

Unit #2: Life Science- Environments

Content Area: **Science**
Course(s): **Grade 4**
Time Period: **Second Trimester**
Length: **12 Weeks**
Status: **Published**

Unit Overview

The study of the structures and behaviors of organisms and the relationships between one organism and its environment builds knowledge of all organisms. With this knowledge comes an awareness of limits. Such knowledge is important because humans can change environments.

This unit has four investigations that focus on the concepts that organisms have structures and behaviors, including sensory receptors, that serve functions in growth, survival and reproduction, and living organisms depend on one another and on their environment for their survival and the survival of populations. Students design investigations to study preferred environments, range of tolerance, and optimum conditions for growth and survival of specific organisms. They conduct controlled experiments by incrementally changing specific environmental conditions to determine the range of tolerance for early growth of seeds and hatching of brine shrimp, and use these data to develop and use models to understand the impact of changes to the environment. They graph and interpret data from multiple trials of experiments and build explanations from evidence. Students gain experiences that will contribute to the understanding of crosscutting concepts of patterns; cause and effect; scale, proportion, and quantity; systems and system models; energy and matter; structure and function; and stability and change.

STAGE 1- DESIRED RESULTS

Educational Standards

2020 New Jersey Student Learning Standards- Science

Performance Expectations

Physical Sciences

SCI.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.
SCI.4-PS3-1	Use evidence to construct an explanation relating the speed of an object to the energy of that object.
SCI.4-PS3-4	Apply scientific ideas to design, test, and refine a device that converts energy from one form to another.
SCI.4-PS3	Energy
SCI.4-PS4-2	Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen.
SCI.4-PS3-2	Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents.
SCI.4-PS3-3	Ask questions and predict outcomes about the changes in energy that occur when objects collide.
SCI.4-PS4-3	Generate and compare multiple solutions that use patterns to transfer information.
SCI.4-PS4	Waves and their Applications in Technologies for Information Transfer

Life Sciences

SCI.4-LS1	From Molecules to Organisms: Structures and Processes
SCI.4-LS1-1	Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.
SCI.4-LS1-2	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.

Earth and Space Sciences

SCI.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.
SCI.4-ESS3	Earth and Human Activity
SCI.4-ESS2	Earth's Systems
SCI.4-ESS2-2	Analyze and interpret data from maps to describe patterns of Earth's features.
SCI.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.
SCI.4-ESS3-1	Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment.
SCI.4-ESS1	Earth's Place in the Universe
SCI.4-ESS3-2	Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.

Engineering Design

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: Environmental Factors

Part 1: How do mealworm structures and behaviors help them grow and survive?

Part 2: What moisture conditions do isopods prefer?

Part 3: What light conditions do isopods prefer?

Part 4: What are the characteristics of animals living in the leaf-litter environment?

Investigation 2: Ecosystems

Part 1: What are the environment factors in an aquatic system?

Part 2: What are the roles of organisms in a food chain?

Part 3: How does food affect a population in its home range?

Part 4: How do animals use their sense of hearing?

Investigation 3: Brine Shrimp Hatching

Part 1: How can we find out if salinity affects brine shrimp hatching?

Part 2: How does salinity affect the hatching of brine shrimp eggs?

Part 3: Does changing the environment allow the brine shrimp eggs to hatch?

Part 4: What are some benefits of having variation within a population?

Investigation 4: Range of Tolerance

Part 1: How much water is needed for early growth of different kinds of plants?

Part 2: What is the salt tolerance of several common farm crops?

Part 3: How does mapping the plants in the schoolyard help us to investigate environmental factors?

Part 4: What are some examples of plant adaptations?

Enduring Understanding

This life science unit develops students' understanding of how: 1) Organisms live, grow, respond to their environment, and reproduce; 2) There are so many similarities among organisms yet so many different kinds of plants, animals, and microorganisms; 3) Biodiversity affects humans; 4) Earth's surface processes and human activities affect each other.

Students will know...

