ROBBINSVILLE PUBLIC SCHOOLS

OFFICE OF CURRICULUM AND INSTRUCTION

DEPARTMENT
Science

COURSE TITLE
Third Grade Science

Board of Education

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BOARD OF EDUCATION INITIAL ADOPTION DATE:
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Course Philosophy

The Robbinsville educators have designed a science curriculum that meets the needs of all learners, integrates the Robbinsville Ready Skills and allows time for students to practice and experience social emotional learning. Students will experience at least one investigation in earth, life and physical science. Investigations are built to allow for exploration, investigation, recording/interpreting data and collaboration. Students also utilize reading, writing and research skills while the educator embeds interdisciplinary opportunities across the curriculum. New Jersey's emphasis on the Climate Change standards allows opportunities for students to become globally conscious critical thinkers who can make informed decisions about their impacts on the planet.

Course Description

The focus of Third Grade Science allows learners to examine, explore and make sense of the world around them with deeper investigations into the systems and structures that support life on earth. . The following course description summarizes the course's three units, U**nit 1, Motion and Matter, Unit 2 Water and Climate** and **Unit 3 Structures of Life**

In Unit One,. **Motion and Matter Unit** provides third grade students with experiences around physical sciences core ideas dealing with forces and interactions, matter and its interactions, and with engineering design. The anchor phenomenon for the first three investigations is motion. Magnetism and gravity are the phenomena investigated as students look for patterns of motion to predict future motion. The driving question is what causes objects to move? Students work with magnets and paper clips, wheel-and-axle systems, paper air twirlers, and rotating tops. Students use their knowledge of science to enter the engineering design process and through the process refine their science understanding.

In the fourth investigation, students move from energy to matter. They build on the science concepts of matter and its interactions developed in the second grade using new tools to quantify observations. Students use metric tools to produce data on mass and volume to serve as the basis for evidence for an explanation of the phenomena of conservation of mass. The driving question is how can we use tools to measure the mass of materials in mixtures? Throughout the **Motion and MatterUnit**, students engage in science and engineering practices to collect data to answer questions, and to define problems in order to develop solutions. Students reflect on their own use of these practices and find out about how others use these practices in science and engineering careers.

The anchor phenomenon for the **Second Unit, Structures of Life Unit** is the diversity of plants and animals we observe in our world. Students experience that organisms exhibit a variety of strategies for life, have a variety of observable structures and behaviors, have varied but predictable life cycles, and reproduce their own kind by passing inherited characteristics to offspring. Students explore how individual organisms have variations in their traits that may provide an advantage in surviving in a particular environment, and how our knowledge of animals that survived in past environments is inferred by studying fossil characteristics. The driving questions for the module are where do organisms come from, how do they survive, and how are all the different kinds of plants and animals able to continue to exist on Earth?

In **Unit Two** students observe, compare, categorize, and care for a selection of organisms. Students engage in science and engineering practices to investigate structures and behaviors of the organisms and learn how some of the structures function in growth, survival, and reproduction. Students look at the interactions between organisms of the same kind, among organisms of different kinds, and between the environment and populations over time. Students focus on these crosscutting concepts to develop understandings about organisms and population survival—patterns;

cause and effect; scale, proportion, and quantity; systems and system models; structure and function; and stability and change, and the influence of engineering, technology, and science on society and the natural world.

In the **Third Unit, Water and Climate**, students learn how water is the most important substance on Earth. Water dominates the surface of our planet, changes the face of the land, and defines life. Weather is driven by the Sun and involves the movement of water over the earth through evaporation, condensation, precipitation, and runoff—the water cycle. Climate is determined in part by the amount of precipitation in a region and by temperature fluctuations. Human societies depend on water, and new technologies are being engineered to conserve and protect this natural resource, to provide for the needs of people around the world.

Students engage with these powerful pervasive ideas in the **Water and Climate Unit** through the anchor phenomenon of weather in diverse climates. The driving questions for the module are how is water involved in weather, and are weather conditions the same around the world and throughout the year? Students explore the properties of water, the water cycle, and interactions between water and other earth materials. Students learn how humans use water as a natural resource. Students engage in science and engineering practices while investigating water, weather, and climate, and explore the crosscutting concepts of patterns; cause and effect; scale, proportion, and quantity; and systems and system models. They are introduced to the nature of science, how science affects everyday life.

Core and Supplemental Instructional Materials

Core Materials	Supplemental Materials
• FOSS science resource books • FOSS material kits • FOSS online videos • FOSS online activities	• BrainPOP Jr. • Discovery Kids • National Geographic Kids

Social Emotional Learning Connections
Below are the five core SEL Competencies as outlined by CASEL, and examples of how each may be addressed within this curriculum
Self-awareness: The ability to accurately recognize one's emotions and thoughts and their influence on behavior. This includes accurately assessing one's strengths and limitations and possessing a well-grounded sense of confidence and optimism. **Example 1:** Establish shared norms, expectations, and routines for classroom behavior. **Example 2:** Self-reflection checklists after completing self-directed learning center activities.
Self-management: The ability to regulate one's emotions, thoughts, and behaviors effectively in different situations. This includes managing stress, controlling impulses, motivating oneself, and setting and working toward achieving personal and academic goals. **Example 1:** Goal setting activities during self-directed learning center activities. **Example 2:** Discussion of Growth Mindset and Fixed Mindset, using videos, read alouds, and chart.
Social awareness: The ability to take the perspective of and empathize with others from diverse backgrounds and cultures, to understand social and ethical norms for behavior, and to recognize family, school, and community resources and supports. **Example 1:** Adding multicultural books into everyday learning.
Relationship skills: The ability to establish and maintain healthy and rewarding relationships with diverse individuals and groups. This includes communicating clearly, listening actively, cooperating, resisting inappropriate social pressure, negotiating conflict constructively, and seeking and offering help when needed. **Example 1:** Morning meeting games to prompt responsive classroom, which will foster positive classroom relationships. **Example 2:** Students will be provided with opportunities to build content knowledge through collaboration and sharing ideas during presentations, projects and group work.
Responsible decision-making: The ability to make constructive and respectful choices about personal behavior and social interactions based on consideration of ethical standards, safety concerns, social norms, the realistic evaluation of consequences of various actions, and the well-being of self and others.

