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MISSISSIPPI DEPARTMENT OF EDUCATION

Ensuring a bright future for every child

2018 Mississippi College- and Career-Readiness Standards for Science

Effective Date: 2018-2019 School Year

2018 Mississippi College- and Career-Readiness Standards for Science

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Introduction

Mission Statement

The Mississippi Department of Education is dedicated to student success, which includes improving student achievement in science, equipping citizens to solve complex problems, and establishing fluent communication skills within a technological environment. The Mississippi College- and Career-Readiness Standards provide a consistent, clear understanding of what students are expected to know and be able to do by the end of each grade level or course. The standards are designed to be robust and relevant to the real world, reflecting the knowledge and skills that students need for success in college and careers and allowing students to compete in the global economy.

Purpose

In an effort to closely align instruction for students who are progressing toward postsecondary study and the workforce, the *2018 Mississippi College- and Career-Readiness Standards for Science* includes grade- and course-specific standards for K-12 science.

This document is designed to provide K-12 science teachers with a basis for curriculum development. In order to prepare students for careers and college, it outlines what knowledge students should obtain, and the types of skills students must master upon successful completion of each grade level. The *2018 Mississippi College- and Career-Readiness Standards (MS CCRS) for Science* replaces the *2010 Mississippi Science Framework*. These new standards reflect national expectations while focusing on postsecondary success, but they are unique to Mississippi in addressing the needs of our students and teachers. The standards' content centers around three basic content strands of science: life science, physical science, and Earth and space science. Instruction in these areas is designed for a greater balance between content and process. Teachers are encouraged to transfer more ownership of the learning process to students, who can then direct their own learning and develop a deeper understanding of science and engineering practices, critical analysis, and knowledge. Doing so will produce students that will become more capable, independent, and scientifically literate adults.

Implementation

The *2018 Mississippi College- and Career-Readiness Standards (MS CCRS) for Science* will be implemented during the 2018-2019 school year.

MISSISSIPPI DEPARTMENT OF EDUCATION

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2018 Mississippi College- and Career-Readiness Standards for Science Overview

Research and Background Information

In today's modern world and complex society, our students are required to possess sufficient knowledge of science and engineering to become vigilant consumers of scientific and technological information. To meet the growing challenges facing our future workforce, the National Research Council (NRC) published a research-based report on teaching and learning science in a 2012 document titled *A Framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas* (NRC, 2012). This document proposes a new approach to K-12 science education through the integration of science and engineering practices (SEPs), crosscutting concepts, disciplinary core ideas, and engineering design within the context of science instruction.

Core Elements in the Use and Design of the *MS CCRS for Science*

The *MS CCRS for Science* are goals that reflect what a student should know and be able to do. This document does not dictate a manner or methods of teaching. The standards in this document are not sequenced for instruction and do not prescribe classroom activities, materials, or instruction strategies. These standards are end-of year expectations for each grade or course. The standards are intended to drive relevant and rigorous instruction that emphasizes student mastery of both disciplinary core ideas (concepts) and application of science and engineering practices (skills) to support student readiness for citizenship, college, and careers.

The *MS CCRS for Science* document was built by adapting and extending information from *A Framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas* (NRC, 2012) and combining with Mississippi's previous science framework process strands (i.e., science as inquiry, unifying concepts and processes, science and technology, science in personal and social perspectives, and the history and nature of science). These concepts connect information across the science content strands (i.e., life science, physical science, and Earth and space science) with the disciplinary core ideas (e.g., ecology and interdependence, motions, forces, and energy, Earth systems and cycles) and are essential to both scientists and engineers because they identify common properties and processes found in practice.

The core elements are integrated across standards and performance objectives in each grade and course. A brief description of each core element is presented below.

1. Nature of Science: Science and Engineering Practices (SEPs) replaced the Inquiry Strand included in the *2010 Mississippi Science Framework*. Beyond integration within the standards, these practices must be mastered by students to produce a more scientifically literate citizenry and to develop students that are more excited about STEM (Science, Technology, Engineering, and Mathematics) topics and careers. Inquiry verbs, along with the SEPs, are woven throughout the standards, especially in the performance objectives. Each has a deliberate placement to indicate the depth of understanding expected of students.

