

## Instructional Implications for Kindergarten

To meet the goals of *Each Child, Our Future*, Ohio's strategic plan for education, schools and districts will find it essential to have appropriate local curricula supported by high-quality instructional materials. Science is part of providing well-rounded content for students, as well-rounded content is one of the four learning domains listed in the strategic plan.

Science is an essential subject for students in grades K-12. It is important to build a strong foundation in science in early elementary years so students are prepared for understanding more complex material in intermediate and middle grades. It is equally important to continue students' science instruction by offering more advanced courses at the high school level. This allows students to better compete for admission to college or other postsecondary programs, as well as jobs. Advanced science courses in high schools also help produce a more scientifically literate public.

This document outlines the most notable changes from the 2010 standards to the 2018 standards and offers insight into how teachers can best prepare their students using the revised content. **The document is merely an overview; it does not provide a comprehensive treatment of changes or take the place of the model curriculum or instructional resources.**

The document consists of tables containing three columns that show the 2010 standard, the 2018 standard and the implications of any significant shifts from 2010 to 2018. The document addresses only areas in which the focus of instruction has changed. Standards that say "No change to content focus" should continue to be taught with the same goals as the corresponding 2010 standards. For standards in which the instructional focus has shifted, only the changed content is included in the third column of the table. Portions of the standard unaffected by the changes may not appear here but should continue to be taught.

Educators should teach all content in the standards incorporating the science and engineering practices, and they should engage students in scientific thought processes. Where possible, instructors should use real-world data and both problem-based and project-based experiences. *Ohio's Cognitive Demands*, which Ohio initiated in the 2010 standards, are clarified in the 2018 standards, featuring additional *Visions into Practice* examples categorized by cognitive demand. These levels of knowledge relate to current understanding and research about the ways people learn, and they are important aspects of an overall understanding of science concepts. Educators should give their students opportunities to practice all four types of thinking. Please note, the *Visions into Practice* section of the Model Curriculum suggests ways to incorporate these levels into instruction, but the examples are not mandatory; they are simply ideas educators could implement or adapt to suit local curriculum.

Also, educators need to design lessons to incorporate the concepts described in the *Nature of Science* sections. The *Nature of Science* provides a way for increasing students' understanding of science as more than a body of knowledge about how the natural world works. It also is a process for gathering information and gaining deeper knowledge about the world. These concepts of science should not form a standalone unit or be additional course materials. They should be embedded in each area of the science classroom experience, including lessons, laboratory or field studies, and assessments.

### 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 physical world around them in greater depth by using scientific inquiry.

**Strand Connections:** 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.

2010 Content Statement	2018 Content Statement	Instructional implications of revisions
<p><b>Earth and Space Science (ESS)</b></p> <p><b>Weather changes are long-term and short-term.</b></p> <p>Weather changes occur throughout the day and from day to day.</p> <p>Air is a nonliving substance that surrounds Earth and wind is air that is moving.</p> <p>Wind, temperature and precipitation can be used to document short-term weather changes that are observable.</p> <p>Yearly weather changes (seasons) are observable patterns in the daily weather changes.</p> <p><b>Note:</b> 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 5.</p>	<p><b>Earth and Space Science (ESS)</b></p> <p><b><u>K.ESS.1:</u> Weather changes are long-term and short-term.</b></p> <p>Weather changes occur throughout the day and from day to day.</p> <p>Air is a nonliving substance that surrounds Earth and wind is air that is moving.</p> <p>Wind, temperature and precipitation can be used to document short-term weather changes that are observable.</p> <p>Yearly weather changes (seasons) are observable patterns in the daily weather changes.</p> <p><b>Note:</b> 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 <u>7</u>5.</p>	<p>No change to content focus, but be sure instruction reflects the strong emphasis on the <i>Nature of Science</i> and the <i>Cognitive Demands</i> included in the 2018 standards.</p>
<p><b>The moon, sun and stars can be observed at different times of the day or night.</b></p> <p>The moon, sun and stars are in different positions at different times of the day or night. 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. The observable shape of the moon changes in size very slowly throughout each day of every month. The sun is visible only during the day.</p> <p>The sun's position in the sky changes in a single day and from season to season. Stars are visible at night, some are visible in the evening or morning and some are brighter than others.</p>	<p><b><u>K.ESS.2:</u> The moon, sun and stars can be observed at different times of the day or night.</b></p> <p>The moon, sun and stars <del>are</del> <u>appear</u> in different positions at different times of the day or night. 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. The observable shape of the moon changes in size very slowly throughout <del>each day of every</del> the month. The sun is visible only during the day.</p> <p>The sun's position in the sky <del>changes</del> <u>appears to change</u> in a single day and from season to season. Stars are visible at night, some are visible in the evening or morning and some are brighter than others.</p>	<p>Careful choice of language when describing the “movement” of the sun and stars at this grade level is important for setting the stage for later understanding that it is actually Earth’s movement that causes the apparent motion of celestial bodies. Although this concept is not taught explicitly until later grades, care now can set the stage and avoid engraining the misconception that the sun and other stars are orbiting Earth. Use language such as “seem to move,” “appears in a new location” or “is now seen to the left” rather than “the sun moved” or “the stars changed their positions.”</p> <p>The change in language describing the moon’s shape is for clarity and has no instructional impact.</p>

