3rd Grade Science

Pacing Guide and Unpacked Standards

GROVEPORT MADISON SCHOOLS

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Resources: School District U-46, of Chicago, IL, The Ohio Department of Education,
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Groveport Madison Science Pacing Guide

3	Science Inquiry and Application	Life Science	Physical Science	Earth and Space Science
1st 9 wks	**Thinking Like a 21st Century Scientist/Engineer** - Intro to Science, Technology and Engineering: Lab Safety, Procedures/Equipment; Team Building; Process Skills, Computer Technology; Engineering Design 6 weeks	**PLANTS: Inheritance/Diversity/Life Cycles (3.LS.1, 3.LS.2, 3.LS.3)** Observable Inherited Physical Traits, Learned Behavioral Traits, Variations within a species, Adaptations, Environmental Adaptations, Life Cycle 3 weeks		
2nd 9 wks	**Thinking Like a 21st Century Scientist/Engineer** (continue to integrate)	**PLANTS: Inheritance/Diversity/Life Cycles Cont'd (3.LS.1, 3.LS.2, 3.LS.3)** 3 weeks **ANIMALS: Inheritance/Diversity/Life Cycles (3.LS.1, 3.LS.2, 3.LS.3)** Observable Inherited Physical Traits, Learned Behavioral Traits, Variations within a species, Adaptations, Environmental Adaptations, Life Cycle 6 weeks		
3rd 9 wks	**Thinking Like a 21st Century Scientist/Engineer** (continue to integrate)		**Matter (3.PS.1)** Properties Volume Weight (mass) 3 weeks **Matter (3.PS.2)** States of Matter Properties Changing States 3 weeks **Energy (3.PS.3)** Forms of Energy 3 weeks	
4th 9 wks	**Thinking Like a 21st Century Scientist/Engineer** (continue to integrate)			**Earth's Nonliving Resources (3.ESS.1)** Composition of Soil and Rocks Rock and Soil Characteristics Investigation 4 weeks **Energy Resources (3.ESS.2)** Nonrenewable Resources Renewable Resources 3 weeks **Earth's Resources Are Limited (3.ESS.3)** Uses Conservation Management 2 weeks

Ohio's Learning Standards- Clear Learning Targets

Science, Grade 3

3.ESS.1

EARTH'S RESOURCES

Earth's nonliving resources have specific properties.

Essential Understandings:

- Soil is composed of pieces of rock, organic material, water and air and has characteristics that can be measured and observed.
- Use the term "soil", not "dirt". Dirt and soils are not synonymous.
- Rocks have specific characteristics that allow them to be sorted and compared.
- Rocks form in different ways.
- Air and water are also nonliving resources.

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

Vocabulary

Clay
Classify/Sort
Compare
Sand
Characteristic
Composition
Humus
Igneous rocks
Metamorphic rocks
Mineral Moisture
Organic material level
Particle Properties
Resource
Rock cycle
Sedimentary rocks
Silt
Soil
Texture

Essential Skills:	**The students can explore characteristics of rocks through observation, measurement, and testing.** **The students can compare characteristics of various rocks** **The students can explain the process by which rocks are formed.** **The students can compare different types of soil according to their characteristics.** **The students can test the ability of water to pass through soil samples.** **The students can observe that the proper type of soil can be used as a resource to support plant life.**

Misconceptions

- Students often think soil is alive. While living things live in soil and organic soil is composed of once-living things, they need to understand that soil itself is not alive.

- Students may think soil type is determined by color. Soil type is actually determined based on particle size. Color is dependent upon the rock type from which the soil is formed over time.

Instructional Strategies and Resources

- Discovery Education: www.discoveryeducation.com
Rocks: The Solid Earth Materials #1 (20:00 – all segments), Rocks: The Solid Earth Materials #2(segments 1-3, 6-8), Getting to Know: Soil (all segments)

- Conducting student-led experiments, research and investigations to test soil properties is an important way to allow students to explore and learn about all aspects of soil.

