South Harrison Township Elementary School District

Committed to Excellence

Course Name: Science	**Grade Level(s): Second**
BOE Adoption Date: October 2017	**Revision Date(s):**

ABSTRACT

Science in the second grade begins with distinguishing different forms of matter based on their properties. Students will determine if changes to matter are reversible or irreversible. Maps will be studied to understand the shapes of land and water in area. Changes to the Earth over time will be studied, including the effects of wind and water. In the final unit students will explore the variety of plant and animal relationships within habitats, including the ways in which plants can use animals to spread their seeds.

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Mission Statement

The primary goal of the South Harrison Township Elementary School District is to prepare each student with the real life skills needed to compete in a highly competitive global economy. This will be achieved by providing a comprehensive curriculum, the integration of technology, and the professional services of a competent and dedicated faculty, administration, and support staff.

Guiding this mission will be Federal mandates, including the Every Student Succeeds Act (ESSA), the New Jersey Student Learning Standards, and local initiatives addressing the individual needs of our students as determined by the Board of Education. The diverse resources of the school district, which includes a caring Home and School Association (HSA) and active adult community, contribute to a quality school system. They serve an integral role in supporting positive learning experiences that motivate, challenge and inspire children to learn.

Curriculum and Instruction Goals

Goal(s):

1. To ensure students are college and career ready upon graduation
2. To vertically and horizontally align curriculum K-12 to ensure successful transition of students at each grade level
3. To identify individual student strengths and weaknesses utilizing various assessment measures (formative, summative, alternative, etc.) so as to differentiate instruction while meeting the rigor of the applicable content standards
4. To improve student achievement as assessed through multiple measures including, but not limited to, state testing, local assessments, and intermediate benchmarking

Philosophy of the Shared Curriculum Service with Kingsway Regional School District

Together in its partnership with the South Harrison Township Elementary School District, the Kingsway Curriculum & Instruction Department is committed to providing all students grades K-12 with an engaging and quality curricular experience that aligns with the New Jersey Student Learning Standards (NJ SLS) for mathematics and English-Language Arts as well as the New Jersey Student Learning Standards (NJ SLS) for all other core disciplines. It is the goal of this shared service to provide students with curricular and educational experiences that allows them to succeed as they move on to the middle and high school level. Through this shared service, both horizontal and vertical alignment is stressed at and within each grade level with the aim of developing life-long learners who are college and career ready upon graduation from high school. Additionally, classroom instruction will be designed to meet the unique learning desires of all children and will be differentiated according to the needs of each learner. Whether through added support or enrichment activities, it is the role of the educator in the classroom to ensure students are reaching their highest level of social, emotional, and academic growth each school year. A combination of summative, formative, and performance-based

assessments will be used to assess students' understanding and acquisition of necessary concepts and skills. Group work, projects, and a variety of co-curricular activities will make mathematics more meaningful and aid in the understanding of its application across all disciplines as well as in life.

How to Read this Document

This document contains a pacing guide and curriculum units. The pacing guides serve to deliver an estimated timeframe as to when noted skills and topics will be taught. The pacing of each course, however, will differ slightly depending upon the unique needs of each class. The curriculum units contain more detailed information as to the specific skills and concepts that are introduced as well as how students will be assessed. The terms and definitions below will assist the reader in better understanding the sections and components of this curriculum document.

Terms to Know

1. **Accommodation(s):** The term "accommodation" may be used to describe an *alteration* of environment, curriculum format, or equipment that allows an individual with a disability to gain access to content and/or complete assigned tasks. They allow students with disabilities to pursue a regular course of study. The term accommodation is often used interchangeable with the term modification. However, it is important to remember that modifications change or modify the intended learning goal while accommodations result in the same learning goal being expected but with added assistance in that achievement. Since accommodations do not alter what is being taught, instructors should be able to implement the same grading scale for students with disabilities as they do for students without disabilities.

2. **Differentiated Instruction:** Differentiation of instruction relies on the idea that instructional approaches should be tailored to each individual student's learning needs. It provides students an array of options during the learning process that allows them make sense of ideas as it relates to them. The integration of differentiated instructional techniques is a curriculum design approach to increase flexibility in teaching and decrease the barriers that frequently limit student access to materials and learning in classrooms. http://www.udlcenter.org/aboutudl

3. **Enduring Understanding:** Enduring understandings (aka big ideas) are statements of understanding that articulate deep conceptual understandings at the heart of each content area. Enduring understandings are noted in the alongside essential questions within each unit in this document. http://www.ascd.org

4. **Essential Question:** These are questions whose purpose is to stimulate thought, to provoke inquiry, and to spark more questions. They extend beyond a single lesson or unit. Essential questions are noted in the beginning of each unit in this document. http://www.ascd.org

5. **Formative Assessment(s):** Formative assessments monitor student learning to provide ongoing feedback that can be used by (1) instructors to improve teaching and (2) by students to improve their learning. Formative assessments help identify students' strengths and weaknesses and address problems immediately.

6. **Learning Activity(s):** Learning activities are those activities that take place in the classroom for which the teacher facilitates and the students participate in to ensure active engagement in the learning process. (Robert J. Marzano, *The Art and Science of Teaching*)

7. **Learning Assignment(s):** Learning assignments are those activities that take place independently by the student inside the classroom or outside the classroom (i.e. homework) to extend concepts and skills within a lesson. http://www.marzanocenter.com

8. **Learning Goal(s):** Learning goals are broad statements that note what students "should know" and/or "be able to do" as they progress through a unit. Learning goals correlate specifically to the NJSLS (New Jersey Student Learning Standards) are noted within each unit.

9. **Learning Objective(s):** Learning objectives are more specific skills and concepts that students must achieve as they progress towards the broader learning goal. These are included within each unit and are assessed frequently by the teacher to ensure students are progressing appropriately. http://www.marzanoresearch.com

10. **Model Assessment:** Within the model curriculum, model assessments are provided that included assessments that allow for measuring student proficiency of those target skills as the year of instruction progresses. http://www.state.nj.us/education/modelcurriculum/

11. **Model Curriculum:** The model curriculum has been provided by the state of New Jersey to provide a "model" for which districts can properly implement the NJSLS (New Jersey Student Learning Standards) by providing an example from which to work and/or a product for implementation.

12. **Modification(s):** The term "modification" may be used to describe a *change* in the curriculum. Modifications are typically made for students with disabilities who are unable to comprehend all of the content an instructor is teaching. The term modification is often used interchangeable with the term accommodations. However, it is important to remember that modifications change or modify the intended learning goal while accommodations result in the same learning goal being expected but with assistance in that achievement.

