Science Curriculum
Kindergarten

Science Curriculum Committee	
Name	**Position**
Christine Moran	*Director of Curriculum & Instruction*
Nevin Werner	*Supervisor of STEAM & Assessment*
Bianca Kim	*Kindergarten Teacher*
Gabrielle Sagala	*Grade 1 Teacher*
Kelly Wendrychowicz	*Grade 2 Teacher*
Ashley Adimando	*Grade 3 Teacher*
Christine O'Keefe	*Grade 4 Teacher*
Sancy Gerbino	*Grade 5 Teacher*
Heather Rothschild	*Grade 6 Teacher*

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INTRODUCTION
The River Edge School District is committed to providing a rich and rigorous curriculum so that all students can achieve at the highest levels, while developing as responsible citizens, who respect individuality. Our curriculum is designed to help students develop skills and learn core content through active, meaningful experiences that will lead to lasting understanding and the ability to apply and use knowledge in new contexts. Our curriculum is aligned to the New Jersey Student Learning Standards. Each area of the curriculum contains identified standards for learning. These standards help to guide classroom instruction and assessment. The standards articulate the skills and knowledge we believe all students need in order to become educated, responsible, and productive citizens. The River Edge curriculum is revised regularly to ensure that the curriculum is aligned with identified New Jersey academic standards. In addition, we seek to integrate college and career readiness standards. Practical and relevant real-life experiences are integrated into our curriculum and learning environment. We use New Jersey's Social Emotional Competencies to ensure our students are healthy and well, and we give our students opportunities to use cutting edge technology in order to prepare them for the future. Our students leave our schools well prepared for Middle School, High School, and beyond.

UNIT PACING		
Unit 1 Earth & Space Science: Weather and Climate	Unit 2 Physical Science: Forces and Interactions: Pushes and Pulls	Unit 3 Life Science: Interdependent Relationship in Ecosystems: Animals, Plants, and their Environment
September- December	January-March	April-June

UNIT ONE -
Earth & Space Science- Weather and Climate
(September-December)

LESSON PACING	
Lesson	**Suggested Time**
The Sun Warms Earth	1 Day
Investigate: Warmth from the Sun	1-2 Day
Think Like an Engineer: Design a Structure (STEAM project)	1-2 Day
The Weather	1 Day
Sunny and Cloudy	1 Day
Windy Weather	1 Day
Blow a Sailboat or Feather with Straw	1 Day
Wet Weather	1 Day
Shaving Cream Wet Clouds (STEAM project)	1 Day
Cotton Ball Types of Clouds	1 Day
Investigate: Weather	1-2 Day
Weather Patterns	1 Day
Investigate: Weather Patterns	1-2 Day
Thunderstorms and Tornadoes	1 Day
Tornado in a Jar (STEAM project)	1 Day
Blizzards and Hurricanes	1 Day
Magic Snow (STEAM project)	1 Day
Predicting Weather	1 Day
Science Career: Weather Expert	1-2 Day

DCI Review: Earth Science	1 Day

INTRODUCTION TO THE UNIT

(Excerpt taken from "What it Looks Like in the Classroom", NJ Model Curriculum, Grade K, Unit/s- "Weather", "Effects of Sun")

In this unit of study, students are expected to develop an understanding of patterns and variations in local weather and the use of weather forecasting to prepare for and respond to severe weather. Throughout the unit, students will look for patterns and cause-and-effect relationships as they observe and record weather events. Students will have opportunities to ask scientific questions, analyze and interpret data, and communicate their findings to others.

In this unit of study, students learn that problem situations can be solved through engineering, and that in order to design a solution, we must first define the problem. As described in the narrative above, students define problems by asking specific questions, making observations, and gathering information that will help them understand the types of problems they might face when weather conditions exist in and around their homes, schools, and communities.

In this unit's progression of learning, students first develop an understanding that patterns in the natural world can be observed and documented, and that, like scientists, they can use these patterns as evidence to describe phenomena and make predictions. In order to observe patterns in weather, kindergartners will learn that weather is the combination of sunlight, wind, precipitation, and temperature in a particular region at a particular time. By observing and recording daily weather events—such as sunny, cloudy, rainy, and windy— students can analyze both *qualitative* and *quantitative* data. Recording and analyzing data over time will reveal recognizable weather patterns that can be used to make predictions.

Examples of weather patterns may include:

- Snow and colder temperatures generally occur in the winter.
- Clouds may bring rain or snow.
- Rain occurs more often in the spring.
- Warmer/hotter temperatures occur in the summer.
- It is generally cooler in the morning and warmer in the afternoon.

At this grade level, it is developmentally appropriate to describe temperature in relative terms; therefore, vocabulary words such as hot, warm, cool, cold, and warmer/cooler should be used to describe temperature, rather than accurately measuring and describing temperature in degrees.

Students also learn that weather events have causes that generate observable patterns over time, and that these patterns help weather scientists predict severe weather. Kindergarteners need opportunities to learn about severe weather, especially those types that tend to occur in the local region in which they live. By using a variety of media and technology, such as computers, radio, and television, and by reading grade-appropriate texts about weather and weather events, students can learn about types of severe weather that are common to their region. In addition, they come to understand that people depend on technology to help us predict and solve problems, and without it, our lives would be very different.

In order to apply their learning, students need opportunities to ask questions about weather forecasting and how it can help us prepare for and respond to different types of severe weather. When kindergartners ask questions, make observations, gather weather information, and look for patterns of change in the weather, it prepares them to think about how to best prepare for and respond to local severe weather. As part of this unit of study, students are challenged to investigate how people prepare for and solve problems caused by severe weather. With adult guidance, students should define weather problems by asking questions, making observations, and gathering information about severe weather situations.

Some questions students might want to consider include the following:

- What kinds of severe weather events tend to occur in New Jersey (e.g., thunderstorms, hurricanes, flooding, snowstorms)?
- What do people do in response to these types of severe weather events?
- What kinds of tools can people use to solve problems caused by severe weather conditions (e.g., umbrellas, sandbags, salt, gravel, shovels, snow blowers)?
- What other solutions might people use for problems caused by severe weather (e.g., closing schools and businesses; sending out emergency workers to restore utilities; sending out early warnings; stockpiling food, water, and other supplies; having a portable generator)?
- What kinds of problems would we face if we had a lot of rain in a short period of time?
- What problems might we have if our community experienced flooding?
- What kinds of problems might occur if strong winds caused damage (e.g., knocked over trees, damaged power lines, damaged homes and businesses)?
- What kinds of precautions do people take during a hurricane? A snowstorm? A thunderstorm? Why?

In addition, in this unit of study, students investigate the effects of the sun on the surface of the Earth. Throughout the unit, students make observations in order to describe patterns of change. With adult support, they design and build a structure that will reduce

the warming effect of sunlight, and then conduct tests to determine if the structure works as intended.

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

As students come to understand that the sun warms the surface of the Earth, they should engage in the engineering design process as follows:
Students are challenged to design and build a structure that will reduce the warming effects of the sun.
Students brainstorm a list of objects that reduce the warming effects of the sun (e.g., shade trees, umbrellas, large hats, canopies).
As a class, students determine what the design should be able to do (criteria). For example:

- The structure must reduce the warming effects of the sun.
- The structure should be built using materials provided by the teacher.
- The structure should be easy to carry and fit through the doorway of the classroom.

Groups of students then use simple drawings or diagrams to design a structure, and use given tools and materials to build their design. Groups should be given a predetermined amount of time to draw and build their designs.
Groups share their designs with the class, using their drawings or diagrams, and then test their designs outside. (Groups can place their structures in a sunny area, then compare the relative temperature of the ground under the structure and the ground in direct sunlight.).

Students make and use observations to determine if the designs worked as intended, then compare the strengths and weaknesses of how each design performed.
While engaging in this process, students should use evidence from their observations to describe how their structures reduced the warming effect of sunlight.

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

NEW JERSEY STUDENT LEARNING STANDARDS

Science

Disciplinary Core Ideas

PS3.B: Conservation of Energy and Energy Transfer

Sunlight warms Earth's surface. (K-PS3-1),(K-PS3-2)

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

Asking questions, making observations, and gathering information are helpful in thinking about problems. (secondary to K-ESS3-2)

Crosscutting Concepts

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-PS3-1),(K-PS3- 2),(K-ESS3-2)

Science and Engineering Practices

Asking Questions and Defining Problems

Asking questions and defining problems in grades K–2 builds on prior experiences and progresses to simple descriptive questions that can be tested.

- Ask questions based on observations to find more information about the designed world. (K-ESS3-2)

Planning and Carrying Out Investigations

Planning and carrying out investigations to answer questions or test solutions to problems in K–2 builds on prior experiences and progresses to simple

investigations, based on fair tests, which provide data to support explanations or design solutions.

- Make observations (firsthand or from media) to collect data that can be used to make comparisons. (K-PS3-1)

Analyzing and Interpreting Data

Analyzing data in K–2 builds on prior experiences and progresses to collecting, recording, and sharing observations.

- Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions. (K-ESS2-1)

Constructing Explanations and Designing Solutions

Constructing explanations and designing solutions in K–2 builds on prior experiences and progresses to the use of evidence and ideas in constructing evidence-based accounts of natural phenomena and designing solutions.

