MIDLAND PARK PUBLIC SCHOOLS
Midland Park, New Jersey
CURRICULUM

Science
Kindergarten

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CCCS born on 9/2012
NJSLS born on 7/2017

Kindergarten Science Curriculum Overview

Kindergarten science is taught in five units throughout the school year. The science curriculum is a hands-on, open-ended and sequential process of investigating the biological and physical world. As part of the spiraling curriculum, aspects of physical science, life science, earth & space science, and engineering; technology & applications of science are taught throughout the year. A guided inquiry program gives students the opportunity to explore topics and concepts though investigations. Participating in this hands-on program helps students:

1. To foster a life-long enjoyment of learning science.
2. To observe science in the world around them.
3. To meet the science standards for New Jersey Public Schools.

Suggested Course Sequence*:

Unit 1: Weather: 10 days (ongoing)
Unit 2: Pushes and Pulls: 15 days
Unit 3: Effects of the Sun: 15 days
Unit 4: Basic Needs of Living Things: 20 days
Unit 5: Basic Needs of Humans: 15 days

Pre-Requisite: None

**The number of instructional days is an estimate based on the information available at this time. 1 day equals approximately 42 minutes of seat time. Teachers are strongly encouraged to review the entire unit of study carefully and collaboratively to determine whether adjustments to this estimate need to be made.*

Content Area: Science

Unit Title: 1 - Weather

Grade Level: Kindergarten

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.

Interdisciplinary Connections:

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.

21st Century Themes and Skills:

CRP2. Apply appropriate academic and technical skills.

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.

Standards (Content and Technology):

CPI#:	Statement:
NJSLS K-ESS2-1	Use and share observations of local weather conditions to describe patterns over time.

NJSLS K-ESS3-2	**Ask questions to obtain information about the purpose of weather forecasting to prepare for, and respond to, severe weather.***
NJSLS K-2-ETS1-1	**Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.**
8.1.2.B.1	**Illustrate and communicate original ideas and stories using multiple digital tools and resources.**
8.1.2.E.1	**Use digital tools and online resources to explore a problem or issue.**

Unit Essential Question(s):

- **What types of patterns can be observed in local weather conditions?**
- **How does weather forecasting help us to prepare for and respond to severe weather?**

Unit Enduring Understandings:

- 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.

- 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.

Unit Learning Targets/Objectives:

Students will...

- **Use and share observations of local weather conditions to describe patterns over time.**
- **Ask questions to obtain information about the purpose of weather forecasting to prepare for, and respond to, severe weather.***
- **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.**

Formative Assessments:

- **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.**
- **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.**

Summative/Benchmark Assessment(s):

- **Describe patterns of weather over time**
- **Explain the purpose of weather forecasting to prepare for severe weather**

Resources/Materials (copy hyperlinks for digital resources)**:**

Watching Weather
Weather Patterns
Weather Walks
Science- Weather
About the Weather

Modifications:

Special Education Students:

- Allow errors
- Rephrase questions, directions, and explanations
- Allow extended time to answer questions, and permit drawing, as an explanation
- Accept participation at any level, even one word
- Consult with Case Managers and follow IEP accommodations/modifications

English Language Learners:

- Assign a buddy, same language or English speaking
- Allow errors in speaking
- Rephrase questions, directions, and explanations
- Allow extended time to answer questions

At-Risk Students:

- Provide extended time to complete tasks
- Consult with Guidance Counselors and follow I&RS procedures/action plans
- Consult with classroom teacher(s) for specific behavior interventions
- Provide rewards as necessary

Gifted and Talented Students:

- Provide extension activities
- Build on students' intrinsic motivations

- Accept participation at any level, even one word
- Consult with parents to accommodate students' interests in completing tasks at their level of engagement

Lesson Name/Topic	Lesson Objective(s)	Time frame (day(s) to complete) Entire Unit: 10 Days
1	**Describe weather patterns**	4 Days
2	**Severe weather**	4 Days
3	**Define a simple problem**	2 Days

Teacher Notes:

Additional Resources

Click links below to access additional resources used to design this unit:

http://www.state.nj.us/education/modelcurriculum/sci/

Content Area: Science

Unit Title: 2 - Pushes and Pulls

Grade Level: Kindergarten

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.

Interdisciplinary Connections:

Integration of Engineering

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. In addition, the following connections to engineering design occur in Unit 2: Effects of the Sun, Unit 3: Weather, and Unit 5: Humans. In these units of study, kindergarten students learn that:

- 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.

Integration of 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.

Integration of Mathematics

During this unit of study, students will make connections to Mathematics in a number of ways. Kindergartners can use simple non-standard 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.

21st Century Themes and Skills:

CRP2. Apply appropriate academic and technical skills.
CRP4. Communicate clearly and effectively and with reason.
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.
CRP11. Use technology to enhance productivity.

