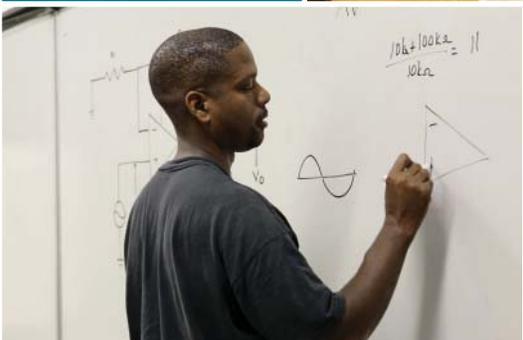


Colorado Academic STANDARDS

Preschool and Kindergarten

Science



Colorado Academic Standards Science

"Science is facts; just as houses are made of stone, so is science made of facts; but a pile of stones is not a house, and a collection of facts is not necessarily science." --*Jules Henri Poincaré (1854-1912) French mathematician.*

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High expectations in education are essential for the U.S. to continue as a world leader in the 21<sup>st</sup> century. In order to be successful in postsecondary education, the workforce, and in life, students need a rigorous, age-appropriate set of standards that include finding and gathering information, critical thinking, and reasoning skills to evaluate information, and use information in social and cultural contexts. Students must learn to comprehend and process information, analyze and draw conclusions, and apply the results to everyday life.

A quality science education embodies 21<sup>st</sup> century skills and postsecondary and workforce readiness by teaching students critical skills and thought processes to meet the challenges of today's world. Scientifically literate graduates will help to ensure Colorado's economic vitality by encouraging the development of research and technology, managing and preserving our environmental treasures, and caring for the health and well-being of our citizens.

Science is both a body of knowledge that represents the current understanding of natural systems, and the process whereby that body of knowledge has been established and is continually extended, refined, and revised. Because science is both the knowledge of the natural world and the processes that have established this knowledge, science education must address both of these aspects.

At a time when pseudo-scientific ideas and outright fraud are becoming more common place, developing the skepticism and critical thinking skills of science gives students vital skills needed to make informed decisions about their health, the environment, and other scientific issues facing society. A major aspect of science is the continual interpretation of evidence. All scientific ideas constantly are being challenged by new evidence and are evolving to fit the new evidence. Students must understand the collaborative social processes that guide these changes so they can reason through and think critically about popular scientific information, and draw valid conclusions based on evidence, which often is limited. Imbedded in the cognitive process, students learn and apply the social and cultural skills expected of all citizens in school and in the workplace. For example, during class activities, laboratory exercises, and projects, students learn and practice self-discipline, collaboration, and working in groups.

The Colorado Academic Standards in science represent what all Colorado students should know and be able to do in science as a result of their preschool through twelfth-grade science education. Specific expectations are given for students who complete each grade from preschool through eighth grade and for high school. These standards outline the essential level of science content knowledge and the application of the skills needed by all Colorado citizens to participate productively in our increasingly global, information-driven society.

## Standards Organization and Construction

As the subcommittee began the revision process to improve the existing standards, it became evident that the way the standards information was organized, defined, and constructed needed to change from the existing documents. The new design is intended to provide more clarity and direction for teachers, and to show how 21<sup>st</sup> century skills and the elements of school readiness and postsecondary and workforce readiness indicators give depth and context to essential learning.

The “Continuum of State Standards Definitions” section that follows shows the hierarchical order of the standards components. The “Standards Template” section demonstrates how this continuum is put into practice.

The elements of the revised standards are:

**Prepared Graduate Competencies:** The preschool through twelfth-grade concepts and skills that all students who complete the Colorado education system must master to ensure their success in a postsecondary and workforce setting.