13. **Performance Assessment(s): (**aka alternative or authentic assessments) Performance assessments are a form of assessment that requires students to perform tasks that generate a more authentic evaluation of a student's knowledge, skills, and abilities. Performance assessments stress the application of knowledge and extend beyond traditional assessments (i.e. multiple-choice question, matching, true & false, etc.).

14. **Standard(s):** Academic standards, from which the curriculum is built, are statements that of what students "should know" or "be able to do" upon completion of a grade-level or course of study. Educational standards help teachers ensure their students have the skills and knowledge they need to be successful by providing clear goals for student learning. http://www.state.nj.us/njded/cccs/

    - **State:** The New Jersey Student Learning Standards (NJSLS) include Preschool Teaching and Learning Standards as well as K-12 standards for: *Visual and Performing Arts; Comprehensive Health and Physical Education; Science; Social Studies; World Languages; Technology; and 21st-Century Life and Careers.*

15. **Summative Assessment(s):** Summative assessments evaluate student learning at the end of an instructional time period by comparing it against some standard or benchmark. Information from summative assessments can be used formatively when students or faculty use it to guide their efforts and activities in subsequent courses.

16. **21st Century Skill(s):** These skills emphasis the growing need to focus on those skills that prepare students successfully by focusing on core subjects and 21st century themes; learning and innovation skills; information, media and technology skills; and life and career skills. These concepts are embedded in each unit of the curriculum. http://www.p21.org/our-work/p21-framework

Proficiencies and Pacing Guide:

Unit Title	Duration/Month(s)	Related Standards	Learning Goals	Crosscutting Concepts
Unit 1 Properties of Matter	5 Weeks	**PS1.A: Structure and Properties of Matter** Different kinds of matter exist and many of them can be either solid or liquid, depending on temperature. Matter can be described and classified by its observable properties. (2-PS1- 1) **PS1.A: Structure and Properties of Matter** Different properties are suited to different purposes. (2-PS1-2)	***Students will…*** • Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties. • Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for an intended purpose. • Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.	**Patterns** Patterns in the natural and human designed world can be observed. (2-PS1-1) **Cause and Effect** Simple tests can be designed to gather evidence to support or refute student ideas about causes. (2-PS1-2)
Unit 2 Changes of Matter	5 Weeks	**PS1.A: Structure and Properties of Matter** Different properties are suited to different purposes. (2-PS1-3) A great variety of objects can be built up from a small set of pieces. (2-PS1-3) **PS1.B: Chemical Reactions** Heating or cooling a substance may cause changes that can be	***Students will…*** • 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. • Construct an argument with evidence that some changes caused by heating or cooling can be reversed and some	**Energy and Matter** Objects may break into smaller pieces and be put together into larger pieces, or change shapes. (2-PS1-3) **Cause and Effect** Events have causes that generate observable patterns. (2-PS1-4)

		observed. Sometimes these changes are reversible, and sometimes they are not. (2-PS1-4)	cannot.	
Unit 3 Earth's Land and Water	6 Weeks	**ESS2.B: Plate Tectonics and Large-Scale System Interactions** Maps show where things are located. One can map the shapes and kinds of land and water in any area. (2-ESS2-2) **ESS2.C: The Roles of Water in Earth's Surface Processes** Water is found in the ocean, rivers, lakes, and ponds. Water exists as solid ice and in liquid form. (2-ESS2-3)	***Students will…*** • Develop a model to represent the shapes and kinds of land and bodies of water in an area. • Obtain information to identify where water is found on Earth and that it can be solid or liquid.	**Patterns** Patterns in the natural world can be observed. (2-ESS2-2), (2-ESS2-3)
Unit 4 Changes in Earth's Land	7 Weeks	**ESS1.C: The History of Planet Earth** Some events happen very quickly; others occur very slowly, over a time period much longer than one can observe. (2-ESS1-1) **ESS2.A: Earth Materials and Systems** Wind and water can change the shape of the land. (2-ESS2-1) **ETS1.C: Optimizing the Design Solution** Because there is always more than one possible solution to a	***Students will…*** • Use information from several sources to provide evidence that Earth events can occur quickly or slowly. • Compare multiple solutions designed to slow or prevent wind or water from changing the shape of the land. • Develop a model to represent the shapes and kinds of land and bodies of water in an area. • Ask questions, make observations, and gather information about a	**Stability and Change** Things may change slowly or rapidly. (2-ESS1-1), (2-ESS2-1) **Patterns** Patterns in the natural world can be observed. (2-ESS2-2)

		problem, it is useful to compare and test designs. *(secondary)* (2-ESS2-1) **ESS2.B: Plate Tectonics and Large-Scale System Interactions** Maps show where things are located. One can map the shapes and kinds of land and water in any area. (2-ESS2-2)	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.	

Unit 1: Properties of Matter	Recommended Duration: 5 Weeks
Unit Description: In this unit of study, students look for patterns and cause-and-effect relationships as they describe and classify materials using physical properties. In addition, students collaboratively plan and carry out investigations and analyze and interpret data in order to determine which materials are best suited for an intended purpose.	

Essential Questions	Enduring Understandings
• *How do the properties of materials determine their uses?*	• *Matter is all around us.*

New Jersey Student Learning Standards

By the end of the unit, the Student will be able to:

Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties. [Clarification Statement: Observations could include color, texture, hardness, and flexibility. Patterns could include the similar properties that different materials share.] 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.* [Clarification Statement: Examples of properties could include, strength, flexibility, hardness, texture, and absorbency.] [*Assessment Boundary: Assessment of quantitative measurements is limited to length.*] 2-PS1-2

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

Science & Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Planning and Carrying Out Investigations Planning and carrying out investigations to answer questions or test solutions to problems in K–2 builds on prior experiences and progresses to simple investigations, based on fair tests, which provide data to support explanations or design solutions. • Plan and conduct an investigation collaboratively to produce data to	**PS1.A: Structure and Properties of Matter** • Different kinds of matter exist and many of them can be either solid or liquid, depending on temperature. Matter can be described and classified by its observable properties. (2-PS1-1) **PS1.A: Structure and Properties of Matter**	**Patterns** • Patterns in the natural and human designed world can be observed. (2-PS1-1) **Cause and Effect** • Simple tests can be designed to gather evidence to support or refute student ideas about causes. (2-PS1-2)

serve as the basis for evidence to answer a question. (2-PS1-1) **Analyzing and Interpreting Data** Analyzing data in K–2 builds on prior experiences and progresses to collecting, recording, and sharing observations. • Analyze data from tests of an object or tool to determine if it works as intended. (2-PS1-2)	Different properties are suited to different purposes. (2-PS1-2)	