Example 1: Creating classroom rules and revisiting the expectations when needed. Using read alouds to prompt the conversation.
Example 2: Use a lesson to teach students a simple formula for making good decisions (e.g., stop, calm down, identify the choice to be made, consider the options, make a choice and do it, how did it go?). Post the decision-making formula in the classroom.

Integration of 21st Century Themes and Skills

NJSLS-CLKS 9.4: Life Literacies and Key Skills	
Creativity and Innovation	Can be found in unit: 1: Motion and Matter 2: Structures of Life 3: Water and Climate 9.4.5.CI.2: Use appropriate communication technologies to collaborate with individuals with diverse perspectives about a local and/or global climate change issue and deliberate about possible solutions. 9.4.5.CI.2: Investigate a persistent local or global issue, such as climate change, and collaborate with individuals with diverse perspectives to improve upon current actions designed to address the issue.
Critical Thinking and Problem Solving	Can be found in unit: 1: Motion and Matter 2: Structures of Life 3: Water and Climate 9.4.5.CT.1: Identify and gather relevant data that will aid in the problem-solving process. 9.4.5.CT.4: Apply critical thinking and problem-solving strategies to different types of problems (e.g., personal, academic, community, global).
Digital Citizenship	Can be found in unit: 1: Motion and Matter 2: Structures of Life 3: Water and Climate 9.4.5.DC.4: Model safe, legal and ethical behavior when using online or offline technology. 9.4.5.DC.8: Propose ways local and global communities can engage digitally to participate in and

	promote climate action.
Global and Cultural Awareness	Can be found in unit: 1: Motion and Matter 2: Structures of Life 3: Water and Climate 9.4.5.GCA.1: Analyze how culture shapes individual and community perspectives and points of view.
Information and Media Literacy	Can be found in unit: 1: Motion and Matter 2: Structures of Life 3: Water and Climate 9.4.5.IML.2: Create a visual representation to organize information about a problem or issue. 9.4.5.IML.6: Use appropriate sources of information from diverse sources, contexts, disciplines and cultures to answer questions.
Technology Literacy	Can be found in unit: 1: Motion and Matter 2: Structures of Life 3: Water and Climate 9.4.5.TL.3: Format a document using a word processing application to enhance text, change page formatting, and include appropriate images, graphics, or symbols. 9.4.5.TL.5: Collaborate digitally to produce an artifact.

Robbinsville Ready 21st Century Skill Integration

The following skills will be embedded throughout the curriculum and instruction of this course.

Collaborative Team Member: Robbinsville students will learn more by working together than in isolation. As educational theorist Lev Vygotsky advocated, learning is a social process. Many workplaces today encourage employees to work in teams to solicit diverse perspectives, brainstorm new ideas and/or products, and solve problems. Further, collaboration fosters interpersonal relationships, self-management skills, cooperation, and a sense of collective responsibility. Collaborative team members are able to work with diverse groups of people who hold a variety of perspectives.

Effective Communicator: Robbinsville students must be able to clearly articulate their ideas orally, in writing, and across various media in order to successfully connect to the world around them. As the world becomes increasingly globalized, communication is more than just sharing one's ideas. Effective communicators are able to communicate their convictions, actively listen and analyze others' work to identify perspective and/or potential bias.

Emotionally Intelligent Learner: Robbinsville students who are emotionally intelligent learn to be empathetic, demonstrate integrity and ethical behavior, are kind, are self-aware, willing to change, and practice self-care. They are better able to cope with the demands of the 21st century digital society and workplace because they are reliable, responsible, form stable and healthy relationships, and seek to grow personally and professionally. Emotionally intelligent people are able to manage their emotions, work effectively on teams and are leaders who can grow and help to develop others.

Informed and Involved Citizen: Robbinsville students need to be digital citizens who are civically and globally aware. The concept of what it means to be "literate" has evolved along with 21st century technological and cultural shifts. Our progressive vision of literacy entails having our students explore real world problems in the classroom. Informed and involved citizens are able to safely and accurately communicate with people all around the world and are financially, environmentally and informationally literate.

Innovative Thinker: Robbinsville students must encompass innovative thinking skills in order to be successful lifelong learners in the 21st century world. As stated by Karl Fisch and Scott McLeod in the short film Shift Happens, "We are currently preparing students for jobs that don't yet exist . . . using technologies that haven't been invented . . . in order to solve problems we don't even know are problems yet." Innovative thinkers are able to think analytically, solve problems critically, creatively engage in curiosity and tinkering, and demonstrate originality.

Resilient and Self-Directed Learner: Robbinsville students need to take risks and ultimately make independent and informed decisions in an ever-changing world. Author of Life, the Truth, and Being Free, Steve Maraboli stated, "Life doesn't get easier or more forgiving, we get stronger and more resilient." Self-directed scholars of the 21st century are able to set goals, initiate resolutions by seeking creative approaches, and adjust their thinking in light of difficult situations. Resilient students are able to take risks without fear of failure and overcome setbacks by utilizing experiences to confront new challenges. Resilient and self directed scholars will consistently embrace opportunities to initiate solutions and overcome obstacles.

Career Awareness and Planning Standards 9.2	
9.2.4.A.2: Identify various life roles and civic and work-related activities in the school, home, and community.	Students make the connection between the scientific processes that they encounter in the world and their community and the corresponding work roles that are related to these concepts. For example, when learning about plant growth, identifying the role of plant growers such as gardeners, landscapers, and farmers in the community and how they utilize this information.

