South Harrison Township Elementary School District

Committed to Excellence

Course Name: Science	**Grade Level(s): Third**
BOE Adoption Date: October 2017	**Revision Date(s):**

ABSTRACT

Science in the third grades covers topics in all three of the sciences. The Life Science unit has students explore Earth's ecosystems and the effect of humans on them. Students will also study the growth and development of organisms within those habitats, and how offspring look similar, but not identical, to their parents. Forces and Motion begin the physical science unit. Students will look for patterns in pushes and pulls to make predictions on the speed or direction of an object's motion. The relationship between electricity and magnetism are investigated, and students will use that relationship to solve a practical engineering problem. Weather and climate are revisited from earlier grades, and students will design ways to reduce the impact of natural hazards.

TABLE OF CONTENTS

Mission Statement

The primary goal of the South Harrison Township Elementary 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 the Every Student Succeeds Act (ESSA), the New Jersey Student Learning 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 Home and School Association (HSA) 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.

Curriculum and Instruction Goals

Goal(s):

1. To ensure students are college and career ready upon graduation
2. To vertically and horizontally align curriculum K-12 to ensure successful transition of students at each grade level
3. To identify individual student strengths and weaknesses utilizing various assessment measures (formative, summative, alternative, etc.) so as to differentiate instruction while meeting the rigor of the applicable content standards
4. To improve student achievement as assessed through multiple measures including, but not limited to, state testing, local assessments, and intermediate benchmarking

Philosophy of the Shared Curriculum Service with Kingsway Regional School District

Together in its partnership with the South Harrison Township Elementary School District, the Kingsway Curriculum & Instruction Department is committed to providing all students grades K-12 with an engaging and quality curricular experience that aligns with the New Jersey Student Learning Standards (NJ SLS) for mathematics and English-Language Arts as well as the New Jersey Student Learning Standards (NJ SLS) for all other core disciplines. It is the goal of this shared service to provide students with curricular and educational experiences that allows them to succeed as they move on to the middle and high school level. Through this shared service, both horizontal and vertical alignment is stressed at and within each grade level with the aim of developing life-long learners who are college and career ready upon graduation from high school. Additionally, classroom instruction will be designed to meet the unique learning desires of all children and will be differentiated according to the needs of each learner. Whether through added support or enrichment activities, it is the role of the educator in the classroom to ensure students are reaching their highest level of social, emotional, and academic growth each school year. A combination of summative, formative, and performance-based

assessments will be used to assess students' understanding and acquisition of necessary concepts and skills. Group work, projects, and a variety of co-curricular activities will make mathematics more meaningful and aid in the understanding of its application across all disciplines as well as in life.

How to Read this Document

This document contains a pacing guide and curriculum units. The pacing guides serve to deliver an estimated timeframe as to when noted skills and topics will be taught. The pacing of each course, however, will differ slightly depending upon the unique needs of each class. The curriculum units contain more detailed information as to the specific skills and concepts that are introduced as well as how students will be assessed. The terms and definitions below will assist the reader in better understanding the sections and components of this curriculum document.

Terms to Know

1. **Accommodation(s):** The term "accommodation" may be used to describe an *alteration* of environment, curriculum format, or equipment that allows an individual with a disability to gain access to content and/or complete assigned tasks. They allow students with disabilities to pursue a regular course of study. The term accommodation is often used interchangeable with the term modification. However, it is important to remember that modifications change or modify the intended learning goal while accommodations result in the same learning goal being expected but with added assistance in that achievement. Since accommodations do not alter what is being taught, instructors should be able to implement the same grading scale for students with disabilities as they do for students without disabilities.

2. **Differentiated Instruction:** Differentiation of instruction relies on the idea that instructional approaches should be tailored to each individual student's learning needs. It provides students an array of options during the learning process that allows them make sense of ideas as it relates to them. The integration of differentiated instructional techniques is a curriculum design approach to increase flexibility in teaching and decrease the barriers that frequently limit student access to materials and learning in classrooms. http://www.udlcenter.org/aboutudl

3. **Enduring Understanding:** Enduring understandings (aka big ideas) are statements of understanding that articulate deep conceptual understandings at the heart of each content area. Enduring understandings are noted in the alongside essential questions within each unit in this document. http://www.ascd.org

4. **Essential Question:** These are questions whose purpose is to stimulate thought, to provoke inquiry, and to spark more questions. They extend beyond a single lesson or unit. Essential questions are noted in the beginning of each unit in this document. http://www.ascd.org

5. **Formative Assessment(s):** Formative assessments monitor student learning to provide ongoing feedback that can be used by (1) instructors to improve teaching and (2) by students to improve their learning. Formative assessments help identify students' strengths and weaknesses and address problems immediately.

6. **Learning Activity(s):** Learning activities are those activities that take place in the classroom for which the teacher facilitates and the students participate in to ensure active engagement in the learning process. (Robert J. Marzano, *The Art and Science of Teaching*)

7. **Learning Assignment(s):** Learning assignments are those activities that take place independently by the student inside the classroom or outside the classroom (i.e. homework) to extend concepts and skills within a lesson. http://www.marzanocenter.com

8. **Learning Goal(s):** Learning goals are broad statements that note what students "should know" and/or "be able to do" as they progress through a unit. Learning goals correlate specifically to the NJSLS (New Jersey Student Learning Standards) are noted within each unit.

9. **Learning Objective(s):** Learning objectives are more specific skills and concepts that students must achieve as they progress towards the broader learning goal. These are included within each unit and are assessed frequently by the teacher to ensure students are progressing appropriately. http://www.marzanoresearch.com

10. **Model Assessment:** Within the model curriculum, model assessments are provided that included assessments that allow for measuring student proficiency of those target skills as the year of instruction progresses. http://www.state.nj.us/education/modelcurriculum/

11. **Model Curriculum:** The model curriculum has been provided by the state of New Jersey to provide a "model" for which districts can properly implement the NJSLS (New Jersey Student Learning Standards) by providing an example from which to work and/or a product for implementation.

12. **Modification(s):** The term "modification" may be used to describe a *change* in the curriculum. Modifications are typically made for students with disabilities who are unable to comprehend all of the content an instructor is teaching. The term modification is often used interchangeable with the term accommodations. However, it is important to remember that modifications change or modify the intended learning goal while accommodations result in the same learning goal being expected but with assistance in that achievement.

13. **Performance Assessment(s):** (aka alternative or authentic assessments) Performance assessments are a form of assessment that requires students to perform tasks that generate a more authentic evaluation of a student's knowledge, skills, and abilities. Performance assessments stress the application of knowledge and extend beyond traditional assessments (i.e. multiple-choice question, matching, true & false, etc.).

14. **Standard(s):** Academic standards, from which the curriculum is built, are statements that of what students "should know" or "be able to do" upon completion of a grade-level or course of study. Educational standards help teachers ensure their students have the skills and knowledge they need to be successful by providing clear goals for student learning. http://www.state.nj.us/njded/cccs/

    - **State:** The New Jersey Student Learning Standards (NJSLS) include Preschool Teaching and Learning Standards as well as K-12 standards for: *Visual and Performing Arts; Comprehensive Health and Physical Education; Science; Social Studies; World Languages; Technology; and 21st-Century Life and Careers.*

15. **Summative Assessment(s):** Summative assessments evaluate student learning at the end of an instructional time period by comparing it against some standard or benchmark. Information from summative assessments can be used formatively when students or faculty use it to guide their efforts and activities in subsequent courses.

16. **21st Century Skill(s):** These skills emphasis the growing need to focus on those skills that prepare students successfully by focusing on core subjects and 21st century themes; learning and innovation skills; information, media and technology skills; and life and career skills. These concepts are embedded in each unit of the curriculum. http://www.p21.org/our-work/p21-framework

Proficiencies and Pacing Guide:

