First Grade Standards: SCIENCE

*Note: This information has been adapted from the 2020 Colorado State Standards as presented on the Colorado Department of Education (CDE) website. It is *not* an exhaustive or detailed list. All standards mentioned represent skills grade-level students should have mastered by the end of the grade-level year. If you desire further information, please visit the Standards page on the CDE website: https://www.cde.state.co.us/standardsandinstruction/standards

This document provides support in addressing the academic standards in four categories: a general **Overview** of expectations and scientific behaviors, **Basic Questions** (a "fly by" glance of concepts a student masters throughout the school year), **Scientific Principles** (principles that students can begin to understand), and **Scientific Practices** (general ideas for how to introduce and teach the principles). As you consider the learning objectives for each grade level, use the "Basic Questions" checklist to help you plan out your year. Start with the end in mind: If my child needs to know how to _____ by the end of the school year, what learning activities can be implemented to introduce and then reinforce the concepts? Think next about smaller steps in learning that your child needs to master in order to reach that end goal. While science units tend to be taught thematically, certain basic skills can (and should) be practiced in every unit (i.e. observing, predicting, experimenting, reading graphs, etc.). We understand that science is often a subject area where parents choose a curriculum that aligns with a family's personal values and worldview. Know that any of the standards can be addressed according to a family's personal beliefs. If you are using a reputable and research-based curriculum, then your child will most likely be working his/her way through these learning objectives in a well-paced and consistent manner. (A brief sampling of solid curriculum options can be found on the CSP website under "Homeschool Resources.")

Overview

Expectations for First Grade Students:

- **Physical Science:** Understand that sound can make matter vibrate and vibrating matter can make sound; objects can be seen if light is available; and people use different devices to communicate.
- **Life Science:** Explain that offspring have characteristics that are similar to but not exactly like their parents' characteristics; understand that an organism is a living thing that has physical features that help it survive.
- **Earth Science**: Understand that patterns of the motion of the sun, moon, and stars in the sky can be observed, described, and predicted.

Throughout First Grade You May Find Students:

- Planning an investigation to provide evidence that vibrating materials make a sound.
- Making observations about how we see objects based on the amount of light present.
- Using tools to build a device that uses light or sound to communicate
- Developing an understanding of how plants and animals use their external parts help them survive and grow.
- Making observations and constructing explanations about how young plants and animals are like, but not exactly like, their parents.
- Observing that the sun and moon appear to rise in one part of the sky, move across the sky, and set in a different part of the sky.
- Making observations about the amount of light in the winter versus the summer.

Basic Questions

Physical Science

1. **What are the characteristic properties and behaviors of waves?**

Life Science

2. **How do the structures of organisms enable life's functions?**
3. **How are the characteristics of one generation related to the previous generation? Why do individuals of the same species vary in how they look, function, and behave?**

Earth and Space Science

4. **What is the universe, and what goes on in stars? What are the predictable patterns caused by Earth's movement in the solar system?**

Specific Principles and Skills

Physical Science

1. **Basic Question: What are the characteristic properties and behaviors of waves?**

   *Scientific Principles

   a. Wave Properties: Waves, which are regular patterns of motion, can be made in water by disturbing the surface. When waves move across the surface of deep water, the water goes up and down in place; it does not move in the direction of the wave - observe, for example, a bobbing cork or seabird - except when the water meets the beach. Sound can make matter vibrate and vibrating matter can make sound.
   b. Electromagnetic Radiation: Objects can be seen only when light is available to illuminate them. Very hot objects give off light (e.g., a fire, the sun).
   c. Information Technologies and Instrumentation: People use their senses to learn about the world around them. Their eyes detect light, their ears detect sound, and they can feel vibrations by touch.
   d. Students understand that sound can make matter vibrate and vibrating matter can make sound.