Robbinsville Public Schools
Scope, Sequence, Pacing and Assessment

Third Grade Science

Unit Title	Unit Understandings and Goals	Recommended Duration/ Pacing	Assessments
Motion and Matter	**<u>Investigation 1: Forces</u>** ● Magnetic force between objects does not require that the objects be in contact; the strength of the magnetic force depends on the objects' properties and their distance apart. ● How magnets interact depends on their orientation (sometimes they attract and sometimes they repel). ● Each force acting on an object has a strength and a direction. Unbalanced forces (pushes and pulls) cause change of motion. ● Gravity is the force that pulls things toward the center of Earth **<u>Investigation 2: Patterns of Motion</u>** ● The patterns of an object's motion in various situations can be observed and measured. ● When past motion exhibits a regular pattern, future motion can be predicted from it. ● A wheel-and-axle system with two sizes of wheels describes a curved path when rolled down a slope. The system curves toward the smaller wheel. ● A twirly bird is a simple winged system that	25 days	Formative • Survey prior to starting module (Benchmark assessment) • Science notebook entries • Response sheets • Performance assessments • Class discussions • Reflections • Exit slips Summative · Performance assessment (observe collaborative group work) Common Benchmark Assessments (mid/end of course) • I-Check after each investigation • Post-test after all investigations are complete Alternative Assessments (projects, etc when appropriate) ·

	spins when it interacts with air. Twirler performance is affected by variables. ● Tops exhibit rotational motion (spinning) when torque is applied to the axial shaft. Top performance is affected by variables.		
Structures of Life	**<u>Investigation 1: Origin of Seeds</u>** ● Seeds develop in the plant part called a fruit. ● Different kinds of fruits have different kinds and numbers of seeds; seeds have a variety of properties. ● A seed is an organism, a living thing. ● Seeds undergo changes in the presence of water. ● A seed contains the embryo plant and stores food. A seed grows into a new plant (reproduction). ● Seed-dispersal mechanisms (wind, water, and animals) move seeds away from parent plants. **<u>Investigation 2: Growing Further</u>** ● Germination is the onset of a seed's development ● Plants need water, light, space, and nutrients to grow. ● The life cycle is the sequence of stages during which a seed grows into an adult (mature) plant and produces seeds, which in turn produces new plants of the same kind. ● The fruit of the plant develops from the flower. ● Roots function to take up water and nutrients so they can be transported to other parts of the plant. Different kinds of plants have different root systems.	25 days	Formative • Survey prior to starting module (Benchmark assessment) • Science notebook entries • Response sheets • Performance assessments • Class discussions • Reflections • Exit slips Summative · Performance assessment (observe collaborative group work) Common Benchmark Assessments (mid/end of course) • I-Check after each investigation • Post-test after all investigations are complete Alternative Assessments (projects, etc when appropriate) ·
Water and Climate	**<u>Investigation 1: Water Observations</u>** ● Water forms beads on waterproof materials and soaks into absorbent materials. ● Water moves downhill.	25 days	Formative • Survey prior to starting module (Benchmark assessment) • Science notebook entries • Response sheets

	• Large water domes move faster down a slope than smaller domes. • The steeper the slope of a surface, the faster a water dome moves. **<u>Investigation 2: Hot and Cold Water</u>** • Temperature is a measure of how hot matter is. • Water expands when heated and contracts when cooled. • A material that floats in water is less dense than the water; a material that sinks is more dense. • Cold water is more dense than warm water. • Water expands when it freezes; ice is less dense than liquid water. • Ice melts when heated; water freezes when cooled.		• Performance assessments • Class discussions • Reflections • Exit slips Summative · Performance assessment (observe collaborative group work) Common Benchmark Assessments (mid/end of course) • I-Check after each investigation • Post-test after all investigations are complete Alternative Assessments (projects, etc when appropriate) ·

Robbinsville Public Schools

Unit #: 1

Enduring Understandings:

Investigation 1: Forces

- Magnetic force between objects does not require that the objects be in contact; the strength of the magnetic force depends on the objects' properties and their distance apart.
- How magnets interact depends on their orientation (sometimes they attract and sometimes they repel).
- Each force acting on an object has a strength and a direction. Unbalanced forces (pushes and pulls) cause change of motion.
- Gravity is the force that pulls things toward the center of Earth

Investigation 2: Patterns of Motion

- The patterns of an object's motion in various situations can be observed and measured.
- When past motion exhibits a regular pattern, future motion can be predicted from it.
- A wheel-and-axle system with two sizes of wheels describes a curved path when rolled down a slope. The system curves toward the smaller wheel.
- A twirly bird is a simple winged system that spins when it interacts with air. Twirler performance is affected by variables.
- Tops exhibit rotational motion (spinning) when torque is applied to the axial shaft. Top performance is affected by variables.

Essential Questions:

Investigation 1: Forces

- How can one explain and predict interactions between objects and within systems of objects?
- Focus Questions
  - What happens when magnets interact with other magnets and with paper clips?
  - How is the magnetic field affected when more magnets are added?
  - What causes change in motion?

Investigation 2: Patterns of Motion

- How can one explain and predict interactions between objects and within systems of objects?
- Focus Questions
  - How can we change the motion of wheels rolling down ramps?
  - What rules help predict where a rolling cup will end up?
  - Student-created questions, e.g., What happens to the motion of a twirly bird when the wing length changes?
  - What is the best design for a top?

Interdisciplinary Connections

Investigation 1: Forces

RI.2: Determine the main idea of text.
RI.3: Describe the relationship of scientific ideas or concepts.
RI.5: Use text features to locate information.
RI.6: Distinguish their own point of view from that of the author of the text.
RI.7: Use information gained from illustrations to demonstrate understanding of text.
SL.1: Engage in collaborative discussions.
L.5: Demonstrate understanding of word relationships.
L.6: Acquire and use domain-specific words.

Investigation 2: Patterns of Motion

RI.1: Ask and answer questions.
RI.5: Use text features to locate information.
RI.7: Use information gained from illustrations to demonstrate understanding of text.
SL.1: Engage in collaborative discussions.
SL.3: Ask and answer questions about information from a speaker.
SL.5: Create engaging audio recordings of stories or poems that demonstrate fluid reading at an understandable pace.
L.4: Determine or clarify the meaning of new or unknown words.
L.5: Demonstrate understanding of word relationships.