Unit Title	Duration/Month(s)	Related Standards	Learning Goals	Crosscutting Concepts
Unit 1 Ecosystems	8 Weeks	**LS2.C: Ecosystem Dynamics, Functioning, and Resilience** When the environment changes in ways that affect a place's physical characteristics, temperature, or availability of resources, some organisms survive and reproduce, others move to new locations, yet others move into the transformed environment, and some die. *(secondary to 3-LS4-4)* **LS4.A: Evidence of Common Ancestry and Diversity** Some kinds of plants and animals that once lived on Earth are no longer found anywhere. (3-LS4-1) Fossils provide evidence about the types of organisms that lived long ago and also about the nature of their environments. (3-LS4-1) **LS4.C: Adaptation** For any particular environment, some kinds of organisms survive well, some survive less	***Students will…*** • Analyze and interpret data from fossils to provide evidence of the organisms and the environments in which they lived long ago. • Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all. • Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change. • Construct an argument that some animals form groups that help members survive.	**Cause and Effect** • Cause and effect relationships are routinely identified and used to explain change. (3-LS2-1),,(3-LS4-3) **Scale, Proportion, and Quantity** • Observable phenomena exist from very short to very long time periods. (3-LS4- 1) **Systems and System Models** • A system can be described in terms of its components and their interactions. (3-LS4-4)

		well, and some cannot survive at all. (3-LS4-3) **LS4.D: Biodiversity and Humans** Populations live in a variety of habitats, and change in those habitats affects the organisms living there. (3-LS4-4)		
Unit 2 Life Cycles	5 Weeks	**LS1.B: Growth and Development of Organisms** Reproduction is essential to the continued existence of every kind of organism. Plants and animals have unique and diverse life cycles. (3-LS1-1 **LS4.B: Natural Selection** Sometimes the differences in characteristics between individuals of the same species provide advantages in surviving, finding mates, and reproducing. (3-LS4-2)	***Students will…*** • Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death. • Use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing.	**Patterns** • Patterns of change can be used to make predictions. (3-LS1-1) **Cause and Effect** • Cause and effect relationships are routinely identified and used to explain change. (3-LS4-2)
Unit 3 Heredity and Traits	5 Weeks	**LS3.A: Inheritance of Traits** Many characteristics of organisms are inherited from their parents. (3-LS3-1) Other characteristics result from individuals' interactions with the environment, which can range from diet to learning. Many characteristics involve	***Students will…*** • Analyze and interpret data to provide evidence that plants and animals have traits inherited from parents and that variation of these traits exists in a group of similar organisms. • Use evidence to support the explanation that traits can	**Patterns** • Similarities and differences in patterns can be used to sort and classify natural phenomena. (3-LS3-1) **Cause and Effect** • Cause and effect relationships are routinely identified and used to explain change. (3-LS3-2),

		both inheritance and environment. (3- LS3-2) **LS3.B: Variation of Traits** Different organisms vary in how they look and function because theyhave different inherited information. (3-LS3- 1) The environment also affects the traits that an organism develops. (3-LS3-2) **ETS1.B: Developing Possible Solutions** Research on a problem should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions. (3-5-ETS1-2) At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs. (3-5-ETS1-2)	be influenced by the environment. • Use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing. • Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.	**Influence of Science, Engineering, and Technology on Society and the Natural World** • Engineers improve existing technologies or develop new ones to increase their benefits, decrease known risks, and meet societal demands. (3-5-ETS1-2)
Unit 4 Forces and Motion	6 Weeks	**PS2.A: Forces and Motion** Each force acts on one particular object and has both strength and a direction. An object at rest typically has multiple forces acting on it, but they add to give zero net force on the object. Forces that do not sum to zero	***Students will…*** • Plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces on the motion of an object. • Make observations and/or	**Patterns** • Patterns of change can be used to make predictions. (3-PS2-2) **Cause and Effect** • Cause and effect relationships are routinely identified. (3-PS2-1)

		can cause changes in the object's speed or direction of motion.(Boundary: Qualitative and conceptual, but not quantitative addition of forces are used at this level.) (3-PS2-1) The patterns of an object's motion in various situations can be observed and measured; when that past motion exhibits a regular pattern, future motion can be predicted from it. (Boundary: Technical terms, such as magnitude, velocity, momentum, and vector quantity, are not introduced at this level, but the concept that some quantities need both size and direction to be described is developed.) (3- PS2-2)	measurements of an object's motion to provide evidence that a pattern can be used to predict future motion.	
Unit 5 Weather and Climate	8 Weeks	**ESS2.D: Weather and Climate** Scientists record patterns of the weather across different times and areas so that they can make predictions about what kind of weather might happen next.(3-ESS2-1) Climate describes a range of an area's typical weather conditions and the extent to whichthose conditions vary over years.(3-ESS2-2)	***Students will…*** • Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season. • Obtain and combine information to describe climates in different regions of the world. • Make a claim about the merit of a design solution that reduces the impacts of	**Patterns** • Patterns of change can be used to make predictions. (3-ESS2-1),(3-ESS2- 2) **Cause and Effect** • Cause and effect relationships are routinely identified, tested, and used to explain change. (3-ESS3-1)

		ESS3.B: Natural Hazards A variety of natural hazards result from natural processes. Humans cannot eliminate natural hazards but can take steps to reduce their impacts. (3-ESS3-1) *(Note: This Disciplinary Core Idea is also addressed by 4-ESS3-2.)*	a weather-related hazard. • Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.	

Unit 1: Ecosystems	Recommended Duration: 8 Weeks
Unit Description: In this unit, students first learn that all organisms have a variety of behaviors and traits that enable them to survive. One of these behaviors includes forming groups. Groups serve different functions and can vary dramatically in size. Animals may form groups to obtain food, to defend themselves, and/or to cope with changes in their environment. Students should have opportunities to conduct research on animals that form groups in order to understand how being part of a group is beneficial to survival and reproduction. Students might begin with studying animals that are indigenous to the local environment (e.g., squirrels, coyotes, deer, birds, or fish), and then investigate other animals of interest, such as (but not limited to) lions, sea turtles, or penguins.	

Essential Questions	Enduring Understandings
• *In a particular habitat, why do some organisms survive well, some survive less well, and some not survive at all?* • *What do fossils tell us about the organisms and the environments in which they lived?*	• *Organisms and their habitats make up a system in which they are interdependent.*

New Jersey Student Learning Standards

By the end of the unit, the Student will be able to:

Analyze and interpret data from fossils to provide evidence of the organisms and the environments in which they lived long ago. [Clarification Statement: Examples of data could include type, size, and distributions of fossil organisms. Examples of fossils and environments could include marine fossils found on dry land, tropical plant fossils found in Arctic areas, and fossils of extinct organisms.] [*Assessment Boundary: Assessment does not include identification of specific fossils or present plants and animals. Assessment is limited to major fossil types and relative ages.*] (3-LS4-1)

Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all. [Clarification Statement: Examples of evidence could include needs and characteristics of the organisms and habitats involved. The organisms and their habitat make up a system in which the parts depend on each other.] (3-LS4-3)

Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change.* [Clarification Statement: Examples of environmental changes could include changes in land characteristics, water distribution, temperature, food, and other organisms.] [*Assessment Boundary: Assessment is limited to a single environmental change. Assessment does not include the greenhouse effect or climate change.*] (3-LS4-4)

Construct an argument that some animals form groups that help members survive. (3-LS2-1)

Science & Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Engaging in Argument from Evidence Engaging in argument from evidence in 3–5 builds on K–2 experiences and progresses to critiquing the scientific explanations or solutions proposed by peers by citing relevant evidence about the natural and designed world(s). • Construct an argument with evidence, data, and/or a model. (3-LS2-1) • Construct an argument with evidence. (3- LS4-3) • Make a claim about the merit of a solution to a problem by citing relevant evidence about how it meets the criteria and constraints of the problem. (3-LS4-4) **Analyzing and Interpreting Data** Analyzing data in 3–5 builds on K–2 experiences and progresses to introducing quantitative approaches to collecting data and conducting multiple trials of qualitative observations. When possible and feasible, digital tools should be used. • Analyze and interpret data to make sense of phenomena using logical reasoning. (3-LS4-1)	**LS2.C: Ecosystem Dynamics, Functioning, and Resilience** When the environment changes in ways that affect a place's physical characteristics, temperature, or availability of resources, some organisms survive and reproduce, others move to new locations, yet others move into the transformed environment, and some die. *(secondary to 3-LS4-4)* **LS4.A: Evidence of Common Ancestry and Diversity** • Some kinds of plants and animals that once lived on Earth are no longer found anywhere. *(Note: moved from K-2)* (3- LS4-1) • Fossils provide evidence about the types of organisms that lived long ago and also about the nature of their environments. (3-LS4-1) **LS4.C: Adaptation** • For any particular environment, some kinds of organisms survive well, some survive less well, and some cannot survive at all. (3-LS4-3) **LS4.D: Biodiversity and Humans** • Populations live in a variety of habitats, and change in those habitats affects the organisms living there. (3-LS4-4)	**Cause and Effect** • Cause and effect relationships are routinely identified and used to explain change. (3-LS2-1),,(3-LS4-3) **Scale, Proportion, and Quantity** • Observable phenomena exist from very short to very long time periods. (3-LS4- 1) **Systems and System Models** • A system can be described in terms of its components and their interactions. (3-LS4-4)

Formative Assessments	Summative Assessments	Performance Assessments	Major Activities/ Assignments
• Rubrics • Learning Questions to guide unit progression • Observe and use patterns in the natural world as evidence. • Use observations *(firsthand or from media)* to describe patterns in the natural world in order to answer scientific questions. • Use observations to describe patterns in what plants need to survive. Examples of patterns could include:	• Rubrics • Oral and Slate Assessments • Science Assessment Tasks	• Science Assessment Tasks • Science Investigations • Student Science notebooks • Student-designed models	**Possible NGSS Phenomena:** *What kind of ecosystem is in your backyard garden?* Topics to focus on might be the roles of males and females within a group as well as the interactions between parents and offspring. For example, within some groups of animals, the offspring leave the nest or pack early while others remain for longer periods of time. Those that stay within the group for longer periods of time may do so because of the benefits provided by the group structure. As students compare group structures of different animals and the functions that define each, they should also think about how the size of the group and the roles of individuals within the group affect the animals' overall ability to obtain food, defend themselves, and reproduce. Students will construct arguments with evidence, using cause-and-effect relationships to show why some animals form groups and

Formative Assessments	Summative Assessments	Performance Assessments	Major Activities/ Assignments
			how this is advantageous to survival and reproduction.

