

Instructional Implications for Grade 2

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 may move. A moving object has energy. Air moving is wind and wind can make a windmill turn. Changes in energy and movement can cause change to organisms and the environments in which they live.

2010 Content Statement	2018 Content Statement	Instructional implications of revisions
Earth and Space Science (ESS)	Earth and Space Science (ESS)	
<p>The atmosphere is made up of air.</p> <p>Air has properties that can be observed and measured. The transfer of energy in the atmosphere causes air movement, which is felt as wind. Wind speed and direction can be measured.</p> <p>Note: Air is introduced in ESS Kindergarten and can be linked to PS and LS.</p>	<p><u>2.ESS.1:</u> The atmosphere is <u>primarily</u> made up of air.</p> <p>Air has properties that can be observed and measured. The transfer of energy in the atmosphere causes air movement, which is felt as wind. Wind speed and direction can be measured.</p> <p>Note: Air is introduced in ESS Kindergarten and can be linked to PS and LS.</p>	<p>The standard still focuses on wind. The insertion of “primarily” was made for increased accuracy to indicate there are things other than air in the atmosphere such as clouds and dust.</p>

2010 Content Statement	2018 Content Statement	Instructional implications of revisions
<p>Water is present in the air.</p> <p>Water is present in air as clouds, steam, fog, rain, ice, snow, sleet or hail. When water in the air cools (change of energy), it forms small droplets of water that can be seen as clouds. Water can change from liquid to vapor in the air and from vapor to liquid. The water droplets can form into raindrops. Water droplets can change to solid by freezing into snow, sleet or hail. Clouds are moved by flowing air.</p> <p>Note: This concept builds upon the changing properties of water from ESS grade 1.</p>	<p><u>2.ESS.2: Water is present in the air-atmosphere.</u></p> <p>Water is present in <u>the atmosphere as water vapor. When water vapor in the atmosphere cools, it forms clouds, fog, rain, ice, snow, sleet or hail.</u> air as clouds, steam, fog, rain, ice, snow, sleet or hail. When water in the air cools (change of energy), it forms small droplets of water that can be seen as clouds. Water can change from liquid to vapor in the air and from vapor to liquid. The water droplets can form into raindrops. Water droplets can change to solid by freezing into snow, sleet or hail. Clouds are moved by flowing air.</p> <p>Note: This concept builds upon the changing properties of water from ESS grade 1.</p> <p>Note: The emphasis at this grade level is <u>investigating condensation and evaporation, not memorizing the water cycle itself.</u></p> <p>Note: The emphasis is not in naming cloud types, but in relating the characteristics of the clouds with weather.</p> <p>The sun's position in the sky changes <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>The emphasis for this standard is understanding phase changes between liquid water and water vapor (condensation and evaporation). This builds on earlier explorations of freezing and melting. Provide opportunities to investigate and observe the condensation and evaporation of water in a variety of situations. Taking advantage of opportunities to point out that energy is transferred during heating and cooling helps build an emerging understanding of energy.</p>
<p>Long- and short-term weather changes occur due to changes in energy.</p> <p>Changes in energy affect all aspects of weather, including temperature, precipitation amount and wind.</p> <p>Note: Discussion of energy at this grade level should be limited to observable changes.</p>	<p><u>2.ESS.3: Long- and short-term weather changes occur due to changes in energy.</u></p> <p>Changes in energy affect all aspects of weather, including temperature, precipitation, and wind.</p> <p>Note: Discussion of energy at this grade level should be limited to observable changes.</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
Physical Science (PS)	Physical Science (PS)	
<p>Forces change the motion of an object.</p> <p>Motion can increase, change direction or stop depending on the force applied.</p> <p>The change in motion of an object is related to the size of the force.</p> <p>Some forces act without touching, such as using a magnet to move an object or objects falling to the ground.</p> <p>Note: At this grade level, gravitational and magnetic forces should be introduced through observation and experimentation only. The definitions of these forces should not be the focus of the content statements.</p>	<p>2.PS.1: Forces change the motion of an object.</p> <p>Motion can increase, change direction or stop depending on the force applied.</p> <p>The change in motion of an object is related to the size of the force.</p> <p>Some forces act without touching, such as using a magnet to move an object or objects falling to the ground.</p> <p>Note: At this grade level, gravitational and magnetic forces should be introduced through observation and experimentation only. The definitions of these forces should not be the focus of the content statements.</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
Life Science (LS)	Life Science (LS)	
<p>Living things cause changes on Earth.</p> <p>Living things function and interact with their physical environments. Living things cause changes in the environments where they live; the changes can be very noticeable or slightly noticeable, fast or slow.</p> <p>Note: At this grade level, discussion is limited to changes that can be easily observed.</p>	<p><u>2.LS.1: Living things cause changes on Earth.</u></p> <p>Living things function and interact with their physical environments. Living things cause changes in the environments where they live; the changes can be very noticeable or slightly noticeable, fast or slow.</p> <p>Note: At this grade level, discussion is limited to changes that can be easily observed.</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>Some kinds of individuals that once lived on Earth have completely disappeared, although they were something like others that are alive today.</p> <p>Living things that once lived on Earth no longer exist, their basic needs were no longer met.</p>	<p><u>2.LS.2: Some kinds of individuals that once lived on Earth have completely disappeared, although they were something like others that are alive today.</u></p> <p><u>All organisms alive today result from their ancestors, some of which may be extinct. Not all kinds of organisms that lived in the past are represented by living organisms today.</u></p> <p>Living things that once lived on Earth no longer exist, their basic needs were no longer met. Some kinds of organisms become extinct when their basic needs are no longer met or the environment changes.</p>	<p>The focus of this standard is understanding that all living things are descended from a line of ancestors. Provide opportunities to observe fossils of various types and discuss ways the appearance of fossilized organisms is similar to and different from that of organisms alive today.</p> <p>Extinction should be understood as the result of an environment that is unable to meet the basic needs of a particular kind of organism.</p>