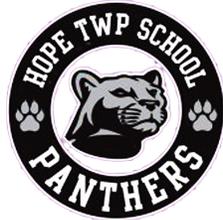


# Belvidere Clusterwide Curriculum



Science

4th Grade

Updated Summer, 2024

All Belvidere Cluster curriculum and instruction areas are aligned to the New Jersey Student Learning Standards (NJSLS) in accordance with the NJ Department of Education's curriculum implementation requirements.

**Curriculum Coordinator:**

**Timm Gast**

**Author:**

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UNITS	Duration	Essential Questions:
Unit 1: Earth's Features and Processes	1st Trimester	<ul style="list-style-type: none"> <li>● How can evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation be observed or measured?</li> <li>● What can rock formations tell us about the past?</li> <li>● What can maps tell us about the features of the world?</li> <li>● In what ways can the impacts of natural Earth processes on humans be reduced?</li> <li>● Could a volcano erupt in your backyard?</li> <li>● Why do volcanoes explode?</li> <li>● Will a mountain last forever?</li> <li>● How could you survive a landslide?</li> <li>● How could you take steps to reduce the impacts of natural hazards?</li> </ul>
Unit 2: Animal and Plant Adaptations	1st Trimester	<ul style="list-style-type: none"> <li>● How do internal and external parts of plants and animals help them to survive, grow, behave, and reproduce?</li> <li>● How do organisms depend on each other to survive?</li> <li>● How are organisms of the same kind different from each other?</li> <li>● How does this help them reproduce and survive?</li> <li>● Why do some sea creatures look so strange?</li> <li>● Why would a sea turtle eat a plastic bag?</li> <li>● Why don't the same trees grow everywhere?</li> </ul>
Unit 3: Human Body, Senses, and the Brain	2nd Trimester	<ul style="list-style-type: none"> <li>● How do animals receive and process types of information from their environment in order to respond appropriately?</li> <li>● How do internal and external structures support the survival, growth, behavior, and reproduction of plants and animals?</li> <li>● How do the structures of organisms contribute to and enable life's functions?</li> <li>● Why do your biceps bulge?</li> <li>● What do people who are blind see?</li> <li>● How can some animals see in the dark?</li> <li>● How does your brain control your body?</li> <li>● How are animals and plants like machines?</li> </ul>
Unit 4: Energy and Energy Transfer	2nd Trimester	<ul style="list-style-type: none"> <li>● Where do we get the energy we need for modern life?</li> <li>● How does energy move?</li> <li>● From what natural resources are energy and fuels</li> </ul>

		<p>derived?</p> <ul style="list-style-type: none"> <li>● In what ways does the human use of natural resources affect the environment?</li> <li>● How is energy transferred?</li> <li>● How is your body similar to a car?</li> <li>● What makes roller coasters go so fast?</li> <li>● How can marbles save the world?</li> <li>● Could you knock down a building using only dominoes?</li> <li>● Can you build a chain reaction machine?</li> </ul>
Unit 5: Electricity, Light, and Heat	3rd Trimester	<ul style="list-style-type: none"> <li>● What is the best way to light up a city?</li> <li>● What if there were no electricity?</li> <li>● How long did it take to travel across the country before there were cars and planes?</li> </ul>
Unit 6: Sound, Waves, and Communication	3rd Trimester	<ul style="list-style-type: none"> <li>● If a beach ball lands in the surf, beyond the breakers, what will happen to it?</li> <li>● Which team can design a way to use patterns to communicate with someone across the room?</li> <li>● How can we use waves to gather and transmit information?</li> <li>● How do you send a secret code?</li> <li>● How far can a whisper travel?</li> <li>● What would happen if you screamed in outer space?</li> <li>● Why are some sounds high and some sounds low?</li> <li>● How can you make sound waves visible?</li> </ul>

## Student Learning

### Career Education (NJDOE CTE Clusters)

#### 21st Century Life and Careers

- 9.1.2.CR.1: Recognize ways to volunteer in the classroom, school and community.
- 9.1.2.FP.1: Explain how emotions influence whether a person spends or saves.
- 9.2.2.CAP.1: Make a list of different types of jobs and describe the skills associated with each job.
- 9.2.2.CAP.2: Explain why employers are willing to pay individuals to work.
- 9.4.2.CI.1: Demonstrate openness to new ideas and perspectives
- 9.4.2.CT.3: Use a variety of types of thinking to solve problems (e.g., inductive, deductive).
- 9.4.2.DC.6: Identify respectful and responsible ways to communicate in digital environments

#### Technology:

- 8.1.2.CS.1: Select and operate computing devices that perform a variety of tasks accurately and quickly based on user needs and preferences.
- 8.1.2.NI.1: Model and describe how individuals use computers to connect to other individuals, places, information and ideas through a network.
- 8.1.2.NI.2: Describe how the Internet enables Individuals to connect with others worldwide.
- 8.2.2.ITH.3: Identify how technology impacts or improves life.
- 8.2.2.ITH.4: Identify how various tools reduce work and improve daily tasks.
- 8.2.2.NT.2: Brainstorm how to build a product, improve a designed product, fix a product that has stopped working, or solve a simple problem.
- 8.2.2.ETW.1: Classify products as resulting from nature or produced as a result of technology.
- 8.2.2.EC.1: Identify and compare technology used in different schools, communities, regions, and parts of the world.

#### Modifications and Accommodations:

##### Special Education

- Printed copy of board work/notes provided
- Additional time for skill mastery
- Assistive technology
- Behavior management plan
- Center-Based Instruction
- Check work frequently for understanding
- Computer or electronic device utilization
- Extended time on tests/ quizzes
- Have student repeat directions to check for understanding
- Highlighted text visual presentation
- Modified assignment format
- Modified test content
- Modified test format
- Modified test length
- Multiple test sessions
- Multi-sensory presentation
- Preferential seating
- Preview of content, concepts, and vocabulary
- Reduced/shortened written assignments
- Secure attention before giving instruction/directions
- Shortened assignments
- Student working with an assigned partner

