Physical Science- Materials and Motion

Content Area:ScienceCourse(s):KindergartenTime Period:First TrimesterLength:12 WeeksStatus:Published

Unit Overview

This unit provides early-childhood students with integrated experiences with physical science, earth science, and engineering core ideas that relate to students' interests. The unit begins with a study of natural resources and properties of materials and how those properties determine their use-wood, paper, and fabric. Students come to understand that humans use natural resources for everything they do and that people affect the world around them. Students will use those materials to engineer structures, applying physical science core ideas of energy transfer.

After building a repertoire of practices with materials, students investigate the effect of pushes and pulls, and apply their intuitive notion of the concept of variables to change the strength and direction of rolling balls to achieve specific outcomes.

Throughout this unit students engage in science and engineering practices by asking questions, participating in collaborative investigations, observing, recording, and interpreting data to build explanations, and designing objects and systems to achieve specific outcomes. Students gain experiences that will contribute to beginning-level understanding of the crosscutting concepts of patterns; cause and effect; scale, proportion, and quantity; systems and system models; energy and matter, and structure and function.

STAGE 1- DESIRED RESULTS

Educational Standards

2020 New Jersey Student Learning Standards- Science

Performance Expectations

Physical Sciences

SCI.K-PS2-1	Plan and conduct an investigation to compare the effects of different strengths or different directions of pushes and pulls on the motion of an object.
SCI.K-PS3-2	Use tools and materials to design and build a structure that will reduce the warming effect of sunlight on an area.
SCI.K-PS2	Motion and Stability: Forces and Interactions
SCI.K-PS3-1	Make observations to determine the effect of sunlight on Earth's surface.
SCI.K-PS3	Energy
SCI.K-PS2-2	Analyze data to determine if a design solution works as intended to change the speed or direction of an object with a push or a pull.

Life Sciences	
SCI.K-LS1-1	Use observations to describe patterns of what plants and animals (including humans) need to survive.
SCI.K-LS1	From Molecules to Organisms: Structures and Processes

Earth and Space Sciences

SCI.K-ESS2-1	Use and share observations of local weather conditions to describe patterns over time.
SCI.K-ESS2	Earth's Systems
SCI.K-ESS3-1	Use a model to represent the relationship between the needs of different plants or animals (including humans) and the places they live.
SCI.K-ESS3-2	Ask questions to obtain information about the purpose of weather forecasting to prepare for, and respond to, severe weather.
SCI.K-ESS2-2	Construct an argument supported by evidence for how plants and animals (including humans) can change the environment to meet their needs.
SCI.K-ESS3	Earth and Human Activity
SCI.K-ESS3-3	Communicate solutions that will reduce the impact of humans on the land, water, air, and/or other living things in the local environment.

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.
SCI.K-2-ETS1-3	Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.

- 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: Obtaining, Evaluating, and Communicating Information
- Practice #8: Engaging in Argument from Evidence

Cross Cutting Concepts

- Cause and Effect
- Energy and Matter
- Influence of Engineering, Technology, and Science on Society and the Natural World
- Interdependence of Science, Engineering, and Technology
- Patterns
- Scale, Proportion, and Quantity
- Stability and Change
- Structure and Functions
- Systems and System Models

Disciplinary Core Ideas

Physical Sciences

- PS1.A- Structure and Properties of Matter
- PS2.A Forces and Motion
- PS2.B Types of Interactions
- PS3.B Conservation of Energy and Energy Transfer
- PS3.C Relationship Between Energy and Forces

Earth and Space Sciences

• ESS3.C- Human impacts on Earth systems

Essential Questions

Investigation 1: Getting to Know Wood

Part 1: Where does wood come from?

What is made of wood?

- Part 2: What happens when wood gets wet?
- Part 3: How can you sink wood?

How many passengers will a wood raft hold?

- Part 4: How can you change the shape of wood?
- **Part 5:** How are sawdust and shavings the same? How are sawdust and shavings different?
- Part 6: How is particleboard made?
- Part 7: How is plywood made?

