

**COURSE TITLE**

Science Kindergarten

**LENGTH**

Full Year

**DEPARTMENT**

STEM Department

**SCHOOL**

Kindergarten Center

**DATE**

September 10, 2018

## Science Kindergarten

### I. Introduction/Overview/Philosophy

The performance expectations in kindergarten help students formulate answers to questions such as: “What happens if you push or pull an object harder? Where do animals live and why do they live there? What is the weather like today and how is it different from yesterday?” Students are expected to develop understanding of patterns and variations in local weather and the purpose of weather forecasting to prepare for, and respond to, severe weather. Students are able to apply an understanding of the effects of different strengths or different directions of pushes and pulls on the motion of an object to analyze a design solution. Students are also expected to develop understanding of what plants and animals (including humans) need to survive and the relationship between their needs and where they live. In the kindergarten performance expectations, students are expected to demonstrate grade-appropriate proficiency in asking questions, developing and using models, planning and carrying out investigations, analyzing and interpreting data, designing solutions, engaging in argument from evidence, and obtaining, evaluating, and communicating information.

### II. Objectives

#### *Course Outline:*

1. Forces
  - a. Push and Pull
  - b. Strength and direction of force
  - c. Forces and Engineering
2. Plants and Animals
  - a. Survival Needs: Food, Safety, Environmental Changes
  - b. Animal homes
  - c. Plant Needs
3. Weather
  - a. Daily weather
  - b. Seasons
  - c. Sun and heat

#### *Student Outcomes:*

After successfully completing this course, the student will:

- Plan and conduct an investigation to compare the effects of different strengths or different directions of pushes and pulls on the motion of an object.
- 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.
- Use observations to describe patterns of what plants and animals (including humans) need to survive.
- Construct an argument supported by evidence for how plants and animals (including humans) can change the environment to meet their needs.
- Use a model to represent the relationship between the needs of different plants or animals (including humans) and the places they live.

- Communicate solutions that will reduce the impact of humans on the land, water, air, and/or other living things in the local environment.
- Make observations to determine the effect of sunlight on Earth's surface.
- Use tools and materials to design and build a structure that will reduce the warming effect of sunlight on an area.
- Use and share observations of local weather conditions to describe patterns over time.

## ***New Jersey Student Learning Standards***

### ***CAREER READY PRACTICES***

#### ***CRP1 Act as a responsible and contributing citizen and employee.***

Career-ready individuals understand the obligations and responsibilities of being a member of a community, and they demonstrate this understanding every day through their interactions with others. They are conscientious of the impacts of their decisions on others and the environment around them. They think about the near-term and long-term consequences of their actions and seek to act in ways that contribute to the betterment of their teams, families, community and workplace. They are reliable and consistent in going beyond the minimum expectation and in participating in activities that serve the greater good.

#### ***CRP2 Apply appropriate academic and technical skills.***

Career-ready individuals readily access and use the knowledge and skills acquired through experience and education to be more productive. They make connections between abstract concepts with real-world applications, and they make correct insights about when it is appropriate to apply the use of an academic skill in a workplace situation

#### ***CRP4 Communicate clearly and effectively and with reason.***

Career-ready individuals communicate thoughts, ideas, and action plans with clarity, whether using written, verbal, and/or visual methods. They communicate in the workplace with clarity and purpose to make maximum use of their own and others' time. They are excellent writers; they master conventions, word choice, and organization, and use effective tone and presentation skills to articulate ideas. They are skilled at interacting with others; they are active listeners and speak clearly and with purpose. Career-ready individuals think about the audience for their communication and prepare accordingly to ensure the desired outcome.

#### ***CRP6. Demonstrate creativity and innovation.***

Career-ready individuals regularly think of ideas that solve problems in new and different ways, and they contribute those ideas in a useful and productive manner to improve their organization. They can consider unconventional ideas and suggestions as solutions to issues, tasks or problems, and they discern which ideas and suggestions will add greatest value. They seek new methods, practices, and ideas from a variety of sources and seek to apply those ideas to their own workplace. They take action on their ideas and understand how to bring innovation to an organization.

#### ***CRP7. Employ valid and reliable research strategies.***

Career-ready individuals are discerning in accepting and using new information to make decisions, change practices or inform strategies. They use reliable research process to search for new information. They evaluate the validity of sources when considering the use and adoption of external information or practices in their workplace situation.

#### ***CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.***

Career-ready individuals readily recognize problems in the workplace, understand the nature of the problem, and devise effective plans to solve the problem. They are aware of problems when they occur and take action quickly to address the problem; they thoughtfully investigate the root cause of the problem prior to introducing solutions. They carefully consider the options to solve the problem. Once a solution is agreed upon, they follow through to ensure the problem is solved, whether through their own actions or the actions of others.

***CRP11. Use technology to enhance productivity.***

Career-ready individuals find and maximize the productive value of existing and new technology to accomplish workplace tasks and solve workplace problems. They are flexible and adaptive in acquiring new technology. They are proficient with ubiquitous technology applications. They understand the inherent risks-personal and organizational-of technology applications, and they take actions to prevent or mitigate these risks.

