Third 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 3rd Grade Students:

- **Physical Science:** Recognize that objects in contact can exert a force on each other. Understand that electric and magnetic force between objects do not require contact, and that patterns of motion can be used to predict future motion.
- **Life Science:** Recognize that organisms have unique and diverse life cycles and vary in how they look and function because they have different inherited information. Explain how being part of a group helps animals obtain food, defend themselves, and cope with changes. Understand that some living organisms resemble organisms that once lived on Earth.
- **Earth and Space Science:** Explain how climate describes patterns of typical weather conditions over different scales and variations. Understand that a variety of weather hazards result from natural processes, and that although humans cannot eliminate weather-related hazards, we can reduce their impact.

Throughout 3rd Grade You May Find Students:

- Asking questions to determine the cause/effect relationship of electric or magnetic forces between objects.
- Planning and conducting investigations about the effects of balanced/unbalanced forces on an object.
- Developing models to describe how though organisms have unique and diverse life cycles, all organisms experience birth, growth, reproduction, and death.
- Obtaining and combining information to describe climates in different regions of the world.
- Making claims about the merit of a design solution that reduces the impacts of a weather-related hazard.

Basic Questions

Physical Science

1. **How can one predict an object's continued motion, changes in motion or stability? What underlying forces explain the variety of interactions observed?**
2. **Why are some physical systems more stable than others?**

Life Science

Note: Some of these questions might lend themselves to discussions regarding evolution and/or origin of life and therefore may want to be adapted to align with a family's personal worldview.

3. **How do the structures of organisms enable life's functions?**
4. **How do organisms interact with the living and nonliving environments to obtain matter and energy?**
5. **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?**
6. **What evidence shows that different species are related? How does genetic variation among organisms affect survival and reproduction?**
7. **How does the environment influence populations of organisms over multiple generations? What is biodiversity, how do humans affect it, and how does it affect humans?**

Earth and Space Science

8. **How do natural hazards affect individuals and societies?**

Specific Principles and Skills

Physical Science

1. **Basic Questions: How can one predict an object's continued motion, changes in motion or stability? What underlying forces explain the variety of interactions observed?**

   *Scientific Principles

   a. Forces and Motion: Each force acts on one particular object and has both strength and a direction. An object at rest typically has multiple forces acting on it, but they add to give zero net force on the object. Forces that do not sum to zero can cause changes in the object's speed or direction of motion. The patterns of an object's motion in various situations can be observed and measured; when that past motion exhibits a regular pattern, future motion can be predicted from it. (Technical terms, such as magnitude, velocity, momentum, and vector quantity, are not introduced at this level, but the concept that some quantities need both size and direction to be described is developed.)
   b. Types of Interactions: Objects in contact exert forces on each other.
   c. Students understand that patterns of motion can be used to predict future motion.

   *Scientific Practices

   a. Plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces on the motion of an object. *(Examples could include an unbalanced force on one side of a ball can make it start moving and balanced forces pushing on a box from both sides will not produce any motion at all. Limited to one variable at a time: number, size or direction of forces and to gravity being addressed as a force that pulls objects down. Does not include quantitative force size, only qualitative and relative.)*

b. Make observations and/or measurements of an object's motion to provide evidence that a pattern can be used to predict future motion. *(Examples of motion with a predictable pattern could include a child swinging in a swing, a ball rolling back and forth in a bowl and two children on a see-saw. Does not include technical terms such as period and frequency.)*

2. Basic Question: Why are some physical systems more stable than others?

*Scientific Principles

a. Types of Interactions: Electric and magnetic forces between a pair of objects do not require that the objects be in contact. The sizes of the forces in each situation depend on the properties of the objects and their distances apart and for forces between two magnets on their orientation relative to each other.
b. Students understand that objects in contact exert forces on each other; electric and magnetic forces between a pair of objects do not require contact.

*Scientific Practices

a. Ask questions to determine cause - and - effect relationships of electric or magnetic interactions between two objects not in contact with each other. *(Examples of an electric force could include the force on hair from an electrically charged balloon and the electrical forces between a charged rod and pieces of paper; examples of a magnetic force could include the force between two permanent magnets, the force between an electromagnet and steel paperclips and the force exerted by one magnet versus the force exerted by two magnets. Examples of cause - and - effect relationships could include how the distance between objects affects strength of the force and how the orientation of magnets affects the direction of the magnetic force. Limited to forces produced by objects that can be manipulated by students, and electrical interactions are limited to static electricity.)*
b. Define a simple design problem that can be solved by applying scientific ideas about magnets. *(Examples of problems could include constructing a latch to keep a door shut and creating a device to keep two moving objects from touching each other.)*

Life Science

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

*Scientific Principles

a. Growth and Development of Organisms: Reproduction is essential to the continued existence of every kind of organism. Plants and animals have unique and diverse life cycles. (Does not refer to details of human reproduction.)
b. Students understand that organisms have unique and diverse life cycles.