- Teacher initiated weekly assignment sheet
- Use open book, study guides, test prototypes
- Cubing activities
- Exploration by interest
- Flexible grouping
- Goal setting with students
- Jigsaw
- Mini workshops to re-teach or extend skills Open-ended activities
- Think-Pair-Share
- Varied supplemental materials
- 
- **ELL**
- Allowing students to correct errors (looking for understanding)
- Teaching key aspects of a topic Eliminate nonessential information Using videos, illustrations, pictures, and drawings to explain or clarify
- allowing products (projects, timelines, demonstrations, models, drawings, dioramas, poster boards, charts, graphs, slideshows, videos, etc.) to demonstrate student's learning
- Allowing students to correct errors (looking for understanding)
- Allowing the use of note cards or open-book during testing
- Decreasing the amount of work presented or required
- Having peers take notes or providing a copy of the teacher's notes
- Modifying tests to reflect selected objectives
- Providing study guides
- Reducing the number of answer choices on a multiple choice test
- Tutoring by peers
- Explain/clarify key vocabulary terms
- 
- **At Risk**
- Allowing students to correct errors (looking for understanding)
- Teaching key aspects of a topic Eliminate nonessential information allowing products (projects, timelines, demonstrations, models, drawings, dioramas, poster boards, charts, graphs, slideshows, videos, etc.) to demonstrate student's learning
- Allowing students to select from given choices .
- Allowing the use of note cards or open-book during testing
- Collaborating (general education teacher and specialist) to modify vocabulary, omit or modify items to reflect objectives for the student, eliminate sections of the test, and determine how the grade will be determined prior to giving the test
- decreasing the amount of work presented or required .
- Having peers take notes or providing a copy of the teacher's notes
- Marking students' correct and acceptable work, not the mistakes
- Modifying tests to reflect selected objectives
- Providing study guides
- Reducing the number of answer choices on a multiple choice test
- Tutoring by peers
- Using authentic assessments with real-life problem-solving
- Using true/false, matching, or fill in the blank tests in lieu of essay tests
- using videos, illustrations, pictures, and drawings to explain or clarify
- Flexible grouping
- Goal setting with students
- Jigsaw
- Mini workshops to re-teach or extend skills Open-ended activities

- Think-Pair-Share
- Varied supplemental materials
- 
- **Gifted and Talented**
- Alternative formative and summative assessments
- Choice boards
- Games and tournaments
- Group investigations
- Independent research and projects Interest groups for real world application
- Learning contracts
- Leveled rubrics
- Multiple intelligence options
- Personal agendas
- Project-based learning
- Problem-based learning
- Stations/centers
- Think-Tac-Toes
- Tiered activities/assignments
- Tiered products\_\_\_\_\_

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- **504**

- Printed copy of board work/notes provided
- Additional time for skill mastery
- Assistive technology
- Behavior management plan
- Center-Based Instruction
- Check work frequently for understanding
- Computer or electronic device utilization
- Extended time on tests/ quizzes
- Have student repeat directions to check for understanding
- Highlighted text visual presentation
- Modified assignment format
- Modified test content
- Modified test format
- Modified test length
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- Student working with an assigned partner
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- Exploration by interest
- Flexible grouping
- Goal setting with students
- Mini workshops to re-teach or extend skills Open-ended activities
- Think-Pair-Share
- Varied supplemental materials



## Unit 1 Overview: Earth's Features and Processes

**Unit 1 Summary:** Students investigate features and processes of the Earth's surface. Students explore the rapid process of volcanic eruptions. In contrast, students also explore the gradual Earth processes of weathering and erosion. Students apply their knowledge and design solutions to mitigate the impacts of these processes on humans.

### Essential Questions:

- How can evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation be observed or measured?
- What can rock formations tell us about the past?
- What can maps tell us about the features of the world?
- In what ways can the impacts of natural Earth processes on humans be reduced?
- Could a volcano erupt in your backyard?
- Why do volcanoes explode?
- Will a mountain last forever?
- How could you survive a landslide?
- How could you take steps to reduce the impacts of natural hazards?

**New Jersey Student Learning Standards**  
**(Please Bold all Climate related standards met throughout all Units)**

**New Jersey Student Learning Standards: Science**

- 4-ESS1-1. Identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time.
- 4-ESS2-1. Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.
- 4-ESS2-2. Analyze and interpret data from maps to describe patterns of Earth's features.
- 4-ESS3-2 Generate and compare multiple solutions to reduce the impacts of natural Earth processes and climate change on humans.
- 3-5-ETS1-2. 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

**Interdisciplinary Connections:**

**Speaking and Listening:**

- SL.4.1 Engage effectively in a range of collaborative discussions
- SL.4.2 Paraphrase information presented in diverse media, including orally

**English Language Arts:**

- RI.4.3. Analyze in detail how a key individual, event, or idea is introduced, illustrated, and elaborated in a text (e.g., through examples or anecdotes).
- RI.4.4. Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings.
- RI.4.7. Integrate information presented in different media or formats (e.g., visually, quantitatively) as well as in words to develop a coherent understanding of a topic or issue.
- RI.4.10 Read and comprehend informational texts
- W.4.2 Write informative/explanatory texts to examine a topic and convey ideas and information clearly
- W.4.4 Produce clear and coherent writing in which the development and organization are appropriate to task, purpose, and audience
- W.4.7 Conduct short research projects that build knowledge through investigation of different aspects of a topic
- W.4.9 Draw evidence from informational texts to support analysis, reflection and research

**SEL:**

- Social Awareness - Demonstrate an understanding of the need for mutual respect when viewpoints differ • Demonstrate an awareness of the expectations for social interactions in a variety of settings

**Arts / Music / Visual and Performing Arts:**

- Anchor Standard 1: Conceptualizing and generating ideas.
- Anchor Standard 2: Organizing and developing ideas. Anchor Standard 3: Refining and completing products.