- The **Ohio Department of Natural Resources Soil and Water Conservation Division** provides resources and support to teach about soil and properties of soil to elementary students. This page provides examples of soil profiling, how to conduct soils tests and maps of local soils (including a *Web Soil Survey* feature that allows students to locate the soil types in their own backyards or at their schools.

Career Connections

Geologist, Metallurgical Engineer, Mineral Resources Engineer, Seismologist, Geochronologist, Paleontologist

Prior Knowledge

2.ESS1: Air has properties that can be observed and measured.

2.ESS.2: Water can be found as water vapor, clouds, fog, rain, ice, snow, sleet or hail.

Future Knowledge

4.ESS.1: Earth's surface has specific characteristics and landforms that can be identified.

4.ESS.2: The surface of the Earth changes due to weathering.

4.ESS.3: The surface of the Earth changes due to erosion and deposition.

Ohio's Learning Standards- Clear Learning Target

Science, Grade 3

3.ESS.2

EARTH'S RESOURCES

Earth's resources can be used for energy.

Vocabulary

Conservation of Energy Finite Limited Resources Natural Non-renewable Renewable Replenished Resources Solar Energy

Essential Understandings:

- Renewable energy resources, such as wind, water or solar energy, can be replenished within a short amount of time by natural processes.
- Nonrenewable energy is a finite resource, such as natural gas, coal or oil, which cannot be replenished in a short amount of time.

Essential Skills:

The students can demonstrate and explain the advantages and disadvantages of one energy source on the environment.

The students can compare & contrast various energy sources to determine their advantages and disadvantages for use in Columbus, Ohio.

The students can state whether an energy source is renewable or nonrenewable.

The students can identify how Ohio's energy sources compare to those of other states.

Misconceptions

- Misconceptions about fossil fuels and energy resources are common. Use effective questioning to help understand preconceptions that elementary students may have about energy resources and address the misconceptions.

- Students may have difficulty differentiating between renewable and nonrenewable resources. Providing investigations and local (Ohio) examples can help students make the connections needed for this understanding. For a teacher fact sheet with important examples to support this content statement and to ensure that misconceptions are addressed, see http://www.epa.gov/osw/education/quest/pdfs/unit1/chap1/u1_natresources.pdf.

Instructional Strategies and Resources

- Discovery Education: www.discoveryeducation.com
More Facts About Energy (2: 31 min), Solar Energy and Steam Power (3:25 min), The Sun's Energy (2:13 min), The Green Earth Club: Solar Energy (15:00 min), Wind-powered generators at Palm Springs, 1993 Land Use in the U.S.: Coal and Oil (2:10 min), Power of Imagination (3:09 min), Alternatives to Fossil Fuels (4:53 min), Renewable Sources of Electrical Energy (3:58 min), Nuclear Energy (1:49 min), Cutting Air Pollution (3:56 min), Hydroelectric Power (:19 min), The Planet Electric (7:20 min), Oil (:55 min), The Demand for Hydroelectricity (1:25 min)

- The National Renewable Energy Laboratory provides links to elementary wind programs (like KidWind and Wind for Schools) and resources and support for teaching about wind and wind turbines. There is information about national challenges for building wind turbine models at different grade levels and links to learn about solar energy and the relationship of solar and wind energy.

- The National Energy Education Development Project provides online information about energy sources at the primary grades, offers free downloads of primary books, and supports the teaching of a variety of energy resources, inquiry-based labs and experiments.

Career Connections

Engineer, Production Worker, Oil and Gas Driller, Hydrologist, Geophysicist, Miner, Surveying Technician, Environmental Consultant

Prior Knowledge

2.ESS.3: Long- and short- term weather changes occur due to changes in energy.

Future Knowledge

Grade 5: N/A

Ohio's Learning Standards- Clear Learning Targets

Science, Grade 3

3.ESS.3

EARTH'S RESOURCES

Some of Earth's resources are limited.

Vocabulary
Conservation
Contamination
Limited Overuse
Recycle Reduce
Resource
Reuse

Essential Understandings:

- 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.

Essential Skills:

The students can name natural resources and explain how they are used by people.

The students can explain why some resources are limited.

The students can identify ways that people can conserve resources.

