# **Unit #1: Physical Science- Solids and Liquids**

Content Area:	Science
Course(s):	Grade 2
Time Period:	First Trimester
Length:	12 Week
Status:	Published

### **Unit Overview**

This unit provides students with physical science core ideas dealing with matter and its interactions and engineering design. The experiences help students to develop an understanding about how materials are similar and different from one another and how the properties of materials relate to their use.

Students build on the science concepts of matter and its interactions developed in kindergarten using new tools to enrich observations. Students observe, describe, and compare properties of solids and liquids. They conduct investigations to find out what happens when solids and water are mixed and when liquids and water are mixed. They use their knowledge of solids and liquids to conduct an investigation on an unknown material (toothpaste). They gain firsthand experience with reversible changes caused by heating or cooling, and read about changes caused by heating that are irreversible.

Throughout this unit, students engage in science and engineering practices to collect data to answer questions, and to define problems in order to develop solutions. 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.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 new or improved object or tool.
SCI.K-2-ETS1-2	Develop 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.

Analyze 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: Solids**

- Part 1: How can solid objects be described?
- Part 2: What are solid objects made of?
- Part 3: Can two or more objects have the same property?
- Part 4: What are the properties of successful towers?
- Part 5: Are there solid objects outdoors?

#### **Investigation 2: Liquids**

- Part 1: How are liquids different from each other?
- Part 2: How can liquids be described?
- Part 3: How do liquids change in containers?
- Part 4: Where are liquids outdoors?

#### **Investigation 3: Bits and Pieces**

- Part 1: Are these materials solid or liquid?
- Part 2: How can mixtures of particles be separated?
- Part 3: How do particles of solids move in bottles?
- Part 4: What is a general rule for using screens to separate a mixture of small objects?
- Part 5: Are there little pieces of solid material outdoors?

#### Investigation 4: Solids, Liquids, and Water

Part 1: What happens when solids are mixed with water?

Part 2: What happens when liquids are mixed with water?

Part 3: Is toothpaste solid or liquid?

Part 4: How do properties of materials change when they are heated or cooled?

Part 5: What happens when you mix water with solid plant material collected outdoors?

#### **Enduring Understanding**

This physical science unit develops students' understanding of how to explain the structure, properties, and interactions of matter.

## Students will know...

Vocabulary

#### Investigation 1: Solids

argument, bend, build, ceramic, claim, color, curve, cylinder, engineer, evidence, fabric, flat, flexible, gas, group, grouping, hard, human-made, leather, liquid, material, matter, metal, natural, object, observe, paper, plastic, pointy, properties, property, rigid, rough, rubber, shape, smooth, soft, solid, sort, straight, texture, tower, wood

#### **Investigation 2: Liquids**

bubble, colorless, dish soap, fabric softener, flow, foam, gravity, hand soap, has color, level, oil, pour, prediction, puddle, shake, starch, surface, syrup, thick, thin, translucent, transparent, viscous

#### Investigation 3: Bits and Pieces

cornmeal, different, funnel, grain, largest, lima bean, mix, mixture, model, mung bean, particle, pile, pinto bean, powder, rice, scoop, screen, separate, size, smallest

#### Investigation 4: Solids, Liquids, and Water

bigger, change, cold, crystal, dark, disappear, dissolve, evaporate, float, freeze, heat, hot, layer, melt, reversible, sink

## Students will be able to...

#### Investigation 1: Solids

- Develop and use models to compare the similarities and differences in the models (drawings and diagrams) of towers and bridges that are built by students from the same set of materials.
- Plan and carry out investigations by making observations of properties of solid objects and determining which properties are shared by two or more objects; to determine the specific kind of material different objects are made from to make comparisons; to compare the ways that a given set of materials can be used to construct successful structures.
- Analyze and interpret data by describing observations of objects and materials, using tables to record and summarize observations, drawing pictures and diagrams of objects used to build structures, and analyzing wind test data to determine if a tower design is successful.
- Construct explanations and design solutions by using objects made of different materials to design and build structures that serve specific functions.
- Engage in argument from evidence to support a claim that two objects can be described with the same property.
- Obtain, evaluate, and communicate information about matter (solids, liquids, and gases) using gradeappropriate text, text features, and communicating information orally and in written forms.

