Grade 3 | Unit 1 Matter

RECOMMENDED TIME: SEPTEMBER – OCTOBER (8 WEEKS)

Unit Overview:

Students should describe, categorize, compare, and measure observable physical properties of matter and objects. Things can be done to materials to change their properties, but not all materials respond in the same way to what is done to them. Younger students emphasize physical properties while older students will recognize chemical changes. Appropriate tools are a necessary component to describe some physical properties of objects.

Essential Question:

How can we accurately describe the physical properties of matter?

Key Ideas:

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

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

Major Understandings:

Quoted from New York State Performance Indicators (PS: 3.1b-e)

- 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)**

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

Standard 6: Interconnectedness: Common Themes

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 systems.

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

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.

- Natural objects and/or observable phenomena exist from the very small to the immensely large or from very short to very long time periods.
- Standard units are used to measure and describe physical quantities such as weight, time, temperature, and volume.

Structure and Function:

The way an object is shaped or structured determines many of its properties and functions.

- Different materials have different substructures, which can sometimes be observed.
- Substructures have shapes and parts that serve functions.

COMMON CORE STATE STANDARDS

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

ELA/Literacy

RI.3.3: Describe the relationship between a series of historical events, scientific ideas or concepts or steps in technical procedures in a text using language that pertains to time, sequence, and cause/effect.

RI.3.4: Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a Grade 3 topic or subject area.

RI.3.7: Use information gained from illustrations (e.g., maps, photographs) and the words in a text to demonstrate understanding of the text (e.g., where, when, why, and how key events occur).

RI.3.10: Read and comprehend informational text.

W.3.2: Write informative/explanatory texts to examine a topic and convey ideas and information clearly.

W.3.5: With guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, and editing.

W.3.6: With guidance and support from adults, use technology to produce and publish writing (using keyboarding skills) as well as to interact and collaborate with others.

SL.3.1: Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on Grade 3 topics and texts, building on others' ideas and expressing their own clearly.

SL3.3: Ask and answer questions about information from a speaker, offering appropriate elaboration and detail.

L.3.3: Use knowledge of language and its conventions when writing, speaking, reading or listening.

L.3.4: Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on Grade 3 reading and content, choosing flexibility from an array of strategies.

ENVIRONMENTAL GUIDELINES FOR LEARNING

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

Strand 1: Questioning, Analysis, and Interpretation Skills

- 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 or environmental topics.
- Guideline D—Evaluating accuracy and reliability—Learners understand the need to use reliable information to answer questions. They are familiar with some basic factors to consider in judging the merits of information.
- 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 F—Working with models and simulations—Learners understand that relationships, patterns, and processes can be represented by models.

Strand 2: Knowledge of Environmental Processes and Systems

Strand 2.1: The Earth as a Physical System

- Guideline B—Changes in matter—Learners are able to identify basic characteristics of and changes in matter.

Mathematics

MP.2: Reason abstractly and quantitatively.

MP.5: Use appropriate tools strategically.

3.MD.A.2: Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l). Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units, e.g., by using drawings (such as a beaker with a measurement scale) to represent the problem.

Grade 3 | Unit 2 Energy

RECOMMENDED TIME: NOVEMBER – JANUARY (11 WEEKS)

Unit Overview:

Students should understand that energy exists in a variety of forms. Students should observe the results of simple energy transformations from one form to another in their physical environment. The safe use and respect of various energy forms must be stressed in the classroom. Describe a variety of forms of energy (e.g., heat, chemical, light) and the changes that occur in objects when they interact with those forms of energy.

Essential Question:

How does the use of various forms of energy affect our world?

Key Ideas:

PS. Key Idea 4: Energy exists in many forms, and when these forms change energy is conserved.

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

Major Understandings:

Quoted from New York State Performance Indicators (PS: 4.1a-d, f, g, 4.2a, b)

- Energy exists in various forms: heat, electric, sound, chemical, mechanical, light. **(4.1a)**
- Everyday events involve one form of energy being changed to another. **(4.2a)**
  - Animals convert food to heat and motion.
  - The Sun's energy warms the air and water.
- Humans utilize interactions between matter and energy. **(4.2b)**
  - Chemical to electrical, light, and heat: battery and bulb.
  - Electrical to sound (e.g., doorbell buzzer).
  - Mechanical to sound (e.g., musical instruments, clapping)
  - Light to electrical (e.g., solar-powered calculator).