The students can demonstrate ways to reduce, reuse, and recycle materials.

Misconceptions

- A common misconception is that as long as an item is recycled there is no need to limit the use of that item. It is important that students know that it is always better to reduce or limit the use of a resource than to use and recycle. Recycling requires energy resources and also can create other unintended issues (due to the recycling process). By investigating the efficiency of recycling, students can begin to understand that many resources are limited and cannot be effectively recycled after use.

- Misconceptions about fossil fuels and energy resources are common. Use effective questioning to help understand preconceptions that elementary students may have about energy resources and address the misconceptions.

Instructional Strategies and Resources

- Discovery Education: www.discoveryeducation.com
  The Business of Recycling (2:29 min), Other Tips for Recycling (1:39 min), Recycling: A Class Project (3:04 min), The Three Stages of Recycling (2:31 min), A Field Trip to the Recycling Plant (3:02 min), How Recycling Helps Keep Our Community Clean (2:04 min), Green Tips: Recycling Strategies for the Home and Concluding Comments about the Benefits of Recycling (1:42 min), Kids Sing a Rap About Recycling (:42 min), The Green Earth Club: A Recycling Update (14:39 min)

- The **EPA** provides educational resources for primary students pertaining to Earth's resources, including background information, project ideas, starting up school recycling programs, how to reduce material use, challenges/contests for student participation and recycling clubs for K-5 students.

- The **Ohio Department of Natural Resources** provides a recycling guide for Ohio with an explanation of what and how things can be recycled in Ohio.

- The **Ohio EPA** provides lists of educational projects and educational opportunities that address Earth's resources. The lists can be used as idea starters and for inquiry-based student projects and provide contact information for teacher training.

- Take a field trip to a local landfill, recycling center, factory/industry that makes materials such as glass or metal or go to a water treatment facility to learn about the cycling of materials from production to disposal. **SWACO** offers fieldtrips, as do many landfill facilities.

Career Connections

Environmental Engineer, Garbage and Recyclable Materials Collector, Geoscientist, Recycling Coordinator, Remediation Project Manager, Sustainability Specialist, Urban and Regional Planner, Water Resources Engineer

Prior Knowledge

2.ESS.1: The atmosphere is primarily made up of air.

2.ESS.2: Water is present in the atmosphere.

Future Knowledge

Grade 5: N/A

Ohio's Learning Standards- Clear Learning Targets

Science, Grade 3

3.LS.1

BEHAVIOR, GROWTH, AND CHANGES

Offspring resemble their parents and each other.

Vocabulary

Parents
Observation
Adulthood
Behaviors
Generation
Individual
Learned Behavior
Offspring
Physical Features
Resemble
Trait Transfer
Variation
Appearance
Functions
Heredity
Inherit
Mature
Organism
Reproduce
Survive
Traits

Essential Understandings:

- **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.**

Essential Skills:

The students can observe the life cycle of a plant as it progresses from germination to death.

The students can compare plant seeds and seedlings to their parent plants, noting similarities and differences.

The students can observe plant behaviors, noting their responses to environmental stimuli.

The students can test different variables on bean seeds to observe their response.

The students can discuss how plant variations can increase or decrease a plant's chances for survival.

The students can explain how traits of an organism affect its ability to survive in a given habitat.

The students can compare the traits they observe with others in the class.

The students can develop a data table to show the results of the observed traits within their class.

Misconceptions

- The Annenberg Media series **Essential Science for Teachers** can be used to provide greater detail on life cycles within the elementary curriculum and misconceptions students may have about various traits.

Instructional Strategies and Resources

- The Franklin Park Conservatory www.fpconservatory.org

- COSI on Wheels www.cosi.org/educators/

- Use webcams to view animals in their natural habitat or simulated environments to observe and record physical characteristics of the animals as well as behavioral traits that are taught from parent to offspring. **Falcon cams** are used by the Ohio Department of Natural Resources and can be used for this study. The **North American Bear Center** and the **International Wolf Center** also have webcams that can be used to study animals in their habitat.

