Science and Engineering practices to provide students with multiple entry points and multiple ways to demonstrate their understandings. ● Use project-based science learning to connect science with observable phenomena. ● Structure the learning around explaining or solving a social or community-based issue. ● Provide ELL students with multiple literacy strategies. ● Collaborate with after-school programs or clubs to extend learning opportunities. ● Restructure lesson using UDL principles (http://www.cast.org/our-work/about-udl.html#.VXmoXcfD_UA). ● Differentiation Strategies

- Differentiation Strategies for Special Education Students
- Differentiation Strategies for Gifted and Talented Students
- Differentiation Strategies for ELL Students
- Differentiation Strategies for At Risk Students
- Differentiation Strategies for Students with a 504

Future Learning
Grade 2: Changes to Earth's Land ● Some events happen very quickly; others occur very slowly, over a time period much longer than one can observe. ● Wind and water can change the shape of the land. **Grade 3: Weather and Climate** ● Scientists record patterns of the weather across different times and areas so that they can make predictions about what kind of weather might happen next. ● Climate describes a range of an area's typical weather conditions and the extent to which those conditions vary over years. ● A variety of natural hazards result from natural processes. Humans cannot eliminate natural hazards but can take steps to reduce their impacts. **Grade 4: Weather and Climate** ● Rainfall helps to shape the land and affects the types of living things found in a region. Water, ice, wind, living organisms, and gravity break rocks, soils, and sediments into smaller particles and move them around. **Grade 4: Earth Processes** ● A variety of hazards result from natural processes (e.g., earthquakes, tsunamis, volcanic eruptions). Humans cannot eliminate the hazards but can take steps to reduce their impacts.

Sample of Open Education Resources
Watching Weather: Students will make their own weather station consisting of actual and simplified versions of real weather equipment. The weather station will consist of a thermometer and a student-made weather vane. They will use that equipment to make observations about the local weather.
Weather Patterns: This lesson is the first in a two-part series on the weather. The study of the weather in these early years is important because it can help students understand that some events in nature have a repeating pattern. It also is important for students to study the earth repeatedly because they take years to acquire the knowledge that they need to complete the picture. The full picture requires the introduction of such concepts as temperature, the water cycle, and other related concepts. In the second activity, What's the Season, students identify the seasonal patterns in temperature and precipitation.
Weather Walks: Students learn about weather by taking walks during various weather conditions over the course of time. Walks take place during sunny, rainy, windy, or snowy conditions. The lesson is divided into four sections with activities assigned to each of the weather conditions being observed. Suggested activities include appropriate investigations to help students observe and describe weather phenomenon through first hand experiences.
Science- Weather: This is a free interactive learning activity designed for individual students and can easily be used as a whole class interactive whiteboard activity. This particular title explores weather in relationship to season and temperature. Students learn to use a thermometer as a tool for recording temperature and identify the four seasons through measurable changes in the thermometer readings.
About the Weather: This lesson is about using local weather to make observations, measure, collect, and record data to describe patterns over time. Students will count types of outdoor clothing worn by classmates and use the data to look for patterns in weather over months and seasons.

Appendix A: NGSS and Foundations for the Unit		
Use and share observations of local weather conditions to describe patterns over time. *[Clarification Statement: Examples of qualitative observations could include descriptions of the weather (such as sunny, cloudy, rainy, and warm); examples of quantitative observations could include numbers of sunny, windy, and rainy days in a month. Examples of patterns could include that it is usually cooler in the morning than in the afternoon and the number of sunny days versus cloudy days in different months.]* [Assessment Boundary: Assessment of quantitative observations limited to whole numbers and relative measures such as warmer/cooler.*]* **(K-ESS2-1)**		
Ask questions to obtain information about the purpose of weather forecasting to prepare for, and respond to, severe weather.* *[Clarification Statement: Emphasis is on local forms of severe weather.]* **(K-ESS3-2)**		
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-ETS1-1)		
The performance expectations above were developed using the following elements from the NRC document *A Framework for K-12 Science Education*:		
Science and Engineering Practices	**Disciplinary Core Ideas**	**Crosscutting Concepts**
Analyzing and Interpreting Data ● Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions. (K-ESS2-1) **Asking Questions and Defining Problems** ● Ask questions based on observations to find more information about the designed world. (K-ESS3-2) ● Ask questions based on observations to find more information about the natural and/or designed world(s). ● Define a simple problem that can be solved through the development of a new or improved object or tool. (K-2-ETS1-1) **Obtaining, Evaluating, and Communicating Information** ● Read grade-appropriate texts and/or use media to obtain scientific information to describe patterns in the natural world. (K-ESS3-2)	**ESS2.D: Weather and Climate** ● Weather is the combination of sunlight, wind, snow or rain, and temperature in a particular region at a particular time. People measure these conditions to describe and record the weather and to notice patterns over time. (K-ESS2-1) **ESS3.B: Natural Hazards** ● Some kinds of severe weather are more likely than others in a given region. Weather scientists forecast severe weather so that the communities can prepare for and respond to these events. (K-ESS3-2) **ETS1.A: Defining and Delimiting an Engineering Problem** ● 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	**Patterns** • Patterns in the natural world can be observed, used to describe phenomena, and used as evidence. (K-ESS2-1) **Cause and Effect** ● Events have causes that generate observable patterns. (K-ESS3-2) - ***Connections to Nature of Science*** **Science Knowledge is Based on Empirical Evidence** ● Scientists look for patterns and order when making observations about the world. (K-ESS2-1) - ***Connections to Engineering, Technology, and Applications of Science*** **Interdependence of Science, Engineering,**

	important to clearly understand the problem. (K-2-ETS1-1)	**and Technology** ● People encounter questions about the natural world every day. (K-ESS3-2) **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. (K-2-ETS1-1)