Formative Assessments	Summative Assessments	Performance Assessments	Major Activities/ Assignments
• Rubrics • Learning Questions to guide unit progression • Observe and use patterns in the natural world as evidence. • Use observations *(firsthand or from media)* to describe patterns in the natural world in order to answer scientific questions. • Use observations to describe patterns in what plants need to survive. Examples of patterns could include:	• Rubrics • Oral and Slate Assessments • Science Assessment Tasks	• Science Assessment Tasks • Science Investigations • Student Science notebooks • Student-designed models	**Possible NGSS Phenomena:** *Did you know that you can build a house with playing cards?* In the natural world, different types of matter exist, and all matter can be described and classified according to physical properties. To begin this unit's progression of learning, students plan and conduct investigations to describe different kinds of material using observable properties. They will collect data during these investigations; analyze the data to find patterns, such as similar properties that different materials share; and use the data to classify materials. Materials can be classified by color, texture, hardness, flexibility, or state of matter. For example, students can explore hardness of rocks by shaking them in containers

Formative Assessments	Summative Assessments	Performance Assessments	Major Activities/ Assignments
			to see how easily they break apart. They can explore viscosity by pouring a set amount of various liquids, such as glue, oil, and water from one container to another to observe the relative speed that each flows. Students can also heat or cool a variety of materials, such as butter, chocolate, or pieces of crayon, in order to determine whether or not these materials can be either solid or liquid depending on temperature.

Possible Assessment Adjustments (Modifications /Accommodations/ Differentiation): *How will the teacher provide multiple means for the following student groups to **EXPRESS** their understanding and comprehension of the content/skills taught?*			
Special Education Students	**English Language Learners (ELLs)**	**At-Risk Learners**	**Advanced Learners**
• Modify assignments as needed (e.g., vary length, limit items) • Shorten assignments • Increase the amount of item allowed to complete assignments and tests • Limit amount of work required or length of tests • Hands-on-projects • Give in small groups ***Individualized per each student per IEP***	• Word/Picture Wall • L1 support • Word/Picture Wall • Manipulatives (etc. Counters, Connecting Cubes, Base-Ten Blocks, Place Value T-Chart • Native language support • Choice questions • Teacher Modeling • Illustrations/diagrams/drawings • Small group	• Manipulatives (etc. Counters, Connecting Cubes, Base-Ten Blocks, Place Value T-Chart) • Teacher Modeling • Small group instruction • Extended time • Illustrations/diagrams/drawings	• Provide independent learning opportunities through learning contracts • Offer accelerated instruction • Computer-Assisted Instruction • Pairing direct instruction w/coaching to promote self-directed learning

Instructional Strategies
• Structure lessons around questions that are authentic, relate to students' interests, social/family background and knowledge of their community. • Provide students with multiple choices for how they can represent their understandings (e.g. multisensory techniques-auditory/visual aids; pictures, illustrations, graphs, charts, data tables, multimedia, modeling). • Provide opportunities for students to connect with people of similar backgrounds (e.g. conversations via digital tool such as SKYPE, experts from the community helping with a project, journal articles, and biographies). • Provide multiple grouping opportunities for students to share their ideas and to encourage work among various backgrounds and cultures (e.g. multiple representation and multimodal experiences). • Engage students with a variety of Science and Engineering practices to provide students with multiple entry points and multiple ways to demonstrate their understandings. • Use project-based science learning to connect science with observable (NGSS) phenomena. • Structure the learning around explaining or solving a social or community-based issue.

Possible Instructional Adjustments (Modifications /Accommodations/ Differentiation): *How will the teacher provide multiple means for the following student groups to **ACCESS** the content/skills being taught?*			
Special Education Students	**English Language Learners (ELLs)**	**At-Risk Learners**	**Advanced Learners**
• Read class materials orally • Provide small group instruction • Provide study outlines/guides • Prior notice of tests • Test study guide • Give tests in small groups **Individualized per each student per IEP**	• Word/Picture Wall • Manipulatives (etc. Counters, Connecting Cubes, Base-Ten Blocks, Place Value T-Chart) • Native language support • Fact Family Triangles • Choice questions • Teacher Modeling • Illustrations/diagrams/drawings • Small group	• Manipulatives (etc. Counters, Connecting Cubes, Base-Ten Blocks, Place Value T-Chart, clock,) • Teacher Modeling • Small group instruction • Extended time • Illustrations/diagrams/drawings	• Provide independent learning opportunities through learning contracts • Offer accelerated instruction • Computer-Assisted Instruction • Pairing direct instruction w/coaching to promote self-directed learning

Interdisciplinary Connections (Applicable Standards)	Integration of Technology	21st Century Themes	21st Century Skills
NJSLS Literacy: RI.2.1 RI.2.5 RI.2.10 W.2.2 W.2.5 L.2.1 SL.2.1 SL.2.2 ***NJSLS Mathematics:*** 2.CC.B.4 2.CC.B.5 2.MD.B.3 ***Mathematical Practices:*** MP.1 MP.2 MP.3 MP.4 MP.6	**8.1 Educational Technology:** All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge • Students may use computers for reinforcement of skills during centers • Interactive whiteboards may be used to display problems and/or interactive manipulatives • Student use of iPads **8.2** All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.	**Leadership and Responsibility**- Acting responsibly with the interests of the larger community in mind. • Students will participate in class activities and discussions appropriately **Collaboration**- Demonstrating the ability to or kith diverse teams • Students will learn to work with a partner on various math activities **Critical Thinking and Problem Solving**- Exercising sound reasoning in understanding • Students will develop problem solving skills and practice verbalizing their reasoning behind it	**Leadership and Responsibility**- Acting responsibly with the interests of the larger community in mind. • Students will participate in class activities and discussions appropriately **Collaboration**- Demonstrating the ability to or kith diverse teams • Students will learn to work with a partner on various math activities **Critical Thinking and Problem Solving**- Exercising sound reasoning in understanding • Students will develop problem solving skills and practice verbalizing their reasoning behind it

Resources

Resources & Materials:

Suggested Literature:

- *The True Story of the Three Pigs*
- RAZ Kids (Leveled Texts)

The Power of Wind (K)

Website/Media Links:

