LAKEWOOD CITY SCHOOL DISTRICT STANDARDS-BASED SCIENCE CURRICULUM
FIRST GRADE

GRADE BAND THEME**: Observations of the Environment--** This theme focuses on helping students develop the skills for systematic discovery to understand the science of the natural world around them in greater depth by using scientific inquiry.

Units: **1. The Sun 2. Water on Earth 3. Basic Needs of Living Things 4. Motion and Materials**

Unit length: One unit per quarter

THE NATURE OF SCIENCE – These skills and understandings should be integrated into grade level content units.



Table 2: Ohio's Cognitive Demands for Science

COGNITIVE DEMAND	DESCRIPTION
DESIGNING TECHNOLOGICAL/ENGINEERING SOLUTIONS USING SCIENCE CONCEPTS (T)	Requires student to solve science-based engineering or technological problems through application of scientific inquiry. Within given scientific constraints, propose or critique solutions, analyze and interpret technological and engineering problems, use science principles to anticipate effects of technological or engineering design, find solutions using science and engineering or technology, consider consequences and alternatives, and/or integrate and synthesize scientific information.
DEMONSTRATING SCIENCE KNOWLEDGE (D)	Requires student to use **scientific inquiry** and develop the ability to think and act in ways associated with inquiry, including asking questions, planning and conducting investigations, using appropriate tools and techniques to gather and organize data, thinking critically and logically about relationships between evidence and explanations, constructing and analyzing alternative explanations, and communicating scientific arguments. (Slightly altered from National Science Education Standards) **Note: Procedural knowledge (knowing how) is included in** *Recalling Accurate Science.*
INTERPRETING AND COMMUNICATING SCIENCE CONCEPTS (C)	Requires student to use subject-specific conceptual knowledge to interpret and explain events, phenomena, concepts and experiences using grade-appropriate scientific terminology, technological knowledge and mathematical knowledge. Communicate with clarity, focus and organization using rich, investigative scenarios, real-world data and valid scientific information.
RECALLING ACCURATE SCIENCE (R)	Requires student to provide accurate statements about scientifically valid facts, concepts and relationships. Recall only requires students to provide a rote response, declarative knowledge or perform routine mathematical tasks. This cognitive demand refers to students' knowledge of science fact, information, concepts, tools, procedures (being able to describe how) and basic principles.

As with all other frameworks and cognitive demand systems, Ohio's system has overlap between the categories. *Recalling Accurate Science* is a part of the other three cognitive demands included in Ohio's framework, because science knowledge is required for students to demonstrate scientific literacy.

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Nature of Science
One goal of science education is to help students become scientifically literate citizens able to use science as a way of knowing about the natural and material world. All students should have sufficient understanding of scientific knowledge and scientific processes to enable them to distinguish what is science from what is not science and to make informed decisions about career choices, health maintenance, quality of life, community and other decisions that impact both themselves and others.

Categories	K-2
Scientific Inquiry, Practice and Applications All students must use these scientific processes with appropriate laboratory safety techniques to construct their knowledge and understanding in all science content areas	● Apply knowledge of science content to real-world challenges. ● Plan and conduct simple scientific investigations using appropriate safety techniques based on explorations, observations and questions. ● Employ simple equipment and tools to gather data and extend the senses. ● Use data and mathematical thinking to construct reasonable explanations. ● Communicate with others about investigations and data.
Science is a Way of Knowing Science assumes the universe is a vast single system in which basic laws are consistent. Natural laws operate today as they did in the past, and they will continue to do so in the future. Science is both a body of knowledge that represents a current understanding of natural systems and the processes used to refine, elaborate, revise and extend this knowledge.	● The world is discovered through exploration. ● Exploration leads to observation. Observation leads to questions. ● Natural events happen today as they happened in the past. ● Events happen in regular patterns and cycles in the natural world.
Science is a Human Endeavor Science has been, and continues to be, advanced by individuals of various races, genders, ethnicities, languages, abilities, family backgrounds and incomes.	● Everyone explores the world which generates questions. ● The answer is not always as important as the process. ● Questions often lead to other questions. ● Discoveries are communicated and discussed with others. ● People address questions through collaboration with peers and continued exploration. ● Everyone can see themselves as scientists.
Scientific Knowledge is Open to Revision in Light of New Evidence Science is not static. Science is constantly changing as we acquire more knowledge.	● It is essential to learn how to identify credible scientific evidence. ● Ideas are revised based on new, credible scientific evidence.

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Earth and Space Science: The Sun

Essential Question: How does the sun affect the Earth?

Big Idea 1: The sun is the main source of energy.

Big Idea 2: Sunlight warms Earth's land, air and water.

Big Idea 3: The amount of exposure to sunlight affects the amount of warming or cooling of air, water and land.