Standards (Content and Technology):

CPI#:	**Statement:**
NJSLS K-PS2-1	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.
NJSLS K-PS2-2	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.
NJSLS K-2-ETS1-3	Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.
RI.K.1	With prompting and support, ask and answer questions about key details in a text.
W.K.7	Participate in shared research and writing projects (e.g. explore a number of books by a favorite author and express opinions about them).
SL.K.3	Ask and answer questions in order to seek help, get information, or clarify something that is not understood.
MP.2	Reason abstractly and quantitatively.
MP.4	Model with mathematics
MP.5	Use appropriate tools strategically.
K.MD.A.1	Describe measurable attributes of objects, such as length or weight. Describe several measureable attributes of a single object.
K.MD.A.2	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.
8.1.2.B.1	Illustrate and communicate original ideas and stories using multiple digital tools and resources.
8.1.2.E.1	Use digital tools and online resources to explore a problem or issue.

Unit Essential Question(s):

- Why do scientists like to play soccer?
- How can you design a simple way to change the speed or direction of an object using a push or pull from another object?

Unit Enduring Understandings:

- 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.
- 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.

Unit Learning Targets/Objectives:

Students will...

- 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)

Formative Assessments:

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.

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.)

Summative/Benchmark Assessment(s):

- Analyze data to determine if a design solution works

Resources/Materials (copy hyperlinks for digital resources)**:**
Note: These are student sense making experiences that can be used after being modified to be three-dimensional.

Push Pull-Changing Direction: Students investigate the interactions between colliding objects using pushes and pulls. Students play a game of kickball and observe how the ball is pushed, pulled, started, stopped, or collided with other objects and how it changed position and speed. As a group, students will then brainstorm about other objects being pushed, pulled or colliding and then
choose one of those objects to investigate.

Michigan NGSS Moodle: The purpose of this website to provide K-5 Science teachers with resources, lessons, and activities based on the NGSS which were created by teachers in our region.

Modifications: (Teachers identify the modifications that they will use in the unit. The unneeded modifications can then be deleted from the list.)

Special Education Students:

- Allow errors
- Rephrase questions, directions, and explanations
- Allow extended time to answer questions, and permit drawing, as an explanation
- Accept participation at any level, even one word
- Consult with Case Managers and follow IEP accommodations/modifications

English Language Learners:

- Assign a buddy, same language or English speaking
- Allow errors in speaking
- Rephrase questions, directions, and explanations
- Allow extended time to answer questions
- Accept participation at any level, even one word

At-Risk Students:

- Provide extended time to complete tasks
- Consult with Guidance Counselors and follow I&RS procedures/action plans
- Consult with classroom teacher(s) for specific behavior interventions
- Provide rewards as necessary

Gifted and Talented Students:

- Provide extension activities
- Build on students' intrinsic motivations
- Consult with parents to accommodate students' interests in completing tasks at their level of engagement

Restructure lesson using UDL principles (http://www.cast.org/our-work/about-udl.html#.VXmoXcfD_UA)

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

Lesson Name/Topic	Lesson Objective(s)	Time frame (day(s) to complete) Entire Unit: 15 Days
1	**Pushes and Pulls**	8
2	**Designing a Solution**	4
3	**Comparing tests**	3

Teacher Notes:

What It Looks Like in the Classroom:

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 (rubberbands, 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.

Additional Resources
http://www.state.nj.us/education/modelcurriculum/sci/

Future Learning

By the end of Grade 2, students will know that:

- 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.

By the end of Grade 3, students will know that:

- 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.

By the end of Grade 4, students will know that:

- The faster a given object is moving, the more energy it possesses.
- 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.

Content Area: Science

Unit Title: 3 - Effects of the Sun

Grade Level: Kindergarten

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.

Interdisciplinary Connections:

Integration of Engineering

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. In addition, the following connections to engineering design occur in Unit 2: Effects of the Sun, Unit 3: Weather, and Unit 5: Humans. In these units of study, kindergarten students learn that:

- 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.

Integration of 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.

Integration of Mathematics

During this unit of study, students will make connections to Mathematics in a number of ways. Kindergartners can use simple non-standard 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.

21st Century Themes and Skills:

CRP2. Apply appropriate academic and technical skills.
CRP4. Communicate clearly and effectively and with reason.
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.
CRP11. Use technology to enhance productivity.

Standards (Content and Technology):

CPI#:	Statement:
NJSLS K-PS3-1	Make observations to determine the effect of sunlight on Earth's surface
NJSLS K-PS3-2	Use tools and materials provided to design and build a structure that will reduce the warming effect of sunlight on Earth's surface.
NJSLS K-2-ETS1-1	Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.
NJSLS K-2-ETS1-2	Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.
8.1.2.B.1	Illustrate and communicate original ideas and stories using multiple digital tools and resources.
8.1.2.E.1	Use digital tools and online resources to explore a problem or issue.