**Mathematics:**

- MP.2 Reason abstractly and quantitatively. (4-ESS1-1)
- MP.4 Model with mathematics. (4-ESS1-1)
- 4.MD.A.1 Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two-column table. (4-ESS1-1)
- 4.MD.A.2 Use the four operations to solve word problems involving distances, intervals of time,

liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale. (4-ESS2-1), (4-ESS2-2)

### **Disciplinary Core Ideas**

#### **ESS1.A: The Universe and its Stars**

- The sun is a star that appears larger and brighter than other stars because it is closer. Stars range greatly in their distance from Earth. (5-ESS1-1)

#### **ESS1.B: Earth and the Solar System**

- The orbits of Earth around the sun and of the moon around Earth, together with the rotation of Earth about an axis between its North and South poles, cause observable patterns. These include day and night; daily changes in the length and direction of shadows; and different positions of the sun, moon, and stars at different times of the day, month, and year. (5-ESS1-2)

#### **ESS2.A: Earth Materials and Systems**

- Earth's major systems are the geosphere (solid and molten rock, soil, and sediments), the hydrosphere (water and ice), the atmosphere (air), and the biosphere (living things, including humans). These systems interact in multiple ways to affect Earth's surface materials and processes. The ocean supports a variety of ecosystems and organisms, shapes landforms, and influences climate. Winds and clouds in the atmosphere interact with the landforms to determine patterns of weather. (5-ESS2-1)

#### **ESS2.C: The Roles of Water in Earth's Surface Processes**

- Nearly all of Earth's available water is in the ocean. Most fresh water is in glaciers or underground; only a tiny fraction is in streams, lakes, wetlands, and the atmosphere. (5-ESS2-2)

#### **ETS1.A: Defining and Delimiting Engineering Problems**

- Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account. (3-5-ETS1-1)

#### **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)
- Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved. (3-5-ETS1-3)

#### **ETS1.C: Optimizing the Design Solution**

- Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints. (3-5-ETS1-3)

### **Science and Engineering Practices**

#### **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 graphical displays (bar graphs, pictographs and/or pie charts) to reveal

patterns that indicate relationships. (5-ESS1-2)

### **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). Support an argument with evidence, data, or a model. (5-ESS1-1)

### **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. Develop a model using an example to describe a scientific principle. (5-ESS2-1)

### **Using Mathematics and Computational Thinking**

- Mathematical and computational thinking in 3–5 builds on K–2 experiences and progresses to extending quantitative measurements to a variety of physical properties and using computation and mathematics to analyze data and compare alternative design solutions. Describe and graph quantities such as area and volume to address scientific questions. (5-ESS2-2)

### **Asking Questions and Defining Problems**

- Asking questions and defining problems in 3–5 builds on grades K–2 experiences and progresses to specifying qualitative relationships.
  - Define a simple design problem that can be solved through the development of an object, tool, process, or system and includes several criteria for success and constraints on materials, time, or cost. (3-5-ETS1-1)

### **Planning and Carrying Out Investigations**

- Planning and carrying out investigations to answer questions or test solutions to problems in 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. (3-5-ETS1-3)

### **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. 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)

## **Crosscutting Connections**

### **Patterns**

- Similarities and differences in patterns can be used to sort, classify, communicate and analyze simple rates of change for natural phenomena. (5-ESS1-2)

### **Scale, Proportion, and Quantity**

- Natural objects exist from the very small to the immensely large. (5-ESS1-1)
- Standard units are used to measure and describe physical quantities such as weight and volume. (5-ESS2-2)

### **Systems and System Models**

- A system can be described in terms of its components and their interactions. (5-ESS2-1)

### **Influence of Engineering, Technology, and Science on Society and the Natural World**

- People's needs and wants change over time, as do their demands for new and improved technologies. (3-5-ETS1-1)
- Engineers improve existing technologies or develop new ones to increase their benefits, decrease known risks, and meet societal demands. (3-5-ETS1-2)

## Unit 1 Student Learning Objectives

Students will know:

- The ways in which tectonic plates move
- How to compare types of maps that show Earth's features
- Explain how topographic maps represent contour and elevation
- How volcanoes form and their relationship to each other
- How solid rock breaks apart into smaller pieces through a process called weathering
- The types, causes, and dangers of landslides
- Global warming and how it affects Earth's process
- What **climate change** is, its causes and effects

Students will be able to:

- Analyze and interpret data from recent volcanic eruptions to support an argument if volcanoes are (or are not) likely to erupt in their backyard.
- Plot volcano locations on a map and find patterns
- Investigate how differences in lava types explain the differences in the shape and eruption patterns among volcanoes
- Explore how solid rock breaks apart through weathering
- Design solutions to protect their "homes" from rock slides then compare the merits of their designs
- **Study a hypothetical map of an area covered with natural hazards and decide where to place natural disaster prevention devices by applying their critical thinking skills and an understanding of the causes of natural disasters.**
- **Describe several methods that engineers use to predict, minimize or eliminate the effects of natural hazards.**

## Unit 1 Assessments

**Formative Assessments:** Entrance/Exit Tickets Science Notebook Entries, Activities

**Summative Assessments:** Science Lesson Assessments, Rubrics for Exploration

**Benchmark Assessments:** End of Unit Assessment

**Alternative Assessment:**

- Interactive Notebook
- Vocabulary

## Unit 2 Overview: Animal and Plant Adaptations

**Unit 2 Summary:** Students explore the adaptations of animals and plants. Students investigate how the external and internal structures of an organism work together as an interconnected system that aid in their growth and survival. They also use models to explore how a combination of instincts and memories influence animal behavior.

**Essential Questions:**

- How do internal and external parts of plants and animals help them to survive, grow, behave, and reproduce?
- How do organisms depend on each other to survive?
- How are organisms of the same kind different from each other?
- How does this help them reproduce and survive?
- Why do some sea creatures look so strange?
- Why would a sea turtle eat a plastic bag?
- Why don't the same trees grow everywhere?

## New Jersey Student Learning Standards

### New Jersey Student Learning Standards: Science

- 4-LSI-1. Construct an argument that the frogfish's external and internal structures work together as part of a system to support their growth and survival.
- [Clarification Statement: Examples of structures could include thorns, stems, roots, colored petals, heart, stomach, lung, brain, and skin.] [*Assessment Boundary: Assessment is limited to macroscopic structures within plant and animal systems.*]
- 4-LSI-2. Use a model to use models to understand how an animal's senses, brain, and memories all work together as a system to influence their behavior and support their survival
- [Clarification Statement: Emphasis is on systems of information transfer.] [*Assessment Boundary: Assessment does not include the mechanisms by which the brain stores and recalls information or the mechanisms of how sensory receptors function.*]
- 4-LS1-1. students use models of roots and branches to explore their functions and then construct an argument about how these structures must work together in order to support the survival of trees in the unique environment of the frozen taiga.

