Life Science- Structures of Life

Content Area: Course(s): Time Period: Length: Status: Science Grade 3 First Trimester 12 Weeks Published

Unit Overview

Human life is unique, as far as we can tell, because humans have the capacity to design, plan, use history, imagine nonexistent objects, and devise systems of laws and codes of behavior. We have power unknown in other life-forms. But we still share the most fundamental requirements with all other life-forms – nourishment, water, air, space, and suitable environment. Students must understand these facts so that they are prepared to assume responsibility for the well-being of the system of life on Earth.

The unit consists of four investigations dealing with big ideas in life science – plants and animals are organisms and exhibit a variety of strategies for life, organisms are complex and have a variety of observable structures and behaviors, organisms have varied but predictable life cycles and reproduce their own kind, and individual organisms have variations in their traits that may provide an advantage in surviving in the environment. Students observe, compare, categorize, and care for a selection of organisms. Students engage in science and engineering practices to investigate structures and behaviors of the organisms and learn how some of the structures function in growth survival. Students look at the interactions between organisms of the same kind, among organisms of different kinds, and between the environment and populations over time.

STAGE 1- DESIRED RESULTS

Educational Standards

2020 New Jersey Student Learning Standards- Science

Performance Expectations

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Physical Sciences

SCI.3-PS2	Motion and Stability: Forces and Interactions
SCI.3-PS2-4	Define a simple design problem that can be solved by applying scientific ideas about magnets.
SCI.3-PS2-1	Plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces on the motion of an object.
SCI.3-PS2-3	Ask questions to determine cause and effect relationships of electric or magnetic interactions between two objects not in contact with each other.
SCI.3-PS2-2	Make observations and/or measurements of an object's motion to provide evidence that a pattern can be used to predict future motion.

Life Sciences

SCI.3-LS4-2	Use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing.
SCI.3-LS4-3	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.
SCI.3-LS1	From Molecules to Organisms: Structures and Processes
SCI.3-LS4	Biological Evolution: Unity and Diversity
SCI.3-LS4-4	Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change.
SCI.3-LS4-1	Analyze and interpret data from fossils to provide evidence of the organisms and the environments in which they lived long ago.
SCI.3-LS2	Ecosystems: Interactions, Energy, and Dynamics
SCI.3-LS1-1	Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death.
SCI.3-LS2-1	Construct an argument that some animals form groups that help members survive.
SCI.3-LS3	Heredity: Inheritance and Variation of Traits
SCI.3-LS3-1	Analyze and interpret data to provide evidence that plants and animals have traits inherited from parents and that variation of these traits exists in a group of similar organisms.
SCI.3-LS3-2	Use evidence to support the explanation that traits can be influenced by the environment.

Earth and Space Sciences

SCI.3-ESS2-1	Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season.
SCI.3-ESS2-2	Obtain and combine information to describe climates in different regions of the world.
SCI.3-ESS3	Earth and Human Activity
SCI.3-ESS2	Earth's Systems
SCI.3-ESS3-1	Make a claim about the merit of a design solution that reduces the impacts of a weather- related hazard.

SCI.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.
SCI.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.
SCI.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.

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: Origin of Seeds

- Part 1: How are seeds alike and different?
- Part 2: What effect does water have on seeds?
- Part 3: How much water does a seed soak up?
- Part 4: How do seeds disperse away from the parent plant?

Investigation 2: Growing Further

- Part 1: What structures does a seedling have to help it grow and survive?
- Part 2: What is the sequence of the bean plant's life cycle?
- Part 3: How do the roots of the schoolyard plants compare to the roots of bean plants?

Investigation 3: Meet the Crayfish

- Part 1: What are the structures of the crayfish?
- Part 2: How do crayfish structures and behaviors help crayfish survive?
- Part 3: What kind of behavior do crayfish display in their habitat?
- Part 4: How are the structures of crayfish and other animals alike and different?
- Part 5: What is needed to sustain a food chain?