*Scientific Practices

a. Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction and death *(i.e. changes organisms go through during their life form a pattern.) (Limited to those of flowering plants and does not include details of human reproduction.)*

4. Basic Question: How do organisms interact with the living and nonliving environments to obtain matter and energy?

*Scientific Principles

a. Social Interactions and Group Behavior: Being part of a group helps animals obtain food, defend themselves and cope with changes. Groups may serve different functions and vary dramatically in size.
b. Students understand that being part of a group helps animals obtain food, defend themselves and cope with changes.

*Scientific Practices

a. Construct an argument that some animals form groups that help members survive.

5. **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: Many characteristics of organisms are inherited from their parents. Other characteristics result from individuals' interactions with the environment, which can range from diet to learning. Many characteristics involve both inheritance and environment.
b. Variation of Traits: Different organisms vary in how they look and function because they have different inherited information. The environment also affects the traits that an organism develops.
c. Students understand that different organisms vary in how they look and function because they have different inherited information; the environment also affects the traits that an organism develops.

*Scientific Practices

a. Analyze and interpret data to provide evidence that plants and animals have traits inherited from parents and that variation of these traits exists in a group of similar organisms. *(Patterns are the similarities and differences in traits shared between offspring and their parents, or among siblings. Emphasis is on organisms other than humans. Does not include genetic mechanisms of inheritance and prediction of traits. Assessment is limited to non-human examples.)*
b. Use evidence to support the explanation that traits can be influenced by the environment. *(Examples of the environment affecting a trait could that include normally tall plants grown with insufficient water are stunted; and a pet dog that is given too much food and little exercise may become overweight.)*

6. **Basic Questions: What evidence shows that different species are related? How does genetic variation among organisms affect survival and reproduction?**

*Scientific Principles

a. Evidence of Common Ancestry and Diversity: Some kinds of plants and animals that once lived on Earth are no longer found anywhere. Fossils provide evidence about the types of organisms that lived long ago and also about the nature of their environments.
b. Natural Selection: Sometimes the differences in characteristics between individuals of the same species provide advantages in surviving, finding mates and reproducing.
c. Students understand that some living organisms resemble organisms that once lived on Earth.

*Scientific Practices

a. Analyze and interpret data from fossils to provide evidence of the organisms and the environments in which they lived long ago. *(Examples of data could include type, size, and distributions of fossil organisms. Examples of fossils and environments could include marine fossils found on dry land, tropical plant fossils found in Arctic areas and fossils of extinct organisms. Does not include identification of specific fossils or present plants and animals and is limited to major fossil types and relative ages.)*
b. Use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates and reproducing. *(Examples of cause-and-effect relationships could be that plants that have larger thorns than other plants may be less likely to be eaten by predators; and animals that have better camouflage coloration than other animals may be more likely to survive and therefore more likely to leave offspring.)*

7. Basic Questions: How does the environment influence populations of organisms over multiple generations? What is biodiversity, how do humans affect it, and how does it affect humans?

*Scientific Principles

a. Ecosystem Dynamics, Functioning, and Resilience: When the environment changes in ways that affect a place's characteristics, temperature or availability of resources, some organisms survive and reproduce, others move to new locations, yet others move into the transformed environment, and some die.
b. Adaptation: For any particular environment, some kinds of organisms survive well, some survive less well, and some cannot survive at all.
c. Biodiversity and Humans: Populations live in a variety of habitats and change in those habitats affects the organisms living there.
d. Students understand that sometimes differences in characteristics between individuals of the same species provide advantages in survival and reproduction.

*Scientific Practices

a. Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well and some cannot survive at all. *(Examples of evidence could include needs and characteristics of the organisms and habitats involved. The organisms and their habitat make up a system in which the parts depend on each other.)*
b. Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change. *(Examples of environmental changes could include changes in land characteristics, water distribution, temperature, food and other organisms. Limited to a single environmental change. Assessment does not include the greenhouse effect or climate change.)*

Earth and Space Science

8. How do natural hazards affect individuals and societies?

*Scientific Principles

a. A variety of natural hazards result from natural processes. Humans cannot eliminate natural hazards but can take steps to reduce their impacts.

*Scientific Practices

a. Make a claim about the merit of a design solution that reduces the impacts of a weather-related hazard. *(Examples of design solutions to weather-related hazards could include barriers to prevent flooding, wind resistant roofs and lightning rods.)*