TOWNSHIP OF UNION PUBLIC SCHOOLS

Science Grade K
Curriculum Guide
Updated December 18, 2018

Mission Statement

The mission of the Township of Union Public Schools is to build on the foundations of honesty, excellence, integrity, strong family, and community partnerships. We promote a supportive learning environment where every student is challenged, inspired, empowered, and respected as diverse learners. Through cultivation of students' intellectual curiosity, skills and knowledge, our students can achieve academically and socially, and contribute as responsible and productive citizens of our global community.

Philosophy Statement

The Township of Union Public School District, as a societal agency, reflects democratic ideals and concepts through its educational practices. It is the belief of the Board of Education that a primary function of the Township of Union Public School System is the formulation of a learning climate conducive to the needs of all students in general, providing therein for individual differences. The school operates as a partner with the home and community.

Statement of District Goals

- Develop reading, writing, speaking, listening, and mathematical skills.
- Develop a pride in work and a feeling of self-worth, self-reliance, and self-discipline.
- Acquire and use the skills and habits involved in critical and constructive thinking.
- Develop a code of behavior based on moral and ethical principles.
- Work with others cooperatively.
- Acquire a knowledge and appreciation of the historical record of human achievement and failures and current societal issues.
- Acquire a knowledge and understanding of the physical and biological sciences.
- Participate effectively and efficiently in economic life and the development of skills to enter a specific field of work.
- Appreciate and understand literature, art, music, and other cultural activities.
- Develop an understanding of the historical and cultural heritage.
- Develop a concern for the proper use and/or preservation of natural resources.
- Develop basic skills in sports and other forms of recreation.

Pacing Guide

Content	Timeline
Unit 1: Weather	**14 days to start and then ongoing**
Unit 2: Pushes and Pulls	**21 Days**
Unit 3: Effects of the Sun	**21 Days**
Unit 4: Basic Needs of Life	**28 Days**
Unit 5: Basic Needs of Humans	**21 Days**

Curriculum Overview

Unit 1: Weather

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.

Unit 2: Pushes and Pulls

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.
This unit is based on K-PS2-1, K-PS2-2, and K-2: ETS1-3.

Unit 3: Effects of the Sun

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.

Unit 4: Basic Needs of Living Things

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.

Unit 5: Basic Needs of Humans

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.

Kindergarten Unit 1: Weather

What is the weather like today and how is it different from yesterday?

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.

Note: Unlike other science units, the Weather unit is intended to become a part of the classroom routine throughout the year. Some weather patterns are not obvious unless the students collect data over long periods of time. For example, in some locations it is sunnier during some parts of a year than others. The temperature outside will change from fall, winter, spring, to summer. Also, during some periods, the weather data should be recorded in the morning and then again in the afternoon. Students will be able to observe patterns in temperature through the course of the day.

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)

Unit Sequence	
Part A: *How can someone predict what the weather will be tomorrow?*	
Concepts	**Formative Assessment**
• 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. • People look for patterns in the weather data when they organize and order when making observations about the world. • Patterns in the natural world can be observed, used to describe phenomena, and used as evidence.	*Students who understand the concepts are able to:* What patterns do you observe in our Weather Chart? a) Have we had more sunny days or cloudy days? What is your evidence? b) When was it warmest this week? What is your evidence? c) Is this week sunnier or cloudier than last week? What is your evidence? d) Has the weather gotten warmer or cooler over the past two weeks? What is your evidence? *(Assessment of quantitative observations limited to whole numbers and relative measures such as warmer/cooler.)*

Unit Sequence	
Part B: *How does weather forecasting help us to prepare for dangerous weather?*	
Concepts	**Formative Assessment**
• 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. • Events have causes that generate observable patterns. • People encounter questions about the natural world every day. • 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.