Investigation 2: Getting to Know Paper

- Part 1: What is made of paper?
- **Part 2:** What makes paper good for writing?

What makes paper easy to fold?

- Part 3: What happens when water gets on paper?
- Part 4: How can new paper be made from old paper?
- Part 5: How can paper be made strong to form a bowl?

Investigation 3: Getting to Know Fabric

Part 1: How are fabrics different?

What is made of fabric?

- Part 2: How is fabric made?
- Part 3: What happens when water gets on fabric?
- Part 4: How are different kinds of fabric used?
- Part 5: How can we conserve natural resources?
- Part 6: What happens to water in sunshine and shade?

How can we design a structure to keep water cool in sunshine?

Investigation 4: Getting Things to Move

- Part 1: What causes objects to move?
- Part 2: What happens when objects collide?
- Part 3: Where can balls roll on the schoolyard?
- Part 4: How can we change how far a balloon rocket travels?

Enduring Understanding

This physical science unit develops students' understanding of how: 1) To explain the structure, properties, and interactions of matter; 2) To explain and predict interactions between objects and within systems of objects; 3) Energy is transferred and conserved; and 4) Earth's surface processes and human activities affect each other.

Students will know...

VOCABULARY

Investigation 1: Getting to Know Wood

above, absorb, basswood, bead up, below, break, cedar, change, communicate, compare, different, evaporate, fewer, float, glue, grain, graph, laminate, layer, less, material, mixture, more, observe, particleboard, pine, plywood, property, raft, rough, same, sand, sandpaper, sawdust, screen, senses, shape, shavings, sink, smooth, soak, spread, strong, test, texture, tree, waterlogged, wood, woodworker

Investigation 2: Getting to Know Paper

around, bend, blot, bumpy, chipboard, construction paper, corner, corrugated cardboard, corrugated paper, crease,

drop, dry, facial tissue, fiber, flat, flip, flour, fold, half, kraft paper, mold, newsprint, over, paper, paper towel, papiermâché, pulp, recycling, rolling, slick, stiff, strip, submerge, tagboard, tear, thick, thin, waxed paper, wet, wheat paste

Investigation 3: Getting to Know Fabric

burlap, cloth, cold, conserve, corduroy, denim, fabric, fleece, hot, knit, least, magnet, most, natural resource, nubby, recycle, reuse, ripstop nylon, rough, satin, scratchy, seersucker, shiny, slippery, smooth, soak, soft, sparkle organza, structure, temperature, terry cloth, texture, thread, warp, waterproof, woof, woven

Investigation 4: Getting Things to Move

cause, collide, collision, direction, distance, effect, fast, gentle, gravity, motion, move, pull, push, rocket, roll, rolling, ramp, slope, slowly, speed, strength, stop

Students will be able to...

nvestigation 1: Getting to Know Wood

- Ask questions and define problems about wood and wood rafts.
- Develop and use models of wood production.
- Plan and carry out investigations in collaboration with peers and with adult guidance. They observe wood interactions with water and transform wood by sanding.
- Analyze and interpret data by describing observations of wood, objects made from wood, wood interactions with water, and processes of making wood. They make and share notebook entries, including writing and labeling pictures.
- Use mathematics and computational thinking to determine the number of passengers a wood raft will hold.
- Construct explanations and design solutions by making firsthand observations of wood and objects made from wood, and using this evidence to answer questions about how properties of wood provide specific functions.
- Engage in argument from evidence about types of wood for specific functions.
- Obtain, evaluate, and communicate information about wood, objects made from wood, and how we can recycle wood.

Investigation 2: Getting to Know Paper

- Ask questions and define problems about paper and making new paper from old paper.
- Develop and use models to follow a process to make paper.
- Plan and carry out investigations in collaboration with peers and with adult guidance. Students will observe properties of paper and look at its interactions with water and other materials.
- Analyze and interpret data by describing observations of paper and paper products and recording information in notebook entries, including writing and labeling pictures. Students use their firsthand observations and those of others in the classroom to describe the patterns they observe in paper products.
- Construct explanations and design solutions by making firsthand observations of paper and paper products and using them as evidence to answer design questions.
- Obtain, evaluate, and communicate information about paper and products manufactured from paper by reading grade-appropriate text and communicating in oral and written formats.

