Unit #3: Life Sciences- Insects and Plants

Content Area:ScienceCourse(s):Grade 2Time Period:Third TrimesterLength:12 WeeksStatus:Published

Unit Overview

This unit provides students with life science core ideas dealing with structure and function of living things, growth and development of plants and animals, interactions of organisms with their environment, and biodiversity of organisms on land and in water.

Students build on the science concepts of growth and development of plants and animals from grades K-1 by observing new organisms over time. Students see the life cycles of insects unfold in real time and compare the stages exhibited by each species to reveal patterns. At the same time, students grow one type of plant from seed and observe it through its life cycle to produce new seeds. They gain experience with the ways that plants and insects interact in feeding relationships, seed dispersal, and pollination, and students develop models to communicate their understanding.

Throughout this unit, students engage in science and engineering practices to collect and interpret data to answer science questions, develop models to communicate interactions and processes, and define problems in order to develop solutions. Students gain experiences that will contribute to understanding of crosscutting concepts of patterns; cause and effect; and structure and function.

STAGE 1- DESIRED RESULTS

Educational Standards

2020 New Jersey Student Learning Standards- Science

Physical Sciences

SCI.2-PS1-3	Make observations to construct an evidence-based account of how an object made of a small set of pieces can be disassembled and made into a new object.
SCI.2-PS1	Matter and its Interactions
SCI.2-PS1-2	Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for an intended purpose.
SCI.2-PS1-4	Construct an argument with evidence that some changes caused by heating or cooling can be reversed and some cannot.
SCI.2-PS1-1	Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties.

Life Sciences

SCI.2-LS4	Biological Evolution: Unity and Diversity
SCI.2-LS2-1	Plan and conduct an investigation to determine if plants need sunlight and water to grow.
SCI.2-LS4-1	Make observations of plants and animals to compare the diversity of life in different habitats.
SCI.2-LS2-2	Develop a simple model that mimics the function of an animal in dispersing seeds or pollinating plants.
SCI.2-LS2	Ecosystems: Interactions, Energy, and Dynamics

Earth and Space Sciences

SCI.2-ESS2-1	Compare multiple solutions designed to slow or prevent wind or water from changing the shape of the land.
SCI.2-ESS1-1	Use information from several sources to provide evidence that Earth events can occur quickly or slowly.
SCI.2-ESS2-3	Obtain information to identify where water is found on Earth and that it can be solid or liquid.
SCI.2-ESS2-2	Develop a model to represent the shapes and kinds of land and bodies of water in an area.
SCI.2-ESS2	Earth's Systems
SCI.2-ESS1	Earth's Place in the Universe

Engineering Design

SCI.K-2-ETS1-1

Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a

SCI.K-2-ETS1-2Develop a simple sketch, drawing, or physical model to illustrate how the shape of an
object helps it function as needed to solve a given problem.SCI.K-2-ETS1-3Analyze data from tests of two objects designed to solve the same problem to compare
the strengths and weaknesses of how each performs.

Science and Engineering Practices

- Practice 1: Asking Questions and Defining Problems
- Practice 2: Developing and Using Models
- Practice 3: Planning and Carrying Out Investigations
- Practice 4: Analyzing and Interpreting Data
- Practice 5: Using Mathematics and Computational Thinking
- Practice 6: Constructing Explanations and Designing Solutions
- Practice 7: Engaging in Argument from Evidence
- Practice 8: Obtaining, Evaluating, and Communicating Information

Cross Cutting Concepts

- Patterns
- Cause and Effect
- Scale, Proportion, and Quantity
- Systems and System Models
- Energy and Matter
- Structure and Functions
- Stability and Change

Disciplinary Core Ideas

Physical Sciences

- PS1. Matter and Its Interaction
- PS1.A: Structure and Properties of Matter
- PS1.B: Chemical Reactions
- PS1.C: Nuclear Processes
- PS2. Motion and Stability: Forces of Interaction

- PS2.A: Forces and Motion
- PS2.B: Types of Interactions
- PS2.C: Stability and Instability in Physical Systems
- PS3. Energy
- PS3.A: Definitions of Energy
- PS3.B: Conservation of Energy and Energy Transfer
- PS3.C: Relationship Between Energy and Forces
- PS3.D: Energy and Chemical Processes in Everyday Life
- PS4. Waves and Their Applications in Technologies for Information Transfer
- PS4.A: Wave Properties
- PS4.B: Electromagnetic Radiation
- PS4.C: Information Technologies and Instrumentation