English Language Arts	Mathematics
Participate in shared research and writing projects (e.g., explore a number of books by a favorite author and express opinions about them). (K-ESS2-1) **W.K.7** With prompting and support, ask and answer questions about key details in a text. (K-ESS3-2) **RI.K.1** Ask and answer questions in order to seek help, get information, or clarify something that is not understood. (K-ESS3-2) **SL.K.3** Ask and answer such questions as who, what, where, when, why, and how to demonstrate understanding of key details in a text. (K-2-ETS1-1) **RI.2.1** With guidance and support from adults, use a variety of digital tools to produce and publish writing, including in collaboration with peers. (K-2-ETS1-1) **W.2.6** Recall information from experiences or gather information from provided sources to answer a question. (K-2-ETS1-1) **W.2.8**	Reason abstractly and quantitatively. (K-ESS2-1),(K-2-ETS1-1) **MP.2** Model with mathematics. (K-ESS2-1),(K-ESS3-2),(K-2-ETS1-1) **MP.4** Use appropriate tools strategically. (K-2-ETS1-1) **MP.5** Counting and Cardinality (K-ESS3-2) **K.CC** Know number names and the count sequence. (K-ESS2-1) **K.CC.A** Describe measurable attributes of objects, such as length or weight. Describe several measurable attributes of a single object. (K-ESS2-1) **K.MD.A.1** Classify objects into given categories; count the number of objects in each category and sort the categories by count. (K-ESS2-1) **K.MD.B.3** Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems using information presented in a bar graph. (K-2-ETS1-1) **2.MD.D.10**
WIDA	**Computer Science & Design Thinking**
ELD Standard 1: The Language of Social and Instructional Language ELD Standard 4: The Language of Science	8.1.2.AP.4: Break down a task into a sequence of steps. 8.2.2.ED.1: Communicate the function of a product or device.

Career Readiness, Life Literacies, and Key Skills

CRP3. Consider the environmental, social and economic impacts of decisions.
CRP4. Demonstrate creativity and innovation.
CRP5. Utilize critical thinking to make sense of problems and persevere in solving them.
CRP9. Work productively in teams while using cultural/global competence.

9.2.2.CAP.1: Make a list of different types of jobs and describe the skills associated with each job.
9.2.2.CAP.2: Explain why employers are willing to pay individuals to work.

Unit Summary
In this unit of study, students develop an understanding of what plants and animals need to survive and the relationship between their needs and where they live. Students compare and contrast what plants and animals need to survive and the relationship between the needs of living things and where they live. The crosscutting concepts of *patterns* and *systems and system models* are called out as organizing concepts for these disciplinary core ideas. Students are expected to demonstrate grade-appropriate proficiency in *developing and using models*, *analyzing and interpreting data*, and *engaging in argument from evidence*. Students are also expected to use these practices to demonstrate understanding of the core ideas. This unit is based on K-LS1-1, K-ESS3-1, and K-ESS2-2.
Student Learning Objectives
Use observations to describe patterns of what plants and animals need to survive. *[Clarification Statement: Examples of patterns could include that animals need to take in food but plants do not; the different kinds of food needed by different types of animals; the requirement of plants to have light; and, that all living things need water.]* **(K-LS1-1)**
Use a model to represent the relationship between the needs of different plants and animals (including humans) and the places they live. *[Clarification Statement: Examples of relationships could include that deer eat buds and leaves, therefore, they usually live in forested areas; and, grasses need sunlight so they often grow in meadows. Plants, animals, and their surroundings make up a system.]* **(K-ESS3-1)**
Construct an argument supported by evidence for how plants and animals (including humans) can change the environment to meet their needs. *[Clarification Statement: Examples of plants and animals changing their environment could include a squirrel digs in the ground to hide its food and tree roots can break concrete.]* **(K-ESS2-2)**
See Content Evidence Statements for student performance expectations. **See Evidence Statements for Engineering Design.**

Resources and Activities
Exploring Science: Teacher's Guide Pages L4-L21;L30-L31, **Lab/Investigation/Rubrics* 12-15 **Exploring Science Guided Reading Books:** **Use throughout the unit** *What Animal Is It?* *What Parts Do Animals Have?* *Guess the Animal* *Animals in Africa* *Animals in the Arctic* *Animals in Australia* **Mystery Science**: See below **Additional online resources**: Discovery Education, Brainpop, Youtube, See ADDITIONAL ACTIVITIES below **Additional Activities**: Resource Folder, See ADDITIONAL ACTIVITIES below for more games and resources **Other**: *Parts of Plants Song,* Student "Science Notebook"

Topic Outline Resources and Activities		
TOPIC	**DISTRICT SCIENCE RESOURCES**	**ADDITIONAL ACTIVITIES**
Understanding Living Things	**Exploring Science lesson:** *Living Things* pages: *L4-L5* **Exploring Science Guided Reading Books:** **Use throughout the unit** *What Animal Is It?* *What Parts Do Animals Have?* *Guess the Animal* *Animals in Africa* *Animals in the Arctic* *Animals in Australia* **Mystery Science** *Why Do Woodpeckers Peck Wood?*- Mystery 1 Video/Activities	*Living and Nonliving Sort & Germinating Seed Journal* - activity sheets Resource Folder Student "Science Notebook" page 16
Understanding Plants and Living Things	**Exploring Science lesson:** *Plants Are Living Things* pages: *L6-L7*	*Parts of Plants Song* Put lima beans into a baggie with a wet paper towel and tape to the window.