- Science Evidence Statements:
  - 2-PS1-2
  - 2-PS1-2
  - K-2-ETS1-3

Possible Investigations:

Because every human-made product is designed by applying some knowledge of the natural world and is built using materials derived from the natural world, it is important that students understand that different properties are suited to different purposes. After investigating and classifying a variety of materials based on their physical properties, students will engage in the engineering design process. Students can work collaboratively, with adult guidance, to test different materials to determine which have properties that are best suited for an intended purpose. For example, this project could be launched using the children's story, *The Three Little Pigs*. After reading the story, students would:

- Investigate the physical properties of straw, sticks, and bricks in order to determine what properties make bricks the material best suited for building a house.
- Work together to brainstorm a list of possible structures that could be built with different materials. For example, students could build bridges or simple roller coasters for marbles.
- Select one structure from the list and determine the intended purpose of that structure.
- Select two or three different materials that could be used to build the structure.
- Investigate the physical properties of the materials, including shape, strength, flexibility, hardness, texture, or absorbency.
- Collect and analyze data to determine whether or not the given materials have properties that are suited for the intended purpose of the selected structure.
- In groups, use one of the materials to build the structure. (Teachers should have different groups use different materials.)
- Test and compare how each structure performs. Because there is always more than one possible solution to a problem, it is useful to compare the strengths and weaknesses of each structure and each material used.

Resources

Integration of engineering:

In this unit, students investigate the physical properties of a variety of materials, and then build a structure with materials that are best suited for the structure's intended purpose.

- Exploring Reversible Changes of State and Exploring Irreversible Changes of State: These two lessons work together to explore reversible and irreversible changes of state through guided investigations. The PDF is a set of activities focusing on materials followed by some optional post-activity lessons.
- Discovering Science: classifying and categorizing (matter, grades 2-3): This resource is a day, or longer, lab activity aimed for second and third grade students. The lesson starts with a guided discussion and an activity identifying and classifying materials, then it guides students through a series of observations of mixing and changing different materials of different states and observing the resulting effects. Overall, the lesson targets the states of matter, and forces and motion. Some of the ideas (i.e., gas and energy) are aimed at the third grader and beyond. Please note that the link above goes to a larger set of activities and you need to click on the link Discovering science: Classifying and categorizing matter grades 2-3.
- Materials and Their Properties: Lessons Comparing the Properties of Different Materials (pp. 22); and Exploring Thermal Insulators and Conductors (pp. 23): Students participate in an open-ended sort using various materials. Based on their self-selected categories, students explain their reasoning. Next, through a fair test trial, students use new information to decide, using evidence, which material is best suited for maintaining cold the longest.
- The Properties of Materials and their Everyday Uses: This wonderful set of lessons engage students in testing materials to understand their properties and discuss appropriate uses for the materials based on those properties. For example, one activity has the students examining the materials that a number of balls are made out of (plastic, rubber, aluminum, etc.) and describing the properties of the materials (light, stretchy, rigid). Next, the students test balls made of those materials for bouncing height and record their data. The students discuss which materials are best for bouncing and why. The teacher could choose to do all of the activities and have a robust alignment with the three dimensions of the NGSS PS1-2, an engineering physical science Performance Expectation.
- Matter Song: a music video by Untamed Science: This is an engaging music video that defines and gives examples of matter. The video is fun, colorful and explores many different kinds of matter as part of the music video sequence. Young students will love the song and the interactive dance sequences.
- Science Games for Kids: Properties of Materials: This resource is an interactive simulation designed to have students test various materials for different properties including flexibility, strength, waterproof, and transparency. The simulation includes a workshop where students can select different materials to see if the selected property matches the intendeduse.

Unit 2: Changes of Matter	Recommended Duration: 5 Weeks
Unit Description: In this unit of study, students investigate cause-and-effect relationships between matter and energy as they analyze and classify materials that undergo change. Throughout the unit, students will construct explanations and engage in argument from evidence as they investigate the ways in which matter can change and determine whether or not a change is reversible.	

Essential Questions	Enduring Understandings
• *How can objects change?* • *Are all changes reversible?*	• *Experiments can prove your thinking.*

New Jersey Student Learning Standards

By the end of the unit, the Student will be able to:

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. [Clarification Statement: Examples of pieces could include blocks, building bricks, or other assorted small objects.] (2-PS1-3)

Construct an argument with evidence that some changes caused by heating or cooling can be reversed and some cannot. [Clarification Statement: Examples of reversible changes could include materials such as water and butter at different temperatures. Examples of irreversible changes could include cooking an egg, freezing a plant leaf, and heating paper.] (2-PS1-4)

Science & Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Constructing Explanations and Designing Solutions Constructing explanations and designing solutions in K–2 builds on prior experiences and progresses to the use of evidence and ideas in constructing evidence- based accounts of natural phenomena and designing solutions. • Make observations (firsthand or from media) to construct an evidence-based account for natural	**PS1.A: Structure and Properties of Matter** • Different properties are suited to different purposes. (2-PS1-3) • A great variety of objects can be built up from a small set of pieces. (2-PS1-3) **PS1.B: Chemical Reactions** Heating or cooling a substance may cause changes that can be observed. Sometimes these changes are reversible, and sometimes they are not. (2-PS1-4)	**Energy and Matter** • Objects may break into smaller pieces and be put together into larger pieces, or change shapes. (2-PS1-3) **Cause and Effect** Events have causes that generate observable patterns. (2-PS1-4)

phenomena. (2-PS1-3) **Engaging in Argument from Evidence** Engaging in argument from evidence in K–2 builds on prior experiences and progresses to comparing ideas and representations about the natural and designed world(s). • Construct an argument with evidence to support a claim. (2-PS1-4)		

Formative Assessments	Summative Assessments	Performance Assessments	Major Activities/ Assignments
• Rubrics • Learning Questions to guide unit progression • Observe and use patterns in the natural world as evidence. • Use observations *(firsthand or from media)* to describe patterns in the natural world in order to answer scientific questions. • Use observations to describe patterns in what plants need to survive. Examples of patterns could include:	• Rubrics • Oral and Slate Assessments • Science Assessment Tasks	• Science Assessment Tasks • Science Investigations • Student Science notebooks • Student-designed models	**Possible NGSS Phenomena:** • *Salt can melt ice.* • *I love playing with Legos; I can build all sorts of things.* In the last unit, Properties of Matter, students engaged in the engineering design process in order to understand that different properties are suited to different purposes. Students use this understanding as they construct evidence-based accounts of how an object made of small pieces can be disassembled and made into new objects. In order to do this, they need multiple opportunities to take apart and reassemble objects that are made of small pieces. For example, using blocks, building bricks, and other small objects such as Legos, small groups of

Formative Assessments	Summative Assessments	Performance Assessments	Major Activities/ Assignments
			students can build an object, and then a second group of students can take the object apart and build another object using those same small blocks or bricks. As students construct and deconstruct objects, then reconstruct the pieces into new objects, they should document the process in their science journals, explaining how they went about reconstructing the pieces into a new object.

