Kindergarten – Unit 2 - Effects of the Sun & Pushes and Pulls

Mission Statement
The primary goal of the Swedesboro-Woolwich School District is to prepare each student with the real life skills needed to compete in a highly competitive global economy. This will be achieved by providing a comprehensive curriculum, the integration of technology, and the professional services of a competent and dedicated faculty, administration, and support staff. Guiding this mission will be Federal mandates, including No Child Left Behind, the New Jersey Core Curriculum Content Standards, and local initiatives addressing the individual needs of our students as determined by the Board of Education. The diverse resources of the school district, which includes a caring PTO and active adult community, contribute to a quality school system. They serve an integral role in supporting positive learning experiences that motivate, challenge and inspire children to learn.

Unit/Module Overview

Effects of the Sun

- In the first part of this unit, students make observations to explore how sunlight warms the Earth's surface. The Sun's energy heats up the pavement, keeps us warm, and can even melt marshmallows. Using what they learn, students think about ways that shade and structures can reduce the warming effect of the Sun.

Pushes & Pulls

- Students will next be introduced to pushes and pulls and how those affect the motion of objects. Students observe and investigate the effects of what happens when the strength or direction of those pushes and pulls are changed. The crosscutting concepts of patterns, cause and effect, interdependence of science, engineering, and technology, and the influence of engineering, technology, and science on society and the natural world are called out as organizing concepts for the disciplinary core ideas. Students are expected to demonstrate age appropriate proficiency in asking questions, analyzing and interesting data, and obtaining, evaluating, and communicating information. Students are also expected to use these practices to demonstrate understanding of the core ideas.

Standards Covered in Current Unit/Module
Related Standards and Learning Goals
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. 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. **Disciplinary Core Ideas** ● PS3.B: Conservation of Energy and Energy Transfer ○ Sunlight warms Earth's surface. (K-PS3-1, K-PS3-2) ● ETS1.A: Defining and Delimiting Engineering Problems ○ A situation that people want to change or create can be approached as a problem to be solved through engineering. (K-2-ETS1-1) ○ Asking questions, making observations, and gathering information are helpful in thinking about problems. (K2-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) ● 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. (KPS2-1, 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) ● ETS1.A: Defining Engineering Problems ○ A situation that people want to change or create can be approached as a problem to be solved through engineering. Such problems may have

many acceptable solutions. (secondary to K-PS2-2)

- ETS1.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

- Planning and Carrying Out Investigations
  - Make observations (firsthand or from media) to collect data that can be used to make comparisons. (K-PS3-1)
  - With guidance, plan and conduct an investigation in collaboration with peers. (K-PS2-1)
- Constructing Explanations and Designing Solutions
  - Use tools and materials provided to design and build a device that solves a specific problem or a solution to a specific problem. (K-PS3-2)
- Asking Questions and Defining Problems
  - Ask questions based on observations to find more information about the natural and/or designed world(s). (K2-ETS1-1)
  - Define a simple problem that can be solved through the development of a new or improved object or tool. (K2-ETS1-1)
- Developing and Using Models
  - Develop a simple model based on evidence to represent a proposed object or tool. (K-2-ETS1-2)
- Analyzing and Interpreting Data
  - Analyze data from tests of an object or tool to determine if it works as intended. (K-2-ETS1-3)
  - Analyze data from tests of an object or tool to determine if it works as intended. (K-PS2-2) (K-2-ETS1-3)

Crosscutting Concepts

- Cause and Effect
  - Events have causes that generate observable patterns. (K-PS3-1, K-PS3-2)
  - Simple tests can be designed to gather evidence to support or refute student ideas about causes. (K-PS2-1, KPS2-2)
- Structure and Function
  - The shape and stability of structures of natural and designed objects are related to their function(s). (K-2- ETS1-2)
- Scientific Investigations Use a Variety of Methods
  - Scientists use different ways to study the world. (K-PS3-1)

Learning Targets	Essential Questions
• I can ask questions to prepare and respond to severe weather. • I can construct an argument supported by evidence for how plants and animals can change the environment to meet their needs. • I can create lists of explanations of the phenomena • I can explain how to prepare for severe storms and weather • I can explain why spring is the best time for offspring to be born • I can identify weather patterns and sequence of seasons	• How can you design a simple way to change the speed or direction of an object using a push or pull from another object? • How does sunlight affect the playground? • Imagine that we have been asked to design a new playground. How would we keep the sand, soil, rocks, and water found on the playground cool during the summer? • What causes pushes and pulls to have different strengths?

• I can observe and describe the weather • I can observe changes in weather to identify when a storm is near. • I can observe weather conditions and identify patterns over time in the arctic. • I can track and record weather data and analyze patterns • I can use and share local weather conditions to describe patterns over time.	

