Grade Three Science

Theme ***Observations of the Environment***

Strand Connection

Matter is what makes up all substances on Earth. Matter has specific properties and exists in different states. Earth's resources are made of matter. Matter can be used by living things and can be used for the energy they contain. There are many different forms of energy. Each living component of an ecosystem is composed of matter and uses energy.

Science Inquiry and Applications:

- Observe and ask questions about the natural environment
- Plan and conduct simple investigations
- Employ simple equipment and tools to gather data and extend the senses
- Use appropriate mathematics with data to construct reasonable explanations
- Communicate about observations, investigations, and explanations
- Review and ask questions about the observations and explanations of others

Topic ***Earth's Resources***

This topic focuses on Earth's resources. While resources can be living and nonliving, within this strand the emphasis is on Earth's nonliving resources, such as water, air, rock, soil and the energy resources they represent.

Pacing

5-7 days

Content Statement

1. Earth's nonliving resources have specific properties.

Soil is composed of pieces of rock, organic material, water, and air and has characteristics that can be measured and observed. Rocks have unique characteristics that allow them to be sorted and classified. Rocks form in different ways. Air and water are nonliving resources.

Note 1: Rock classification is not the focus for this grade level; this is found in grade 6. At this grade, the actual characteristics of rocks can be used to sort or compare, rather than formal classification.

Note 2: Properties of air and water have been addressed in PreK.

Learning Targets:

- I can separate rocks based upon properties (grain size, texture, color, composition).
- I can analyze soils based upon properties (texture, composition, moisture, color).

Content Elaborations

Prior Concepts Related to Properties of Nonliving Resources

PreK-2: Objects and materials can be sorted and described by their properties. Living things are different than nonliving things. Properties of objects and materials can change. Water and air have specific properties that can be observed and measured.

Grade 3 Concepts

The properties of air and water are introduced in the early elementary grades, so the focus at the third grade level is on soil and rocks. Air and water are present within rocks and soil. Air and water also play an important role in the formation of rocks and soil. All are considered nonliving resources.

The characteristics of rocks and soil must be studied through sampling, observation, and testing. This testing includes the ability of water to pass through samples of rock or soil and the determination of color, texture, composition, and moisture level of soil. Measurable and observable

• I can examine rocks and soils using tools (hand lens, toothpicks, sediment tube, etc.).	characteristics of rocks include size and shape of the particles or grains (if present) within the rock, texture, and color. Age appropriate tools must be used to test and measure the properties. The characteristics of the rock can help determine the environment in which it formed. Technology can be used to analyze and compare test results, connect to other classrooms to compare data or share samples, and document the findings. Note: It is important to use the term "soil," not "dirt." Dirt and soil are not synonymous. ***Future Application of Concepts*** Grades 4-5: The characteristics of both soil and rock are related to the weathering and erosion of soil and rock, which result in changes on Earth's surface. The general characteristics of Earth are studied. Grades 6-8: Further exploration of soil and rock classification is found with the expansion of instruction to minerals and mineral properties.
Content Vocabulary • air • color • composition • grain • living • nonliving • organic • particle • properties • rocks • soil • texture • water	**Academic Vocabulary** These words are to be taught and used whenever possible; not to be made into spelling lists or vocabulary lists. • analyze • brainstorm • cause • compare • conclude • conduct • control • defend • describe • determine • distinguish • essential • estimate • evaluate • evidence • examine • explain • focus • formulate • generate • infer • inquire • interpret • judge • manipulate • measure • model • predict • procedure • purpose • reaction • restate • revise • structure • summarize • support

Formative Assessments • Formative assessments should help the teacher and students better understand the learners' progress towards mastery.	**Summative Assessments** • Assessments should reflect the learning targets found in the Content Statement section.
Resources • Focus Curriculum: "*What is Soil?*"	**Enrichment Strategies** • Games • Flashcards • Graphic organizers • Websites
Integrations • **ELA**: Picture books and literature. Students should also write about what they are doing in science class (i.e., predictions, observations, procedures, and conclusions). • **Math**: Measuring and graphing. Number sense. • **Social Studies**:	**Intervention Strategies** • Games • Flashcards • Graphic organizers • Websites

Grade Three Science

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Pacing

5-7 days

Content Statement

2. Earth's resources can be used for energy.

Many of Earth's resources can be used for the energy they contain. Renewable energy is an energy resource, such as wind, water, or solar energy, that is replenished within a short amount of time by natural processes. Nonrenewable energy is an energy resource, such as coal or oil, that is a finite energy source that cannot be replenished in a short amount of time.