Possible Assessment Adjustments (Modifications /Accommodations/ Differentiation): *How will the teacher provide multiple means for the following student groups to **EXPRESS** their understanding and comprehension of the content/skills taught?*			
Special Education Students	**English Language Learners (ELLs)**	**At-Risk Learners**	**Advanced Learners**
• Modify assignments as needed (e.g., vary length, limit items) • Shorten assignments • Increase the amount of item allowed to complete assignments and tests • Limit amount of work required or length of tests • Hands-on-projects • Give in small groups ***Individualized per each student per IEP***	• Word/Picture Wall • L1 support • Word/Picture Wall • Manipulatives (etc. Counters, Connecting Cubes, Base-Ten Blocks, Place Value T-Chart • Native language support • Choice questions • Teacher Modeling • Illustrations/diagrams/drawings • Small group	• Manipulatives (etc. Counters, Connecting Cubes, Base-Ten Blocks, Place Value T-Chart) • Teacher Modeling • Small group instruction • Extended time • Illustrations/diagrams/drawings	• Provide independent learning opportunities through learning contracts • Offer accelerated instruction • Computer-Assisted Instruction • Pairing direct instruction w/coaching to promote self-directed learning

Instructional Strategies
• Structure lessons around questions that are authentic, relate to students' interests, social/family background and knowledge of their community. • Provide students with multiple choices for how they can represent their understandings (e.g. multisensory techniques-auditory/visual aids; pictures, illustrations, graphs, charts, data tables, multimedia,modeling). • Provide opportunities for students to connect with people of similar backgrounds (e.g. conversations via digital tool such as SKYPE, experts from the community helping with a project, journal articles, and biographies). • Provide multiple grouping opportunities for students to share their ideas and to encourage work among various backgrounds and cultures (e.g. multiple representation and multimodal experiences). • Engage students with a variety of Science and Engineering practices to provide students with multiple entry points and multiple ways to demonstrate

Instructional Strategies
their understandings. • Use project-based science learning to connect science with observable (NGSS)phenomena. • Structure the learning around explaining or solving a social or community-based issue.

Possible Instructional Adjustments (Modifications /Accommodations/ Differentiation): *How will the teacher provide multiple means for the following student groups to **ACCESS** the content/skills being taught?*			
Special Education Students	**English Language Learners (ELLs)**	**At-Risk Learners**	**Advanced Learners**
• Read class materials orally • Provide small group instruction • Provide study outlines/guides • Prior notice of tests • Test study guide • Give tests in small groups **Individualized per each student per IEP**	• Word/Picture Wall • Manipulatives (etc. Counters, Connecting Cubes, Base-Ten Blocks, Place Value T-Chart) • Native language support • Fact Family Triangles • Choice questions • Teacher Modeling • Illustrations/diagrams/drawings • Small group	• Manipulatives (etc. Counters, Connecting Cubes, Base-Ten Blocks, Place Value T-Chart, clock,) • Teacher Modeling • Small group instruction • Extended time • Illustrations/diagrams/drawings	• Provide independent learning opportunities through learning contracts • Offer accelerated instruction • Computer-Assisted Instruction • Pairing direct instruction w/coaching to promote self-directed learning

Interdisciplinary Connections (Applicable Standards)	**Integration of Technology**	**21st Century Themes**	**21st Century Skills**
NJSLS Literacy: RI.3.1 RI.3.5 RI.3.10 W.3.2 W.3.5 L.3.1 SL.3.1	**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 • Students may use computers	**Leadership and Responsibility**- Acting responsibly with the interests of the larger community in mind. • Students will participate in class activities and discussions appropriately **Collaboration**- Demonstrating the	**Leadership and Responsibility**- Acting responsibly with the interests of the larger community in mind. • Students will participate in class activities and discussions appropriately **Collaboration**- Demonstrating the ability to or kith diverse teams

Interdisciplinary Connections (Applicable Standards)	Integration of Technology	21st Century Themes	21st Century Skills
SL.3.2 ***NJSLS Mathematics:*** 3.CC.B.4 3.CC.B.5 3.MD.B.3 ***Mathematical Practices:*** MP.1 MP.2 MP.3 MP.4 MP.6	for reinforcement of skills during centers • Interactive whiteboards may be used to display problems and/or interactive manipulatives • Student use of iPads **8.2** 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.	ability to or kith diverse teams • Students will learn to work with a partner on various math activities **Critical Thinking and Problem Solving**- Exercising sound reasoning in understanding • Students will develop problem solving skills and practice verbalizing their reasoning behind it	• Students will learn to work with a partner on various math activities **Critical Thinking and Problem Solving**- Exercising sound reasoning in understanding • Students will develop problem solving skills and practice verbalizing their reasoning behind it

Resources

Resources & Materials:

Suggested Literature:

- RAZ Kids (Leveled Texts)

Coral Reefs (N), (Q),(U)	*Exploring Tide Pools (R)*	*Woods of Wonder (O),(R)*	*Polar Regions of the Earth (S)*
Deserts Dry (T)	*Weird Bird Beaks (R)*	*Camouflage (T)*	*Strange Plants (Q)*

Website/Media Links:

- Science Evidence Statements:
  - 3-LS2-1
  - 3-LS4-1
  - 3-LS4-3
  - 3-LS4-4
- Videos:
  - Musk Ox Save Calf from Wolves Video In this short video, Arctic wolves attack a musk ox calf on Canada's Ellesmere Island, but the herd rushes to its defense by forming a defensive circle around the calves.
  - Battle at Kruger: Water Buffalo Save Calf from Lions Video This short video captures student imagination and elicits ideas about how groups of organisms work together for survival. The video contains real footage of a pack of lions attack on a water buffalo calf. The footage filmed by amateur tourists features a surprising plot twist (featuring a crocodile), and exciting finale with the water buffalo herd rescues the calf and chases off the lions.
  - Squirrel Goes to the Beach (youtube.com): Short video as squirrel recounts her vacation to the beach.

Possible Investigations:

Students will need the opportunity to engage in a portion of the engineering design process in order to investigate the merit of solutions to problems caused when the environment changes. This process should include the following steps:

- Students brainstorm a list of environmental changes that might affect the organisms that live in the environment. This could include changes in
  - Land characteristics,
  - Water distribution,
  - Temperature,
  - Food,
  - Other organisms.
- As a class or in small groups, students define a problem that occurs when the environment changes. For example, if the distribution of water changes, the available water may no longer support the types of organisms that are found in the environment.

Resources

- As a class, determine criteria that can be used to weigh a possible solution's viability. For example, the response (solution) to the problem should not result in the extinction of a species.
- Small groups conduct research, using books and other reliable media sources, to determine possible solutions/ways in which organisms can solve the problem. For example, if the available water supply is no longer adequate for the organisms in the environment, there are a number of ways in which organisms respond (i.e., solve the problem); these include:
    - Plants do not grow as large as before (shorter plant, smaller or fewer leaves);
    - Fewer seeds germinate, thereby resulting in a smaller population;
    - Herd animals may move to another environment where the water supply is adequate;
    - Populations of some species may decrease, either through lower rate of reproduction or death;
    - Some populations completely die out; or
    - Other organisms (plants and animals) that require less water to survive may move into the environment.
- Students make claims about the merit of each of the various responses (solutions) by organisms based on how well the responses meet criteria; students use research data as evidence to support their thinking.

At every stage, communicating with peers is an important part of the design process. Students should identify cause-and-effect relationships throughout the process and use these relationships to explain the changes that might occur in the environment and in the populations of organisms that live there.

Unit 2: Life Cycles	Recommended Duration: 5 Weeks

Unit Description: In this unit of study, students learn that the changes an organism goes through during its life form an observable pattern. Although different types of organisms have unique and diverse life cycles, they follow a pattern of birth, growth, reproduction, and death. While observing and studying life cycles, students should look closely for patterns of change and use these observed patterns to make predictions. They should also sort and classify a variety of organisms using the similarities and differences they observe. For example, flowering plants begin as seeds. With the right conditions, the seeds germinate and grow, from small seedlings to adult plants. Adult plants then produce flowers that, once pollinated, will produce seeds from which the next generation will grow.