### Interdisciplinary Connections:

#### Speaking and Listening:

- SL.4.1 Engage effectively in a range of collaborative discussions
- SL.4.2 Paraphrase information presented in diverse media, including orally

#### ELA:

- RI.4.3. Analyze in detail how a key individual, event, or idea is introduced, illustrated, and elaborated in a text (e.g., through examples or anecdotes).
- RI.4.4. Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings.
- RI.4.7. Integrate information presented in different media or formats (e.g., visually, quantitatively) as well as in words to develop a coherent understanding of a topic or issue.
- RI.4.10 Read and comprehend informational texts
- W.4.2 Write informative/explanatory texts to examine a topic and convey ideas and information clearly
- W.4.4 Produce clear and coherent writing in which the development and organization are appropriate to task, purpose, and audience
- W.4.7 Conduct short research projects that build knowledge through investigation of different aspects of a topic
- W.4.9 Draw evidence from informational texts to support analysis, reflection and research

#### SEL:

- Social Awareness - Demonstrate an understanding of the need for mutual respect when viewpoints differ • Demonstrate an awareness of the expectations for social interactions in a variety of settings

#### Arts / Music / Visual and Performing Arts:

- Anchor Standard 1: Conceptualizing and generating ideas.
- Anchor Standard 2: Organizing and developing ideas. Anchor Standard 3: Refining and completing products.

#### Mathematics:

- 4.G.A.3 Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded across the line into matching parts. Identify line-symmetric figures and draw lines of symmetry. (4-LS1-1)

#### Health/P.E.:

- 2.1.5.PGD.1: Identify effective personal health strategies and behaviors that reduce illness, prevent

injuries, and maintain or enhance one's wellness (e.g., adequate sleep, balanced nutrition, ergonomics, regular physical activity).

- 2.2.5.PF.5: Determine how different factors influence personal fitness and other healthy lifestyle choices (e.g., heredity, physical activity, nutrition, sleep, technology).
- 2.3.5.HCDM.1: Identify conditions that may keep the human body from working properly, and the ways in which the body responds.

### **Disciplinary Core Ideas**

#### **LS1.A: Structure and Function**

- Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction. (4-LS1-1)

#### **LS1.D: Information Processing**

- Different sense receptors are specialized for particular kinds of information, which may be then processed by the animal's brain. Animals are able to use their perceptions and memories to guide their actions. (4-LS1-2)

### **Science and Engineering Practices**

#### **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.
  - Use a model to test interactions concerning the functioning of a natural system. (4-LS1-2)

#### **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. (4-LS1-1)

### **Crosscutting Connections**

#### **Systems and System Models**

- A system can be described in terms of its components and their interactions. (4-LS1-1),(4-LS1-2)

## **Unit 2 Student Learning Objectives**

#### **Students will know:**

- How external and internal structures work together as part of a system to support their growth and survival
- How animals receive information through their senses and process that information in their brain, using instincts and memories to guide their behaviors
- How animals process information in their brains and then respond to that information in different ways
- How body systems work together

#### **Students will be able to:**

- Use their observations to construct an argument that the frogfish's external and internal structures work together as part of a system to support their growth and survival
- Use a racoon brain model to understand how an animal's senses, brain, and memories all work together as a system to influence their behavior and support their survival

- Use models of roots and branches to explore their functions and then construct an argument about how these structures must work together in order to support the survival of trees in the unique environment of the frozen taiga.

## Unit 2 Assessments

### **Formative Assessments:**

- Entrance/Exit Tickets, Science Notebook Entries, Activities

### **Summative Assessments:**

- Science Lesson Assessments, Rubrics for Exploration

### **Benchmark Assessments:**

- End of Unit Assessment

### **Alternative Assessments:**

- Journal
- STEM Activities

## Unit 3 Overview: Human Body, Senses, and the Brain

**Unit 3 Summary:** Students investigate structures and functions of the human body. Students explore how our bones and muscles are interconnected, how our eyes interact with light and impact our vision, and how our brain responds to stimuli in our environment.

### Essential Questions:

- How do animals receive and process types of information from their environment in order to respond appropriately?
- How do internal and external structures support the survival, growth, behavior, and reproduction of plants and animals?
- How do the structures of organisms contribute to and enable life's functions?
- Why do your biceps bulge?
- What do people who are blind see?
- How can some animals see in the dark?
- How does your brain control your body?
- How are animals and plants like machines?

## New Jersey Student Learning Standards

### New Jersey Student Learning Standards: Science

- 4-LSI-1. Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.
- [Clarification Statement: Examples of structures could include thorns, stems, roots, colored petals, heart, stomach, lung, brain, and skin.] [*Assessment Boundary: Assessment is limited to macroscopic structures within plant and animal systems.*]
- 4-LSI-2. Use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways.
- [Clarification Statement: Emphasis is on systems of information transfer.] [*Assessment Boundary: Assessment does not include the mechanisms by which the brain stores and recalls information or the mechanisms of how sensory receptors function.*]
- 4-PS4-2. Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen. [*Assessment Boundary: Assessment does not include knowledge of specific colors reflected and seen, the cellular mechanisms of vision, or how the retina works.*]

### Interdisciplinary Connections:

#### Speaking and Listening:

- SL.4.1 Engage effectively in a range of collaborative discussions
- SL.4.2 Paraphrase information presented in diverse media, including orally

#### ELA:

- RI.4.3. Analyze in detail how a key individual, event, or idea is introduced, illustrated, and elaborated in a text (e.g., through examples or anecdotes).
- RI.4.4. Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings.
- RI.4.7. Integrate information presented in different media or formats (e.g., visually, quantitatively) as well as in words to develop a coherent understanding of a topic or issue.
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- W.4.2 Write informative/explanatory texts to examine a topic and convey ideas and information clearly
- W.4.4 Produce clear and coherent writing in which the development and organization are appropriate to task, purpose, and audience
- W.4.7 Conduct short research projects that build knowledge through investigation of different aspects of a topic
- W.4.9 Draw evidence from informational texts to support analysis, reflection and research

#### SEL:

- Social Awareness - Demonstrate an understanding of the need for mutual respect when viewpoints differ • Demonstrate an awareness of the expectations for social interactions in a variety of settings

#### Arts / Music / Visual and Performing Arts:

- Anchor Standard 1: Conceptualizing and generating ideas.
- Anchor Standard 2: Organizing and developing ideas. Anchor Standard 3: Refining and completing products.