**Standard:** The topical organization of an academic content area.

**High School Expectations:** The articulation of the concepts and skills of a standard that indicates a student is making progress toward being a prepared graduate. *What do students need to know in high school?*

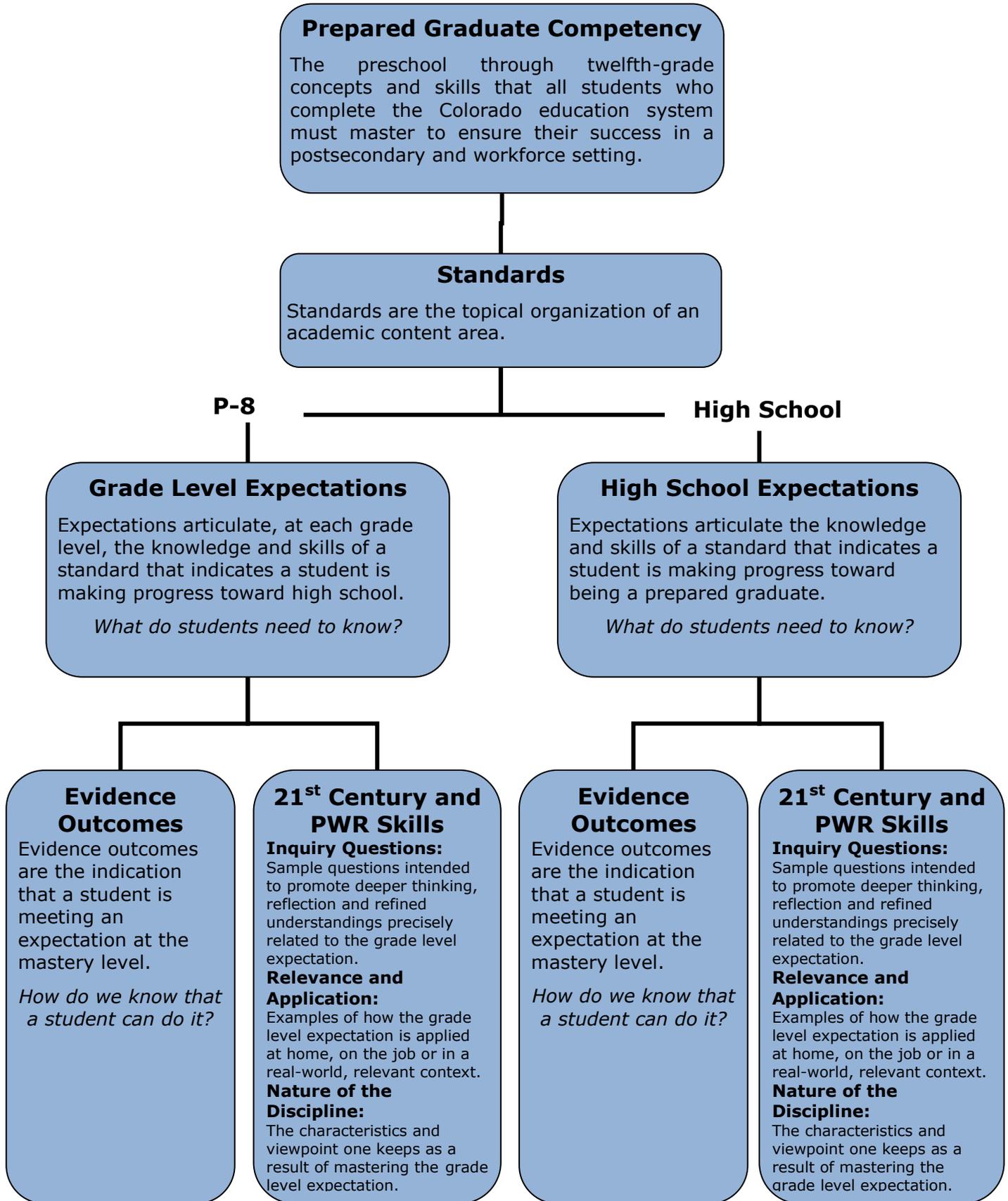
**Grade Level Expectations:** The articulation (at each grade level), concepts, and skills of a standard that indicate a student is making progress toward being ready for high school. *What do students need to know from preschool through eighth grade?*

**Evidence Outcomes:** The indication that a student is meeting an expectation at the mastery level. *How do we know that a student can do it?*

**21<sup>st</sup> Century Skills and Readiness Competencies:** Includes the following:

- ***Inquiry Questions:***  
Sample questions are intended to promote deeper thinking, reflection and refined understandings precisely related to the grade level expectation.
- ***Relevance and Application:***  
Examples of how the grade level expectation is applied at home, on the job or in a real-world, relevant context.
- ***Nature of the Discipline:***  
The characteristics and viewpoint one keeps as a result of mastering the grade level expectation.