***CRP12. Work productively in teams while using cultural global competence.***

Career-ready individuals positively contribute to every team, whether formal or informal. They apply an awareness of cultural difference to avoid barriers to productive and positive interaction. They find ways to increase the engagement and contribution of all team members. They plan and facilitate effective team meetings.

***TECHNOLOGY***

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

***Strand B. Creativity and Innovation:*** Students demonstrate creative thinking, construct knowledge and develop innovative products and process using technology.

8.1.2.B.1- Illustrate and communicate original ideas and stories using multiple digital tools and resources.

***Strand C. Communication and Collaboration:*** Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others.

8.1.2.C.1- Engage in a variety of developmentally appropriate learning activities with students in other classes, schools, or countries using various media formats such as online collaborative tools, and social media.

***Strand E: Research and Information Fluency:*** Students apply digital tools to gather, evaluate, and use information.

8.1.2.E.1- Use digital tools and online resources to explore a problem or issue.

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

***Strand A. The Nature of Technology: Creativity and Innovation*** Technology systems impact every aspect of the world in which we live.

8.2.2.A.1- Define products produced as a result of technology or of nature.

8.2.2.A.2- Describe how designed products and systems are useful at school, home and work.

8.2.2.A.3- Identify a system and the components that work together to accomplish its purpose.

***Strand B. Technology and Society:*** Knowledge and understanding of human, cultural and societal values are fundamental when designing technological systems and products in the global society.

8.2.2.B.1- Identify how technology impacts or improves life.

8.2.2.B.3- Identify products or systems that are designed to meet human needs.

8.2.2.B.4- Identify how the ways people live and work has changed because of technology.

**Strand C. Design:** The design process is a systematic approach to solving problems.

8.2.2.C.1- Brainstorm ideas on how to solve a problem or build a product.

**Strand D. Abilities for a Technological World:** The designed world is the product of a design process that provides the means to convert resources into products and systems.

8.2.2.D.1- Collaborate and apply a design process to solve a simple problem from everyday experiences.

## ***21ST CENTURY LIFE AND CAREERS***

### ***9.2 Career Awareness, Exploration, and Preparation***

#### ***Strand A: Career Awareness***

9.2.4.A.1 Identify reasons why people work, different types of work, and how work can help a person achieve personal and professional goals.

9.2.4.A.4 Explain why knowledge and skills acquired in the elementary grades lay the foundation for future academic and career success.

## ***NEW JERSEY STUDENT LEARNING STANDARDS- SCIENCE***

K-PS2-1. Plan and conduct an investigation to compare the effects of different strengths or different directions of pushes and pulls on the motion of an object.

K-PS2-2. Analyze data to determine if a design solution works as intended to change the speed or direction of an object with a push or a pull.

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

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

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

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

K-ESS2-2. Construct an argument supported by evidence for how plants and animals (including humans) can change the environment to meet their needs.

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

K-ESS3-2. Ask questions to obtain information about the purpose of weather forecasting to prepare for, and respond to, severe weather.

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

K-2-ETS1-1. Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.

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

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

## **III. Proficiency Levels**

This curriculum is appropriate for all students in Kindergarten.

## **IV. Methods of Assessment**

**Student Assessment**

Even though at this level students are not formally assessed in science, progress is monitored both formatively and summatively. Scientific questioning about what they see and experience allows both student and teacher to monitor their understanding of science concepts. Journal writing is introduced to record student progress.

**Curriculum/Teacher Assessment**

The teacher will provide the subject area supervisor with suggestions for changes on an ongoing basis.

**V. Grouping**

This curriculum is appropriate for all students in Kindergarten.

**VI. Articulation/Scope & Sequence/Time Frame**

Course length is one year.

**VII. Resources*****Texts/Supplemental Reading/References***

Resources include but are not limited to:

1. [www.mysteryscience.com](http://www.mysteryscience.com)
2. Various Nonfiction Books

**VIII. Suggested Activities**

Appropriate activities are listed in the curriculum map.

**IX. Methodologies**

Appropriate methodologies include hands-on active learning, inquiry, integration of disciplines and content areas, and multi-sensory methods. Lessons created by the elementary science specialist serve to coordinate with and enhance the content area topics. Technology plays an important part in learning science as well.

**X. Interdisciplinary Connections**

At this grade level, connections to many other disciplines are appropriate and natural. Reading and writing become an integral part of the science process. Connections with mathematics are frequent throughout the curricula.

**XI. Differentiating Instruction for Students with Special Needs: Students with Disabilities, Students at Risk, English Language Learners, and Gifted & Talented Students**

Differentiating instruction is a flexible process that includes the planning and design of instruction, how that instruction is delivered, and how student progress is measured. Teachers recognize that students can learn in

multiple ways as they celebrate students' prior knowledge. By providing appropriately challenging learning, teachers can maximize success for all students.