#### Mathematics:

- 4.G.A.3 Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded across the line into matching parts. Identify line-symmetric figures and draw lines of symmetry. (4-LS1-1)

#### Health/P.E.:

- 2.1.5.PGD.1: Identify effective personal health strategies and behaviors that reduce illness, prevent injuries, and maintain or enhance one's wellness (e.g., adequate sleep, balanced nutrition, ergonomics,

regular physical activity).

- 2.2.5.PF.5: Determine how different factors influence personal fitness and other healthy lifestyle choices (e.g., heredity, physical activity, nutrition, sleep, technology).
- 2.3.5.HCDM.1: Identify conditions that may keep the human body from working properly, and the ways in which the body responds.

### **Disciplinary Core Ideas**

#### **LS1.A: Structure and Function**

- Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction. (4-LS1-1)

#### **LS1.D: Information Processing**

- Different sense receptors are specialized for particular kinds of information, which may be then processed by the animal's brain. Animals are able to use their perceptions and memories to guide their actions. (4-LS1-2)

#### **PS4.A: Wave Properties**

- Waves, which are regular patterns of motion, can be made in water by disturbing the surface. When waves move across the surface of deep water, the water goes up and down in place; there is no net motion in the direction of the wave except when the water meets a beach.(4-PS4- 1)
- Waves of the same type can differ in amplitude (height of the wave) and wavelength (spacing between wave peaks). (4-PS4-1)

#### **PS4.B: Electromagnetic Radiation**

- An object can be seen when light reflected from its surface enters the eyes. (4-PS4-2)

#### **PS4.C: Information Technologies and Instrumentation**

- Digitized information can be transmitted over long distances without significant degradation. High-tech devices, such as computers or cell phones, can receive and decode information—convert it from digitized form to voice—and vice versa. (4-PS4-3)

#### **ETS1.C: Optimizing The Design Solution**

- Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints. (secondary to 4-PS4-3)

### **Science and Engineering Practices**

#### **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.
  - Use a model to test interactions concerning the functioning of a natural system. (4-LS1-2)

#### **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. (4-LS1-1)

### **Crosscutting Connections**

#### **Systems and System Models**

- A system can be described in terms of its components and their interactions. (4- LS1-1),(4-LS1-2)

#### **Patterns**

- Similarities and differences in patterns can be used to sort and classify natural phenomena. (4-PS4-1)
- Similarities and differences in patterns can be used to sort and classify designed products. (4- PS4-3)

#### **Cause and Effect**

- Cause and effect relationships are routinely identified. (4-PS4-2)

## Connections to Engineering, Technology, and Applications of Science

- Interdependence of Science, Engineering, and Technology
  - Knowledge of relevant scientific concepts and research findings is important in engineering. (4-PS4-3)

## Unit 3 Student Learning Objectives

### Students will know:

- Which fruits are related to each other based on traits of leaves, flowers, and arrangement of seeds
- Students will explore the extreme trait variation of different dog breeds -- and pet pigeon breeds
- How nature, not human beings, can slowly change the appearance of an animal using the process of selection.
- How plants and animals have traits inherited from parents and that variation of these traits exists in a group of similar organisms
- How the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing.
- Why dogs' expressions, like tail wagging, are so useful when living in a pack

### Students will be able to:

- Explore similarities and differences in the leaves, flowers, and fruits of plants found at the grocery store to sort them into groups and identify patterns of inheritance.
- Analyze trait similarities and differences among parent, offspring, and sibling pigeons. They interpret this data to discover that the variation and inheritance of traits creates a pattern that explains why we see such extreme traits in artificially selected animal breeds.
- Simulate how natural selection affects a group of tree-climbing green lizards when their island is invaded by hungry brown lizards.
- Students gather evidence to explain how a change to the environment can cause a certain trait to become more common in a population over time through the process of natural selection.
- 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.
- Watch videos of different animals that live in groups to simulate observing them in their natural habitats.
- Discuss and record their observations, and construct an explanation of how living in groups helps these animals survive.
- Analyze how a NASA astronaut's traits changed during his "year in space." Then they measure some of their physical traits (arm strength, height, and balance) and predict how their own traits might change after living in space.

## Unit 3 Assessments

- **Formative:** Entrance/Exit Tickets, Science Notebook Entries, Activities
- **Summative:** Science Lesson Assessments, Rubrics for Exploration

- **Benchmark:** End of Unit Assessment
- **Alternative Assessment:** Interactive Notebook

## Unit 4 Overview: Energy and Energy Transfer

**Unit 4 Summary:** Students explore energy! Students investigate how energy is stored, how it can make objects move, and how collisions transfer energy between objects. Students also construct chain reaction machines to explore the many different ways that energy can be transferred.

### Essential Questions:

- Where do we get the energy we need for modern life?
- How does energy move?
- From what natural resources are energy and fuels derived?
- In what ways does the human use of natural resources affect the environment?
- How is energy transferred?
- How is your body similar to a car?
- What makes roller coasters go so fast?
- How can marbles save the world?
- Could you knock down a building using only dominoes?
- Can you build a chain reaction machine?

## New Jersey Student Learning Standards

### New Jersey Student Learning Standards: Science

- 4-PS3-1. Use evidence to construct an explanation relating the speed of an object to the energy of that object.
- 4-PS3-3 Ask questions and predict outcomes about the changes in energy that occur when objects collide.
- 4-PS3-4 Apply scientific ideas to design, test, and refine a device that converts energy from one form to another.
- 3-5-ETS1-1. Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.
- 3-5-ETS1-2. 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-ETS1-3. 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.

### Interdisciplinary Connections:

#### Speaking and Listening:

- SL.4.1 Engage effectively in a range of collaborative discussions
- SL.4.2 Paraphrase information presented in diverse media, including orally

#### ELA:

- RI.4.3. Analyze in detail how a key individual, event, or idea is introduced, illustrated, and elaborated in a text (e.g., through examples or anecdotes).
- RI.4.4. Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings.
- RI.4.7. Integrate information presented in different media or formats (e.g., visually, quantitatively) as well as in words to develop a coherent understanding of a topic or issue.
- RI.4.10 Read and comprehend informational texts
- W.4.2 Write informative/explanatory texts to examine a topic and convey ideas and information clearly
- W.4.4 Produce clear and coherent writing in which the development and organization are appropriate to task, purpose, and audience
- W.4.7 Conduct short research projects that build knowledge through investigation of different aspects of a topic
- W.4.8 Recall relevant information from experiences or gather relevant information from print and digital sources; take notes and categorize information and provide a list of sources.
- W.4.9 Draw evidence from informational texts to support analysis, reflection and research

#### SEL:

#### Social Awareness

- Demonstrate an understanding of the need for mutual respect when viewpoints differ
- Demonstrate an awareness of the expectations for social interactions in a variety of settings

#### Arts / Music / Visual and Performing Arts:

- Anchor Standard 1: Conceptualizing and generating ideas.
- Anchor Standard 2: Organizing and developing ideas. Anchor Standard 3: Refining and completing products.