		Observe and note growth onto journal sheets Resource Folder
Understanding Plant Needs	**Exploring Science lesson:** *What Plants Need* pages: *L8-L9*	*Living and Nonliving Sort & Germinating Seed Journal* - journal sheets Resource Folder Plant seeds. Then observe, discuss, and journal their growth. *Plants Need - Flip Book* - activity pages Resource Folder Student "Science Notebook" pages 17-19
Understanding Animals Are Living Things	**Exploring Science lesson:** *Animals Are Living Things* pages: *L10-L11*	Being Alive -Discovery Education activity
Understanding Animal Needs	**Exploring Science lesson:** *What Animals Need* pages: *L12-L13*	Brain Pop Jr. - Animal Food Chain Student "Science Notebook" page 20
Observe: Use Observations to Describe Patterns of What Plants and Animals Need to Survive	**Exploring Science lesson:** *Observe* pages: L14-L15b **Lab/Investigation/Rubrics* *12, 13*	*How Plants Grow is Amazing to Me* - Discovery Education video
Explain Living Things Live Where They Have What They Need	**Exploring Science lesson:** *Where Living Things Live* pages: *L16-L17*	*Habitats of the World* - little book Resource Folder

	Mystery Science *How Can You Find Animals in the Woods?- Mystery 2 Video/Activities	Adaptations to Habitat - Discovery Education video Brain Pop Jr. - Plant Adaptations *Animal Habitats Graphic Organizer*- activity sheet Resource Folder Student "Science Notebook" page 21
Make a Model	**Exploring Science lesson:** *Make a Model:* pages L18-L19b **Lab/Investigation/Rubrics* *14, 15*	*Home for Animals*- *Reading Rainbow: Is This House for a Hermit Crab* -Discovery Education video Habitats: Homes for Living Things- Discovery Education video
Identify How Living Things Change Their Environment	**Exploring Science lesson:** *Living Things Change The Places They Live* pages L20-L21	
Science Career	OPTIONAL - **Exploring Science lesson:** *Wildlife Expert* pages L30-L31	

Before You Teach

"Kid Questions"

- ✓ *How can you tell if something is alive?*
- ✓ *What do living things need to survive?*
- ✓ *Where do organisms live and why do they live there?*

The unit should begin with observable phenomena. The purpose of presenting phenomena to students is to start them thinking and wondering about what they observe. After students have observed the event, they can work individually, with partners, or in a small group to develop questions about what they saw. The questions will lead them into investigational opportunities throughout the unit that will help them answer their questions.

The questions students share about this unit will be used to guide them in identifying patterns of what plants and animals need to survive. For example, a pattern may include the types of food that specific organisms eat or that animals consume food but plants do not. Furthermore, students' questions and investigations will also guide them in developing models that reflect their understanding of the inter-relationship between an organism and its environment.

- Prior to starting the unit, display pictures of living and non-living things. Direct students to sort the pictures into two groups: living and non-living. Ask students to explain how they decided which pictures represented living things and which represented non-living things.
- Watch the PBS video "Is It Alive?" Stop after each picture and ask students if it's alive or not. Ask them to explain how they can tell. (This activity will also provide an opportunity to pre-assess students' understandings and/or misconceptions. It will also provide an opportunity for students to think about what having life means.)
- Watch the TeacherTube video "Living or Non-Living?" (This activity provides similar experiences for students as the PBS video. The difference is that after each picture and question, the narrator provides the answer with reasoning.)

In this unit's progression of learning, students first learn that scientists look for patterns and order when making observations about the world and those patterns in the natural world can be observed and used as evidence. Students conduct firsthand and media-based observations of a variety living things and use their observations as evidence to support the concepts

- ✓ Plants do not need to take in food, but do need water and light to live and grow.
- ✓ All animals need food in order to live and grow, that they obtain their food from plants or from other animals, that different kinds of food are needed by different kinds of animals, and that all animals need water.

After determining what plants need to survive, kindergarteners learn that plants are systems, with parts, or structures, that work together, enabling plants to meet their needs in a variety of environments. The vast majority of plants have similar structures, such as roots, stems, and leaves, but the structures may look different depending on the type or variety of plant. Although there are many varieties of plants, their structures function in similar ways, allowing the plants to obtain the water and light they need to survive. In other words, each variety of plant has structures that are well-suited to the environment in which it lives. As students learn about different types of plants and the environments in which they live, they use models, such as diagrams, drawings, physical replicas, or dioramas, to represent the relationships between the needs of plants and the places they live in the natural world. For example, grasses need sunlight, so they often grow in meadows. Cacti, which live in places subject to drought, have thick, wide stems and

modified leaves (spines) that keep water within the plant during long periods without rain.

After determining what animals need to survive, kindergarteners learn that animals are systems that have parts, or structures, that work together, enabling animals to meet their needs in a variety of environments. Many animals have similar structures, such as mouths or mouthparts, eyes, legs, wings, or fins, but the structures may look different, depending on the type or species of animal. Although there are many types of animals, their structures function in similar ways, allowing them to obtain the water and food they need to survive. In other words, each type of animal has structures that are well-suited to the environment in which they live. As students learn about different types of animals and the environments in which they live, they use models, such as diagrams, drawings, physical replicas, or dioramas, to represent the relationships between the needs of animals and the places they live in the natural world. For example, deer eat buds and leaves; therefore, they usually live in forested areas; pelicans eat fish, therefore they live near the shorelines of oceans or seas.

The final portion of the learning progression focuses on the understanding that plants and animals are system with parts, or structures, that work together. Students use what they have learned about plants and animals to make further observations to determine ways in which plants and animals change their environment to meet their needs. For example:

- ✓ Tree roots can break rocks and concrete in order to continue to grow, plants will expand their root systems in search of water that might be found deeper in the earth, and plants can be found growing around and through man-made structures in search of light.
- ✓ A squirrel digs in the ground to hide food, and birds collect small twigs to build nests in trees. Students need opportunities to make observations, and then, with adult guidance, to use their observations as evidence to support a claim for how an animal can change its environment to meet its needs.