Possible Assessment Adjustments (Modifications /Accommodations/ Differentiation): *How will the teacher provide multiple means for the following student groups to **EXPRESS** their understanding and comprehension of the content/skills taught?*			
Special Education Students	**English Language Learners (ELLs)**	**At-Risk Learners**	**Advanced Learners**
• Modify assignments as needed (e.g., vary length, limit items) • Shorten assignments • Increase the amount of item allowed to complete assignments and tests • Limit amount of work required or length of tests • Hands-on-projects • Give in small groups ***Individualized per each student per IEP***	• Word/Picture Wall • L1 support • Word/Picture Wall • Manipulatives (etc. Counters, Connecting Cubes, Base-Ten Blocks, Place Value T-Chart • Native language support • Choice questions • Teacher Modeling • Illustrations/diagrams/drawings • Small group	• Manipulatives (etc. Counters, Connecting Cubes, Base-Ten Blocks, Place Value T-Chart) • Teacher Modeling • Small group instruction • Extended time • Illustrations/diagrams/drawings	• Provide independent learning opportunities through learning contracts • Offer accelerated instruction • Computer-Assisted Instruction • Pairing direct instruction w/coaching to promote self-directed learning

Instructional Strategies
• Structure lessons around questions that are authentic, relate to students' interests, social/family background and knowledge of their community. • Provide students with multiple choices for how they can represent their understandings (e.g. multisensory techniques-auditory/visual aids; pictures, illustrations, graphs, charts, data tables, multimedia, modeling). • Provide opportunities for students to connect with people of similar backgrounds (e.g. conversations via digital tool such as SKYPE, experts from the community helping with a project, journal articles, and biographies). • Provide multiple grouping opportunities for students to share their ideas and to encourage work among various backgrounds and cultures (e.g. multiple representation and multimodal experiences). • Engage students with a variety of Science and Engineering practices to provide students with multiple entry points and multiple ways to demonstrate their understandings. • Use project-based science learning to connect science with observable (NGSS) phenomena. • Structure the learning around explaining or solving a social or community-based issue.

Possible Instructional Adjustments (Modifications /Accommodations/ Differentiation): *How will the teacher provide multiple means for the following student groups to **ACCESS** the content/skills being taught?*			
Special Education Students	**English Language Learners (ELLs)**	**At-Risk Learners**	**Advanced Learners**
• Read class materials orally • Provide small group instruction • Provide study outlines/guides • Prior notice of tests • Test study guide • Give tests in small groups **Individualized per each student per IEP**	• Word/Picture Wall • Manipulatives (etc. Counters, Connecting Cubes, Base-Ten Blocks, Place Value T-Chart) • Native language support • Fact Family Triangles • Choice questions • Teacher Modeling • Illustrations/diagrams/drawings • Small group	• Manipulatives (etc. Counters, Connecting Cubes, Base-Ten Blocks, Place Value T-Chart, clock,) • Teacher Modeling • Small group instruction • Extended time • Illustrations/diagrams/drawings	• Provide independent learning opportunities through learning contracts • Offer accelerated instruction • Computer-Assisted Instruction • Pairing direct instruction w/coaching to promote self-directed learning

Interdisciplinary Connections (Applicable Standards)	Integration of Technology	21st Century Themes	21st Century Skills
NJSLS Literacy: RI.2.1 RI.2.5 RI.2.10 W.2.2 W.2.5 L.2.1 SL.2.1 SL.2.2 ***NJSLS Mathematics:*** 2.CC.B.4 2.CC.B.5 2.MD.B.3 ***Mathematical Practices:*** MP.1 MP.2 MP.3 MP.4 MP.6	**8.1 Educational Technology:** All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge • Students may use computers for reinforcement of skills during centers • Interactive whiteboards may be used to display problems and/or interactive manipulatives • Student use of iPads **8.2** All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.	**Leadership and Responsibility**- Acting responsibly with the interests of the larger community in mind. • Students will participate in class activities and discussions appropriately **Collaboration**- Demonstrating the ability to or kith diverse teams • Students will learn to work with a partner on various math activities **Critical Thinking and Problem Solving**- Exercising sound reasoning in understanding • Students will develop problem solving skills and practice verbalizing their reasoning behind it	**Leadership and Responsibility**- Acting responsibly with the interests of the larger community in mind. • Students will participate in class activities and discussions appropriately **Collaboration**- Demonstrating the ability to or kith diverse teams • Students will learn to work with a partner on various math activities **Critical Thinking and Problem Solving**- Exercising sound reasoning in understanding • Students will develop problem solving skills and practice verbalizing their reasoning behind it

Resources

Website/Media Links:

- Science Evidence Statements:
  - 2-PS1-3
  - 2-PS1-4

Possible Investigations:

After students have worked through and documented this process, ask them, “Are the changes you made to each of the original objects reversible? Can we disassemble the new objects and use the pieces to reconstruct the original object? After class discussion, ask students, “Are all changes reversible?” This should lead to opportunities for students to observe changes caused by heating or cooling. With close supervision and guidance by teachers, students can investigate such changes as heating or cooling butter, chocolate chips, or pieces of crayon, freezing water, and melting ice. They can observe an egg before and after cooking or a small piece of paper or cardboard before and after burning. As they attempt to reverse changes, they will also notice that all events have causes that generate patterns of change that can be observed and predicted. Through these types of experiences, students will recognize that some changes caused by heating or cooling can be reversed and some cannot, and they can use evidence from their investigations to support their thinking.