Investigation 4: Human Body

- Part 1: What are the functions of the skeletal system?
- Part 2: In what ways are the skeletons of a rodent and human similar?
- Part 3: What makes our skeletal system flexible?
- Part 4: How are fingerprints alike and different?

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) Characteristics are passed from one generation to the next, and how individuals of the same species and even siblings have different characteristics; 4) There can be so many similarities among organisms yet so many different kinds of plants, animals, and microorganisms; and 5) Biodiversity affects humans.

Students will know... VOCABULARY

Investigation 1: Origin of Seeds

compete, cotyledon, disperse, dormant, embryo, engineer, estimate, fruit, function, living, modify, observe, organism, parent plant, pattern, physical model, predict, property, protect, reproduce, seed, seed coat, structure, survive

Investigation 2: Growing Further

adult, fibrous root, flower, germination, growth, hydroponics, inherit, leaf, life cycle, nutrient, root, seedling, shoot, stem, taproot

Investigation 3: Meet the Crayfish

adaptation, antenna, appendage, behavior, carapace, carnivore, crayfish, crustacean, elodea, energy, environment, female, food chain, genus, habitat, herbivore, male, molt, offspring, omnivore, pincer, population, predator, prey, protective coloration, species, stable system, sustain, sustainable, swimmeret, system, territory, trait, variation

Investigation 4: Human Body

arch, articulated, ball-and-socket joint, bone, characteristic, contract, fingerprint, fossil, gliding joint, hinge joint, joint, loop, movement, muscle, opposable thumb, pattern, protection, skeletal muscle, skeletal system, skeleton, skull, support, tendon, tissue, torso, whorl

Students will be able to...

Investigation 1: Origin of Seeds

- Ask questions about plant growth and development, and about how seeds travel away from the parent plant to secure a suitable environment for germination.
- Develop and use models to describe the process of seed dispersal and to relate structure and function.
- Plan and carry out investigations dealing with the effect of water on seeds to serve as evidence for an explanation of the process of germination.
- Analyze and interpret data to compare the number of seeds found in a pod of one kind of fruit in order to reveal patterns that can be used to make predictions.
- Construct explanations using evidence, such as the amount of water a seed absorbs in the early stages of germination, to support explanations of germination.

Investigation 2: Growing Further

- Ask questions about plant growth and development.
- Plan and carry out investigations with growing beans hydroponically.
- Analyze and interpret data collected from their investigations involving germination, plant life cycle, and root development.
- Construct explanations based on their data when monitoring plant growth.
- Engage in argument from evidence about the function of the plant roots.

• Obtain, evaluate, and communicate information from books and media and integrate that with their first-hand experiences to construct explanations about the life cycles of organisms.

Investigation 3: Meet the Crayfish

- Develop models of aquatic habitats to investigate crayfish social behavior; use models and simulations to look at change over time in numbers of organisms in several populations related in a food chain; use computer simulations to look at changes in traits in a species of insect over five generations due to predation in different habitats.
- Plan and carry out investigations dealing with crayfish behavior.
- Analyze and interpret data collected from investigations involving crayfish, simulated walking sticks, and food chains.
- Use mathematics and computational thinking to determine the resulting population of insects after five generations in a specific environment.
- Construct explanations based on data when monitoring crayfish, observing predation of walking sticks, studying schoolyard organisms, and analyzing number of organisms in populations involved in a food chain.
- Engage in argument from evidence about the social behavior of crayfish.
- Obtain, evaluate, and communicate information from books and media and integrate that with their first-hand experiences to construct explanations about adaptations of organisms, the survival value of group behavior in some animals, and the inheritance of traits from parents.

Investigation 4: Human Body

- Develop models of articulated skeletons and compare the functioning of the model to the actual skeleton.
- Plan and carry out investigations of dealing with the joints in their hands.
- Analyze and interpret data collected from their investigations involving the human skeleton, skeletons found in owl pellets, the working of joints in a human hand, and patterns of fingerprints.
- Construct explanations based on their data when studying the human skeleton, rodent skeletons found in owl pellets, the working of joints in a human hand, and types of human fingerprints.
- Engage in argument from evidence about the advantages of an internal or external skeleton.
- Obtain, evaluate, and communicate information from books and media and integrate that with their first-hand experiences to construct explanations about the evidence found in owl pellets, and the structure and function of different kinds of skeletons and joints.