- The Annenberg Media series **Essential Science for Teachers: Life Science: Session 3 and 4** provides information about how children can learn about the life cycles of animals and offers classroom footage to illustrate implementation.

- *Project Wild* was developed through a joint effort of the Western Association of Fish and Wildlife Agencies and the Council for Environmental Education. This program helps students learn basic concepts about wild animals, their needs and importance and their relationships to people and the environment. The activity guides are available to educators free of charge when they attend a workshop. Information about upcoming workshops are available on the **ODNR Website**. In the *Aquatic Project Wild activity, Are You Me?* Students match picture cards into juvenile and adult aquatic animal pairs.

Career Connections

Biologist, Zoologist, Geneticist, Botanist, Plant Scientist, Florist, Landscape Architect, Farmer, Ecologist

Prior Knowledge	**Future Knowledge**
2.LS.2: All organisms alive today result from their ancestors, some of which may be extinct.	**4.LS.1:** Changes in an organism's environment are sometimes beneficial to its survival and sometimes harmful. **4.LS.2:** Fossils can be compared to one another and to present-day organisms according to their similarities and differences.

Ohio's Learning Standards- Clear Learning Targets

Science, Grade 3

3.LS.2

BEHAVIOR, GROWTH, AND CHANGES

Individuals of the same kind of organism differ in their inherited traits. These differences give some individuals an advantage in surviving and/or reproducing.

Essential Understandings:

- 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 influence their chances of surviving in particular environments.

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

Vocabulary

Adulthood	Appearance
Behaviors	Environment
Environmental Stimuli	Function
Generation	Heredity
Immature stages	Individual
Instinctual Behavior	Inherit
Learned Behavior	Interactions
Life Cycle	Mature
Offspring	Organism
Physical Features	Reproduce
Resemble	Structures
Survive	Trait Transfer
Traits	Variation

Essential Skills:

The students can observe the life cycle of a plant as it progresses from germination to death.

The students can compare plant seeds and seedlings to their parent plants, noting similarities and differences.

The students can observe plant behaviors, noting their responses to environmental stimuli.

The students can test different variables on bean seeds to observe their response.

The students can discuss how plant variations can increase or decrease a plant's chances for survival.

The students can explain how traits of an organism affect its ability to survive in a given habitat.

The students can compare the traits they observe with others in the class.

The students can develop a data table to show the results of the observed traits within their class.

Misconceptions

- The Annenberg Media series Essential Science for Teachers can be used to provide greater detail on life cycles within the elementary curriculum and misconceptions students may have about various traits.

Instructional Strategies and Resources

- **Monarchwatch.org** provides guidance on how to hatch and raise butterflies for classroom observations of the life cycle. Additional information about emergence cages also can be found on this site.

- The program **One Species at a Time** allows an audio tour of the wonders of nature by examining a variety of life forms through stories and ways to hone backyard observation skills. This program is developed by the Encyclopedia of Life and Atlantic Public Media.

- *Project Wild* was developed through a joint effort of the Western Association of Fish and Wildlife Agencies and the Council for Environmental Education. This program helps students learn basic concepts about wild animals, their needs and importance and their relationships to people and the environment. The activity guides are available to educators free of charge when they attend a workshop. Information about upcoming workshops are available on the **ODNR Website**. In the activity, *Thicket Game* students illustrate animal survival adaptations through a game of hide and seek. In *Quick Frozen Critters* students illustrate animal survival adaptations through a game of freeze tag.

Career Connections

Biologist, Zoologist, Botanist, Horticulturist, Florist, Farmer, Landscape Architect, Ecologist, Veterinarian, Forest Ranger

Prior Knowledge

2.LS.2: Some kinds of organisms become extinct when their basic needs are no longer met or the environment changes.

Future Knowledge

4.LS.1: Changes in an organism's environment are sometimes beneficial to its survival and sometimes harmful.

Ohio's Learning Standards- Clear Learning Targets

Science, Grade 3

3.LS.3

BEHAVIOR, GROWTH, AND CHANGES
Plants and animals have life cycles that are part of their adaptations for survival in their natural environments.