- 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)

Obtaining, Evaluating, and Communicating Information

Obtaining, evaluating, and communicating information in K–2 builds on prior experiences and uses observations and texts to communicate new information.

- Read grade-appropriate texts and/or use media to obtain scientific information to describe patterns in the natural world. (K-ESS3-2)

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-ESS3- 2)

Connections to Nature of Science

Scientific Investigations Use a Variety of Methods

- Scientists use different ways to study the world. (K-PS3-1)

Science Knowledge is Based on Empirical Evidence

- Scientists look for patterns and order when making observations about the world. (K-ESS2-1)

BIG IDEA/COMMON THREAD

Patterns and variations exist in local weather. The purpose of weather forecasting is to prepare for, and respond to, severe weather.

ENDURING UNDERSTANDINGS

- Sunlight warms Earth's surface
- Weather is the combination of sunlight, wind, snow or rain, and temperature in a particular region and time
- People record weather patterns over time
- In a region, some kinds of severe weather are more likely than others
- Forecasts allow communities to prepare for severe weather

ESSENTIAL QUESTIONS

- How can we observe and record patterns in weather conditions over time?
- How does weather forecasting help to keep people safe?
- How does sunlight affect the earth's surface?

UNIT OBJECTIVES

Students will be able to …

- Make observations to determine the effect of sunlight on Earth's surface. (K-PS3-1.)
  [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.]

Disciplinary Core Ideas
- Understand that sunlight warms the Earth's surface.

Crosscutting Concepts
- Recognize that events have causes that generate observable patterns.

Science and Engineering Practices
- Make observations (firsthand or from media) to collect data that can be used to make comparisons.

K-PS3-1

Concepts	Students Can...
• Sunlight warms Earth's surface. • Events have causes that generate observable patterns. • Scientists use different ways to study the world.	• Make observations to determine the effect of sunlight on Earth's surface. Examples of Earth's surface could include: ▪ Sand ▪ Soil ▪ Rocks ▪ Water • Understand that sunlight warms the earth's surface

	• Observe patterns in events generated by cause-and-effect relationships. • Make observations to make comparisons.

Students will be able to …

- Use tools and materials to design and build a structure that will reduce the warming effect of sunlight on an area. (K-PS3-2.) *

  * See Appendix A, K-2 Engineering Design

  [Clarification Statement: Examples of structures could include a small replica of an umbrella, canopy, or tent that minimize the warming effect of the sun.]

Disciplinary Core Ideas

- Understand that sunlight warms the Earth's surface.

Crosscutting Concepts

- Recognize that events have causes that generate observable patterns.

Science and Engineering Practices

- 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

Concepts	Students Can...
• Sunlight warms Earth's surface. • Events have causes that generate observable patterns. • The shape and stability of structures determines their function. • Designs can be conveyed through sketches, drawings, or physical models. • It is useful to compare and test designs because there is always more than one possible solution to a problem.	• Understand that sunlight warms the earth's surface, and structures may reduce the warming effect of sunlight. • Observe patterns in events generated by cause-and-effect relationships. • Use tools and materials provided to design and build a solution to reducing the effect of sunlight on an object or area.

Students will be able to…

- Use and share observations of local weather conditions to describe patterns over time. (K-ESS2-1)

  [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: cooler in the morning than in the afternoon, 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.]

Disciplinary Core Ideas

- Understand that weather is the combination of sunlight, wind, snow or rain, and temperature in a particular region at a particular time.
- Understand that people measure and record these weather conditions to notice patterns over time.

Crosscutting Concepts

- Recognize that patterns in the natural world can be observed, used to describe phenomena, and used as evidence.

Science and Engineering Practices

- Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions.

K-ESS2-1

Concepts	Students Can...

• Weather is the combination of sunlight, wind, snow, or rain and temperature in a particular region at a particular time.
• People measure and record these weather conditions to notice patterns over time.
• Patterns in the natural world can be observed, used to describe phenomena, and used as evidence.
• Scientists look for patterns and order when making observations about the world.
	• Understand that weather is the combination of sunlight, wind, snow, or rain and temperature in a particular region.
	• Understand that people measure and record weather conditions to notice patterns over time.
	• Observe and use patterns in the natural world as evidence and to describe scientific concepts.
	• Use and share observations of local weather conditions to describe patterns over time.
	  ○ Examples of *qualitative observations* could include descriptions of the weather, such as sunny, cloudy, windy, rainy, and warm.
	  ○ Examples of *quantitative observations* could include numbers of sunny, cloudy, windy, and rainy days in a month.
	  ○ Examples of *patterns* could include that it is usually cooler in the morning than in the afternoon.

Students will be able to…

Ask questions to obtain information about the purpose of weather forecast in to prepare for, and respond to, severe weather. (K-ESS3-2) *

* See Appendix A, K-2 Engineering Design

[Clarification Statement: Emphasis is on local forms of severe weather.]

Disciplinary Ideas

- Understand that kinds of severe weather are more likely than others in a given region.
- Understand that weather scientists forecast severe weather so that the communities can prepare for and respond to these events.

Crosscutting Concepts

- Recognize that events have causes that generate observable patterns.

Science and Engineering Practices

- Ask questions based on observations to find more information about the designed world.

K-ESS3-2

Concepts	Students Can...
• 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 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. • A situation that people want to change or create can be approached as a problem to be solved through engineering.	• Understand that weather scientists forecast severe weather in order for communities to prepare for events. • Observe patterns in events generated by cause-and-effect relationships. • Ask questions and obtain information through books and other media to describe patterns in the natural world and design world.

SUGGESTED ACTIVITIES

- Record and chart daily weather patterns: temperature, cloud cover, precipitation (rain/snow). Compare the weather of different seasons.

- Make a paper plate sundial
- Make a pinwheel
- Design and build a sun structure to measure the effects of sun on the earth's surface
    - Using UV beads to test if the sun penetrated the surface
    - http://www.oradellschool.org/osnj/STAFF/Faculty%20and%20Staff/Ms.%20Denise%20Kuehner/Links%20for%20activities/
- Cloud observations
- Tornado in a Jar
- Shaving cream rain clouds (http://onelittleproject.com/shaving-cream-rain-clouds/)
- Create a class weather vane

UNIT VOCABULARY

cloudy- having many clouds in the sky

cold- having a very low temperature

forecast- using information to predict the weather

hot- having a very high temperature

hurricane- an extremely large, powerful, and destructive storm

precipitation- general name for water in any form falling from clouds. This includes rain, drizzle, hail, snow and sleet.

rainy- having a lot of rain

shelter- a structure that covers or protects people or things

snowstorm- a storm with a large amount of falling snow

snowy- having a lot of snow

storm- an occurrence of bad weather in which there is a lot of rain, snow, etc., and often strong winds

sunny- having plenty of bright sunlight

temperature- the measurement of how hot or cold something is

thermometer- the instrument which measures temperature

thunderstorm- a storm with lightning and thunder

weather - the temperature and other outside conditions (such as rain, cloudiness, etc.) at a particular time and place

windy- having a lot of wind

DIFFERENTIATION

NGSS Appendix D - "All Standards, All Students": Making the Next Generation Science Standards Accessible to All Students

Special Education Students:

- Have students draw two simple pictures of wet weather. One picture should show rain falling and the other picture should show snow falling. Help students label the appropriate picture *rain* or *snow*.
- Preview content vocabulary
- Extended time for assignments
- Prompting, re-assurance and time to formulate ideas
- Visual clues (pictures)
- Preferential seating
- Repeated directions
- Check for understanding
- Ask pointed questions
- Instructional aides in classroom setting
- Peer models
- Leveled texts
- Audio books
- Picture schedule of activities and experiments
- Hands on materials
- Use of FM system to improve attention and support auditory information
- Behavior chart to increase focus and work completion
- Sensory breaks with timers
- Chromebook carts with literacy apps

- Chromebook extensions
- Instructional aides in classroom setting

Multilingual Learners:

- Ask yes/no questions, such as: Does weather change from day to day? (Yes.) Is the weather always the same in morning and afternoon? (No.) Provide sentence frames, such as: *Weather can (change) from day to day. Weather can be cool in the (morning) and warm in the (afternoon).* Help students complete sentence stems about weather patterns. Provide these stems: *Weather changes … Weather can be sunny in the morning and …*
- *Ask yes/no questions, such as: Are all weather careers the same? (No.) Is Sepi Yalda a weather expert? (Yes.) Provide sentence frames, such as: Sepi studied (weather) in college. Now Sepi makes (better tools) for predicting weather. Help students complete sentence stems that describe Sepi Yalda's work. Provide these stems: When Sepi was in school, she … In college, Sepi … Sepi's job is …*
- Preview content vocabulary
- Visual clues (pictures)
- Repeated directions
- Check for understanding
- Ask pointed questions
- Picture cards for readers workshop routines and expectations
- Peer models
- English language supports for parents of non English speaking students. *Ex: Teacher created dictionary with weather words and labels in English and student's first language.*

Students at Risk of School Failure:

- Have students draw two simple pictures of wet weather. One picture should show rain falling and the other picture should show snow falling. Help students label the appropriate picture *rain* or *snow*.
- Response to intervention - targeted skill/goal improvement plans within a set time frame
- Hands on materials
- Multi-sensory manipulatives
- Color coding word tracking
- Preferential seating
- Behavior chart to increase focus and work completion
- Use of FM system to improve attention and support auditory information
- Sensory breaks with timers
- Chromebook extensions
- Consultation with academic support teachers to address skills identified by classroom teacher

Gifted and Talented Students:

- Ask students to recall how they might measure rain or snow. Then have them draw a

picture of themselves measuring rain, perhaps using a measuring cup, or snow, perhaps using a ruler.
- Challenge questions
- Higher leveled thinking about information within the text (making connections, predictions without prompting)
- Recall routines and procedures without prompting and move from talking to writing
- Leveled readers
- Quality responses to questions and advanced prompts

Students with 504 Plans:

- Have students draw two simple pictures of wet weather. One picture should show rain falling and the other picture should show snow falling. Help students label the appropriate picture *rain* or *snow*.
- Extended time for assignments
- Prompting
- Reassurance and time to formulate ideas
- Visual clues (pictures)
- Preferential seating
- Repeated directions
- Check for understanding
- Ask pointed questions
- Instructional Aides in classroom setting
- Peer models
- Frequent breaks during read alouds
- Use of FM system to improve attention and support auditory information
- Behavior chart to increase focus and work completion
- Sensory breaks with timers
- Chromebook extensions

ASSESSMENTS

Formative
Wrap It Up! Questions
Various levels of questioning
Teacher Observation
Class Discussions/Partner Talk
Science Notebook activities
Performance Expectation Activities: *Investigate; Think Like a Scientist; Think Like an Engineer, STEAM Projects*
Teacher Rubrics for Performance Expectations Activities

Summative
Earth Science Summary
Earth Science Performance Task
DCI Review: Earth Science

CORE INSTRUCTIONAL MATERIALS

National Geographic Exploring Science
National Geographic My NG connect Exploring Science Digital Resources
National Geographic Exploring Science through Literacy Teacher's Guide
Write About Earth Science Summer Is the Best! Big Book
Hand2Mind Exploring Science Hands on Kit

Leveled Readers

- Working in Snowy Weather-Picture Book
- Weather Fun-Picture Book
- People Work in All Kinds of Weather-Level A
- People Play in All Kinds of Weather-Level B
- Weather on a Trip- Level B
- People Travel in All Kinds of Weather-Level C

Supplemental Materials

- Generation Genius

Suggested Websites

- http://ngss.nsta.org/AccessStandardsByTopic.aspx - The NGSS Standards, by topic
- https://phet.colorado.edu - online simulations
- https://concord.org/stem-resources - online simulations (requires Java)
- http://ngss.nsta.org/Classroom-Resources.aspx - lesson ideas
- http://sciencespot.net/Pages/refdeskNextGen.html - lesson ideas
- http://www.weatherwizkids.com/ activity ideas, daily weather, experiments
- http://eo.ucar.edu/webweather/ - activity ideas

INTERDISCIPLINARY CONNECTIONS

English Language Arts

Reading

- **RI.CR.K.1** With prompting and support, ask and answer questions about key details in an informational text (e.g., who, what, where, when, why, how).
- **RI.IT.K.3.** With prompting and support, describe the connection between two individuals, events, ideas, or pieces of information in a text.

Writing

- **W.AW.K.1.** Use a combination of drawing, dictating, and writing to compose opinion pieces on topics or texts (e.g., My favorite book is...).

- **W.IW.K.2.** Use a combination of drawing, dictating, and writing to compose informative/explanatory texts to convey ideas.
- **W.SE.K.6.** With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question.
- **W.RW.K.7.** With prompting and support, engage in brief but regular writing and drawing tasks.

Speaking and Listening

- **SL.PE.K.1.** Participate in collaborative conversations with diverse partners about kindergarten topics and texts with peers and adults in small and larger groups.
- **SL.II.K.2.** Confirm understanding of a text read aloud or information presented orally or through other media by asking and answering questions about key details and requesting clarification if something is not understood.
- **SL.ES.K.3.** Ask and answer questions in order to seek help, get information, or clarify something that is not understood.
- **SL.UM.K.5.** Add drawings or other visual displays to descriptions as desired to provide additional detail.
- **SL.AS.K.6.** Speak audibly and express thoughts, feelings, and ideas clearly.

Mathematics

- **MP.2** Reason abstractly and quantitatively. (K-ESS2-1)
- **MP.4** Model with mathematics. (K-ESS2-1),(K-ESS3-2)

- **K.CC** Counting and Cardinality (K-ESS3-2)
- **K.CC.A** Know number names and the count sequence. (K-ESS2-1)
- **K.M.A.1** Describe measurable attributes of objects, such as length or weight. Describe several measurable attributes of a single object.
- **K.M.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. For example, directly compare the heights of two children and describe one child as taller/shorter.
- **K.DL.A.1** Classify objects into given categories; count the numbers of objects in each category and sort the categories by count. (Clarification: Limit category counts to be less than or equal to 10)

Visual and Performing Arts

- **1.5.2.Cr1a** Engage in individual and collaborative exploration of materials and ideas through multiple approaches, from imaginative play to brainstorming, to solve art and design problems.

- **1.5.2.Cr2c** Create art that represents natural and constructed environments. Identify and classify uses of everyday objects through drawings, diagrams, sculptures or other visual means including repurposing objects to make something new.
- **1.1.2.Pr4c** Demonstrate contrasting dynamics and energy with accuracy (e.g., loose/tight, light/heavy, sharp/smooth).

NJSLS Career Readiness, Life Literacies, and Key Skills

CAREER AWARENESS, EXPLORATION, PREPARATION, AND TRAINING

- **9.2.2.CAP.1.** Make a list of different types of jobs and describe the skills associated with each job.

LIFE LITERACY AND KEY SKILLS

- **9.4.2.CI.1** Demonstrate openness to new ideas and perspectives (e.g., 1.1.2.CR1a, 2.1.2.EH.1, 6.1.2.CivicsCM.2).
- **9.4.2.CI.2** Demonstrate originality and inventiveness in work (e.g., 1.3A.2CR1a).
- **9.4.2.CT.1** Gather information about an issue, such as climate change, and collaboratively brainstorm ways to solve the problem (e.g., K-2-ETS1-1, 6.3.2.GeoGI.2).
- **9.4.2.CT.2** Identify possible approaches and resources to execute a plan (e.g., 1.2.2.CR1b, 8.2.2.ED.3).
- **9.4.2.CT.3** Use a variety of types of thinking to solve problems (e.g., inductive, deductive).
- **9.4.2.DC.7** Describe actions peers can take to positively impact climate change (e.g., 6.3.2.CivicsPD.1).

PRACTICES

- **CLKSP4** Demonstrate creativity and innovation.
- **CLKSP5** Utilize critical thinking to make sense of problems and persevere in solving them.
- **CLKSP6** Model integrity, ethical leadership and effective management.

Computer Science & Design Thinking

Domain	Core Idea	Performance Expectation
Data & Analysis	Data can be used to make predictions about the world	8.1.2.DA.3: Identify and describe patterns in data visualizations 8.1.2.DA.4: Make predictions based on data using charts or graphs.
Algorithms & Programming	Complex tasks can be broken down into simpler instructions, some of which can be broken down even further.	8.1.2.AP.4: Break down a task into a sequence of steps.
Nature of Technology	Innovation and the improvement of existing technology involves creative thinking.	8.2.2.NT.2: Brainstorm how to build a product, improve a designed product, fix a product that has stopped working, or solve a simple problem.

SOCIAL EMOTIONAL LEARNING COMPETENCIES

- **Self-Awareness**: ability to recognize one's emotions and know one's strengths and limitations
    - Connections:
        - Reflecting on one's learning (Oral, Thumbs Up, Thumbs Down, Pictures, etc.)

- **Self-Management**: ability to regulate and control one's emotions and behaviors, particularly in stressful situations
    - Connections:
        - Visit the mindfulness corner in the classroom for self-soothing activities (Squishy ball, sand timer, fidget popper, etc.)

- **Social Awareness**: ability to take the perspective of others, demonstrate empathy, acknowledge and appreciate similarities and differences, and understand how one's actions influence and are influenced by others
    - Connections:
        - Students collaborate and help each other during STEAM projects

- **Relationship Skills**: refers to one's ability to demonstrate prosocial skills and behaviors in order to develop meaningful relationships and resolve interpersonal conflicts

- Connections:
  - Class discussions
  - Incentives for individual students and small groups

- **<u>Responsible Decision-Making</u>**: refers to the ability to use multiple pieces of information to make ethical and responsible decisions
  - Connections:
    - Class rules and routines
    - Class discussions
    - Following directions for STEAM projects

<u>UNIT TWO</u> -

<u>Physical Science</u>- Forces and Interactions: Pushes and Pulls

<u>LESSON PACING</u>	
Lesson	**Suggested Time**
How Things Move	1 Day
Hard Push, Soft Push	1 Day
Investigate: Hard and Soft Pushes	1-2 Day
Weak Pull, Strong Pull	1 Day
Investigate: Weak and Strong Pulls	1-2 Day
Starting and Stopping	1 Day
Investigate: Starting and Stopping	1-2 Days
Changing Direction	1 Day
Investigate: Changing Direction	1-2 Day
Changing Speed	1 Day
Investigate: Changing Speed	1-2 Day
Think Like a Scientist: Plan and Conduct an Investigation (STEAM project)	1-2 Day
Think Like an Engineer: Analyze Data	1-2 Day

Science Career: Pilot	1-2 Day
DCI Review: Physical Science	1 Day

INTRODUCTION

(Excerpt taken from "What it Looks Like in the Classroom", NJ Model Curriculum, Grade K, Unit- "Pushes and Pulls")

In this unit of study, students plan and carry out investigations in order to understand the effects of different strengths and different directions of pushes and pulls on the motion of an object. Students will also engage in a portion of the *engineering design process* to determine whether a design solution works as intended to change the speed or direction of an object.