   The practices describe the behaviors that scientists engage in as they investigate and build models and theories about the natural world. They also describe the key set of engineering practices that engineers use as they design and build models and systems. These practices work together (overlap and interconnect) and are not separated in the study and investigation of science concepts. For example, the practice of *mathematical and computational thinking* may include some aspects of *analyzing and interpreting data*. The data often come from *planning and carrying out an investigation*. The writing task force for the *MS CCRS for Science* incorporated this language into the performance objectives to emphasize the importance of a student-centered science classroom and not a teacher-centered classroom. A list of these eight practices is listed below.

a. **Ask Questions (science) and Define Problems (engineering)**
b. **Develop and Use Models**
c. **Plan and Conduct Investigations**
d. **Analyze and Interpret Data**
e. **Use Mathematical and Computational Thinking**
f. **Construct Explanations (science) and Design Solutions (engineering)**
g. **Engage in Scientific Argument from Evidence**
h. **Obtain, Evaluate, and Communicate Information**

2. Crosscutting concepts: These seven, binding concepts were adopted directly from the National Research Council's *A Framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas* (2012) and should be woven into instruction for every grade and course. Crosscutting concepts are designed to help students see the unity of the sciences. Students often are confused when they study ecosystems for three weeks, then weather for two weeks, and finally motion and forces for several weeks. A concept is crosscutting if it communicates a scientific way of thinking about a subject and it applies to many different disciplines of science and engineering. Crosscutting concepts are sometimes called "the ties that bind." The seven concepts are listed below.

   a. **Patterns**
   b. **Cause and effect: Mechanism and explanation**
   c. **Scale, proportion, and quantity**
   d. **Systems and system models**
   e. **Energy and matter: Flows, cycles, and conservation**
   f. **Structure and function**
   g. **Stability and change**

3. Technology: If Mississippi students are to compete on a global stage and exit high school prepared for college, career, and life, technology should be used in the classroom in a way that suits 21st-century learners and reflects the modern workplace. Technology is essential in teaching and learning of science; it influences and enhances students' learning. Flexible access, customized delivery, and increased convenience for the user are core tenets. K-12 learners have fundamentally changed over the past few decades, and our classrooms should adapt to accommodate them. Dr. Ruben Puentedura's SAMR (Substitution, Augmentation, Modification, and Redefinition) model is a resource that can be considered by teachers, administrators, and technology staff as they integrate meaningful and appropriate digital learning experiences into the classroom. At the basic level, technology enhances instruction.

4. Science and society: This core element assures exploration of science's impacts on society and the feedback loop that must be cultivated and sustained to continue improvement of systems.

5. History of science: Because most modern-day scientific advancement derives from past discoveries, it is essential that students understand the breakthroughs that make today's work possible.

6. Engineering design process (EDP) is the method of devising a system, component, or process to meet desired needs. Engineering standards are represented in some performance objectives with grade-banded, specific wording that prompts educators to approach learning and exploration using the engineering process. These performance objectives are marked with an *. It is important to

note that the EDP is flexible. Most students will approach the process in various ways. The EDP is also a cycle—there is no official start or end point. Students can begin at any step, focus on just one step, move back and forth between steps, or repeat the cycle. Professional development and teacher resources will be developed for Mississippi teachers as EDP is incorporated into Mississippi standards.

Students should be provided a safe environment for failure without consequence, which is one of the most powerful drivers in learning. Providing many opportunities for students to fail, learn, and try again, with appropriate levels of support, fosters a deeper level of understanding and greater student interest and engagement.

Other Important Core Elements

Mathematics is integrated throughout the science standards document because it is essential to the scientific process, requiring students to quantify, analyze, and present results. Students must be familiar with data analysis, critical thinking, and recording their own data; students must organize and analyze it before presenting their findings. Analysis of scientific studies and publications from a quantitative perspective is also very important.

English/language arts skills are also integrated into the science standards. Students will be required to read informational text for understanding as well as process and critique information. Students must be able to articulate a critical point of view using proper terminology. In addition, the K-4 science curriculum should be increasingly tied to language arts to lay the foundation for students to have access to science before fifth grade.