Students need opportunities make observations; then, with adult guidance, they can use their observations as evidence to support a claim about how living things can change its environment to meet its needs.

Unit Sequence - CONTENT	
Part A: CONTENT - *What do plants need to live and grow?*	
Concepts	**Formative Assessment**
● Scientists look for patterns and order when making observations about the world. ● Patterns in the natural and human-designed world can be observed and used as evidence. ● Plants need water and light to live and grow.	*Students who understand the concepts are able to:* ● Observe and use patterns in the natural world as evidence. ● Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions. ● Use observations to describe patterns in what plants need to survive. Examples of patterns could include: ✓ Plants do not need to take in food. ✓ All plants require light. ✓ All living things need water. ● Use observations to describe patterns in what animals need to survive. Examples of patterns could include: ✓ Animals need to take in food, but plants do not. ✓ Different kinds of food are needed by different types of animals. ✓ All living things need water.

Unit Sequence - DESIGN	
Part B: DESIGN - *What is the relationship between what plants need and where they live?*	
Concepts	**Formative Assessment**
• Systems in the natural and designed world have parts that work together. • Living things need water, air, and resources from the land, and they live in places that have the things they need.	*Students who understand the concepts are able to:* • Observe that systems in the natural and designed world have parts that work together. • Use a model to represent relationships between the needs of different plants and the places they live in the natural world. (Plants, animals, and their surroundings make up a system.) ✓ Examples of relationships could include that grasses need sunlight, so they often grow in meadows. ✓ Examples of models include diagrams, drawings, physical replicas, dioramas, dramatizations, or storyboards. • Use a model to represent the relationships between the needs of

	different animals and the places they live in the natural world. (Plants, animals, and their surroundings make up a system.) ✓ Examples of relationships could include that deer eat buds and leaves and therefore usually live in forested areas. ✓ Examples of models include diagrams, drawings, physical replica, dioramas, dramatizations, and storyboards.

Unit Sequence	
Part C: *How can plants change their habitat?*	
Concepts	**Formative Assessment**
• Systems in the natural and designed world have parts that work together. • Plants can change their environments. • Things that people do to live comfortably can affect the world around them. People can make choices that reduce their impacts on the land, water, air, and other living things. *(The focus of this unit is on plants and animals. Even though this particular concept is part of K-ESS2-2, it will not be addressed in this unit of study, but will instead be addressed in Unit 5, Humans.)*	*Students who understand the concepts are able to:* • Observe that systems in the natural and designed world have parts that work together. • Use a model to represent relationships between the needs of different plants and the places they live in the natural world. (Plants, animals, and their surroundings make up a system.) ✓ Examples of relationships could include that grasses need sunlight, so they often grow in meadows. ✓ Examples of models include diagrams, drawings, physical replicas, dioramas, dramatizations, or storyboards.

Assessments
Formative: See formative assessment options above **Benchmark**: Exploring Science Assessments (after completion of each discipline). Note: Benchmark for Life Science after Unit 5 on pages L32-L35 of the Exploring Science Teacher Manual. **Summative**: Mystery Science Unit and/or Mystery Assessments **Alternative**: Science journal/notebook and digital notebook entries, labs, Stem Gauge Assessments (Google Folder), student self-evaluation rubrics (Exploring Science teacher manual at the conclusion of each lesson)

Connecting with English Language Arts/literacy and Mathematics
English Language Arts: With adult support, kindergarteners use trade books (read-alouds and big books) to learn about plants and animals. With prompting and support strategies, such as Think-Pair-Share, students can discuss what they have learned and read and answer questions using key details from text. As students learn about different types of plants, animals and the environments in which they live, they will use models, such as diagrams, drawings, physical replicas, or dioramas, to represent the relationships between the needs of living things and the places they live in the natural world. Using models in this way gives students an opportunity to use simple informative writing to provide additional detail that will enhance their visual displays. ***Mathematics*** With adult support, kindergarteners use simple measurements to describe various attributes of plants and animals. Kindergarteners can use simple, nonstandard units to measure the height of plants or the amount of water given to plants. For example, they might use Unifix cubes to measure height or count the number of scoops of water given to a plant on a daily or weekly basis. Students should work in groups to measure and record their data. They also measurements to describe various attributes of animals. Kindergarteners can use simple, nonstandard units to measure such attributes as height, length, or weight. They can also count numbers of appendages or other body parts. They might use Unifix cubes to measure height or length and wooden blocks to measure weight. Students should work in groups to measure and record their data. With adult guidance and questioning, students can then learn to analyze their data. As students use data to compare the amount of growth that occurs in plants that get varying amounts of water or sunlight, they are given the opportunity to reason abstractly and quantitatively. For example, students can measure and compare the height of a sunflower grown in the shade compared to the height of a sunflower grown in the sun, or they can count and compare the number of leaves on bean plants that receive different amounts of water daily. These investigations will give students evidence to support claims about the needs of plants. Students should also have opportunities to solve one-step addition/subtraction word problems based on their collected data.

Modifications

(Note: Teachers identify the modifications that they will use in the unit. See NGSS Appendix D: All Standards, All Students/Case Studies for vignettes and explanations of the modifications.)
● Structure lessons around questions that are authentic, relate to students' interests, social/family background and knowledge of their community.
● Provide students with multiple choices for how they can represent their understandings (e.g. multisensory techniques-auditory/visual aids; pictures, illustrations, graphs, charts, data tables, multimedia, modeling).
● Provide opportunities for students to connect with people of similar backgrounds (e.g. conversations via digital tool such as SKYPE, experts from the community helping with a project, journal articles, and biographies).
● Provide multiple grouping opportunities for students to share their ideas and to encourage work among various backgrounds and cultures (e.g. multiple representation and multimodal experiences).
● Engage students with a variety of Science and Engineering practices to provide students with multiple entry points and multiple ways to demonstrate their understandings.
● Use project-based science learning to connect science with observable phenomena.
● Structure the learning around explaining or solving a social or community-based issue.
● Provide ELL students with multiple literacy strategies.
● Collaborate with after-school programs or clubs to extend learning opportunities.
● Restructure lesson using UDL principles (http://www.cast.org/our-work/about-udl.html#.VXmoXcfD_UA).
● Differentiation Strategies
  ● Differentiation Strategies for Special Education Students
  ● Differentiation Strategies for Gifted and Talented Students
  ● Differentiation Strategies for ELL Students
  ● Differentiation Strategies for At Risk Students
  ● Differentiation Strategies for Students with a 504