Essential Questions	Enduring Understandings
• *Do all living things have the same life cycle?* • *Are there advantages to variation?*	• *The changes an organism goes through during its life form an observable pattern.*

New Jersey Student Learning Standards

By the end of the unit, the Student will be able to:

Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death. [Clarification Statement: Changes organisms go through during their life form a pattern.] [*Assessment Boundary: Assessment of plant life cycles is limited to those of flowering plants. Assessment does not include details of human reproduction.*] (3-LS1-1)

Use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing. *[Clarification Statement: Examples of cause and effect relationships could be plants that have larger thorns than other plants may be less likely to be eaten by predators; and, animals that have better camouflage coloration than other animals may be more likely to survive and therefore more likely to leave offspring.]* **(**3-LS4-2)

Science & Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Developing and Using Models Modeling in 3–5 builds on K–2 experiences and progresses to building and revising simple models and using models to represent events and design solutions.	**LS1.B: Growth and Development of Organisms** • Reproduction is essential to the continued existence of every kind of organism. Plants and animals have unique and diverse life cycles. (3-LS1-1)	**Patterns** • Patterns of change can be used to make predictions. (3-LS1-1) **Cause and Effect**

• Develop models to describe phenomena. (3-LS1-1) **Constructing Explanations and Designing Solutions** Constructing explanations and designing solutions in 3–5 builds on K–2 experiences and progresses to the use of evidence in constructing explanations that specify variables that describe and predict phenomena and in designing multiple solutions to design problems. • Use evidence (e.g., observations, patterns) to construct an explanation. (3-LS4-2)	**LS4.B: Natural Selection** ● Sometimes the differences in characteristics between individuals of the same species provide advantages in surviving, finding mates, and reproducing. (3-LS4-2)	● Cause and effect relationships are routinely identified and used to explain change. (3-LS4-2)

Formative Assessments	Summative Assessments	Performance Assessments	Major Activities/ Assignments
• Rubrics • Learning Questions to guide unit progression • Observe and use patterns in the natural world as evidence. • Use observations *(firsthand or from media)* to describe patterns in the natural world in order to answer scientific questions. • Use observations to describe patterns in what plants need	• Rubrics • Oral and Slate Assessments • Science Assessment Tasks	• Science Assessment Tasks • Science Investigations • Student Science notebooks • Student-designed models	**Possible NGSS Phenomena:** ● *Can a plant grow in the dark?* ● *Caterpillars turn into butterflies, but they don't look anything alike.*

Formative Assessments	Summative Assessments	Performance Assessments	Major Activities/ Assignments
to survive. Examples of patterns could include:			

Possible Assessment Adjustments (Modifications /Accommodations/ Differentiation): *How will the teacher provide multiple means for the following student groups to **EXPRESS** their understanding and comprehension of the content/skills taught?*			
Special Education Students	**English Language Learners (ELLs)**	**At-Risk Learners**	**Advanced Learners**
• Modify assignments as needed (e.g., vary length, limit items) • Shorten assignments • Increase the amount of item allowed to complete assignments and tests • Limit amount of work required or length of tests • Hands-on-projects • Give in small groups ***Individualized per each student per IEP***	• Word/Picture Wall • L1 support • Word/Picture Wall • Manipulatives (etc. Counters, Connecting Cubes, Base-Ten Blocks, Place Value T-Chart • Native language support • Choice questions • Teacher Modeling • Illustrations/diagrams/drawings • Small group	• Manipulatives (etc. Counters, Connecting Cubes, Base-Ten Blocks, Place Value T-Chart) • Teacher Modeling • Small group instruction • Extended time • Illustrations/diagrams/drawings	• Provide independent learning opportunities through learning contracts • Offer accelerated instruction • Computer-Assisted Instruction • Pairing direct instruction w/coaching to promote self-directed learning

Instructional Strategies
• Structure lessons around questions that are authentic, relate to students' interests, social/family background and knowledge of their community. • Provide students with multiple choices for how they can represent their understandings (e.g. multisensory techniques-auditory/visual aids; pictures, illustrations, graphs, charts, data tables, multimedia, modeling). • Provide opportunities for students to connect with people of similar backgrounds (e.g. conversations via digital tool such as SKYPE, experts from the community helping with a project, journal articles, and biographies). • Provide multiple grouping opportunities for students to share their ideas and to encourage work among various backgrounds and cultures (e.g. multiple representation and multimodal experiences). • Engage students with a variety of Science and Engineering practices to provide students with multiple entry points and multiple ways to demonstrate their understandings.

Instructional Strategies
• Use project-based science learning to connect science with observable (NGSS)phenomena. • Structure the learning around explaining or solving a social or community-based issue.

Possible Instructional Adjustments (Modifications /Accommodations/ Differentiation): *How will the teacher provide multiple means for the following student groups to **ACCESS** the content/skills being taught?*			
Special Education Students	**English Language Learners (ELLs)**	**At-Risk Learners**	**Advanced Learners**
• Read class materials orally • Provide small group instruction • Provide study outlines/guides • Prior notice of tests • Test study guide • Give tests in small groups **Individualized per each student per IEP**	• Word/Picture Wall • Manipulatives (etc. Counters, Connecting Cubes, Base-Ten Blocks, Place Value T-Chart) • Native language support • Fact Family Triangles • Choice questions • Teacher Modeling • Illustrations/diagrams/drawings • Small group	• Manipulatives (etc. Counters, Connecting Cubes, Base-Ten Blocks, Place Value T-Chart, clock,) • Teacher Modeling • Small group instruction • Extended time • Illustrations/diagrams/drawings	• Provide independent learning opportunities through learning contracts • Offer accelerated instruction • Computer-Assisted Instruction • Pairing direct instruction w/coaching to promote self-directed learning

Interdisciplinary Connections (Applicable Standards)	**Integration of Technology**	**21st Century Themes**	**21st Century Skills**
NJSLS Literacy: RI.3.1 RI.3.5 RI.3.10 W.3.2 W.3.5 L.3.1 SL.3.1 SL.3.2	**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 • Students may use computers for reinforcement of skills	**Leadership and Responsibility**- Acting responsibly with the interests of the larger community in mind. • Students will participate in class activities and discussions appropriately **Collaboration**- Demonstrating the ability to or kith diverse teams	**Leadership and Responsibility**- Acting responsibly with the interests of the larger community in mind. • Students will participate in class activities and discussions appropriately **Collaboration**- Demonstrating the ability to or kith diverse teams • Students will learn to work with a

Interdisciplinary Connections (Applicable Standards)	Integration of Technology	21st Century Themes	21st Century Skills
NJSLS Mathematics: 3.CC.B.4 3.CC.B.5 3.MD.B.3 ***Mathematical Practices:*** MP.1 MP.2 MP.3 MP.4 MP.6	during centers • Interactive whiteboards may be used to display problems and/or interactive manipulatives • Student use of iPads **8.2** 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.	• Students will learn to work with a partner on various math activities **Critical Thinking and Problem Solving**- Exercising sound reasoning in understanding • Students will develop problem solving skills and practice verbalizing their reasoning behind it	partner on various math activities **Critical Thinking and Problem Solving**- Exercising sound reasoning in understanding • Students will develop problem solving skills and practice verbalizing their reasoning behind it

Resources

Suggested Reading (leveled texts):

- RAZ Kids (level)

Life Cycles (Q) *Puffins (T),(W)* *Strange Plants (Q)* *Seeds and Sunflowers (R)*

Website/Media Links:

- Science Evidence Statements:
  - 3-LS1-1
  - 3-LS4-2

Possible Investigations:

Animals go through observable patterns of change, which allow students to sort and classify them based on the stages of their life cycles. Some animals, for example, undergo complete metamorphosis; others go through incomplete metamorphosis; while others do not undergo metamorphosis at all. Some animals begin their life cycles with a live birth, while others hatch from eggs. Students should develop models to describe the unique and diverse life cycles of organisms. They can draw diagrams, build physical models, or create presentations to show the patterns of change that make up the life cycles of given organisms. As students become familiar with the stages in the life cycles of different types of plant and animals, they will come to understand that reproduction is essential to the continued existence of every kind of organism.

Resources

- Let's Hear It For Ladybugs! This article describes a ladybug life cycle unit that incorporates language arts and science concepts. Students build on their prior knowledge of butterflies as they explore the metamorphosis of ladybugs. To create their final project, clay life cycle models, students synthesize what they learned from live observation and nonfictiontexts.
- Simply Butterflies! This article gives suggestions for building a simple walk-in classroom butterfly observatory and using the observatory to hatch out Painted Lady butterflies as part of a four-week unit on life cyclestages.