Content Strands and Disciplinary Core Ideas

Science (and engineering) fields can be divided into three content-strand domains based on relative content presented in strands, extending from kindergarten to eighth grade. Grouping content in this way allows for vertical alignment of competencies and objectives to better organize content distribution. Content strands are not included in the Grades 9-12 course organization, which allows for a more logical, sequential placement and flow of content. Content strands are subdivided into 10 disciplinary core ideas in which standards and performance objectives for science content can be placed in grades K-8.

K-8 content strands with the 10 disciplinary core ideas include:

Life Science

1. Hierarchical Organization
2. Reproduction and Heredity
3. Ecology and Interdependence
4. Adaptations and Diversity

Physical Science

5. Organization of Matter and Chemical Interactions
6. Motions, Forces, and Energy

Earth and Space Science

7. Earth’s Structure and History
8. Earth and the Universe
9. Earth Systems and Cycles
10. Earth’s Resources

Structure of the Standards Document

The organization and structure of this standards document are as follows:

- Grade-band overview: An overview that describes the general content and themes for the grade-level band or the high school courses. Outputs and outcomes are provided along with examples of, and references to, science and engineering practices and connecting concepts.

- Grade-level or course overview: An overview that describes the specific content and themes for each grade level and/or high school course. The K-8 standards are presented with each grade focused on a grade-level theme. High school courses provide an overview of the major ideas and strategies to use when planning instruction for the course.

- Content strand: Domains into which science fields can be divided based on relative content extending from kindergarten to eighth grade. In grades K through 8, the content strands are organized into three distinct areas: (1) life science, (2) physical science, and (3) Earth and space science. For the Grade 9-12 courses, the content areas are organized around the core ideas of each course.

- Disciplinary core ideas: Subdivision of the main content strands providing recurring ideas from the three content strands. The core ideas are the key organizing principles for the development of learning units. The K-8 vertical alignment is designed in a spiral arrangement, which places emphasis on one of the three content strands in each grade level. All content strands will be found in each grade level, but all disciplinary core ideas will not be found in every grade level in K-8 due to the spiral arrangement of content.

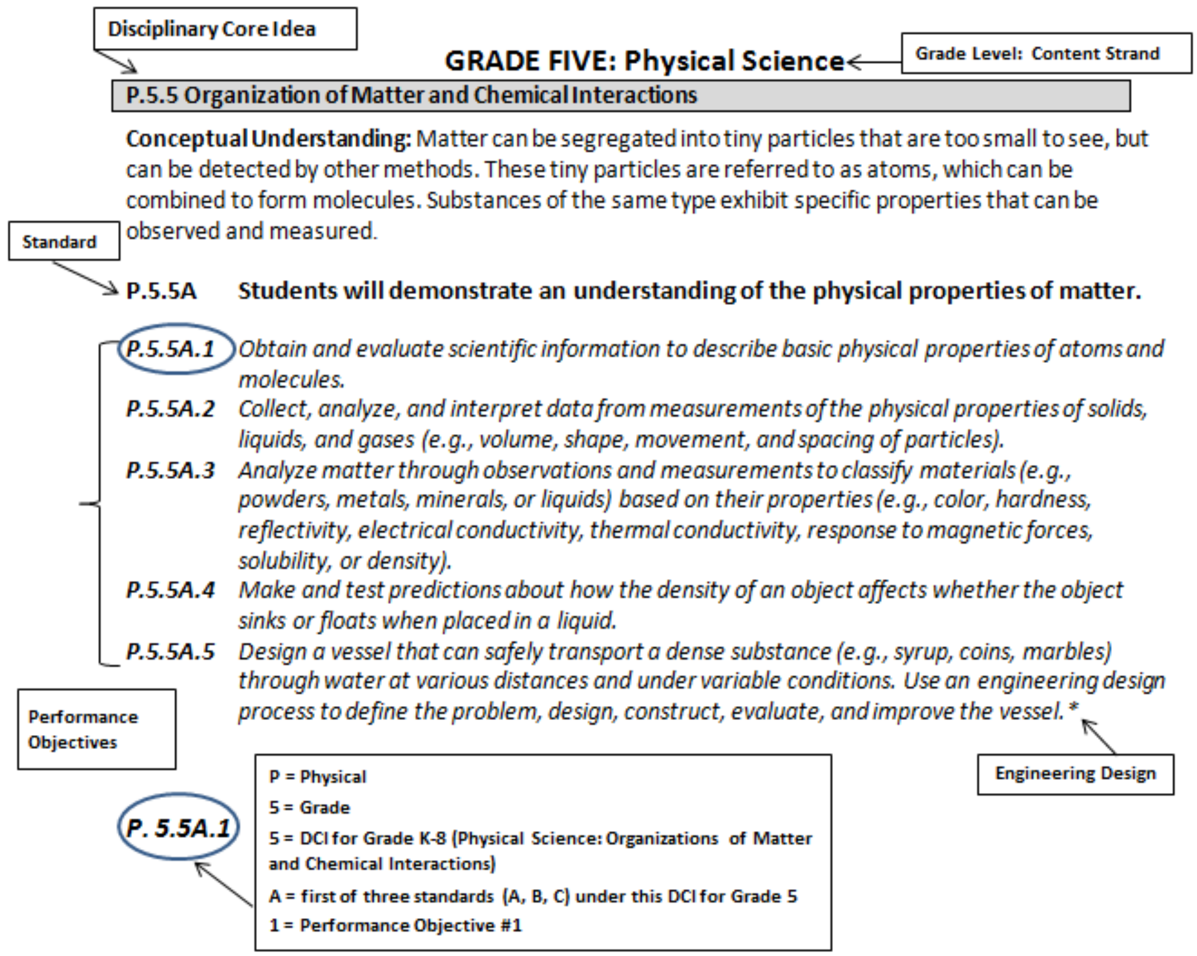
- Conceptual understanding: Statements of the core ideas for which student should demonstrate an understanding. Some grade level and/or course topics include more than one conceptual understanding with each guiding the intent of the standards.

