# Colorado Model Content Standards

# Science

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## COLORADO STATE BOARD OF EDUCATION

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# Colorado Model Content Standards

# SCIENCE

**Standard 1**

Students apply the processes of scientific investigation and design, conduct, communicate about, and evaluate such investigations.

**Standard 2**

Physical Science: Students know and understand common properties, forms, and changes in matter and energy. *(Focus: Physics and Chemistry)*

**Standard 3**

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. *(Focus: Biology-- Anatomy, Physiology, Botany, Zoology, Ecology)*

**Standard 4**

Earth and Space 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. *(Focus: Geology, Meteorology, Astronomy, Oceanography)*

**Standard 5**

Students understand that the nature of science involves a particular way of building knowledge and making meaning of the natural world.

# Colorado Model Content Standards for Science

# INTRODUCTION

## Introduction

In this time of increasing globalization, high expectations in science education are essential for the United States to continue as a world leader in science and technology. The vitality of Colorado's economy is dependent upon our ability to produce a growing workforce capable of expanding the world's science and technology innovation.

The Colorado Model Content Standards for Science represent what all Colorado students should know and be able to do in science as a result of their K-12 science education. Specific expectations are given for students completing grades K-2, 3-5, 6-8, and 9-12. These standards outline the essential level of science knowledge and skills needed by all Colorado citizens to participate productively in our increasingly technological society

## History

The Colorado Model Content Standards for Science were developed by Colorado science educators and adopted by the Colorado State Board of Education on May 10, 1995. The *Benchmark*s from the American Association for the Advancement of Science's *Project 2061* and the National Science Education Standards Project from the National Research Council were used in the development these standards.

The Colorado Model Content Standards for Science were reviewed by the Colorado Department of Education during the 2005-2006 school-year concluding with the report titled *The State's Formula for Success*. Statewide input collected through this review process indicated that revisions to the state's science standards and benchmarks were necessary to: 1) reduce redundancies in standards and benchmark statements, 2) replace curricular activities and test questions from the standards and benchmarks with statements of the concepts that they represented and 3) identify
and fill any gaps.

The recommendations for revisions were developed through the focused work of many experienced Colorado science educators and scientists. The Colorado State Board of Education amended the Colorado Model Content Standards for Science on February 8, 2007.

## Organization

The Colorado model standards presented here specify what all students should know and be able to do in science as a result of their school studies. Students are expected to demonstrate age appropriate understanding of these scientific concepts. Ways that students demonstrate scientific understanding include: describing, observing, identifying, planning, and explaining. Many of the benchmarks include examples that are intended to clarify what an age appropriate understanding of the concept would be. These examples are not comprehensive lists of what should be covered

# Colorado Model Content Standards for Science

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in the curriculum or what will be included on the state assessments. An outline of what is a assessed on the Colorado Student Assessment Program (CSAP) can be found in the Assessment Frameworks.

There are five science standards, three focus on key content areas and two focus on the process and nature of science that is critical to each of the content areas. The numerical order of the five content standards does not imply any particular judgments regarding their relative importance or teaching priorities.

The standards are numbered one through five with organizational headings within each grade level range, K-2, 3-5, 6-8, 9-12. The benchmarks are numbered within each grade level range. For example, a benchmark identified as **2.3-5.4** would be found in standard 2, grades 3-5, the 4th benchmark.

## Standards and Benchmarks

The state of Colorado's education system is operated **locally**. There are **state** standards and the commensurate benchmarks and assessment frameworks which articulate more specific areas of focus expected at grade levels. The annual state assessment is administered grades 3-10 in reading, writing, and math and 5th, 8th and 10th grade in science. CSAP Assessment Frameworks exist only for these specific areas.

The Colorado Model Content Standards for Mathematics indicate the broad knowledge and skills that all students should acquire in Colorado schools. In this document, standards are articulated into benchmarks that include tactical descriptions of the knowledge and skills students should acquire within each grade level range.

## CSAP and Assessment Objectives

The Assessment Frameworks for the Colorado Student Assessment Program (CSAP) **outlines what is assessed on the state paper and pencil, standardized, and timed assessment**. Assessment objectives delineate the specific knowledge and skills measured by CSAP for each grade level and content area assessed. The CSAP Assessment Frameworks are available on the Colorado Department of Education website (http://www.cde.state.co.us).

## Curriculum and Instructional Objectives

Colorado has no state curriculum. Local school districts in Colorado are responsible for determining the necessary curriculum and instructional scope and sequence to ensure that their students meet state standards.

The Colorado Department of Education provides a “resource bank” of curriculum, instruction and assessment tools acquired from Colorado schools that are achieving positive results in

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science to be used by school districts at their discretion.