Future Learning
Grade 1: Mimicking Organisms to Solve Problems ● 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. **Grade 2: Relationships in Habitats** ● Plants depend on water and light to grow. ● Plants depend on animals for pollination or to move their seeds around. **Grade 3: Using Evidence to Understand Change in Environments** ● Sometimes the differences in characteristics between individuals of the same species provide advantages in surviving, finding mates, and reproducing. ● When the environment changes in ways that affect a place's physical characteristics, temperature, or availability of resources, some organisms survive and reproduce, others move to new locations, yet others move into the transformed environment, and some die.*(secondary)* **Grade 4: Weathering and Erosion** ● Rainfall helps to shape the land and affects the types of living things found in a region. Water, ice, wind, living organisms, and gravity break rocks, soils, and sediments into smaller particles and move them around. **Grade 5: Energy and Matter in Ecosystems** ● Plants acquire their material for growth chiefly from air and water. ● The food of almost any kind of animal can be traced back to plants. Organisms are related in food webs in which some animals eat plants for food and other animals eat the animals that eat plants. Some organisms, such as fungi and bacteria, break down dead organisms (both plants or plants parts and animals) and therefore operate as "decomposers." Decomposition eventually restores (recycles) some materials back to the soil. Organisms can survive only in environments in which their particular needs are met. A healthy ecosystem is one in which multiple species of different types are each able to meet their needs in a relatively stable web of life. Newly introduced species can damage the balance of an ecosystem. **Grade 5: Earth Systems** Earth's major systems are the geosphere (solid and molten rock, soil, and sediments), the hydrosphere (water and ice), the atmosphere (air), and the biosphere (living things, including humans). These systems interact in multiple ways to affect Earth's surface materials and processes. The ocean supports a variety of ecosystems and organisms, shapes landforms, and influences climate. Winds and clouds in the atmosphere interact with the landforms to determine patterns of weather.

Connections to Other Units
In **Unit 5, Basic Needs of Humans**, students will develop and understandings of what humans need to live and grow as well as the relationship between their needs and where they live.

Sample of Open Education Resources
Read-Aloud Lesson: Where Do Polar Bears Live? Students identify and recall characteristics that allow polar bears to survive in the extremely cold Arctic environment. "Good Night" & Where Do Polar Bears Live? This is a Paired Text activity that uses the "Where Do Polar Bears Live" read aloud and the non-fiction text "Good Night" which addresses hibernation. The Needs of Living Things This lesson plan has one level for Grades K-2 and another level for Grades 3-5. Students will learn about what plants and animals need to survive and how habitats support those needs. They will also learn about how organisms can change their environment. Living Things and Their Needs: This is an excellent resource that provides a Teacher Guide, videos, reading resources, and student activity sheets. The objective of the lessons is for students to learn about living organisms and what they need to survive. These lessons can easily be taught as an interdisciplinary set of learning experiences. How do living things Interact: This unit plan is about unit plan about living things and environmental interactions 5E Science Lesson Plan: This Prezi presentation describes lesson ideas that support students' understanding of living organisms. Lessons also provide an opportunity for students to identify patterns that help them determine similarities and differences between plants and animals. Curious George: Paper Towel Plans: This video from Curious George shows students helping bean seeds sprout outside of soil by meeting their essential needs for moisture, temperature, air, and light. The children place the beans and a wet paper towel inside a zippered plastic bag and leave them undisturbed in a warm, well-lighted place. After two weeks, the students return and observe that the beans have sprouted and, like apple seeds, will one day grow to be fully developed plants. From Seed to Fruit | Everyday Learning: Seed to Fruit takes children through the different stages of growth in the life of a cherry tomato plant. Planting a seed in a cup and watching it grow over time is a wonderful way to introduce the life cycle to young children. This resource is part of the KET Everyday Science for Preschoolers collection. This video is available in both English and Spanish audio, along with corresponding closed captions. Think Garden: The Importance of Water: This video from KET's Think Garden collection explores why plants need water to survive, and how they tell us they're thirsty. Learn about the signs plants give when they've had too much or too little water and the part water plays in the process of photosynthesis. See a quick, easy-to-understand animation explaining the water cycle and transpiration process. Also find out how to improve water quality with rain gardens and how to conserve water with rain barrels. This video is available in both English and Spanish audio, along with corresponding closed captions. Think Garden: Plant Structure: This video from KET's Think Garden collection examines plant structure by taking a closer look at the root and shoots systems. Learn about roots, stems, leaves, flowers, seeds, and fruit through engaging illustrations and animations.

