Grade 2 | Unit 1 Earth Materials

RECOMMENDED TIME: SEPTEMBER – NOVEMBER (12 WEEKS)

Unit Overview:

Many of the phenomena that we observe on Earth involve interactions among components of air, water, and land. Students should be engaged in observing, describing, and investigating the basic properties and components of soil. Students should explore how erosion and deposition are the results of interactions between air, water, and land. Students should observe and describe the physical properties of rocks. Compare and sort rocks by size, color, luster, texture, patterns, hardness/softness. Students should understand that nonliving things can be human-created or naturally occurring.

Essential Question:

How do different materials affect the makeup of the Earth?

Key Ideas:

LE. Key Idea 1: Living things are both similar to and different from each other and from nonliving things.

PS. Key Idea 2: Many of the phenomena that we observe on Earth involve interactions among components of air, water, and land.

PS. Key Idea 3: Matter is made up of particles whose properties determine the observable characteristics of matter and its reactivity.

NYS SCIENCE STANDARDS

Quoted from New York State Performance Indicators (PS: 2.1d, 3.1b-g, 3.1c, 3.1d, 3.1e, 3.1f, 3.1g) (LE: 1.1d)

Major Understandings:

Quoted from New York State Performance Indicators (PS: 2.1d, 3.1b-g, 3.1c, 3.1d, 3.1e, 3.1f, 3.1g) (LE: 1.1d)

- Erosion and deposition result from the interaction among air, water, and land. **(2.1d)**
  - Interaction between air and water breaks down Earth materials.
  - Pieces of Earth material may be moved by air, water, wind, and gravity.
  - Pieces of Earth material will settle or deposit on land or in the water in different places.
  - Soil is composed of broken-down pieces of living and nonliving Earth material.

continued

MST STANDARDS

http://www.p12.nysed.gov/ciai/mst/pub/elecoresci.pdf

Standard 2: Information Systems

Key Idea 1: Information technology is used to retrieve, process, and communicate information as a tool to enhance learning.

Standard 6: Interconnectedness: Common Themes

Key Idea 1: Through systems thinking, people can recognize the commonalities that exist among all systems and how parts of a system interrelate and combine to perform specific functions.

Key Idea 2: Models are simplified representations of objects, structures, or systems used in analysis, explanation, interpretation, or design.

continued

NGSS CROSS-CUTTING CONCEPTS

http://www.nextgenscience.org/sites/ngss/files/Appendix%20G%20-%20Crosscutting%20Concepts%20FINAL%20edited%204.10.13.pdf

Patterns:

Observed patterns in nature guide organization and classification and prompt questions about relationships and causes underlying them.

- Patterns in the natural and human designed world can be observed, used to describe phenomena, and used as evidence.

Scale, Proportion, and Quantity:

In considering phenomena, it is critical to recognize what is relevant at different size, time, and energy scales, and to recognize proportional relationships between different quantities as scales change.

