# LAKEWOOD CITY SCHOOL DISTRICT STANDARDS-BASED KINDERGARTEN SCIENCE CURRICULUM

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.** Properties of Everyday Objects and Materials **2.** Space **3.** Living Things **4.** Weather

Unit length: 1 unit per quarter




## 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)<br>**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.<br>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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## THE NATURE OF SCIENCE--K-2: These skills and understandings should be integrated into grade level content units.

| | |
|---|---|
| **Nature of Science**<br>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. | |
| **Scientific Inquiry, Practice and Applications**<br><br>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.<br>• Plan and conduct simple scientific investigations using appropriate safety techniques based on explorations, observations and questions.<br>• Employ simple equipment and tools to gather data and extend the senses.<br>• Use data and mathematical thinking to construct reasonable explanations.<br>• Communicate with others about investigations and data. |
| **Science is a Way of Knowing**<br><br>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.<br>• Exploration leads to observation. Observation leads to questions.<br>• Natural events happen today as they happened in the past.<br>• Events happen in regular patterns and cycles in the natural world. |
| **Science is a Human Endeavor**<br><br>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.<br>• The answer is not always as important as the process.<br>• Questions often lead to other questions.<br>• Discoveries are communicated and discussed with others.<br>• People address questions through collaboration with peers and continued exploration.<br>• Everyone can see themselves as scientists. |
| **Scientific Knowledge is Open to Revision in Light of New Evidence**<br><br>Science is not static. Science is constantly changing as we acquire more knowledge. | • It is essential to learn how to identify credible scientific evidence.<br>• Ideas are revised based on new, credible scientific evidence. |

# LAKEWOOD CITY SCHOOL DISTRICT STANDARDS-BASED KINDERGARTEN SCIENCE CURRICULUM

## PHYSICAL SCIENCE: Properties of Everyday Objects and Materials

**Essential Question:** How can we sort objects?

**BIG IDEA 1:** Objects can be sorted by their properties.

**BIG IDEA 2:** Objects can be sorted by how they produce vibrations and sound.

**BIG IDEA 3:** Objects can be sorted by their pitch and/or volume.

| Content Statements | Content Elaboration and Clarification from Model Curriculum | Strategies for Instruction and Assessment + Resource Options |
|---|---|---|
| K.PS.1: Objects and materials can be sorted and described by their properties.<br><br>Objects can be sorted and described by the properties of the materials from which they are made. Some of the properties can include color, size and texture. | In kindergarten, the concept that objects are made of specific materials (e.g., clay, cloth, paper, metal, glass) is reinforced. Objects have certain properties (e.g., color, shape, size, temperature, odor, texture, flexibility) that can be described, compared and sorted. Students should not use the sense of taste as a way of observing an unknown substance. Observations are limited to descriptors such as hot, warm, cold, heavy and light. Comparisons of objects are a precursor to measurement. Comparisons are used to sort and describe objects (e.g., is the wooden block heavier or lighter than the plastic block?). Standard and nonstandard measuring tools can give additional information about the environment and can be used to make comparisons of objects and events. Magnifiers can be used to see detail that cannot be seen with the unaided eye. Familiar objects from home, the classroom or the natural environment can be explored and investigated.<br><br>**Future Application of Concepts Grades 1-2:** Changes in objects are investigated, including temperature changes, solid-liquid phase changes and possible changes in amount of liquid water in open and/or closed containers. | **Properties of Objects Unit**<br><br>Ohio's Science Model Curriculum<br><br>You Hear with Your Ears by Melvin and Gllda Berger<br><br>**Resource List**<br><br>https://jr.brainpop.com/search/?keyword=Sound |