Unit/Module Weekly Learning Activities and Pacing Guide			
Topic & # Days	**NJ Standards**	**Critical Knowledge & Skills**	**Possible Resources & Activities**
Grade K– Unit 2 Effects of Sun; Pushes and Pulls 1 day	• K-PS3-1. Make observations to determine the effect of sunlight on Earth's surface.	**Obj. We are learning to**: • Targets Listed Above **Suggested Formative Assessment(s)**: • • Graphic Organizers • • Mystery Science Formative Assessments • • Mystery Science Summative Assessments	Resources and Activities: • *Anchor Phenomena • Solar Sizzle Materials · Mystery Science · NJCTL ○ Marble Rolls ○ Ramp Building ○ Forces and Motions Unit ○ Roller Coaster · The Wonder of Science - Sun Warms the Earth · Brainpop Jr. Videos · PebbleGo

Grade K– Unit 2 Effects of Sun; Pushes and Pulls 3 days	• K-PS3-1. Make observations to determine the effect of sunlight on Earth's surface. • 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-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.	**Obj. We are learning to**: • Targets Listed Above **Suggested Formative Assessment(s)**: • • Graphic Organizers • • Mystery Science Formative Assessments • • Mystery Science Summative Assessments	Resources and Activities: • Read-Along Lesson 1: • How could you walk barefoot across hot pavement without burning your feet? Materials · Mystery Science · NJCTL o Marble Rolls o Ramp Building o Forces and Motions Unit o Roller Coaster · The Wonder of Science - Sun Warms the Earth · Brainpop Jr. Videos · PebbleGo
Grade K– Unit 2 Effects of Sun; Pushes and Pulls 4 days	• K-PS3-1. Make observations to determine the effect of sunlight on Earth's surface	**Obj. We are learning to**: • Targets Listed Above **Suggested Formative Assessment(s)**: • • Graphic Organizers • • Mystery Science Formative Assessments • • Mystery Science Summative Assessments	Resources and Activities: • Lesson 3: • Why does it get cold in winter? Materials · Mystery Science · NJCTL o Marble Rolls o Ramp Building o Forces and Motions Unit o Roller Coaster · The Wonder of Science - Sun Warms the Earth · Brainpop Jr. Videos

			· PebbleGo
Grade K– Unit 2 Effects of Sun; Pushes and Pulls 1 day	• K-PS3-1. Make observations to determine the effect of sunlight on Earth's surface	**Obj. We are learning to**: • Targets Listed Above **Suggested Formative Assessment(s)**: • • Graphic Organizers • • Mystery Science Formative Assessments • • Mystery Science Summative Assessments	Resources and Activities: • *Performance Task • Can you use the sun to cook food? Materials · Mystery Science · NJCTL o Marble Rolls o Ramp Building o Forces and Motions Unit o Roller Coaster · The Wonder of Science - Sun Warms the Earth · Brainpop Jr. Videos · PebbleGo
Grade K– Unit 2 Effects of Sun; Pushes and Pulls 3 days	• K-PS2-1. Plan & conduct an investigation to compare the effects of different strengths or different directions of pushes and pulls on the motion of an object.	**Obj. We are learning to**: • Targets Listed Above **Suggested Formative Assessment(s)**: • • Graphic Organizers • • Mystery Science Formative Assessments • • Mystery Science Summative Assessments	Resources and Activities: • Lesson 1: • What's the biggest excavator? Materials · Mystery Science · NJCTL o Marble Rolls o Ramp Building o Forces and Motions Unit o Roller Coaster · The Wonder of Science - Sun Warms the Earth · Brainpop Jr. Videos

			· PebbleGo
Grade K– Unit 2 Effects of Sun; Pushes and Pulls 3 days	• K-PS2-1. Plan & conduct an investigation to compare the effects of different strengths or different directions of pushes and pulls on the motion of an object.	**Obj. We are learning to**: • Targets Listed Above **Suggested Formative Assessment(s)**: • • Graphic Organizers • • Mystery Science Formative Assessments • • Mystery Science Summative Assessments	Resources and Activities: • Read-Along Lesson 2: • Why do builders need so many big machines? Materials · Mystery Science · NJCTL o Marble Rolls o Ramp Building o Forces and Motions Unit o Roller Coaster · The Wonder of Science - Sun Warms the Earth · Brainpop Jr. Videos · PebbleGo
Grade K– Unit 2 Effects of Sun; Pushes and Pulls 4 days	• K-PS2-1. Plan & conduct an investigation to compare the effects of different strengths or different directions of pushes and pulls on the motion of an object.	**Obj. We are learning to**: • Targets Listed Above **Suggested Formative Assessment(s)**: • • Graphic Organizers • • Mystery Science Formative Assessments • • Mystery Science Summative Assessments	Resources and Activities: • Lesson 3: • How can you knock down a wall made of concrete? Materials · Mystery Science · NJCTL o Marble Rolls o Ramp Building o Forces and Motions Unit o Roller Coaster · The Wonder of Science - Sun Warms the Earth