Learning Targets:

- I can distinguish between renewable and nonrenewable energy resources.
- I can identify energy resources found in Ohio.
- I can compare Ohio's energy resources to other states.

Content Elaborations

Prior Concepts Related to Energy from Earth's Resources

PreK-2: Wind is moving air, water and wind have measurable properties, and sunlight warms the air and water.

Grade 3 Concepts

Distinguishing between renewable and nonrenewable resources through observation and investigation is the emphasis for this content statement. This can be connected to learning about the different forms of energy (PS grade 3). Electrical circuit or solar panel models can be used to demonstrate different forms of energy and the source of the energy. The conservation of energy is explored within the content statement: Some of Earth's resources are limited. Specific energy sources in Ohio are introduced, such as fossil fuels found in Ohio, new energy technologies, and the development of renewable energy sources within Ohio. Ohio must be compared to other states regarding energy sources.

	Future Application of Concepts Grades 4-5: Energy is explored through electrical energy, magnetic energy, heat, light, and sound. Grades 6-8: The formation of coal, oil and gas, kinetic and potential energy, thermal energy, energy conservation, energy transfer (includes renewable energy systems) and additional examinations of nonrenewable resources are studied.
Content Vocabulary • coal • energy • fossil fuels • gas • nonrenewable • oil • renewable • solar • water • wind	**Academic Vocabulary** These words are to be taught and used whenever possible; not to be made into spelling lists or vocabulary lists. • analyze • brainstorm • cause • compare • conclude • conduct • control • defend • describe • determine • distinguish • essential • estimate • evaluate • evidence • examine • explain • focus • formulate • generate • infer • inquire • interpret • judge • manipulate • measure • model • predict • procedure • purpose • reaction • restate • revise • structure • summarize • support
Formative Assessments • Formative assessments should help the teacher and students better understand the learners' progress towards mastery.	**Summative Assessments** • Assessments should reflect the learning targets found in the Content Statement section.
Resources • Focus Curriculum: Renewable and Nonrenewable Resources	**Enrichment Strategies** • Games • Flashcards

	• Graphic organizers • Websites
Integrations • **ELA**: Picture books and literature. Students should also write about what they are doing in science class (i.e., predictions, observations, procedures, and conclusions). • **Math**: Measuring and graphing. Number sense. • **Social Studies**:	**Intervention Strategies** • Games • Flashcards • Graphic organizers • Websites

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Pacing

5-7 days

Content Statement

3. Some of Earth's resources are limited.

Some of Earth's resources become limited due to overuse and/or contamination. Reducing resource use, decreasing waste and/or pollution, recycling, and reusing can help conserve these resources.

Learning Targets:

- I can explain the causes of limited resources.
- I can formulate a plan to help conserve Earth's resources.
- I can defend my resource conservation plan.

Content Elaborations

Prior Concepts Related to Limit of Earth's Resources

PreK-2: Properties of objects and materials can change. The amount of exposure to sunlight affects the warming of air, water, and land. Living things acquire resources from nonliving components. Resources are necessary for living things.

Grade 3 Concepts

Within third grade, the focus is on the different types of Earth's resources, how they are used, and how they can be conserved. Scientific data should be used to evaluate and compare different methods of conservation (e.g., effectiveness of different kinds of recycling such as paper vs. metal). The concentration must be the science behind the conservation of resources and why certain resources are limited. Reducing or limiting the use and/or waste of resources should be emphasized (rather than concentrating only on recycling of resources).