#### **Investigation 2: Liquids**

- Ask questions about puddles and about how liquids move in bottles.
- Develop and use models to represent the surface level of a given volume of water in different shaped containers to show patterns; use models to show the behavior of liquid in a bottle due to gravity as the bottle falls on its side.
- Plan and carry out investigations by making observations of properties of different kinds of liquids in containers and collecting data about how liquids change when poured from one container to another. Observe puddles outdoors to see how water pours on a flat surface and flows.
- Analyze and interpret data of liquids in closed containers, liquids moving from one container to another, and liquids outdoors in puddles; record information, share drawings of observations, use observations to describe patterns of liquids, and compare predictions about puddles to what actually occurs.
- Use mathematics and computational thinking in order to determine how the shape of a container changes the liquid level reached by a given volume of water.
- Construct explanations about how properties of liquids and the patterns of liquids moving from one container to another.
- Engage in argument from evidence to support a claim about the properties of liquids.
- Obtain, evaluate, and communicate information about liquids using grade-appropriate text, and communicating information orally and in written forms.

#### **Investigation 3: Bits and Pieces**

- Develop and use models by distinguishing between a model of a screen (transparency) and the actual screen used to separate small objects; use models to represent sizes of objects that are bigger or smaller than the model screen.
- Plan and carry out investigations using screens to sort materials by size and to compare the behaviors of liquids

and solid particles.

- Analyze and interpret data by describing observations of small particles in bottles, using screens and models of screens to separate particles, and determining a general rule to solve a problem of separating a mixture.
- Construct explanations about how the properties of small solid particles and liquids are the same and different.
- Engage in argument to support or refute that cornmeal is a solid.
- Obtain, evaluate, and communicate information about solids and liquids using grade-appropriate text, and communicating information orally and in written forms.

#### Investigation 4: Solids, Liquids, and Water

- Ask questions about what materials will look like after they are mixed and cooled and then find the answer by investigating. Ask questions about common materials (toothpaste) to determine if they are solid or liquid.
- Plan and carry out investigations by mixing water with solids, water with liquids, cooling and heating solids and liquids to observe and collect data to answer questions about the natural world. Conduct tests on a common material to determine its properties and compare those properties to those of solids and liquids.
- Analyze and interpret data about mixing solids and liquids.
- Construct explanations about change of state of materials when they are heated and cooled.
- Engage in argument from evidence to support a claim that a material (toothpaste) is a solid or a liquid.
- Obtain, evaluate, and communicate information about reversible and irreversible changes of solids and liquids using grade-appropriate text, and communicating information orally and in written forms.

## **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: Solids

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

#### **Investigation 2: Liquids**

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

#### **Investigation 3: Bits and Pieces**

- Science notebook entries
- Performance assessments
- Investigation 3 I-Check

#### Investigation 4: Solids, Liquids, and Water

- Science notebook entries
- Performance assessment
- Investigation 4 I-Check

## **Benchmark Assessments**

## **STAGE 3- LEARNING PLAN**

#### **Instructional Map**

Investigation 1: Solids

Investigation 2: Liquids

Investigation 3: Bits and Pieces

Investigation 4: Solids, Liquids, and Water

#### Investigation 1: Solids

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#### Investigation 1: Part 1- Solid Objects

After identifying three states of matter (solid, liquid, gas), students observe a variety of solid objects. After a period of free exploration, students describe properties of the objects and develop vocabulary in order to communicate their thinking about those properties.

#### Content:

- Solid is one state or phase of matter.
- Objects are described and identified by their properties.

#### **Investigation 1: Part 2- Solid Materials**

Students observe eight similar rectangular objects that vary in the material from which they are made (fabric, plastic, rubber, wood, metal, paper, leather, ceramic). Students examine the objects used in Part 1, as well as classroom objects, to determine their materials.

#### Content:

• Objects are made of one or more materials.

#### Investigation 1: Part 3- Group Solid Objects

Students group solid objects in a variety of ways to discover that many objects can have the same property and that different objects can be made of the same material.

#### Content:

• Solids can be sorted by their properties.

#### Investigation 1: Part 4- Construct with Solids

Students use solid materials to build towers (at least 45 cm tall), using the best objects and the best materials at each level of the tower to provide strength and stability. After building towers, students take the structures apart and use the same materials to construct bridges.

#### Content:

- Some properties of solid objects and materials make them appropriate for tower construction.
- Engineers use knowledge of material properties to design structures that solve problems.

#### **Investigation 1: Part 5- Outdoor Solids**

Students take a field trip to discover solid objects in the schoolyard environment. They sort the found objects into two groups—natural and human-made.

#### Content:

• Natural and human-made objects occur outdoors.

#### Investigation 2: Liquids

#### Investigation 2: Part 1- Liquids in Bottles

Students working at a learning center investigate seven different liquids to develop the concept of liquid. They tip, swirl, shake, roll, and otherwise investigate the liquids in plastic bottles: plain water, corn syrup, liquid dish soap, liquid hand soap, cooking oil, fabric softener (or laundry starch), and water with color.

#### Content:

- Liquid is one common state of matter.
- Liquids move freely in containers.

#### Investigation 2: Part 2- Properties of Liquids

Students observe the seven liquids and describe their properties in their own words. Their descriptive language is used as a springboard to develop precise vocabulary for properties of liquids. Vocabulary is supported by posters and practiced with liquid-properties card activities.