Differentiating in this course includes but is not limited to:

*Differentiation for Support (ELL, Special Education, Students at Risk)*

- Peer mentoring on problems
- Differentiated teacher feedback on assignments
- Modeling out problems on whiteboard
- Visual aids as we project problems on whiteboard
- Study guides
- Tiered assignments
- Scaffolding of materials and assignments
- Re-teaching and review
- Guided note taking
- Exemplars of varied performance levels
- Multi-media approach to accommodating various learning styles

*Differentiation for Enrichment*

- Supplemental reading material for independent study
- Flexible grouping
- Tiered assignments
- Topic selection by interest
- Enhanced expectations for independent study
- Elevated questioning techniques using Webb's Depth of Knowledge matrix

## **XII. Professional Development**

The teacher will continue to improve expertise through participation in a variety of professional development opportunities.

## XII. Curriculum Map/Pacing Guide

Unit Topic	Time Allocated	Differentiating Instruction for Students with Disabilities, Students at Risk, English Language Learners, & Gifted & Talented Students	Standards	Assessments
Forces <ul style="list-style-type: none"> <li>• Push and Pull</li> <li>• Strength and direction of force</li> <li>• Forces and Engineering</li> </ul>	13 weeks	<i>For Support:</i> <ul style="list-style-type: none"> <li>• Provide role playing opportunities</li> </ul> <i>For Enhancement:</i> <ul style="list-style-type: none"> <li>• Compare and contrast 2 different machine types.</li> <li>• Identify the effects that machines can have on work</li> <li>• Analyze data derived through experimentation</li> </ul>	K-PS2-1, K-PS2-2, K-ETS1-2, K-2-ETS1-3 CRP1,2,4,6,7,8,11,12 8.1.2.B.1, 8.1.2.C.1, 8.1.2.E.1 8.2.2.A.1, 8.2.2.A.2, 8.2.2.A.3, 8.2.2.B.1, 8.2.2.B.3, 8.2.2.B.4, 8.2.2.C.1, 8.2.2.D.1, 8.2.2.E.1 9.2.4.A.4	<ul style="list-style-type: none"> <li>• Demonstrate an understanding that machines multiply the work a human can do.</li> <li>• Identify Cause and effect relationship between the movement of a machine and the work it can do</li> <li>• Identify cause and effect relationship between the size of an object the direction or speed</li> </ul>
Plants and Animals <ul style="list-style-type: none"> <li>• Survival Needs: Food, Safety, Environmental Changes</li> <li>• Animal homes</li> <li>• Plant Needs</li> </ul>	13 weeks	<i>For Support:</i> <ul style="list-style-type: none"> <li>• Provide opportunities to create animal homes introduced</li> <li>• Utilize visual representation of the identified needs</li> </ul> <i>For Enhancement:</i> <ul style="list-style-type: none"> <li>• Provide evidence to</li> </ul>	K-LS1-1, K-ESS3-1, K-ESS2-2, K-LS1-1, K-ESS3-3 CRP1,2,4,6,7,8,11,12 8.1.2.B.1, 8.1.2.C.1, 8.1.2.E.1 8.2.2.A.1, 8.2.2.A.2, 8.2.2.A.3, 8.2.2.B.1,	<ul style="list-style-type: none"> <li>• Recognize and demonstrate animal behaviors to seek out food</li> <li>• Identify animal homes</li> <li>• Identify animal needs</li> <li>• Illustrate the system of</li> </ul>

Unit Topic	Time Allocated	Differentiating Instruction for Students with Disabilities, Students at Risk, English Language Learners, & Gifted & Talented Students	Standards	Assessments
		support why animals act in certain ways. <ul style="list-style-type: none"> <li>Identify patterns in the natural world that have not been identified</li> </ul>	8.2.2.B.3, 8.2.2.B.4, 8.2.2.C.1, 8.2.2.D.1, 8.2.2.E.1 9.2.4.A.4	plants, animals and their surrounding's interaction <ul style="list-style-type: none"> <li>Identify impact of people on environment</li> </ul>
Weather <ul style="list-style-type: none"> <li>Daily weather</li> <li>Seasons</li> <li>Sun and heat</li> </ul>	13 weeks	<i>For Support:</i> <ul style="list-style-type: none"> <li>provide visual choices to identify weather</li> <li>provide a hands-on experience to demonstrate heat from the sun</li> </ul> <i>For Enhancement:</i> <ul style="list-style-type: none"> <li>predict upcoming weather based on observed weather patterns</li> <li>predict temperature of other planets based on proximity to sun.</li> </ul>	K-ESS2-1, K-ESS3-2, K-PS3-1, K-PS3-2, K-2-ETS1-2, K-2-ETS1-3 CRP1,2,4,6,7,8,11,12 8.1.2.B.1, 8.1.2.C.1, 8.1.2.E.1 8.2.2.A.1, 8.2.2.A.2, 8.2.2.A.3, 8.2.2.B.1, 8.2.2.B.3, 8.2.2.B.4, 8.2.2.C.1, 8.2.2.D.1, 8.2.2.E.1 9.2.4.A.4	<ul style="list-style-type: none"> <li>Identify observed weather</li> <li>Identify cause and effect relationship between weather tracking and hazard preparation</li> <li>Demonstrate an understanding of cause and effect relationship between sunlight and the temperature on Earth's surface</li> </ul>