Content Statements	Content Elaboration and Clarification from Model Curriculum	Strategies for Instruction and Assessment + Resource Options
1.ESS.1: The sun is the principal source of energy Sunlight warms Earth's land, air and water. The amount of exposure to sunlight affects the amount of warming or cooling of air, water and land.	**PreK-K Concepts Related to Sun and Weather:** Weather changes every day. Weather changes are short- and long-term. The sun is visible during the day and the apparent position of the sun can change. **Grade 1 Concepts:** Quantitative measurements are used to observe and document the warming and cooling of air, water or soil. The length of time an object or material (including water) is exposed to sunlight and its resulting temperature can be observed, as should the amount of time for the object or material to cool down after it is taken out of the sunlight. Appropriate tools and technology are used to collect, compare and document data. Investigation and experimentation are combined with explanation, questioning and discussion of the results and findings. **Future Application of Concepts Grade 2:** The relationship between energy and long- and short-term weather is introduced.	**Sun Unit** Ohio's Science Model Curriculum **Resource List**

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Earth and Space Science: Water on Earth

Essential Question: What do you notice about water on Earth?

Big Idea 1: Water is present in many places on Earth.

Big Idea 2: Water on Earth is present in many forms (solid and liquid).

Big Idea 3: Water can change the shape of land.

Content Statements	Content Elaboration and Clarification from Model Curriculum	Strategies for Instruction and Assessment + Resource Options
1.ESS.2: Water on Earth is present in many forms. The physical properties of water can change. These changes occur due to changing energy. Water can change from a liquid to a solid and from a solid to a liquid. *Note: Water as a vapor is not introduced until grade 2; the water cycle is reserved for later grades.*	**PreK-K Concepts Related to Water:** Water can be observed in many different forms. Precipitation (e.g., rain, sleet, hail, snow) is a component of weather that can be measured. **Grade 1 Concepts:** Water can be observed in lakes, ponds, streams, wetlands, the ocean and through weather events. Freezing and melting of water are investigated through measurements and observations using technology, in the classroom or in a natural setting. Examining maps of Ohio, world maps or globes can illustrate the amount of Earth's surface that is covered in water and why it is important to learn about water. Water can change the shape of the land (e.g., moving soil or sand along the banks of a river or at the beach). Water can also be observed in the air as clouds, steam or fog, but this content should be limited to observation only at this grade level. Investigations (inside or outside) and experimentation are used to demonstrate the changing properties of water. Use appropriate tools to test and measure water's weight, texture, temperature or size (e.g., compare measurements of water before and after freezing, examine the texture of snow or ice crystals using a hand lens) to document the physical properties. **Future Application of Concepts Grade 2:** Water as a vapor is introduced. Water is present in the atmosphere.	**Water on Earth Unit** Ohio's Science Model Curriculum **Resource List**

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LIFE SCIENCE: Living Things

Essential Question: What do living things need to survive?

Big Idea 1: Living things need sunlight, water, food and an appropriate range of temperature for survival.
Big Idea 2: Plants get their energy from sunlight.
Big Idea 3: Animals get energy from plants and other animals.

Content Statements	Content Elaboration and Clarification from Model Curriculum	Strategies for Instruction and Assessment + Resource Options
1.LS.1: Living things have basic needs, which are met by obtaining materials from the physical environment. Living things require energy, water, and a particular range of temperatures in their environments. Plants get energy from sunlight. Animals get energy from plants and other animals. Living things acquire resources from the living and nonliving components of the environment.	**PreK-K Concepts Related to Interactions within Environments:** Living things are identified in a variety of ecosystems. Living things have physical traits, which enable them to live in different ecosystems. **Grade 1 Concepts:** Earth has many different environmental conditions that support living things. The emphasis of this content statement is that living things meet their basic needs for survival by obtaining necessary materials from the environment. This includes, but is not limited to, temperature range, amount of water, amount of sunlight and available food sources. The environment includes both living (plants and animals) and nonliving (e.g., water, air, sunlight, nutrients) things. Living things get the energy they require to respond, grow and reproduce from the environment. Observing energy being used in everyday situations can help promote understanding that living things get resources from the physical environment. A detailed discussion of energy is not appropriate at this grade level. Energy is not scientifically explained until grade 3. When studying living things, ethical treatment of animals and safety must be employed. See guidelines here. Respect for and proper treatment of living things must be modeled. Investigations about the types of living things that live in specific ecosystems can be done virtually or in nature. **Future Application of Concepts Grade 2:** How living things impact the environment and how the environment impacts living things will be examined.	**Living Things Unit (links to highlighted resources below)** information about planting the amaryllis **Mammals of Ohio Field Guide** Habitat matching game Ohio's Science Model Curriculum **Resource List**