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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.

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

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).

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NGSS CROSS-CUTTING CONCEPTS
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Patterns:

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

- Similarities and differences in patterns can be used to sort, classify, communicate and analyze simple rates of change for natural phenomena and designed products.
- Patterns of change can be used to make predictions.
- Patterns can be used as evidence to support an explanation.

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.

- Cause and effect relationships are routinely identified, tested, and used to explain change.

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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
■ Energy can be transferred from one place to another. **(4.1b)** ■ Some materials transfer energy better than others (heat and electricity). **(4.1c)** ■ Energy and matter interact: water is evaporated by the Sun's heat; a bulb is lighted by means of electrical current; a musical instrument is played to produce sound; dark colors may absorb light, light colors may reflect light. **(4.1d)** ■ Heat can be released in many ways, for example, by burning, rubbing (friction), or combining one substance with another. **(4.1f)** ■ Interactions with forms of energy can be either helpful or harmful. **(4.1g)**	**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.	■ Events that occur together with regularity might or might not be a cause and effect relationship. **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. ■ Natural objects and/or observable phenomena exist from the very small to the immensely large or from very short to very long time periods. ■ Standard units are used to measure and describe physical quantities such as weight, time, temperature, and volume. **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. ■ A system is a group of related parts that make up a whole and can carry out functions its individual parts cannot. ■ A system can be described in terms of its components and their interactions.

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.

- Matter is made of particles.
- Matter flows and cycles can be tracked in terms of the weight of the substances before and after a process occurs. The total weight of the substances does not change. This is what is meant by conservation of matter. Matter is transported into, out of, and within systems.
- Energy can be transferred in various ways and between objects.

Structure and Function:

The way an object is shaped or structured determines many of its properties and functions.

- Different materials have different substructures, which can sometimes be observed.
- Substructures have shapes and parts that serve functions.

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.

- Change is measured in terms of differences over time and may occur at different rates.
- Some systems appear stable, but over long periods of time will eventually change.

COMMON CORE STATE STANDARDS

http://www.corestandards.org/ELA-Literacy/
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ELA/Literacy

RI.3.3: Describe the relationship between a series of historical events, scientific ideas or concepts or steps in technical procedures in a text using language that pertains to time, sequence, and cause/effect.

RI.3.4: Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a Grade 3 topic or subject area.

RI.3.7: Use information gained from illustrations (e.g., maps, photographs) and the words in a text (e.g., comparison, cause/effect, first/second/third in a sequence).

RI.3.10: Read and comprehend informational text.

W.3.2: Write informative/explanatory texts to examine a topic and convey ideas and information clearly.

W.3.5: With guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, and editing.

W.3.6: With guidance and support from adults, use technology to produce and publish writing.

SL.3.1: Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on Grade 4 topics and texts, building on others' ideas and expressing their own clearly.

SL.3.3: Ask and answer questions about information from a speaker, offering appropriate elaboration and detail.

L.3.3: Use knowledge of language and its conventions when writing, speaking, reading or listening.

L.3.4: Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on Grade 3 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.

3.MD.B.3 Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step "how many more" and "how many less" problems using information presented in bar graphs.

ENVIRONMENTAL GUIDELINES FOR LEARNING

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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 D—Evaluating accuracy and reliability—Learners understand the need to use reliable information to answer their questions. They are familiar with some basic factors to consider in judging the merits of information.
- 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 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 2.0: Knowledge of Environmental Processes and Systems

Strand 2.1: The Earth as a Physical System

- Guideline C—Energy—While they may have little understanding of formal concepts associated with energy, learners are familiar with the basic behavior of some different forms of energy.

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.
- Guideline E—Environmental issues—Learners are familiar with some local environmental issues and understand that people in other places experience environmental issues as well.