Investigation 3: Getting to Know Fabric

- Ask questions and define problems about fabric types and uses and the design of a structure for a specific purpose.
- Develop and use models to understand how fabric is woven.
- Plan and carry out investigations in collaboration with peers and with adult guidance. Students will observe properties of fabric and look at fabric interactions with water.
- Analyze and interpret data by observing fabric and fabric products, recording information, and using and sharing notebook entries, including writing and labeling pictures. Students use their firsthand observations and those of others in the classroom to describe the patterns they observe in fabric.
- Use mathematics and computational thinking to create a bar graph showing fabric selections for specific articles of clothing (pants, dress, shirt, jacket, etc.).
- Construct explanations and design solutions by making firsthand observations of fabric and objects made of fabric and using this as evidence to answer design questions. They design and test a structure using knowledge of wood, paper, and fabric to solve a problem.
- Obtain, evaluate, and communicate information about fabric and products made from fabric by reading gradeappropriate text and communicating in oral and written formats.

Investigation 4: Getting Things to Move

- Ask questions and define problems about pushes and pulls and the design of a structure for a specific purpose.
- Plan and carry out investigations in collaboration with peers and with adult guidance involving rolling balls on ramps with different slopes to observe speed and direction of travel. Use balloon rockets to investigate the speed and distance traveled with different amounts of air pushing the balloon-rocket system.
- Analyze and interpret data by describing observations of objects moving because of gravity, recording information, and using and sharing notebook entries, including writing and labeling pictures. Students use their firsthand observations and those of others in the classroom to describe the patterns they observe in moving objects.
- Use mathematics and computational thinking to determine the distance that a balloon rocket travels on a flight line.
- Construct explanations and design solutions by observing objects rolling due to pushes and pulls and using this as evidence to answer design questions. They design and test a system using knowledge of motion.

Obtain, evaluate, and communicate information about pushes, pulls, and collisions by reading grade-appropriate text and communicating in oral and written formats.

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: Getting to Know Wood

- Teacher observations
- Science notebook entries

Investigation 2: Getting to Know Paper

- Teacher observations
- Science notebook entries

Investigation 3: Getting to Know Fabric

- Teacher observations
- Science notebook entries

Investigation 4: Getting Things to Move

- Teacher observations
- Science notebook entries

Benchmark Assessments

Assessment Checklists

STAGE 3- LEARNING PLAN

Instructional Map

Investigation 1: Getting to Know Wood

Investigation 2: Getting to Know Paper

Investigation 3: Getting to Know Fabric

Investigation 4: Getting Things to Move

Investigation 1: Getting to Know Wood

Investigation 1: Part 1- Observing Wood

Students become familiar with different kinds and forms of wood found in their home and school environments. Students compare and describe five uniform samples of different kinds of wood, learn the names, and observe how the woods are alike and different. Students go on a wood hunt in the classroom and label wood objects. They go outdoors to find wood.

- Wood can be described in terms of its properties.
- Different kinds of wood come from different kinds of trees. Trees are natural resources.
- Some kinds of woods are processed and transformed by people.
- Wood is used for many everyday things.

Investigation 1: Part 2- Wood and Water

Students observe how wood and water interact, first by putting drops of water on the wood, then by putting the wood in basins of water.

Content:

- Wood can be described in terms of its properties.
- Wood floats in water.
- Wood absorbs water.

Investigation 1: Part 3- Testing a Raft

Students find ways to sink floating wood samples by attaching paper clips to the wood with rubber bands. Students discover how easy it is to sink the plywood compared to the pine sample. Students refine their techniques for sinking wood samples, and they test two other kinds of wood. Students make a bar graph of their results to find a kind of wood to make a raft to hold passengers.

