

## Kindergarten Science

<b>Theme</b> <i>Observations of the Environment</i>	
<b>Strand Connection</b> <i>Living and nonliving things have specific physical properties that can be used to sort and classify. The physical properties of air and water are presented as they apply to weather.</i>	
<b>Science Inquiry and Applications:</b> <i>All students must be developing the ability to:</i> <ul style="list-style-type: none"> <li>• Observe and ask questions about the natural environment</li> <li>• Plan and conduct simple investigations</li> <li>• Employ simple equipment and tools to gather data and extend the senses</li> <li>• Use appropriate mathematics with data to construct reasonable explanations</li> <li>• Communicate about observations, investigations, and explanations</li> <li>• Review and ask questions about the observations and explanations of others</li> </ul>	
<b>Topic</b> <i>Daily and Seasonal Changes</i>  This topic focuses on observing, exploring, describing, and comparing weather changes, patterns in the sky, and changing seasons.	<b>Pacing</b>  Ongoing – done throughout year
<b>Content Statement</b>  <b>1. Weather changes are long term and short term.</b>  <b>Learning Targets:</b> <ul style="list-style-type: none"> <li>• I can observe and measure (nonstandard) wind.</li> <li>• I can describe wind as moving air.</li> <li>• I can observe and measure (nonstandard) temperature.</li> <li>• I can observe and measure (nonstandard) precipitation (rain, sleet, hail, snow).</li> <li>• I can use technology to communicate and share weather data.</li> </ul>	<b>Content Elaborations</b>  <b>Kindergarten Concepts</b> 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 is marked on a dowel rod to check the depth.  Weather measurements must 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.  Use technology to compare classroom data to local data, study weather events, communicate and share data with other classrooms, and record classroom data.

	<p><b>Future Application of Concepts</b></p> <p>Grades 1-2: The properties of water and air are explored as they relate to the weather observations and measurement from Kindergarten.</p> <p>Grades 3-5: Different states of water are defined in Physical Sciences. Wind and water are recognized as processes that can change the surface of Earth through weathering and erosion. The observed seasons from Kindergarten are related to the sun and the tilt and orbit of Earth in grade 5.</p>
<p><b>Content Vocabulary</b></p> <ul style="list-style-type: none"> <li>• wind</li> <li>• air</li> <li>• temperature</li> <li>• precipitation</li> <li>• gauge</li> <li>• thermometer</li> </ul>	<p><b>Academic Vocabulary</b></p> <ul style="list-style-type: none"> <li>• observe</li> <li>• measure</li> <li>• communicate</li> <li>• technology</li> </ul>
<p><b>Formative Assessments</b></p> <ul style="list-style-type: none"> <li>• Weather Journal – student draw/selected photos</li> </ul>	<p><b>Summative Assessments</b></p> <p>Not applicable at this grade level</p>
<p><b>Resources</b></p> <ul style="list-style-type: none"> <li>• Rain Gauge</li> <li>• Snow Gauge</li> <li>• Beaufort Scale</li> <li>• Thermometer</li> <li>• Journey North</li> <li>• Outside my window?</li> <li>• Epals.com</li> <li>• <i>The Wind Blew</i>, by Pat Hutchins</li> </ul>	<p><b>Enrichment Strategies</b></p> <ul style="list-style-type: none"> <li>• Introducing standard measurement for temperature and wind</li> <li>• Comparing local weather information to other locations</li> </ul>
<p><b>Integrations</b></p> <ul style="list-style-type: none"> <li>• Morning routine</li> <li>• Read alouds</li> <li>• Writing workshop</li> <li>• Writing pen pals/ePals</li> <li>• Science journaling</li> <li>• Math graphing</li> </ul>	<p><b>Intervention Strategies</b></p> <ul style="list-style-type: none"> <li>• Peer models</li> <li>• One-on-one help with teacher or volunteer</li> <li>• Visual prompts and posters</li> <li>• Use of technology as aide</li> <li>• Small group instruction</li> </ul>