The Colorado Science webpage provides: resources to address the needs of students performing at grade level, as well as struggling and advanced learners; model programs of instruction and assessment collected from school districts and organizations throughout the state and nation that have proven to be successful; and many resources that may assist Colorado's science educators in enhancing their teaching methods and improving student performance outcomes (http://www.cde.state.co.us/coloradoscience/index.htm).

**Standard 1:**
Students apply the processes of scientific investigation and design, conduct, communicate about, and evaluate such investigations.

## RATIONALE

*In everyday life, we find ourselves gathering and evaluating information (data), noting and wondering about patterns and regularities, devising and testing possible explanations for how things work, and discussing ideas with others. These characteristically human activities mirror in many ways how scientists think and work.*

*Scientific investigation (inquiry) often begins with a question or problem and usually ends with further questions to investigate. Such investigations may include long-term field studies and are not limited to direct experimentation in a lab setting. They involve the identification and control of variables. Inquiry in the science classroom helps students develop a useful base of scientific knowledge, communicated in increasingly mathematical and conceptual ways as they progress through school. In addition, scientific inquiry stimulates student interest, motivation, and creativity. Designing and conducting investigations encourages students to interpret, analyze, and evaluate what is known, how we know it, and how scientific questions are answered. Some scientific inquiries can only be investigated by the use of models since actual events are not repeatable.*

*The knowledge and skills related to scientific inquiry enable students to understand how science works, and are powerful ways for students to build their understanding of the scientific facts, principles, concepts, and applications that are described in the other science content standards, particularly standards two, three, and four. To comprehend the world around them, students need opportunities to pursue questions that are relevant to them and to learn how to conduct scientific investigations.*

## BENCHMARKS

### GRADES K-2

1. use their senses to make and describe careful observations
2. ask questions and make predictions
3. conduct simple experiments using tools and technology (*for example: computers, thermometers, magnifiers, rulers, balances*)
4. record data, report on findings and explain with reasons

### GRADES 3-5

1. design, plan and conduct a variety of simple investigations (*for example: formulate a testable question, state a hypothesis, make systematic observations, develop and communicate logical conclusions based on evidence*)
2. select and use appropriate tools and technology to gather and display (*for example: graphs, charts, diagrams*) quantitative and qualitative data related to an investigation *(for example: length, volume, and mass measuring instruments, thermometers, watches, magnifiers, microscopes, calculators, and computers)*

### GRADES 6-8

1. ask questions and state hypotheses that lead to different types of scientific investigations *(for example: experimentation, collecting specimens, constructing models, researching scientific literature)*
2. use appropriate tools, technologies and metric measurements to gather and organize data and report results
3. interpret and evaluate data in order to formulate logical conclusions
4. demonstrate that scientific ideas are used to explain previous observations and to predict future events *(for example: plate tectonics and future earthquake activity)*
5. identify and evaluate alternative explanations and procedures
6. communicate results of their investigations in appropriate ways *(for example: written reports, graphic displays, oral presentations*

### GRADES 9-12

1. ask questions and state hypotheses using prior scientific knowledge to help design and guide development and implementation of a scientific investigation
2. select and use appropriate technologies to gather, process, and analyze data and to report information related to an investigation
3. identify major sources of error or uncertainty within an investigation *(for example: particular measuring devices and experimental procedures)*
4. recognize and analyze alternative explanations and models
5. construct and revise scientific explanations and models, using evidence, logic, and experiments that include identifying and controlling variables
6. communicate and evaluate scientific thinking that leads to particular conclusions

**Standard 2:**
Physical Science: Students know and understand common properties, forms, and changes in matter and energy. *(Focus: Physics and Chemistry)*

## RATIONALE

*Everyone has experience with matter in a variety of forms. Such experiences help build students' understanding of similarities and differences in the properties of matter. Their personal experiences help students understand common properties such as hardness, strength, color, shapes and states of matter (solid, liquid, gas and plasma). Knowledge of observable properties of matter and its microscopic/macroscopic structure and composition is helpful in considering matter's varied uses, availability, and limitations in our world.*

*Energy is a central concept in science because all physical interactions involve changes in energy. Students need to understand that all physical events involve transferring energy, or changing one form of energy into another, such as when forces act on matter producing changes in motion. Knowledge of forms of energy, its transfer and transformation, is essential to interpreting, explaining, predicting, and influencing change in our world.*

*Interactions between matter and energy account for changes observed in everyday events that are sometimes misunderstood. Understanding how matter and energy interact and are conserved extends students' knowledge of the physical world, and allows them to monitor and explain a wide variety of changes and to predict future physical and chemical changes.*