Math:
MP.2. Reason abstractly and quantitatively.
MP.4. Model with mathematics.
MP.5. Use appropriate tools strategically.

- Reading skills supported through reading science resources book: reading fluency, reading comprehension, determining main ideas, integrating information from multiple texts, making connections, drawing evidence and conclusions from informational texts, distinguishing between evidence (fact) and opinion, determining meaning of domain specific vocabulary
- Writing skills supported through writing in interactive science notebooks: take notes, gather relevant information, recall relevant information from experiences, organize and produce clear and coherent written responses, draw evidence and conclusions from informational texts, label using appropriate vocabulary, revise thinking
- Mathematics:
    - Use place value understanding and properties of operations to perform multi-digit problems
    - Creating tables and graphs, interpret data
    - Using metric measurements and estimation of intervals of time
    - Using critical and higher order thinking to solve problems

Guiding / Topical Questions with Specific Standards		Content, Themes, Concepts, and Skills	Teaching Strategies	Instructional Resources and Materials	Assessment Strategies
PS2.B:	**<u>Investigation 1: Forces</u>** Objects in contact exert forces on each other. Electric and magnetic forces between a pair of objects do not require that the objects be in contact. The sizes of the forces in	**Content (Vocabulary):** attract, balanced, change of motion, evidence, force, gravity, magnet, magnetic field, magnetic force, magnetism, model, motion, observe, predict, prediction, pull, push, repel, unbalanced **Concepts:** Magnetic force between objects does not require that the objects be in contact; the strength of the magnetic force depends on the	Students ask questions while observing the interaction of magnets. Develop a model to explain the attraction between magnets and paper clips. Analyze and interpret data in order to make a prediction about the boundary of the magnetic field.	Content-specific anchor charts, content-specific word wall Student resources book FOSS online activities FOSS online videos	**<u>Part 1 Two Forces</u>** *Focus Question- What happens when magnets interact with other magnets and with paper clips?* **Science Notebook Check:** Students draw a model

	each situation depend on the properties of the objects and their distances apart and, for forces between two magnets, on their orientation relative to each other. PS2-1: Plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces on the motion of an object. PS2-2: Make observations and/ or measurements of an object's motion to provide evidence that a pattern can be used to predict future motion. PS2-3: Ask questions to determine cause and effect relationships of electric or magnetic interactions between two objects not in contact with each other. PS2-4: Define a simple design problem that can be solved by applying scientific ideas about magnets. ETS1-1: Design a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or costs. ETS1-2: Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the	objects' properties and their distance apart. How magnets interact depends on their orientation (sometimes they attract and sometimes they repel). Each force acting on an object has a strength and a direction. Unbalanced forces (pushes and pulls) cause change of motion. Gravity is the force that pulls things toward the center of Earth	Centers-based rotations Socratic seminar Partnership/small group explorations		that indicates two forces at work: magnetism and gravity. Students write a few sentences to describe their model. **<u>Part 2 Magnetic Force Investigation</u>** *Focus Question- How is the magnetic field affected when more magnets are added?* **Performance Assessment Checklist:** Students are able to collaborate and carry out the investigation. (Planning and carrying out investigations.) Students are able to use the snap data they collect from one magnet and three magnets to make a reasonable prediction for two magnets' snap distance. (Analyzing and interpreting data; using mathematics and computational thinking.) Students are able to communicate their findings. (Obtaining, evaluating, and communicating

ETS1-3:	criteria and constraints of a problem. 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.				information; PS2.B: Types of interactions.) Students know that they are looking for a pattern in the data from which to make a prediction. (Patterns.) **Response Sheet:** Students determine the units of force needed to hold the cart in place. (If one student is pushing with 500 units of force the other student must be pushing with the same force to keep the cart in one place.) Students know that forces hold the apple in place. Gravity is pulling the apple down toward Earth's center; the hand is pushing with an equal upward force to keep the apple in one place. **<u>Part 3- More about Forces</u>** *Focus Question: What causes change of motion?* Investigation 1 I-Check

	Investigation 2: Patterns of Motion	**Content (Vocabulary):** axis, axle, friction, outcome, pattern of motion, ramp, rotate, shaft, slope, standard, system, top, twirly bird,variable, wheel	Students ask questions about how changes of system variables affect the system's motion.	Content-specific anchor charts, content-specific word wall	**Part 1 Wheel and Axis Systems**
PS2.A:	The patterns of an object's motion in various situations can be observed and measured; when the past motion exhibits a regular pattern, future motion can be predicted from it.	**Concepts:** The patterns of an object's motion in various situations can be observed and measured.	Make observations to produce data to test a design.	Student resources book	*Focus Question - How can we change the motion of wheels running down ramps?*
PS2-1:	Plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces on the motion of an object.	When past motion exhibits a regular pattern, future motion can be predicted from it.	Communicate observations and comparisons of motion, using precise vocabulary.	FOSS online activities	**Science Notebook Check:**
PS2-2:	Make observations and/ or measurements of an object's motion to provide evidence that a pattern can be used to predict future motion.	A wheel-and-axle system with two sizes of wheels describes a curved path when rolled down a slope. The system curves toward the smaller wheel.	Centers-based rotations	FOSS online videos	Students clearly describe and/or draw a system they constructed.
PS2-3:	Ask questions to determine cause and effect relationships of electric or magnetic interactions between two objects not in contact with each other.	A twirly bird is a simple winged system that spins when it interacts with air. Variables affect twirler performance.	Socratic seminar		Students describe the motion of the system and logically connect the structure of the system with the motion observed.
PS2-4:	Define a simple design problem that can be solved by applying scientific ideas about magnets.	Tops exhibit rotational motion (spinning) when torque is applied to the axial shaft. Variables affect top performance.	Partnership/small group explorations		**Part 2 Predicting Motion of New Systems** *Focus Question - What rules help predict where a rolling cup will end up?*
ETS1-1:	Design a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or costs.				**Response Sheet A and B - Investigation 2:**
	Generate and compare				Students choose an object with different-sized ends to roll off the ramp at position 1; the smaller end of the object should start closest to side 1.
					Students choose an