Scientists often design simple tests in order to gather evidence that can be used to understand cause-and-effect relationships. In this unit's progression of learning, kindergarteners need adult guidance to collaboratively plan and conduct simple investigations to discover and compare the effects of pushes and pulls on the motion of an object. Students will need opportunities to push and pull a variety of objects, such as balls, toy cars, pull toys, cans, tops, and boxes. Students should push/pull these objects first with varying strengths, and then in a variety of directions. They should also explore the effects of pushing objects into one another, as well as into walls and other stationary objects. Students should record their observations using pictures and words, and should participate in class discussions on the effects of varying the strength or direction of a push or pull on an object.

As students engage in these types of simple force and motion investigations, they will learn that:

- Pushes and pulls can have different strengths and directions.
- Pushing or pulling on an object can change the speed or direction of its motion and can start or stop it.
- When objects touch or collide, the object's motion can be changed.
- The force of the push or pull will make things speed up or slow down more quickly.

To enhance students' experiences, teachers can schedule time for students to investigate these force and motion concepts using playground equipment, such as swings, seesaws, and slides. Teachers can also use trade books and multimedia resources to enrich students' understanding. As students participate in discussions, they should be encouraged to ask questions, share observations, and describe cause-and-effect relationships between forces (pushes and pulls) and the motion of objects.

As students come to understand the force and motion concepts outlined above, they should engage in the *engineering design process* as follows.

- Students are challenged to design a simple way to change the speed or direction of an object using a push or pull from another object.
- As a class, students determine what the design should be able to do (criteria).

For example:

- An object should move a second object a certain distance; An object should move a second object so that the second object follows a particular path;
- An object should change the direction of the motion of a second object; and/or
- An object should knock down other specified objects.

Students determine the objects that will move/be moved (balls, ramps, blocks, poker chips) and the types of structures (ramps or barriers) and materials (rubber bands, paper tubes, cardboard, foam, wooden blocks) that can be used to meet this challenge.

Groups of students then develop a simple drawing or diagram and use given materials to build their design. Groups should be given a predetermined amount of time to draw and build their designs.

Groups share their designs with the class, using their drawings or diagrams, and then test their designs.

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

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

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

NEW JERSEY STUDENT LEARNING STANDARDS
Science

Disciplinary Core Ideas

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.

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.

Crosscutting Concepts

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)

Science and Engineering Practices

Planning and Carrying Out Investigations

Planning and carrying out investigations to answer questions or test solutions to problems in K–2 builds on prior experiences and progresses to simple investigations, based on fair tests, which provide data to support explanations or design solutions.

- With guidance, plan and conduct an investigation in collaboration with peers. (K-PS2-1)

Analyzing and Interpreting Data

Analyzing data in K–2 builds on prior experiences and progresses to collecting, recording, and sharing observations.

- Analyze data from tests of an object or tool to determine if it works as intended. (K-PS2-2)

Connections to the Nature of Science

Scientific Investigations Use a Variety of Methods

- Scientists use different ways to study the world. (K-PS2-1)

BIG IDEA/COMMON THREAD

Different strengths or different directions of pushes and pulls have an effect on the motion of an object.

ENDURING UNDERSTANDINGS

Pushes and pulls can have different strengths and directions, can change the speed or direction of its motion, or can start or stop an object.

ESSENTIAL QUESTIONS

- What happens if you push or pull an object harder?
- How can you design a simple way to change the speed or direction of an object?

UNIT OBJECTIVES

Students will be able to…

- 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. (K-PS2-1)
  [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.]

Disciplinary Ideas

- Understand 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, they push on one another and can change motion.

Crosscutting Concepts

- Recognize that simple tests can be designed to gather evidence to support or refute student ideas about causes.

Science and Engineering Practices

- Plan and carry out investigations to answer questions or test solutions to problems in K–2 builds on prior experiences and progresses to simple investigations, based on fair tests, which provide data to support explanations or design solutions. With guidance, plan and conduct an investigation in collaboration with peers.

K-PS2-1

Concepts	Students Can...

• 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
	• Notice the effects of pushes and pulls
	• With guidance, design simple tests to gather evidence to support or refute ideas about cause-and-effect relationships.
	• With guidance, collaboratively plan and conduct an investigation with peers to compare the effects of different strengths or different directions of pushes and pulls on the motion of an object.
	• 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 will be able to…

- 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. (K-PS2-2)
  [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.]

Disciplinary Ideas

- Understand 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.

Crosscutting Concepts

- Recognize that simple tests can be designed to gather evidence to support or refute student ideas about causes.

Science and Engineering Practices

- Analyze data from tests of an object or tool to determine if it works as intended.

K-PS2-2

Concepts	Students Can...

• 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.
• Simple tests can be designed to gather evidence to support or refute student ideas about cause
• Because there is always more than one possible solution to a problem, it is useful to compare and test designs.
	• 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.
	• 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/s designed to solve the same problem to compare the strengths and weaknesses of how each performs.

SUGGESTED ACTIVITIES

- Students bring their own objects in and explore how they move- sort objects by the way they move (push, pull, roll, slide, battery-powered, etc.)

- 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.
  - http://ngss.nsta.org/Resource.aspx?ResourceID=129

- Marble Roll: This is an assessment probe from the book Uncovering Student Ideas in Primary Science Vol. 1 that is used to elicit children's descriptions of motion. The probe is designed to reveal how students describe the path of a moving object as it leaves a winding track.
    - http://ngss.nsta.org/Resource.aspx?ResourceID=211

- Roller Coaster: There are two parts to this lesson from the book More Picture Perfect Science Lessons. In the first part learners explore ways to change the speed and direction of a rolling object by building roller coasters out of pipe insulation after reading the book, Roller Coaster by Marla Frazee. In the second part students read I Fall Down by Vicki Cobb and then investigate the idea that gravity affects all objects equally by conducting dropping races with everyday items.
    - http://ngss.nsta.org/Resource.aspx?ResourceID=227

- Ramps 2: Ramp Builder: This is a multi-day lesson plan that has students design, build, and test their own ramps. Students are introduced to a variety of materials and explore putting them together. Students engage in an inquiry-based learning experience to reinforce math, science, and technology. They create plans for ramps by evaluating a variety of materials provided to them.
    - http://ngss.nsta.org/Resource.aspx?ResourceID=457

- School wide Scavenger Hunt for Pushes and Pulls: School-wide push or pull hunt using common objects around school. Students and/or teacher takes photographs of objects. Student sort the objects into push or pull.

- Soda Bottle Bowling (Push): Children experiment with pushing a ball hard and with less force to knock over soda bottles. They can compare a big push to a small push. What kind of push made the ball move the fastest? They will see how when objects collide (ball and soda bottle), they push on one another and can change motion. (an investigation of colliding objects)

- Dominoes - Students create and design a domino run.

UNIT VOCABULARY

bump - to hit against an object in a sudden and forceful way

backward - toward what is behind

collide - to hit or crash

direction - the line or course on which something moves.

force - a push or pull

forward - toward what is ahead

gravity - a force that pulls things to Earth

motion - the action or process of moving or being moved

pull - when you make things move towards you. Pulling is a force.

push - when you make things move away from you. Pushing is a force.

ramp - a sloping surface which can change the speed of an object

rolling - moving by turning over and over

slope - ground that slants downward or upward

speed - how fast things move

start - to begin moving

stop - to not move

DIFFERENTIATION

NGSS Appendix D - "All Standards, All Students": Making the Next Generation Science Standards Accessible to All Students

Special Education Students:

- Place a collection of small classroom objects on the floor. Some objects should have wheels, some should be very light, and others a bit heavier. Have students experiment with pulling each object with weak and strong pulls.
- Have students discuss the different ways a baseball player can change the speed of a moving ball. Remind students that a pitcher throws a ball at a quick speed toward a

batter.
- Extended time for assignments
- Prompting, re-assurance and time to formulate ideas
- Visual clues (pictures)
- Preferential seating
- Repeated directions
- Check for understanding
- Ask pointed questions
- Picture cards for readers workshop routines and expectations
- Instructional aides in classroom setting
- Peer models
- Leveled texts
- Audio books
- Picture schedule of activities and experiments
- Hands on materials
- Use of FM system to improve attention and support auditory information
- Behavior chart to increase focus and work completion
- Sensory breaks with timers
- Chromebook carts with literacy apps
- Chromebook extensions
- Instructional aides in classroom setting

Multilingual Learners:

- Have students sort pictures of items that are moving and are not moving. Ask either/or questions about the type of movement. *(Is the boat walking or sailing?)* Help students identify the name of the person or object that is moving and the type of movement shown in the pictures they found. Provide sentence frames, such as: *The cat walks up the hill. The on the box.* Encourage students to use descriptive words when writing sentences about the pictures they found. For example, they might write, *The cat jumps on the box.* Have them look at the picture and think of a way to describe the movement.
- Have students sort pictures of people pushing or pulling on objects to start or stop motion. Ask either/or questions about the type of movement, such as: Is the girl starting or stopping the ball? Is she using a push or a pull? Help students identify in their pictures whether the person is starting or stopping the motion and the type of force being used. Provide sentence frames, such as:He/She (stops) the (ball) with a (push). He/She(starts) the (wagon) with a (pull). Encourage students to use descriptive words when writing sentences about the pictures they found. For example,they might write, The girl stops the ball with apush. Have them look at the picture and think of a way to describe the movement in greater detail.
- Preview content vocabulary
- Visual clues (pictures)
- Repeated directions
- Check for understanding
- Ask pointed questions
- Picture cards for readers workshop routines and expectations
- Peer models

- English language supports for parents of non English speaking students. *Ex: Teacher created dictionary with weather words and labels in English and student's first language.*

Students at Risk of School Failure:

- Place a collection of small classroom objects on the floor. Some objects should have wheels, some should be very light, and others a bit heavier. Have students experiment with pulling each object with weak and strong pulls.
- Have students discuss the different ways a baseball player can change the speed of a moving ball. Remind students that a pitcher throws a ball at a quick speed toward a batter.
- Response to intervention - targeted skill/goal improvement plans within a set time frame
- Hands on materials
- Multi-sensory manipulatives
- Color coding word tracking
- Preferential seating
- Behavior chart to increase focus and work completion
- Use of FM system to improve attention and support auditory information
- Sensory breaks with timers
- Chromebook extensions
- Consultation with academic support teachers to address skills identified by classroom teacher

Gifted and Talented Students:

- Have students use a dump truck or another type of truck that can hold objects in the back to explore what types of pulls are required for heavier and lighter loads. Provide small blocks, having students place a few at a time in the back of the truck and then pulling the truck with weak pulls. Encourage students to continue adding blocks, noting when they need to increase their force from a weak to a strong pull in order to make the truck move.
- Have students make a list of different sports that involve a ball or puck that is pushed or pulled to change its speed throughout the game. Encourage students to discuss what equipment is used to change the speed of the ball or puck and what players need to do to change the speed of these moving objects.
- Challenge questions
- Higher leveled thinking about information within the text (making connections, predictions without prompting)
- Recall routines and procedures without prompting and move from talking to writing
- Leveled readers
- Quality responses to questions and advanced prompts

Students with 504 Plans:

- Place a collection of small classroom objects on the floor. Some objects should have wheels, some should be very light, and others a bit heavier. Have students experiment with pulling each object with weak and strong pulls.
- Have students discuss the different ways a baseball player can change the speed of a moving ball. Remind students that a pitcher throws a ball at a quick speed toward a

batter.
- Extended time for assignments
- Prompting
- Reassurance and time to formulate ideas
- Visual clues (pictures)
- Preferential seating
- Repeated directions
- Check for understanding
- Ask pointed questions
- Instructional Aides in classroom setting
- Peer models
- Frequent breaks during read alouds
- Use of FM system to improve attention and support auditory information
- Behavior chart to increase focus and work completion
- Sensory breaks with timers
- Chromebook extensions

ASSESSMENTS

Formative
Wrap It Up! Questions
Various levels of questioning
Teacher Observation
Class Discussions/Partner Talk
Science Notebook activities
Performance Expectation Activities: *Investigate; Think Like a Scientist; Think Like an Engineer, STEAM Projects*
Teacher Rubrics for Performance Expectations Activities

Summative
Physical Science Summary
Physical Science Performance Task
DCI Review: Physical Science

Core Instructional Materials

National Geographic Exploring Science
National Geographic My NG connect Exploring Science Digital Resources
National Geographic Exploring Science through Literacy Teacher's Guide
Hand2Mind Exploring Science Hands on Kit

<u>Leveled Readers</u>
- Toys to Push and Pull- Picture Book
- Push and Pull Faces- Picture Book
- Vehicles Push and Pull-Level A
- People Push and Pull-Level B

- What Can Pull Wagons- Level B
- Animals Push and Pull- level C

Supplemental Materials
- Generation Genius

Suggested Websites
- http://ngss.nsta.org/AccessStandardsByTopic.aspx - The NGSS Standards, by topic
- Generation Genius
- http://ngss.nsta.org/Classroom-Resources.aspx - lesson ideas
- http://sciencespot.net/Pages/refdeskNextGen.html - lesson ideas
- https://jr.brainpop.com/ - videos for students, assessments, educational games

INTERDISCIPLINARY CONNECTIONS

English Language Arts

Reading
- **RI.CR.K.1** With prompting and support, ask and answer questions about key details in an informational text (e.g., who, what, where, when, why, how).

Writing
- **W.IW.K.2.** Use a combination of drawing, dictating, and writing to compose informative/explanatory texts to convey ideas.
- **W.RW.K.7.** With prompting and support, engage in brief but regular writing and drawing tasks.

Speaking and Listening
- **SL.PE.K.1.** Participate in collaborative conversations with diverse partners about kindergarten topics and texts with peers and adults in small and larger groups.
- **SL.II.K.2.** Confirm understanding of a text read aloud or information presented orally or through other media by asking and answering questions about key details and requesting clarification if something is not understood.
- **SL.ES.K.3.** Ask and answer questions in order to seek help, get information, or clarify something that is not understood.
- **SL.UM.K.5.** Add drawings or other visual displays to descriptions as desired to provide additional detail.
- **SL.AS.K.6.** Speak audibly and express thoughts, feelings, and ideas clearly.

Mathematics

- **MP.2** Reason abstractly and quantitatively. (K-PS2-1)
- **MP.5** Uses appropriate tools strategically.

- **K.M.A.1** Describe measurable attributes of objects, such as length or weight. Describe several measurable attributes of a single object.
- **K.M.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. For example, directly compare the heights of two children and describe one child as taller/shorter.

Visual and Performing Arts

- **1.5.2.Cr1a** Engage in individual and collaborative exploration of materials and ideas through multiple approaches, from imaginative play to brainstorming, to solve art and design problems.
- **1.5.2.Cr2c** Create art that represents natural and constructed environments. Identify and classify uses of everyday objects through drawings, diagrams, sculptures or other visual means including repurposing objects to make something new.
- **1.1.2.Pr4c** Demonstrate contrasting dynamics and energy with accuracy (e.g., loose/tight, light/heavy, sharp/smooth).

Comprehensive Health and Physical Education

- 2.2.2.MSC.1: Perform a combination of sequences of locomotor movements and rhythmic activities (e.g., walking, balancing, hoping, skipping, running).
- 2.2.2.MSC.2: Differentiate non-locomotor and locomotor movements as well transferring body weight (e.g., stretching, bending, twisting, curling).
- 2.2.2.MSC.3: Demonstrate manipulative movements (e.g., throwing, catching, dribbling, running, kicking) while moving in personal and general space, time, directions, pathways and ranges.
- 2.2.2.MSC.4: Differentiate manipulative movements (e.g., throwing, catching, dribbling).

<u>NJSLS Career Readiness, Life Literacies, and Key Skills</u>

CAREER AWARENESS, EXPLORATION, PREPARATION, AND TRAINING

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

LIFE LITERACY AND KEY SKILLS

- **9.4.2.CI.1** Demonstrate openness to new ideas and perspectives (e.g., 1.1.2.CR1a, 2.1.2.EH.1, 6.1.2.CivicsCM.2).
- **9.4.2.CI.2** Demonstrate originality and inventiveness in work (e.g.,

1.3A.2CR1a).

- **9.4.2.CT.1** Gather information about an issue, such as climate change, and collaboratively brainstorm ways to solve the problem (e.g., K-2-ETS1-1, 6.3.2.GeoGI.2).
- **9.4.2.CT.2** Identify possible approaches and resources to execute a plan (e.g., 1.2.2.CR1b, 8.2.2.ED.3).
- **9.4.2.CT.3** Use a variety of types of thinking to solve problems (e.g., inductive, deductive).
- **9.4.2.DC.7** Describe actions peers can take to positively impact climate change (e.g., 6.3.2.CivicsPD.1).

PRACTICES

- **CLKSP4** Demonstrate creativity and innovation.
- **CLKSP5** Utilize critical thinking to make sense of problems and persevere in solving them.
- **CLKSP6** Model integrity, ethical leadership and effective management.

Computer Science & Design Thinking

Domain	Core Idea	Performance Expectation
Data & Analysis	Data can be used to make predictions about the world	8.1.2.DA.3: Identify and describe patterns in data visualizations 8.1.2.DA.4: Make predictions based on data using charts or graphs.
Algorithms & Programming	Complex tasks can be broken down into simpler instructions, some of which can be broken down even further.	8.1.2.AP.4: Break down a task into a sequence of steps.
Engineering Design	Engineering design is a creative process for meeting human needs or wants that can result in multiple solutions.	8.2.2.ED.2: Collaborate to solve a simple problem, or to illustrate how to build a product using the design process. 8.2.2.ED.3: Select and use appropriate tools and materials to build a product using the design process.