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: Origin of Seeds

- Survey
- Science notebook entries
- Response sheet
- Performance assessment
- Investigation 1 I-Check

Investigation 2: Growing Further

- Response sheet
- Science notebook entries
- Investigation 2 I-Check

- Science notebook entries
- Performance assessment
- Response sheet
- Investigation 3 I-Check

Investigation 4: Human Body

- Response sheet
- Performance assessment

Science notebook entries

Benchmark Assessments

STAGE 3- LEARNING PLAN

Instructional Map

Investigation 1: Origin of Seeds

Investigation 2: Growing Further

Investigation 3: Meet the Crayfish

Investigation 4: Human Body

Investigation 1: Origin of Seeds

Investigation 1: Part 1 – Seed Search

Students embark on a seed hunt, delving into an assortment of fresh fruits. They open a fruit, locate the seeds, describe the seed properties, and count or estimate the number of seeds in the fruit.

Content:

- Seeds develop in the plant part called a fruit.
- Different kinds of fruits have different kinds and numbers of seeds.
- Seeds have a variety of properties.

Investigation 1: Part 2 – The Sprouting Seed

Students use two kinds of sprouting devices to find out what effect water has on seeds. They water the seeds daily for a week and record their observations.

Content:

- Seeds undergo developmental changes in the presence of water.
- A seed is an organism, a living thing.

Investigation 1: Part 3 – Seed Soak

Students compare the mass of seeds that have been soaked in water overnight to the mass of dry seeds. They determine how much water the seeds soaked up.

Content:

- A seed contains the embryo plant and a supply of food.
- A seed grows into a new plant (reproduction).
- Seeds undergo developmental changes in the presence of water.

Investigation 1: Part 4 – Seed Dispersal

Students go to the schoolyard to design and apply modifications to seeds and fruits for dispersal by various natural forces. Students search for seeds in the schoolyard and consider how they are adapted for dispersal.

• Seeds move away from parent plants via a number of dispersal mechanisms including wind, water, and animals.

Investigation 2: Growing Further

Investigation 2: Part 1 – Germination and Growth

Students compare four seeds germinating in minisprouters. They identify and describe emerging plant structures such as seed coats, cotyledons, stems, leaves, and roots. Students discuss germination strategies used by different plants and how those strategies enhance the plants' chances of survival.

Content:

- Germination is the onset of a seed's growth.
- Plants need water, light, space, and nutrients to grow.

Investigation 2: Part 2 – Life Cycle of the Bean

Students grow seedlings hydroponically in nutrient solution and observe the throughout their life cycle. They observe and record the emergence of flowers, fruit, and new seeds. They sequence illustrations that depict different stages of the life cycle of a bean plant. Students read about the concept of life cycle in plants and animals and get additional information from a video on animal life cycles. Students compare life cycles and discuss inheritance of characteristics.

Content:

- The life cycle is the sequence of stages during which a seed grows into an adult (mature) plant and produces seeds, which in turn produce new plants of the same kind.
- Plants need water, light, space, and nutrients to grow.
- The fruit of the plant develops from the flower.
- Each kind of organism has inherited characteristics.

Students go to the schoolyard to investigate the roots and shoots of various plants. They use tools to dig up plants and compare the structures above ground to those below ground. They also compare root structures of different plants and discuss inheritance of characteristics.

Content:

- Roots are plant structures that serve several functions. One function is to take up water and nutrients so they can be transported to other parts of the plant. Different kinds of plants have different root systems.
- Each kind of organism has inherited characteristics. Some characteristics are a result of the environment.

Investigation 3: Meet the Crayfish

Investigation 3: Part 1 – Crayfish Structures

Students observe and record crayfish structures through direct interaction with live crayfish. They set up two crayfish habitats and learn to care for the crayfish in the classroom.