ETS1-2: ETS1-3:	multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of a problem. 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.				object with equal_sized ends to roll off the ramp at position 2; e.g. the pencil or the vase with the wide opening. Students choose an object with different-sized ends to roll off the ramp at position 1; the smaller end of the object should start closest to side 3. **<u>Part 3 Twirly Birds</u>** *Focus Question - Student created questions, e.g., What happens to the motion of a twirly bird when the design changes?* **Performance Assessment:** Students ask testable questions. Students change only one variable at a time and compare the varied twirly bird with the standard. Students communicate their findings. Students describe the forces at work when the twirly bird is in motion. Students describe

					cause-and-effect relationships that they observe. For example, if they cut the wings short (cause) they can connect short wings to faster spin and faster descent (effect). **<u>Part 4 Tops</u>** *Focus Question - What is the best design for a top?* Investigation 2 I-Check

Robbinsville Public Schools

Unit #: 2

Enduring Understandings:	**Essential Questions:**

Investigation 1: Origin of Seeds
● Seeds develop in the plant part called a fruit.
● Different kinds of fruits have different kinds and numbers of seeds; seeds have a variety of properties.
● A seed is an organism, a living thing.
● Seeds undergo changes in the presence of water.
● A seed contains the embryo plant and stores food. A seed grows into a new plant (reproduction).
● Seed-dispersal mechanisms (wind, water, and animals) move seeds away from parent plants.
 	
Investigation 2: Growing Further
● Germination is the onset of a seed's development
● Plants need water, light, space, and nutrients to grow.
● The life cycle is the sequence of stages during which a seed grows into an adult (mature) plant and produces seeds, which in turn produces new plants of the same kind.
● The fruit of the plant develops from the flower.
● Roots function to take up water and nutrients so they can be transported to other parts of the plant. Different kinds of plants have different root systems.
	Investigation 1: Origin of Seeds
	● How do organisms grow?
	● How are the characteristics of one generation related to the previous generation?
	● Focus Questions:
	  ● How are seeds alike and different?
	  ● What effect does water have on seeds?
	  ● How much water does a seed soak up?
	  ● How do seeds disperse away from the parent plant
	
	Investigation 2: Growing Further
	● How do organisms live, grow, respond to their environment, and reproduce?
	● How are characteristics of one generation passed to the next?
	● Focus Questions:
	  ● What structures does a seedling have to help it grow and survive?
	  ● What is the sequence of the bean plant's life cycle?
	  ● How do the roots of schoolyard plants compare to the roots of bean plants?

Interdisciplinary Connections

Investigation 1: Origin of Seeds

Rl.1: Ask and answer questions to demonstrate understanding of a text.
RI.2: Determine the main idea of text.
RI.3: Describe the relationship between scientific ideas, using language that pertains to cause and effect.
RI.5: Use text features to locate information.
RI.7: Use information gained from illustrations and words to demonstrate understanding of text.
W.3: Write a narrative.
SL.1: Engage in collaborative discussions.
SL.4: Recount an experience with appropriate facts and relevant descriptive details.
L.4: Determine the meaning of unknown words.

L.6: Acquire and use domain-specific words.

Investigation 2: Growing Further
RI.4: Determine the meaning of domain-specific words and phrases in text.
RF.4: Read with fluency.
SL.1: Engage in collaborative discussions.
SL.2: Determine the main idea from information presented orally.
SL.3: Ask and answer questions, offering appropriate elaboration and detail.
L.5: Demonstrate understanding of word relationships.

CCSS Math:
MP.2. Reason abstractly and quantitatively
MP.4. Model with mathematics
MP.5. Use appropriate tools strategically

- Reading skills supported through reading science resources book: reading fluency, reading comprehension, determining main ideas, integrating information from multiple texts, making connections, drawing evidence and conclusions from informational texts, distinguishing between evidence (fact) and opinion, determining meaning of domain specific vocabulary
- Writing skills supported through writing in interactive science notebooks: take notes, gather relevant information, recall relevant information from experiences, organize and produce clear and coherent written responses, draw evidence and conclusions from informational texts, label using appropriate vocabulary, revise thinking
- Mathematics:
    - Use place value understanding and properties of operations to perform multi-digit problems
    - Creating tables and graphs, interpret data
    - Using metric measurements and estimation of intervals of time
    - Using critical and higher order thinking to solve problems

Guiding / Topical Questions with Specific Standards		Content, Themes, Concepts, and Skills	Teaching Strategies	Instructional Resources and Materials	Assessment Strategies
LS1.B:	**<u>Investigation 1: Origin of Seeds</u>** Growth and development of organisms: Reproduction is essential to the continued existence of every organism. Plants and animals have unique and	**Content (Vocabulary):** compete, cotyledon, disperse, dormant, embryo, engineer, estimate, fruit, function, living, modify, observe, organism, parent plant, pattern, physical model, predict, property, protect, reproduce, seed, seed coat, structure, survive **Concepts:** Seeds develop in the plant part called a fruit.	Observe and compare properties of fruits. Investigate the effects of water on seeds. Monitor and record daily changes in seeds.	Content-specific anchor charts, content-specific word wall Student resources book FOSS online activities	**<u>Part 1 Seed Search</u>** *<u>Focus Question</u>- How are seeds alike and different?* **Science Notebook Check:** Students record the name of the fruit and

LS3.A:	diverse life cycles. Inheritance of traits: Many characteristics of organisms are inherited from their parents.	Different kinds of plants have different kinds and numbers of seeds; seeds have a variety of properties. A seed is an organism, a living thing. Seeds undergo developmental changes in the presence of water. A seed contains an embryo plant and a supply of food. A seed grows into a new plant (reproduction). Seeds move away from parent plants via a number of seed disposal mechanisms, including wind, water, and animals.	Compare the mass of dry seeds to those soaked in water. Design and test models of seed-dispersal systems. Centers-based rotations Socratic seminar Partnership/small group explorations	FOSS online videos	the number of seeds. Students describe and draw the properties of each kind of seed. **<u>Part 2 The Sprouting Seed</u>** *Focus Question- What effect does water have on seeds?* **Response Sheet-Investigation 1:** Students write and include the date of each observation and suggest ways to add more information and detail to the written observation with words and labeled drawings. Students list properties that she could include, such as change in size, shape, color, texture, and so on. Students understand that it is important to keep written records to remember exactly what happened over time. Students understand that the focus question is asking about cause (water) and effect (changes to seeds). **<u>Part 3- Seed Soak</u>**