# Continuum of State Standards Definitions



## STANDARDS TEMPLATE

**Content Area: NAME OF CONTENT AREA**

**Standard:** The topical organization of an academic content area.

**Prepared Graduates:**

- The preschool through twelfth-grade concepts and skills that all students who complete the Colorado education system must master to ensure their success in a postsecondary and workforce setting.

### High School and Grade Level Expectations

**Concepts and skills students master:**

Grade Level Expectation: High Schools: The articulation of the concepts and skills of a standard that indicates a student is making progress toward being a prepared graduate.

Grade Level Expectations: The articulation, at each grade level, the concepts and skills of a standard that indicates a student is making progress toward being ready for high school.

*What do students need to know?*

**Evidence Outcomes**

**Students can:**

Evidence outcomes are the indication that a student is meeting an expectation at the mastery level.

*How do we know that a student can do it?*

**21<sup>st</sup> Century Skills and Readiness Competencies**

**Inquiry Questions:**

Sample questions intended to promote deeper thinking, reflection and refined understandings precisely related to the grade level expectation.

**Relevance and Application:**

Examples of how the grade level expectation is applied at home, on the job or in a real-world, relevant context.

**Nature of the Discipline:**

The characteristics and viewpoint one keeps as a result of mastering the grade level expectation.

## Prepared Graduate Competencies in Science

The preschool through twelfth-grade concepts and skills that all students who complete the Colorado education system must master to ensure their success in a postsecondary and workforce setting.

Prepared Graduates:

- Observe, explain, and predict natural phenomena governed by Newton's laws of motion, acknowledging the limitations of their application to very small or very fast objects
- Apply an understanding of atomic and molecular structure to explain the properties of matter, and predict outcomes of chemical and nuclear reactions
- Apply an understanding that energy exists in various forms, and its transformation and conservation occur in processes that are predictable and measurable
- Analyze the relationship between structure and function in living systems at a variety of organizational levels, and recognize living systems' dependence on natural selection
- Explain and illustrate with examples how living systems interact with the biotic and abiotic environment
- Analyze how various organisms grow, develop, and differentiate during their lifetimes based on an interplay between genetics and their environment
- Explain how biological evolution accounts for the unity and diversity of living organisms
- Describe and interpret how Earth's geologic history and place in space are relevant to our understanding of the processes that have shaped our planet
- Evaluate evidence that Earth's geosphere, atmosphere, hydrosphere, and biosphere interact as a complex system
- Describe how humans are dependent on the diversity of resources provided by Earth and Sun

## Standards in Science

Standards are the topical organization of an academic content area. The three standards of science are:

**1. Physical Science**

Students know and understand common properties, forms, and changes in matter and energy.

**2. Life Science**

Students know and understand the characteristics and structure of living things, the processes of life, and how living things interact with each other and their environment.

**3. Earth Systems Science**

Students know and understand the processes and interactions of Earth's systems and the structure and dynamics of Earth and other objects in space.

## Science Grade Level Expectations at a Glance

| Standard                 | Grade Level Expectation                                                                                                                                                                                 |
|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Kindergarten</b>      |                                                                                                                                                                                                         |
| 1. Physical Science      | 1. Objects can move in a variety of ways that can be described by speed and direction<br>2. Objects can be sorted by physical properties, which can be observed and measured                            |
| 2. Life Science          | 1. Organisms can be described and sorted by their physical characteristics                                                                                                                              |
| 3. Earth Systems Science | 1. The sun provides heat and light to Earth                                                                                                                                                             |
| <b>Preschool</b>         |                                                                                                                                                                                                         |
| 1. Physical Science      | 1. Objects have properties and characteristics<br>2. There are cause-and-effect relationships in everyday experiences                                                                                   |
| 2. Life Science          | 1. Living things have characteristics and basic needs<br>2. Living things develop in predictable patterns                                                                                               |
| 3. Earth Systems Science | 1. Earth's materials have properties and characteristics that affect how we use those materials<br>2. Events such as night, day, the movement of objects in the sky, weather, and seasons have patterns |