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<b>Science Inquiry and Applications:</b> <i>All students must be developing the ability to:</i> <ul style="list-style-type: none"> <li>• Observe and ask questions about the natural environment</li> <li>• Plan and conduct simple investigations</li> <li>• Employ simple equipment and tools to gather data and extend the senses</li> <li>• Use appropriate mathematics with data to construct reasonable explanations</li> <li>• Communicate about observations, investigations, and explanations</li> <li>• Review and ask questions about the observations and explanations of others</li> </ul>	
<b>Topic</b> <i>Daily and Seasonal Changes</i>  This topic focuses on observing, exploring, describing, and comparing weather changes, patterns in the sky, and changing seasons.	<b>Pacing</b>  <i>Watch the moon over the course of a month.            Could be ongoing throughout the year.</i>
<b>Content Statement</b>  <b>2. The moon, sun, and stars can be observed at different times of the day and night.</b>  <b>Learning Targets:</b> <ul style="list-style-type: none"> <li>• I can describe how the moon looks in the sky over a month’s time (shape, position in sky, time of day).</li> <li>• I can describe how the sun moves across the sky during the day.</li> <li>• I can describe when stars can be seen in the sky.</li> <li>• I can observe the differences between stars (bright, dim, colors).</li> </ul>	<b>Content Elaborations</b>  <b>Kindergarten Concepts</b> Changes in the position of the sun in the sky can be measured and recorded at different times during the school day. Observations also can 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 and what can actually be observed are included. The moon also can be observed in the daylight, at times. Drawings, photographs, or other graphics can be used to document student observations.  Demonstrating (either 3-D or virtual) and testing/experimenting (through kits or models) must 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.

	<p><b><i>Future Application of Concepts</i></b></p> <p>Grades 1-2: The sun is introduced as a primary source of energy that relates to long- and short-term weather changes.</p> <p>Grades 3-5: The tilt and orbit of the Earth and position of the sun are related to the seasons, the sun is the only star in the solar system, and celestial bodies orbit the sun.</p>
<p><b>Content Vocabulary</b></p> <ul style="list-style-type: none"> <li>• bright/dim</li> <li>• moon</li> <li>• stars</li> <li>• sun</li> </ul>	<p><b>Academic Vocabulary</b></p> <ul style="list-style-type: none"> <li>• appearance</li> <li>• describe</li> <li>• position</li> <li>• observe/observation</li> </ul>
<p><b>Formative Assessments</b></p> <ul style="list-style-type: none"> <li>• Journaling using virtual sky</li> </ul>	<p><b>Summative Assessments</b></p> <p>Not applicable at this grade level</p>
<p><b>Resources</b></p> <ul style="list-style-type: none"> <li>• Virtual sky website</li> <li>• Make moon journal page</li> <li>• OSU Planetarium</li> <li>• Make your own planetarium</li> </ul>	<p><b>Enrichment Strategies</b></p> <ul style="list-style-type: none"> <li>• Using technology to observe and look up the moon as it appears in different places and times</li> <li>• Learning the names of the phases of the moon</li> </ul>
<p><b>Integrations</b></p> <ul style="list-style-type: none"> <li>• Morning routine</li> <li>• Read alouds</li> <li>• Writing workshop</li> <li>• Writing pen pals/ePals</li> <li>• Science journaling</li> <li>• Learning of seasons</li> </ul>	<p><b>Intervention Strategies</b></p> <ul style="list-style-type: none"> <li>• Peer models</li> <li>• One-on-one help with teacher or volunteer</li> <li>• Visual prompts and posters</li> <li>• Use of technology as aide</li> <li>• Small group instruction</li> </ul>

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<b>Science Inquiry and Applications:</b> <i>All students must be developing the ability to:</i> <ul style="list-style-type: none"> <li>• Observe and ask questions about the natural environment</li> <li>• Plan and conduct simple investigations</li> <li>• Employ simple equipment and tools to gather data and extend the senses</li> <li>• Use appropriate mathematics with data to construct reasonable explanations</li> <li>• Communicate about observations, investigations, and explanations</li> <li>• Review and ask questions about the observations and explanations of others</li> </ul>	
<b>Topic</b> <i>Physical and Behavioral Traits of Living Things</i>  This topic focuses on observing, exploring, describing, and comparing living things in Ohio.	<b>Pacing</b>  Ongoing Spring months
<b>Content Statement</b>  <b>3. <i>Living things are different from nonliving things.</i></b>  <b>Learning Targets:</b> <ul style="list-style-type: none"> <li>• I can identify living things.</li> <li>• I can identify nonliving things.</li> <li>• I can explain what it means to be alive.</li> <li>• I know that living things respond to stimuli.</li> <li>• I know living things need food/energy.</li> <li>• I know living things grow.</li> </ul>	<b>Content Elaborations</b>  <b>Kindergarten Concepts</b> 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.  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 respond to stimuli, grow, and require energy.  Living things respond to stimuli. The responses described must be easy to observe (e.g., fish in an aquarium respond to a stimulus – food). Living things grow (e.g., plant seeds or seedlings and watch them grow). Observing plants growing toward a light source can lead to experiments and explorations of what happens when the plant is placed in a different location in the classroom (e.g., on the floor, in a closet, on a desk) or rotated 90 degrees. Some observations also can be done virtually.