#### Content:

• Liquids have many properties that help identify them.

#### **Investigation 2: Part 3- Liquid Level**

Students pour a measured volume (one vial) of water in different containers. They observe that liquids fill different containers to different heights and that liquids always have flat, level surfaces. Students practice these concepts with representational tasks: recording the shape, location, and appearance of liquid in a bottle as the bottle rotates; and sequencing images of a bottle of liquid as it falls onto its side.

#### Content:

- Liquids take the shapes of their containers.
- The surfaces of liquids are flat and level.

#### **Investigation 2: Part 4- Puddles**

Students search their schoolyard for puddles. If they find puddles, they observe the water closely and describe its properties. Students try to make a puddle by choosing a likely site and pouring water. In the process, they learn two more key characteristics of liquids: they pour and flow.

#### Content:

• Liquids pour and flow.

#### Investigation 3: Bits and Pieces

#### **Investigation 3: Part 1- Solids in Containers**

Students work at learning centers with solid materials representing five particle sizes: cornmeal, rice, and three different kinds of beans. Students investigate the properties of the materials, one at a time, by pouring them from one container to another.

#### Content:

- Solid materials can occur as masses of small particles.
- A mass of particulate matter can form piles and support a more dense object on its surface.

#### **Investigation 3: Part 2- Separating Soup Mix**

Students use screens of three sizes to separate a mixture of five particulate materials: cornmeal, rice, mung beans, pinto beans, and lima beans.

#### Content:

• Particulate solids can be separated by size (with screens).

#### **Investigation 3: Part 3- Solids in Bottles**

Students use funnels to put four particulate solid materials into clear bottles with caps. They observe how the particulate materials look, sound, and move when they shake and roll the bottles. Students compare the properties of particulate solid materials to liquids.

#### Content:

- Masses of particulate matter can pour.
- The surface of a mass of particles is not flat and level.

#### **Investigation 3: Part 4- Beads and Screens**

Students use representations of screens of different mesh sizes to determine which screens can be used to separate mixtures of beads of two sizes. The concepts of solid and liquid are reinforced with a reading.

#### Content:

• Particulate solids can be separated by size (with screens).

#### **Investigation 3: Part 5- Spills**

Students go outdoors to search for particulate solid materials. They compare the behaviors of the particulate materials with water and observe differences in their appearances when poured on a flat surface.

#### Content:

- Particulate matter occurs naturally in the outdoors.
- Masses of particulate matter can pour.
- The surface of a mass of particles is not flat and level.

#### Investigation 4: Solids, Liquids, and Water

#### **Investigation 4: Part 1- Solids and Water**

Students investigate mixtures made of water and familiar solid materials. They observe and discuss the changes that occur immediately and set the mixtures aside for a day. They observe the mixtures, note changes, and graph the changes. Students attempt to return the solids to their starting conditions by drying.

#### Content:

- Some solids change when mixed with water; others do not.
- Some solids dissolve in water.
- Water mixtures can be separated using evaporation.

#### Investigation 4: Part 2- Liquids and Water

Students add water to bottles of familiar liquids. They observe changes that occur immediately, then tip the bottles gently, and finally shake them vigorously. Students observe and record the results of the mixing after a day of settling.

#### Content:

• Some liquids mix with water; others form layers.

#### Investigation 4: Part 3- Toothpaste Investigation

Students apply their knowledge of solids and liquids to determine if toothpaste is solid or liquid. Students observe its behavior in water before and after shaking. They let the mixture settle and observe again. They let a sample of the mixture evaporate and observe the results before reaching a conclusion.

#### Content:

• Some materials are mixtures of solids and liquids.

#### **Investigation 4: Part 4- Changing Properties**

Students use a hot-water bath to see if they can change small samples of ice, margarine, and chocolate. They find that heat can melt some materials. They put liquids in a freezer to find that some materials freeze in the cold.

#### Content:

- Melting occurs when material changes from solid to liquid.
- Freezing occurs when material changes from liquid to solid.
- Heat causes materials to melt; cold causes them to freeze.
- Some changes are reversible; some changes are irreversible.

#### Investigation 4: Part 5- Tea Time

Students collect materials outdoors and mix them with water to see if they can make "tea". Students look for changes in the color and clarity of the water as evidence that something from the solid material is mixed with the water.

#### Content:

• Water can dissolve materials from natural solids found in the outdoor environment.

## **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

- 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**

PS1: Grade 1: Sound and Light

Grade 3: Water and Climate, Motion and Matter

Grade 5: Earth and Sun; Mixtures and Solutions

Grade 8: Chemical Interactions

Preparation for high school science courses.

## **Additional Materials**

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