In the previous unit, students learned that organisms have traits that are inherited from their parents. This process occurs during reproduction. While observing and identifying traits of a specific species or type of organism, students also learned that there are differences in characteristics within the same species. In this unit, students learn that these differences in characteristics among individuals of the same species sometimes provide advantages in survival, finding mates, and reproducing. For example, when comparing plants from the same species, those with larger or more abundant thorns may be less likely to be eaten by a predator. Likewise, animals with better camouflage coloration may be more likely to survive and therefore more likely to leave offspring. As students read about, observe, and discuss variations in organisms' characteristics, they should identify cause-and-effect relationships that help explain why any variation might give an advantage in surviving or reproducing to some members of a species over others.

- Plant Life Cycles From PBS, this series of lessons allows students to sequence the stages of plant life, from germination to plant growth.
- Plant Structure and Function from PBS has students explore how the structure of seeds and fruits contributes to seed dispersal, how flower structures contribute to pollination, and how other plant structures relate to theirfunction.
- BrainPOP Jr: Plants

Unit 3: Heredity and Traits	Recommended Duration: 5 Weeks

Unit Description: The characteristics that organisms inherit influence how they look and how they function within their environment. As students observe parents and their offspring, they will notice that parents and offspring share many traits. As they observe a larger number of organisms from the same group, they will notice similarities and differences in the traits of individuals within a group. Students can observe similarities and differences in the traits of organisms and use these observations as evidence to support the idea that offspring inherit traits from parents, but these traits do vary within a group of similar organisms.

Essential Questions	Enduring Understandings
• *How are traits of offspring determined?* • *What kinds of traits are passed from parents to offspring?*	• *Environmental factors influence the traits of specific organisms.*

New Jersey Student Learning Standards

By the end of the unit, the Student will be able to:

Analyze and interpret data to provide evidence that plants and animals have traits inherited from parents and that variation of these traits exists in a group of similar organisms. [Clarification Statement: Patterns are the similarities and differences in traits shared between offspring and their parents, or among siblings. Emphasis is on organisms other than humans.] [*Assessment Boundary: Assessment does not include genetic mechanisms of inheritance and prediction of traits. Assessment is limited to non-human examples.*] (3-LS3-1)

Use evidence to support the explanation that traits can be influenced by the environment. [Clarification Statement: Examples of the environment affecting a trait could include normally tall plants grown with insufficient water are stunted; and, a pet dog that is given too much food and little exercise may become overweight.] (3-LS3-2)

Use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing. [Clarification Statement: Examples of cause and effect relationships could be plants that have larger thorns than other plants may be less likely to be eaten by predators; and, animals that have better camouflage coloration than other animals may be more likely to survive and therefore more likely to leave offspring.] (3-LS3-3)

Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem. (3-5-ETS1-2)

Science & Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Analyzing and Interpreting Data • Analyzing data in 3–5 builds on K–2 experiences and progresses to introducing quantitative approaches to collecting data and conducting multiple trials of qualitative observations. When possible and feasible, digital tools should be used. • Analyze and interpret data to make sense of phenomena using logical reasoning. (3-LS3-1) **Constructing Explanations and Designing Solutions** Constructing explanations and designing solutions in 3–5 builds on K–2 experiences and progresses to the use of evidence in constructing explanations that specify variables that describe and predict phenomena and in designing multiple solutions to design problems. • Use evidence (e.g., observations, patterns) to support an explanation. (3- LS3-2) • Generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design problem. (3-5- ETS1-2)	**LS3.A: Inheritance of Traits** • Many characteristics of organisms are inherited from their parents. (3-LS3-1) • Other characteristics result from individuals' interactions with the environment, which can range from diet to learning. Many characteristics involve both inheritance and environment. (3- LS3-2) **LS3.B: Variation of Traits** • Different organisms vary in how they look and function because they have different inherited information. (3-LS3- 1) • The environment also affects the traits that an organism develops. (3-LS3-2) **ETS1.B: Developing Possible Solutions** • Research on a problem should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions. (3-5-ETS1-2) • At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs. (3-5-ETS1-2)	**Patterns** • Similarities and differences in patterns can be used to sort and classify natural phenomena. (3-LS3-1) **Cause and Effect** • Cause and effect relationships are routinely identified and used to explain change. (3-LS3-2), **Influence of Science, Engineering, and Technology on Society and the Natural World** • Engineers improve existing technologies or develop new ones to increase their benefits, decrease known risks, and meet societal demands. (3-5-ETS1-2)

Formative Assessments	Summative Assessments	Performance Assessments	Major Activities/ Assignments
• Rubrics • Learning Questions to guide unit progression	• Rubrics • Oral and Slate Assessments • Science Assessment Tasks	• Science Assessment Tasks • Science Investigations • Student Science notebooks • Student-designed models	**Possible NGSS Phenomena:** • *How can Chihuahuas and Great Danes be related?* • *Why do I have different colored eyes/hair than my mom or*

Formative Assessments	Summative Assessments	Performance Assessments	Major Activities/ Assignments
• Observe and use patterns in the natural world as evidence. • Use observations *(firsthand or from media)* to describe patterns in the natural world in order to answer scientific questions. • Use observations to describe patterns in what plants need to survive. Examples of patterns could include:			*dad?* ● *Why are birds all different colors?*

Possible Assessment Adjustments (Modifications /Accommodations/ Differentiation): *How will the teacher provide multiple means for the following student groups to **EXPRESS** their understanding and comprehension of the content/skills taught?*			
Special Education Students	**English Language Learners (ELLs)**	**At-Risk Learners**	**Advanced Learners**
• Modify assignments as needed (e.g., vary length, limit items) • Shorten assignments • Increase the amount of item allowed to complete assignments and tests • Limit amount of work required or length of tests • Hands-on-projects • Give in small groups ***Individualized per each student per IEP***	• Word/Picture Wall • L1 support • Word/Picture Wall • Manipulatives (etc. Counters, Connecting Cubes, Base-Ten Blocks, Place Value T-Chart • Native language support • Choice questions • Teacher Modeling • Illustrations/diagrams/drawings • Small group	• Manipulatives (etc. Counters, Connecting Cubes, Base-Ten Blocks, Place Value T-Chart) • Teacher Modeling • Small group instruction • Extended time • Illustrations/diagrams/drawings	• Provide independent learning opportunities through learning contracts • Offer accelerated instruction • Computer-Assisted Instruction • Pairing direct instruction w/coaching to promote self-directed learning

Instructional Strategies
• Structure lessons around questions that are authentic, relate to students' interests, social/family background and knowledge of their community. • Provide students with multiple choices for how they can represent their understandings (e.g. multisensory techniques-auditory/visual aids; pictures, illustrations, graphs, charts, data tables, multimedia, modeling). • Provide opportunities for students to connect with people of similar backgrounds (e.g. conversations via digital tool such as SKYPE, experts from the community helping with a project, journal articles, and biographies). • Provide multiple grouping opportunities for students to share their ideas and to encourage work among various backgrounds and cultures (e.g. multiple representation and multimodal experiences). • Engage students with a variety of Science and Engineering practices to provide students with multiple entry points and multiple ways to demonstrate their understandings. • Use project-based science learning to connect science with observable (NGSS) phenomena. • Structure the learning around explaining or solving a social or community-based issue.

Possible Instructional Adjustments (Modifications /Accommodations/ Differentiation): *How will the teacher provide multiple means for the following student groups to **ACCESS** the content/skills being taught?*			
Special Education Students	**English Language Learners (ELLs)**	**At-Risk Learners**	**Advanced Learners**
• Read class materials orally • Provide small group instruction • Provide study outlines/guides • Prior notice of tests • Test study guide • Give tests in small groups **Individualized per each student per IEP**	• Word/Picture Wall • Manipulatives (etc. Counters, Connecting Cubes, Base-Ten Blocks, Place Value T-Chart) • Native language support • Fact Family Triangles • Choice questions • Teacher Modeling • Illustrations/diagrams/drawings • Small group	• Manipulatives (etc. Counters, Connecting Cubes, Base-Ten Blocks, Place Value T-Chart, clock,) • Teacher Modeling • Small group instruction • Extended time • Illustrations/diagrams/drawings	• Provide independent learning opportunities through learning contracts • Offer accelerated instruction • Computer-Assisted Instruction • Pairing direct instruction w/coaching to promote self-directed learning

Interdisciplinary Connections (Applicable Standards)	Integration of Technology	21st Century Themes	21st Century Skills
NJSLS Literacy: RI.3.1 RI.3.5 RI.3.10 W.3.2 W.3.5 L.3.1 SL.3.1 SL.3.2 ***NJSLS Mathematics:*** 3.CC.B.4 3.CC.B.5 3.MD.B.3 ***Mathematical Practices:*** MP.1 MP.2 MP.3 MP.4 MP.6	**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 • Students may use computers for reinforcement of skills during centers • Interactive whiteboards may be used to display problems and/or interactive manipulatives • Student use of iPads **8.2** 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.	**Leadership and Responsibility**- Acting responsibly with the interests of the larger community in mind. • Students will participate in class activities and discussions appropriately **Collaboration**- Demonstrating the ability to or kith diverse teams • Students will learn to work with a partner on various math activities **Critical Thinking and Problem Solving**- Exercising sound reasoning in understanding • Students will develop problem solving skills and practice verbalizing their reasoning behind it	**Leadership and Responsibility**- Acting responsibly with the interests of the larger community in mind. • Students will participate in class activities and discussions appropriately **Collaboration**- Demonstrating the ability to or kith diverse teams • Students will learn to work with a partner on various math activities **Critical Thinking and Problem Solving**- Exercising sound reasoning in understanding • Students will develop problem solving skills and practice verbalizing their reasoning behind it