	<p>Animals need food; plants make their own food. Read grade-appropriate, nonfiction books to students or by students (e.g., picture books) that accurately describe the characteristics of living things found in Ohio. Technology also can be used to find photographs and stories or take photographs of living things in Ohio.</p> <p>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 <a href="http://www.nsta.org/about/positions/animals.aspx">http://www.nsta.org/about/positions/animals.aspx</a>.</p> <p><b>Future Application of Concepts</b></p> <p>Grades 1-2: This content builds to understanding that living things use the environment to acquire what they need in order to survive.</p> <p>Grades 3-5: Food webs and food chains are used to illustrate energy transfer within an ecosystem.</p> <p>Grades 6-8: The characteristics of life are detailed via Modern Cell Theory and reproduction.</p>
<p><b>Content Vocabulary</b></p> <ul style="list-style-type: none"> <li>• alive</li> <li>• living</li> <li>• nonliving</li> <li>• stimuli</li> <li>• grow</li> <li>• energy</li> </ul>	<p><b>Academic Vocabulary</b></p> <ul style="list-style-type: none"> <li>• identify</li> <li>• respond</li> <li>• explain</li> </ul>
<p><b>Formative Assessments</b></p> <ul style="list-style-type: none"> <li>• Picture sort – living vs. nonliving things (pocket chart, Smart Board, etc.)</li> </ul>	<p><b>Summative Assessments</b></p> <p>Not applicable at this grade level</p>
<p><b>Resources</b></p> <ul style="list-style-type: none"> <li>• Seeds, soil, planting materials, etc.</li> <li>• Light source</li> </ul>	<p><b>Enrichment Strategies</b></p> <ul style="list-style-type: none"> <li>• Exposing plants to different variables and allowing students to make predictions as to what may or may not happen (i.e., changing where it is growing, changing the food source, etc.).</li> </ul>

<ul style="list-style-type: none"><li>• Photographs of living things</li><li>• Class pet</li></ul>	
<p><b>Integrations</b></p> <ul style="list-style-type: none"><li>• Measuring and graphing plant growth</li><li>• Read alouds</li><li>• Science journaling (writing/drawing observations)</li><li>• Sorting living and nonliving things</li></ul>	<p><b>Intervention Strategies</b></p> <ul style="list-style-type: none"><li>• Peer models</li><li>• One-on-one help with teacher or volunteer</li><li>• Visual prompts and posters</li><li>• Use of technology as aide</li><li>• Small group instruction</li></ul>

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<b>Topic</b> <i>Physical and Behavioral Traits of Living Things</i>  This topic focuses on observing, exploring, describing, and comparing living things in Ohio.	<b>Pacing</b>  2 weeks
<b>Content Statement</b>  <b>4. <i>Living things have physical traits and behaviors which influence their survival.</i></b>  <b>Learning Targets:</b> <ul style="list-style-type: none"> <li>• I can recognize the physical characteristics of living things that help them survive.</li> <li>• I can describe how parts of plants and animals are used for different things.</li> </ul>	<b>Content Elaborations</b>  <b>Kindergarten Concepts</b> 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 parts of living thing but associating through interaction and observation that living things are made of parts, and because of those parts living things can do specific things. The scientific explanations of how those parts function will come later. Identify and discuss examples such as birds have wings for flying and beaks for eating. Dogs have eyes for seeing, teeth for chewing, and legs for moving. Trees have leaves and trunks.  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 (e.g., using a hand lens, focusing on macroscopic organisms), raising a classroom pet, planting seeds and watching them grow, and noting differences between different types of plants or bird watching.