#### Mathematics

- 4.OA.A.3 Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the

reasonableness of answers using mental computation and estimation strategies including rounding.

- MP.4 Model with mathematics.
- 4.G.A.1 Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures.

### **Social Studies**

- 6.1.5.GeoPP.1: Compare and contrast characteristics of regions in the United States based on culture, economics, and physical characteristics to understand the concept of regionalism.
- 6.1.5.GeoPP.2: Describe how landforms, climate and weather, and availability of resources have impacted where and how people live and work in different regions of New Jersey and the United States.

### **Health/P.E.**

- 2.1.5.PGD.1: Identify effective personal health strategies and behaviors that reduce illness, prevent injuries, and maintain or enhance one's wellness (e.g., adequate sleep, balanced nutrition, ergonomics, regular physical activity).
- 2.2.5.PF.5: Determine how different factors influence personal fitness and other healthy lifestyle choices (e.g., heredity, physical activity, nutrition, sleep, technology).
- 2.2.5.N.1: Explain how healthy eating provides energy, helps to maintain healthy weight, lowers risk of disease, and keeps body systems functioning effectively.
- 2.3.5.PS.1: Develop strategies to reduce the risk of injuries at home, school, and in the community.

## **Disciplinary Core Ideas**

### **PS3.A: Definitions of Energy**

- The faster a given object is moving, the more energy it possesses. (4- PS3-1)
- Energy can be moved from place to place by moving objects or through sound, light, or electric currents. (4-PS3-2),(4-PS3-3)

### **PS3.B: Conservation of Energy and Energy Transfer**

- Energy is present whenever there are moving objects, sound, light, or heat. When objects collide, energy can be transferred from one object to another, thereby changing their motion. In such collisions, some energy is typically also transferred to the surrounding air; as a result, the air gets heated and sound is produced. (4-PS3-2),(4-PS3-3)
- Light also transfers energy from place to place. (4-PS3-2)
- Energy can also be transferred from place to place by electric currents, which can then be used locally to produce motion, sound, heat, or light. The currents may have been produced to begin with by transforming the energy of motion into electrical energy. (4-PS3-2),(4- PS3-4)

### **PS3.C: Relationship Between Energy and Forces**

- When objects collide, the contact forces transfer energy so as to change the objects' motions. (4-PS3-3)

### **PS3.D: Energy in Chemical Processes and Everyday Life**

- The expression "produce energy" typically refers to the conversion of stored energy into a desired form for practical use. (4-PS3-4)

### **ETS1.A: Defining Engineering Problems**

- Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account. (secondary to 4-PS3-4)

## **Science and Engineering Practices**

### **Asking Questions and Defining Problems**

- Asking questions and defining problems in grades 3–5 builds on grades K–2 experiences and progresses to specifying qualitative relationships.
  - Ask questions that can be investigated and predict reasonable outcomes based on patterns such as cause and effect relationships. (4-PS3-3)

#### **Planning and Carrying Out Investigations**

- Planning and carrying out investigations to answer questions or test solutions to problems in 3–5 builds on K– 2 experiences and progresses to include investigations that control variables and provide evidence to support explanations or design solutions.
  - Make observations to produce data to serve as the basis for evidence for an explanation of a phenomenon or test a design solution. (4-PS3-2)

#### **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., measurements, observations, patterns) to construct an explanation. (4-PS3-1)
  - Apply scientific ideas to solve design problems. (4- PS3-4)

### **Crosscutting Connections**

#### **Energy and Matter**

- Energy can be transferred in various ways and between objects. (4-PS3-1),(4-PS3-2),(4-PS3-3),(4-PS3-4)

#### **Connections to Engineering, Technology, and Applications of Science**

- Influence of Science, Engineering and Technology on Society and the Natural World Engineers improve existing technologies or develop new ones. (4-PS3-4)

#### **Connections to Nature of Science**

- Science is a Human Endeavor
  - Most scientists and engineers work in teams. (4-PS3-4)
  - Science affects everyday life. (4-PS3-4)

### **Unit 4 Student Learning Objectives**

#### **Students will know:**

- The energy from food to make our bodies move just like cars use the energy from gasoline to move
- That speed and energy are related
- Giving something “height” is another way to store energy
- About storing, releasing, and transferring energy

#### **Students will be able to:**

- Build paper models of an amusement park ride & examine the relationship between energy and speed
- Build a model of a roller coaster, analyze data to explain the connection between height, energy, and motion
- Construct an explanation of how energy is stored, released, and transferred in chain reactions
- Design a chain reaction machine
- Design a Rube Goldberg machine that utilizes energy transfers and conversions to turn on a flashlight.

## Unit 4 Assessments

**Formative:** Entrance/Exit Tickets, Science Notebook Entries, Activities

**Summative:** Science Lesson Assessments, Rubrics for Exploration

**Benchmark:** End of Unit Assessment

**Alternative Assessment:** Interactive Notebook

## **Unit 5 Overview: Electricity, Light, and Heat**

**Unit 5 Summary:** Students investigate the different forms of energy! Students obtain information about how heat energy, solar energy, wind energy, and water energy can be transformed into electrical energy. They also construct devices that convert energy from one form into another, such as heat into motion and electricity into light.

### **Essential Questions:**

- What is the best way to light up a city?
- What if there were no electricity?
- How long did it take to travel across the country before there were cars and planes?

## New Jersey Student Learning Standards

### New Jersey Student Learning Standards: Science

- 4-PS3-2 Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents.
- 4-PS3-4 Apply scientific ideas to design, test, and refine a device that converts energy from one form to another.
- 4-ESS3-1. Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment.
- 3-5-ETS1-1. Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.
- 3-5-ETS1-3. 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.