Life Sciences

- LS1. From Molecules to Organisms: Structure and Processes
- LS1.A: Structure and function
- LS1.B: Growth and development of organisms
- LS1.C: Growth and development of organisms
- LS1.D: Information Processing
- LS2. Ecosystems: Interactions, Energy, and Dynamics
- LS2.A: Interdependent relationships in ecosystems
- LS2.B: Cycles of matter and energy transfer in ecosystems
- LS2.C: Ecosystem dynamics, functioning, and resilience
- LS2.D: Social interactions and group behavior
- LS3. Heredity: Inheritance and Variation of Traits
- LS3.A: Inheritance of traits
- LS3.B: Variation of traits
- LS4. Biological Evolution: Unity and Diversity
- LS4.A: Evidence of common ancestry and diversity
- LS4.B: Natural selection
- LS4.C: Adaptation
- LS4.D: Biodiversity and humans

Earth and Space Sciences

- ESS1. Earth's Place in the Universe
- ESS1.A: The universe and its stars

- ESS1.B: Earth and the solar system
- ESS1.C: The history of planet Earth
- ESS2. Earth's System
- ESS2.A: Earth materials and systems
- ESS2.B: Plate tectonics and large-scale system interactions
- ESS2.C: The roles of water in Earth's surface processes
- ESS2.D: Weather and climate
- ESS2.E: Biogeology
- ESS3. Earth and Human Activity
- ESS3.A: Natural resources
- ESS3.B: Natural hazards
- ESS3.C: Human impacts on Earth systems
- ESS3.D: Global climate change

Essential Questions

Investigation 1: Mealworms

- Part 1: What do mealworms need to live?
- Part 2: How do mealworms grow and change?
- Part 3: What are the stages of a beetle's life cycle?

Investigation 2: Brassica Seeds

- Part 1: How did we plant the brassica seeds?
- Part 2: How does a young plant change as it grows?
- Part 3: What will happen to the flowers on the brassica plants?
- Part 4: Where is a good outdoor place for growing young plants?

Investigation 3: Milkweed Bugs

- Part 1: What are the yellow objects and how do they change over time?
- Part 2: What do milkweed bugs need in their habitat?
- Part 3: How do milkweed bugs grow and change?

Part 4: Where do insects live?

Investigation 5: Butterflies

Part 1: What do caterpillars do?

- Part 2: How is a painted lady pupa different from a silkworm pupa?
- Part 3: What is the life cycle of a painted lady butterfly?
- Part 4: What plants in our schoolyard have pollen?

Enduring Understanding

This life science unit develops students' understanding of how:

- 1) Organisms live, grow, respond to their environment, and reproduce;
- 2) And why organisms interact with their environment and what are the effects of these interactions;

3) There can be so many similarities among organisms yet so many different kinds of plants, animals, and microorganisms; and

4) Biodiversity affects humans.

Students will know...

Vocabulary

Investigation 1: Mealworms

abdomen, adult, air, antenna, bran, darkling beetle, dead, dropping, egg, exoskeleton, food, habitat, head, insect, larva, leg, life cycle, living, mealworm, molt, molting, observe, organism, pupa, segment, space, stage, structure, thorax, water

Investigation 2: Brassica Seeds

brassica, bud, fertilizer, flower, fruit, germinate, leaf, light, nutrient, plant, pollen, pollination, root, seed, seedling, seedpod, soil, sprout, stem

Investigation 3: Milkweed Bugs

bug, female, hatch, male, mating, milkweed bug, nymph, proboscis, shelter

Investigation 5: Butterflies

butterfly, caterpillar, chrysalis, nectar, offspring, painted Lady, predict, waste

Students will be able to...