Resources
Suggested Literature: ● RAZ Kids (level) ○ *Life Cycles (Q)* ○ *Color Blindness (Q)* ○ *Puffins (T)*

Resources

- *Strange Plants (Q)*
- *Seeds and Sunflowers (R)*

Website/Media Links:

- Science Evidence Statements:
  - 3-LS3-1
  - 3-LS3-2
  - 3-LS3-3
  - 3-5-ETS1-2

Possible Investigations:

Sometimes, variations among organisms within a group are due to fact that individuals inherit traits from different parents. However, traits can also be influenced by an individual's interaction with the environment. For example, all lions have the necessary inherited traits that allow them to hunt, such as sharp claws, sharp teeth, muscular body type, and speed. However, being a successful hunter also depends on the interaction that individual lions have with their parents and their environment. A lion cub raised in captivity without parents will have the same type of claws, teeth, and muscular body as all other lions, but it may never have the opportunity to learn to use its traits to hunt. Additionally, the environment can affect an organism's physical development. For example, any plant that lacks sufficient nutrients or water will not thrive and grow as it should. It will most likely be smaller in size, have fewer leaves, and may even look sickly. Likewise, too much food and lack of exercise can result in an overweight dog.

To investigate how the environment influences traits, students can plant the same type of seedling in different locations, which will provide variations of light, water, or soil. Data can be collected about rates of growth, height, and heartiness of the plant. The information gathered can be analyzed to provide evidence as to how the environment influenced the traits of the plant. As students read about, observe, and discuss these ideas, they learn that even though every organism inherits particular traits from its parents, the environment can have a marked effect on those traits and the development of others.

- Animal Detectives: An interdisciplinary, 5E unit that begins with students becoming animal detectives to explore the school habitat, moves on to students watching wolf families on a webcam, and ends with students forming groups to become "Animal Detectives." The students investigate a focus animal, with each group having a different animal in their "mission folder". The key questions in the unit are: 'What characteristics does the animal have to help them survive in this environment?', 'What would they need to survive?', 'How might these characteristics help them survive?', 'What traits did the offspring inherit from the parents?', and 'How do the traits vary among the offspring?'
- Mystery Plant Adaptation: Students perform a simulated investigation that models how thriving species are of an organism are adapted to their environments and that variation in a species can help the species adapt to changes in that environment.
- Mystery Plants Mystery: Student use a simulation activity to discover that plants that look alike can have different types of roots, that plants with different types of roots can thrive in soils that have different amounts of moisture, and that plants can adapt their root type to their environment over time.

Unit 4: Forces and Motion	Recommended Duration: 6 Weeks

Unit Description: In this unit of study, students look for cause-and-effect relationships as they investigate the effects of balanced and unbalanced forces on the motion of an object. They learn that objects in contact exert forces on each other, and these forces have both strength and direction. When forces are balanced, there is no change in the motion or the position of an object. In other words, an object at rest typically has multiple forces acting on it, but the forces balance out to equal a zero net force on the object. For example, if two children stand with their hands together and push against each other, the pushing force each exerts balances to a net zero effect if neither child moves. Pushing a box from both sides also demonstrates a balanced force if the forces do not produce any change in motion or position of the box.

Essential Questions	Enduring Understandings
• *How do equal and unequal forces on an object affect the object?*	• *Humans can use patterns that we observed to predict future movement.*

New Jersey Student Learning Standards

By the end of the unit, the Student will be able to:

Plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces on the motion of an object. [Clarification Statement: Examples could include an unbalanced force on one side of a ball can make it start moving; and, balanced forces pushing on a box from both sides will not produce any motion at all.] [Assessment Boundary: Assessment is limited to one variable at a time: number, size, or direction of forces. Assessment does not include quantitative force size, only qualitative and relative. Assessment is limited to gravity being addressed as a force that pulls objects down.] (3-PS2-1)

Make observations and/or measurements of an object's motion to provide evidence that a pattern can be used to predict future motion. [Clarification Statement: Examples of motion with a predictable pattern could include a child swinging in a swing, a ball rolling back and forth in a bowl, and two children on a see-saw.] [Assessment Boundary: Assessment does not include technical terms such as period and frequency.] (3-PS2-2)

Science & Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Planning and Carrying Out Investigations Planning and carrying out investigations to answer questions or test solutions to problems in	**PS2.A: Forces and Motion** • Each force acts on one particular object and has both strength and a direction. An object	**Patterns** • Patterns of change can be used to make predictions. (3-PS2-2)

3–5 builds on K–2 experiences and progresses to include investigations that control variables and provide evidence to support explanations or design solutions. • Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence, using fair tests in which variables are controlled and the number of trials considered. (3-PS2-1) • Make observations and/or measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon or test a design solution. (3-PS2-2)	at rest typically has multiple forces acting on it, but they add to give zero net force on the object. Forces that do not sum to zero can cause changes in the object's speed or direction of motion. (Boundary: Qualitative and conceptual, but not quantitative addition of forces are used at this level.) (3-PS2-1) • The patterns of an object's motion in various situations can be observed and measured; when that past motion exhibits a regular pattern, future motion can be predicted from it. (Boundary: Technical terms, such as magnitude, velocity, momentum, and vector quantity, are not introduced at this level, but the concept that some quantities need both size and direction to be described is developed.) (3-PS2-2)	**Cause and Effect** • Cause and effect relationships are routinely identified. (3-PS2-1)

Formative Assessments	Summative Assessments	Performance Assessments	Major Activities/ Assignments
• Rubrics • Learning Questions to guide unit progression • Observe and use patterns in the natural world as evidence. • Use observations *(firsthand or from media)* to describe patterns in the natural world in order to answer scientific questions.	• Rubrics • Oral and Slate Assessments • Science Assessment Tasks	• Science Assessment Tasks • Science Investigations • Student Science notebooks • Student-designed models	**Possible NGSS Phenomena:** *"Changing Forces" video on www.ngssphenonema.com What will happen to the moving truck next? How do you win a game of tug of war?* • *If you are on a slide, what makes you slide down? What makes you stop?* • *If you are mini golfing and the ball hits the flag and goes in, why might the flag not move? Why does a swing go back and forth?*

Formative Assessments	Summative Assessments	Performance Assessments	Major Activities/ Assignments
• Use observations to describe patterns in what plants need to survive. Examples of patterns could include:			

Possible Assessment Adjustments (Modifications /Accommodations/ Differentiation): *How will the teacher provide multiple means for the following student groups to **EXPRESS** their understanding and comprehension of the content/skills taught?*

Special Education Students	English Language Learners (ELLs)	At-Risk Learners	Advanced Learners
• Modify assignments as needed (e.g., vary length, limit items) • Shorten assignments • Increase the amount of item allowed to complete assignments and tests • Limit amount of work required or length of tests • Hands-on-projects • Give in small groups ***Individualized per each student per IEP***	• Word/Picture Wall • L1 support • Word/Picture Wall • Manipulatives (etc. Counters, Connecting Cubes, Base-Ten Blocks, Place Value T-Chart • Native language support • Choice questions • Teacher Modeling • Illustrations/diagrams/drawings • Small group	• Manipulatives (etc. Counters, Connecting Cubes, Base-Ten Blocks, Place Value T-Chart) • Teacher Modeling • Small group instruction • Extended time • Illustrations/diagrams/drawings	• Provide independent learning opportunities through learning contracts • Offer accelerated instruction • Computer-Assisted Instruction • Pairing direct instruction w/coaching to promote self-directed learning

Instructional Strategies

- Structure lessons around questions that are authentic, relate to students' interests, social/family background and knowledge of their community.
- Provide students with multiple choices for how they can represent their understandings (e.g. multisensory techniques-auditory/visual aids; pictures, illustrations, graphs, charts, data tables, multimedia, modeling).
- Provide opportunities for students to connect with people of similar backgrounds (e.g. conversations via digital tool such as SKYPE, experts from the community helping with a project, journal articles, and biographies).
- Provide multiple grouping opportunities for students to share their ideas and to encourage work among various backgrounds and cultures (e.g. multiple representation and multimodal experiences).

Instructional Strategies
• Engage students with a variety of Science and Engineering practices to provide students with multiple entry points and multiple ways to demonstrate their understandings. • Use project-based science learning to connect science with observable (NGSS)phenomena. • Structure the learning around explaining or solving a social or community-based issue.