### Interdisciplinary Connections:

#### Speaking and Listening:

- SL.4.1 Engage effectively in a range of collaborative discussions
- SL.4.2 Paraphrase information presented in diverse media, including orally

#### ELA:

- RI.4.3. Analyze in detail how a key individual, event, or idea is introduced, illustrated, and elaborated in a text (e.g., through examples or anecdotes).
- RI.4.4. Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings.
- RI.4.7. Integrate information presented in different media or formats (e.g., visually, quantitatively) as well as in words to develop a coherent understanding of a topic or issue.
- RI.4.10 Read and comprehend informational texts
- W.4.2 Write informative/explanatory texts to examine a topic and convey ideas and information clearly
- W.4.4 Produce clear and coherent writing in which the development and organization are appropriate to task, purpose, and audience
- W.4.7 Conduct short research projects that build knowledge through investigation of different aspects of a topic
- W.4.8 Recall relevant information from experiences or gather relevant information from print and digital sources; take notes and categorize information and provide a list of sources.
- W.4.9 Draw evidence from informational texts to support analysis, reflection and research

#### SEL:

#### Social Awareness

- Demonstrate an understanding of the need for mutual respect when viewpoints differ
- Demonstrate an awareness of the expectations for social interactions in a variety of settings

#### Arts / Music / Visual and Performing Arts:

- Anchor Standard 1: Conceptualizing and generating ideas.
- Anchor Standard 2: Organizing and developing ideas. Anchor Standard 3: Refining and completing products.

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- 4.OA.A.3 Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.
- MP.4 Model with mathematics.

- 4.G.A.1 Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures.

### **Social Studies**

- 6.1.5.GeoPP.1: Compare and contrast characteristics of regions in the United States based on culture, economics, and physical characteristics to understand the concept of regionalism.
- 6.1.5.GeoPP.2: Describe how landforms, climate and weather, and availability of resources have impacted where and how people live and work in different regions of New Jersey and the United States.

### **Health/P.E.**

- 2.1.5.PGD.1: Identify effective personal health strategies and behaviors that reduce illness, prevent injuries, and maintain or enhance one's wellness (e.g., adequate sleep, balanced nutrition, ergonomics, regular physical activity).
- 2.2.5.PF.5: Determine how different factors influence personal fitness and other healthy lifestyle choices (e.g., heredity, physical activity, nutrition, sleep, technology).
- 2.2.5.N.1: Explain how healthy eating provides energy, helps to maintain healthy weight, lowers risk of disease, and keeps body systems functioning effectively.
- 2.3.5.PS.1: Develop strategies to reduce the risk of injuries at home, school, and in the community.

## **Disciplinary Core Ideas**

### **PS3.A: Definitions of Energy**

- The faster a given object is moving, the more energy it possesses. (4- PS3-1)
- Energy can be moved from place to place by moving objects or through sound, light, or electric currents. (4-PS3-2),(4-PS3-3)

### **PS3.B: Conservation of Energy and Energy Transfer**

- Energy is present whenever there are moving objects, sound, light, or heat. When objects collide, energy can be transferred from one object to another, thereby changing their motion. In such collisions, some energy is typically also transferred to the surrounding air; as a result, the air gets heated and sound is produced. (4-PS3-2),(4-PS3-3)
- Light also transfers energy from place to place. (4-PS3-2)
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### **PS3.C: Relationship Between Energy and Forces**

- When objects collide, the contact forces transfer energy so as to change the objects' motions. (4-PS3-3)

### **PS3.D: Energy in Chemical Processes and Everyday Life**

- The expression "produce energy" typically refers to the conversion of stored energy into a desired form for practical use. (4-PS3-4)

### **ETS1.A: Defining Engineering Problems**

- Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account. (secondary to 4-PS3-4)

### **ESS3.A: Natural Resources**

- Energy and fuels that humans use are derived from natural sources, and their use affects the environment in multiple ways. Some resources are renewable over time, and others are not. (4-ESS3-1)

### **ESS3.B: Natural Hazards**

- A variety of hazards result from natural processes (e.g., earthquakes, tsunamis, volcanic eruptions).

Humans cannot eliminate the hazards but can take steps to reduce their impacts. (4-ESS3-2)

### **ETS1.B: Designing Solutions to Engineering Problems**

- Testing a solution involves investigating how well it performs under a range of likely conditions. (secondary to 4-ESS3-2)

### **Science and Engineering Practices**

#### **Asking Questions and Defining Problems**

- Asking questions and defining problems in grades 3–5 builds on grades K–2 experiences and progresses to specifying qualitative relationships.
  - Ask questions that can be investigated and predict reasonable outcomes based on patterns such as cause and effect relationships. (4-PS3-3)

#### **Planning and Carrying Out Investigations**

- Planning and carrying out investigations to answer questions or test solutions to problems in 3–5 builds on K–2 experiences and progresses to include investigations that control variables and provide evidence to support explanations or design solutions.
  - Make observations to produce data to serve as the basis for evidence for an explanation of a phenomenon or test a design solution. (4-PS3-2)

#### **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., measurements, observations, patterns) to construct an explanation. (4-PS3-1)
  - Apply scientific ideas to solve design problems. (4-PS3-4)

### **Crosscutting Concepts**

#### **Energy and Matter**

- Energy can be transferred in various ways and between objects. (4-PS3-1),(4-PS3-2),(4-PS3-3),(4-PS3-4)

#### **Connections to Engineering, Technology, and Applications of Science**

- Influence of Science, Engineering and Technology on Society and the Natural World Engineers improve existing technologies or develop new ones. (4-PS3-4)

#### **Connections to Nature of Science**

- Science is a Human Endeavor
  - Most scientists and engineers work in teams. (4-PS3-4)
  - Science affects everyday life. (4-PS3-4)

## **Unit 5 Student Learning Objectives**

### **Students will know:**

- Although the lives of animals can be very different, they all have in common birth, growth, reproduction, and death.
- The role of mosquitoes in carrying diseases such as malaria.
- How and why flowers are pollinated.
- Why plants grow fruit.
- While there is great diversity among flowering plants, they all share similar life cycles.
- That plants start from seeds, grow, and eventually reproduce through the process of pollination.