Investigation 1: Mealworms

- Ask questions about mealworms based on observations to find out more about the growth and development of these organisms.
- Plan and carry out investigations with mealworms, providing them with basic needs of air, water, food, and space, and carefully observing them over time to collect data to form into evidence to answer questions about the life cycle of these organisms. During the weeks of observations, students will make predictions about the future growth and change of the mealworms at different stages based on the students' prior experiences.
- Analyze and interpret data by describing observations of the mealworms at different stages in their life cycle, recording information using and sharing notebook entries including writing and labeled pictures. Students use their firsthand observations and those of others in the classroom to describe the patterns displayed in the life cycle of the mealworm. Students compare predictions of the changes to the actual changes observed in the mealworms during their life cycle.
- Use mathematics and computational thinking to describe what an insect is (number of legs, number of body parts).
- Construct explanations by making firsthand observations of mealworms and use this as evidence to answer
 questions about their life cycle.
- Engage in argument from evidence to support predictions made based on evidence gathered through observations of mealworms.
- Obtain, evaluate, and communicate information about plants and animals in different environments to develop an understanding about biodiversity.

Investigation 2: Brassica Seeds

- Ask questions about how a plant started from a seed grows, develops, and changes over time as it goes through its life cycle.
- Develop and use models to represent how insects help to pollinate plants, how animals disperse seeds from one location to another to promote plant diversity, and how a plant starting from a seed goes through its life cycle.
- Plan and carry out investigations with brassica seeds to observe and collect data about the life cycle of a plant, and make predictions based on prior experiences with plants; observe seeds on the schoolyard.
- Analyze and interpret data at different stages in the life cycle of a brassica plant, recording information using pictures, drawings, and words to describe the process of growth and development leading to answering questions about plant reproduction.
- Construct explanations of plant growth, development, and reproduction by using brassica as a representative.
- Engage in argument from evidence gathered by observing brassica plants over time to support claims that plants are living organisms that grow and change.
- Obtain, evaluate, and communicate information about plant growth and reproduction by reading gradeappropriate text and using media to gather information to answer questions and by communicating information

orally and in written forms using models, drawings, words, and numbers.

Investigation 3: Milkweed Bugs

- Ask questions and define problems about milkweed bugs at different stages in their life cycle; ask questions about a schoolyard organism to define the problem in order to gather information to design an appropriate habitat.
- Develop and use models by designing a classroom habitat for an outdoor insect or other small critter based on information about the needs of the organism.
- Plan and carry out investigations collaboratively by building a habitat and observing milkweed bugs during different parts of the insect's life cycle.
- Analyze and interpret data by describing observations of milkweed bugs during their life cycle stages using labeled drawings and words; making scientific drawings of schoolyard insects. Use firsthand observations to describe life cycle patterns of insects and to compare predictions to what actually occurred.
- Construct explanations and design solutions by making observations of milkweed bugs through their life cycle stages and by generation and comparing multiple solutions to designing a habitat for a given organism.
- Engage in argument from evidence to support a claim that a habitat meets the needs of an organism. Listen to the arguments presented by other students about how the needs of an organism are met by the design of a habitat and determining agreement or disagreement.
- Obtain, evaluate, and communicate information about specific insects by using grade-appropriate text and media, and by sharing ideas about insects and habitat designs by using models, drawings, and writing.

Investigation 5: Butterflies

- Define problems by gathering information about painted lady butterflies at different stages in their life cycle in order to design an appropriate habitat.
- Develop and use models by designing a simple model to mimic the function of an insect in pollinating flowers by moving pollen from one flower to another.
- Plan and carry out investigations collaboratively by providing a habitat and observing painted lady butterflies during different parts of the insect's life cycle.
- Analyze and interpret data by describing observations of painted ladies during their life-cycle stages using labeled drawings and words. Use firsthand observations to describe life-cycle patterns of insects and to compare predictions to what actually occurred.
- Construct explanations and design solutions by making observations of painted lady butterflies through their lifecycle stages and by generating and designing changes to classroom habitats as the needs of the organism changes.
- Obtain, evaluate, and communicate information about specific insects by using grade-appropriate text and media, and by sharing ideas about insects and habitat designs by using models, drawings, and writing.