continued

NYS SCIENCE STANDARDS http://www.p12.nysed.gov/ciai/mst/pub/elecoresci.pdf	MST STANDARDS http://www.p12.nysed.gov/ciai/mst/pub/elecoresci.pdf	NGSS CROSS-CUTTING CONCEPTS http://www.nextgenscience.org/sites/ngss/files/Appendix%20G%20-%20Crosscutting%20Concepts%20FINAL%20edited%204.10.13.pdf
■ Matter has properties (color, hardness, odor, sound, taste, etc.) that can be observed through the senses. **(3.1b)** ■ Objects have properties that can be observed, described, and/or measured: length, width, volume, size, shape, mass or weight, temperature, texture, flexibility, reflectiveness of light. **(3.1c)** ■ Measurements can be made with standard metric units and nonstandard units (Note: Exceptions to the metric system usage are found in meteorology.) **(3.1d)** ■ The material(s) an object is made up of determine some specific properties of the object (sink/float, conductivity, magnetism). Properties can be observed or measured with tools such as hand lenses, metric rulers, thermometers, balances, magnets, circuit testers, and graduated cylinders. **(3.1e)** ■ Objects and/or materials can be sorted or classified according to their properties. **(3.1f)** ■ Some properties of an object are dependent on the conditions of the present surroundings in which the object exists. **(3.1g)** For Example: — temperature: hot or cold — lighting: shadows, color — moisture: wet or dry ■ Nonliving things can be human-created or naturally occurring. **(LE 1.1d)**	**Key Idea 3:** The grouping of magnitudes of size, time, frequency, and pressures or other units of measurement into a series of relative order provides a useful way to deal with the immense range and the changes in scale that affect the behavior and design of systems. **Key Idea 4:** Equilibrium is a state of stability due either to a lack of change (static equilibrium) or a balance between opposing forces (dynamic equilibrium). **Key Idea 5:** Identifying patterns of change is necessary for making predictions about future behavior and conditions. **Key Idea 6:** In order to arrive at the best solution that meets criteria within constraints, it is often necessary to make trade-offs. **Standard 7: Interdisciplinary Problem Solving** **Key Idea 1:** The knowledge and skills of mathematics, science, and technology are used together to make informed decisions and solve problems, especially those relating to issues of science/technology/society, consumer decision making, design, and inquiry into phenomena. **Key Idea 2:** Solving interdisciplinary problems involves a variety of skills and strategies, including effective work habits; gathering and processing information; generating and analyzing ideas; realizing ideas; making connections among the common themes of mathematics, science, and technology; and presenting results.	■ Relative scales allow objects and events to be compared and described (e.g., bigger and smaller; hotter and colder; faster and slower). ■ Standard units are used to measure length. **Systems and System Models:** A system is an organized group of related objects or components; models can be used for understanding and predicting the behavior of systems. ■ Objects and organisms can be described in terms of their parts. ■ Systems in the natural and designed world have parts that work together. **Energy and Matter: Flows, Cycles, and Conservation:** Tracking energy and matter flows into, out of, and within systems helps one understand their system's behavior. ■ Objects may break into smaller pieces, be put together into larger pieces, or change shapes. **Stability and Change:** For both designed and natural systems, conditions that affect stability and factors that control rates of change are critical elements to consider and understand. ■ Some things stay the same while other things change. ■ Things may change slowly or rapidly.

COMMON CORE STATE STANDARDS

http://www.corestandards.org/ELA-Literacy/
http://www.corestandards.org/wp-content/uploads/Math_Standards.pdf

ELA/Literacy

RI.2.3: Describe the connections between a series of historical events, scientific ideas or concepts or steps in technical procedures in a text.

RI.2.4: Determine the meaning of words and phrases in a text relevant to a Grade 2 topic or subject area.

RI.2.7: Explain how specific images (e.g., a diagram showing how a machine works) contribute to and clarify a text.

RI.2.10: Read and comprehend informational texts.

W.2.2: Write informative/explanatory texts in which they introduce a topic, use facts and definitions to develop points, and provide a concluding statement or section.

W.2.8: Recall information from experiences or gather information from provided sources to answer a question.

SL.2.1: Participate in collaborative conversations with diverse partners about Grade 2 topics and texts with peers and adults in small and larger groups.

SL.2.3: Ask and answer questions about what a speaker says in order to clarify comprehension, gather additional information, or deepen understanding of a topic or issue.

L.2.3: Use knowledge of language and its conventions when writing, speaking, reading or listening.

L.2.4: Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on Grade 2 reading and content, choosing flexibility from an array of strategies.

Mathematics

MP.2: Reason abstractly and quantitatively.

MP.4: Model with mathematics.

MP.5: Use appropriate tools strategically.

2.NBT.A: Understand place value.

2.MD.B.5: Use addition and subtraction within 100 to solve word problems involving lengths that are given in the same units, e.g., by using drawings (such as drawings of rulers) and equations with a symbol for the unknown number to represent the problem.

2.MD.1 Measure the length of an object by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tapes.

ENVIRONMENTAL GUIDELINES FOR LEARNING

http://resources.spaces3.com/89c197bf-e630-42b0-ad9a-91f0bc55c72d.pdf

Strand 1: Questioning, Analysis, and Interpretation Skills

- Guideline C—Collecting information—Learners are able to locate and collect information about the environment and environmental topics.
- Guideline E—Organizing information—Learners are able to describe data and organize information to search for relationships and patterns concerning the environment and environmental topics.

Strand 2: Knowledge of Environmental Processes and Systems

Strand 2.1: The Earth as a Physical System

- Guideline A—Processes that shape the Earth—Learners are able to identify changes and differences in the physical environment.