- STEM in a BOX - Shakin' Up the Classroom: K-3EarthScienceSTEMintheboxprint.docx: In this engaging lesson, the students examine and describe materials and their properties in order to assemble these materials into a strong building that could withstand the earth shaking. Go to the resource listed under K-3:k-3EarthScienceSTEMintheboxprint.docx
- Thousands of tiny pieces can create something big: In this resource which is based on enactment in a second grade classroom and includes videos and examples of student work, the teacher introduces students to Watt's tower, a tower made of many pieces of junk in the neighborhood. Students make their own objects out of many pieces or materials that the teacher provides and the students think about and discuss whether they could use the same set of materials to make somethingdifferent.
- Take it apart, put it together: This is a wonderfully supported and creative lesson that involves students taking apart an old appliance and making a new object using the appliance parts. The teacher guides students using a variety of teacher prompts and individual journaling to track their idea development, questions, changing plans, and evidence-basedexplanations.
- Exploring Reversible Changes of State and Exploring Irreversible Changes of State The first lesson involves teachers showing students phenomena and then asking the students to generate questions about their observations of the phenomena. The second lesson involves students engaging in investigating, explaining and asking questions about two irreversible changes and using observations to identify what about the changes make them irreversible.
- The Magic School Bus Baked in a Cake lesson and video, "Ready Set Dough" !: This is a lesson plan that accompanies the reading or watching of The Magic School Bus Baked a Cake, or Ready Set Dough. The lesson is a short activity with guided questions that accompany making pretzel dough. In the book and video, which are not included in the resource, The Magic School Bus shrinks down to molecule size to observe and discuss chemical and physical changes while baking. The video can be found at https://www.youtube.com/watch?v=dTw-ok3KkuU.
- The Science of Macaroni Salad (and 2. Dig Deeper): (Teacher Resource) This three minute video is great for teachers who need a short and deeper understanding of what is entailed in the Performance Expectations for Properties of Matter and what is involved when a physical and chemical change occurs.

Unit 3: Earth's Land and Water	Recommended Duration: 6 Weeks
Unit Description: Students look for patterns as they identify where water is found on Earth and explore the shapes and kinds of land and bodies of water found in an area. Students also develop models to identify and represent the shapes and kinds of land and bodies of water in an area.	

Essential Questions	Enduring Understandings
• *Where do we find water?*	• *Water is a resource that all living things need to survive.*

New Jersey Student Learning Standards

By the end of the unit, the Student will be able to:

Develop a model to represent the shapes and kinds of land and bodies of water in an area. [*Assessment Boundary: Assessment does not include quantitative scaling in models.*] (2-ESS2-2)

Obtain information to identify where water is found on Earth and that it can be solid or liquid. (2-ESS2-3)

Science & Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Developing and Using Models Modeling in K–2 builds on prior experiences and progresses to include using and developing models (i.e., diagram, drawing, physical replica, diorama, dramatization, or storyboard) that represent concrete events or design solutions. • Develop a model to represent patterns in the natural world. (2-ESS2-2) **Obtaining, Evaluating, and Communicating Information** Obtaining, evaluating, and communicating information in K–2 builds on prior experiences and uses observations and texts to communicate new	**ESS2.B: Plate Tectonics and Large-Scale System Interactions** • Maps show where things are located. One can map the shapes and kinds of land and water in any area. (2-ESS2-2) **ESS2.C: The Roles of Water in Earth's Surface Processes** • Water is found in the ocean, rivers, lakes, and ponds. Water exists as solid ice and in liquid form. (2-ESS2-3)	**Patterns** • Patterns in the natural world can be observed. (2-ESS2-2), (2-ESS2-3)

information. • Obtain information using various texts, text features (e.g., headings, tables of contents, glossaries, electronic menus, icons), and other media that will be useful in answering a scientific question. (2-ESS2-3)		

Formative Assessments	Summative Assessments	Performance Assessments	Major Activities/ Assignments
• Rubrics • Learning Questions to guide unit progression • Observe and use patterns in the natural world as evidence. • Use observations *(firsthand or from media)* to describe patterns in the natural world in order to answer scientific questions. • Use observations to describe patterns in what plants need to survive. Examples of patterns could include:	• Rubrics • Oral and Slate Assessments • Science Assessment Tasks	• Science Assessment Tasks • Science Investigations • Student Science notebooks • Student-designed models	**Possible NGSS Phenomena:** • *Did you know that most of the globe is painted blue?* • *In what ways can you represent the shapes and kinds of land and bodies of water in an area?*

Possible Assessment Adjustments (Modifications /Accommodations/ Differentiation): *How will the teacher provide multiple means for the following student groups to **EXPRESS** their understanding and comprehension of the content/skills taught?*			
Special Education Students	**English Language Learners (ELLs)**	**At-Risk Learners**	**Advanced Learners**
• Modify assignments as needed (e.g., vary length, limit items) • Shorten assignments • Increase the amount of item allowed to complete assignments and tests • Limit amount of work required or length of tests • Hands-on-projects • Give in small groups ***Individualized per each student per IEP***	• Word/Picture Wall • L1 support • Word/Picture Wall • Manipulatives (etc. Counters, Connecting Cubes, Base-Ten Blocks, Place Value T-Chart • Native language support • Choice questions • Teacher Modeling • Illustrations/diagrams/drawings • Small group	• Manipulatives (etc. Counters, Connecting Cubes, Base-Ten Blocks, Place Value T-Chart) • Teacher Modeling • Small group instruction • Extended time • Illustrations/diagrams/drawings	• Provide independent learning opportunities through learning contracts • Offer accelerated instruction • Computer-Assisted Instruction • Pairing direct instruction w/coaching to promote self-directed learning

Instructional Strategies
• Structure lessons around questions that are authentic, relate to students' interests, social/family background and knowledge of their community. • Provide students with multiple choices for how they can represent their understandings (e.g. multisensory techniques-auditory/visual aids; pictures, illustrations, graphs, charts, data tables, multimedia,modeling). • Provide opportunities for students to connect with people of similar backgrounds (e.g. conversations via digital tool such as SKYPE, experts from the community helping with a project, journal articles, andbiographies). • Provide multiple grouping opportunities for students to share their ideas and to encourage work among various backgrounds and cultures (e.g. multiple representation and multimodal experiences). • Engage students with a variety of Science and Engineering practices to provide students with multiple entry points and multiple ways to demonstrate their understandings. • Use project-based science learning to connect science with observable (NGSS)phenomena. • Structure the learning around explaining or solving a social or community-based issue.