SOCIAL EMOTIONAL LEARNING COMPETENCIES

- **Self-Awareness**: ability to recognize one's emotions and know one's strengths and limitations
    - Connections:

        - Reflecting on one's learning (Oral, Thumbs Up, Thumbs Down, Pictures, etc.)

- **Self-Management**: ability to regulate and control one's emotions and behaviors, particularly in stressful situations
    - Connections:
        - Visit the mindfulness corner in the classroom for self-soothing activities (Squishy ball, sand timer, fidget popper, etc.)

- **Social Awareness**: ability to take the perspective of others, demonstrate empathy, acknowledge and appreciate similarities and differences, and understand how one's actions influence and are influenced by others
    - Connections:
        - Students collaborate and help each other during STEAM projects

- **Relationship Skills**: refers to one's ability to demonstrate prosocial skills and behaviors in order to develop meaningful relationships and resolve interpersonal conflicts
    - Connections:
        - Class discussions
        - Incentives for individual students and small groups

- **Responsible Decision-Making**: refers to the ability to use multiple pieces of information to make ethical and responsible decisions
    - Connections:
        - Class rules and routines
        - Class discussions
        - Following directions for STEAM projects

UNIT THREE -

Life Science- Interdependent Relationships in Ecosystems: Animals, Plants, and their Environment

LESSON PACING	
Lesson	**Suggested Time**
Living Things	1 Day

Plants Are Living Things	1 Day
What Plants Need	1 Day
Planting Seed (STEAM project)	1 Day
Animals Are Living Things	1 Day
What Animals Need	1 Day
Think Like a Scientist: Observe	1-2 Day
Where Living Things Live	1 Days
Think Like a Scientist: Make a Model (STEAM project)	1-2 Day
Living Things Change the Places They Live	1 Day
Think Like a Scientist: Explain Change	1-2 Day
People Use Resources	1 Day
Using Resources Wisely	1 Day
Climate Change	1-2 Day
Reducing Air Pollution	1 Day
Reducing Food Waste	1 Day
Litter and Our Oceans	1 Day
Waste Less	1 Day
Think Like an Engineer: Share Solutions	1-2 Day
Science Career: Wildlife Expert	1-2 Day
DCI Review: Life Science	1 Day

INTRODUCTION

(Excerpt taken from "What it Looks Like in the Classroom", NJ Model Curriculum, Grade K, Unit- "Basic Needs of Living Things')

Begin: "Kid Questions"

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

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

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

Prior to starting the unit, display pictures of living and non-living things. Direct students to sort the pictures into two groups: living and non-living. Ask students to explain how they decided which pictures represented living things and which represented non-living things.

Watch the PBS video "Is It Alive?" Stop after each picture and ask students if it's alive or not. Ask them to explain how they can tell. (This activity will also provide an opportunity to pre-assess students' understandings and/or misconceptions. It will also provide an opportunity for students to think about what having life means.)
Watch the TeacherTube video "Living or Non-Living?" (This activity provides similar experiences for students as the PBS video. The difference is that after each picture and question, the narrator provides the answer with reasoning.)

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

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

After determining what plants need to survive, kindergarteners learn that plants are systems, with parts, or structures, that work together, enabling plants to meet their needs in a variety of environments. The vast majority of plants have similar structures, such as roots, stems, and leaves, but the structures may look different depending on the type or variety of plant. Although there are many varieties of plants, their structures function in similar ways, allowing the plants to obtain the water and light they need to survive. In other words, each variety of plant has structures that are well-suited to the environment in which it lives. As students learn about different types of plants and the environments in which they live, they use models, such as diagrams, drawings, physical replicas, or dioramas, to represent the relationships between the needs of plants and the places they live in the natural world. For example, grasses need sunlight, so they often grow in meadows. Cacti, which live in places subject to drought, have thick, wide stems and modified leaves (spines) that keep water within the plant during long periods without rain.

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

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

- ➔ Tree roots can break rocks and concrete in order to continue to grow, plants will expand their root systems in search of water that might be found deeper in the earth, and plants can be found growing around and through man-made structures in search of light.
- ➔ A squirrel digs in the ground to hide food, and birds collect small twigs to build nests in trees.

Students need opportunities to make observations, and then, with adult guidance, to use their observations as evidence to support a claim for how a living thing can change its environment to meet its needs.

NEW JERSEY STUDENT LEARNING STANDARDS

Science

Disciplinary Core Ideas

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)

ESS2.E: Biogeology

Plants and animals can change their environment. (K-ESS2-2)

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)

ESS3.C: Human Impacts on Earth Systems

Things that people do to live comfortably can affect the world around them. But they can make choices that reduce their impacts on the land, water, air, and other living things. (secondary to K-ESS2-2)

Communicate solutions that will reduce the impact of climate change and humans on the land, water, air, and/or other living things in the local environment. (K-ESS3-3)

ETS1.B: Developing Possible Solutions

Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people. (secondary to K-ESS3-3)

Crosscutting Concepts

Patterns

- Patterns in the natural and human designed world can be observed and used as evidence. (K-LS1-1)

Cause and Effect

- Events have causes that generate observable patterns. (K-ESS3-3)

Systems and System Models

- Systems in the natural and designed world have parts that work together. (K-ESS2-2),(K-ESS3-1)

Science and Engineering Practices

Developing and Using Models

Modeling in K–2 builds on prior experiences and progresses to include using and developing models (i.e., diagram, drawing, physical replica, diorama, dramatization, or storyboard) that represent concrete events or design solutions.

- Use a model to represent relationships in the natural world. (K-ESS3-1)

Analyzing and Interpreting Data

Analyzing data in K–2 builds on prior experiences and progresses to collecting, recording, and sharing observations.

- Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions. (K-LS1-1)

Engaging in Argument from Evidence

Engaging in argument from evidence in K–2 builds on prior experiences and progresses to comparing ideas and representations about the natural and designed world(s).

- Construct an argument with evidence to support a claim. (K-ESS2-2)

Obtaining, Evaluating, and Communicating Information

Obtaining, evaluating, and communicating information in K–2 builds on prior experiences and uses observations and texts to communicate new information.

- Communicate solutions with others in oral and/or written forms using models and/or drawings that provide detail about scientific ideas. (K-ESS3-3)

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)

BIG IDEA/COMMON THREAD

Plants and animals need basic elements to survive, and they rely on where they live.

ENDURING UNDERSTANDINGS

- Animals obtain food they need from plants and/or other animals.
- Plants and animals can change their local environment.
- 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.
- Things people do can affect the environment positively and negatively, but they can make choices to reduce their impacts on climate change.

ESSENTIAL QUESTIONS

- Where do animals and plants live and why do they live there?
- How can people take care of the Earth to reduce climate change?

UNIT OBJECTIVES

Students will be able to …

- Use observations to describe patterns of what plants and animals (including humans) need to survive. (K-LS1-1)
  [*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.]

Disciplinary Ideas

- Understand that 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.

Crosscutting Concepts

- Recognize that patterns in the natural and human designed world can be observed and used as evidence.

Science and Engineering Practices

- Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions.

K-LS1-1

Concepts	Students Can...
• Plants need water and light to live and grow. • Patterns in the natural and human-designed world can be observed and used as evidence. • Scientists look for patterns and order when making observations about the world.	• Use observations to describe patterns of what plants need to survive. Examples of patterns could include: ○ 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 and use patterns in the natural world as evidence. • Use observations to describe

	patterns in the natural world in order to answer scientific questions.

Students will be able to …

- Construct an argument supported by evidence for how plants and animals (including humans) can change the environment to meet their needs. (K-ESS2-2)
  [*Clarification Statement:* Examples of plants/animals changing their environment could include a squirrel digs in the ground to hide its food and tree roots can break concrete.]

Disciplinary Core Ideas
- Understand that plants and animals can change their environment.

Crosscutting Concepts
- Recognize that systems in the natural and designed world have parts that work together.

Science and Engineering Practices
- Construct an argument with evidence to support a claim.

K-ESS2-2

Concepts	Students Can...

• Plants can change their environments.
• People can make choices that reduce their impacts on the land, water, air, and other living things.
• Systems in the natural and designed world have parts that work together.
	• Understand that plants and animals can change their environment
	• 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.
	Examples of relationships could include:
	  • Tree roots often break concrete to continue to grow
	  • Flowers will turn toward the sun

Students will be able to …

- Use a model to represent the relationship between the needs of different plants or animals (including humans) and the places they live. (K-ESS3-1)

[*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.]

Disciplinary Ideas

- Understand that 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.

Crosscutting Concepts

- Recognize that systems in the natural and designed world have parts that work together.

Science and Engineering Practices

- Use a model to represent relationships in the natural world.

K-ESS3-1

Concepts	Students Can...
• 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. • Models can be used to represent relationships in the natural world.	• Understand that plants and animals can change their environment. • Observe that systems in the natural and designed world have parts that work together. • Use a model to represent the relationships between the needs of different animals and the places they live in the natural world. Examples of relationships could include: ◦ Deer eat buds and leaves from their environment.