Appendix A: NGSS and Foundations for the Unit		
Use observations to describe patterns of what plants and animals (including humans) need to survive. *[Clarification Statement: Examples of patterns could include that animals need to take in food but plants do not; the different kinds of food needed by different types of animals; the requirement of plants to have light; and, that all living things need water.]* **(K-LS1-1)**		
Use a model to represent the relationship between the needs of different plants and animals (including humans) and the places they live. *[Clarification Statement: Examples of relationships could include that deer eat buds and leaves, therefore, they usually live in forested areas; and, grasses need sunlight so they often grow in meadows. Plants, animals, and their surroundings make up a system.]* **(K-ESS3-1)**		
Construct an argument supported by evidence for how plants and animals (including humans) can change the environment to meet their needs. *[Clarification Statement: Examples of plants and animals changing their environment could include a squirrel digs in the ground to hide its food and tree roots can break concrete.]* **(K-ESS2-2)**		
The performance expectations above were developed using the following elements from the NRC document *A Framework for K-12 Science Education*:		
Science and Engineering Practices	**Disciplinary Core Ideas**	**Crosscutting Concepts**
Planning and Carrying Out Investigations • Make observations (firsthand or from media) to collect data that can be used to make comparisons. (K-PS3-1) **Analyzing and Interpreting Data** • Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions. (K-LS1-1) **Developing and Using Models** • Use a model to represent relationships in the natural world. (K-ESS3-1) **Engaging in Argument from Evidence** • Construct an argument with evidence to support a claim. (K-ESS2-2)	**LS1.C: Organization for Matter and Energy Flow in Organisms** • All animals need food in order to live and grow. They obtain their food from plants or from other animals. Plants need water and light to live and grow. (K-LS1-1) **ESS3.A: Natural Resources** • Living things need water, air, and resources from the land, and they live in places that have the things they need. Humans use natural resources for everything they do. (K-ESS3-1) **ESS2.E: Biogeology** • Plants and animals can change their environment. (K-ESS2-2)	**Patterns** • Patterns in the natural and human designed world can be observed and used as evidence. (K-LS1-1) **Systems and System Models** • Systems in the natural and designed world have parts that work together. (K-ESS3-1), (K-ESS2-2) - ***Connections to Nature of Science*** **Scientific Knowledge is Based on Empirical Evidence** • Scientists look for patterns and order when making observations about the world. (K-LS1-1)

English Language Arts	Mathematics
Use a combination of drawing, dictating, and writing to compose opinion pieces in which they tell a reader the topic or the name of the book they are writing about and state an opinion or preference about the topic or book. (K-ESS2-2) **W.K.1** Use a combination of drawing, dictating, and writing to compose informative/explanatory texts in which they name what they are writing about and supply some information about the topic. (K-ESS2-2) **W.K.2** Participate in shared research and writing projects (e.g., explore a number of books by a favorite author and express opinions about them). (K-LS1-1) **W.K.7** Add drawings or other visual displays to descriptions as desired to provide additional detail. (K-ESS3-1) **SL.K.5** With prompting and support, ask and answer questions about key details in a text. (K-ESS2-2) **R.K.1**	Directly compare two objects with a measurable attribute in common, to see which object has “more of”/”less of” the attribute, and describe the difference. (K-LS1-1) **K.MD.A.2** Reason abstractly and quantitatively. (K-ESS3-1) **MP.2** Model with mathematics. (K-ESS3-1) **MP.4** Counting and Cardinality (K-ESS3-1) **K.CC**
WIDA	**Computer Science & Design Thinking**
ELD Standard 1: The Language of Social and Instructional Language ELD Standard 4: The Language of Science	8.1.2.AP.4: Break down a task into a sequence of steps. 8.2.2.ED.1: Communicate the function of a product or device.
Career Readiness, Life Literacies, and Key Skills	
CRP3. Consider the environmental, social and economic impacts of decisions. CRP4. Demonstrate creativity and innovation. CRP5. Utilize critical thinking to make sense of problems and persevere in solving them. CRP9. Work productively in teams while using cultural/global competence.	

Unit Summary
In this unit of study, students develop an understanding of what humans need to survive and the relationship between their needs and where they live. The crosscutting concept of *cause and effect* is called out as the organizing concept for the disciplinary core ideas. Students demonstrate grade-appropriate proficiency in *asking questions* and *defining problems,* and *in obtaining, evaluating, and communicating information*. Students are also expected to use these practices to demonstrate understanding of the core ideas. This unit is based on K-ESS3-3 and K-2 ETS1-1.
Student Learning Objectives
Communicate solutions that will reduce the impact of climate change and humans on the land, water, air, and/or other living things in the local environment. (K-5 NJSLS-S, p.8) *[Clarification Statement: Examples of human impact on the land could include cutting trees to produce paper and using resources produce bottles. Examples of solutions could include reusing paper and recycling cans and bottles.]* **(K-ESS3-3)**
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 ETS1-1)
See Content Evidence Statements for student performance expectations. **See Evidence Statements for Engineering Design.**

Resources and Activities

Exploring Science: Teacher's Guide Pages L22-L35, **Lab/Investigation/Rubrics* *16-19*

Mystery Science: See below

Additional online resources: Brainpop, Youtube, See ADDITIONAL ACTIVITIES below

Additional Activities: Resource Folder, See ADDITIONAL ACTIVITIES below for more games and resources

Other: Student "Science Notebook"

Topic Outline Resources and Activities

TOPIC	DISTRICT SCIENCE RESOURCES	ADDITIONAL ACTIVITIES
Understand and Describe How Living Things Change Their Environment	**Exploring Science lesson:** *Explain Change* pages: *L22-L23b* **Lab/Investigation/Rubrics* *16,17*	
Understanding Human Use of Resources	**Exploring Science lesson:** *People Use Resources* pages: *L24-L25*	Brain Pop Jr. - Natural Resources Student "Science Notebook" page 22
Effects of Human Use of Resources	**Exploring Science lesson:** *Using Resources Wisely* pages: *L26-L27*	
Discuss Solutions to Help Reduce Human Effects on Resources	**Exploring Science lesson:** *Share Solutions* pages: *L28-L29b* * **Lab/Investigation/Rubrics* *18, 19*	*Earth Day Emergent Reader* - little book Resource Folder Student "Science Notebook" page 23
Assessment	**Exploring Science Assessment:** pages: *L32-L35*	

