Instructional Implications for Grade 1

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: Energy is observed through movement, heating, cooling and the needs of living organisms.

2010 Content Statement	2018 Content Statement	Instructional implications of revisions
Earth and Space Science (ESS)	**Earth and Space Science (ESS)**	
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.	**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.	No change to content focus, but be sure instruction reflects the strong emphasis on the *Nature of Science* and the *Cognitive Demands* included in the 2018 standards.
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. Weather observations can be used to examine the property changes of water. **Note:** Water as a vapor is not introduced until grade 2; only solid and liquid water should be discussed at this level. A broader coverage of states of matter is found in grade 4. This concept builds on the PS Kindergarten strand pertaining to properties (liquids and solids).	**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. ~~Weather observations can be used to examine the property changes of water.~~ **Note:** Water as a vapor is not introduced until grade 2; the water cycle is reserved for later grades. ~~only solid and liquid water should be discussed at this level. A broader coverage of states of matter is found in grade 4. This concept builds on the PS Kindergarten strand pertaining to properties (liquids and solids).~~	The content statement has been revised to better reflect the extent of the existing content elaboration. Although changes in the physical properties of water are an important component of this standard, instruction should also cover other topics related to water. These include the extent to which Earth is covered by water, the various locations of water on Earth and the effects water can have on Earth's surface through erosion and deposition. At this level, observations form the basis of instruction. Provide a variety of opportunities to measure the properties of different forms of water and observe water and its effects on the local environment, as well as through media, maps and globes.

2010 Content Statement	2018 Content Statement	Instructional implications of revisions
Physical Science (PS)	**Physical Science (PS)**	
Properties of objects and materials can change. Objects and materials change when exposed to various conditions, such as heating or freezing. Not all materials change in the same way. **Note1:** Changes in temperature are a result of changes in energy. **Note 2:** Water changing from liquid to solid and from solid to liquid is found in ESS grade 1.	**1.PS.1: Properties of objects and materials can change.** Objects and materials change when exposed to various conditions, such as heating or ~~freezing.~~ cooling. Changes in temperature are a result of changes in energy. Not all materials change in the same way. ~~**Note1:** Changes in temperature are a result of changes in energy.~~ ~~**Note 2:** Water changing from liquid to solid and from solid to liquid is found in ESS grade 1.~~	The opposite of heating is cooling. This was clarified in the content statement by removing the term frozen. This aligns the standard with the existing elaboration. Introduce the idea that heating a substance is adding energy to it and cooling a substance is subtracting energy. At this level, details of energy transfer are not appropriate. Changes should be observable, but be intentional in pointing out the transfer of energy taking place. *Energy from the sun is entering the candy bar, heating it up and melting it. Energy leaves your skin when holding an ice cube and your fingers get colder.* Content relating to parts making up objects was removed. The focus of this standard is on changes in the properties of objects and materials.
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. **Note:** Changes in motion are a result of changes in energy.	**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.	Introduce the idea that forces between objects can transfer energy. *A ball rolled into another ball passes some of its energy to the second ball. Mom pushing you in the swing transfers energy from mom's arms to the swing.* At this level, students are not expected to distinguish between forces and energy or know formal definitions of these terms. However, the correct application of these terms during instruction helps build a foundation that can improve understanding in later grades.

2010 Content Statement	2018 Content Statement	Instructional implications of revisions
Life Science (LS)	**Life Science (LS)**	
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.	**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.	No change to content focus, but be sure instruction reflects the strong emphasis on the *Nature of Science* and the *Cognitive Demands* included in the 2018 standards.
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.	**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.	No change to content focus, but be sure instruction reflects the strong emphasis on the *Nature of Science* and the *Cognitive Demands* included in the 2018 standards.