Unit 1 Resources and Suggested Activities	
Grades K-5 Science Storylines Grade K Unit 1 Doing Science Lesson 1: Our Senses Student Edition, pp. 1-4 Teacher Edition, p. 13 Inquiry Center: What's in the Bag? Lesson 2: Science Skills Student Edition, pp. 5-8 Teacher Edition, p. 21 Inquiry Center: Use Science Skills Lesson 3: Science Tools Student Edition, pp. 9-12 Teacher Edition, p. 29 Inquiry Center: Use Science Tools Grade K Unit 5 Day and Night Lesson 15: Day Sky Student Edition, pp. 59-62 Teacher Edition, p. 159 Inquiry Center: How Does the Day Sky Change? Lesson 16: Night Sky Student Edition, pp. 63-66 Teacher Edition, p. 167 Inquiry Center: Compare Day and Night Sky Grade K Unit 7 Weather and the Seasons Lesson 20: Weather Student Edition, pp. 81-86 Teacher Edition, p. 219 Inquiry Center: Observe the Weather Lesson 21: Measuring Weather Student Edition, pp. 87-90 Teacher Edition, p. 227 Inquiry Center: Measure Temperature Lesson 22: Seasons Student Edition, pp. 91-96 Teacher Edition, p. 237 Inquiry Center: How Can We Keep Things Warm?	Unit 1: Doing Science-Leveled Readers Below-Level: I Can Sort On-Level/Enrichment: What Do You See? Above Level/Challenge: Check the Weather Unit 5: Day and Night-Leveled Readers Below-Level: Look Up! On-Level/Enrichment: Above Me Above Level/Challenge: Day, Month, Year Unit 7: Doing Science-Leveled Readers Below-Level: Kinds of Weather On-Level/Enrichment: Measuring Weather Above Level/Challenge: Check the Weather National Science Teacher Association Lessons and Links Weather Weather and Climate Basics Cloud in a Jar Observation Booklet Weather Walks About the Weather The Many Faces of Mother Nature Check out the Weather Song Seasons Song Video Kindergarten Time – Sun Travel with Words Brain Pop, Jr. Sheppard Software Seasons Games STEM Activities Cloud in a Cup Wind Experiments Make it Rain

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. *Literacy Connections* Recite Rhymes TE pg. 15 Ask and Answer Questions TE pg. 23 Sing a Sunny Song TE pg. 161 Write on Illustrated Stars TE pg. 169 Tell a Weather Story TE pg. 220 Describe Seasonal Changes TE pg. 239 Write a Descriptive Poem TE pg. 221 Write a Hot and Cold Poem TE pg. 229 *Literature Connections* Cloudette by Tom Lichtenheld The Cloud Book by Tomie dePaola Little Cloud by Eric Carle Hello, World! Weather by Jill McDonald Like a Windy Day by Frank Asch Red Leaf, Yellow Leaf by Lois Ehlert First Day of Winter by Denise Fleming The Reasons for Seasons by Gail Gibbons Summer Days and Nights by Wong Herbert Yee Day and Night by Robin Nelson

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.

Math Connections

Solve Sense Problems TE pg. 14
Identify and Make Patterns TE pg. 22
Measure Standing Jumps TE pg. 30
Sequence Daily Events TE pg. 160
Count Stars in the Night Sky TE pg. 168
Make a Graph TE pg. 228
Make a Picture Graph TE pg. 238

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 principals (http://www.cast.org/our-work/about-udl.html#.VXmoXcfD_UA).

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 important to clearly understand the problem. (K-2-ETS1-1)	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, 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

Kindergarten Unit 2: Pushes and Pulls

What happens if you push or pull an object harder?

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.

This unit is based on K-PS2-1, K-PS2-2, and K-2:ETS1-3.

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)

Unit Sequence	
Part A: *Why do scientists like to play soccer?*	
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	
Part B: *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.	*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

• Because there is always more than one possible solution to a problem, it is useful to compare and test designs.	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.)*

Unit 2 Resources and Suggested Activities	
Grades K-5 Science Storylines Grade K Unit 9 Energy Lesson 26: Sound Student Edition, pp. 111-114 Teacher Edition, p. 287 Inquiry Center: Compare Sounds Lesson 27: Light Student Edition, pp.11 5-118 Teacher Edition, p. 295 Inquiry Center: Observe how the sun changes paper Lesson 28: Heat Student Edition, pp. 119-124 Teacher Edition, p. 305 Inquiry Center: What Can Heat Do? Grade K Unit 10 Motion Lesson 29: Where Things Are Student Edition, pp. 125-128 Teacher Edition, p. 321 Inquiry Center: Where is It? Lesson 30: How Things Move Student Edition, pp. 129-134 Teacher Edition, p. 331 Inquiry Center: How Do Things Move? Lesson 31: Changing How Things Move Student Edition, pp. 135-138 Teacher Edition, p. 339 Inquiry Center: Make Predictions About Gravity Lesson 32: Magnets Student Edition, pp. 139-142 Teacher Edition, p. 347 Inquiry Center: Use Magnets	Unit 9: Energy-Leveled Readers Below-Level: Shadows On-Level/Enrichment: We Get Energy Above Level/Challenge: All About Matter Unit 10: Motion-Leveled Readers Below-Level: Ways Things Move On-Level/Enrichment: Up and Down Above Level/Challenge: Push It or Pull It? National Science Teacher Association Lessons, Links and STEM activities Push Pull-Changing Direction Marble Roll Invent a backscratcher from everyday materials Roller Coasters Ramp Builder Catch Me if You Can! Understanding Energy Forces Can Push or Pull Song

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.