					Focus question- How much water does a seed soak up? **Performance Assessment Checklist:** Students plan and conduct a well-reasoned investigation, using the balance appropriately. Students organize their observations and use logic to analyze data, and understand the cause-and-effect relationship: if you soak lima beans in water they soak up water and weigh more. **<u>Part 4- Seed Dispersal</u>** *Focus Question- How do seeds disperse away from the parent plant?* Investigation 1 I-Check
LS1.A: Structure and function All organisms have external parts. Plants have different parts (roots, stems, leaves, flowers, fruits) that help them survive and grow. LS1.B: Growth and development of organisms	**<u>Investigation 2: Growing Further</u>** Structure and function All organisms have external parts. Plants have different parts (roots, stems, leaves, flowers, fruits) that help them survive and grow. Growth and development of organisms	**Content (Vocabulary):** adult, fibrous root, flower, germination, growth, hydroponics, inherit, leaf, life cycle, nutrient, root, seedling, shoot, stem, taproot **Concepts:** Germination is the onset of a seed's growth. Plants need water, light, space, and nutrients to grow. The life cycle is the sequence of stages during which a seed grows into an adult (mature) plant	Describe and compare different kinds of germinated seeds. Plant bean seedlings in nutrient solution and observe them throughout their life cycle. Observe plant structures as they appear during the plant's life cycle. Centers-based rotations Socratic seminar	Content-specific anchor charts, content-specific word wall Student resources book FOSS online activities FOSS online videos	**<u>Part 1 Germination and Growth</u>** *Focus Question - What structures does a seedling have to help it grow and survive?* **Response Sheet - Investigation 2:** Students write that a root is growing, not a stem.

	Reproduction is essential to the continued existence of every kind of organism. Plants and animals have unique and diverse life cycles. LS2.C: 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. LS3.A: Inheritance of traits: Many characteristics of organisms are inherited from their parents. Other characteristics result from individuals' interactions with the environment. Many characteristics involve both inheritance and environment.	and produces seeds, which in turn produces new plants of the same kind. The fruit of the plant develops from the flower. Roots are plant structures that take up water and nutrients so they can be transported to other parts of the plant. Different kinds of plants have different root systems. Each kind of organism has inherited characteristics. Some characteristics are a result of the environment.	Partnership/small group explorations		Students write that the root usually grows first, not the stem. Students write that the root's function is to take in water and nutrients. Students write that germination is the pattern of growth in a living seed. **<u>Part 2 Life Cycle of the Bean</u>** *Focus Question - What is the sequence of the bean plant's life cycle?* **Science Notebook Check:** Students put all the pictures in the correct order. Students caption the pictures as follows: 1. Seed: contains the new plant. 2. Root is beginning to grow. 3. First leaves have grown. Cotyledon is drying up. 4. Plant has grown and has many leaves.

					5. Flowers have appeared. 6. Fruit or bean pods have appeared. 7. Pods are fully grown and are full of seeds. **<u>Part 3 Roots and Shoots</u>** *Focus Question - How do the roots of schoolyard plants compare to the roots of bean plants?* Investigation 2 I-Check

Robbinsville Public Schools

Unit #: 3

Enduring Understandings:

Investigation 1: Water Observations

- Water forms beads on waterproof materials and soaks into absorbent materials.
- Water moves downhill.
- Large water domes move faster down a slope than smaller domes.
- The steeper the slope of a surface, the faster a water dome moves.

Investigation 2: Hot and Cold Water

- Temperature is a measure of how hot matter is.
- Water expands when heated and contracts when cooled.
- A material that floats in water is less dense than the water; a material that sinks is more dense.
- Cold water is more dense than warm water.
- Water expands when it freezes; ice is less dense than liquid water.
- Ice melts when heated; water freezes when cooled.

Essential Questions:

Investigation 1: Water Observations

- How and why is Earth constantly changing?
- How do Earth's surface processes and human activities affect each other?
- Focus Questions:
  - What happens when water falls on different surfaces?
  - How does water move on a slope?
  - How much water can a dry sponge soak up?
  - What happens outdoors when rain falls on natural materials?

Investigation 2: Hot Water, Cold Water

- How and why is Earth constantly changing?
- How can one explain the structure, properties, and interactions of matter?
- Focus Questions:
  - How can you measure temperature accurately?
  - What happens to water when it gets hot? Cold?
  - What happens when hot or cold water is put into room-temperature water?
  - How does water change when it gets really cold?
  - Where should an animal go to stay warm or to stay cool?

Interdisciplinary Connections

Investigation 1: Water Observations

RI.1: Ask and answer questions.
RI.2: Determine the main idea of text.
RL.3: Describe in a text the steps in technical procedures.
RL.5: Use text features to locate information.
RI.7: Use information gained from illustrations to demonstrate understanding of the text.
RF.4: Read with fluency, purpose and understanding.
W.5: Strengthen writing by revising and editing.
SL.1: Engage in collaborative discussions.
SL.3: Ask and answer questions about the speaker's information.
SL.4: Recount an experience.

L.4: Use glossaries to determine or clarify the precise meaning of key words.
L.5: Demonstrate understanding of word relationships.
L.6: Acquire and use domain-specific words.

Investigation 2: Hot Water, Cold Water
RI.1: Ask and answer questions to demonstrate understanding of a text..
RI.2: Determine the main idea of text; recount key details.
RL.3: Describe the relationship between scientific concepts using language that pertains to cause and effect.
RI.4: Determine the meaning of domain-specific words and phrases in a text.
W.5: Strengthen writing by revisiting and editing.
SL.1: Engage in collaborative discussions.
SL.2: Determine main ideas and supporting details of information presented in diverse formats.
L.5: Demonstrate understanding of word relationships.