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ENVIRONMENTAL GUIDELINES FOR LEARNING

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Strand 3: Skills for Understanding and Addressing Environmental Issues

Strand 3.1: Skills for Analyzing and Investigating Environmental Issues

- Guideline C—Identifying and evaluating alternative solutions and courses of action—Learners understand there are many approaches to resolving issues.

Strand 4: Personal and Civic Responsibility

- Guideline D—Accepting personal responsibility—Learners understand that they have responsibility for the effects of their actions.

Grade 3 | Unit 3 Simple Machines

RECOMMENDED TIME: FEBRUARY – MARCH (7 WEEKS)

Unit Overview:

Students will observe and describe the ease and difficulty of the movement of objects in their world. Exploring the observable effects of gravity helps 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. Describe the effects of common forces (pushes and pulls) of objects, such as those caused by gravity, and mechanical forces.

Essential Question:

How do simple machines help us in our daily lives?

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: 5.1b-d, f)

- Mechanical energy may cause change in motion through the application of force and through the use of simple machines such as pulleys, levers, and inclined planes. **(5.1f)**
- The amount of change in the motion of an object is affected by friction. **(5.1d)**
- 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)**

MST STANDARDS
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Standard 6 – Interconnectedness Common Themes:

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

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- Patterns of change can be used to make predictions.
- Patterns can be used as evidence to support an explanation.

Cause and Effect: Mechanism and Prediction:

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	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.	■ Events that occur together with regularity might or might not be a cause and effect relationship. **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. ■ Natural objects and/or observable phenomena exist from the very small to the immensely large or from very short to very long time periods. ■ Standard units are used to measure and describe physical quantities such as weight, time, temperature, and volume. **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. ■ A system is a group of related parts that make up a whole and can carry out functions its individual parts cannot. ■ A system can be described in terms of its components and their interactions.
Structure and Function: The way an object is shaped or structured determines many of its properties and functions. ■ Different materials have different substructures, which can sometimes be observed. ■ Substructures have shapes and parts that serve functions.	**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. ■ Change is measured in terms of differences over time and may occur at different rates. ■ Some systems appear stable, but over long periods of time will eventually change.	**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. ■ Matter is made of particles. ■ Matter flows and cycles can be tracked in terms of the weight of the substances before and after a process occurs. The total weight of the substances does not change. This is what is meant by conservation of matter. Matter is transported into, out of, and within systems. ■ Energy can be transferred in various ways and between objects.

COMMON CORE STATE STANDARDS

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ELA/Literacy

RI.3.3: Describe the relationship between a series of historical events, scientific ideas or concepts or steps in technical procedures in a text using language that pertains to time, sequence, and cause/effect.

RI.3.4: Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a Grade 3 topic or subject area.

RI.3.7: Use information gained from illustrations (e.g., maps, photographs) and the words in a text (e.g., comparison, cause/effect, first/second/third in a sequence).

RI.3.10: Read and comprehend informational text.

W.3.2: Write informative/explanatory texts to examine a topic and convey ideas and information clearly.

W.3.5: With guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, and editing.

W.3.6: With guidance and support from adults, use technology to produce and publish writing.

SL.3.1: Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on Grade 3 topics and texts, building on others' ideas and expressing their own clearly.

SL.3.3: Ask and answer questions about information from a speaker, offering appropriate elaboration and detail.

L.3.3: Use knowledge of language and its conventions when writing, speaking, reading or listening.

L.3.4: Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on Grade 3 reading and content, choosing flexibility from an array of strategies.

Mathematics

MP.2: Reason abstractly and quantitatively.

MP.5: Use appropriate tools strategically.

ENVIRONMENTAL GUIDELINES FOR LEARNING

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Strand 1: Questioning, Analysis, and Interpretation Skills

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- Guideline C—Collecting information—Learners are able to locate and collect information about the environment and environmental topics.
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- 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 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: Knowledge of Environmental Processes and Systems

Strand 2.1: The Earth as a Physical System

- Guideline C—Energy—While they may have little understanding of formal concepts associated with energy, learners are familiar with the basic behavior of some different forms of energy.