Students will be able to …

- Communicate solutions that will reduce the impact of climate change and humans on the land, water, air, and/or other living things in the local environment. (K-ESS3-3)

  [*Clarification Statement*: Examples of human impact on the land could include cutting trees to produce paper and using resources to produce bottles. Examples of solutions could include reusing paper and recycling cans and bottles.]

Disciplinary Ideas

- Understand that the things that people do to live comfortably can affect the world around them, but they can make choices that reduce their impacts on the land, water, air, and other living things.

- Understand 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.

Crosscutting Concepts
- Recognize that events have causes that generate observable patterns.

Science and Engineering Practices
- Communicate solutions with others in oral and/or written forms using models and/or drawings that provide detail about scientific ideas.

K-ESS3-3

Concepts	Students Can...
• Things that people do to live comfortably can impact climate change. • People can make choices that reduce their impacts on the land, water, air, and other living things. • Climate change has causes that generate observable patterns. • Possible solutions to climate change designs can be conveyed through sketches, drawings, or physical models. • A situation that people want to change or create in relation to climate change can be approached as a problem to be solved through engineering. • Asking questions, making observations, and gathering information are helpful in thinking about problems.	• Communicate solutions that will reduce the impact of climate change and humans on the land, water, air, and/or other living things in the local environment, such as recycling. • Observe patterns in events such as climate change that are generated due to cause-and-effect relationships. • Communicate solutions to climate change with others in oral and/or written forms (drawings). • Ask questions, make observations, and gather information about a situation in relation to climate change that people want to change. • Define a simple problem such as climate change that can be solved through the development of a new or improved object or tool.

SUGGESTED ACTIVITIES

- Science journal/notebook- to record data

- Planting seeds and experimenting with plant needs (growing a plant in the sunlight vs. the dark)

- Climate Change (Read-Aloud Lesson): *Where Do Polar Bears Live?* (http://www.readworks.org/lessons/gradek/where-do-polar-bears-live/paired-text-questions) Students identify and recall characteristics that allow polar bears to survive in the extremely cold Arctic environment.

- Read- Aloud Lesson: *Winston of Churchill: One Bear's Battle Against Global Warming*
  Students will learn about environmental factors negatively affecting the polar bears' habitat and expository science facts about global warming. Students will identify causes, problems and plans to solve the problems.

- BrainPop Jr. - Animals, Plants, Habitats, Conservation

- BrainPop - Climate Change
  Students will discuss different impacts that humans have on climate change.

- Living Things and Their Needs
  http://www.bioedonline.org/lessons-and-more/teacher-guides/living-things-and-their-needs/ : This provides a Teacher Guide, videos, reading resources, and student activity sheets. The objective of the lessons is for students to learn about living organisms and what they need to survive.

- Reducing Air Pollution
  https://ny.pbslearningmedia.org/resource/ee18-sci-airpol/kids-go-green-reducing-air-pollution/: This video teaches students the effects of electricity on the environment. Students will learn about ways to reduce electricity usage and help keep the air clean.

- Reducing Food Waste
  https://ny.pbslearningmedia.org/resource/ee18-sci-foodwst/kids-go-green-reducing-food-waste/: This video teaches students about the impact of food waste on the environment. Students will discover ways to reduce food waste.

- Litter and Our Oceans
  https://ny.pbslearningmedia.org/resource/ee18-sci-waterpol/kids-go-green-litter-and-our-oceans/: This video teaches students to learn about the impact of litter on bodies of water and discover ways to reduce litter. In the accompanying activity, students will attempt to clean a simulated polluted lake using various techniques and materials.

- Waste Less https://ny.pbslearningmedia.org/resource/ee18-sci-greentm/kids-go-green-waste-less/: This video teaches students ways to help the environment by reducing waste in their school.

- Compare and Contrast pictures of different animals- How are they alike/different?

- Design and/or build a bird feeder using natural or recycled materials.

- Design and/or create something useful using recycled materials.

UNIT VOCABULARY

animal - a living thing that has movement and basic needs of food, water, air, and space to live

climate - average weather in a place over many years

climate change - long-term changes in global temperatures and other characteristics of the atmosphere

earth - the planet on which we live; the world; soil

environment - the surroundings or conditions in which a person, animal, or plant lives or operates

food - any nutritious substance that people or animals eat or drink, or that plants absorb, in order to maintain life and growth

habitat - the natural home or environment of an animal, plant, or other organism

natural resources - something found in nature that can be used by people

plant - a living thing with basic needs of nutrients, sunlight, water, air, and space

pollute - contaminate water, air, or a place with harmful or poisonous substances

recycle - to make something new from something that has been used before

survive - continue to live

DIFFERENTIATION

NGSS Appendix D - "All Standards, All Students": Making the Next Generation Science Standards Accessible to All Students

Special Education Students:

- Have students draw a picture of a plant in the classroom or outside (either visible from a classroom window or on the playground). Direct students to include the soil in which the plant is growing, the space it has to grow, and any other need that can be seen (e.g, getting light from the sun, getting water from rain or a watering can). Remind students that plants need these things in order to live.
- Provide sentence frames to help students describe the needs of living things: *A turtle breathes. It needs (air) to live. A jaguar drinks. It needs (water) to live.* Ask students to draw a picture of an animal, such as a pet, meeting one or more of its needs. Work with students to help them write descriptive words about the animal and what need the picture is showing.
- Have students explain what a day in the life of an animal might be like, including how they might meet their needs during the day.
- Preview content vocabulary
- Extended time for assignments
- Prompting, Re-assurance and time to formulate ideas
- Visual clues (pictures)
- Preferential seating
- Repeated directions
- Check for understanding
- Ask pointed questions
- Picture cards for readers workshop routines and expectations
- Instructional aides in classroom setting
- Peer models
- Leveled texts
- Audio books
- Picture schedule of activities and experiments
- Hands on materials
- Use of FM system to improve attention and support auditory information
- Behavior chart to increase focus and work completion
- Sensory breaks with timers
- Chromebook carts with literacy apps
- Chromebook extensions
- Instructional aides in classroom setting

Multilingual Learners:

- *Point to the jaguar. Ask: Is the jaguar a living thing? (Yes.) What is the jaguar doing? (It is drinking water.) Does the jaguar need water to live? (Yes.) Continue by asking yes/no questions about the needs of the turtle shown on page 11. Provide sentence frames to help students describe the needs of living things: A turtle breathes. It needs (air) to live. A jaguar drinks. It needs (water) to live. Ask students to draw a picture of*

an animal, such as a pet, meeting one or more of its needs. Work with students to help them write descriptive words about the animal and what need the picture is showing.

- Have pairs of students prepare five index cards: one card for each animal need. Students should illustrate each need with a drawing, and may write the name of the need if they are able. Pairs can use the cards to help form sentences. Provide sentence frames to help students express their ideas: *Animals need to drink (water) to (live). Animals need to eat (food) to (live). Animals need to breathe (air) to (live). Animals need to find (space/shelter) to (live).* Have students explain what a day in the life of an animal might be like, including how they might meet their needs during the day.
- Point to the pile of tires. Ask: Are these tires made from reused materials? (No.) Can people reuse these tires to make something else? (Yes.) Point to the playground surface. Is this playground surface made from reused materials? (Yes.) What was reused to make this surface? (old tires) Provide sentence frames to help students describe how people can reuse resources: *Tires can be (reused) to make something else. A playground surface can be made from (reused) tires.* Ask students to draw a picture showing different ways that people can reuse materials to make something new. Work with students to help write descriptive words about the new creation and what resource was reused to make it.
- Preview content vocabulary
- Visual clues (pictures)
- Repeated directions
- Check for understanding
- Ask pointed questions
- Picture cards for readers workshop routines and expectations
- Peer models
- English language supports for parents of non English speaking students. *Ex: Teacher created dictionary with weather words and labels in English and student's first language.*

Students at Risk of School Failure:

- Have students draw a picture of a plant in the classroom or outside (either visible from a classroom window or on the playground). Direct students to include the soil in which the plant is growing, the space it has to grow, and any other need that can be seen (e.g, getting light from the sun, getting water from rain or a watering can). Remind students that plants need these things in order to live.
- Provide sentence frames to help students describe the needs of living things: *A turtle breathes. It needs (air) to live. A jaguar drinks. It needs (water) to live.* Ask students to draw a picture of an animal, such as a pet, meeting one or more of its needs. Work with students to help them write descriptive words about the animal and what need the picture is showing.
- Have students explain what a day in the life of an animal might be like, including how they might meet their needs during the day.
- Response to intervention - targeted skill/goal improvement plans within a set time frame
- Hands on materials
- Multi-sensory manipulatives

- Color coding word tracking
- Preferential seating
- Behavior chart to increase focus and work completion
- Use of FM system to improve attention and support auditory information
- Sensory breaks with timers
- Chromebook extensions
- Consultation with academic support teachers to address skills identified by classroom teacher

Gifted and Talented Students:

- Have students draw a picture of a garden in which several plants are growing. Ask students the following questions as they make their drawings: Do your plants have enough space to grow? Are they getting air? Are they planted in the soil? Can your garden get enough sunlight? Encourage students to draw their gardens such that all the plants' needs are being met and the plants can live and grow.
- Challenge questions
- Higher leveled thinking about information within the text (making connections, predictions without prompting)
- Recall routines and procedures without prompting and move from talking to writing
- Leveled readers
- Quality responses to questions and advanced prompts