## **21<sup>st</sup> Century Skills and Readiness Competencies in Science**

### **Colorado's Description of 21st Century Skills**

Colorado's description of 21st century skills is a synthesis of the essential abilities students must apply in our rapidly changing world. Today's students need a repertoire of knowledge and skills that are more diverse, complex, and integrated than any previous generation. These skills do not stand alone in the standards, but are woven into the evidence outcomes, inquiry questions, and application and are within the nature of science. Science inherently demonstrates each of Colorado's 21<sup>st</sup> century skills, as follows:

#### Critical Thinking and Reasoning

Science requires students to analyze evidence and draw conclusions based on that evidence. Scientific investigation involves defining problems and designing studies to test hypotheses related to those problems. In science, students must justify and defend scientific explanations and distinguish between correlation and causation.

#### Information Literacy

Understanding science requires students to research current ideas about the natural world. Students must be able to distinguish fact from opinion and truth from fantasy. Science requires a degree of skepticism because the ideas of science are subject to change. Science students must be able to understand what constitutes reliable sources of information and how to validate those sources. One key to science is understanding that converging different lines of evidence from multiple sources strengthens a scientific conclusion.

#### Collaboration

Science students must be able to listen to others' ideas, and engage in scientific dialogs that are based on evidence – not opinion. These types of conversations allow them to compare and evaluate the merit of different ideas. The peer review process helps to ensure the validity of scientific explanations.

#### Self-Direction

Students in science must have persistence and perseverance when exploring scientific concepts. Students must generate their own questions, and design investigations to find the answers. Students must be open to revising and redefining their thinking based on evidence.

#### Invention

Designing investigations and engineering new products involves a large degree of invention. Scientists and engineers often have to think "outside the box" as they push the limits of our current knowledge. They must learn from their failures to take the next steps in understanding. Science students also must integrate ideas from multiple disciplines to formulate an understanding of the natural world. In addition to using invention to design investigations, scientists also use findings from investigations to help them to invent new products.

## **Colorado’s Description for School Readiness**

*(Adopted by the State Board of Education, December 2008)*

School readiness describes both the preparedness of a child to engage in and benefit from learning experiences, and the ability of a school to meet the needs of all students enrolled in publicly funded preschools or kindergartens. School readiness is enhanced when schools, families, and community service providers work collaboratively to ensure that every child is ready for higher levels of learning in academic content.

## **Colorado’s Description of Postsecondary and Workforce Readiness**

*(Adopted by the State Board of Education, June 2009)*

Postsecondary and workforce readiness describes the knowledge, skills, and behaviors essential for high school graduates to be prepared to enter college and the workforce and to compete in the global economy. The description assumes students have developed consistent intellectual growth throughout their high school career as a result of academic work that is increasingly challenging, engaging, and coherent. Postsecondary education and workforce readiness assumes that students are ready and able to demonstrate the following without the need for remediation: Critical thinking and problem-solving; finding and using information/information technology; creativity and innovation; global and cultural awareness; civic responsibility; work ethic; personal responsibility; communication; and collaboration.

## **How These Skills and Competencies are Embedded in the Revised Standards**

Three themes are used to describe these important skills and competencies and are interwoven throughout the standards: *inquiry questions; relevance and application; and the nature of each discipline*. These competencies should not be thought of stand-alone concepts, but should be integrated throughout the curriculum in all grade levels. Just as it is impossible to teach thinking skills to students without the content to think about, it is equally impossible for students to understand the content of a discipline without grappling with complex questions and the investigation of topics.

**Inquiry Questions** – Inquiry is a multifaceted process requiring students to think and pursue understanding. Inquiry demands that students (a) engage in an active observation and questioning process; (b) investigate to gather evidence; (c) formulate explanations based on evidence; (d) communicate and justify explanations, and; (e) reflect and refine ideas. Inquiry is more than hands-on activities; it requires students to cognitively wrestle with core concepts as they make sense of new ideas.