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

Strand 3.2: Decision-Making and Citizenship Skills

- Guideline C—Planning and taking action—By participating in issues of their choosing—mostly close to home—they learn the basics of individual and collective action.

Grade 3 | Unit 4 Plant and Animal Adaptations

RECOMMENDED TIME: APRIL – JUNE (11 WEEKS)

Unit Overview:

Recognize that for humans and other living things there is genetic continuity between generations. Describe how the structures of plants and animals are appropriate for the environment of that plant or animal. Describe basic life functions of common living organisms (e.g., guppies, mealworms, gerbils). Describe some survival behaviors of common living organisms. Describe how plants and animals, including humans, depend upon each other and the nonliving environment. *[Refer to Appendix A for the Humane Treatment of Animals and for Conservation Day]*

Essential Question:

How can we best inform the community about creating and sustaining wildlife, pollinator, and food habitats in urban and suburban NYC communities?

Key Ideas:

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 5: Organisms maintain a dynamic equilibrium that sustains life.

LE. Key Idea 6: Plants and animals depend on each other and their environment.

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

Major Understandings:

Quoted from New York State Performance Indicators (LE: 2.1a, b, 3.1 a-c, 5.1a, b, 5.2a, b, d-f and 6.1f)

- All living things grow, take in nutrients, breathe, reproduce, and eliminate waste. **(5.1a)**
- An organism's external physical features can enable it to carry out life functions in its particular environment. **(5.1b)**
- 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.

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MST STANDARDS
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Standard 2: Information Systems

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

Key Idea 2: Knowledge of the impacts and limitations of information systems is essential to its effective and ethical use.

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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NGSS CROSS-CUTTING CONCEPTS
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Patterns:

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- Similarities and differences in patterns can be used to sort, classify, communicate and analyze simple rates of change for natural phenomena and designed products.
- Patterns of change can be used to make predictions.
- Patterns can be used as evidence to support an explanation.

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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. ■ In order to survive in their environment, plants and animals must be adapted to that environment. **(3.1c)** — Seeds disperse by a plant's own mechanism and/or in a variety of ways that can include wind, water, and animals. — Leaf, flower, stem, and root adaptations may include variations in size, shape, thickness, color, smell, and texture. — Animal adaptations include coloration for warning or attraction, camouflage, defense mechanisms, movement, hibernation, and migration. ■ 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 the plant to grow; seeds germinate, and leaves form and grow. **(5.2a)** ■ When the environment changes, some plants and animals survive and reproduce, and others die or move to new locations. **(6.1f)** ■ Each animal has different structures that serve different functions in growth, survival, and reproduction. **(3.1a)** — Wings, legs, or fins enable some animals to seek shelter and escape predators. *continued*	**Key Idea 2:** Models are simplified representations of objects, structures, or systems used in analysis, explanation, interpretation, or design. **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. ■ Cause and effect relationships are routinely identified, tested, and used to explain change. ■ Events that occur together with regularity might or might not be a cause and effect relationship. **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. ■ Natural objects and/or observable phenomena exist from the very small to the immensely large or from very short to very long time periods. ■ Standard units are used to measure and describe physical quantities such as weight, time, temperature, and volume. **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. ■ A system is a group of related parts that make up a whole and can carry out functions its individual parts cannot. ■ A system can be described in terms of its components and their interactions. *continued*