   *Scientific Practices

   a. Plan and conduct investigations to provide evidence that vibrating materials can make a sound and that sound can make materials vibrate. *(Examples of vibrating materials that make sound could include tuning forks and plucking a stretched string. Examples of how sound can make matter vibrate could include holding a piece of paper near a speaker making sound and holding an object near a vibrating tuning fork.)*
   b. Make observations to construct an evidence-based account that objects can be seen only when illuminated. *(Examples of observations could include those made in a completely dark room, a pinhole box, and a video of a cave explorer with a flashlight. Illumination could be from an external light source or by an object giving off its own light.)*
   c. Plan and conduct an investigation to determine the effect of placing objects made with different materials in the path of a beam of light. *(Examples of materials could include those that are transparent [such as clear plastic], translucent [such as wax paper], opaque [such as cardboard] and reflective [such as a mirror].)*

d. Use tools and materials to design and build a device that used light or sound to solve the problem of communicating over a distance.

Life Science

2. Basic Question: How do the structures of organisms enable life's functions?

*Scientific Principles

a. Structure and Function: All organisms have external parts. Different animals use their body parts in different ways to see, hear, grasp objects, protect themselves, move from place to place and seek, find and take in food, water and air. Plants also have different parts (roots, stems, leaves, flowers, fruits) that help them survive, grow and produce more plants.

b. Growth and Development of Organisms: Plants and animals have predictable characteristics at different stages of development. Plants and animals grow and change. Adult plants and animals can have young. In many kinds of animals, parents and the offspring themselves engage in behaviors that help the offspring to survive.

c. Information Processing: Animals have body parts that capture and convey different kinds of information needed for growth and survival - for example, eyes for light, ears for sounds, and skin for temperature or touch. Animals respond to these inputs with behaviors that help them survive (e.g., find food, run from a predator). Plants also respond to some external inputs (e.g., turn leaves toward the sun).

d. Students understand that all organisms have external parts that they use to perform daily functions.

*Scientific Practices

a. Use materials to design a solution to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow and meet their needs. *(Examples of human problems that can be solved could include designing clothing or equipment to protect bicyclists by mimicking turtle shells, acorn shells and animal scales; stabilizing structures by mimicking animal tails and roots on plants; keeping out intruders by mimicking thorns on branches and animal quills; and detecting intruders by mimicking eyes and ears.)*

b. Read texts and use media to determine patterns in behavior of parents and offspring that help offspring survive. *(Examples of patterns of behaviors could include the signals that offspring make [such as crying, cheeping and other vocalizations] and the responses of the parents [such as feeding, comforting and protecting the offspring].)*

3. Basic Questions: How are the characteristics of one generation related to the previous generation? Why do individuals of the same species vary in how they look, function, and behave?

*Scientific Principles

a. Inheritance of Traits: Young animals are very much, but not exactly, like their parents. Plants also are very much, but not exactly, like their parents.

b. Variation of Traits: Individuals of the same kind of plant or animal are recognizable as similar but can also vary in many ways.

c. Students understand that young organisms are very much, but not exactly, like their parents, and also resemble other organisms of the same kind.

*Scientific Practices

a. Make observations to construct an evidence-based account that young plants and animals are like, but not exactly like, their parents. *(Examples of patterns could include features that plants or animals share. Examples of observations could include leaves from the same kind of plant that are the same shape but can differ in size; a particular breed of dog looks like its parents but is not exactly the same.)*

Earth and Space Science

4. **Basic Questions: What is the universe, and what goes on in stars? What are the predictable patterns caused by Earth's movement in the solar system?**

*Scientific Principles

a. A The Universe and its Stars: Patterns of the motion of the sun, moon and stars in the sky can be observed, described, and predicted. At night one can see the light coming from many stars with the naked eye, but telescopes make it possible to see many more and to observe them and the moon and planets in greater detail.
b. Earth and the Solar System: Seasonal patterns of sunrise and sunset can be observed, described, and predicted.
c. Students understand that patterns of movement of the sun, moon and stars as seen from Earth can be observed, described, and predicted.

*Scientific Practices

a. Use observations of the sun, moon, and stars to describe patterns that can be predicted. *(Examples of patterns could include that the sun and moon appear to rise in one part of the sky, move across the sky and set; stars other than our sun are visible at night but not during the day.)*
b. Make observations at different times of year to relate the amount of daylight to the time of year. *(Emphasis is on relative comparisons of the amount of daylight in the winter to the amount in the spring or fall (limited to relative amounts of daylight, not quantifying the hours or time of daylight).*