**Relevance and Application** – The hallmark of learning a discipline is the ability to apply the knowledge, skills, and concepts in real-world, relevant contexts. Components of this include solving problems, developing, adapting, and refining solutions for the betterment of society. The application of a discipline, including how technology assists or accelerates the work, enables students to more fully appreciate how the mastery of the grade level expectation matters after formal schooling is complete.

**Nature of Discipline** – The unique advantage of a discipline is the perspective it gives the mind to see the world and situations differently. The characteristics and viewpoint one keeps as a result of mastering the grade level expectation is the nature of the discipline retained in the mind’s eye.

# 1. Physical Science

Students know and understand common properties, forms and changes in matter and energy.

## **Prepared Graduates**

The preschool through twelfth-grade concepts and skills that all students who complete the Colorado education system must master to ensure their success in a postsecondary and workforce setting.

### **Prepared Graduate Competencies in the Physical Science standard:**

- Observe, explain, and predict natural phenomena governed by Newton's laws of motion, acknowledging the limitations of their application to very small or very fast objects
- Apply an understanding of atomic and molecular structure to explain the properties of matter, and predict outcomes of chemical and nuclear reactions
- Apply an understanding that energy exists in various forms, and its transformation and conservation occur in processes that are predictable and measurable

**Content Area: Science**  
**Standard: 1. Physical Science**

**Prepared Graduates:**

- Observe, explain, and predict natural phenomena governed by Newton's laws of motion, acknowledging the limitations of their application to very small or very fast objects

**Grade Level Expectation: Kindergarten**

**Concepts and skills students master:**

1. Objects can move in a variety of ways that can be described by speed and direction

**Evidence Outcomes**

**Students can:**

- a. Observe, investigate, and describe how different objects move (DOK 1-2)
- b. Describe the motion of a child who is playing (DOK 1)

**21<sup>st</sup> Century Skills and Readiness Competencies**

**Inquiry Questions:**

1. What can change how fast or slow an object travels?
2. What indicates which objects will be easier or harder to move?

**Relevance and Application:**

1. People must push harder to move their bikes, skateboards, or scooters as they go faster or as they go up a hill.
2. Information about motion can be represented in pictures, illustrations, and simple charts.

**Nature of Science**

1. Recognize that scientists try to be clear and specific when they describe things. (DOK 1)
2. Make predictions about the motion of an object. (DOK 1-2)
3. Ask testable questions about the movement of objects. (DOK 1-3)

**Content Area: Science**

**Standard: 1. Physical Science**

**Prepared Graduates:**

- Apply an understanding of atomic and molecular structure to explain the properties of matter, and predict outcomes of chemical and nuclear reactions

**Grade Level Expectation: Kindergarten**

**Concepts and skills students master:**

2. Objects can be sorted by physical properties, which can be observed and measured

**Evidence Outcomes**

**Students can:**

- a. Observe, investigate, and describe how objects can be sorted using their physical properties (DOK 1-2)
- b. Explain why objects are sorted into categories (DOK 2)
- c. Sort a set of objects based on their physical characteristics, and then explain how the objects are sorted (DOK 1-2)

**21<sup>st</sup> Century Skills and Readiness Competencies**

**Inquiry Questions:**

- 1. How can objects belong to more than one group?
- 2. How do you decide which properties are most important when putting objects into groups?

**Relevance and Application:**

- 1. Materials have uses based on properties such as whether they are glass or plastic.
- 2. Machines such as coin sorting machines can be designed to sort things efficiently.