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— The mouth, including teeth, jaws, and tongue, enables some animals to eat and drink. — Eyes, nose, ears, tongue, and skin of some animals enable the animals to sense their surroundings. — Claws, shells, spines, feathers, fur, scales, and color of body covering enable some animals to protect themselves from predators and other environmental conditions, or enable them to obtain food. — Some animals have parts that are used to produce sounds and smells to help the animal meet its needs. — The characteristics of some animals change as seasonal conditions change (e.g., fur grows and is shed to help regulate body heat; body fat is a form of stored energy and it changes as the seasons change). ■ Animals respond to change in their environment, (e.g., perspiration, heart rate, breathing rate, eye blinking, shivering, and salivating). **(5.2b)** ■ Some animals, including humans, move from place to place to meet their needs. **(5.2d)** ■ Particular animal characteristics are influenced by changing environmental conditions including: fat storage in winter, coat thickness in winter, camouflage, shedding of fur. **(5.2e)** ■ Some animal behaviors are influenced by environmental conditions. These behaviors may include: nest building, hibernating, hunting, migrating, and communicating. **(5.2f)** ■ Some traits of living things have been inherited (e.g., color of flowers and number of limbs of animals). **(2.1a)** ■ Some characteristics result from an individual's interactions with the environment and cannot be inherited by the next generation (e.g., having scars; riding a bicycle). **(2.1b)**		**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. ■ Matter is made of particles. ■ Matter flows and cycles can be tracked in terms of the weight of the substances before and after a process occurs. The total weight of the substances does not change. This is what is meant by conservation of matter. Matter is transported into, out of, and within systems. ■ Energy can be transferred in various ways and between objects. **Structure and Function:** The way an object is shaped or structured determines many of its properties and functions. ■ Different materials have different substructures, which can sometimes be observed. ■ Substructures have shapes and parts that serve functions. **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. ■ Change is measured in terms of differences over time and may occur at different rates. ■ Some systems appear stable, but over long periods of time will eventually change.

COMMON CORE STATE STANDARDS

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

ELA/Literacy

RI.3.3: Describe the relationship between a series of historical events, scientific ideas or concepts or steps in technical procedures in a text using language that pertains to time, sequence, and cause/effect.

RI.3.4: Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a Grade 3 topic or subject area.

RI.3.7: Use information gained from illustrations (e.g., maps, photographs) and the words in a text to demonstrate understanding of the text (e.g., where, when, why, and how key events occur).

W.3.2: Write informative/explanatory texts to examine a topic and convey ideas and information clearly.

W.3.5: With guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, and editing.

W.3.6: With guidance and support from adults, use technology to produce and publish writing.

W.3.7: Conduct short research projects that build knowledge about a topic.

SL.3.1: Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on Grade 3 topics and texts, building on others' ideas and expressing their own clearly.

SL.3.3: Ask and answer questions about information from a speaker, offering appropriate elaboration and detail.

L.3.3: Use knowledge of language and its conventions when writing, speaking, reading or listening.

L.3.4: Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on Grade 3 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.

3.NBT: Number and Operations in Base Ten

continued

ENVIRONMENTAL GUIDELINES FOR LEARNING

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

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 D—Evaluating accuracy and reliability—Learners understand the need to use reliable information to answer their questions. They are familiar with some basic factors to consider in judging the merits of information.
- 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 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: Knowledge 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.

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COMMON CORE STATE STANDARDS http://www.corestandards.org/ELA-Literacy/ http://www.corestandards.org/wp-content/uploads/Math_Standards.pdf	ENVIRONMENTAL GUIDELINES FOR LEARNING http://resources.spaces3.com/89c197bf-e630-42b0-ad9a-91f0bc55c72d.pdf
3.MD.B.3: Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step "how many more" and "how many less" problems using information presented in scaled bar graphs. **3.MD.B.4:** Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units—whole numbers, halves, or quarters.	■ Guideline E—Environmental issues—Learners are familiar with some local environmental issues and understand that people in other places experience environmental issues as well. **Strand 3: Skills for Understanding and Addressing Environmental Issues** **Strand 3.1: Skills for Analyzing and Investigating Environmental Issues** ■ Guideline A—Identifying and investigating issues—Learners are able to identify and investigate issues in their local environments and communities. ■ Guideline B—Sorting out the consequences of issues—As learners come to understand that environmental and social phenomena are linked, they are able to explore the consequences of issues. **Strand 4: Personal and Civic Responsibility** ■ Guideline A—Understanding societal values and principles – Learners can identify fundamental principles of U.S. society and explain their importance in the context of environmental issues. ■ Guideline D—Accepting personal responsibility—Learners understand that they have responsibility for the effects of their actions.