Literacy Connections

Make Up Poems TE pg. 307
Make a Sounds Chart TE pg. 289
Make a Book about Heat TE pg. 306
Write Up Above and Down Below Sentences TE pg. 322
Write a Movement poem TE pg. 333
Make a Magnetic Match TE pg. 349

Literature Connections

Forces and Motion by Toni DeRosa
Move It! by Adrienne Mason
The Shocking Truth about Energy by Loreen Leedy
And Everyone Shouted, "Pull!" by Claire Llewellyn
Push and Pull by Patricia J. Murphy
Why Should I Save Energy? By Mike Gordon

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.

Math Connections

Make Water Instruments TE p. 288
Measure the Lengths of Shadows TE p. 297
Put it in its Place TE pg. 323
Count Steps TE pg. 340
Measure Long and Short Distances TE pg. 332
Find out How Strong Magnets Are TE pg. 349

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 principals (http://www.cast.org/our-work/about-udl.html#.VXmoXcfD_UA).

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 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)	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. (K-PS2-1) PS3.C: Relationship Between Energy and Forces A bigger push or pull makes things speed up or slow down more quickly. (secondary to K-PS2-1) 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	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) --- Connections to the Nature of Science Scientific Investigations Use a Variety of Methods Scientists use different ways to study the world. (K- PS2-1)

	A situation that people want to change or create can be approached as a problem to be solved through engineering. (K-2-ETS1-1) Asking questions, making observations, and gathering information are helpful in thinking about problems. (K-2-ETS1-1) Before beginning to design a solution, it is important to clearly understand the problem. (K-2-ETS1-1)	

Kindergarten Unit 3: Effects of the Sun

How can we use science to keep a playground cool in the summertime?

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)

Unit Sequence	
Part A: *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	
Part B: *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

Unit 3 Resources and Suggested Activities	
Grades K-5 Science Storylines Grade K Unit 6 Earth's Resources Lesson 17: Rocks Student Edition, pp. 67-70 Teacher Edition, p. 183 Inquiry Center: Sort Rocks Lesson 18: Water Student Edition, pp.71-74 Teacher Edition, p. 191 Inquiry Center: How Can We Change How Water Flows? Lesson 19: Natural Resources Student Edition, pp. 75-80 Teacher Edition, p. 201 Inquiry Center: Tell Ways We Use Water	Unit 6: Earth's Resources-Leveled Readers Below-Level: Our Earth On-Level/Enrichment: Wonderful Earth Above Level/Challenge: Natural Resources National Science Teacher Association Lessons, Links and STEM activities Earth's Water: A Drop in Your Cup Earth is the Water Planet Video Soil Erosion Simulation Do Rocks Last Forever? Our Super Star How Can Water Change the Shape of the Land? Observing the Sun Water is Wonderful

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. *Literacy Connections* Make a Class Book of Rocks TE pg. 184 Write a Taking-Care-of-Earth Story TE pg. 203 *Literature Connections* What Does It Mean to Be Green? By Rana DiOrio The Earth Book by Todd Parr Michael Recycle by Ellie Bethel The Earth and I by Frank Asch Sun by Steve Tomecek Earth Day Every Day by Lisa Bullard I Love Rocks! By Cari Meister Rocks! Rocks! Rocks! By Nancy Elizabeth Wallace We Need Water by Charles Ghigna Water Everywhere! By Christine Taylor-Butler Dirt: The Scoop on Soil by Natalie M. Rosinsky

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.

Math Connections

Sequence Rocks by Size TE pg. 184
Make Predictions About Which Rock is Heaviest TE pg. 185
Predict Whether Objects Sink or Float TE pg. 193

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 principals (http://www.cast.org/our-work/about-udl.html#.VXmoXcfD_UA).

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) 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)	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. (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)	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 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

Kindergarten Unit 4: Basic Needs of Life

Where do plants and animals live and why do they live there?