	Future Application of Concepts Grades 4-5: Conservation of matter, environmental changes through Earth's history, and erosion (loss of resources/contamination) are introduced. Grades 6-8: Common and practical uses of soil, rock, and minerals (geologic resources), biogeochemical cycles, global climate patterns, and interactions between the spheres of Earth (Earth Systems) are found.
Content Vocabulary • contamination • overuse • pollution • reducing • reuse • recycle • waste	**Academic Vocabulary** These words are to be taught and used whenever possible; not to be made into spelling lists or vocabulary lists. • analyze • brainstorm • cause • compare • conclude • conduct • control • defend • describe • determine • distinguish • essential • estimate • evaluate • evidence • examine • explain • focus • formulate • generate • infer • inquire • interpret • judge • manipulate • measure • model • predict • procedure • purpose • reaction • restate • revise • structure • summarize • support
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Topic ***Behavior, Growth, and Changes***

This topic explores life cycles of organisms and the relationship between the natural environment and an organism's (physical and behavioral) traits, which affect its ability to survive and reproduce.

Pacing

5-7 days

Content Statement

1. ***Offspring resemble their parents and each other.***

   Individual organisms inherit many traits from their parents indicating a reliable way to transfer information from one generation to the next.

   Some behavioral traits are learned through interactions with the environment and are not inherited.

   Learning Targets:
   - I can observe similarities and differences in parents and offspring.
   - I can predict which offspring matches its parents.

Content Elaborations

Prior Concepts Related to Behavior, Growth, and Changes

PreK-2: Similarities and differences exist among individuals of the same kinds of plants and animals.

Grade 3 Concepts

Organisms are similar to their parents in appearance and behavior but still show some variation. Although the immature stages of some living things may not resemble the parents, once the offspring matures it will resemble the parent. At this grade level, the focus is on establishing, through observation, that organisms have a reliable mechanism for ensuring that offspring resemble their parents. It is not appropriate or necessary to introduce the genetic mechanisms involved in heredity; however, care should be taken to avoid introducing the misconception that the individual organism has a way to select the traits that are passed on to the next generation. As part of the study of the life cycle of organisms, the physical appearance of the adults will be compared to the offspring (e.g., compare butterflies to determine if offspring look exactly

	like the parents). A considerable amount of animal behavior is directly related to getting materials necessary for survival (food, shelter) from the environment and that influences what an animal learns. The focus at this grade level is on examples provided through observation or stories of animals engaging in instinctual and learned behaviors. Some organisms have behavioral traits that are learned from the parent (e.g., hunting). Other behavior traits are in response to environmental stimuli (e.g., a plant stem bending toward the light). At this grade level, the definition of either instinctual or learned behavior is not learned. The focus is on making observations of different types of plant and animal behavior. Technology (e.g., a webcam) can be used to observe animals in their natural or human-made environments. ***Future Application of Concepts*** Grades 6-8: These observations will build to a description and understanding of the biological mechanisms involved in ensuring that offspring resemble their parents. Cell Theory will be introduced which will explore how cells come from pre-existing cells and new cells will have the genetic information of the old cells. The details of reproduction will be outlined. **Note**: Human genetic study is not recommended since not all students may have information available from their biological parents.
Content Vocabulary • body parts • generations • inherit • offspring • physical features • reproduce • similarity • traits • variation	**Academic Vocabulary** These words are to be taught and used whenever possible; not to be made into spelling lists or vocabulary lists. • analyze • brainstorm • cause • compare • conclude • conduct • control • defend • describe • formulate • generate • infer • inquire • interpret • judge • manipulate • measure • model

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Formative Assessments

- Formative assessments should help the teacher and students better understand the learners' progress towards mastery.

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Summative Assessments

- Assessments should reflect the learning targets found in the Content Statement section.

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- **ELA**: Picture books and literature. Students should also write about what they are doing in science class (i.e., predictions, observations, procedures, and conclusions).
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- **Social Studies**:

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Topic ***Behavior, Growth, and Changes***

This topic explores life cycles of organisms and the relationship between the natural environment and an organism's (physical and behavioral) traits, which affect its ability to survive and reproduce.

Pacing

5-7 days

Content Statement

2. Individuals of the same kind differ in their traits and sometimes the differences give individuals an advantage in surviving and reproducing.

Plants and animals have physical features that are associated with the environments where they live.