STAGE 2- EVIDENCE OF LEARNING

- 3- Minute Pause
- A-B-C Summaries
- Analogy Prompt
- Choral Response
- Debriefing
- Exit Card / Ticket
- Hand Signals
- Idea Spinner
- Index Card Summaries
- Inside-Outside Circle Discussion (Fishbowl)
- Journal Entry
- Misconception Check
- Observation
- One Minute Essay
- One Word Summary
- Portfolio Check
- Questions & Answers
- Quiz
- Self-Assessment
- Student Conference
- Think-Pair-Share
- Web or Concept Map

Authentic Assessments Suggestions

Investigation 1: Mealworms

- Science notebook entries
- Performance assessment
- Investigation 1 I-Check

Investigation 2: Brassica Seeds

- Science notebook entries
- Performance assessment
- Investigation 2 I-Check

Investigation 3: Milkweed Bugs

• Science notebook entries

• Investigation 3 I-Check

Investigation 5: Butterflies

- Performance assessment
- Science notebook entries
- Investigation 5 I-Check

Benchmark Assessments

Unit Posttest

STAGE 3- LEARNING PLAN

Instructional Map

Investigation 1: Mealworms

- Investigation 2: Brassica Seeds
- Investigation 3: Milkweed Bugs
- Investigation 5: Butterflies

Investigation 1: Mealworms

Investigation 1: Part 1- Mealworms

Students begin their study of insects. They are introduced to mealworms and observe their structures and behaviors. Each pair of students monitors several mealworms over time and attends to the insects' needs—food, water, space, and air.

Content:

• Insects are animals and need air, food, water, and space.

- Living organisms need to be treated with care and respect.
- Mealworms resemble each other.

Investigation 1: Part 2- Larva, Pupa, Adult

Mini-sessions are conducted whenever students observe a change in their mealworms. They discuss molting, pupation, adults, and mating. They learn the three parts of an insect body: head, thorax, and abdomen. Students observe, compare, and draw the mealworms as they progress through their stages.

Content:

- Insects have characteristic structures and behaviors.
- The structures of some insects change as the insect grows.
- As insects grow, they molt their hard, external covering.
- Adult insects have a head, thorax, and abdomen.

Investigation 1: Part 3- Life Cycle

Students discover tiny larvae in the class mealworm habitat several weeks after adults appear.

Content:

- The life cycle of the beetle is egg, larva, pupa, and adult, which produces eggs.
- Insects have predictable characteristics at different stages of development.

Investigation 2: Brassica Seeds

Investigation 2: Part 1- Planting Brassica

Students plant rapid-cycling brassica seeds in soil, water the seeds, and place them under a lamp where they will receive continuous light.

Content:

- Plants are living organisms that need water, air, nutrients, light, and space to grow.
- Plants produce seeds that develop into new plants that look like the parent plant.

Investigation 2: Part 2- Observing Brassica Growth

Students observe germination, growth, and flowering of the brassica plants. They monitor and record changes in the plants over time. They discuss environmental conditions that promote germination and gain awareness of flower

pollination. Students view videos showing what plants need to grow, the different stages of development of plants, and the importance of insects in plant pollination.

Content:

- As plants grow, they develop roots, stems, leaves, buds, flowers, and seeds in a sequence called the life cycle.
- Bees and other insects help some plants by moving pollen from flower to flower.

Investigation 2: Part 3- Plant Life Cycle

Students observe brassica flowers change and become seedpods. They harvest the seeds, getting an introduction to the concept of life cycle in plants. Students read about the importance of fruit, seeds, and flowers for a plant's life cycle.

Content:

• As plants grow, they develop roots, stems, leaves, buds, flowers, and seeds in a sequence called the life cycle.

Investigation 2: Part 4- Planting Outdoors

Students find outdoor locations where young plants can grow and thrive. Students plant marigold seeds and seedlings outdoors and observe them over time. They look for flowers, seeds, and seedpods in the schoolyard.

Content:

- Plants are living organisms that need water, air, nutrients, light, and space to grow.
- Animals disperse seeds, moving them from one location to another.

Investigation 3: Milkweed Bugs

Investigation 3: Part 1- Eggs

Students observe the tiny yellow or orange milkweed bug eggs in vials and speculate on what they are and how they might change over time.

Content:

- Insects hatch from eggs.
- Living organisms need to be treated with care and respect.

Investigation 3: Part 2- Habitats

Students prepare milkweed bug habitats for the nymphs and outfit them with food (sunflower seeds), water, air, and space with shelter. They hang up the habitat in the classroom. They use a thermometer to measure the air temperature near the habitats.