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)

Unit Sequence	
Part A: *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	
Part B: *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	*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

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.)*	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.

Unit 4 Resources and Suggested Activities	
Grades K-5 Science Storylines Grade K Unit 3 Plants Lesson 9: Many Plants Student Edition, pp. 35-38 Teacher Edition, p. 95 Inquiry Center: How Are Plants Alike and Different? Lesson 10: What Plants Need Student Edition, pp.39-42 Teacher Edition, p. 103 Inquiry Center: Observe a Plant's Needs Lesson 11: Plant Parts Student Edition, pp. 43-46 Teacher Edition, p. 111 Inquiry Center: Compare Plant Parts Lesson 12: Plants Grow and Change Student Edition, pp. 47-50 Teacher Edition, p. 119 Inquiry Center: Observe Plants Grow	Unit 6: Earth's Resources-Leveled Readers Below-Level: How Does a Plant Grow? On-Level/Enrichment: A Plant Grows Above Level/Challenge: All About Plants National Science Teacher Association Lessons, Links and STEM activities Do Plants Need Sunlight? Sock Seeds Who Needs What? Pollinating Vanilla to make ice cream Plant activities Plants for Kids

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.

Literacy Connections

Write a Story About Plants TE pg. 96
Write a Play About Plant Parts TE pg. 113
Write an Acrostic Poem TE pg. 96
Make a Plant Needs Book TE pg. 104

Literature Connections

Seeds by Vijaya Khisty Bodach
Let's Look at a Garden by Angela Royston
Someday a Tree by Eve Bunting
The Tiny Seed by Eric Carle
A Tree is a Plant by Clyde Robert Bulla
The Surprise Garden by Zoe Hall
Zinnia's Flower Garden by Monica Wellington
How a Seed Grows by Helene J. Jordan
Growing Vegetable Soup by Lois Ehlert
Seeds! Seeds! Seeds! By Nancy Elizabeth Wallace

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.

Math Connections

Make a Picture Graph TE pg. 97
Play a Sort-It-Out Game TE pg. 97
Figure Out the Right Amount TE pg. 105
Measure the Amount of Water One Plant Takes In TE pg. 113
Make a Plant-Growth Graph TE pg. 120
Count the Number of Sprouts TE pg. 121

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 principals (http://www.cast.org/our-work/about-udl.html#.VXmoXcfD_UA).

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

Kindergarten Unit 5: Basic Needs of Humans

How do people impact the environment as they gather and use what they need to live and grow?

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 (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)

Unit Sequence	
Part A: *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.

Unit 5 Resources and Suggested Activities	
Grades K-5 Science Storylines Grade K Unit 2 Animals Lesson 4: Living and Nonliving Student Edition, pp. 13-16 Teacher Edition, p. 45 Inquiry Center: Sort Living and Nonliving Things Lesson 5: Real and Pretend Student Edition, pp.17-20 Teacher Edition, p. 53 Inquiry Center: Real or Pretend Lesson 6: Many Animals Student Edition, pp. 21-26 Teacher Edition, p. 63 Inquiry Center: Sort Animals Lesson 7: What Animals Need Student Edition, pp. 27-30 Teacher Edition, p. 71 Inquiry Center: What Does Our Pet Need? Lesson 8: Animals Grow and Change Student Edition, pp. 31-34 Teacher Edition, p. 79 Inquiry Center: How Do Animals Change As They Grow? Grade K Unit 4 Habitats Lesson 13: Homes For Living Things Student Edition, pp. 51-54 Teacher Edition, p. 135 Inquiry Center: Make a Model Terrarium Lesson 30: Animals and Plants Together Student Edition, pp. 55-58 Teacher Edition, p. 143 Inquiry Center: Tell About Animals and Plants	Unit 2: Animals-Leveled Readers Below-Level: Animal Coverings On-Level/Enrichment: Do Animals Live in Plants? Above Level/Challenge: Animals Change as They Grow Unit 4: Habitats-Leveled Readers Below-Level: Places to Live and Grow On-Level/Enrichment: Do Animals Live in Plants? Above Level/Challenge: Animal Homes National Science Teacher Association Lessons, Links and STEM activities Humans on Earth Interactions Among Living Things The Needs of Living Things How Animals Meet Their Needs Cats and Their Coats Ultimate Animal Moms – Baby Animals What's Your Habitat? Sheppard Software Animal Games