Content:

- Wood can be described in terms of its properties.
- Wood floats in water but can be made to sink. Some kinds of wood sink more easily than others.
- Engineers test wood products and use certain kinds of wood for specific uses.

Investigation 1: Part 4- Sanding Wood

Students add to their knowledge of the properties of wood and learn how to use those properties to change wood. Students use sandpaper to change the shape of basswood and a stick.

- Wood can be changed (appearance and behavior) by mechanical action, such as sanding and mixing with water.
- Sawdust is tiny pieces of wood. Sawdust can be recycled into usable wood.

Investigation 1: Part 5- Sawdust and Shavings

Students compare sawdust and shavings. They find out what happens to sawdust and shavings when they mix the two with water and then separate out the shavings. Students spread out wet sawdust on paper plates and observe it after a few days.

Content:

- Wood floats in water but can be made to sink.
- Wood can be changed (appearance and behavior) by mechanical action, such as sanding and mixing with water.
- Wood that is waterlogged sinks.

Investigation 1: Part 6- Making Particleboard

Students simulate the making of particleboard by using sawdust and a cornstarch matrix. They compare their particleboard with the samples from the kit.

Content:

- Different kinds of wood come from different kinds of trees. Trees are natural resources. Some kinds of wood are processed and made by people.
- Sawdust is tiny pieces of wood. Sawdust can be recycled into usable wood.
- Basic materials can be transformed into new materials (particleboard).

Investigation 1: Part 7- Making Plywood

Students make plywood from thin strips of wood and glue. They compare the breakable strength of a craft stick to that of their homemade plywood.

- Different kinds of wood come from different kinds of trees. Trees are natural resources. Some kinds of wood are processed and made by people.
- Gluing (laminating) thin sheets of wood together produces stronger wood that is hard to break.

Investigation 2: Getting to Know Paper

Investigation 2: Part 1- Paper Hunt

Students observe and compare the properties of ten kinds of paper. They go on a paper hunt, looking for a sample that matches one that they are given. Students place labels around the classroom to highlight all the items in their environment made of paper.

Content:

- Paper has many observable properties.
- Many objects are made from paper.
- People make paper from wood.

Investigation 2: Part 2- Using Paper

Students use crayons, pencils, and marking pens to explore and compare the properties of paper that make it suitable or unsuitable for writing and drawing. Students fold paper and compare the properties of paper that allow it to be folded.

Content:

- Paper has many observable properties.
- The properties of different papers determine their use.

Investigation 2: Part 3- Paper and Water

Students drop water on ten different paper samples and observe and compare the results. They submerge the paper in water and let it dry to see if the paper changes in any way. Students decorate paper flags and hang them on a string outdoors to observe the paper over time.

- Paper has many observable properties.
- Some kinds of paper absorb water, while others do not. Some paper changes when soaked in water. Some

paper breaks down into small fibers.

Investigation 2: Part 4- Paper Recycling

Students are introduced to papermaking and recycling. They shake toilet tissue and water in a bottle to make a pulp and then form it into a new sheet of paper. Students discover that the new paper has many of the properties of the original paper and also has some very different properties.

Content:

- People make paper from wood.
- Some kinds of paper absorb water, while others do not. Some paper changes when soaked in water. Some paper breaks down into small fibers.
- Paper, a resource, can be reused, recycled, and fabricated.

Investigation 2: Part 5- Papier-Mâché

Students use wheat paste (flour and water) to mold strips of newspaper over a small container. They use this papiermâché technique to change the paper from flexible to stiff and strong so it will keep a shape.

Content:

• Paper, a resource, can be reused, recycled, and fabricated.

Investigation 3: Getting to Know Fabric

Investigation 3: Part 1- Feely Boxes and Fabric Hunt

Students observe the properties of ten different fabrics (burlap, corduroy, denim, fleece, knit, ripstop nylon, satin, seersucker, sparkle organza, and terry cloth). Students match properties by using feely boxes, hunting for fabric, and locating fabrics that are used in the classroom.

Content:

• Fabric is a flexible material with a wide range of properties.