Plants and animals have certain physical or behavioral characteristics that improve their chances of surviving in particular environments.

Individuals of the same kind have different characteristics that they have inherited. Sometimes these different characteristics give individuals an advantage in surviving and reproducing.

Note: The focus is on the individual, not the population. Adaption is not the focus at this grade level.

Learning Targets:

Content Elaborations

Prior Concepts Related to Behavior, Growth, and Changes

PreK-2: Similarities and differences exist among individuals of the same kinds of plants and animals. Living things have physical traits and behaviors that influence their survival.

Grade 3 Concepts

Organisms have different structures and behaviors that serve different functions. Some plants have leaves, stems, and roots; each part serves a different function for the plant. Some animals have wings, feathers, beaks; each part serves a different function for the animals. The observation of body parts should be limited to gross morphology and not microscopic or chemical features. Comparison across species is not appropriate at this grade level; only observation of variation within the same species is expected. This content statement can be combined with the observation of the life cycles of organisms and/or the observation of the similarity between offspring and parents.

• I can hypothesize what would happen to an organism when removed from its natural environment. • I can categorize adaptations as favorable or unfavorable for future generations. • I can locate parts of plants or animals which give the organism an advantage to survive.	There may be variations in the traits that are passed down that increase the ability of organisms to thrive and reproduce. Some variations in traits that are passed down may reduce the ability of organisms to survive and reproduce. Some variations in traits that are passed down may have no appreciable effect on the ability of organisms to survive and reproduce. Variations in physical features among animals and plants can help them survive in different environmental conditions. Variations in color, size, weight, etc. can be observed as the organism develops. Plants and animals that survive and reproduce pass successful features on to future generations. Some grade-appropriate organisms to study are plants (e.g., radishes, beans) and insects (e.g., butterflies, moths, beetles, and brine shrimp). Comparisons can be made in nature or virtually. Venn diagrams can be used to illustrate the similarities and differences between individuals of the same type. ***Future Application of Concepts*** Grades 4-5: Changes in the environment may benefit some organisms and be a detriment to other organisms. Grades 6-8: The reproduction of organisms will explain how traits are transferred from one generation to the next.
Content Vocabulary • adaptations • body parts • physical features • traits • variation	**Academic Vocabulary** These words are to be taught and used whenever possible; not to be made into spelling lists or vocabulary lists. • analyze • brainstorm • cause • compare • conclude • conduct • control • defend • describe • determine • distinguish • essential • formulate • generate • infer • inquire • interpret • judge • manipulate • measure • model • predict • procedure • purpose

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Topic ***Behavior, Growth, and Changes***

This topic explores life cycles of organisms and the relationship between the natural environment and an organism's (physical and behavioral) traits, which affect its ability to survive and reproduce.

Pacing

5-7 days

Content Statement

3. Plants and animals have life cycles that are part of their adaptations for survival in their natural environments.

Over the whole earth, organisms are growing, reproducing, dying, and decaying. The details of the life cycle are different for different organisms, which affects their ability to survive and reproduce in their natural environments.

Note: The names of the stages within the life cycles are not the focus.

Note: New organisms are produced by the old ones.

Learning Targets:

- I can construct a life cycle diagram (plants and animals).
- I can compare life cycles of various plants and animals.
- I can debate the advantages and disadvantages of an organism's life cycle for its survival.

Content Elaborations

Prior Concepts Related to Behavior, Growth, and Changes

PreK-2: Plants and animals have variations in their physical traits that enable them to survive in a particular environment. Some organisms exhibit seasonal behaviors that enable them to survive environmental conditions and changes.

Grade 3 Concepts

Plants and animals have life cycles that are adapted to survive in distinct environments (e.g., bean plants can be grown inside during winter but cannot grow outside in the winter). Most life cycles start with birth, then progress to growth, development, adulthood, reproduction, and death. The process can be interrupted at any stage. The details of the life cycle are different for different organisms.