2010 Content Statement	2018 Content Statement	Instructional implications of revisions
<b>Physical Science (PS)</b>	<b>Physical Science (PS)</b>	
<p><b>Objects and materials can be sorted and described by their properties.</b></p> <p>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.</p> <p><b>Note:</b> 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>	<p><b><u>K.PS.1:</u> Objects and materials can be sorted and described by their properties.</b></p> <p>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.</p> <p><del><b>Note:</b> 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.</del></p>	<p>No change to content focus, but be sure instruction reflects the strong emphasis on the <i>Nature of Science</i> and the <i>Cognitive Demands</i> included in the 2018 standards.</p>
<p><b>Some objects and materials can be made to vibrate to produce sound.</b></p> <p>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.</p>	<p><b><u>K.PS.2:</u> Some objects and materials can be made to vibrate to produce sound.</b></p> <p>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.</p>	<p>No change to content focus, but be sure instruction reflects the strong emphasis on the <i>Nature of Science</i> and the <i>Cognitive Demands</i> included in the 2018 standards.</p>

2010 Content Statement	2018 Content Statement	Instructional implications of revisions
<p><b>Life Science (LS)</b></p> <p><b>Living things are different from nonliving things.</b></p> <p>Living things include anything that is alive or has ever been alive. Living things have specific characteristics and traits. Living things grow and reproduce. Living things are found almost everywhere in the world. There are somewhat different kinds in different places.</p> <p><b>Note 1:</b> The focus is on the traits and behaviors of living things not on attributes of nonliving things. See Kindergarten Physical Science for nonliving things.</p> <p><b>Note 2:</b> Listing the characteristics that distinguish living things from nonliving things is not appropriate at this grade level. Further details will appear in the model curriculum.</p>	<p><b>Life Science (LS)</b></p> <p><b><u>K.LS.1: Living things are different from nonliving things. Living things have specific characteristics and traits.</u></b></p> <p><del>Living things include anything that is alive or has ever been alive. Living things have specific characteristics and traits. Living things grow and reproduce. Living things are found almost everywhere in the world. There are somewhat different kinds in different places.</del></p> <p><u>Living things grow and reproduce. Living things are found worldwide.</u></p> <p><del>Note 1: The focus is on the traits and behaviors of living things not on attributes of nonliving things. See Kindergarten Physical Science for nonliving things.</del></p> <p><del>Note 2: Listing the characteristics that distinguish living things from nonliving things is not appropriate at this grade level. Further details will appear in the model curriculum.</del></p>	<p>Kindergarten instruction should emphasize the characteristics and behaviors of living things rather than the distinctions between living and non-living things. Provide many opportunities to directly observe a variety of familiar organisms, including humans. Observe that living things require energy, grow, reproduce and respond to their surroundings.</p>
<p><b>Living things have physical traits and behaviors, which influence their survival.</b></p> <p>Living things are made up of a variety of structures. Some of these structures and behaviors influence their survival.</p> <p><b>Note:</b> This concept is addressed in PreK, but is included here for districts that do not have a PreK program. Further information for districts is provided in the model curriculum section.</p>	<p><b><u>K.LS.2: Living things have physical traits and behaviors, which influence their survival.</u></b></p> <p>Living things are made up of a variety of structures. <u>Some traits can be observable structures.</u> Some of these structures and behaviors influence their survival.</p> <p><del><b>Note:</b> This concept is addressed in PreK, but is included here for districts that do not have a PreK program. Further information for districts is provided in the model curriculum section.</del></p>	<p>This standard emphasizes that the structures and behaviors of a living thing help it survive in its environment. Naming structures is not as important as understanding what they do and how they are helpful to the organism. <i>Mice have legs to run so they can escape predators. Bats have wings to fly so they can catch insects. Seedlings have roots to get water from the soil so they do not shrivel and die.</i></p>