- Content standards: Written below each disciplinary core ideas and conceptual understanding, the standards are a general statement of what students should know and be able to do because of instruction.

- Performance objectives: Detailed statements of content and skills to be mastered by the students. Performance objectives are specific statements of what students know and can do because of the science instruction at that level. These statements contain SEP and inquiry verb language.

Standards will appear in the following format:

Grade-Band Overview
Grade Level Theme (K-8)
Grade Level (K-8) or Course Overview (9-12)
Grade Level: Content Strand (K-8); Course Name (9-12)
    Disciplinary Core Idea (DCI)
    Conceptual Understanding
    Standard
    Performance Objectives



Safety in the Science Classroom

The National Science Teachers Association (NSTA) encourages K–12 school leaders and teachers to promote and support the use of science activities in science instruction and work to avoid and reduce injury. NSTA provides the following guidelines for school leaders and teachers to develop safety programs that include the effective management of chemicals, implement safety training for teachers and others, and create school environments that are as safe as possible (NSTA 2013).

1) National Science Teacher Association's *Safety in the Science Classroom*, accessible at http://www.nsta.org/docs/SafetyInTheScienceClassroom.pdf.
2) An extensive list of safety resources is available at http://www.nsta.org/safety/.

Support Documents and Resources

The MDE will develop support documents after these standards have been approved by the State Board of Education. Local districts, schools, and teachers may use these documents to construct standards-based science curriculum, allowing them to customize content to fit their students' needs and match available instructional materials. The support documents will include suggested resources, instructional strategies, essential knowledge, and detailed information about the core elements (e.g., SEPs, crosscutting concepts).

Professional development efforts will be aligned with the standards and delivered in accord with teacher resources to help expand expertise in delivering student-centered lessons (e.g., inquiry-based learning, 5-E instructional models, or other best practices in STEM teaching). The most successful national models and programs will be referenced for a capacity-building effort that can develop a more effective culture of science education in Mississippi.

Investigate, Apply, and Understand

It is important that the pedagogical paradigm of Mississippi's science classroom reflects the nature of the content being learned. The essence of science is natural to children and includes discovery, observation, questioning, design, testing, failure, iteration, and hands-on application. Research-based approaches such as inquiry-based (IB), project-based, and discovery learning are all pedagogical pathways that make sense, especially in the science classroom. Mississippi's science teachers are encouraged to embrace the growth mindset and constantly seek to upgrade classroom approaches by experimenting and adopting methods that excite students to learn and become functional, autonomous learners and contributors. Students should be provided increased maneuverability in the classroom to formulate their own ideas to investigate and understand the scientific and engineering design processes.