Observation of the complete life cycle of an organism can be made in the classroom (e.g., butterflies, mealworms, plants) or virtually. Hand lens,

	magnifying lenses, metric rulers, and scales are some of the tools that can be used to question, explore, and investigate the physical appearance of living things. When studying living things, ethical treatment of animals and safety must be employed. Respect for and proper treatment of living things must be modeled. For example, shaking a container, rapping on insect bottles, unclean cages or aquariums, leaving living things in the hot sun, or exposure to extreme temperatures (hot or cold) must be avoided. The National Science Teachers Association (NSTA) has a position paper to provide guidance in the ethical use and treatment of animals in the classroom at http://www.nsta.org/about/positions/animals.aspx. ***Future Application of Concepts*** Grades 4-5: Organisms perform a variety of roles in an ecosystem. Grades 6-8: The structure and organization of organisms and the necessity of reproduction for the continuation of the species will be detailed.
Content Vocabulary • adaptations • behavioral characteristics • environments • life cycles • survive	**Academic Vocabulary** These words are to be taught and used whenever possible; not to be made into spelling lists or vocabulary lists. • analyze • brainstorm • cause • compare • conclude • conduct • control • defend • describe • determine • distinguish • essential • estimate • evaluate • evidence • examine • explain • formulate • generate • infer • inquire • interpret • judge • manipulate • measure • model • predict • procedure • purpose • reaction • restate • revise • structure • summarize

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Formative Assessments • Formative assessments should help the teacher and students better understand the learners' progress towards mastery.	**Summative Assessments** • Assessments should reflect the learning targets found in the Content Statement section.
Resources • Focus Curriculum: Comparing Life Cycles of Animals. Comparing Life Cycles of Plants.	**Enrichment Strategies** • Games • Flashcards • Graphic organizers • Websites
Integrations • **ELA**: Picture books and literature. Students should also write about what they are doing in science class (i.e., predictions, observations, procedures, and conclusions). • **Math**: Measuring and graphing. Number sense. • **Social Studies**:	**Intervention Strategies** • Games • Flashcards • Graphic organizers • Websites

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Topic ***Matter and Forms of Energy***

This topic focuses on the relationship between matter and energy. Matter has specific properties and is found in all substances on Earth. Heat is a familiar form of energy that can change the states of matter.

Pacing

5-7 days

Content Statement

1. All objects and substances in the natural world are composed of matter.

Matter takes up space and has mass*.

*While mass is the scientifically correct term to use in this context, the NAEP 2009 Science Framework (page 27) recommends using the more familiar term "weight" in the elementary grades with the distinction between mass and weight being introduced at the middle school level. In Ohio, students will not be assessed on the differences between mass and weight until Grade 6.

Learning Targets:

- I can classify matter as a solid, liquid, or gas.
- I can measure weight and volume of an object.

Content Elaborations

Prior Concepts Related to Matter

PreK-2: Objects are things that can be seen or felt. Properties of objects may be described, measured, and sorted. The physical properties of water change as observed in weather. Air has mass* and takes up space (ESS).

Grade 3 Concepts

Objects are composed of matter and matter has observable properties. Matter is anything that has mass and takes up space. All solids, liquids, and gases are made of matter.

Volume is a measure of the amount of space an object takes up. Volumes of liquids can be measured in metric units with a beaker or graduated cylinder. Weight is a measure of gravity (how strongly Earth's gravity pulls the object toward Earth). Weight is measured using a scale. For any given location, the more matter there is in an object, the greater the weight. Opportunities to investigate and experiment with different methods of measuring weight and

	liquid volume must be provided. Objects are made of smaller parts, some too small to be seen even with magnification. Matter continues to exist, even when broken into pieces too tiny to be visible. Notes: Atomic and subatomic nature of matter is not appropriate at this grade. Math standards at this grade limit volume measurements to liquids measured to the nearest whole number. This document follows the recommendations of the NAEP 2009 Science Framework (see page 27) for dealing with the concepts of mass and weight. ***Future Application of Concepts*** Grades 4-5: The mass and total amount of matter remains the same when it undergoes a change, including phase changes. The sum of the mass of the parts of an object is equal to the weight (mass) of the entire object. Grades 6-8: The atomic model is introduced. Properties are explained by the arrangement of particles. *While mass is the scientifically correct term to use in this context, the NAEP 2009 Science Framework (page 27) recommends using the more familiar term "weight" in the elementary grades with the distinction between mass and weight being introduced at the middle school level. In Ohio, students will not be assessed on the differences between mass and weight until Grade 6.
Content Vocabulary • beaker • gases • graduated cylinder • liquids • matter • properties • scale • solids • volume	**Academic Vocabulary** These words are to be taught and used whenever possible; not to be made into spelling lists or vocabulary lists. • analyze • brainstorm • cause • compare • conclude • conduct • control • defend • describe • determine • formulate • generate • infer • inquire • interpret • judge • manipulate • measure • model • predict