Content:

- Insects need air, food, water, and appropriate space including shelter; different insects meet these needs in different ways.
- Variations exist within a group of related organisms.

Investigation 3: Part 3- Growing Milkweed Bugs

Students care for the bugs and observe the changes that occur as the bugs mature. They observe egg hatching, molting, feeding, growth, movement, change of color pattern, mating, egg laying, and death—leading to opportunities to develop the concept of life cycle. Each time they observe, they record the temperature of the air near the habitats. Students read about the variation in color, size, and shape in different groups of organisms.

Content:

- As insects grow, they molt their hard, external covering.
- Insects have three main body parts: head, thorax, and abdomen.
- Insects and other animals have different structures that help them grow and survive.
- The life cycle of some insects is egg, nymph stages, and adult, which produces eggs.

Investigation 3: Part 4- Insect Search

Students go outdoors to search the schoolyard for insects living in a natural habitat, either on the ground or on plants. Students each select one insect for careful observation and draw it in their notebooks. Students select one of the common schoolyard insects to study as a class. After researching the insect's needs and life cycle, students design an appropriate classroom habitat for the insect.

Content:

- Insects need air, food, water, and appropriate space including shelter; different insects meet these needs in different ways.
- Designing an insect habitat requires asking questions, making observations, and gathering information to clearly understand the problem to be solved. Designs can be conveyed through drawings.

Investigation 5: Butterflies

Investigation 5: Part 1- Caterpillars

Students are introduced to a painted lady caterpillar (larval stage) and observe it closely to determine its structures. They monitor its behaviors—eating, moving, molting—until it pupates into a chrysalis.

Content:

- The life cycle of the butterfly involves complete metamorphosis—egg, larva, pupa, and adult, which produces eggs.
- Butterflies construct chrysalises when they pupate.

Investigation 5: Part 2- Chrysalises

The painted lady pupae are transferred to a net cage to prepare for the emergence of adult painted ladies.

Content:

- Butterflies construct chrysalises when they pupate.
- Life cycles are different for different animals.

Investigation 5: Part 3- Adult Butterflies

Students observe butterflies feeding at a sugar-water fountain, watch for mating, and search for eggs. With luck, some eggs will hatch, and tiny larvae will emerge to start the cycle again. Students read an article about the life cycles of a fish, frog, duck, and mouse.

Content:

- The life cycle of the butterfly involves complete metamorphosis—egg, larva, pupa, and adult, which produces eggs.
- Life cycles are different for different animals.

Investigation 5: Part 4- Flower Powder

Students review a video describing the important role that insects and hummingbirds play in pollinating flowers. Students search the schoolyard for plants with pollen-rich flowers. While outdoors, students may observe butterflies and other insects engaged in pollination. Students design model pollinators to test the shape and materials that will collect pollen.

Content:

• As butterflies, moths, bees, and other insects get food, they move pollen from a flower of one kind to another

flower of the same kind. Plants depend on insects and birds to pollinate flowers in order to produce seeds.

Modifications/Differentiation of Instruction

Differentiation Strategies for Special Education Students

- Remove unnecessary material, words, etc., that can distract from the content
- Use of off-grade level materials
- Provide appropriate scaffolding
- Limit the number of steps required for completion
- Time allowed
- Level of independence required
- Tiered centers, assignments, lessons, or products
- Provide appropriate leveled reading materials
- Deliver the content in "chunks"
- Varied texts and supplementary materials
- Use technology, if available and appropriate
- Varied homework and products
- Varied questioning strategies
- Provide background knowledge
- Define key vocabulary, multiple-meaning words, and figurative language.
- Use audio and visual supports, if available and appropriate
- Provide multiple learning opportunities to reinforce key concepts and vocabulary
- Meet with small groups to reteach idea/skill
- Provide cross-content application of concepts
- Ability to work at their own pace
- Present ideas using auditory, visual, kinesthetic, & tactile means
- Provide graphic organizers and/or highlighted materials
- Strategy and flexible groups based on formative assessment
- Differentiated checklists and rubrics, if available and appropriate