Investigation 3: Part 2- Taking Fabric Apart

Students investigate the structure of woven fabrics by disassembling and comparing loosely woven burlap and tightly woven wool plaid.

Content:

• Fabric can be made of woven threads.

Investigation 3: Part 3- Water and Fabric

Students investigate how fabrics interact with water. They discover the many ways the different fabrics absorb, transmit, and repel water. Students immerse fabric in water and observe that it is unchanged after it dries-the water evaporates.

Content:

- Fabrics can absorb, transmit, or repel water.
- Wet fabric dries when water evaporates, leaving the fabric unchanged.

Investigation 3: Part 4- Graphing Fabric Uses

Students think about the kind of fabric that would make a good pair of pants and other items of clothing. They prepare picture graphs that represent their decisions regarding the fabric they would use for different kinds of clothing.

Content:

• The properties of fabrics determine their uses.

Investigation 3: Part 5- Reuse and Recycle Resources

Students are introduced to natural resources and the need to reuse and recycle materials. They sort materials for recycling, based on the kind of material. Students use magnets to sort steel from other metals.

Content:

- Land, air, water, and trees are natural resources.
- People reuse and recycle to conserve natural resources

Investigation 3: Part 6- Building Structures

Students place cups of water outdoors in the sunshine and shade and compare the water temperature after at least 15 minutes. They observe that the cups of water in the sunlight got warmer. Students are challenged to design and build a structure, using wood, paper, fabric, glue, and natural materials that will keep water cool in the sunshine. Students use the knowledge they have gained in the previous parts of the module to design their structures.

Content:

- People use knowledge of the properties of materials to create useful structures.
- The Sun warms Earth's surface.

Investigation 4: Getting Things to Move

Investigation 4: Part 1- Pushes and Pulls

Students observe and describe how a push or a pull causes something to move. They roll balls at different speeds (slow and fast) and determine the strength of the push required to achieve a certain speed. They are introduced to gravity as a pulling force.

Content:

- Pushing or pulling on an object can change the speed or direction of its motion and can start or stop it.
- Gravity pulls things down.

Investigation 4: Part 2- Colliding Objects

Students use balls and ramps to achieve different speeds. They explore what happens when a moving ball hits an object. Students change the speed of the ball by changing the slope of the ramp to knock over blocks. They apply their knowledge of ball motion to make a ball land in a particular spot.

Content:

- Pushing or pulling on an object can change the speed or direction of its motion and can start or stop it.
- Gravity pulls things down.
- A bigger push or pull can make things move faster.
- When objects touch or collide, they push on one another, which can change motion.

Investigation 4: Part 3- Rolling Outdoors

Students find slopes in the schoolyard that can be used to set balls in motion. Each group uses a plastic bottle as a target to predict the path of a ball on a slope.

Content:

- Gravity pulls things down.
- When objects touch or collide, they push on one another, which can change motion.

Investigation 4: Part 4- Balloon Rockets

Students observe a balloon-rocket system to find out how far the air in the balloon will propel the system along the flight line. The class investigates how changing the strength of the push (number of pumps of air in the balloon) changes the speed of the balloon rocket and how far it travels. Students also observe what happens to the system when it collides with an object on the flight line.

Content:

- Pushing or pulling on an object can change the speed or direction of its motion and can start or stop it.
- A bigger push or pull can make things move faster.
- When objects touch or collide, they push on one another, which can change motion.

Modifications/Differentiation of Instruction

Differentiation Strategies for Special Education Students

• Remove unnecessary material, words, etc., that can distract from the content

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

Differentiation Strategies for Gifted and Talented Students

- Increase the level of complexity
- Decrease scaffolding
- Variety of finished products
- Allow for greater independence
- Learning stations, interest groups
- Varied texts and supplementary materials
- Use of technology
- Flexibility in assignments
- Varied questioning strategies
- Encourage research
- Strategy and flexible groups based on formative assessment or student choice
- Acceleration within a unit of study
- Exposure to more advanced or complex concepts, abstractions, and materials
- Encourage students to move through content areas at their own pace
- After mastery of a unit, provide students with more advanced learning activities, not more of the same activity
- Present information using a thematic, broad-based, and integrative content, rather than just single-