CCSS Math:
MP.2. Reason abstractly and quantitatively.
MP.4. Model with mathematics.
MP.5. Use appropriate tools strategically.

- Reading skills supported through reading science resources book: reading fluency, reading comprehension, determining main ideas, integrating information from multiple texts, making connections, drawing evidence and conclusions from informational texts, distinguishing between evidence (fact) and opinion, determining meaning of domain specific vocabulary
- Writing skills supported through writing in interactive science notebooks: take notes, gather relevant information, recall relevant information from experiences, organize and produce clear and coherent written responses, draw evidence and conclusions from informational texts, label using appropriate vocabulary, revise thinking
- Mathematics:
    - Use place value understanding and properties of operations to perform multi-digit problems
    - Creating tables and graphs, interpret data
    - Using metric measurements and estimation of intervals of time
    - Using critical and higher order thinking to solve problems

Guiding / Topical Questions with Specific Standards	Content, Themes, Concepts, and Skills	Teaching Strategies	Instructional Resources and Materials	Assessment Strategies

ESS2.C: ESS3.C:	**<u>Investigation 1: Water Observations</u>** The roles of water in Earth's surface processes Water is found in the ocean, rivers, lakes, and ponds. Water exists as solid ice and in liquid form. Nearly all of Earth's available water is in the ocean. Human impacts on Earth systems Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, ocean, air, and even outer space. But individuals and communities are doing things to help protect Earth's resources and environments.	**Content (Vocabulary):** absorb, bead, bead-up, data, direction, dome, earth material, evidence, gravity, move, natural material, observation, opinion, relationship, repel, slope, surface, waterproof **Concepts:** Water forms beads on waterproof materials and soaks into absorbent materials. Water moves downhill. Large water domes move faster down a slope than smaller domes. The steeper the slope of a surface, the faster a water dome moves.	Discover how water-dome size, slope, and speed are related. Use appropriate tools to make accurate measurements. Students will plan a procedure, and apply it to solve a problem. Collect and use measurement data to construct explanations. Students will differentiate evidence from opinion. Centers-based rotations Socratic seminar Partnership/small group explorations	Content-specific anchor charts, content-specific word wall Student resources book FOSS online activities FOSS online videos	**<u>Part 1</u>** *Focus Question- What happens when water falls on a surface?* **Science Notebook Check:** Students organize data in a meaningful way. Students generate functional drawings. Students incorporate new vocabulary into the answer correctly. Students draw a model to represent water being absorbed or beading up on a surface. **<u>Part 2</u>** *Focus Question: How does water move on a slope?* **Performance Assessment Checklist:** Students collaborate and carry out the investigation Students express the cause-and-effect relationships they should be noticing **<u>Part 3</u>** *Focus Question: How*

					much water can a dry sponge soak up? **Science Notebook Check:** Students measure mass accurately. Students indicate that the sponge can soak up water about 10 times its own mass **<u>Part 4</u>** *Focus Question: What happens outdoors when rain falls on natural materials?* Investigation 1 I-Check
ESS2.C: The roles of water in Earth's surface processes Water is found in the ocean, rivers, lakes, and ponds. Water exists as solid ice and in liquid form. Nearly all of Earth's available water is in the ocean. ESS2.D: Weather and climate Climate describes a range of an area's typical weather conditions and the extent to which those conditions vary over years. PS1.A: Structures and properties of matter	**<u>Investigation 2: Hot Water, Cold Water</u>**	**Content (Vocabulary):** bulb, cold, contract, degree celsius, expand, float, freeze, hot, less dense, liquid, mass, melt, more dense, sink, solid, state, temperature, thermometer, volume **Concepts:** Temperature is a measure of how hot matter is. Water expands when heated and contracts when cooled. A material that floats in water is less dense than the water; a material that sinks is more dense. Cold water is more dense than warm water. Water expands when it freezes. Ice is less dense than liquid water. Ice melts when heated; water freezes when cooled.	Observe and explain the interaction between masses of water at different temperatures. Observe and explain the interactions between masses of water in liquid and solid states. Construct a thermometer to observe that water expands as it warms and contracts as it cools. Use thermometers to measure temperature. Centers-based rotations Socratic seminar Partnership/small group explorations	Content-specific anchor charts, content-specific word wall Student resources book FOSS online activities FOSS online videos	**<u>Part 1</u>** *Focus Question - How can you measure temperature accurately?* **Science Notebook Check:** Students write that the bulb of the thermometer must be immersed in the fluid. Students write that they must wait a short time before reading the temperature. Students read the temperature by comparing the top of the red liquid with the numbers printed on

	Different kinds of matter exist and many of them can be either solid or liquid, depending on temperature. Matter can be described and classified by its observable properties.				the thermometer scale. **<u>Part 2</u>** *Focus Question - What happens to water when it gets hot? Cold?* **Science Notebook Check:** Students explain that water expands to take up more space when it is heated. Students explain that water contracts to take up less space when it is cooled. **<u>Part 3</u>** *Focus Question: What happens when hot or cold water is put into room-temperature water?* **Performance Assessment Checklist:** Students collaborate and carry out the investigation. Students articulate a model that explains why water at different temperatures sinks or floats compared to room-temperature water. **Part 4**

					Focus Question - How does water change when it gets really cold? **Response Sheet - Investigation 2:** Students write that when the water on the bottom of the pot is heated, it expands and gets less dense. Students write that as the water is heated and becomes less dense, the cooler (more dense) water will sink to the bottom of the pot, and push the warmer (less dense) water up. **<u>Part 5</u>** *Focus Question - Where should an animal go to stay warm or to stay cool?* Investigation 2 I-Check