**Nature of Science:**

- 1. Recognize that scientists try to be clear and specific when they describe things. (DOK 1)
- 2. Share observations with others; be clear and precise like scientists. (DOK 1-2)

**Content Area: Science**

**Standard: 1. Physical Science**

**Prepared Graduates:**

- Apply an understanding of atomic and molecular structure to explain the properties of matter, and predict outcomes of chemical and nuclear reactions

**Grade Level Expectation: Preschool**

**Concepts and skills students master:**

1. Objects have properties and characteristics

**Evidence Outcomes**

**Students can:**

- a. Use senses to gather information about objects (DOK 1-2)
- b. Make simple observations, predictions, explanations, and generalizations based on real-life experiences (DOK 1-2)
- c. Collect, describe, and record information through discussion, drawings, and charts (DOK 1-2)

**21<sup>st</sup> Century Skills and Readiness Competencies**

**Inquiry Questions:**

1. How are various objects similar and different?

**Relevance and Application:**

1. Use scientific tools such as magnets, magnifying glasses, scales, and rulers in investigations and play.

**Nature of Science:**

1. Be open to and curious about new tasks and challenges. (DOK 1-3)
2. Explore and experiment. (DOK 1-3)
3. Show capacity for invention and imagination. (DOK 1-3)
4. Ask questions based on discoveries made while playing. (DOK 2)

**Content Area: Science**

**Standard: 1. Physical Science**

**Prepared Graduates:**

- Apply an understanding of atomic and molecular structure to explain the properties of matter, and predict outcomes of chemical and nuclear reactions

**Grade Level Expectation: Preschool**

**Concepts and skills students master:**

2. There are cause-and-effect relationships in everyday experiences

**Evidence Outcomes**

**Students can:**

- a. Recognize and investigate cause-and-effect relationships in everyday experiences – pushing, pulling, kicking, rolling, or blowing objects (DOK 1-2)

**21<sup>st</sup> Century Skills and Readiness Competencies**

**Inquiry Questions:**

- 1. How do various objects react differently to the same cause?

**Relevance and Application:**

- 1. Use scientific tools such as magnets, magnifying glasses, scales, and rulers in investigations and play.

**Nature of Science:**

- 1. Be open to and curious about new tasks and challenges. (DOK 2-3)
- 2. Explore and experiment. (DOK 1-3)
- 3. Reflect on and interpret cause-and-effect relationships. (DOK 2)

## 2. Life Science

Students know and understand the characteristics and structure of living things, the processes of life and how living things interact with each other and their environment.

### **Prepared Graduates**

The preschool through twelfth-grade concepts and skills that all students who complete the Colorado education system must master to ensure their success in a postsecondary and workforce setting.

#### **Prepared Graduate Competencies in the Life Science standard:**

- Analyze the relationship between structure and function in living systems at a variety of organizational levels, and recognize living systems' dependence on natural selection
- Explain and illustrate with examples how living systems interact with the biotic and abiotic environment
- Analyze how various organisms grow, develop, and differentiate during their lifetimes based on an interplay between genetics and their environment
- Explain how biological evolution accounts for the unity and diversity of living organisms

**Content Area: Science**  
**Standard: 2. Life Science**

**Prepared Graduates:**

- Analyze the relationship between structure and function in living systems at a variety of organizational levels, and recognize living systems' dependence on natural selection

**Grade Level Expectation: Kindergarten**

**Concepts and skills students master:**

1. Organisms can be described and sorted by their physical characteristics

**Evidence Outcomes**

**Students can:**

- a. Sort a group of items based on observable characteristics (DOK 1-2)
- b. Communicate and justify an evidence-based scientific rationale for sorting organisms into categories (DOK 1-2)

**21<sup>st</sup> Century Skills and Readiness Competencies**

**Inquiry Questions:**

1. What do living things have in common?
2. What characteristics are useful for sorting and classifying organisms?

**Relevance and Application:**

1. There are patterns in the natural world.
2. There are many ways to classify a group of organisms.

**Nature of Science:**

1. Ask questions about physical characteristics that will help them sort organisms. (DOK 2)
2. Share scientific ideas verbally in a clear way. (DOK 1-2)
3. Question peers about reasons for how they sort organisms, and encourage them to use evidence to support their ideas. (DOK 2)
4. Use scientific tools such as magnifying glasses, sorting blocks, and rulers in investigations and play. (DOK 1)