Vocabulary

Observation
Adulthood
Behaviors
Environmental Stimuli
Generation
Appearance
Environment
Function
Heredity

Immature stages
Instinctual Behavior
Learned Behavior
Life Cycle
Offspring
Physical Features
Resemble
Survive
Traits
Individual
Inherit
Interactions
Mature
Organism
Reproduce
Structures
Trait Transfer
Variation

Essential Understandings:

- Worldwide, 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.

Essential Skills:

The students can observe the life cycle of a plant as it progresses from germination to death.

The students can compare plant seeds and seedlings to their parent plants, noting similarities and differences.

The students can observe plant behaviors, noting their responses to environmental stimuli.

The students can test different variables on bean seeds to observe their response.

The students can discuss how plant variations can increase or decrease a plant's chances for survival.

The students can explain how traits of an organism affect its ability to survive in a given habitat.

The students can compare the traits they observe with others in the class.

The students can develop a data table to show the results of the observed traits within my class.

Misconceptions

- The Annenberg Media series Essential Science for Teachers can be used to provide greater detail on life cycles within the elementary curriculum and misconceptions students may have about various traits.

Instructional Strategies and Resources

- ODNR-Division of Wildlife's **A to Z Species Guide** has photos, information, tracks and sounds of Ohio's wild animals

- Explore how organisms reproduce, grow and find shelter in habitats around the world. The **National Geographic website** for kids houses information about the life cycles of animals from around the world. **The National Wildlife Federation** features Ranger Rick, with links to a variety of different types of wildlife. Plants and animals are featured in their natural habitats and their life cycles can be explored though stories and pictures.

- The life cycle of organisms can be observed in the classroom or virtually via **The Children's Butterfly Site**, or other grade-appropriate sources of information on the life cycle of organisms **http://www.learningscience.org/lsc1blifecycles.htm**. These sites include local, national and international projects and interactive games that explore various organisms.

- Sessions 3 and 4 of the Annenberg Media series *Essential Science for Teachers: Life Science* provides information about how children can learn about the life cycles of animals and offer classroom footage to illustrate implementation at **http://www.learner.org/resources/series179.html**.

Career Connections

Biologist, Zoologist, Botanist, Horticulturist, Florist, Farmer, Landscape Architect, Ecologist, Veterinarian, Forest Ranger

Prior Knowledge	Future Knowledge
2.LS.2: Some kinds of organisms become extinct when their basic needs are no longer met or the environment changes.	**4.LS.1:** Changes in an organism's environment are sometimes beneficial to its survival and sometimes harmful.

Ohio's Learning Standards- Clear Learning Targets

Science, Grade 3

3.PS.1

MATTER AND FORMS OF ENERGY

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

Vocabulary

Beaker
Gas
Graduated Cylinder
Gravity
Magnification
Weight (mass)
Matter
Metric Unit
Property
Substance
Scale
Solid
Volume
Liquid

Essential Understandings:

- Matter takes up space and has mass.

Note: Differentiating between mass and weight is not necessary at this grade level.

Essential Skills:

The students can determine the weight of solids and liquids with the use of a scale.

The students determine the volume of liquids with the use of a graduated cylinder/beaker and a scale.

The students can identify and describe the physical properties of object.

The students can describe the differences between a solid, a liquid, and a gas.

The students can explain that everything is made of matter and that matter takes up space and has mass (or weight).

Misconceptions

- From a time of 3:15 to 16:40, this video on demand produced by Annenberg shows individual interviews with children that highlight common misconceptions about what is matter (e.g., air is not matter) and ways that this can be addressed in the classroom.

- Kind (2004) cites that students think matter has no permanent aspect. When matter disappears from sight (e.g., when sugar dissolves in water), it ceases to exist.

- Students often think of solids at matter, but not liquids and gases (AAAS, 1993).

- Kind (2004, p.8) cites that children do not reason consistently. They may use sensory reasoning on some occasions and logical reasoning on others. Sensory experience dominates in cases where matter is not visible.

Students often think that:

- Measurement is only linear.

- Any quantity can be measured as accurately as you want.