	<p>Note: To ensure the health of students, check for allergies prior to raising a classroom pet.</p> <p><b>Future Application of Concepts</b>  Grades 1-2: The physical environment is identified as the source for what organisms need to survive.  Grades 3-5: Plants and animals have certain physical or behavioral characteristics that improve their chances of surviving in particular environments.  Grades 6-8: Changes in environmental conditions can affect how beneficial a trait will be for survival and reproductive success of an individual or an entire species.</p>
<p><b>Content Vocabulary</b></p> <ul style="list-style-type: none"> <li>• physical characteristics</li> <li>• survive</li> </ul>	<p><b>Academic Vocabulary</b></p> <ul style="list-style-type: none"> <li>• parts</li> <li>• recognize</li> <li>• describe</li> <li>• compare</li> <li>• contrast</li> </ul>
<p><b>Formative Assessments</b></p> <ul style="list-style-type: none"> <li>• Compare and contrast a variety of living things</li> </ul>	<p><b>Summative Assessments</b>  Not applicable at this grade level</p>
<p><b>Resources</b></p> <ul style="list-style-type: none"> <li>• Hand lens</li> </ul>	<p><b>Enrichment Strategies</b></p> <ul style="list-style-type: none"> <li>• Make a Venn Diagram that compares and contrasts physical traits of living things.</li> <li>• Design and write about your own animal including its environment and physical traits.</li> </ul>
<p><b>Integrations</b></p> <ul style="list-style-type: none"> <li>• Discussion of fiction vs. nonfiction in regard to characteristics plants and animals possess in books and in real life</li> <li>• Sorting animals by characteristics</li> </ul>	<p><b>Intervention Strategies</b></p> <ul style="list-style-type: none"> <li>• Peer models</li> <li>• One-on-one help with teacher or volunteer</li> <li>• Visual prompts and posters</li> <li>• Use of technology as aide</li> <li>• Small group instruction</li> </ul>

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<b>Topic</b> <i>Properties of Everyday Objects and Materials</i>  This topic focuses on the production of sound and on observing, exploring, describing, and comparing the properties of objects and materials with which the student is familiar.	<b>Pacing</b>  2 weeks
<b>Content Statement</b>  <b>5. Objects and materials can be sorted and described by their properties.</b>  <b>Learning Targets:</b> <ul style="list-style-type: none"> <li>• I can use my senses to describe properties of objects.</li> <li>• I can identify materials (clay, cloth, paper, metal, glass).</li> <li>• I can sort objects by materials or other properties (color, size, texture).</li> </ul>	<b>Content Elaborations</b>  <b>Kindergarten Concepts</b> 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. Temperature observations must be limited to descriptors such as hot, warm, and cold. Observations of weight must be limited to describing objects as heavy or light. Comparisons must be 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 must be explored and investigated.  Note: Using the sense of taste should be prohibited in the classroom. Discussions of taste can be limited to experiences outside the classroom. Comparisons of objects are a precursor to measurement.

	<p><b><i>Future Application of Concepts</i></b></p> <p>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.</p> <p>Grades 3-5: Matter is defined and gases (air) are introduced. Measurements of weight and liquid volume are made. The mass* and kind of material remains the same when an object is reshaped or broken into pieces. The properties of solids, liquids, and gases (air) and phase changes are explored.</p> <p>*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.</p>
<p><b>Content Vocabulary</b></p> <ul style="list-style-type: none"> <li>• properties</li> <li>• materials</li> <li>• senses</li> <li>• objects</li> <li>• clay</li> <li>• cloth</li> <li>• paper</li> <li>• metal</li> <li>• glass</li> <li>• color</li> <li>• size</li> <li>• texture</li> <li>• heavy</li> <li>• light</li> <li>• hot</li> <li>• warm</li> <li>• cold</li> </ul>	<p><b>Academic Vocabulary</b></p> <ul style="list-style-type: none"> <li>• identify</li> <li>• sort</li> <li>• compare</li> </ul>
<p><b>Formative Assessments</b></p> <ul style="list-style-type: none"> <li>• Picture sort</li> </ul>	<p><b>Summative Assessments</b></p> <p>Not applicable at this grade level</p>