			· Brainpop Jr. Videos · PebbleGo
Grade K– Unit 2 Effects of Sun; Pushes and Pulls 3 days	• 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.	**Obj. We are learning to**: • Targets Listed Above **Suggested Formative Assessment(s)**: • • Graphic Organizers • • Mystery Science Formative Assessments • • Mystery Science Summative Assessments	Resources and Activities: • Read-Along Lesson 4: • How can you knock down the most bowling pins? Materials · Mystery Science · NJCTL o Marble Rolls o Ramp Building o Forces and Motions Unit o Roller Coaster · The Wonder of Science - Sun Warms the Earth · Brainpop Jr. Videos · PebbleGo
Grade K– Unit 2 Effects of Sun; Pushes and Pulls 4 days	• 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-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	**Obj. We are learning to**: • Targets Listed Above **Suggested Formative Assessment(s)**: • • Graphic Organizers • • Mystery Science Formative Assessments • • Mystery Science Summative Assessments	Resources and Activities: • Lesson 5: • How can we protect a mountain town from falling rocks? Materials · Mystery Science · NJCTL o Marble Rolls o Ramp Building o Forces and Motions Unit o Roller Coaster

	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.		· The Wonder of Science - Sun Warms the Earth · Brainpop Jr. Videos · PebbleGo
Grade K– Unit 2 Effects of Sun; Pushes and Pulls 3 days	• 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.	**Obj. We are learning to**: • Targets Listed Above **Suggested Formative Assessment(s)**: • • Graphic Organizers • • Mystery Science Formative Assessments • • Mystery Science Summative Assessments	Resources and Activities: • Read-Along Lesson 6: • How could you invent a trap? • Performance Task Materials · Mystery Science · NJCTL o Marble Rolls o Ramp Building o Forces and Motions Unit o Roller Coaster · The Wonder of Science - Sun Warms the Earth · Brainpop Jr. Videos · PebbleGo

Interdisciplinary Connections	Career Ready, Life Literacies, and Key Skills
NJSLS ELA RI.K.1 With prompting and support, ask and answer questions about key details in a text. (K-PS2-2) W.K.7 Participate in shared research and writing projects (e.g., explore a number of books by a favorite author and express opinions about them). (K-PS2-1) SL.K.3 Ask and answer questions in order to seek help, get information, or clarify something that is not understood. (K-PS2-2) NJSLS Mathematics MP.2 Reason abstractly and quantitatively. (K-PS2-1) MP.4 Model with mathematics. (K-2-ETS1-3) MP.5 Use appropriate tools strategically. (K-2-ETS1-3) K.MD.A.1 Describe measurable attributes of objects, such as length or weight. Describe several measurable attributes of a single object. (K-PS2-1) K.MD.A.2 Directly compare two objects with a measurable attribute in common, to see which object has "more of/less of" the attribute, and describe the difference. (K-PS2-1) English Language Arts In order to integrate English Language Arts into this unit, students need the opportunity to participate in shared research that will enhance their understanding of the effect of forces (pushes and pulls) on objects. This could include exploring simple books and other media or digital resources. With prompting and support, students should ask and answer questions about key details in texts in order to seek help, get information, or clarify something that they do not understand. With support from adults, students will also recall information from experiences to answer questions and clarify their thinking. With support and/or collaboration, they can use digital tools to produce and publish simple informative writing or to document their observations of the simple force and motion systems they design and build. Mathematics	CS.K-2.8.1.2.DA.3 Identify and describe patterns in data visualizations. CS.K-2.8.1.2.DA.4 Make predictions based on data using charts or graphs. CAEP.9.2.4.A.2 Identify various life roles and civic and work - related activities in the school, home, and community. CAEP.9.2.4.A.4 Explain why knowledge and skills acquired in the elementary grades lay the foundation for future academic and career success. TECH.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). TECH.9.4.2.CI.2 Demonstrate originality and inventiveness in work (e.g., 1.3A.2CR1a). TECH.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).

During this unit of study, students will make connections to Mathematics in a number of ways. Kindergartners can use simple nonstandard units to measure the distances that two different objects travel when pushed or pulled or the distances that an object travels when varying the strength of a push or a pull. If using two objects, students can compare them using a measurable attribute, such as weight, to see which object has "more of" or "less of" the attribute, and describe the effect that increased weight has on the distance that an object travels. As students conduct multiple trials with the two objects (or with a single object, varying the strength of the push or pull), they can document the distance traveled in a simple graph. Then they can analyze the data in order to describe the cause-and-effect relationship between forces and motion of objects. As students collect and analyze data, they are learning to reason abstractly and quantitatively and use appropriate tools strategically	

Link to Additional Components including Cross Curricular Connections, Accommodations, Assessments, Etc

ELA Enduring Understanding Statements