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Resources • Focus Curriculum: All About Matter?	**Enrichment Strategies** • Games • Flashcards • Graphic organizers • Websites
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Grade Three Science

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Topic ***Matter and Forms of Energy***

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Pacing

5-7 days

Content Statement

2. Matter exists in different states, each of which has different properties.

The most common states of matter are solids, liquids, and gases.

Shape and compressibility are properties that can distinguish between the states of matter.

One way to change matter from one state to another is by heating or cooling.

Learning Targets:

- I can differentiate phase changes in matter.
- I can contrast the shapes of solids, liquids, and gases.
- I can compare the ability of solids, liquids, and gases to flow or be compressed.

Content Elaborations

Prior Concepts Related to Matter

PreK-2: Materials can be sorted by properties. The physical properties of water change as observed in weather (ESS).

Grade 3 Concepts

Gases, liquids, and solids are different states of matter that have different properties. Liquids and solids do not compress into a smaller volume as easily as do gases. Liquids and gases flow easily, but solids do not flow easily. Solids retain their shape and volume (unless a force is applied). Liquids assume the shape of the part of the container that it occupies (retaining its volume). Gases assume the shape and volume of the container.

Heating may cause a solid to melt to form a liquid or cause a liquid to boil or evaporate to form a gas. Cooling may change a gas into a liquid or cause a liquid to freeze and form a solid.

	Conducting experiments or investigations that demonstrate phase changes, such as the melting or freezing of substances other than water (e.g., vinegar, vegetable oil, sugar, butter), must be used to reinforce the concept that materials other than water also go through phase changes. Note 1: Purdue University provides a table that can help in differentiating the properties of solids, gases, and liquids. Teaching about the atomic structure as related to the phases is not appropriate for this grade level. Note 2: Only solids, liquids, and gases are appropriate at this grade, even though other phases have been identified. The differences between boiling and evaporation are not dealt with at this grade. ***Future Application of Concepts*** Grades 4-5: The amount of mass* and matter remains the same during phase changes. Grades 6-8: Atomic theory is introduced. Properties of solids, liquids, and gases are related to the spacing and motion of particles. Thermal energy and temperature are related to the motion of particles. *While mass is the scientifically correct term to use in this context, the NAEP 2009 Science Framework (page 27) recommends using the more familiar term "weight" in the elementary grades with the distinction between mass and weight being introduced at the middle school level. In Ohio, students will not be assessed on the differences between mass and weight until Grade 6.
Content Vocabulary • compress • cooling • evaporate • flow • freeze • gases • heating • liquids • melt • phase change • shape	**Academic Vocabulary** These words are to be taught and used whenever possible; not to be made into spelling lists or vocabulary lists. • analyze • brainstorm • cause • compare • conclude • conduct • control • defend • describe • formulate • generate • infer • inquire • interpret • judge • manipulate • measure • model

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solids
states of matter

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determine
distinguish
essential
estimate
evaluate
evidence
examine
explain
focus
predict
procedure
purpose
reaction
restate
revise
structure
summarize
support

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Formative Assessments

Formative assessments should help the teacher and students better understand the learners' progress towards mastery.

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Summative Assessments

Assessments should reflect the learning targets found in the Content Statement section.

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Resources

Focus Curriculum: What is Matter?