Grade 2 | Unit 2 Forces and Motion

RECOMMENDED TIME: DECEMBER – FEBRUARY (10 WEEKS)

Unit Overview:

Energy and matter interact through forces that result in changes in motion. Students should be able to observe and describe relative positions between objects in their world. Exploring the observable effects of gravity and magnetism may help students develop an understanding of the reason for the direction of an object's motion. Manipulation and application of simple tools and machines may help students learn about the relationships between forces and motion.

Essential Question:
What causes objects to move?

Key Ideas:

PS. Key Idea 5: Energy and matter interact through forces that result in changes in motion.

NYS SCIENCE STANDARDS
http://www.p12.nysed.gov/ciai/mst/pub/elecoresci.pdf

Major Understandings:

Quoted from New York State Performance Indicators (PS: 5.1, 5.1 a-c, 5.2a)

- The position of an object can be described by locating it relative to another object or the background. **(5.1a)**
- Describe the effects of common forces (pushes and pulls) of objects, such as those caused by gravity, magnetism and mechanical forces. **(5.1)**
- The position or direction of motion of an object can be changed by pushing or pulling. **(5.1b)**
- The force of gravity pulls objects toward the center of Earth. **(5.1c)**
- The forces of gravity and magnetism can affect objects through gases, liquids, and solids. **(5.2a)**

MST STANDARDS
http://www.p12.nysed.gov/ciai/mst/pub/elecoresci.pdf

Standard 2: Information Systems

Key Idea 1: Information technology is used to retrieve, process, and communicate information as a tool to enhance learning.

Standard 6: Interconnectedness: Common Themes

Key Idea 2: Models are simplified representations of objects, structures, or systems, used in analysis, explanation, or design.

Key Idea 4: Equilibrium is a state of stability due either to a lack of change (static equilibrium) or a balance between opposing forces (dynamic equilibrium).

Key Idea 5: Identifying patterns of change is necessary for making predictions about future behavior and conditions.

NGSS CROSS-CUTTING CONCEPTS
http://www.nextgenscience.org/sites/ngss/files/Appendix%20G%20-%20Crosscutting%20Concepts%20FINAL%20edited%204.10.13.pdf

Patterns:

Observed patterns in nature guide organization and classification and prompt questions about relationships and causes underlying them.

- Patterns in the natural and human designed world can be observed, used to describe phenomena, and used as evidence.

Cause and Effect: Mechanism and Prediction:

Events have causes, sometimes simple, sometimes multifaceted. Deciphering causal relationships, and the mechanisms by which they are mediated, is a major activity of science and engineering.

- Events have causes that generate observable patterns.
- Simple tests can be designed to gather evidence to support or refute student ideas about causes.

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		NGSS CROSS-CUTTING CONCEPTS http://www.nextgenscience.org/sites/ngss/files/Appendix%20G%20-%20Crosscutting%20Concepts%20FINAL%20edited%204.10.13.pdf
		Systems and System Models: A system is an organized group of related objects or components; models can be used for understanding and predicting the behavior of systems. ■ Objects and organisms can be described in terms of their parts. ■ Systems in the natural and designed world have parts that work together. **Stability and Change:** For both designed and natural systems, conditions that affect stability and factors that control rates of change are critical elements to consider and understand. ■ Some things stay the same while other things change. ■ Things may change slowly or rapidly.

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ELA/Literacy

RI.2.7: Explain how specific images (e.g., a diagram showing how a machine works) contribute to and clarify a text.

RI.2.10: Read and comprehend informational texts.

W.2.2: Write informative/explanatory texts in which they introduce a topic, use facts and definitions to develop points, and provide a concluding statement or section.

W.2.8: Recall information from experiences or gather information from provided sources to answer a question.

SL.2.1: Participate in collaborative conversations with diverse partners about Grade 2 topics and texts with peers and adults in small and larger groups.

SL.2.3: Ask and answer questions about what a speaker says in order to clarify comprehension, gather additional information, or deepen understanding of a topic or issue.

L.2.3: Use knowledge of language and its conventions when writing, speaking, reading or listening.

L.2.4: Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on Grade 2 reading and content, choosing flexibility from an array of strategies.