Before You Teach
In this unit of study, students will develop an understanding of the impact that humans have on the land, water, air, and other living things in the local environment and engage in a portion of the engineering design process in order to communicate solutions that can reduce these impacts. To help students recognize the impact that humans have on the living and nonliving components of the local environment, they need opportunities to observe and think about the things that people do to live comfortably. Over a period of a few days, students can observe their families in their day-to-day lives, paying attention to what they eat, what they throw away, when and how they use water, how they warm or cool their home, what types of appliances and gadgets they use, how they maintain their home and yard, what resources are used to make the clothes they wear, how they travel from place to place, and how they communicate with others. During whole-group discussions, students can share their observations and then discuss the concept of comfortable lifestyle. This list could include: • Plants and animals for food • Trees, rocks, sand, and other materials for building homes and schools • Local reserves of water for drinking, washing clothes, showering, washing dishes, watering lawns, and cooking • Gas and oil for cars and buses • Electricity to power the appliances in their homes • Land for homes, schools, parks, parking lots, and landfills Then the class can discuss how obtaining and using these types of resources affects the local environment. To help with these discussions, teachers can use books, multimedia resources, field trips, or even invite guest speakers to the classroom. As students participate in discussions, they should be encouraged to ask questions, share observations, and describe cause-and-effect relationships between human use of resources and human impact on the environment. As students come to understand that things people do to live comfortably can affect the world around them, they are ready to engage in the engineering design process. The process should include the following steps: ✓ As a class or in groups, students participate in shared research to find examples of ways that people solve some of the problems created by humans' use of resources from the environment. For example, people in the community might choose to: o Recycle plastic, glass, paper, and other materials in order to reduce the amount of trash in landfills; o Plant trees in areas where trees have been cut down for lumber to renew regional habitats for local wildlife; or o Set up rainwater collection systems so that rainwater can be used to maintain landscaping instead of using water from local reserves. ✓ Groups of students then develop a simple sketch, drawing, diagram, or physical model to illustrate how the solution reduces the impact of humans on land, water, air and/or other living things in the local environment. ✓ Groups need the opportunity to communicate their solutions with the class in oral and/or written form, using their sketches, drawings, diagrams, or models to help explain how the solution reduces the human impact on the environment. While engaging in this process, students should learn that even though humans affect the environment in many ways, people can make choices that reduce their impacts on the land, water, air, and other living things in the environment.

Unit Sequence - CONTENT	
Part A: CONTENT - *How can humans reduce their impact on the land, water, air, and other living things in the local environment?*	
Concepts	**Formative Assessment**
• Events have causes that generate observable patterns. • Things that people do to live comfortably can affect the world around them. • People can make choices that reduce their impacts on the land, water, air, and other living things. • 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. • 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.	*Students who understand the concepts are able to:* • Observe patterns in events generated due to cause-and-effect relationships. • Communicate solutions with others in oral and/or written forms using models and/or drawings that provide detail about scientific ideas. • Communicate solutions that will reduce the impact of humans on the land, water, air, and/or other living things in the local environment. • Ask questions based on observations to find more information about the natural and/or designed world. • Define a simple problem that can be solved through the development of a new or improved object or tool. • Ask questions, make observations, and gather information about a situation that people want to change in order to define a simple problem that can be solved through the development of a new or improved object or tool.

Assessments
Formative: See formative assessment options above **Benchmark**: Exploring Science Assessments (after completion of each discipline). Note: Benchmark for Life Science after Unit 5 on pages L32-L35 of the Exploring Science Teacher Manual. **Summative**: Mystery Science Unit and/or Mystery Assessments **Alternative**: Science journal/notebook and digital notebook entries, labs, Stem Gauge Assessments (Google Folder), student self-evaluation rubrics (Exploring Science teacher manual at the conclusion of each lesson)

Connecting with English Language Arts/literacy and Mathematics
English Language Arts: With adult support, students participate in shared research in order to find examples of ways that humans reduce their impact on the land, water, air, and other living things in the local environment. With prompting and support, students will ask and answer questions about key details in a text. Students, with adult support and/or peer collaboration, can also use simple books and media resources to gather information and then use drawings, simple informative writing (or dictation), and visual displays to represent some of the ways that people lessen their impact on the environment. With support from adults, students will recall information from experiences or gather information provided from sources to answer a question. Students can clarify their ideas, thoughts, and feelings using simple informative writing. ***Mathematics:*** With adult support, students will classify data by one attribute, sort data into categories, and graph the data. For example, students can keep track of the amount of materials recycled over a period of time. They can classify recycled trash as paper, plastic, or glass, then count and graph these data, using bar graphs or picture graphs. Students should have opportunities to analyze and compare the data and then use the data to solve word problems. As students work with their data, they are learning to reason abstractly and quantitatively, model by diagramming the situation mathematically, and use appropriate tools strategically.

Modifications

(Note: Teachers identify the modifications that they will use in the unit. See NGSS Appendix D: All Standards, All Students/Case Studies for vignettes and explanations of the modifications.)
● Structure lessons around questions that are authentic, relate to students' interests, social/family background and knowledge of their community.
● Provide students with multiple choices for how they can represent their understandings (e.g. multisensory techniques-auditory/visual aids; pictures, illustrations, graphs, charts, data tables, multimedia, modeling).
● Provide opportunities for students to connect with people of similar backgrounds (e.g. conversations via digital tool such as SKYPE, experts from the community helping with a project, journal articles, and biographies).
● Provide multiple grouping opportunities for students to share their ideas and to encourage work among various backgrounds and cultures (e.g. multiple representation and multimodal experiences).
● Engage students with a variety of Science and Engineering practices to provide students with multiple entry points and multiple ways to demonstrate their understandings.
● Use project-based science learning to connect science with observable phenomena.
● Structure the learning around explaining or solving a social or community-based issue.
● Provide ELL students with multiple literacy strategies.
● Collaborate with after-school programs or clubs to extend learning opportunities.
● Restructure lesson using UDL principles (http://www.cast.org/our-work/about-udl.html#.VXmoXcfD_UA).
● Differentiation Strategies
  ● Differentiation Strategies for Special Education Students
  ● Differentiation Strategies for Gifted and Talented Students
  ● Differentiation Strategies for ELL Students
  ● Differentiation Strategies for At Risk Students
  ● Differentiation Strategies for Students with a 504