VOCABULARY

Investigation 1: Environmental Factors

adult, antennae, behavior, condition, darkling beetle, environment, environmental factor, function, inference, isopod, larva, life cycle, living, mealworm, molting, nonliving, observation, organism, pill bug, preferred environment, pupa, pupate, sow bug, stage, structure

Investigation 2: Ecosystems

algae, aquarium, aquatic environment, carnivore, carrying capacity, competition, consumer, decomposer, ecosystem, elodea, energy, food chain, food web, freshwater environment, herbivore, home range, interaction, microorganism, omnivore, phytoplankton, population, predator, prey, producer, zooplankton

Investigation 3: Brine Shrimp Hatching

brine, brine shrimp, concentration, controlled experiment, inherited trait, migrate, optimum, range of tolerance, reproduce, salinity, salt lake, survive, thrive, tolerance, variation, viable

Investigation 4: Range of Tolerance

adaptation, dominant plant, drought, irrigate, plant distribution, salt-sensitive, salt-tolerant

Students will be able to...

Investigation 1: Environmental Factors

- Ask questions about the preferred environmental conditions of isopods and design experiments based on cause-and-effect relationships.
- Develop and use models to test environmental preferences of isopods to understand a natural system.
- Plan and carry out investigations dealing with the effect of different environmental conditions on mealworms and isopods. Collect data to serve as the basis for evidence for a claim.
- Analyze and interpret data to find preferences of organisms for different environmental conditions in order to reveal patterns that can be used to make predictions. Compare data observed by different groups to look for similarities and differences. Organize simple data sets about where organisms were collected outdoors to find relationships between the organisms' structures and the environment in which they are found.
- Construct explanations using evidence, such as the relationships between environmental conditions and the structures and behaviors of isopods, beetles, and other small animals.
- Engage in argument from evidence about the preferred environmental conditions for organisms. Critique the investigations of others and offer suggestions for improvement.
- Obtain, evaluate, and communicate information from books and media and integrate that with their firsthand experiences to construct explanations about how organisms interact with their environment.

Investigation 2: Ecosystems

- Develop and use models of ecosystems to investigate the interactions in natural systems.
- Plan and carry out investigations with fresh water organisms in an aquarium to make observations to serve as the basis for evidence of interactions of structures and behaviors that serve the organism in survival.
- Analyze and interpret data collected from simulations and models on how organisms sense their environment and the behaviors that allow them to respond and survive.
- Construct explanations about feeding relationships in terrestrial and aquatic environments and the factors that contribute to change in populations in an area.
- Engage in argument from evidence about the source of energy in an environment.
- Obtain, evaluate, and communicate information from books and media and integrate that with their firsthand experiences to construct explanations about survival of organisms in specific environments.

Investigation 3: Brine Shrimp Hatching

- Develop and use models of brine shrimp environments, such as Mono Lake, to test the salt conditions that will support brine shrimp egg hatching to better understand the natural lake system.
- Plan and carry out investigations collaboratively, make observations over time, and combine resulting data to serve as the basis for making a decision about the proper salt environment for brine shrimp egg hatching. Make a prediction about the viability of eggs that were in conditions outside the range of tolerance for hatching.
- Analyze and interpret data of brine shrimp hatching in different environmental conditions by representing data in

tables and charts to reveal patterns, and using those patterns to make sense of phenomena using logical reasoning.

- Use mathematics and computational thinking by organizing simple data sets to show the relationship between salinity and brine shrimp egg hatching.
- Construct explanations about the range of tolerance for salt for brine shrimp egg hatching in salt lake environments.
- Engage in argument from evidence to evaluate cause-and-effect claims about brine shrimp egg hatching.
- Obtain, evaluate, and communicate information from books and media and integrate that with their firsthand experiences to construct explanations and the functioning of ecosystems.