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Enrichment Strategies

Games
Flashcards
Graphic organizers
Websites

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Integrations

ELA: Picture books and literature. Students should also write about what they are doing in science class (i.e., predictions, observations, procedures, and conclusions).
Math: Measuring and graphing. Number sense.
Social Studies:

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Grade Three Science

Theme ***Observations of the Environment***

Strand Connection

Matter is what makes up all substances on Earth. Matter has specific properties and exists in different states. Earth's resources are made of matter. Matter can be used by living things and can be used for the energy they contain. There are many different forms of energy. Each living component of an ecosystem is composed of matter and uses energy.

Science Inquiry and Applications:

- Observe and ask questions about the natural environment
- Plan and conduct simple investigations
- Employ simple equipment and tools to gather data and extend the senses
- Use appropriate mathematics with data to construct reasonable explanations
- Communicate about observations, investigations, and explanations
- Review and ask questions about the observations and explanations of others

Topic ***Matter and Forms of Energy***

This topic focuses on the relationship between matter and energy. Matter has specific properties and is found in all substances on Earth. Heat is a familiar form of energy that can change the states of matter.

Pacing

5-7 days

Content Statement

3. Heat, electrical energy, light, sound, and magnetic energy are forms of energy.

There are many different forms of energy. Energy is the ability to cause motion or create change.

Note: The different forms of energy that are outlined at this grade level should be limited to familiar forms of energy that a student is able to observe.

Learning Targets:

- I can relate energy (heat, electrical, light, sound, and magnetic) to how it can be used.
- I can illustrate how energy (heat, electrical, light, sound, and magnetic) affects matter.

Content Elaborations

Prior Concepts Related to Sound, Energy, and Motion

PreK-2: Vibrations are associated with sound. An object is in motion when its position is changing. Forces change the motion of an object. Sunlight is the principal source of energy on Earth and warms Earth's land, air, and water (ESS). Weather changes occur due to changes in energy (ESS). Living things require energy (LS). Plants get energy from sunlight (LS).

Grade 3 Concepts

Examples of energy causing motion or creating change include a falling rock causing a crater to form on the ground, heating water causing water to change into a gas, light energy from the sun contributing to plant growth, electricity causing the blades of a fan to move, electrically charged objects causing movement in uncharged objects or other electrically charged objects, sound from a drum causing rice sitting on the drum to vibrate, and magnets causing other magnets and some metal objects to move.

	Investigations (3-D or virtual) must be used to demonstrate the relationship between different forms of energy and motion. Note 1: It is not appropriate at this grade level to explore the different types of energy in depth or use wave terminology when discussing energy. These will be developed at later grades. Note 2: There often is confusion between the concepts of force and energy. Force can be thought of as a push or pull between two objects and energy as the property of an object that can cause change. If forces actually push or pull something over a distance, then there is an exchange of energy between the objects. The differences between force and energy will be developed over time and are not appropriate for this grade level. Note 3: The word "heat" is used loosely in everyday language, yet it has a very specific scientific meaning. Usually what is called heat is actually "thermal or radiant energy." An object has thermal energy due to the random movement of the particles that make up the object. Radiant energy is that which is given off by objects through space (e.g., warmth from a fire, solar energy from the sun). "Heating" is used to describe the transfer of thermal or radiant energy to another object or place. Differentiating between these concepts is inappropriate at this grade. This document uses the same conventions as noted in the NAEP 2009 Science Framework (see page 29) where "heat" is used in lower grades. However, the word "heat" has been used with care so it refers to a transfer of thermal or radiant energy. The concept of thermal energy, as it relates to particle motion, is introduced in grade 6. ***Future Application of Concepts*** Grades 4-5: Processes of energy transfer and transformation are introduced. Heat, electrical energy, light, and sound are explored in more detail. Grades 6-8: Energy is classified as kinetic or potential. The concepts of conservation of energy and thermal energy as it relates to particle motion are introduced.
Content Vocabulary • electrical energy • energy • heat	**Academic Vocabulary** These words are to be taught and used whenever possible; not to be made into spelling lists or vocabulary lists. • analyze • formulate

<table>
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- light energy
- magnetic energy
- phase change
- sound energy

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- brainstorm
- cause
- compare
- conclude
- conduct
- control
- defend
- describe
- determine
- distinguish
- essential
- estimate
- evaluate
- evidence
- examine
- explain
- focus
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- manipulate
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- predict
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Integrations

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