Possible Instructional Adjustments (Modifications /Accommodations/ Differentiation): *How will the teacher provide multiple means for the following student groups to **ACCESS** the content/skills being taught?*			
Special Education Students	**English Language Learners (ELLs)**	**At-Risk Learners**	**Advanced Learners**
• Read class materials orally • Provide small group instruction • Provide study outlines/guides • Prior notice of tests • Test study guide • Give tests in small groups **Individualized per each student per IEP**	• Word/Picture Wall • Manipulatives (etc. Counters, Connecting Cubes, Base-Ten Blocks, Place Value T-Chart) • Native language support • Fact Family Triangles • Choice questions • Teacher Modeling • Illustrations/diagrams/drawings • Small group	• Manipulatives (etc. Counters, Connecting Cubes, Base-Ten Blocks, Place Value T-Chart, clock,) • Teacher Modeling • Small group instruction • Extended time • Illustrations/diagrams/drawings	• Provide independent learning opportunities through learning contracts • Offer accelerated instruction • Computer-Assisted Instruction • Pairing direct instruction w/coaching to promote self-directed learning

Interdisciplinary Connections (Applicable Standards)	**Integration of Technology**	**21st Century Themes**	**21st Century Skills**
NJSLS Literacy: RI.3.1 RI.3.5 RI.3.10 W.3.2 W.3.5 L.3.1	**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	**Leadership and Responsibility**- Acting responsibly with the interests of the larger community in mind. • Students will participate in class activities and discussions appropriately	**Leadership and Responsibility**- Acting responsibly with the interests of the larger community in mind. • Students will participate in class activities and discussions appropriately **Collaboration**- Demonstrating the ability

Interdisciplinary Connections (Applicable Standards)	Integration of Technology	21st Century Themes	21st Century Skills
SL.3.1 SL.3.2 ***NJSLS Mathematics:*** 3.CC.B.4 3.CC.B.5 3.MD.B.3 ***Mathematical Practices:*** MP.1 MP.2 MP.3 MP.4 MP.6	• Students may use computers for reinforcement of skills during centers • Interactive whiteboards may be used to display problems and/or interactive manipulatives • Student use of iPads **8.2** 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.	**Collaboration**- Demonstrating the ability to or kith diverse teams • Students will learn to work with a partner on various math activities **Critical Thinking and Problem Solving**- Exercising sound reasoning in understanding • Students will develop problem solving skills and practice verbalizing their reasoning behind it	to or kith diverse teams • Students will learn to work with a partner on various math activities **Critical Thinking and Problem Solving**- Exercising sound reasoning in understanding • Students will develop problem solving skills and practice verbalizing their reasoning behind it

Resources

Possible Reading Connections:

- RAZ Kids (level):

Simple Machines (K) *Big Machines (L)* *Bigger than a Monster Truck (O), (L)*

Website/Media Links:

- Science Evidence Statements:
  - 3-PS2-1
  - 3-PS2-2

Possible Investigations:

Through planning and conducting investigations, students will come to understand that forces that result in changes in an object's speed or direction of motion are unbalanced. Students can observe everyday examples on the playground, with seesaws and swings and by kicking and throwing soccer balls. As they conduct investigations and make observations, students should identify the cause-and-effect relationships at work and identify the objects that are exerting forces on one another. They should also

Resources

use qualitative descriptions when identifying the relative strength (greater than, less than, equal) and direction of the forces, even if an object is at rest.

Investigating the effects of forces on objects will also give students opportunities to observe that patterns exist everywhere. Patterns are found in shapes, structures, natural environments, and recurring events. Scientists and engineers analyze patterns to make predictions, develop questions, and create solutions. As students have opportunities to observe forces interacting with objects, they will ask questions and analyze and interpret data in order to identify patterns of change in the motion of objects and to make predictions about an object's future motion. When students are on the playground, they can observe multiple patterns of change in the back-and-forth motion of a child swinging on a swing or in the up-and-down motion of a seesaw. In the classroom, students can observe a variety of objects, such as marbles rolling back and forth in bowls or tops spinning across the floor.

Throughout this unit, as students plan and carry out investigations, it is extremely important that they routinely identify cause-and-effect relationships and look for patterns of change as objects interact. As students interact with objects, such as when they push a door closed, bounce a ball, or roll a ball down a ramp, they may ask, "What caused the changes that I observed? How can I change the way in which the object moved?" Students need to have many experiences in order to deepen their understanding of the cause-and-effect relationships between balanced and unbalanced forces on the motion of an object, and they should be guided to plan and conduct fair tests, testing only one variable at a time.

- *Discuss that a force is a push or a pull*
    - *Create a Venn diagram that shows everyday items that we push, pull or both*
    - *Try pushing/pulling in different ways (push and pull chairs, push-ups/pull-ups)*
- *Discuss friction and how it allows objects to stop from the materials rubbing together*
    - *Have students try to slide on the floor with their sneakers, then with socks (carefully)*
    - *Discuss why it is easier to slide with socks (smooth surfaces have less friction)*
- *Discuss different forces and how forces cause objects to be balanced or unbalanced*
    - *Gravity- roll items down a ramp in various weights and discuss which when down faster and why*
    - *Gravity/Air Resistance- parachute activity*
    - Puffing Forces: Students will predict and observe what happens when a force is applied to an object, and compare the relative effects of a force of the same strength on objects of different weights by using a straw to gently puff air at a ping pong ball then a golf ball and measuring the distance the ball travels with a ruler. Students will repeat this procedure using a harder puff. This lesson was adapted from the Utah Education Network http://www.uen.org/Lessonplan/preview?LPid=14858
    - Robo Arm: This fun activity is one of five in a series of space based engineering challenges developed by NASA and Design Squad where students are engaged in implementing the Engineering Design process to build a robotic arm that can lift a cup off a table using cardboard strips, brass fasteners, paper clips, straw, string, tape and a cup. The activity includes an instructor's guide, questioning techniques, discussion questions, extension activity, a rubric, and 3 short video clips that enhance the purpose of the activity and its relevance to NASA.

Unit 5: Weather and Climate	Recommended Duration: 8 Weeks
Unit Description: In this unit of study, students organize and use data to describe typical weather conditions expected during a particular season. They notice patterns as they analyze and interpret weather data, and they use this data to determine cause-and-effect relationships. By applying their understanding of weather-related hazards, students make claims about the merit of a design solution that reduces the impacts of such hazards, using evidence to support their claims.	

Essential Questions	Enduring Understandings
• *What is the typical weather near us?* • *How can we protect people from weather-related hazards? How can we protect people from natural hazards such as flooding, fast wind, or lightning?* • *How can climates in different regions of the world be described?*	• *Humans can predict the kind of weather patterns that we see in each season.*

New Jersey Student Learning Standards

By the end of the unit, the Student will be able to:

Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season. [Clarification Statement: Examples of data could include average temperature, precipitation, and wind direction.] [*Assessment Boundary: Assessment of graphical displays is limited to pictographs and bar graphs. Assessment does not include climate change.*] (3-ESS2-1)

Obtain and combine information to describe climates in different regions of the world. (3-ESS2-2)

Make a claim about the merit of a design solution that reduces the impacts of a weather-related hazard.* *[Clarification Statement: Examples of design solutions to weather-related hazards could include barriers to prevent flooding, wind resistant roofs, and lightning rods.]* (3-ESS3-1)

Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved. (3-3-ETS1-3)

Science & Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Analyzing and Interpreting Data Analyzing data in 3–5 builds on K–2 experiences and progresses to introducing quantitative approaches to collecting data and conducting multiple trials of qualitative observations. When possible and feasible, digital tools should be used. • Represent data in tables and various graphical displays (bar graphs and pictographs) to reveal patterns that indicate relationships. (3-ESS2-1) **Engaging in Argument from Evidence** Engaging in argument from evidence in 3–5 builds on K–2 experiences and progresses to critiquing the scientific explanations or solutions proposed by peers by citing relevant evidence about the natural and designed world (s). • Make a claim about the merit of a solution to a problem by citing relevant evidence about how it meets the criteria and constraints of the problem. (3-ESS3-1) **Obtaining, Evaluating, and Communicating Information** Obtaining, evaluating, and communicating information in 3–5 builds on K–2 experiences and progresses to evaluating the merit and accuracy of ideas and methods. • Obtain and combine information from books and other reliable media to explain phenomena. (3-ESS2-2)	**ESS2.D: Weather and Climate** • Scientists record patterns of the weather across different times and areas so that they can make predictions about what kind of weather might happen next. (3- ESS2-1) • Climate describes a range of an area's typical weather conditions and the extent to which those conditions vary over years. (3-ESS2-2) **ESS3.B: Natural Hazards** • A variety of natural hazards result from natural processes. Humans cannot eliminate natural hazards but can take steps to reduce their impacts. (3-ESS3-1) *(Note: This Disciplinary Core Idea is also addressed by 4-ESS3-2.)*	**Patterns** • Patterns of change can be used to make predictions. (3-ESS2-1),(3-ESS2-2) **Cause and Effect** • Cause and effect relationships are routinely identified, tested, and used to explain change. (3-ESS3-1)