Investigation 4: Range of Tolerance

- Plan and carry out investigations collaboratively as a class to determine the range of tolerance for water and salt for germination and growth of a variety of seed; evaluate experimental design methods and ways of collecting data; make firsthand observations to produce data on plant growth under incremental changes in environmental conditions of a specific factor to serve as the basis for evidence for an explanation; make predictions about what would happen if an environmental factor changed.
- Analyze and interpret data by representing data in tables and visual displays to reveal growth patterns and making sense of data using logical reasoning.
- Construct explanations based on their data when monitoring plant growth under different environmental conditions; construct explanations of observed relationships between environmental factors and the distribution of kinds of plants in the schoolyard; use evidence from plant experiments to support explanations, and identify the evidence that support specific points in the explanation.
- Engage in argument from evidence by using data to evaluate claims about cause (amount of moisture or amount of salt in water used for watering) and growth patterns; construct an argument about plant growth using data; use data from other students to evaluate claims about cause and effect.
- Obtain, evaluate, and communicate information from books and media, and integrate that with their firsthand experiences to construct explanations about plant growth and survival patterns in terms of environmental factors.

STAGE 2- EVIDENCE OF LEARNING

Formative Assessment Suggestions

- 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: Environmental Factors

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

Investigation 2: Ecosystems

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

Investigation 3: Brine Shrimp Hatching

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

Investigation 4: Range of Tolerance

- Performance assessment
- Response sheet
- Science notebook entries

Benchmark Assessments

Unit Posttest

STAGE 3- LEARNING PLAN

Instructional Map

Investigation 1: Environmental Factors

Investigation 2: Ecosystems

Investigation 3: Brine Shrimp Hatching

Investigation 4: Range of Tolerance

Investigation 1: Environmental Factors

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Investigation 1: Part 1 – Observing Mealworms

Students observe mealworms and describe their structures and behaviors. They ask questions to determine what they need to do to provide a proper environment for the mealworm to thrive. Each group sets up a mealworm environment and keeps it at room temperature. The class keeps additional mealworm environments at a colder temperature.

Content:

- An environment is everything living and nonliving that surrounds and influences an organism.
- A relationship exists between environmental factors and how well organisms grow.
- Animals have structures and behaviors that function to support survival, growth, and reproduction. These include sensory system structures.

Investigation 1: Part 2 – Designing an Isopod Environment

The class conducts two different investigations to find out how isopods respond to the environmental factors of water and light. Based on their findings, students design an isopod environment in a terrarium.

Content:

- Designing an investigation involves controlling the factors so that the effect of one factor can be observed.
- Every organism has a set of preferred environmental conditions.
- Isopods prefer moist environments; isopods prefer dark environments.

Investigation 1: Part 3 – Leaf-Litter Critters

Students go to the schoolyard to collect, observe, and sort small animals living in natural ground litter. They use a Critter Replicator to become familiar with the anatomical parts of animals they will find in leaf litter. Students consider adding found organisms to their group's isopod environment.

Content:

- Every organism has a set of preferred environmental conditions.
- An environment is everything living and nonliving that surrounds and influences an organism.
- A relationship exists between environmental factors and how well organisms grow.

Investigation 2: Ecosystems

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Investigation 2: Part 1 – Designing an Aquarium

Students review the environmental factors in a terrestrial environment and compare them to environmental factors in aquatic environments. They observe guppies and goldfish and add them separately to two class aquariums. They add other organisms to both aquariums and monitor the living and nonliving factors in each environment over time.

Content:

- Aquatic environments include living and nonliving factors (water and temperature).
- An aquatic environment can contain many different kinds of organisms that interact.
- The interaction of organisms with one another and with the nonliving environment is an ecosystem.

Investigation 2: Part 2 – Food Chains and Food Webs

Students work with organism cards to create food chains and food webs in a woodland ecosystem that includes terrestrial and aquatic environments. Students learn that by using the Sun's energy, plants and algae are the primary source of matter and energy entering most food chains and food webs. Students are introduced to the terms for different functional roles that organisms play in food chains.

Content:

- Organisms interact in feeding relationships in ecosystems.
- Producers (plants, algae, phytoplankton) make their own food, which is also used by animals (consumers).
- Organisms may compete for resources in an ecosystem.
- Decomposers eat dead plant and animal materials and recycle the nutrients in the system.

Investigation 2: Part 3 – Population Simulation

Students go to the schoolyard to simulate a population of deer foraging for food in its home range. Students are introduced to the concept of carrying capacity, the greatest number of organisms that can be supported (carried) by an area without damaging it.