Students with 504 Plans:

- Have students draw a picture of a plant in the classroom or outside (either visible from a classroom window or on the playground). Direct students to include the soil in which the plant is growing, the space it has to grow, and any other need that can be seen (e.g, getting light from the sun, getting water from rain or a watering can). Remind students that plants need these things in order to live.
- Have students explain what a day in the life of an animal might be like, including how they might meet their needs during the day.
- Extended time for assignments
- Prompting
- Reassurance and time to formulate ideas
- Visual clues (pictures)
- Preferential seating
- Repeated directions
- Check for understanding
- Ask pointed questions
- Instructional Aides in classroom setting
- Peer models
- Frequent breaks during read alouds
- Use of FM system to improve attention and support auditory information
- Behavior chart to increase focus and work completion
- Sensory breaks with timers
- Chromebook extensions

ASSESSMENTS

Formative
Wrap It Up! Questions
Various levels of questioning
Teacher Observation
Class Discussions/Partner Talk
Science Notebook activities
Performance Expectation Activities: *Investigate; Think Like a Scientist; Think Like an Engineer, STEAM Projects*
Teacher Rubrics for Performance Expectations Activities

Summative
Life Science Summary
Life Science Performance Task
DCI Review: Life Science

Core Instructional Materials

National Geographic Exploring Science
National Geographic My NG connect Exploring Science Digital Resources
National Geographic Exploring Science through Literacy Teacher's Guide
Hand2Mind Exploring Science Hands on Kit

Leveled Readers

- What Animal Is It?- Picture Book
- What Parts Do Animals Have?- Picture Book
- Animals in Africa- Level A
- Guess the Animal-Level A
- Animals in the Arctic-Level B
- Animals in Australia- Level C

Supplemental Materials

- Generation Genius

Suggested Websites

- http://ngss.nsta.org/AccessStandardsByTopic.aspx - The NGSS Standards, by topic
- http://ngss.nsta.org/Classroom-Resources.aspx - lesson ideas
- http://sciencespot.net/Pages/refdeskNextGen.html - lesson ideas
- http://brainpopjr.com

INTERDISCIPLINARY CONNECTIONS

English Language Arts

Reading

- **RI.CR.K.1** With prompting and support, ask and answer questions about key details in an informational text (e.g., who, what, where, when, why, how).

Writing

- **W.AW.K.1.** Use a combination of drawing, dictating, and writing to compose opinion pieces on topics or texts (e.g., My favorite book is...).
- **W.IW.K.2.** Use a combination of drawing, dictating, and writing to compose informative/explanatory texts to convey ideas.
- **W.RW.K.7.** With prompting and support, engage in brief but regular writing and drawing tasks.

Speaking and Listening

- **SL.PE.K.1.** Participate in collaborative conversations with diverse partners about kindergarten topics and texts with peers and adults in small and larger groups.
- **SL.II.K.2.** Confirm understanding of a text read aloud or information presented orally or through other media by asking and answering questions about key details and requesting clarification if something is not understood.
- **SL.ES.K.3.** Ask and answer questions in order to seek help, get information, or clarify something that is not understood.
- **SL.UM.K.5.** Add drawings or other visual displays to descriptions as desired to provide additional detail.
- **SL.AS.K.6.** Speak audibly and express thoughts, feelings, and ideas clearly.

Mathematics

- **MP.2** Reason abstractly and quantitatively. (K-ESS3-1)
- **MP.4** Model with mathematics. (K-ESS3-1)
- **K.CC** Counting and Cardinality (K-ESS3-1)
- **K.M.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. For example, directly compare the heights of two children and describe one child as taller/shorter.

Visual and Performing Arts

- **1.5.2.Cr1a** Engage in individual and collaborative exploration of materials and ideas through multiple approaches, from imaginative play to brainstorming, to solve art and design problems.
- **1.5.2.Cr2c** Create art that represents natural and constructed environments.

Identify and classify uses of everyday objects through drawings, diagrams, sculptures or other visual means including repurposing objects to make something new.
- **1.1.2.Pr4c** Demonstrate contrasting dynamics and energy with accuracy (e.g., loose/tight, light/heavy, sharp/smooth).

Comprehensive Health and Physical Education
- **2.1.2.PP.1** Define reproduction.
- **2.1.2.PP.2** Explain the ways in which parents may care for their offspring (e.g., animals, people, fish).

NJSLS Career Readiness, Life Literacies, and Key Skills

CAREER AWARENESS, EXPLORATION, PREPARATION, AND TRAINING
- **9.2.2.CAP.1.** Make a list of different types of jobs and describe the skills associated with each job.
- **9.2.2.CAP.2.** Explain why employers are willing to pay individuals to work.

LIFE LITERACY AND KEY SKILLS
- **9.4.2.CI.1** Demonstrate openness to new ideas and perspectives (e.g., 1.1.2.CR1a, 2.1.2.EH.1, 6.1.2.CivicsCM.2).
- **9.4.2.CI.2** Demonstrate originality and inventiveness in work (e.g., 1.3A.2CR1a).
- **9.4.2.CT.1** Gather information about an issue, such as climate change, and collaboratively brainstorm ways to solve the problem (e.g., K-2-ETS1-1, 6.3.2.GeoGI.2).
- **9.4.2.CT.2** Identify possible approaches and resources to execute a plan (e.g., 1.2.2.CR1b, 8.2.2.ED.3).
- **9.4.2.CT.3** Use a variety of types of thinking to solve problems (e.g., inductive, deductive).
- **9.4.2.DC.7** Describe actions peers can take to positively impact climate change (e.g., 6.3.2.CivicsPD.1).

PRACTICES
- **CLKSP4** Demonstrate creativity and innovation.
- **CLKSP5** Utilize critical thinking to make sense of problems and persevere in solving them.
- **CLKSP6** Model integrity, ethical leadership and effective management.

Computer Science & Design Thinking

Domain	Core Idea	Performance Expectation
Data & Analysis	Data can be used to make predictions about the world	8.1.2.DA.3: Identify and describe patterns in data visualizations 8.1.2.DA.4: Make predictions based on data using charts or

		graphs.
Algorithms & Programming	Complex tasks can be broken down into simpler instructions, some of which can be broken down even further.	8.1.2.AP.4: Break down a task into a sequence of steps.
Engineering Design	Engineering design is a creative process for meeting human needs or wants that can result in multiple solutions.	8.2.2.ED.2: Collaborate to solve a simple problem, or to illustrate how to build a product using the design process.
Effects of Technology on the Natural World	The use of technology developed for the human designed world can affect the environment, including land, water, air, plants, and animals. Technologies that use natural sources can have negative effects on the environment, its quality, and inhabitants. Reusing and recycling materials can save money while preserving natural resources and avoiding damage to the environment.	8.2.2.ETW.4: Explain how the disposal of or reusing a product affects the local and global environment.

SOCIAL EMOTIONAL LEARNING COMPETENCIES

- **Self-Awareness**: ability to recognize one's emotions and know one's strengths and limitations
    - Connections:
        - Reflecting on one's learning (Oral, Thumbs Up, Thumbs Down, Pictures, etc.)

- **Self-Management**: ability to regulate and control one's emotions and behaviors, particularly in stressful situations
    - Connections:
        - Visit the mindfulness corner in the classroom for self-soothing activities (Squishy ball, sand timer, fidget popper, etc.)

- **Social Awareness**: ability to take the perspective of others, demonstrate empathy, acknowledge and appreciate similarities and differences, and understand how one's actions influence and are influenced by others
    - Connections:

        - Students collaborate and help each other during STEAM projects

- **Relationship Skills**: refers to one's ability to demonstrate prosocial skills and behaviors in order to develop meaningful relationships and resolve interpersonal conflicts
    - Connections:
        - Class discussions
        - Incentives for individual students and small groups

- **Responsible Decision-Making**: refers to the ability to use multiple pieces of information to make ethical and responsible decisions
    - Connections:
        - Class rules and routines
        - Class discussions
        - Following directions for STEAM projects

Appendix A

K-2 Engineering Design Standards

Students who demonstrate understanding can:
K-2-ETS1-1. Ask questions, make observations, and gather information about a situation people want to change (e.g., climate change) to define a simple problem that can be solved through the development of a new or improved object or tool.

K-2-ETS1-2. Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.

K-2-ETS1-3. Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.

Disciplinary Core Ideas

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)

Science and Engineering Practices

Asking Questions and Defining Problems

Asking questions and defining problems in K–2 builds on prior experiences and progresses to simple descriptive questions.

- Ask questions based on observations to find more information about the natural and/or designed world. (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

Modeling in K–2 builds on prior experiences and progresses to include using and developing models (i.e., diagram, drawing, physical replica, diorama, dramatization, or storyboard) that represent concrete events or design solutions.

- Develop a simple model based on evidence to represent a proposed object or tool. (K-2-ETS1-2)

Analyzing and Interpreting Data

Analyzing data in K–2 builds on prior experiences and progresses to collecting, recording, and sharing observations.

- Analyze data from tests of
- an object or tool to determine if it works as intended. (K-2-ETS1-3)

Crosscutting Concepts

Structure and Function

- The shape and stability of structures of natural and designed objects are related to their function(s). (K-2- ETS1-2)