Unit Essential Question(s):

- **How does sunlight affect the playground?**
- **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?**

Unit Enduring Understandings:

- Scientists use different ways to study the world.
  - Events have causes that generate observable patterns.
  - Sunlight warms Earth's surface.
- 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.

Unit Learning Targets/Objectives:

Students will...

- **Make observations to determine the effect of sunlight on Earth's surface**
- **Use tools and materials provided to design and build a structure that will reduce the warming effect of sunlight on Earth's surface.**

- **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.**
- **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.**

Formative Assessments:

• 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
• 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 Kindergarten Model Science Unit 2: Effects of the Sun (date 3.14.16) Instructional Days: 25 3 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

Summative/Benchmark Assessment(s):

- 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.

Resources/Materials (copy hyperlinks for digital resources)**:**

http://www.readwritethink.org/classroom-resources/lesson-plans/casting-shadows-across-literacy-1016.html?tab=4
http://sciencenetlinks.com/lessons/the-warmth-of-the-sun/
http://education.gsfc.nasa.gov/eclipse/pages/SunActiv.html
http://ngss.nsta.org/Resource.aspx?ResourceID=124
http://www.pbslearningmedia.org/resource/ab608973-106b-40d7-922f-db1e9ccdefc9/shadow-smile-part-6-sid-the-science-kid/

Modifications:

Special Education Students:

- Allow errors
- Rephrase questions, directions, and explanations
- Allow extended time to answer questions, and permit drawing, as an explanation
- Accept participation at any level, even one word
- Consult with Case Managers and follow IEP accommodations/modifications

At-Risk Students:

- Provide extended time to complete tasks
- Consult with Guidance Counselors and follow I&RS procedures/action plans
- Consult with classroom teacher(s) for specific behavior interventions
- Provide rewards as necessary

English Language Learners:

- Assign a buddy, same language or English speaking
- Allow errors in speaking
- Rephrase questions, directions, and explanations
- Allow extended time to answer questions
- Accept participation at any level, even one word

Gifted and Talented Students:

- Provide extension activities
- Build on students' intrinsic motivations
- Consult with parents to accommodate students' interests in completing tasks at their level of engagement

Lesson Name/Topic	Lesson Objective(s)	Time frame (day(s) to complete) Entire Unit: 15 Days
1	**Effect of sunlight**	5
2	**Reducing the warming effect of sunlight**	5
3	**Define a simple problem**	3
4	**Developing a model**	2

Teacher Notes:

Additional Resources

Click links below to access additional resources used to design this unit:

http://www.state.nj.us/education/modelcurriculum/sci/

Content Area: Science

Unit Title: 4 - Basic Needs of Living Things

Grade Level: Kindergarten

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.

Interdisciplinary Connections:

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.

21st Century Themes and Skills:

CRP2. Apply appropriate academic and technical skills.
CRP4. Communicate clearly and effectively and with reason.
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.
CRP11. Use technology to enhance productivity.

Standards (Content and Technology):

CPI#:	Statement:
NJSLS K-LS1-1	Use observations to describe patterns of what plants and animals (including humans) need to survive.
NJSLS K-ESS3-1	Use a model to represent the relationship between the needs of different plants and animals (including humans) and the places they live.
NJSLS K-ESS2-2	Construct an argument supported by evidence for how plants and animals (including humans) can change the environment to meet their needs.
8.1.2.B.1	Illustrate and communicate original ideas and stories using multiple digital tools and resources.
8.1.2.E.1	Use digital tools and online resources to explore a problem or issue.

Unit Essential Question(s):

- **What do plants need to live and grow?**
- **What is the relationship between what plants need and where they live?**
- **How can plants change their habitat?**

Unit Enduring Understandings:

- 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.
- 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.
- Systems in the natural and designed world have parts that work together.
- Plants can change their environments

Unit Learning Targets/Objectives:

Students will...

- **Use observations to describe patterns of what plants and animals (including humans) need to survive.**
- **Use a model to represent the relationship between the needs of different plants and animals (including humans) and the places they live.**
- **Construct an argument supported by evidence for how plants and animals (including humans) can change the environment to meet their needs.**

Formative Assessments:

- **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.**
- **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.**
- **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.**

Summative/Benchmark Assessment(s):

- Construct an argument supported by evidence for how plants and animals (including humans) can change the environment to meet their needs.