subject areas

Differentiated Strategies for ELL Students

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

Differentiation Strategies for At Risk Students

- Remove unnecessary materials, words, etc., that can distract from the content
- Provide appropriate scaffolding
- Limit the number of steps required for completion
- Gradually increase the level of independence required
- Tiered centers, assignments, lessons, or products
- Provide appropriate leveled reading materials
- Deliver the content in "chunks"
- Varied texts and supplementary materials
- Use technology, if available and appropriate
- Differentiate homework and products
- Varied questioning strategies
- Provide background knowledge

- Define key vocabulary, multiple-meaning words, and figurative language
- Use audio and visual supports, if available and appropriate
- Provide multiple learning opportunities to reinforce key concepts and vocabulary
- Meet with small groups to reteach idea/skill
- Provide cross-content application of concepts
- Presenting ideas through auditory, visual, kinesthetic, & tactile means
- Provide graphic organizers and/or highlighted materials
- Strategy and flexible groups based on formative assessment

504 Plans

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

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

Examples of accommodations in 504 plans include:

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

Modification Strategies

- Extended Time
- Frequent Breaks

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

High Preparation Differentiation

- Alternative Assessments
- Choice Boards
- Games and Tournaments
- Group Investigations
- Guided Reading
- Independent Research / Project
- Interest Groups
- Learning Contracts
- Leveled Rubrics
- Literature Circles
- Menu Assignments
- Multiple Intelligence Options
- Multiple Texts
- Personal Agendas
- Project Based Learning (PBL)
- Stations / Centers
- Think-Tac-Toe
- Tiered Activities / Assignments
- Varying Graphic Organizers

Low Preparation Differentiation

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

Horizontal Integration- Interdisciplinary Connections

New Jersey Student Learning Standards for Mathematics

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

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

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

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

A-SSE.A. Interpret the structure of expressions

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

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

- 1. Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.
- F-IF.A. Understand the concept of a function and use functional notation.
 - 1. Understand that a function from one set to another set.
- F-IF.B Interpret functions that arise in applications in terms of the context.
- F-IF.C. Analyze functions using different representations
- S-ID.A. Summarize, represent, and interpret data on a single count or measurement variable
 - 1. Represent data with plots on a real number line.
- S-ID.B. Summarize, represent, and interpret data on two categorical and quantitative variables.
- S-ID.C. Interpret linear models.
- S-IC.A. Understand and evaluate random processes underlying statistical experiments.
- S-IC.B. Make inferences and justify conclusions from surveys, experiments, and observational studies.

Kindergarten English Language Arts Standards

- RF 1: Demonstrate understanding of the organization and basic features of print.
- RF 2: Demonstrate understanding of spoken words, syllables, and sounds.
- RF 4: Read text with purpose and understanding.
- 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.
- RI 10: Actively engage in group reading activities with purpose and understanding.
- W 2: Write informative/explanatory text.

- W 5: Respond to questions and suggestions from peers.
- W 5: Strengthen writing by revising and editing.
- W 7: Participate in shared research and writing projects.
- W 8: Gather information to answer a question.
- 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 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 5a: Sort words and objects into categories.
- L 6: Use acquired words and phrases.
- RL 1: Ask and answer questions about key details in a text.
- RL 2: Retell stories, including key details.
- RL 6: Name and define the role of the author and illustrator.
- RL 10: Actively engage in group reading activities 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

8.2.2.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

PS2: Grade 1: Sound and Light

Grade 2: Solids and Liquids; Pebbles, Sand, and Silt

Grade 3: Motion and Matter

Grade 5: Earth and Sun; Mixtures and Solutions

Grade 8: Chemical Interactions

PS3: Grade 4: Energy

Grade 5: Earth and Sun

Grade 7: Electromagnetic Force, Gravitational, and Kinetic Forces

Grade 8: Chemical Interactions

ESS3: Grade 1: Air and Weather

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.