General Differentiated Instruction Strategies	
• Leveled texts • Chunking texts • Choice board • Socratic Seminar • Tiered Instruction • Small group instruction • Guided Reading • Sentence starters/frames • Writing scaffolds • Tangible items/pictures • Adjust length of assignment	• Repeat, reword directions • Brain breaks and movement breaks • Brief and concrete directions • Checklists for tasks • Graphic organizers • Assistive technology (spell check, voice to type) • Study guides • Tiered learning stations • Tiered questioning • Data-driven student partnerships • Extra time

Possible Additional Strategies for Special Education Students, 504 Students, At-Risk Students, and English Language Learners (ELLs)			
Time/General	**Processing**	**Comprehension**	**Recall**
• Extra time for assigned tasks • Adjust length of assignment • Timeline with due dates for reports and projects • Communication system between home and school • Provide lecture notes/outline	• Extra Response time • Have students verbalize steps • Repeat, clarify or reword directions • Mini-breaks between tasks • Provide a warning for transitions • Reading partners	• Precise step-by-step directions • Short manageable tasks • Brief and concrete directions • Provide immediate feedback • Small group instruction • Emphasize multi-sensory learning	• Teacher-made checklist • Use visual graphic organizers • Reference resources to promote independence • Visual and verbal reminders • Graphic organizers

Assistive Technology	Assessments and Grading	Behavior/Attention	Organization
• Computer/whiteboard • Tape recorder • Spell-checker • Audio-taped books	• Extended time • Study guides • Shortened tests • Read directions aloud	• Consistent daily structured routine • Simple and clear classroom rules • Frequent feedback	• Individual daily planner • Display a written agenda • Note-taking assistance • Color code materials

Enrichment

The goal of Enrichment is to provide learners with the opportunity to participate in extension activities that are differentiated and enhance the curriculum. All enrichment decisions will be based upon individual student needs.

- Show a high degree of intellectual, creative and/or artistic ability and demonstrate this ability in multiple ways.
- Pose questions and exhibit sincere curiosity about principles and how things work.
- The ability to grasp concepts and make real world and cross-curricular connections.
- Generate theories and hypotheses and pursue methods of inquiry.
- Produce products that express insight, creativity, and excellence.
- Possess exceptional leadership skills.
- Evaluate vocabulary
- Elevate Text Complexity
- Inquiry based assignments and projects
- Independent student options
- Tiered/Multi-level activities
- Purposeful Learning Center
- Open-ended activities and projects
- Form and build on learning communities
- Providing pupils with experiences outside the 'regular' curriculum
- Altering the pace the student uses to cover regular curriculum in order to explore topics of interest in greater depth/breadth within their own grade level
- A higher quality of work than the norm for the given age group.
- The promotion of a higher level of thinking and making connections.
- The inclusion of additional subject areas and/or activities (cross-curricular).
- Using supplementary materials in addition to the normal range of resources.

English Language Learner (ELL) Resources

- Learning style quiz for students- http://www.educationplanner.org/students/self-assessments/learning-styles-quiz.shtml
- "Word clouds" from text that you provide-http://www.wordle.net/
- Bilingual website for students, parents and educators: http://www.colorincolorado.org/
- Learn a language for FREE-www.Duolingo.com
- Time on task for students-http://www.online-stopwatch.com/
- Differentiation activities for students based on their Lexile-www.Mobymax.com
- WIDA-http://www.wida.us/
- Everything ESL - http://www.everythingESL.net
- ELL Tool Box Suggestion Site http://www.wallwisher.com/wall/elltoolbox
- Hope4Education - http://www.hope4education.com
- Learning the Language http://blogs.edweek.org/edweek/learning-the-language/
- FLENJ (Foreign Language Educators of NJ) 'E-Verse' wiki: http://www.flenj.org/Publications/?page=135
- OELA - http://www.ed.gov/offices/OBEMLA
- New Jersey Department of Education- Bilingual Education information http://www.state.nj.us/education/bilingual/

Special Education Resources

- Animoto -Animoto provides tools for making videos by using animation to pull together a series of images and combining them with audio. Animoto videos or presentations are easy to publish and share. https://animoto.com
- Bookbuilder -Use this site to create, share, publish, and read digital books that engage and support diverse learners according to their individual needs, interests, and skills. http://bookbuilder.cast.org/
- CAST -CAST is a non-profit research and development organization dedicated to Universal Design for Learning (UDL). UDL research demonstrates that the challenge of diversity can and must be met by making curriculum flexible and responsive to learner differences. http://www.cast.org
- CoSketch -CoSketch is a multi-user online whiteboard designed to give you the ability to quickly visualize and share your ideas as images. http://www.cosketch.com/
- Crayon -The Crayon.net site offers an electronic template for students to create their own newspapers. The site allows you to bring multiple sources together, thus creating an individualized and customized newspaper. http://crayon.net/ Education Oasis -Education Oasis offers a collection of graphic organizers to help students organize and retain knowledge – cause and effect, character and story, compare and

contrast, and more! http://www.educationoasis.com/printables/graphic-organizers/

- Edutopia -A comprehensive website and online community that increases knowledge, sharing, and adoption of what works in K-12 education. We emphasize core strategies: project-based learning, comprehensive assessment, integrated studies, social and emotional learning, educational leadership and teacher development, and technology integration. http://www.edutopia.org/
- Glogster -Glogster allows you to create "interactive posters" to communicate ideas. Students can embed media links, sound, and video, and then share their posters with friends. http://edu.glogster.com/?ref=personal
- Interactives – Elements of a Story -This interactive breaks down the important elements of a story. Students go through the series of steps for constructing a story including: Setting, Characters, Sequence, Exposition, Conflict, Climax, and Resolution. http://www.learner.org/interactives/story/index.html
- National Writing Project (NWP) -Unique in breadth and scale, the NWP is a network of sites anchored at colleges and universities and serving teachers across disciplines and at all levels, from early childhood through university. We provide professional development, develop resources, generate research, and act on knowledge to improve the teaching of writing and learning in schools and communities. http://www.nwp.org
- Pacecar -Vocab Ahead offers videos that give an active demonstration of vocabulary with audio repeating the pronunciation, definition, various uses, and synonyms. Students can also go through flash cards which give a written definition and visual representation of the word. http://pacecar.missingmethod.com/