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| Content Statements | Content Elaboration and Clarification from Model Curriculum | Strategies for Instruction and Assessment + Resource Options |
|---|---|---|
| K.PS.2: Some objects and materials can be made to vibrate and produce sound.<br><br>Sound is produced by touching, blowing or tapping objects. The sounds that are produced vary depending on the properties of objects. Sound is produced when objects vibrate. | Sound can be made in many ways. Objects like cymbals, the tabletop or drums can be tapped to produce sound. Objects like a rubber band or a guitar string can be plucked to produce sound. Objects like a bottle or a trumpet can be blown into to produce sound. A wide variety of sounds can be made with the same object (e.g., a plastic bottle could be tapped or blown into). The connection between sound energy and the vibration of an object must be made. Vibrations can be made visible as water splashes when a cymbal or triangle is placed in water or when rice vibrates on the top of a banging drum. The concepts of pitch (low vs. high notes) and volume (loudness) are introduced. Sound needs to be experienced, investigated and explored through observations and experimentation. Standard, virtual and student-constructed instruments can be used to explore sound. Wave descriptions of sound and the propagation of sound energy are not appropriate at this grade level.<br><br>**Future Application of Concepts Grades 1-2:** Exploring sound provides an experiential basis for the concepts of motion and energy. A variety of motions is explored. Forces are needed to change the motion of objects. | **Properties of Objects Unit**<br><br>Ohio's Science Model Curriculum<br><br>Resource List |

# LAKEWOOD CITY SCHOOL DISTRICT STANDARDS-BASED KINDERGARTEN SCIENCE CURRICULUM

## EARTH AND SPACE SCIENCE: Space

**Essential Question:** What do we notice about the moon, sun, stars from the time we wake up to the time we go to bed?

**BIG IDEA 1:** The moon, sun and stars appear in different positions at different times of day or night.

**BIG IDEA 2:** The observable shape of the moon changes in size very slowly throughout the month.

**BIG IDEA 3:** The sun is only visible during the day.

| Content Statements | Content Elaboration and Clarification from Model Curriculum | Strategies for Instruction and Assessment + Resource Options |
|---|---|---|
| **K.ESS.2: The moon, sun and stars can be observed at different times of the day or night.**<br><br>● The moon, sun and stars appear in different positions at different times of the day or night.<br>● Sometimes the moon is visible during the night, sometimes the moon is visible during the day and at other times the moon is not visible at all.<br>● The observable shape of the moon changes in size very slowly throughout the month.<br>● The sun is visible only during the day. The sun's position in the sky appears to change in a single day and from season to season.<br>● Stars are visible at night, some are visible in the evening or morning and some are brighter than others. | Changes in the position of the sun in the sky can be measured and recorded at different times during the school day. Observations can also be made virtually. This data can be compared from month to month to monitor changes. Stars, groups of stars and different phases of the moon can be observed through books or virtually and documented throughout the month. The names of the stars, constellations or moon phases are not appropriate for kindergarten; only the changes in appearances that can be observed are included. At times, the moon can be observed in the daylight. Drawings, photographs or other graphics can be used to document student observations.<br><br>Demonstrating (either 3-D or virtual) and testing/experimenting (through kits or models) can be used to explain the changing positions (in the sky) of the sun, stars and moon. Review, question and discuss the demonstrations and observations to deepen understanding.<br><br>**Future Application of Concepts Grades 1-2:** The sun is introduced as a primary source of energy that relates to long- and short-term weather changes. | **Space Unit Plan**<br><br>Resource ListKindergarten Science Resources 2019-20<br><br>Ohio's Science Model Curriculum<br><br>https://jr.brainpop.com/science/space/ |

# LAKEWOOD CITY SCHOOL DISTRICT STANDARDS-BASED KINDERGARTEN SCIENCE CURRICULUM

## LIFE SCIENCE: Living Things

**Essential Question**: What does it mean to be a living thing?

**BIG IDEA 1:** Living things grow and reproduce.

**BIG IDEA 2:** Living things are found worldwide.

**BIG IDEA 3:** Living things have traits that influence their survival.

| Content Statements | Content Elaboration and Clarification from Model Curriculum | Strategies for Instruction and Assessment + Resource Options |
|---|---|---|
| **K.LS.1: Living things have specific characteristics and traits.**<br><br>Living things grow and reproduce. Living things are found worldwide.<br><br>**Future Application of Concepts Grades 1-2:** This content builds to understanding that living things use the environment to acquire what they need in order to survive. | The emphasis of this content statement is to build a grade-appropriate understanding of what it means to be living, not to distinguish living and nonliving (things). Nonliving things often share some characteristics with living things (e.g., a fire uses energy and grows). Simply listing the characteristics that distinguish living things from nonliving things is not appropriate at this grade level.<br><br>There are different kinds of living things. The focus is on familiar organisms (e.g., grass, trees, flowers, cats, dogs, horses). Some grade-appropriate characteristics include that living things grow, reproduce, require energy and respond to stimuli. Animals need food for energy; plants acquire energy from the sun.<br><br>Living things respond to stimuli (e.g., fish in an aquarium respond to the addition of food). Living things grow (e.g., seedlings placed in soil grow). Conduct experiments and explorations to observe what happens when plants are placed in different classroom habitats (e.g., on the floor, in a closet, on a desk). Some observations can also be done virtually.<br><br>When studying living things, ethical treatment of animals, safety procedures and proper hygiene 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. | **Living Things Unit Plan**<br><br>Resource List<br><br>Ohio's Science Model Curriculum |