Content:

- Crayfish have observable structures that serve various functions in growth, survival, and reproduction.
- Crayfish have particular requirements for life, including clean, cool water with oxygen; food; and space.

Investigation 3: Part 2 – Adaptation

Students study crayfish behavior and learn that it has survival value. They are introduced to the concept of adaptation – a structure or behavior that improves an organism's chance of survival. Students study environments and consider the particular adaptations that allow organisms to survive. Students use a computer simulation to study variation of traits in species and how variation might affect survival of individuals.

Content:

- Adaptations are structures and behaviors of an organism that help it survive and reproduce.
- Differences in characteristics between individuals of the same species may provide an advantage in surviving.

Investigation 3: Part 3 – Crayfish Territory

Students set up a long-term habitat and recording system for investigating territorial behavior in crayfish. They record and analyze the locations of individual crayfish. They consider territorial behavior as a possible adaptation that serves to improve the crayfish's chance for survival.

Content:

- Behavior of organisms is influenced by internal and external cues.
- Some animals claim a territory that they defend against others of their kind. Some organisms live in social groups.
- Diversity of organisms is related to the diversity of environments.

Investigation 3: Part 4 – Compare Crayfish to Other Animals

Students seek local schoolyard organisms for observation. Snail diagrams are suggested, and students may use other local organisms. Using a Venn diagram, students compare crayfish structures and functions to one other animal's structures and functions.

Content:

- Crayfish have observable structures that serve various functions in growth, survival, and reproduction.
- When the environment changes, some plants and animals survive and reproduce, others decline and move to new locations, and some die.

Investigation 3: Part 5 – Food Chains

number in each population (grass, grasshoppers, frogs, and hawks), students try to achieve a sustainable food chain.

Content:

• Organisms are related in feeding relationships called food chains. Animals eat plants, and other animals eat those animals.

Investigation 4: Human Body

Investigation 4: Part 1 – Counting Bones

Students start by observing the human body jumping rope. They count the number of bones in the skeleton, first without visual aids, then using photographs and posters to help make a more accurate count. Students assemble a model of a human skeleton from memory. They compare and discuss their models. They compare a picture of an accurate model to their own work.

Content:

- A skeleton is a system of interacting bones.
- There are about 206 bones in the human skeleton.
- Bones have several functions: support, protection, and movement.
- Each bone in the human body has an identifiable shape, position, orientation, and function.

Investigation 4: Part 2 – Owl Pellets

Students examine owl pellets, remove the rodent bones from them, and compare the structures of rodent bones to the structures of human bones. Students reconstruct the rodent skeleton. They read about researchers finding 10,000-year-old preserved owl pellets. Through reading and media, students learn about fossils, how they are formed, and what evidence they provide about past environments.

Content:

- The skeletons of humans and other mammals have many similarities.
- Bones have different shapes depending on where they are and what their purpose is.
- The number and kinds of bones in an organism are characteristics inherited from the parents of the organism.
- Fossils are important evidence about extinct organisms and past environments.

Investigation 4: Part 3 – Joints and Muscles

Students investigate joints and discover the advantages of an articulated skeletal system. They modify their hands to simulate having no thumbs. They look for and feel their muscles when the muscles are working. Students work in pairs to build a model leg and foot that emulate the actions of a leg and foot during jumping.

Content:

- The place where two bones meet is called a joint.
- The human skeleton has different types of joints.
- Muscles contract when they work.
- Muscles attach across joints to move bones.

Investigation 4: Part 4 – Fingerprints

Students use pencils and tape to make carbon prints of their skin texture and fingerprints. They classify their fingerprints into three basics patterns: whorl, arch, and loop.

Content:

• Fingerprints can be sorted into three groups based on basic patterns.

No two people have the same fingerprints.

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 singlesubject 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 3

- 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 6: Distinguish their own point of view from that of the author of the text.
- 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.
- RI 10: Actively engage in group reading activities 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.