## BENCHMARKS

### GRADES K-2

1. solids and liquids (matter) can be identified, compared, sorted/classified by their physical properties *(for example: size, shape, texture, flexibility, temperature, color and patterns)*
2. mixtures can be created and separated based on physical properties *(for example: salt and sand, iron filings and soil, oil and water)*
3. the only way to change the motion of an object is by pushing or pulling on it (force)

### GRADES 3-5

1. objects have physical properties that can be measured (*for example: length, mass, volume and temperature)*
2. measurable physical properties can be compared before and after effecting a change to verify a change has occurred and used to predict its outcome in similar circumstances\
3. matter is made up of parts that are too small to be seen
4. matter exists in physical states (solid, liquid, gas) and can change from one state to another
5. there are different types and sources of energy (*for example: light, heat, motion*)
6. electricity in circuits can produce light, heat, sound and magnetic effects
7. there are different types of forces (*for example: gravity and magnetism*)
8. changes in speed or direction of motion are caused by forces

### GRADES 6-8

1. physical properties of solids, liquids, gases and the plasma state and their changes can be explained using the particulate nature of matter model
2. mixtures of substances can be separated based on their properties *(for example: solubilities, boiling points, magnetic properties, densities and specific heat)*
3. mass is conserved in a chemical or physical change
4. mass and weight can be distinguished
5. all matter is made up of atoms that are comprised of protons, neutrons and electrons and when a substance is made up of only one type of atom it is an element
6. when two or more elements are combined a compound is formed which is made up of molecules
7. quantities (*for example: time, distance, mass, force*) that characterize moving objects and their interactions within a system *(for example, force, speed, velocity, potential energy, kinetic energy)* can be described, measured and calculated
8. that there are different forms of energy and those forms of energy can be transferred and stored (*for example: kinetic, potential*) but total energy is conserved
9. electric circuits provide a means of transferring electrical energy when heat, light, sound, magnetic effects and chemical changes are produced
10. white light is made up of different colors that correspond to different wavelengths

### GRADES 9-12 (continued on next page)

1. elements can be organized by their physical and chemical properties (Periodic Table)
2. the spatial configuration of atoms and the structure of the atoms in a molecule determine the chemical properties of the substance
3. there are observable and measurable physical and chemical properties that allow one to compare,

**Standard 2: Continued**
Physical Science: Students know and understand common properties, forms, and changes in matter and energy. *(Focus: Physics and Chemistry)*

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contrast, and separate substances (*for example: pH, melting point, conductivity, magnetic attraction)*

4. word and chemical equations are used to relate observed changes in matter to its composition and structure (*for example: conservation of matter*)
5. quantitative relationships involved with thermal energy can be identified, measured, calculated and analyzed (f*or example: heat transfer in a system involving mass, specific heat, and change in temperature of matter*)
6. energy can be transferred through a variety of mechanisms and in any change some energy is lost as heat (*for example: conduction, convection, radiation, motion, electricity, chemical bonding changes*)
7. light and sound waves have distinct properties; frequency, wavelengths and amplitude
8. quantities that demonstrate conservation of mass and conservation of energy in physical interactions can be measured and calculated
9. Newton's Three Laws of Motion explain the relationship between the forces acting on an object, the object's mass, and changes in its motion

**Standard 3:**
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. *(Focus: Biology-- Anatomy, Physiology, Botany, Zoology, Ecology)*

## RATIONALE

*As a result of their study of a variety of organisms and where they live, students gain a better understanding of their world. Students have a natural curiosity about life and the great diversity of organisms. Their curiosity leads to the study of organisms and how the organisms interact with the world. Through the study of similarities and differences of organisms, students learn the importance of structure and function in the growth and development of organisms. In their future as citizens, students will need to think about and make decisions about the diversity and extinction of organisms in their communities and the world.*

***From experience, students know that they must eat food to live. As a result of their study of energy transfer and transformation in living organisms, students understand that the Sun is the primary and ultimate source of energy for living organisms. They learn why a constant input of matter and energy is critical for life. Photosynthetic organisms are critical to all organisms and need to be maintained. If one or more components are altered in an ecosystem, all other components are affected. Through studying the interrelationships of organisms, students learn that they can have a critical impact on other organisms.***

***Students are interested in learning about their bodies and how they relate biologically to other forms of life. The study of structure and function, body organization, growth and development, and maintenance of other organisms enhances students' understanding of human development, health, and disease. Knowledge of these areas can assist students in making informed choices regarding nutrition, exercise and other factors that influence their body functions.***

***Students study the scientific concept of biological evolution--the changes in populations of organisms through time--in order to understand diversity and relatedness within the living world. Inquiries into evolution explain the ways in which natural processes produce life's diversity. These studies help students understand that evolution is the major unifying concept in the biological sciences and that it explains a wide variety of observations that can be made about the living world. In particular, students see that the study of evolution initiates questions about biodiversity, adaptation, genetics, mutations, the geological record, and the observed unity at molecular and whole-organism levels. This content standard does not define any student expectations related to the origin of life.***