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. *Literacy Connections* Classify Things in a Poem TE pg. 47 Identify Real and Pretend Animals TE pg. 54 Play an Animal Memory Game TE pg. 73 Write Riddles TE pg. 65 Make an Illustrated Animal Book TE pg. 80 Complete Sentence Frames TE pg. 137 Write a Poem TE pg. 145 Write a Habitat Story TE pg. 136 Write an Illustrated Response TE pg. 144 *Literature Connections* Little Gorilla by Ruth Bornstein Wag! by Patrick McDonnell Biggest, Strongest, Fastest by Steve Jenkins Walking Through the Jungle by Debbie Harter Animal Camouflage in the Snow by Martha E. H. Rustad Armadillos Sleep in Dugouts: And Other Places Animals Live by Pam Munoz Ryan

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.

Math Connections

Identify Living and Nonliving Things TE pg. 46
Measure Real and Pretend Plants TE pg. 54
Make an Animal Picture Graph TE pg. 64
Solve Problems About Feeding Pets TE pg. 72
Find the Missing Step TE pg. 81

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 principals (http://www.cast.org/our-work/about-udl.html#.VXmoXcfD_UA).

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

Best Practices and Exemplars

Students with Disabilities, English Language Learners, and Gifted & Talented Students:
Differentiating instruction is a flexible process that includes the planning and design of instruction, how that instruction is delivered, and how student progress is measured. Teachers recognize that students can learn in multiple ways. By providing appropriately challenging learning, teachers can maximize success for all students.

Examples of Strategies and Practices that Support Students with Disabilities:
***Refer to students' IEP for specific modifications and accommodations**

- Use of visual and multisensory formats
- Use of assisted technology
- Use of prompts
- Modification of content and student products
- Testing accommodations
- Authentic assessments

Examples of Strategies and Practices that Support Gifted & Talented Students:

- Adjusting the pace of lessons
- Curriculum compacting
- Inquiry-based instruction
- Independent study
- Higher-order thinking skills
- Interest-based content
- Student-driven instruction
- Real-world problems and scenarios

Examples of Strategies and Practices that Support English Language Learners:
***All WIDA Can Do Descriptors can be found at:** https://wida.wisc.edu/teach/can-do/descriptors

- Pre-teaching of vocabulary and concepts
- Visual learning, including graphic organizers
- Use of cognates to increase comprehension
- Teacher modeling

• Pairing students with beginning English language skills
with students who have more advanced English language skills
• Scaffolding
•Word walls
•Sentence frames
•Think-pair-share
•Cooperative learning groups
•Teacher think-aloud

Interdisciplinary connections are made across grades and content areas to model the integration of knowledge and skills in the real world.

21st Century Themes

● Global Awareness

● Environmental Literacy

● Health Literacy

● Civic Literacy

● Financial, Economic, Business, and

Entrepreneurial Literacy

21st Century Skills

● Creativity and Innovation (E)

● Critical Thinking and Problem Solving (T) (A)

● Communication (E)

● Collaboration (E) (T)

Career Ready Practices:

- CRP1: Act as a responsible and contributing citizen and employee.
- CRP2: Apply appropriate academic and technical skills.
- CRP3: Attend to personal health and financial well-being.
- CRP4: Communicate clearly and effectively and with reason.
- CRP5: Consider the environmental, social and economic impacts of decisions.
- CRP6: Demonstrate creativity and innovation.
- CRP7: Employ valid and reliable research strategies.
- CRP8: Utilize critical thinking to make sense of problems and persevere in solving them.
- CRP9: Model integrity, ethical leadership and effective management.
- CRP10: Plan education and career paths aligned to personal goals.
- CRP11: Use technology to enhance productivity.
- CRP12: Work productively in teams while using global competence.

9.1 Personal Financial Literacy

This standard outlines the important fiscal knowledge, habits, and skills that must be mastered in order for students to make informed decisions about personal finance. Financial literacy is an integral component of a student's college and career readiness, enabling students to achieve fulfilling, financially-secure, and successful careers.

9.2 Career Awareness, Exploration, and Preparation

This standard outlines the importance of being knowledgeable about one's interests and talents, and being well informed about postsecondary and career options, career planning, and career requirements.

9.3 Career and Technical Education

This standard outlines what students should know and be able to do upon completion of a CTE Program of Study

Technology Standards: Technology standards are embedded throughout all curricular units.

8.1 Educational Technology All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and create and communicate knowledge.

8.2 Technology Education, Engineering, Design and Computational Thinking - Programming
All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.