Possible Instructional Adjustments (Modifications /Accommodations/ Differentiation): *How will the teacher provide multiple means for the following student groups to **ACCESS** the content/skills being taught?*			
Special Education Students	**English Language Learners (ELLs)**	**At-Risk Learners**	**Advanced Learners**
• Read class materials orally • Provide small group instruction • Provide study outlines/guides • Prior notice of tests • Test study guide • Give tests in small groups **Individualized per each student per IEP**	• Word/Picture Wall • Manipulatives (etc. Counters, Connecting Cubes, Base-Ten Blocks, Place Value T-Chart) • Native language support • Fact Family Triangles • Choice questions • Teacher Modeling • Illustrations/diagrams/drawings • Small group	• Manipulatives (etc. Counters, Connecting Cubes, Base-Ten Blocks, Place Value T-Chart, clock,) • Teacher Modeling • Small group instruction • Extended time • Illustrations/diagrams/drawings	• Provide independent learning opportunities through learning contracts • Offer accelerated instruction • Computer-Assisted Instruction • Pairing direct instruction w/coaching to promote self-directed learning

Interdisciplinary Connections (Applicable Standards)	**Integration of Technology**	**21st Century Themes**	**21st Century Skills**
NJSLS Literacy: RI.2.1 RI.2.5 RI.2.10 W.2.2 W.2.5 L.2.1 SL.2.1 SL.2.2 ***NJSLS Mathematics:***	**8.1 Educational Technology:** All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge • Students may use computers for reinforcement of skills during centers • Interactive whiteboards may	**Leadership and Responsibility**- Acting responsibly with the interests of the larger community in mind. • Students will participate in class activities and discussions appropriately **Collaboration**- Demonstrating the ability to or kith diverse teams • Students will learn to work with a partner on various	**Leadership and Responsibility**- Acting responsibly with the interests of the larger community in mind. • Students will participate in class activities and discussions appropriately **Collaboration**- Demonstrating the ability to or kith diverse teams • Students will learn to work with a partner on various math activities **Critical Thinking and Problem Solving**-

Interdisciplinary Connections (Applicable Standards)	Integration of Technology	21st Century Themes	21st Century Skills
2.CC.B.4 2.CC.B.5 2.MD.B.3 ***Mathematical Practices:*** MP.1 MP.2 MP.3 MP.4 MP.6	be used to display problems and/or interactive manipulatives • Student use of iPads **8.2** All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.	math activities **Critical Thinking and Problem Solving**- Exercising sound reasoning in understanding • Students will develop problem solving skills and practice verbalizing their reasoning behind it	Exercising sound reasoning in understanding • Students will develop problem solving skills and practice verbalizing their reasoning behind it

Resources

Suggested Literature:

- RAZ Kids (level)

Earth's Water (K),(N) *Deep in the Ocean (L),(N)* *The Force of Water (N)* *A Landforms Adventure (N)*
What Happens When You Flush? (O)

Website/Media Links:

- Science Evidence Statements:
  - 2-ESS2-2
  - 2-ESS2-3

Possible Investigations:

To begin this unit's progression of learning, students identify where water is found on Earth and whether it is solid or liquid. Using texts, maps, globes, and other resources (including appropriate online resources), students will observe that water is found in liquid form in oceans, rivers, lakes, and ponds. They also discover that water exists as a solid in the Earth's snowcaps and glaciers.

After students identify where water is found on the Earth, they take a closer look at bodies of water and landforms that can be found in the natural world. Using firsthand observations and media resources, students should look for patterns among the types of landforms and bodies of water.
For example, students should notice that mountains are much taller and more rugged than hills, lakes are an enclosed body of water surrounded by land, and streams flow

Resources
across land and generally end at a larger body of water, such as a lake or the ocean. Students should also have opportunities to use maps to determine where landforms and bodies of water are located. As students become more familiar with the types and shapes of landforms and bodies of water, they develop models to represent the landforms and bodies of water found in an area. For example, students can draw/create a map of the area of the state in which they live, showing various landforms (e.g., hills, coastlines, and islands) and bodies of water (e.g., rivers, lakes, ponds, and the ocean). Teachers should keep in mind that assessment does not include quantitative scaling of models (an accurate proportional relationship with the real world).

Unit 4: Changes to Earth's Land	Recommended Duration: 7 Weeks

Unit Description: In this unit of study, students learn that a situation that people want to change or create can be approached as a problem to be solved through engineering. Before beginning to design a solution, it is important to clearly understand the problem, and asking questions, making observations and gathering information are helpful in thinking about and clarifying problems. Students learn that designs can be conveyed through sketches, drawings, or physical models, and that these representations are useful in communicating ideas for a problem's solutions to other people. As outlined in the narrative above, students will develop simple sketches or drawings showing how humans have helped minimized the effects of a chosen Earth event.

Essential Questions	Enduring Understandings
• *In what ways do humans slow or prevent wind or water from changing the shape of the land?*	• *Humans can have an effect on their environment.*

New Jersey Student Learning Standards

By the end of the unit, the Student will be able to:

Use information from several sources to provide evidence that Earth events can occur quickly or slowly. [Clarification Statement: Examples of events and timescales could include volcanic explosions and earthquakes, which happen quickly and erosion of rocks, which occurs slowly.] [*Assessment Boundary: Assessment does not include quantitative measurements of timescales.*] (2-ESS1-1)

Compare multiple solutions designed to slow or prevent wind or water from changing the shape of the land.* [Clarification Statement: Examples of solutions could include different designs of dikes and windbreaks to hold back wind and water, and different designs for using shrubs, grass, and trees to hold back the land.] (2-ESS2-1)

Develop a model to represent the shapes and kinds of land and bodies of water in an area. [*Assessment Boundary: Assessment does not include quantitative scaling in models.*] (2-ESS2-2)

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. (K-2-ETS1-1)

Science & Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Constructing Explanations and Designing Solutions Constructing explanations and designing solutions in K–2 builds on prior experiences and progresses to the use of evidence and ideas in constructing evidence-based accounts of natural phenomena and designing solutions. • Make observations from several sources to construct an evidence- based account for natural phenomena. (2-ESS1-1) • Compare multiple solutions to a problem. • (2-ESS2-1) **Developing and Using Models** Modeling in K–2 builds on prior experiences and progresses to include using and developing models (i.e., diagram, drawing, physical replica, diorama, dramatization, or storyboard) that represent concrete events or design solutions. • Develop a model to represent patterns in the natural world. (2-ESS2-2)	**ESS1.C: The History of Planet Earth** • Some events happen very quickly; others occur very slowly, over a time period much longer than one can observe. (2-ESS1-1) **ESS2.A: Earth Materials and Systems** • Wind and water can change the shape of the land. (2-ESS2-1) **ETS1.C: Optimizing the Design Solution** Because there is always more than one possible solution to a problem, it is useful to compare and test designs. *(secondary)* (2-ESS2-1) **ESS2.B: Plate Tectonics and Large-Scale System Interactions** Maps show where things are located. One can map the shapes and kinds of land and water in any area. (2-ESS2-2)	**Stability and Change** • Things may change slowly or rapidly. (2-ESS1-1), (2-ESS2-1) **Patterns** • Patterns in the natural world can be observed. (2-ESS2-2)