<ul style="list-style-type: none"> <li>• Feely box</li> <li>• Journal response</li> </ul>	
<p><b>Resources</b></p> <ul style="list-style-type: none"> <li>• Balance</li> <li>• Magnifiers</li> </ul>	<p><b>Enrichment Strategies</b></p> <ul style="list-style-type: none"> <li>• Building and testing structures made of various materials and describing which materials work best for the situation/structure</li> </ul>
<p><b>Integrations</b></p> <ul style="list-style-type: none"> <li>• Sorting objects</li> <li>• Writing workshop</li> <li>• Using your 5 senses</li> <li>• 3 Little Pigs – compare and contrast materials in different versions of the story</li> </ul>	<p><b>Intervention Strategies</b></p> <ul style="list-style-type: none"> <li>• Peer models</li> <li>• One-on-one help with teacher or volunteer</li> <li>• Visual prompts and posters</li> <li>• Use of technology as aide</li> <li>• Small group instruction</li> </ul>

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<b>Topic</b> <i>Properties of Everyday Objects and Materials</i>  This topic focuses on the production of sound and on observing, exploring, describing, and comparing the properties of objects and materials with which the student is familiar.	<b>Pacing</b>  2 weeks
<b>Content Statement</b>  <b>6. <i>Some objects and materials can be made to vibrate to produce sound.</i></b>  <b>Learning Targets:</b> <ul style="list-style-type: none"> <li>• I can describe ways sound can be made.</li> <li>• I can observe and explore how different sounds can be made with the same object.</li> <li>• I can experiment with vibrations and sounds.</li> <li>• I can recognize that sound is caused by vibrating objects.</li> <li>• I can describe the effect vibrations have on pitch (fast = high; slow = low).</li> <li>• I can create and compare ways to make loud and soft sounds.</li> </ul>	<b>Content Elaborations</b>  <b>Kindergarten Concepts</b> 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 when water splashes from a cymbal or triangle placed in water or rice vibrates on the top of a banging drum. The concepts of pitch (low vs. high notes) and loudness are introduced. The pitch of sound can be changed by changing how fast an object vibrates. Objects that vibrate slowly produce low pitches; objects that vibrate quickly produce high pitches. Sound must be experienced, investigated, and explored through observations and experimentation. Standard, virtual, and student-constructed instruments must be used to explore sound.

	<p>Note: Wave descriptions of sound and the propagation of sound energy are not appropriate at this grade.</p> <p><b>Future Application of Concepts</b></p> <p>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.</p> <p>Grades 3-5: Energy is introduced as something that can make things move or cause change. The concept of a medium for sound is introduced and disturbances in liquid and solid media are observed.</p> <p>Grades 6-8: The wave nature of sound is introduced.</p>
<p><b>Content Vocabulary</b></p> <ul style="list-style-type: none"> <li>• sound</li> <li>• vibrate</li> <li>• pitch</li> <li>• object</li> <li>• fast</li> <li>• slow</li> <li>• high</li> <li>• low</li> <li>• loud</li> <li>• soft</li> </ul>	<p><b>Academic Vocabulary</b></p> <ul style="list-style-type: none"> <li>• describe</li> <li>• observe</li> <li>• experiment</li> <li>• recognize</li> <li>• create</li> <li>• compare</li> <li>• effect</li> </ul>
<p><b>Formative Assessments</b></p> <ul style="list-style-type: none"> <li>• Nonverbal cues to communicate pitch and loudness</li> <li>• Identifying objects in containers based on their sounds</li> </ul>	<p><b>Summative Assessments</b></p> <p>Not applicable at this grade level</p>
<p><b>Resources</b></p> <ul style="list-style-type: none"> <li>• Standard instruments (cymbals, bells, drums, guitar)</li> <li>• Virtual instruments</li> <li>• Student-constructed instruments</li> <li>• <i>Thump, Thump, Tat-a-Tat-Tat</i>, by Gene Baer</li> <li>• <i>Sounds All Around (Let's-Read-and-Find-Out Science I)</i></li> <li>• <i>Sound: Loud, Soft, High, and Low</i>, by Natalie Rosinsky</li> <li>• <i>All About Sound</i> (Rookie Reader)</li> </ul>	<p><b>Enrichment Strategies</b></p> <ul style="list-style-type: none"> <li>• Compare and contrast objects or instruments by loudness and pitch</li> </ul>

**Integrations**

- Music
- 5 senses

**Intervention Strategies**

- Peer models
- One-on-one help with teacher or volunteer
- Visual prompts and posters
- Use of technology as aide
- Small group instruction