Mathematics

MP.2: Reason abstractly and quantitatively.

MP.4: Model with mathematics.

MP.5: Use appropriate tools strategically.

2.MD.D.10: Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems using information presented in a bar graph.

Strand 1: Questioning, Analysis, and Interpretation Skills

- Guideline B—Designing investigations—Learners are able to design simple investigations.
- Guideline F—Working with models and simulations—Learners understand that relationships, patterns, and processes can be represented by models.
- Guideline G—Drawing conclusions and developing explanations —Learners can develop simple explanations that address their questions about the environment.

Strand 2.4: Environment and Society

- Guideline D—Technology—Learners understand that technology is an integral part of human existence and culture.

Grade 2 | Unit 3 Plant Diversity

RECOMMENDED TIME: MARCH – JUNE (14 WEEKS)

Unit Overview:

Living things are both similar to and different from each other and from nonliving things. There are basic characteristics, needs, and functions common to all living things. Nonliving things are present in nature or are made by living things. Understanding the variety and complexity of life and its processes can help students develop respect for their own and for all life. It should also lead them to better realize the value of all life on this fragile planet. As students investigate the continuity of life, emphasis should be placed on how plants reproduce their own kind. Throughout time, plants changed depending on their environment. In learning how organisms have been successful in their habitats, students should observe and record information about plants. The continuity of life is sustained through reproduction and development. *[Refer to Appendix A for Conservation Day]*

Essential Question:

How are plants alike and different?

Key Ideas:

LE. Key Idea 1: Living things are both similar to and different from each other and from nonliving things.

LE. Key Idea 2: Organisms inherit genetic information in a variety of ways that result in continuity of structure and function between parents and offspring.

LE. Key Idea 3: Individual organisms and species change over time.

LE. Key Idea 4: The continuity of life is sustained through reproduction and development.

LE. Key Idea 5: Organisms maintain a dynamic equilibrium that sustains life.

NYS SCIENCE STANDARDS
http://www.p12.nysed.gov/ciai/mst/pub/intersci.pdf

Major Understandings:

Quoted from New York State Performance Indicators (LE: 1.1b, 1.2a, 2.1a, 2.2a, b, 3.1b, 4.1a-d, 5.1a, 5.2a)

- Each plant has different structures that serve different functions in growth, survival, and reproduction. **(3.1b)**
  - — Roots help support the plant and take in water and nutrients.
  - — Leaves help plants utilize sunlight to make food for the plant.

continued

MST STANDARDS
http://www.p12.nysed.gov/ciai/mst/pub/elecoresci.pdf

Standard 6: Interconnectedness: Common Themes

Key Idea 1: Through systems thinking, people can recognize the commonalities that exist among all systems and how parts of a system interrelate and combine to perform specific functions.