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GRADES K-2 OVERVIEW

Students in Grades K-2 are naturally curious about their world and learn best through hands-on experiences. Teachers must consider the students' developmental level to provide appropriate learning experiences so that students will understand the nature of science. Therefore, investigations using the five senses should be an integral part of scientific inquiry. Recognizing and observing patterns are also important, and students should be given experiences with living things to help them build their scientific understanding. Learning opportunities should also facilitate the development of language-process skills and mathematical concepts, while the students develop the ability to observe and then communicate observations. Students need to be supplied with the appropriate materials and equipment necessary to complete scientific investigations.

Each grade is developed around a theme:

- Kindergarten – Change in the Natural World
- Grade 1 – Discovering Patterns and Constructing Explanations
- Grade 2 – Systems, Order, and Organization

In kindergarten, students are introduced to the concept of change. They learn to generate questions, conduct structured experiments, sort, classify, sequence, and predict to communicate those findings. In first grade, students build on the knowledge gained from kindergarten and make deeper connections by examining evidence, observing patterns, and formulating explanations. By second grade, students learn to organize and categorize their findings, which establish a foundation for logical thinking. They also use abstract reasoning and interpretation of observations to draw conclusions from their investigations.

The core science content utilizes hands-on classroom instruction to reinforce the seven crosscutting concepts (i.e., patterns; cause and effect; scale, portion, and quantity; systems and system models; energy and matter; structure and function; and stability and change).

SEPs are in life science, physical science, and Earth and space science. The SEPs are designed so that students may develop skills and apply knowledge to solve real-life problems. While presented as distinct skill sets, the eight practices intentionally overlap and interconnect as students explore the science concepts. Some examples of specific skills students should develop in grades K-2 are listed below.

1. Generate questions and investigate the differences between liquids and solids and develop awareness that a liquid can become a solid and vice versa.
2. Develop and use models to predict weather conditions associated with seasonal patterns and changes.
3. Conduct an investigation to provide evidence that vibrations create sound (e.g., pluck a guitar string) and that sound can create vibrations (e.g., feeling sound through a speaker).
4. Analyze and interpret data from observations and measurements to describe local weather conditions (including temperature, wind, and forms of precipitation).
5. Compare and measure the length of solid objects using technology and mathematical representations. Analyze and communicate findings.
6. Construct an explanation for the general pattern of change in daily temperatures by measuring and calculating the difference between morning and afternoon temperatures.
7. Obtain and evaluate informational texts and other media to generate and answer questions about water sources and human uses of clean water.

Curricula and instructions that integrate science and engineering practices should reflect the skills outlined above.

The Engineering Design Process (EDP) is a step-by-step method of devising a system, component, or process to meet desired needs. This is similar to the "scientific method" which is taught to young scientists. However, the EDP is a flexible process. Students can begin at any step, focus on just one step, move back and forth between steps, or repeat the cycle. Engineering standards are represented in some performance objectives with grade-banded, specific wording that will prompt students to approach learning and exploration using the engineering process. **These performance objectives are marked with an * at the end of the statement.** Professional development and teacher resources will be developed for teachers as EDP is incorporated into Mississippi standards.

Each K-2 standard allows students to be active doers of science rather than passive observers. This approach creates an opportunity for student learning and engages the pupil in the scientific investigation process.

GRADE ONE

Theme: Discovering Patterns and Constructing Explanations

In Grade 1, students build on the language, vocabulary, and mathematical concepts developed in kindergarten to construct explanations stemming from patterns observed in the natural environment. Students conduct investigations to determine what plants need to live and grow. They test predictions, discover patterns in plant and animal life cycles, and construct explanations about plant needs for growth and survival. Students use an engineering design process to solve the problem of plant overcrowding in a garden. Students observe plant adaptations, such as trees shedding leaves, or leaves turning toward the sun, and establish the cause and effect relationship between adaptations and environmental changes. Students describe, compare, and analyze daily weather data to determine weather patterns in different seasons. They use an engineering design process to create a system to better plan and respond to severe weather. Students investigate light and sound to find materials that light passes through and materials that change sound. They construct a device that uses light and/or sound to communicate over a distance. Students develop investigations and make predictions about patterns in the natural world. Acting as scientists, students observe the natural world and use investigations, charts, drawings, sketches, and models to communicate ideas.