- L 4: Determine or clarify the meaning of unknown or multiple meaning words and phrases.
- L 4c: Use a known root word as a clue to the meaning of an unknown word.
- L 5: Demonstrate understanding of word relationships and nuances in word meanings.
- L 6: Use acquired words and phrases.
- W 1: Write opinion pieces.
- W 2: Write informational text.
- W 3: Write narratives.
- W 7: Conduct short research projects.

W 8: Recall from experience and gather information from print; take brief notes and sort evidence into provided categories.

- RF 3: Apply word analysis skills in decoding words.
- RF 4: Read text with purpose and understanding.

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

8.2.5.ED.1: Explain the functions of a system and its subsystems.

8.2.5.ED.2: Collaborate with peers to collect information, brainstorm to solve a problem, and evaluate all possible solutions to provide the best results with supporting sketches or models. 8.2.5.ED.3: Follow step by step directions to assemble a product or solve a problem, using appropriate tools to accomplish the task.

8.2.5.ED.4: Explain factors that influence the development and function of products and systems (e.g., resources, criteria, desired features, constraints).

8.2.5.ED.5: Describe how specifications and limitations impact the engineering design process.

8.2.5.ED.6: Evaluate and test alternative solutions to a problem using the constraints and trade-offs identified in the design process.

8.2.5.ITH.1: Explain how societal needs and wants influence the development and function of a product and a system.

8.2.5.ITH.2: Evaluate how well a new tool has met its intended purpose and identify any shortcomings it might have.

8.2.5.ITH.3: Analyze the effectiveness of a new product or system and identify the positive and/or negative consequences resulting from its use.

8.2.5.ITH.4: Describe a technology/tool that has made the way people live easier or has led to a new business or career.

8.2.5.NT.1: Troubleshoot a product that has stopped working and brainstorm ideas to correct the problem.

8.2.5.NT.2: Identify new technologies resulting from the demands, values, and interests of individuals, businesses, industries, and societies.

8.2.5.NT.3: Redesign an existing product for a different purpose in a collaborative team. 8.2.5.NT.4: Identify how improvement in the understanding of materials science impacts technologies.

8.2.5.ETW.1: Describe how resources such as material, energy, information, time, tools, people, and capital are used in products or systems.

8.2.5.ETW.2: Describe ways that various technologies are used to reduce improper use of resources.

8.2.5.ETW.3: Explain why human-designed systems, products, and environments need to be constantly monitored, maintained, and improved.

8.2.5.ETW.4: Explain the impact that resources, such as energy and materials used to develop technology, have on the environment.

8.2.5.ETW.5: Identify the impact of a specific technology on the environment and determine what can be done to increase positive effects and to reduce any negative effects, such as climate change.

8.2.5.EC.1: Analyze how technology has contributed to or reduced inequities in local and global communities and determine its short- and long-term effects.

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

9.2.5.CAP.1: Evaluate personal likes and dislikes and identify careers that might be suited to personal likes.

9.2.5.CAP.2: Identify how you might like to earn an income.

9.2.5.CAP.3: Identify qualifications needed to pursue traditional and non-traditional careers and occupations.

9.2.5.CAP.4: Explain the reasons why some jobs and careers require specific training, skills, and certification (e.g., life guards, child care, medicine, education) and examples of these requirements.

9.4 Life Literacies and Key Skills

9.4.5.CI.1: Use appropriate communication technologies to collaborate with individuals with diverse perspectives about a local and/or global climate change issue and deliberate about possible solutions (e.g., W.4.6, 3.MD.B.3,7.1.NM.IPERS.6).

9.4.5.CI.2: Investigate a persistent local or global issue, such as climate change, and collaborate with individuals with diverse perspectives to improve upon current actions designed to address the issue (e.g., 6.3.5.CivicsPD.3, W.5.7).

9.4.5.Cl.3: Participate in a brainstorming session with individuals with diverse perspectives to expand one's thinking about a topic of curiosity (e.g., 8.2.5.ED.2, 1.5.5.CR1a).