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Content Statements	Content Elaboration and Clarification from Model Curriculum	Strategies for Instruction and Assessment + Resource Options
1.LS.2: Living things survive only in environments that meet their needs. Resources are necessary to meet the needs of an individual and populations of individuals. Living things interact with their physical environments as they meet those needs. Effects of seasonal changes within the local environment directly impact the availability of resources.	**PreK-K Concepts Related to Interactions within Environments:** Living things are identified in a variety of ecosystems. Living things have physical traits, which enable them to live in different ecosystems. **Grade 1 Concepts:** Plants and animals require resources from the environment. The focus at this grade level is on macroscopic interactions and needs of common living things (plants and animals). Animals require basic habitat components, including food, water, cover and space. The amount and distribution of the basic components will influence the types of animals that can survive in an area. Food sources might include plants, fruits, seeds, insects or other animals. Water sources may be as small as drops of dew found on grass or as large as a lake or river. Animals need cover for many life functions including nesting, escaping from predators, seeking shelter from unfavorable weather conditions and resting. Animals also need space in which to perform necessary activities such as feeding or raising young. Seasonal changes affect the resources available to living things (e.g., grasses are not as available in winter as they are in summer). The needs of plants include room to grow, appropriate temperature range, light, water, air and nutrients. Changes in these conditions can affect the growing season for certain plants. The amount and distribution of these conditions will influence the types of plants that can survive in an area. Observations of seasonal changes in temperature, liquid water availability, wind and light are applied to the effect of seasonal changes on local plants. **Future Application of Concepts Grade 2:** This concept expands to include interactions between organisms and the physical environment as the environment changes.	**Living Things Unit** Ohio's Science Model Curriculum **Resource List**

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PHYSICAL SCIENCE: Motion and Materials

Essential Question: What conditions cause change to the properties of objects and materials?

Big Idea 1: Heating and cooling changes some, but not all, properties of materials.

Big Idea 2: Not all materials change in the same way.

Big Idea 3: Other actions can change the properties of objects (ex. tearing, wetting, cutting, pressure application)

Content Statements	Content Elaboration and Clarification from Model Curriculum	Strategies for Instruction and Assessment + Resource Options
1.PS.1: Properties of objects and materials can change. Objects and materials change when exposed to various conditions, such as heating or cooling. Changes in temperature are a result of changes in energy. Not all materials change in the same way.	**PreK-K Concepts Related to Properties of Objects and Materials:** Objects are things that can be seen or felt. Properties can be observed using tools or one's senses and can be used to sort objects. Comparisons of objects are made as a precursor to measurement. **Grade 1 Concepts:** Materials can be exposed to conditions that change some of their properties, but not all materials respond the same way. The properties of a material can change as it interacts with other materials. Heating and cooling changes some, but not all, properties of materials. Emphasis is placed on observations. Concepts of thermal energy, atoms and heat transfer are not appropriate at this grade level. Some materials are a liquid or solid at room temperature and may change from one form to the other with a change in temperature. A liquid may turn into a solid when cooled. A solid may turn into a liquid when heated. The amount of the material in the solid or liquid remains the same before and after the change. Investigations and experiments (may include virtual investigations) are conducted to explore property changes of objects and materials. **Future Application of Concepts Grade 2:** Water can change from liquid to vapor in the air and from vapor to liquid (ESS).	**Materials Unit** Ohio's Science Model Curriculum **Resource List**

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Essential Question: How can forces of motion move objects along different paths?

Big Idea 1: An object is in motion when its position is changing.

Big Idea 2: Objects can move along in different paths (straight, zigzag, circular and back and forth).

Big Idea 3: The motion of an object is affected by a force.

Content Statements	Content Elaboration and Clarification from Model Curriculum	Strategies for Instruction and Assessment + Resource Options
1.PS.2: Objects can be moved in a variety of ways, such as straight, zigzag, circular and back and forth. The position of an object can be described by locating it relative to another object or to the object's surroundings. An object is in motion when its position is changing. The motion of an object can be affected by pushing or pulling. A push or pull is a force that can make an object move faster, slower or go in a different direction. Changes in motion are a result of changes in energy. *Note: Scientific definitions and calculations of speed are not appropriate at this grade level.* **Future Application of Concepts Grade 2:** Forces are necessary to change the motion of objects.	**PreK-K Concepts Related to Motion:** Vibrating objects can cause sound. **Grade 1 Concepts:** The position of an object is described by comparing its location relative to another object (e.g., in front, behind, above, below). Objects can be moved and their positions changed. Objects can move in a straight line (e.g., a dropped coin falling to the ground) or a circle (e.g., a pinwheel) or back and forth (e.g., a swing) or even in a zigzag pattern. Objects near Earth fall to the ground unless something holds them from falling. Object motion can be faster, slower or change direction by pushing or pulling the object. Experimentation, testing and investigations of different ways to change the motion of different objects (e.g., a ball, a pinwheel, a kite) can be used to demonstrate movement. Force is a push or pull between two objects and energy is the property of an object that can cause change. A force acting on an object can sometimes result in a change in energy. The differences between force and energy will be developed over time and are not appropriate for this grade level.	**Motion Unit** Ohio's Science Model Curriculum **Resource List**