GRADE ONE: Life Science

L.1.1 Hierarchical Organization

Conceptual Understanding: All living things reproduce, grow, develop, respond to stimuli, and die. Living things require air, food, water, and an environment in which to live. Plants are living things, and each plant part (roots, stem, leaves, and fruit) helps them survive, grow, and reproduce.

L.1.1 Students will demonstrate an understanding of the basic needs and structures of plants.

L.1.1.1 *Construct explanations using first-hand observations or other media to describe the structures of different plants (i.e., root, stem, leaves, flowers, and fruit). Report findings using drawings, writing, or models.*

L.1.1.2 *Obtain information from informational text and other media to describe the function of each plant part (roots absorb water and anchor the plant, leaves make food, the stem transports water and food, petals attract pollinators, flowers produce seeds, and seeds produce new plants).*

L.1.1.3 *Design and conduct an experiment that shows the absorption of water and how it is transported through the plant. Report observations using drawings, sketches, or models.*

L.1.1.4 *Create a model which explains the function of each plant structure (roots, stem, leaves, petals, flowers, seeds).*

L.1.1.5 *With teacher support, gain an understanding that scientists are humans who use observations and experiments to learn about the natural world. Obtain information from informational text or other media about scientists who have made important observations about plants (e.g., Theophrastus, Gregor Mendel, George Washington Carver, Katherine Esau).*

GRADE ONE: Life Science

L.1.2 Reproduction and Heredity

Conceptual Understanding: Plants and animals change with each stage of life. Plants have predictable and observable characteristics at each developmental stage (germination, growth, reproduction, and seed dispersal). Most plants are stationary so they depend upon animals or the wind for seed dispersal. Plants and animals are similar to their parents and resemble other plants and animals of the same kind.

L.1.2 Students will demonstrate an understanding of how living things change in form as they go through the general stages of a life cycle.

L.1.2.1 *Investigate, using observations and measurements (non-standard units), flowering plants (pumpkins, peas, marigolds, or sunflowers) as they change during the life cycle (i.e., germination, growth, reproduction, and seed dispersal). Use drawings, writing, or models to communicate findings.*

L.1.2.2 *Obtain, evaluate, and communicate information through labeled drawings, the life cycle (egg, larva, pupa, adult) of pollinating insects (e.g., bees, butterflies).*

GRADE ONE: Life Science

L.1.3 Ecology and Interdependence

Conceptual Understanding: The needs of plants must be met to survive. Sunlight, water, nutrients, and space to grow are necessary for plant growth and repair.

L.1.3A Students will demonstrate an understanding of what plants need from the environment for growth and repair.

L.1.3A.1 *Conduct structured investigations to make and test predictions about what plants need to live, grow, and repair including water, nutrients, sunlight, and space. Develop explanations, compare results, and report findings.*

Conceptual Understanding: Animals, such as insects, depend on other living organisms for food. Many plants depend on insects or other animals for pollination or to move their seeds around so the plant can survive.

L.1.3B Students will demonstrate an understanding of the interdependence of flowering plants and pollinating insects.

L.1.3B.1 *Identify the body parts of a pollinating insect (e.g., bee, butterfly) and describe how insects use these parts to gather nectar or disburse pollen. Report findings using drawings, writing, or models.*

GRADE ONE: Life Science

L.1.4 Adaptations and Diversity

Conceptual Understanding: Plants respond to stimuli (e.g., turn their leaves to the sun, use tendrils to grab and support) to adapt to changes in the environment. There are distinct environments in the world that support certain types of plants. Plants have features that help them survive in their environment.

L.1.4 Students will demonstrate an understanding of the ways plants adapt to their environment in order to survive.