Resources/Materials (copy hyperlinks for digital resources)**:**

http://www.readworks.org/lessons/gradek/where-do-polar-bears-live/read-aloud-lesson
http://www.readworks.org/lessons/gradek/where-do-polar-bears-live/paired-text-questions
http://www.pbslearningmedia.org/resource/tdc02.sci.life.colt.lp_stayalive/the-needs-of-living-things/
http://www.bioedonline.org/lessons-and-more/teacher-guides/living-things-and-their-needs/
http://www.georgetowncollege.edu/ccrp/files/2014/04/How-do-interactions-happen-with-livin
https://prezi.com/k81tc04fnxxy/5e-science-lesson-plan/
http://www.pbslearningmedia.org/resource/lsps07.sci.life.gen.cgtowelplant/paper-towel-plants/
http://www.pbslearningmedia.org/resource/evscps.sci.life.seed/from-seed-to-fruit/
http://www.pbslearningmedia.org/resource/thnkgard.sci.ess.water/think-garden-the-importance-of-water/
http://www.pbslearningmedia.org/resource/5dea21b4-6c92-46ff-982c-8650f9429c01/think-garden-plant-structure/

Modifications:

Special Education Students:

- Allow errors
- Rephrase questions, directions, and explanations
- Allow extended time to answer questions, and permit drawing, as an explanation
- Accept participation at any level, even one word
- Consult with Case Managers and follow IEP accommodations/modifications

English Language Learners:

- Assign a buddy, same language or English speaking
- Allow errors in speaking
- Rephrase questions, directions, and explanations
- Allow extended time to answer questions
- Accept participation at any level, even one word

At-Risk Students:

- Provide extended time to complete tasks
- Consult with Guidance Counselors and follow I&RS procedures/action plans
- Consult with classroom teacher(s) for specific behavior interventions
- Provide rewards as necessary

Gifted and Talented Students:

- Provide extension activities
- Build on students' intrinsic motivations
- Consult with parents to accommodate students' interests in completing tasks at their level of engagement

Lesson Name/Topic	Lesson Objective(s)	Time frame (day(s) to complete) Entire Unit: 20 Days
1	What plants and animals need to survive	7 Days
2	Relationship between needs and location	7 Days
3	Changing the environment to meet needs	6 Days

Teacher Notes:

Additional Resources

Click links below to access additional resources used to design this unit:

http://www.state.nj.us/education/modelcurriculum/sci/

Content Area: Science

Unit Title: 5 - Basic Needs of Humans

Grade Level: Kindergarten

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.

Interdisciplinary Connections:

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. Student 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.

21st Century Themes and Skills:

CRP2. Apply appropriate academic and technical skills.
CRP4. Communicate clearly and effectively and with reason.
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.
CRP11. Use technology to enhance productivity.

Standards (Content and Technology)**:**

CPI#:	Statement:
NJSLS K-ESS3-3	Communicate solutions that will reduce the impact of humans on the land, water, air, and/or other living things in the local environment.
NJSLS K-2-ETS1-1	Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.
8.1.2.B.1	Illustrate and communicate original ideas and stories using multiple digital tools and resources.
8.1.2.E.1	Use digital tools and online resources to explore a problem or issue.

Unit Essential Question(s):

- **How can humans reduce their impact on the land, water, air, and other living things in the local environment?**

Unit Enduring Understandings:

- 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.

Unit Learning Targets/Objectives:

Students will...

- **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, 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. (**

Formative Assessments:

- **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.**

Summative/Benchmark Assessment(s):

- Communicate solutions that will reduce the impact of humans on the land, water, air, and/or other living things in the local environment.

Resources/Materials (copy hyperlinks for digital resources)**:**

http://ngss.nsta.org/Resource.aspx?ResourceID=237

http://www.nj.gov/dep/seeds/clnwatbk.htm

http://www.nj.gov/dep/seeds/recycle.htm
http://www.nj.gov/dep/seeds/speak.htm
http://www.nj.gov/dep/seeds/5rs.htm
http://water.usgs.gov/edu/

Modifications:

Special Education Students:

- Allow errors
- Rephrase questions, directions, and explanations
- Allow extended time to answer questions, and permit drawing, as an explanation
- Accept participation at any level, even one word
- Consult with Case Managers and follow IEP accommodations/modifications

At-Risk Students:

- Provide extended time to complete tasks
- Consult with Guidance Counselors and follow I&RS procedures/action plans
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- Provide rewards as necessary

English Language Learners:

- Assign a buddy, same language or English speaking
- Allow errors in speaking
- Rephrase questions, directions, and explanations
- Allow extended time to answer questions
- Accept participation at any level, even one word

Gifted and Talented Students:

- Provide extension activities
- Build on students' intrinsic motivations
- Consult with parents to accommodate students' interests in completing tasks at their level of engagement

Lesson Name/Topic	Lesson Objective(s)	Time frame (day(s) to complete) Entire Unit: 15 Days
1	**Reducing the impacts of humans**	12 Days
2	**Define a simple problem**	3 Days

Teacher Notes:

Additional Resources
Click links below to access additional resources used to design this unit:
http://www.state.nj.us/education/modelcurriculum/sci/