Differentiation Strategies for Gifted and Talented Students

- Increase the level of complexity
- Decrease scaffolding
- Variety of finished products
- Allow for greater independence
- Learning stations, interest groups
- Varied texts and supplementary materials
- Use of technology
- Flexibility in assignments

- Varied questioning strategies
- Encourage research
- Strategy and flexible groups based on formative assessment or student choice
- Acceleration within a unit of study
- Exposure to more advanced or complex concepts, abstractions, and materials
- Encourage students to move through content areas at their own pace
- After mastery of a unit, provide students with more advanced learning activities, not more of the same activity
- Present information using a thematic, broad-based, and integrative content, rather than just single-subject areas

Differentiated Strategies for ELL Students

- Remove unnecessary materials, words, etc., that can distract from the content
- Provide appropriate scaffolding
- Limit the number of steps required for completion
- Gradually increase the level of independence required
- Tiered centers, assignments, lessons, or products
- Provide appropriate leveled reading materials
- Deliver the content in "chunks"
- Varied texts and supplementary materials, including visuals
- Use technology, if available and appropriate
- Differentiate homework and products
- Varied questioning strategies
- Provide background knowledge
- Define key vocabulary, multiple-meaning words, and figurative language.
- Use audio and visual supports, if available and appropriate
- Provide multiple learning opportunities to reinforce key concepts and vocabulary
- Meet with small groups to reteach idea/skill
- Provide cross-content application of concepts
- Allow students to work at their own pace
- Presenting ideas through auditory, visual, kinesthetic, & tactile means
- Role play
- Provide graphic organizers, highlighted materials
- Strategy and flexible groups based on formative assessment

Differentiation Strategies for At Risk Students

- Remove unnecessary materials, words, etc., that can distract from the content
- Provide appropriate scaffolding
- Limit the number of steps required for completion

- Gradually increase the level of independence required
- Tiered centers, assignments, lessons, or products
- Provide appropriate leveled reading materials
- Deliver the content in "chunks"
- Varied texts and supplementary materials
- Use technology, if available and appropriate
- Differentiate homework and products
- Varied questioning strategies
- Provide background knowledge
- Define key vocabulary, multiple-meaning words, and figurative language
- Use audio and visual supports, if available and appropriate
- Provide multiple learning opportunities to reinforce key concepts and vocabulary
- Meet with small groups to reteach idea/skill
- Provide cross-content application of concepts
- Presenting ideas through auditory, visual, kinesthetic, & tactile means
- Provide graphic organizers and/or highlighted materials
- Strategy and flexible groups based on formative assessment

504 Plans

Students can qualify for 504 plans if they have physical or mental impairments that affect or limit any of their abilities to:

- walk, breathe, eat, or sleep
- communicate, see, hear, or speak
- read, concentrate, think, or learn
- stand, bend, lift, or work

Examples of accommodations in 504 plans include:

- preferential seating
- extended time on tests and assignments
- reduced homework or classwork
- verbal, visual, or technology aids
- modified textbooks or audio-video materials
- behavior management support
- adjusted class schedules or grading
- verbal testing
- excused lateness, absence, or missed classwork
- pre-approved nurse's office visits and accompaniment to visits

• occupational or physical therapy

Modification Strategies

- Extended Time
- Frequent Breaks
- Highlighted Text
- Interactive Notebook
- Modified Test
- Oral Directions
- Peer Tutoring
- Preferential Seating
- Re-Direct
- Repeated Drill / Practice
- Shortened Assignments
- Teacher Notes
- Tutorials
- Use of Additional Reference Material
- Use of Audio Resources

High Preparation Differentiation

- Alternative Assessments
- Choice Boards
- Games and Tournaments
- Group Investigations
- Guided Reading
- Independent Research / Project
- Interest Groups
- Learning Contracts
- Leveled Rubrics
- Literature Circles
- Menu Assignments
- Multiple Intelligence Options
- Multiple Texts
- Personal Agendas

- Project Based Learning (PBL)
- Stations / Centers
- Think-Tac-Toe
- Tiered Activities / Assignments
- Varying Graphic Organizers