Future Learning
Grade 3: Weather and Climate ● 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. *(secondary)* **Grade 4: Transfer of Energy** ● Energy and fuels that humans use are derived from natural sources, and their use affects the environment in multiple ways. Some resources are renewable over time, and others are not. **Grade 5: Water on Earth** ● Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, ocean, air, and even outer space. But individuals and communities are doing things to help protect Earth's resources and environments.

Connections to Other Units
In **Unit 4, Basic Needs of Plants,** students learned that plants need sunlight and water in order to live and grow. In **Unit 5**, **Basic Needs of Animals**, student learned that all animals need food in order to live and grow. They obtain their food from plants or from other animals.

Sample of Open Education Resources
Humans on Earth: This is a 3.5 minute narrated video explaining the use of natural resources to supply the needs of humans, and solutions for preserving them. The Clean Water Book: Choices for Resource Water Protection: This book is available from the New Jersey Department of Environmental Protection Recycling Manual for New Jersey Schools: This manual will guide school personnel through a step-by-step process of setting up a recycling program in the school. It provides all the necessary tools for designing and implementing a viable and comprehensive program in private, public and parochial institutions. Speakers Program: The New Jersey Department of Environmental Protection (DEP) fields requests for public speakers, classroom presentations and exhibitors regarding the various environmental topics, programs and services that are administered by the agency. Practice the 5 R's – Poster The USGS Water Science School: Welcome to the U.S. Geological Survey's (USGS) Water Science School. We offer information on many aspects of water, along with pictures, data, maps, and an interactive center where you can give opinions and test your water knowledge.

Appendix A: NGSS and Foundations for the Unit		
Communicate solutions that will reduce the impact of climate change and humans on the land, water, air, and/or other living things in the local environment. (K-5 NJSLS-S, p.8) *[Clarification Statement: Examples of human impact on the land could include cutting trees to produce paper and using resources to produce bottles. Examples of solutions could include reusing paper and recycling cans and bottles.]* **(K-ESS3-3)**		
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 ETS1-1)		
The performance expectations above were developed using the following elements from the NRC document *A Framework for K-12 Science Education*:		
Science and Engineering Practices	**Disciplinary Core Ideas**	**Crosscutting Concepts**
Planning and Carrying Out Investigations • Make observations (firsthand or from media) to collect data that can be used to make comparisons. (K-PS3-1) **Obtaining, Evaluating, and Communicating Information** • Communicate solutions with others in oral and/or written forms using models and/or drawings that provide detail about scientific ideas. (K-ESS3-3) **Asking Questions and Defining Problems** • Ask questions based on observations to find more information about the natural and/or designed world(s). (K-2-ETS1-1) • Define a simple problem that can be solved through the development of a new or improved object or tool. (K-2-ETS1-1)	**ESS3.C: Human Impacts on Earth Systems** • Things that people do to live comfortably can affect the world around them. But they can make choices that reduce their impacts on the land, water, air, and other living things. (K-ESS3-3) **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.*(secondary)* (K-ESS3-3) **ETS1.A: Defining and Delimiting Engineering Problems** • A situation that people want to change or create can be approached as a problem to be solved through engineering. (K-2-ETS1-1) • Asking questions, making observations, and gathering information are helpful in thinking about problems. (K-2-ETS1-1) • Before designing solutions, be sure to clearly understand the problem. (K-2-ETS1-1)	**Cause and Effect** • Events have causes that generate observable patterns. (K-ESS3-3) **Structure and Function** • The shape and stability of structures of natural and designed objects are related to their function(s). (K-2-ETS1-2)

English Language Arts	Mathematics
Use a combination of drawing, dictating, and writing to compose informative/explanatory texts in which they name what they are writing about and supply some information about the topic. (K-ESS3-3) **W.K.2** Ask and answer such questions as who, what, where, when, why, and how to demonstrate understanding of key details in a text. (K-2-ETS1-1) **RI.2.1** With guidance and support from adults, use a variety of digital tools to produce and publish writing, including in collaboration with peers. (K-2-ETS1-1) **W.2.6** Recall information from experiences or gather information from provided sources to answer a question. (K-2-ETS1-1) **W.2.8**	Reason abstractly and quantitatively. (K-2-ETS1-1) **MP.2** Model with mathematics. (K-2-ETS1-1) **MP.4** Use appropriate tools strategically. (K-2-ETS1-1) **MP.5** Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems using information presented in a bar graph. (K-2-ETS1-1) **2.MD.D.10**
WIDA	**Computer Science & Design Thinking**
ELD Standard 1: The Language of Social and Instructional Language ELD Standard 4: The Language of Science	8.2.2.ED.2: Collaborate to solve a simple problem, or to illustrate how to build a product using the design process.
Career Readiness, Life Literacies, and Key Skills	
CRP3. Consider the environmental, social and economic impacts of decisions. CRP4. Demonstrate creativity and innovation. CRP5. Utilize critical thinking to make sense of problems and persevere in solving them. CRP9. Work productively in teams while using cultural/global competence.	9.4.2.CT.1: Gather information about an issue, such as climate change, and collaboratively brainstorm ways to solve the problem (e.g., K-2-ETS1-1, 6.3.2.GeoGI.2). 9.4.2.IML.1: Identify a simple search term to find information in a search engine or digital resource