Students will be able to:

- Develop a model to compare the life stories of different animals.
- Evaluate the merits of different solutions for getting rid of mosquitoes at various locations in a town.
- Design a solution to help the town deal with an abundance of mosquitoes resulting from a very rainy summer.
- Make flower models out of paper and bee models out of pipe cleaners.
- Fly their bees from flower to flower and observe what happens to the flower's pollen during this process.
- Examine common grocery produce and predict if each item is a science fruit or science vegetable.
- Observe and predict how changes to the pollinators affect plant reproduction, which affects the life cycles of those plants.

## Unit 5 Assessments

**Formative:** Entrance/Exit Tickets, Science Notebook Entries, Activities, etc.

**Summative:** Science Lesson Assessments, Rubrics for Exploration

**Benchmark:** End of Unit Assessment

**Alternate Assessment:**  
Interactive Notebook

## Unit 6 Overview: Sound, Waves, and Communication

**Unit 6 Summary:** Students investigate the science of sound. Students construct physical devices to feel the vibrations that allow us to communicate across distances. Students also use digital devices to visualize the characteristics of different sound waves that cause us to hear different things.

### Essential Questions:

- How do you send a secret code?
- How far can a whisper travel?
- What would happen if you screamed in outer space?
- Why are some sounds high and some sounds low?
- How can you make sound waves visible?

## New Jersey Student Learning Standards

### New Jersey Student Learning Standards: Science

- 4-PS4-1 Develop a model of waves to describe patterns in terms of amplitude and wavelength and that waves can cause objects to move.
- 4-PS4-3 Generate and compare multiple solutions that use patterns to transfer information.

### Interdisciplinary Connections:

#### Speaking and Listening:

- SL.4.1 Engage effectively in a range of collaborative discussions
- SL.4.2 Paraphrase information presented in diverse media, including orally
- SL.4.5 Add audio recordings and visual displays to presentations when appropriate to enhance the development of main ideas or themes.

#### ELA:

- RI.4.1 Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text.
- RI.4.3. Analyze in detail how a key individual, event, or idea is introduced, illustrated, and elaborated in a text (e.g., through examples or anecdotes).
- RI.4.4. Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings.
- RI.4.7. Integrate information presented in different media or formats (e.g., visually, quantitatively) as well as in words to develop a coherent understanding of a topic or issue.
- RI.4.9 Integrate information from two texts on the same topic in order to write or speak about the subject knowledgeably
- RI.4.10 Read and comprehend informational texts
- W.4.2 Write informative/explanatory texts to examine a topic and convey ideas and information clearly
- W.4.4 Produce clear and coherent writing in which the development and organization are appropriate to task, purpose, and audience
- W.4.7 Conduct short research projects that build knowledge through investigation of different aspects of a topic

#### Mathematics:

- MP.4 Model with mathematics.
- 4.G.A.1 Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures.

#### Health/P.E.:

- 2.1.5.PGD.1: Identify effective personal health strategies and behaviors that reduce illness, prevent injuries, and maintain or enhance one's wellness (e.g., adequate sleep, balanced nutrition, ergonomics, regular physical activity).

#### SEL:

- Social Awareness - Demonstrate an understanding of the need for mutual respect when viewpoints differ. Demonstrate an awareness of the expectations for social interactions in a variety of settings

### Disciplinary Core Ideas

#### PS4.A: Wave Properties

- Waves, which are regular patterns of motion, can be made in water by disturbing the surface. When waves move across the surface of deep water, the water goes up and down in place; there is no net motion in the direction of the wave except when the water meets a beach. (4-PS4- 1)
- Waves of the same type can differ in amplitude (height of the wave) and wavelength (spacing between wave peaks). (4-PS4-1)

**PS4.B: Electromagnetic Radiation**

- An object can be seen when light reflected from its surface enters the eyes. (4-PS4-2)

**PS4.C: Information Technologies and Instrumentation**

- Digitized information can be transmitted over long distances without significant degradation. High-tech devices, such as computers or cell phones, can receive and decode information—convert it from digitized form to voice—and vice versa. (4-PS4-3)

**ETS1.C: Optimizing The Design Solution**

- Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints. (secondary to 4-PS4-3)

**Science and Engineering Practices****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.
  - Develop a model using an analogy, example, or abstract representation to describe a scientific principle. (4-PS4- 1)
  - Develop a model to describe phenomena. (4-PS4-2)

**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.
  - Generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design solution. (4-PS4-3)

**Connections to Nature of Science**

- Scientific Knowledge is Based on Empirical Evidence
  - Science findings are based on recognizing patterns. (4- PS4-1)

**Crosscutting Concepts****Patterns**

- Similarities and differences in patterns can be used to sort and classify natural phenomena. (4-PS4-1)
- Similarities and differences in patterns can be used to sort and classify designed products. (4- PS4-3)

**Cause and Effect**

- Cause and effect relationships are routinely identified. (4-PS4-2)

**Connections to Engineering, Technology, and Applications of Science**

- Interdependence of Science, Engineering, and Technology
  - Knowledge of relevant scientific concepts and research findings is important in engineering. (4-PS4-3)

**Unit 6 Student Learning Objectives****Students will know:**

- How digital devices encode complex information so that it can be transferred over long distances
- About the connection between sounds and vibration.
- The factors that affect the pitch and loudness of sound produced by vibrating objects.
- The role that air plays in enabling a sound vibration to travel.
- How sound is transmitted, reflected and/or absorbed by different materials.
- How sound is affected by different materials in different environments.
- That sound is a wave.

- The structure and function of the human ear.

Students will be able to:

- Generate their own codes in order to transfer information across the classroom
- Make telephones using cups and string.
- Modify the design of their telephones using different types of supplies to see if they can improve the sound quality.
- Explore sound vibrations.
- Experiment with sound to understand how it moves through the air and then consider what would happen in an environment like space where there is no air.
- Draw the waves that different sounds make using a virtual oscilloscope, a machine that shows images of sound waves.
- Vibrate a rope to make waves that look like the ones made by the oscilloscope
- Design and build a device that uses the vibrations of sound to make visible patterns

## Unit 6 Assessments

**Formative:** Entrance/Exit Tickets, Science Notebook Entries, Activities, etc.

**Summative:** Science Lesson Assessments, Rubrics for Exploration

**Benchmark:** End of Unit Assessment

**Alternate Assessment:**

Interactive Notebook