Low Preparation Differentiation

- Choice of Book / Activity
- Cubing Activities
- Exploration by Interest (using interest inventories)
- Flexible Grouping
- Goal Setting With Student
- Homework Options
- Jigsaw
- Mini Workshops to Extend Skills
- Mini Workshops to Re-teach
- Open-ended Activities
- Think-Pair-Share by Interest
- Think-Pair-Share by Learning Style
- Think-Pair-Share by Learning Style
- Think-Pair-Share by Readiness
- Use of Collaboration
- Use of Reading Buddies
- Varied Journal Prompts
- Varied Product Choice
- Varied Supplemental Materials
- Work Alone / Together

Horizontal Integration- Interdisciplinary Connections

New Jersey Student Learning Standards for Mathematics

N-Q.A.Reason quantitatively and use units to solve problems.

- 1. Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; chose and interpret the scale and the origin in graphs and data displays
- 2. Define appropriate quantities for the purpose of descriptive modeling.

3. Choose the level of accuracy appropriate to limitations on measurement when reporting quantities.

N-CN.A. Perform arithmetic operations with complex numbers.

- 1. Know there is a complex number.
- 2. Use the commutative, associative, and distributive properties.

A-SSE.A. Interpret the structure of expressions

1. Interpret expressions that represent a quantity in terms of its context.

A-SSE.B. Write expressions in equivalent forms to solve problems.

- 1. Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.
- F-IF.A. Understand the concept of a function and use functional notation.
 - 1. Understand that a function from one set to another set.

F-IF.B Interpret functions that arise in applications in terms of the context.

- F-IF.C. Analyze functions using different representations
- S-ID.A. Summarize, represent, and interpret data on a single count or measurement variable
 - 1. Represent data with plots on a real number line.
- S-ID.B. Summarize, represent, and interpret data on two categorical and quantitative variables.
- S-ID.C. Interpret linear models.
- S-IC.A. Understand and evaluate random processes underlying statistical experiments.

S-IC.B. Make inferences and justify conclusions from surveys, experiments, and observational studies.

English Language Arts Standards – Grade 2

- RI 1: Ask and answer questions about key details.
- RI 2: Identify main topic and retell key details.
- RI 3: Describe the connection between two ideas.
- RI 4: Ask and answer questions about unknown words.
- RI 5: Identify the front cover, back cover, and title page of a book.
- RI 7: Describe the relationship between illustrations and the text.

- RI 8: Identify the reasons an author gives to support points.
- RI 9: Identify similarities in and differences between text on the same topic.
- W 3: Write narratives.
- W 5: Strengthen writing by revising and editing.
- W 7: Record science observations.
- W 8: Gather information to answer a question.
- RF 4: Read text with purpose and understanding.
- SL 1: Participate in collaborative conversations.
- SL 2: Ask and answer questions about key details and request clarification.
- SL 3: Ask and answer questions to seek help, information, or to clarify.
- SL 4: Describe with details.
- SL 5: Add drawings or other visual displays to recounts of experiences.
- SL 6: Speak audibly, express clearly.
- L 1: Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.
- L 4: Determine or clarify the meaning of unknown or multiple meaning words and phrases.
- L 5: Demonstrate understanding of word relationships and nuances in word meanings.
- L 6: Use acquired words and phrases.

2020 New Jersey Student Learning Standards- Computer Science and Design Thinking

Computer Science and Design Thinking Practices

CSDT.K-12.CSDTP1	Fostering an Inclusive Computing and Design Culture
CSDT.K-12.CSDTP2	Collaborating Around Computing and Design
CSDT.K-12.CSDTP3	Recognizing and Defining Computational Problems

CSDT.K-12.CSDTP4	Developing and Using Abstractions
CSDT.K-12.CSDTP5	Creating Computational Artifacts
CSDT.K-12.CSDTP6	Testing and Refining Computational Artifacts
CSDT.K-12.CSDTP7	Communicating About Computing and Design

8.2 Design Thinking

8.2.2.ED.1: Communicate the function of a product or device.

8.2.2.ED.2: Collaborate to solve a simple problem, or to illustrate how to build a product using the design process.

8.2.2.ED.3: Select and use appropriate tools and materials to build a product using the design process.

8.2.2.ED.4: Identify constraints and their role in the engineering design process.

8.2.2.ITH.1: Identify products that are designed to meet human wants or needs.

8.2.2.ITH.2: Explain the purpose of a product and its value.