**Content Area: Science**  
**Standard: 2. Life Science**

|                                                                                                                                                                                                                                                                                                                                                                                          |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>Prepared Graduates:</b></p> <ul style="list-style-type: none"> <li>➤ Analyze the relationship between structure and function in living systems at a variety of organizational levels, and recognize living systems’ dependence on natural selection</li> <li>➤ Explain and illustrate with examples how living systems interact with the biotic and abiotic environment</li> </ul> |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

**Grade Level Expectation: Preschool**

**Concepts and skills students master:**  
 1. Living things have characteristics and basic needs

| <b>Evidence Outcomes</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | <b>21<sup>st</sup> Century Skills and Readiness Competencies</b>                                                                                                                                                           |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>Students can:</b></p> <ul style="list-style-type: none"> <li>a. Use senses to gather information about living things (DOK 1-2)</li> <li>b. Observe and explore the natural processes of growing, changing, and adapting to the environment (DOK 1-2)</li> <li>c. Ask and pursue questions through simple investigations and observations of living things (DOK 2-3)</li> <li>d. Collect, describe, and record information about living things through discussion, drawings, and charts (DOK 1-2)</li> </ul> | <p><b>Inquiry Questions:</b></p> <ul style="list-style-type: none"> <li>1. What do living things need to survive?</li> </ul>                                                                                               |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | <p><b>Relevance and Application:</b></p> <ul style="list-style-type: none"> <li>1. Mittens and hats keep people warm when the weather is cold.</li> <li>2. Gills on a fish allow them to “breathe” under water.</li> </ul> |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | <p><b>Nature of Science:</b></p> <ul style="list-style-type: none"> <li>1. Be open to and curious about new tasks and challenges. (DOK 1-3)</li> <li>2. Explore and experiment. (DOK 1-3)</li> </ul>                       |

**Content Area: Science**  
**Standard: 2. Life Science**

|                                                                                                                                                                                                                                                                                                                                                                                          |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>Prepared Graduates:</b></p> <ul style="list-style-type: none"> <li>➤ Analyze the relationship between structure and function in living systems at a variety of organizational levels, and recognize living systems' dependence on natural selection</li> <li>➤ Explain and illustrate with examples how living systems interact with the biotic and abiotic environment</li> </ul> |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

**Grade Level Expectation: Preschool**

**Concepts and skills students master:**  
 2. Living things develop in predictable patterns

| <b>Evidence Outcomes</b>                                                                                                                                                                                                                                                                                                                                                                                                                                              | <b>21<sup>st</sup> Century Skills and Readiness Competencies</b>                                                                                                                                                                                                                                                                |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>Students can:</b></p> <ul style="list-style-type: none"> <li>a. Identify the common needs such as food, air, and water of familiar living things (DOK 1)</li> <li>b. Predict, explain, and infer patterns based on observations and representations of living things, their needs, and life cycles (DOK 1-3)</li> <li>c. Make and record by drawing, acting out, or describing observations of living things and how they change over time (DOK 1-2)</li> </ul> | <p><b>Inquiry Questions:</b></p> <ul style="list-style-type: none"> <li>1. How do different living things change over time?</li> <li>2. What are some similarities and differences in how living things develop?</li> <li>3. How do the adults of various animals compare to younger versions of those same animals?</li> </ul> |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <p><b>Relevance and Application:</b></p> <ul style="list-style-type: none"> <li>1. Butterflies have a predictable growth cycle.</li> <li>2. Leaves on a tree change color and fall every year.</li> </ul>                                                                                                                       |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <p><b>Nature of Science:</b></p> <ul style="list-style-type: none"> <li>1. Show a capacity for invention and imagination when looking for patterns of development. (DOK 1-3)</li> </ul>                                                                                                                                         |

# 3. Earth Systems Science

Students know and understand the processes and interactions of Earth's systems and the structure and dynamics of Earth and other objects in space.

## **Prepared Graduates:**

The preschool through twelfth-grade concepts and skills that all students who complete the Colorado education system must master to ensure their success in a postsecondary and workforce setting.