Content:

- Organisms interact in feeding relationships in ecosystems.
- When the environment changes, some plants and animals survive and reproduce, others move to new locations, and some die.

Investigation 2: Part 4 – Sound Off

Students go to the schoolyard and pretend to be animals who have poor vision or are active at night. The animals communicate with one unique sound and try to find others of their kind before being “captured” by a predator. After three rounds of this activity, students sit silently to listen to animals in the schoolyard.

Content:

- Animals communicate to warn others of danger, scare predators away, or locate others of their kind, including family members.
- Organisms have sensory systems to gather information about their environment and act on it.

Investigation 3: Brine Shrimp Hatching

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Investigation 3: Part 1 – Setting Up the Experiment

Students investigate the environmental factor of salinity in hatching brine shrimp eggs. They conduct a controlled experiment to determine which one of four salt concentrations allows brine shrimp eggs to hatch.

Content:

- Brine shrimp are crustaceans that live in marine or salt-pond environments.
- An environmental factor is one part of an environment. It can be living or nonliving.
- Organisms have ranges of tolerance for environmental factors.

Investigation 3: Part 2 – Determining Range of Tolerance

Students monitor saltwater environments. They determine which environments are conducive to hatching brine shrimp eggs. Students analyze the results of a multiple-trial experiment conducted by the class and draw conclusions. They read about the Mono Lake ecosystem and create food webs using the organism cards and information in the article.

Content:

- Within a range of tolerance, there are optimum conditions that produce maximum reproduction and growth.
- Brine shrimp eggs can hatch in a range of salt concentrations, but more hatch in environments with optimum salt concentrations.
- When environments change, some plants and animals survive and reproduce, others move to new locations, and some die.

Investigation 3: Part 3 – Determining Viability

Students are challenged to manipulate the environment to see if they can get the dormant eggs to hatch and grow. They formulate and justify predictions and design an investigation to test their predictions.

Content:

- Brine shrimp eggs can hatch in a range of salt concentrations, but more hatch in environments with optimum salt concentrations.
- When environments change, some plants and animals survive and reproduce, others move to new locations,

and some die.

Investigation 3: Part 4 – Variation in a Population

Students go to the schoolyard in two teams, to place a population of imaginary animals in a suitable habitat based on a description of the population's natural history. Through a predator-prey simulation, students find out how variations in color and size within a population affect survival of the population.

Content:

- Individuals of the same kind differ in their characteristics, and sometimes the differences give individuals an advantage in surviving and reproducing.

Investigation 4 – Range of Tolerance

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Investigation 4: Part 1 – Water or Salt Tolerance and Plants

Half the class sets up an experiment to determine the range of water tolerance for the early growth of four different plants (barley, pea, corn, and radish). Students make observations after 5, 8, and 13 days of growth. They disassemble their planters and compare the growth of each plant in the different environments.

The other half of the class sets up a controlled experiment to test the effect of salinity on the same four plants. They water each container with a different concentration of salt water. Students monitor growth of their plants at 5, 8, and 13 days after planting. They disassemble their planters and compare the growth of each plant in the different environments to determine the salt tolerance of the four plants.

Content:

- Every organism has a range of tolerance for each factor in its environment.
- Organisms have specific requirements for successful growth, development, and reproduction. A relationship exists between environmental factors and how well organisms grow.
- Optimum conditions are those most favorable to an organism.

Investigation 4: Part 2 – Plant Patterns

Students observe and map plant-distribution patterns in the schoolyard. They discuss the environmental factors that might be responsible for these patterns.

Content:

- Organisms have specific requirements for successful growth, development, and reproduction. A relationship exists between environmental factors and how well organisms grow.
- Fossils are important evidence about extinct organisms and past environments.

Investigation 4: Part 3 – Plant Adaptations

Students review environmental factors that influence plant growth (water, light, nutrients). They are introduced to different adaptations of plants that allow some to thrive in dry environments and others to thrive in wet environments.

Content:

- Adaptations are structures and behaviors of an organism that help it survive and reproduce.
- A relationship exists between environmental factors and how well organisms grow.

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; choose 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 4

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.

W 2: Write informative /explanatory text.

W 5: Strengthen writing by revising and editing.