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.ITH.5: Design a solution to a problem affecting the community in a collaborative team and explain the intended impact of the solution.

8.2.2.NT.1: Model and explain how a product works after taking it apart, identifying the relationship of each part, and putting it back together.

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.ETW.2: Identify the natural resources needed to create a product.

8.2.2.ETW.3: Describe or model the system used for recycling technology.

8.2.2.ETW.4: Explain how the disposal of or reusing a product affects the local and global environment.

8.2.2.EC.1: Identify and compare technology used in different schools, communities, regions, and parts of the world.

2020 New Jersey Student Learning Standards- Career Readiness, Life Literacies, and Key Skills Career Readiness, Life Literacies, and Key Skills Practices

CRP.K-12.CRP1	Act as responsible and contributing community members and employee.
CRP.K-12.CRP2	Attend to financial well-being.
CRP.K-12.CRP3	Consider the environmental, social and economic impacts of decisions.
CRP.K-12.CRP4	Demonstrate creativity and innovation.
CRP.K-12.CRP5	Utilize critical thinking to make sense of problems and persevere in solving them.
CRP.K-12.CRP6	Model integrity, ethical leadership and effective management.
CRP.K-12.CRP7	Plan education and career paths aligned to personal goals.
CRP.K-12.CRP8	Use technology to enhance productivity, increase collaboration and communicate effectively.
CRP.K-12.CRP9	Work productively in teams while using cultural/global competence.

9.2 Career Awareness and Planning

9.1.2.CAP.1: Make a list of different types of jobs and describe the skills associated with each job.

9.4 Life Literacies and Key Skills

9.4.2.Cl.1: Demonstrate openness to new ideas and perspectives.

9.4.2.Cl.2: Demonstrate originality and inventiveness in work.

9.4.2.CT.1: Gather information about an issue, such as climate change, and collaboratively brainstorm ways to solve the problem.

9.4.2.CT.2: Identify possible approaches and resources to execute a plan.

9.4.2.CT.3: Use a variety of types of thinking to solve problems.

9.4.2.DC.1: Explain differences between ownership and sharing of information.

9.4.2.DC.2: Explain the importance of respecting digital content of others.

9.4.2.DC.3: Explain how to be safe online and follow safe practices when using the internet.

9.4.2.DC.4: Compare information that should be kept private to information that might be made public.

9.4.2.DC.5: Explain what a digital footprint is and how it is created.

9.4.2.DC.6: Identify respectful and responsible ways to communicate in digital environments.

9.4.2.DC.7: Describe actions peers can take to positively impact climate change.

9.4.2.IML.1: Identify a simple search term to find information in a search engine or digital resource.

9.4.2.IML.2: Represent data in a visual format to tell a story about the data.

9.4.2.IML.3: Use a variety of sources including multimedia sources to find information about topics such as climate change, with guidance and support from adults.

9.4.2.IML.4: Compare and contrast the way information is shared in a variety of contexts. 9.4.2.TL.1: Identify the basic features of a digital tool and explain the purpose of the tool.

9.4.2.TL.2: Create a document using a word processing application.

9.4.2.TL.3: Enter information into a spreadsheet and sort the information.

9.4.2.TL.4: Navigate a virtual space to build context and describe the visual content.

9.4.2.TL.5: Describe the difference between real and virtual experiences.

9.4.2.TL.6: Illustrate and communicate ideas and stories using multiple digital tools.

9.4.2.TL.7: Describe the benefits of collaborating with others to complete digital tasks or develop digital artifacts.

Vertical Integration- Discipline Mapping

LS2: Grade 3: Structures of Life

Grade 5: Living Systems

Grade 7: Populations and Ecosystems

- LS4: Grade 3: Structures of Life
 - Grade 4: Environments
 - Grade 8: Earth's History; Heredity and Adaptations

LS1*: Kindergarten: Trees and Weather; Animals Two by Two

Grade 1: Plants and Animals

Grade 3: Structures of Life

- Grade 4: Environments
- Grade 5: Living Systems
- Grade 6: Diversity of Life
- Grade 8: Human Systems Interactions

Preparation for high school science courses

Additional Materials

Visit FOSSWEB.com for list of websites and additional readings.