- Some objects cannot be measured because of their size or inaccessibility.

- The five senses are infallible.

- Gases are not matter because most are invisible.

- Gases do not have mass.

- Air and oxygen are the same gas.

- Helium and hot air are the same gas.

- Materials can only exhibit properties of one state of matter.

- Melting/freezing and boiling/condensation are often understood only in terms of water.

- Steam is visible water gas molecules.

- Materials can only exhibit properties of one state of matter.

- Melting and dissolving are confused.

- Dew formed on the outside of glass comes from the inside of the glass.
- Gases are not matter because most are invisible.
- Weight and volume, which both describe an amount of matter, are the same property.
- Steam is water vapor over boiling water.

Instructional Strategies and Resources

-Discovery Education: (www.discoveryeducation.com)Properties of Matter, Part 1 Properties of Matter, Part 2 A First Look: Solids, Liquids, Gases Matter and Its Properties: Measuring Matter

-Essential Science for Teachers: Physical Science: Session 1: Matter, a video on demand produced by Annenberg, explores the concept of matter with elementary children and teachers. The segment includes defining matter and exploring properties and states of matter. It incorporates interviews with children and classroom segments to identify common misconceptions and gives teaching strategies to address these misconceptions.

Career Connections

Scientist, Engineer, Medical Researcher

Prior Knowledge	**Future Knowledge**
Grade 2: N/A	**4.PS.1:** When objects break into smaller pieces, dissolve, or change state, the total amount of matter is conserved.

Ohio's Learning Standards- Clear Learning Targets

Science, Grade 3

3.PS.2

MATTER AND FORMS OF ENERGY

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

Vocabulary

Cooling
Heating
Melting
Compressibility
Energy Evaporate
States of matter
Properties
Freezing
Gas
Liquid
Matter
Solid
Volume

Essential Understandings:

- The most recognizable 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.

Essential Skills:

The students can demonstrate that heating and cooling causes matter to change its states and properties.

The students can recognize that there are three states of matter which are commonly known as solids, liquids, and gases.

The students can explain that shape and compressibility are properties that are used to distinguish between the states of matter.

The students can identify different properties of solids, liquids, and gases.

The students can employ simple equipment and tools to gather data and extend knowledge on the states of matter.

The students can obtain, evaluate, and ask questions about the observations and explanations of other students' thinking.

The students can communicate about observations, investigations, and explanations of their learning.

Misconceptions
Children often think that:

- Measurement is only linear.
- Any quantity can be measured as accurately as youwant.
- Some objects cannot be measured because of their size or inaccessibility.
- The five senses are infallible.
- Gases are not matter because most are invisible.
- Gases do not have mass.
- Air and oxygen are the same gas.
- Helium and hot air are the same gas.
- Materials can only exhibit properties of one state of matter.
- Melting/freezing and boiling/condensation are often understood only in terms of water.
- Steam is visible water gas molecules.
- Materials can only exhibit properties of one state of matter.
- Melting and dissolving are confused.
- Dew formed on the outside of glass comes from the inside of theglass.
- Gases are not matter because most are invisible.
- Weight and volume, which both describe an amount of matter, are the same property.
- Steam is the visible cloud of water vapor over boiling water.
- Students' explanation of powders as liquids is often "because they can be poured." Reasons for non-rigid objects being neither solid nor liquid are because they "are soft," "crumble," or "can be torn." Children characterized the state of matter of a material according to its macroscopic appearance and behavior with the result that solids are associated with hardness, strength and an inability to bend (Driver et al., 1994).
- Students' understanding of boiling comes before their understanding of evaporation (Keeley, 2005).
- Driver (1994) states that from a sample of students ages 6-8, 70 percent understood that when water boils, vapor comes from it and that the vapor is made of water; the same students did not recognize that when a wet surface dries, the water turns to water vapor.
- Because students confuse heat and temperature as being the same, they believe that the longer something is heated, the hotter it gets and the boiling point increases the longer it is allowed to boil