W 8: Gather information to answer a question.

W 9: Draw evidence from informational text to support reflection.

SL 1: Participate in collaborative conversations.

SL 2: Ask and answer questions about key details and request clarification.

SL 4: Describe with details.

SL 5: Add drawings or other visual displays to recounts of experiences.

L 3: Use knowledge of language and its conventions when writing, speaking, reading, or listening.

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.

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

<p>8.2.5.ED.1: Explain the functions of a system and its subsystems.</p> <p>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.</p> <p>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.</p> <p>8.2.5.ED.4: Explain factors that influence the development and function of products and systems (e.g., resources, criteria, desired features, constraints).</p> <p>8.2.5.ED.5: Describe how specifications and limitations impact the engineering design process.</p> <p>8.2.5.ED.6: Evaluate and test alternative solutions to a problem using the constraints and trade-offs identified in the design process.</p>
<p>8.2.5.ITH.1: Explain how societal needs and wants influence the development and function of a product and a system.</p> <p>8.2.5.ITH.2: Evaluate how well a new tool has met its intended purpose and identify any shortcomings it might have.</p> <p>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.</p> <p>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.</p>
<p>8.2.5.NT.1: Troubleshoot a product that has stopped working and brainstorm ideas to correct the problem.</p> <p>8.2.5.NT.2: Identify new technologies resulting from the demands, values, and interests of individuals, businesses, industries, and societies.</p>

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.Cl.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.Cl.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).

<p>9.4.5.CI.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).</p> <p>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).</p>
<p>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).</p> <p>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).</p> <p>9.4.5.CT.3: Describe how digital tools and technology may be used to solve problems.</p> <p>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).</p>
<p>9.4.5.DC.1: Explain the need for and use of copyrights.</p> <p>9.4.5.DC.2: Provide attribution according to intellectual property rights guidelines using public domain or creative commons media.</p> <p>9.4.5.DC.3: Distinguish between digital images that can be reused freely and those that have copyright restrictions.</p> <p>9.4.5.DC.4: Model safe, legal, and ethical behavior when using online or offline technology (e.g., 8.1.5.NI.2).</p> <p>9.4.5.DC.5: Identify the characteristics of a positive and negative online identity and the lasting implications of online activity.</p> <p>9.4.5.DC.6: Compare and contrast how digital tools have changed social interactions (e.g., 8.1.5.IC.1).</p> <p>9.4.5.DC.7: Explain how posting and commenting in social spaces can have positive or negative consequences.</p> <p>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).</p>
<p>9.4.5.IML.1: Evaluate digital sources for accuracy, perspective, credibility and relevance (e.g., <i>Social Studies Practice</i> - Gathering and Evaluating Sources).</p> <p>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).</p> <p>9.4.5.IML.3: Represent the same data in multiple visual formats in order to tell a story about the data.</p> <p>9.4.5.IML.4: Determine the impact of implicit and explicit media messages on individuals, groups, and society as a whole.</p> <p>9.4.5.IML.5: Distinguish how media are used by individuals, groups, and organizations for varying purposes. (e.g., 1.3A.5.R1a).</p> <p>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).</p> <p>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).</p>
<p>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.</p> <p>9.4.5.TL.2: Sort and filter data in a spreadsheet to analyze findings.</p> <p>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.</p> <p>9.4.5.TL.4: Compare and contrast artifacts produced individually to those developed collaboratively (e.g., 1.5.5.CR3a).</p>

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

Vertical Integration- Discipline Mapping

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

Grade 1: Plants and Animals

Grade 2: Insects and Plants

Grade 3: Structures of Life

Grade 5: Living Systems

Grade 6: Diversity of Life

Grade 7: Populations and Ecosystems

Grade 8: Human Systems Interactions

LS4- Grade 2: Insects and Plants

Grade 3: Structures of Life

Grade 8: Earth's History; Heredity and Adaptations

ESS3: Kindergarten: Trees and Weather; Animals Two by Two

Grade 3: Water and Climate

Grade 5: Earth and Sun; Living Systems

Grade 6: Weather and Water

Grade 8: Earth's History

Preparation for high school science courses

Additional Materials

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