9.4.5.CI.4: Research the development process of a product and identify the role of failure as a part of the creative process (e.g., W.4.7, 8.2.5.ED.6).

9.4.5.CT.1: Identify and gather relevant data that will aid in the problem-solving process (e.g., 2.1.5.EH.4, 4-ESS3-1, 6.3.5.CivicsPD.2).

9.4.5.CT.2: Identify a problem and list the types of individuals and resources (e.g., school, community agencies, governmental, online) that can aid in solving the problem (e.g., 2.1.5.CHSS.1, 4-ESS3-1).

9.4.5.CT.3: Describe how digital tools and technology may be used to solve problems.

9.4.5.CT.4: Apply critical thinking and problem-solving strategies to different types of problems such as personal, academic, community and global (e.g., 6.1.5.CivicsCM.3).

9.4.5.DC.1: Explain the need for and use of copyrights.

9.4.5.DC.2: Provide attribution according to intellectual property rights guidelines using public domain or creative commons media.

9.4.5.DC.3: Distinguish between digital images that can be reused freely and those that have copyright restrictions.

9.4.5.DC.4: Model safe, legal, and ethical behavior when using online or offline technology (e.g., 8.1.5.NI.2).

9.4.5.DC.5: Identify the characteristics of a positive and negative online identity and the lasting implications of online activity.

9.4.5.DC.6: Compare and contrast how digital tools have changed social interactions (e.g., 8.1.5.IC.1).

9.4.5.DC.7: Explain how posting and commenting in social spaces can have positive or negative consequences.

9.4.5.DC.8: Propose ways local and global communities can engage digitally to participate in and promote climate action (e.g., 6.3.5.GeoHE.1).

9.4.5.IML.1: Evaluate digital sources for accuracy, perspective, credibility and relevance (e.g., *Social Studies Practice* - Gathering and Evaluating Sources).

9.4.5.IML.2: Create a visual representation to organize information about a problem or issue (e.g., 4.MD.B.4, 8.1.5.DA.3).

9.4.5.IML.3: Represent the same data in multiple visual formats in order to tell a story about the data.

9.4.5.IML.4: Determine the impact of implicit and explicit media messages on individuals, groups, and society as a whole.

9.4.5.IML.5: Distinguish how media are used by individuals, groups, and organizations for varying purposes. (e.g., 1.3A.5.R1a).

9.4.5.IML.6: Use appropriate sources of information from diverse sources, contexts, disciplines, and cultures to answer questions (e.g., RI.5.7, 6.1.5.HistoryCC.7, 7.1.NM. IPRET.5).

9.4.5.IML.7: Evaluate the degree to which information meets a need including social emotional learning, academic, and social (e.g., 2.2.5. PF.5).

9.4.5.TL.1: Compare the common uses of at least two different digital tools and identify the advantages and disadvantages of using each.

9.4.5.TL.2: Sort and filter data in a spreadsheet to analyze findings.

9.4.5.TL.3: Format a document using a word processing application to enhance text, change page formatting, and include appropriate images graphics, or symbols.

9.4.5.TL.4: Compare and contrast artifacts produced individually to those developed collaboratively (e.g., 1.5.5.CR3a).

9.4.5.TL.5: Collaborate digitally to produce an artifact (e.g., 1.2.5CR1d).

Vertical Integration- Discipline Mapping

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

Grade 1: Plants and Animals

Grade 4: Environments

Grade 5: Living Systems

Grade 6: Diversity of Life

Grade 7: Populations and Ecosystems

Grade 8: Human Systems Interactions

LS2: Grade 2: Insects and Plants

Grade 5: Living Systems

Grade 7: Populations and Ecosystems

LS3: Grade 1: Plants and Animals

Grade 6: Diversity of Life

Grade 8: Heredity and Adaptations

LS4: Grade 2: Insects and Plants

Grade 4: Environments

Grade 8: Earth's History; Heredity and Adaptations

Additional Materials

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