Instructional Strategies and Resources

-Discovery Education: www.discoveryeducation.com
States of Matter 3, Common Properties of Matter: Atoms, Elements, and States, States of Matter: Solid, Liquid, and Gas, The Language of Science: Physical Science, Science Lab: Matter, Lodge McCammon Songs: Shake: Solids, Liquids, and Gases, Matter Changes Review: Matter, Gases, Three Types of Matter: An Introduction

-**Essential Science for Teachers: Physical Science: Session 1: Matter**, a video on demand produced by Annenberg, explores the concept of matter with elementary children and teachers. The segment includes defining matter and exploring properties and states of matter. It incorporates interviews of children and classroom segments to identify common misconceptions and gives teaching strategies to address these misconceptions. While the segment on plasma is interesting, it is content beyond this grade level.

-*Solids and Liquids*, an interactive simulation from BBC Schools, has children determine the melting point of different substances to observe the properties of liquids and solids.

-*Changing State* is an interactive simulation from BBC Schools that allows students to heat and cool water and to observe phase changes. The optional section dealing with heating the gas further is not aligned to this content statement.

-*Gases Around Us* is an interactive simulation from BBC Schools that demonstrates that gases expand to fill a container.

Career Connections
Scientist, Engineer, Meteorologist, Chef

Prior Knowledge

Grade 2: N/A

Future Knowledge

4.PS.1: When objects break into smaller pieces, dissolve, or change state, the total amount of matter is conserved.

Ohio's Learning Standards- Clear Learning Targets

Science, Grade 3

3.PS.3

MATTER AND FORMS OF ENERGY

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

Vocabulary

Energy
Charged Objects
Magnetic
Motion
Electrical Energy
Heat Energy
Uncharged Objects
Light Energy
Sound Energy

Essential Understandings:

- There are many different forms of energy. Energy is the ability to cause motion or create change.
- The different forms of energy that are outlined at this grade level should be limited to familiar forms that a student is able to observe.

Essential Skills:

The students can demonstrate that heat is a form of energy and can create change in an object.

The students can demonstrate that sound, motion, light, and electricity are also forms of energy which could cause motion or create change.

The students can compare and contrast items to demonstrate that magnetic energy causes motion and creates change.

Misconceptions

- Do not use resources that claim "free energy" or "perpetual motion machines" since these perpetuate myths that violate the law of conservation of energy. These are especially common when dealing with magnetic energy.
- Students do not realize that light, heat and sound are forms of energy and can cause things to happen.
- Energy is a thing, an object or something that is tangible.
- Energy is confined to some particular origin, such as what we get from food or what the electric company sells.
- Energy is a thing. This is a fuzzy notion, probably because of the way we talk about the amount of energy; it is difficult to imagine an amount of an abstraction.
- The terms "energy" and "force" are interchangeable.
- Heat is a substance.
- Heat is not energy.

Instructional Strategies and Resources

-Discovery Education: **www.discoveryeducation.com**

-Electricity and Magnetism: The Magic of Magnets, A First Look: Sound, Electricity and Magnetism: Static Electricity, Exploring: Energy

-Essential Science for Teachers: Physical Science: Session 1: Matter, a video on demand produced by Annenberg, explores the concept of matter with elementary children and teachers. The segment includes defining matter and exploring properties and states of matter. It incorporates interviews with children and classroom segments to identify common misconceptions and gives teaching strategies to address these misconceptions. While the segment on plasma is interesting, it is content beyond this grade level.

-Science in Focus: Energy is a series of videos on demand produced by Annenberg to help teachers understand children's preconceptions about energy and what is important to understand about energy. Some of the content, like forces and work, are not directly related to this content statement. However, teachers need a good understanding of the differences and relationships between these important concepts.

-Write and illustrate a children's book about energy. Use observable forms of magnetic energy, electrical energy, light, sound and heat. Include descriptions and illustrations.

-COSI On Wheels program

Career Connections

Scientist, Engineer, Electrician, Sound Engineer, Lighting Technician, Heating/Cooling Specialist

Prior Knowledge

Grade 2: N/A

Future Knowledge

4.PS.2: Energy can be transferred from one location to another or can be transformed from one form to another.