Formative Assessments	Summative Assessments	Performance Assessments	Major Activities/ Assignments
• Rubrics • Learning Questions to guide unit progression • Observe and use patterns in the natural world as evidence. • Use observations *(firsthand or from media)* to describe patterns in the natural world in order to answer scientific questions. • Use observations to describe patterns in what plants need to survive. Examples of patterns could include:	• Rubrics • Oral and Slate Assessments • Science Assessment Tasks	• Science Assessment Tasks • Science Investigations • Student Science notebooks • Student-designed models	**Possible NGSS Phenomena:** • *Mom/Dad said this was a mild winter.* • *It's always warm in Hawaii, but not in South Harrison, NJ.*

Possible Assessment Adjustments (Modifications /Accommodations/ Differentiation): *How will the teacher provide multiple means for the following student groups to **EXPRESS** their understanding and comprehension of the content/skills taught?*			
Special Education Students	**English Language Learners (ELLs)**	**At-Risk Learners**	**Advanced Learners**
• Modify assignments as needed (e.g., vary length, limit items) • Shorten assignments • Increase the amount of item allowed to complete assignments and tests • Limit amount of work required or length of tests	• Word/Picture Wall • L1 support • Word/Picture Wall • Manipulatives (etc. Counters, Connecting Cubes, Base-Ten Blocks, Place Value T-Chart • Native language support • Choice questions • Teacher Modeling	• Manipulatives (etc. Counters, Connecting Cubes, Base-Ten Blocks, Place Value T-Chart) • Teacher Modeling • Small group instruction • Extended time • Illustrations/diagrams/drawings	• Provide independent learning opportunities through learning contracts • Offer accelerated instruction • Computer-Assisted Instruction • Pairing direct instruction w/coaching to promote self-directed learning

• Hands-on-projects • Give in small groups ***Individualized per each student per IEP***	• Illustrations/diagrams/drawings • Small group		

Instructional Strategies
• Structure lessons around questions that are authentic, relate to students' interests, social/family background and knowledge of their community. • Provide students with multiple choices for how they can represent their understandings (e.g. multisensory techniques-auditory/visual aids; pictures, illustrations, graphs, charts, data tables, multimedia,modeling). • Provide opportunities for students to connect with people of similar backgrounds (e.g. conversations via digital tool such as SKYPE, experts from the community helping with a project, journal articles, and biographies). • Provide multiple grouping opportunities for students to share their ideas and to encourage work among various backgrounds and cultures (e.g. multiple representation and multimodal experiences). • Engage students with a variety of Science and Engineering practices to provide students with multiple entry points and multiple ways to demonstrate their understandings. • Use project-based science learning to connect science with observable (NGSS)phenomena. • Structure the learning around explaining or solving a social or community-based issue.

Possible Instructional Adjustments (Modifications /Accommodations/ Differentiation): *How will the teacher provide multiple means for the following student groups to **ACCESS** the content/skills being taught?*			
Special Education Students	**English Language Learners (ELLs)**	**At-Risk Learners**	**Advanced Learners**
• Read class materials orally • Provide small group instruction • Provide study outlines/guides • Prior notice of tests • Test study guide	• Word/Picture Wall • Manipulatives (etc. Counters, Connecting Cubes, Base-Ten Blocks, Place Value T-Chart) • Native language support • Fact Family Triangles • Choice questions • Teacher Modeling • Illustrations/diagrams/drawings	• Manipulatives (etc. Counters, Connecting Cubes, Base-Ten Blocks, Place Value T-Chart, clock,) • Teacher Modeling • Small group instruction • Extended time • Illustrations/diagrams/drawings	• Provide independent learning opportunities through learning contracts • Offer accelerated instruction • Computer-Assisted Instruction

• Give tests in small groups **Individualized per each student per IEP**	• Small group		• Pairing direct instruction w/coaching to promote self-directed learning

Interdisciplinary Connections (Applicable Standards)	Integration of Technology	21st Century Themes	21st Century Skills
NJSLS Literacy: RI.3.1 RI.3.5 RI.3.10 W.3.2 W.3.5 L.3.1 SL.3.1 SL.3.2 ***NJSLS Mathematics:*** 3.CC.B.4 3.CC.B.5 3.MD.B.3 ***Mathematical Practices:*** MP.1 MP.2 MP.3 MP.4 MP.6	**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 • Students may use computers for reinforcement of skills during centers • Interactive whiteboards may be used to display problems and/or interactive manipulatives • Student use of iPads **8.2** 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.	**Leadership and Responsibility**- Acting responsibly with the interests of the larger community in mind. • Students will participate in class activities and discussions appropriately **Collaboration**- Demonstrating the ability to or kith diverse teams • Students will learn to work with a partner on various math activities **Critical Thinking and Problem Solving**- Exercising sound reasoning in understanding • Students will develop problem solving skills and practice verbalizing their reasoning behind it	**Leadership and Responsibility**- Acting responsibly with the interests of the larger community in mind. • Students will participate in class activities and discussions appropriately **Collaboration**- Demonstrating the ability to or kith diverse teams • Students will learn to work with a partner on various math activities **Critical Thinking and Problem Solving**- Exercising sound reasoning in understanding • Students will develop problem solving skills and practice verbalizing their reasoning behind it

Resources

Possible Reading Connections:

- RAZ Kids (level):

Tornadoes (P) *The Nor'easter (Q)* *Storm Chasers (R)* *Severe Weather (T)*

Website/Media Links:

- Science Evidence Statements:
  - 3-ESS2-1
  - 3-ESS2-2
  - 3-ESS3-1
  - 3-5-ETS1-3

Weather Science content for Kids and Teens: The National Weather Service has several education resources available at this website.
NOAA Education Resources: The National Oceanic and Atmospheric Administration (NOAA) provides education resources at this website.

Possible Investigations:

Initially, students learn that scientists record patterns of weather across different times and locations in order to make predictions about future weather conditions. To understand how scientists use weather data, students need time, tools, and resources (both print and digital) to collect weather data. They can use a variety of tools (e.g., thermometers, anemometers, rain gauges) to collect firsthand data and multiple resources (e.g., Weather Bug, NOAA) to gather weather data that has been collected over longer periods of time. Multiple units of measurement (e.g., m, cm, °C, km/hr) should be used when recording weather conditions such as temperature, types and amounts of precipitation, and wind direction and speed. To organize the data they collect, students create graphical displays (bar graphs and pictographs) and tables. Once a sufficient amount of data is collected, students need opportunities to analyze data, looking for patterns of change that can be used to make predictions about typical weather conditions for a particular region and time of year. As they collect and analyze data over time, students learn that certain types of weather tend to occur in a given area and that combinations of weather conditions lead to certain types of weather (e.g., it is always cloudy when it rains or snows, but not all types of clouds bring precipitation).

Weather is a combination of sunlight, wind, precipitation, and temperature in a particular region at a particular time. Climate describes the range of an area's typical weather conditions and the extent to which those conditions vary over the years. After learning to analyze and use data to make weather predictions, students use long-term patterns in weather to describe climates in a variety of regions around the world. To accomplish this, students use books and other reliable media to obtain information and weather data collected over a long period of time for a variety of regions. With guidance, students analyze the available data and information in order to describe the climate (e.g., average temperatures, average precipitation, average amount of sunlight) in each region. Science affects everyday life. Whenever people encounter problems, engineers use scientific knowledge to develop new technologies or improve existing ones to solve our day-to-day problems.

After studying weather and climate, students investigate how weather-related hazards can be reduced. Students learn that there are a variety of natural hazards that result from severe weather. Severe weather, such as high winds, flooding, severe thunderstorms, tornadoes, hurricanes, ice or snowstorms, dust storms, or drought, has the

Resources
potential to disrupt normal day-to-day routines and cause damage or even loss of life. While humans cannot eliminate natural hazards, they can take steps to reduce their impact. Students can use trade books and media resources to research types of severe weather hazards and their effects on communities and find examples of how communities solve problems caused by severe weather. As a class, students determine the types of severe weather that are common to the local area and discuss the effects on the community. (Define the problem.) In pairs or small groups, students can research ways that the community reduces the effects of severe weather. (Determine ways in which the problem is solved.) Given criteria, groups can determine how well each solution reduces the effects of severe weather. Groups can also prepare a presentation that: • Describes the solution that the group thinks is best for reducing the effects of a given type of weather hazard, • Lists evidence to support their thinking, and • Lists at least one possible constraint, such as materials, time, or cost.