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— Stems, stalks, trunks, and other similar structures provide support for the plant. — Some plants have flowers. — Flowers are reproductive structures of plants that produce fruit which contains seeds. — Seeds contain stored food that aids in germination and the growth of young plants. ■ Some traits of living things have been inherited. **(2.1a)** ■ Plants and animals closely resemble their parents and other individuals in the species. **(2.2a)** ■ Plants and animals can transfer specific traits to their offspring when they reproduce. **(2.2b)** ■ Plants and animals have life cycles. These may include beginning of a life, development into an adult, reproduction as an adult, and eventually death. **(4.1a)** ■ Each kind of plant goes through its own stages of growth and development that may include seed, young plant, and mature plant. **(4.1b)** ■ The length of time from beginning of development to death of the plant is called its life span. **(4.1c)** ■ Life cycles of some plants include changes from seed to mature plant. **(4.1d)** ■ Plants require air, water, and food in order to live and thrive. **(1.1b)** ■ Living things grow, take in nutrients, breathe, reproduce, eliminate waste, and die. **(1.2a)** ■ All living things grow, take in nutrients, breathe, reproduce, and eliminate waste. **(5.1a)** *continued*	**Key Idea 3:** The grouping of magnitudes of size, time, frequency, and pressures or other units of measurement into a series of relative order provides a useful way to deal with the immense range and the changes in scale that affect the behavior and design of systems. **Key Idea 4:** Equilibrium is a state of stability due either to a lack of change (static equilibrium) or a balance between opposing forces (dynamic equilibrium). **Key Idea 5:**Identifying patterns of change is necessary for making predictions about future behavior and conditions. **Key Idea 6:** In order to arrive at the best solution that meets criteria within constraints, it is often necessary to make trade-offs. **Standard 7: Interdisciplinary Problem Solving** **Key Idea 1:** The knowledge and skills of mathematics, science, and technology are used together to make informed decisions and solve problems, especially those relating to issues of science/technology/society, consumer decision making, design, and inquiry into phenomena. **Key Idea 2:** Solving interdisciplinary problems involves a variety of skills and strategies, including effective work habits; gathering and processing information; generating and analyzing ideas; realizing ideas; making connections among the common themes of mathematics, science, and technology; and presenting results.	**Cause and Effect: Mechanism and Prediction:** Events have causes, sometimes simple, sometimes multifaceted. Deciphering causal relationships, and the mechanisms by which they are mediated, is a major activity of science and engineering. ■ Events have causes that generate observable patterns. ■ Simple tests can be designed to gather evidence to support or refute student ideas about causes. **Scale, Proportion, and Quantity:** In considering phenomena, it is critical to recognize what is relevant at different size, time, and energy scales, and to recognize proportional relationships between different quantities as scales change. ■ Relative scales allow objects and events to be compared and described (e.g., bigger and smaller; hotter and colder; faster and slower). ■ Standard units are used to measure length. **Systems and System Models:** A system is an organized group of related objects or components; models can be used for understanding and predicting the behavior of systems. ■ Objects and organisms can be described in terms of their parts. ■ Systems in the natural and designed world have parts that work together. **Energy and Matter: Flows, Cycles, and Conservation:** Tracking energy and matter flows into, out of, and within systems helps one understand their system's behavior. ■ Objects may break into smaller pieces, be put together into larger pieces, or change shapes. *continued*

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■ Plants respond to changes in their environment. For example, the leaves of some green plants change position as the direction of light changes; the parts of some plants undergo seasonal changes that enable plants to grow; seeds germinate, and leaves form and grow. **(5.2a)**		**Structure and Function:** The way an object is shaped or structured determines many of its properties and functions. ■ The shape and stability of structures of natural and designed objects are related to their function(s). **Stability and Change:** For both designed and natural systems, conditions that affect stability and factors that control rates of change are critical elements to consider and understand. ■ Some things stay the same while other things change. ■ Things may change slowly or rapidly.

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RI.2.10: Read and comprehend informational texts.

W.2.2: Write informative/explanatory texts in which they introduce a topic, use facts and definitions to develop points, and provide a concluding statement or section.

W.2.7: Participate in shared research and writing projects (e.g., read a number of books on a single topic to produce a report; record science observations.

W.2.8: Recall information from experiences or gather information from provided sources to answer a question.

SL.2.1: Participate in collaborative conversations with diverse partners about Grade 2 topics and texts with peers and adults in small and larger groups.

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Strand 1: Questioning, Analysis, and Interpretation Skills

- Guideline A—Questioning—Learners are able to develop questions that help them learn about the environment and do simple investigations.
- Guideline B—Designing investigations—Learners are able to design simple investigations.
- Guideline C—Collecting information—Learners are able to locate and collect information about the environment and environmental topics.
- Guideline E—Organizing information—Learners are able to describe data and organize information to search for relationships and patterns concerning the environment and environmental topics.
- Guideline G—Drawing conclusions and developing explanations—Learners can develop simple explanations that address their questions about the environment.

Strand 2: Knowing of Environmental Processes and Systems

Strand 2.2: The Living Environment

- Guideline A—Organisms, populations, and communities—Learners understand basic similarities and differences among a wide variety of living organisms. They understand the concept of habitat.
- Guideline B—Heredity and evolution—Learners understand that plants and animals have different characteristics and that many of the characteristics are inherited.
- Guideline C—Systems and connections—Learners understand basic ways in which organisms are related to their environments and other organisms.
- Guideline D—Flow of matter and energy—Learners know that living things need some source of energy to live and grow.

Strand 2.4: Environment and Society

- Guideline A—Human/environment interactions—Learners understand that people depend on, change, and are affected by the environment.
- Guideline C—Resources—Learners understand the basic concepts of resource and resource distribution.