L.1.4.1 *Explore the cause and effect relationship between plant adaptations and environmental changes (i.e., leaves turning toward the sun, leaves changing color, leaves wilting, or trees shedding leaves).*

L.1.4.2 *Describe how the different characteristics of plants help them to survive in distinct environments (e.g., rain forest, desert, grasslands, forests).*

L.1.4.3 *Create a solution for an agricultural problem (i.e. pollination, seed dispersal, over-crowding). Use an engineering design process to define the problem, design, construct, evaluate, and improve the solution.**

GRADE ONE: Physical Science

P.1.6 Motions, Forces, and Energy

Conceptual Understanding: Some objects allow light to pass through them and some objects do not allow any light to pass through them, creating shadows. Very hot objects give off light. Objects reflect light, and objects can only be seen when light is reflected off them. Mirrors and prisms can be used to change the direction of a light beam-

P.1.6A Students will demonstrate an understanding that light is required to make objects visible.

P.1.6A.1 *Construct explanations using first-hand observations or other media to describe how reflected light makes an object visible.*

P.1.6A.2 *Use evidence from observations to explain how shadows form and change with the position of the light source.*

Conceptual Understanding: Vibrations of matter can create sound, and sound can make an object vibrate. Humans use sound and light to communicate over long distances.

P.1.6B Students will demonstrate an understanding of sound.

P.1.6B.1 *Conduct an investigation to provide evidence that vibrations create sound (e.g., pluck a guitar string) and that sound can create vibrations (e.g., feeling sound through a speaker).*

P.1.6B.2 *Create a device that uses light and/or sound to communicate over a distance (e.g., signal lamp with a flashlight). Use an engineering design process to define the problem, design, construct, evaluate, and improve the device.**

GRADE ONE: Earth and Space Science

E.1.9 Earth's Systems and Cycles

Conceptual Understanding: Weather is a combination of temperature, sunlight, wind, snow, or rain in a particular place at a particular time. People measure weather conditions (temperature, precipitation) to describe and record the weather and to notice patterns over time. Temperature and precipitation can change with the seasons. Some kinds of severe weather (hurricane, tornado, flood, and drought) are more likely to occur in certain regions. Meteorologists forecast severe weather so that communities can prepare for and respond appropriately.

E.1.9A Students will demonstrate an understanding of the patterns of weather by describing, recording, and analyzing weather data to answer questions about daily and seasonal weather patterns.

E.1.9A.1 *Analyze and interpret data from observations and measurements to describe local weather conditions (including temperature, wind, and forms of precipitation).*
E.1.9A.2 *Develop and use models to predict weather conditions associated with seasonal patterns and changes.*
E.1.9A.3 *Construct an explanation for the general pattern of change in daily temperatures by measuring and calculating the difference between morning and afternoon temperatures.*
E.1.9A.4 *Obtain and communicate information about severe weather conditions to explain why certain safety precautions are necessary.*

Conceptual Understanding: The Earth is made of different materials, including rocks, soil, and water (nonliving things). Plants and animals, including humans, depend on the Earth's land, water, and air to live and grow. Animals, including humans, can change the environment (e.g., shape of the land, the flow of water).

E.1.9B Students will demonstrate an understanding of models (drawings or maps) to describe how water and land are distributed on Earth.

E.1.9B.1 *Locate, classify, and describe bodies of water (oceans, rivers, lakes, and ponds) on the Earth's surface using maps, globes, or other media.*
E.1.9B.2 *Generate and answer questions to explain the patterns and location of frozen and liquid bodies of water on earth using maps, globes, or other media.*
E.1.9B.3 *With teacher guidance, plan and conduct a structured investigation to determine how the movement of water can change the shape of the land on earth.*

GRADE ONE: Earth and Space Science

E.1.10 Earth's Resources

Conceptual Understanding: Water is essential to life on earth. Humans and other living things are dependent on clean water to survive. Water is an Earth material, and like all of Earth's resources, the amount of water is limited. Continued health and survival of humans are dependent on solutions that maintain clean water sources.

E.1.10 Students will demonstrate an understanding of human dependence on clean and renewable water resources.

E.1.10.1 *Obtain and evaluate informational texts and other media to generate and answer questions about water sources and human uses of clean water.*
E.1.10.2 *Communicate solutions that will reduce the impact of humans on the use and quality of water in the local environment.*
E.1.10.3 *Create a device that will collect free water to meet a human need (e.g., household drinking water, watering plants/animals, cleaning). Use an engineering design process to define the problem, design, construct, evaluate, and improve the device.**