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| Content Statements | Content Elaboration and Clarification from Model Curriculum | Strategies for Instruction and Assessment + Resource Options |
|---|---|---|
| **K.LS.2: Living things have physical traits and behaviors, which influence their survival.**<br><br>Living things are made up of a variety of structures. Some traits can be observable structures. Some of these structures and behaviors influence their survival. | At this grade level, providing exposure through personal observation and stories to a large variety of living things is required. The focus is not on naming the structures of living things but associating through interaction and observation that living things are made of structures, and because of those structures, living things can do specific activities. Identify and discuss examples, such as: birds having wings for flying and beaks for eating; dogs having eyes for seeing, teeth for chewing and legs for moving; trees having leaves to capture sunlight and trunks for support.<br><br>Concrete experiences are necessary to deepen knowledge of the traits and behaviors of living things. Technology can be used to compare data on the number of honeybees observed in the schoolyard with other schools. Additional inquiry investigations include conducting observations of pond water (focusing on macroscopic organisms), raising a classroom pet (check for student allergies), bird watching, noting differences between different types of plants and planting seeds and watching them grow.<br><br>**Future Application of Concepts Grades 1-2:** The physical environment is identified as the source for what organisms need to survive. | **Living Things Unit Plan**<br><br>Resource List<br><br>Ohio's Science Model Curriculum |

# LAKEWOOD CITY SCHOOL DISTRICT STANDARDS-BASED KINDERGARTEN SCIENCE CURRICULUM

## EARTH AND SPACE SCIENCE: Weather

**Essential Questions:** How does the weather change throughout the day? How does the weather change from day to day?

**BIG IDEA 1:** Weather is measured by wind, temperature and precipitation.

**BIG IDEA 2:** Daily weather patterns help define the seasons.

| Content Statements | Content Elaboration and Clarification from Model Curriculum | Strategies for Instruction and Assessment + Resource Options |
|---|---|---|
| K.ESS.1: Weather changes are long-term and short-term.<br><br>• Weather changes occur throughout the day and from day to day.<br>• Air is a nonliving substance that surrounds Earth and wind is air that is moving.<br>• Wind, temperature and precipitation can be used to document short-term weather changes that are observable.<br>• Yearly weather changes (seasons) are observable patterns in the daily weather changes.<br><br>*Note: The focus is on observing the weather patterns of seasons. The reason for changing seasons is not appropriate for this grade level; this is found in grade 7.* | Wind, temperature and precipitation are components of the weather that can be observed and measured for kindergarten. The measurements collected and tools used can be nonstandard and must be age appropriate. For example, the temperature may be above or below a given point (warmer or colder) or the amount of snow may be marked on a dowel rod to check the depth.<br><br>Weather measurements should be collected on a regular basis throughout the school year and then compared, explained and discussed each week and each month. At the end of the school year, a comparison can be made and seasons can be identified by the patterns that were measured throughout the year. Consistent review and questioning to deepen understanding are essential.<br><br>Use technology to study weather events, record classroom data, compare classroom data to local data, communicate and share data with other classrooms.<br><br>**Future Application of Concepts Grades 1-2:** The properties of water and air are explored as they relate to the weather observations and measurement from kindergarten. | **Weather and Seasonal Changes Unit**<br><br>Additional Weather Unit Ideas<br><br>Resource List<br><br>**IDEAS FOR THINGS TO DO**<br>1. **RAIN JAR**<br>2. **WHY DO LEAVES CHANGE COLOR?**<br>3. **SNOW SLIME**<br>4. **STUDENTS AS A METEOROLOGIST**<br><br>Ohio's Science Model Curriculum |