### **Prepared Graduate Competencies in the Earth Systems Science standard:**

- Describe and interpret how Earth's geologic history and place in space are relevant to our understanding of the processes that have shaped our planet
- Evaluate evidence that Earth's geosphere, atmosphere, hydrosphere, and biosphere interact as a complex system
- Describe how humans are dependent on the diversity of resources provided by Earth and Sun

**Content Area: Science**

**Standard: 3. Earth Systems Science**

**Prepared Graduates:**

- Apply an understanding that energy exists in various forms, and its transformation and conservation occur in processes that are predictable and measurable
- Describe and interpret how Earth's geologic history and place in space are relevant to our understanding of the processes that have shaped our planet

**Grade Level Expectation: Kindergarten**

**Concepts and skills students master:**

1. The Sun provides heat and light to Earth

**Evidence Outcomes**

**Students can:**

- a. Investigate, explain, and describe that the Sun provides heat and light to Earth (DOK 1)
- b. Analyze and interpret temperature data between day (when the Sun shines on our area) and night (when the Sun does not shine on our area) (DOK 1-3)
- c. Investigate and communicate findings about what happens when the Sun's light is blocked (DOK 1-2)
- d. Investigate and communicate the effect of varying heat and light on the growth of plants through a scientific study (DOK 1-2)

**21<sup>st</sup> Century Skills and Readiness Competencies**

**Inquiry Questions:**

1. How does the Sun impact Earth?
2. What happens when the Sun's light is blocked?

**Relevance and Application:**

1. Decisions about activities to do on school grounds can be based on the light and heat from the sun (i.e. read under a tree to stay cool or avoid the slide when it is too hot from the sun, etc.)
2. People make decisions about where to live based on temperature and how much sun that place gets.

**Nature of Science:**

1. Question peers and encourage clarity of reasoning about why they think the Sun provides heat and light to Earth. (DOK 2)

**Content Area: Science**

**Standard: 3. Earth Systems Science**

**Prepared Graduates:**

- Describe how humans are dependent on the diversity of resources provided by Earth and Sun

**Grade Level Expectation: Preschool**

**Concepts and skills students master:**

1. Earth's materials have properties and characteristics that affect how we use those materials

**Evidence Outcomes**

**Students can:**

- a. Use senses to gather information about Earth's materials (DOK 1-2)
- b. Make simple observations, explanations, and generalizations about Earth's materials based on real-life experiences (DOK 1-2)
- c. Describe how various materials might be used based on characteristics or properties (DOK 1-2)

**21<sup>st</sup> Century Skills and Readiness Competencies**

**Inquiry Questions:**

1. What are the similarities and differences among various earth materials?
2. How do scientists study and describe Earth's materials?

**Relevance and Application:**

1. Use scientific tools in investigations, and play with materials such as rocks, soil, sand, and water.

**Nature of Science:**

1. Ask testable question based on discoveries made while playing. (DOK 2)
2. Collect, describe, and record information through discussions, drawings, and charts. (DOK 1-2)

**Content Area: Science**

**Standard: 3. Earth Systems Science**

**Prepared Graduates:**

- Describe and interpret how Earth's geologic history and place in space are relevant to our understanding of the processes that have shaped our planet

**Grade Level Expectation: Preschool**

**Concepts and skills students master:**

- 2. Events such as night, day, the movement of objects in the sky, weather, and seasons have patterns

**Evidence Outcomes**

**Students can:**

- a. Identify, predict, and extend patterns based on observations and representations of objects in the sky, daily weather, and seasonal changes (DOK 1-3)
- b. Observe and describe patterns observed over the course of a number of days and nights, possibly including differences in the activities or appearance of plants and animals (DOK 1-2)

**21<sup>st</sup> Century Skills and Readiness Competencies**

**Inquiry Questions:**

- 1. What natural patterns do you notice during the day?
- 2. What natural patterns do you notice at night?
- 3. What patterns do you notice in the seasons?
- 4. What patterns do you notice in weather?

**Relevance and Application:**

- 1. Different activities of various animals – including humans – are aligned with daily and seasonal patterns.

**Nature of Science:**

- 1. Be open to and curious about new tasks and challenges. (DOK 1-3)
- 2. Explore and experiment. (DOK 1-3)

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