Formative Assessments	Summative Assessments	Performance Assessments	Major Activities/ Assignments
• Rubrics • Learning Questions to guide unit progression • Observe and use patterns in the natural world as evidence. • Use observations *(firsthand or from media)* to describe	• Rubrics • Oral and Slate Assessments • Science Assessment Tasks	• Science Assessment Tasks • Science Investigations • Student Science notebooks • Student-designed models	**Possible NGSS Phenomena:** • *What evidence can we find to prove that Earth events can occur quickly or slowly?* • *In what ways do humans slow or prevent wind or water from changing the shape of the land?*

Formative Assessments	Summative Assessments	Performance Assessments	Major Activities/ Assignments
patterns in the natural world in order to answer scientific questions. • Use observations to describe patterns in what plants need to survive. Examples of patterns could include:			

Possible Assessment Adjustments (Modifications /Accommodations/ Differentiation): *How will the teacher provide multiple means for the following student groups to **EXPRESS** their understanding and comprehension of the content/skills taught?*			
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Instructional Strategies
• Structure lessons around questions that are authentic, relate to students' interests, social/family background and knowledge of their community. • Provide students with multiple choices for how they can represent their understandings (e.g. multisensory techniques-auditory/visual aids; pictures, illustrations, graphs, charts, data tables, multimedia, modeling).

Instructional Strategies
• Provide opportunities for students to connect with people of similar backgrounds (e.g. conversations via digital tool such as SKYPE, experts from the community helping with a project, journal articles, and biographies). • Provide multiple grouping opportunities for students to share their ideas and to encourage work among various backgrounds and cultures (e.g. multiple representation and multimodal experiences). • Engage students with a variety of Science and Engineering practices to provide students with multiple entry points and multiple ways to demonstrate their understandings. • Use project-based science learning to connect science with observable (NGSS) phenomena. • Structure the learning around explaining or solving a social or community-based issue.

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Interdisciplinary Connections (Applicable Standards)	Integration of Technology	21st Century Themes	21st Century Skills
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Resources

Resources & Materials:
 	
Website/Media Links:
• Science Evidence Statements:
  ○ 2-ESS1-1
  ○ 2-ESS2-1
  ○ 2-ESS2-2

Resources

- ✓ How Can Water Change the Shape of the Land? In this lesson plan children investigate water erosion. Students make a sand tower and observe the erosion as they drop water on it. Students observe, illustrate, and record notes about the process. Short videos and a read aloud also further support understanding of the Performance Expectation.
- ✓ How Can Wind Change the Shape of the Land? This lesson builds on another lesson created by Jeri Faber in which students discovered how water changes the earth. For this lesson, students take part in a teacher-led investigation to show how wind changes the land. The children use straws to blow on a small mound or hill of sand. As each child takes a turn, the other students record their detailed observations that will later be used to draw conclusions. Students also watch a short video on wind erosion and discuss the new learning with partners.
- ✓ Finding Erosion at Our School In this lesson, students walk around the school grounds, neighborhood, or another area of their community to locate evidence of erosion. Various problems caused by erosion are discussed and a solution is developed for one of the problems. This lesson is one in a series on erosion by Jeri Faber. A follow-up lesson is available where students compare their erosion design solutions.
- ✓ Getting to the Core: The Changing Earth Journal: This series of activities has students review terms, answer text-dependent questions, make observations and present on the erosion, the earth, and fossils.

Possible Investigations:

Students use evidence from several sources to develop an understanding that Earth events can occur quickly or slowly. Because some events happen too quickly too observe, and others too slowly, we often rely on models and simulations to help us understand how changes to the surface of the Earth are caused by a number of different Earth events. For example,

- Volcanic eruptions are Earth events that happen very quickly. As volcanic eruptions occur, ash and lava are quickly emitted from the volcano. The flow of lava from the volcano causes immediate changes to the landscape as it flows and cools.
- Flooding can happen quickly during events such as hurricanes and tsunamis. Flooding can cause rapid changes to the surface of the Earth.
- Rainfall is an event that recurs often over long periods of time and will gradually lead to the weathering and erosion of rocks and soil.

In order to gather information to use as evidence, students need to make observations. They can easily look for evidence of changes caused by rain, flooding, or drought. However, actually observing Earth events as they happen is often not possible; therefore, students will need opportunities to observe different types of Earth events using models, simulations, video, and other media and online sources. At this grade level, quantitative measurements of timescales are not important. Students do need to see the kinds of changes that Earth events cause, and whether the changes are rapid or slow.

- Engaging in engineering design helps students understand that a situation that people want to change or create can be approached as a problem to be solved through engineering. Asking questions, making observations, and gathering information are helpful in clearly understanding the problem. Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people. In this unit of study, students need the opportunity to engage in the engineering design process in order to generate and compare multiple solutions designed to slow or prevent wind or water from changing

Resources
the shape of the land. Students are not expected to come up with original solutions, although original solutions are always welcome. The emphasis is on asking questions, making observations, and gathering information in order to compare multiple solutions designed to slow or prevent wind or water from changing the land. This process should include the following steps: • As a class, with teacher guidance, students brainstorm a list of natural Earth events, such as a volcano, earthquakes, tsunamis, or floods. The class selects one Earth event to research in order to gather more information. • As a class or in small groups, with guidance, students conduct research on the selected Earth event using books and other reliable sources. They gather information about the problems that are caused by the selected event, and gather information on the ways in which humans have minimized the effects of the chosen earth event. For example, o Different designs of dikes or dams to hold back water, o Different designs of windbreaks to hold back wind, or o Different designs for using plants (shrubs, grass, and/or trees) to hold back the land. • Next, students look for examples in their community of ways that humans have minimized the effect of natural Earth events. This can be accomplished through a nature walk or short hike around the schoolyard, during a field trip, or students can make observations around their own neighborhoods. If available, students can carry digital cameras (or other technology that allows them to take pictures) in order to document any examples they find. • Groups select one solution they have found through research and develop a simple sketch, drawing, or physical model to illustrate how it minimizes the effects of the selected Earth event. • Groups should prepare a presentation using their sketches, drawings, or models, and present them to the class.