## BENCHMARKS

### GRADES K-2

1. an organism (plant, animal) is a living thing that has physical characteristics that help it to survive
2. offspring have characteristics that are similar to but not exactly like their parents
3. fossil evidence helps identify organisms that once lived on Earth but have completely disappeared *(for example: dinosaurs, dodo bird, woolly mammoth and saber tooth tiger)*
4. there are similarities and differences in growth and development of organisms *(for example: insect, plant, mammal)*
5. organisms interact with each other and with nonliving parts of their habitat to meet their basic needs *(for example: food, water, air, shelter, space)*

### GRADES 3-5

1. each plant or animal has different structures and behaviors that serve different functions in growth, survival, and reproduction
2. green plants need energy from sunlight and various raw materials to live, and animals consume plants and other organisms to live
3. human body systems have basic structures, functions and needs *(for example: digestive, respiratory, circulatory, skeletal, muscular)*
4. there is interaction and interdependence between and among nonliving and living components of ecosystems (*for example: food webs, symbiotic and parasitic relationships, dependence on rainfall, pollination)*
5. life cycles vary from organism to organism (*for example: frog, chicken, butterfly, radish, bean plant*)
6. fossils can be compared to one another and to living organisms according to their similarities and differences
7. there are similarities and differences in appearance among individuals of the same population (*for example: size, color, shape*)
8. there are similarities and differences between organisms (*for example: plants vs. animals, vertebrate vs. invertebrate*)

### GRADES 6-8 (Continued on next page)

1. classification schemes can be used to understand the structure of organisms
2. human body systems have specific functions and interaction (*for example: circulatory and respiratory, muscular and skeletal)*
3. there is a differentiation among levels of organization

**Standard 3: Continued**
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. *(Focus: Biology-- Anatomy, Physiology, Botany, Zoology, Ecology)*

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(cells, tissues, and organs) and their roles within the whole organism

4. multicellular organisms have a variety of ways to get food and other matter to their cells *(for example: digestion, transport of nutrients by circulatory system)*
5. photosynthesis and cellular respiration are basic processes of life *(for example, set up a terrarium or aquarium and make changes such as blocking out light)*
6. different types of cells have basic structures, components and functions (*for example: cell membrane, nucleus, cytoplasm, chloroplast, single-celled organisms in pond water, Elodea, onion cell, human cheek cell)*
7. there are noncommunicable conditions and communicable diseases (*for example: heart disease and chicken pox*)
8. there is a flow of energy and matter in an ecosystem (*for example: as modeled in a food chain, web, pyramid, decomposition*)
9. asexual and sexual cell reproduction/division can be differentiated
10. chromosomes and genes play a role in heredity (f*or example, genes control traits, while chromosomes are made up of many genes*)
11. changes in environmental conditions can affect the survival of individual organisms, populations, and entire species
12. changes or constancy in groups of organisms over geologic time can be revealed through evidence
13. individual organisms with certain traits are more likely than others to survive and have offspring.

**GRADES 9-12**

1. the pattern/process of reproduction and development is specific to different organisms
2. there is a relationship between the processes of photosynthesis and cellular respiration (*for example: in terms of energy and products*)
3. there is a purpose of synthesis and breakdown of macromolecules in an organism *(for example: carbohydrates, lipids, amino acids serve as building blocks of proteins; carbon dioxide and water are the basic materials for building sugars through photosynthesis)*
4. energy is used in the maintenance, repair, growth, and production of tissues
5. the human body functions in terms of interacting organ systems composed of specialized structures that maintain or restore health *(for example: mechanisms involved in homeostasis [balance], such as feedback in the endocrine system*)
6. changes in an ecosystem can affect biodiversity and biodiversity contributes to an ecosystem's dynamic equilibrium
7. there is a cycling of matter (*for example: carbon, nitrogen*) and the movement and change of energy through the ecosystem *(for example: some energy dissipates as heat as it is transferred through a food web)*
8. certain properties of water sustain life (*for example: polarity, cohesion, solubility*)
9. cellular organelles have specific functions (*for example: the relationship of ribosomes to protein, and the relationship of mitochondria to energy transformation)*
10. cell reproduction/division has various processes and purposes (mitosis, meiosis, binary fission)
11. DNA has a general structure and function and a role in heredity and protein synthesis *(for example: replication of DNA and the role of RNA in protein synthesis)*
12. genes serve as the vehicle for genetic continuity and the source of genetic diversity upon which natural selection can act
13. some traits can be inherited while others are due to the interaction of genes and the environment *(for example: skin cancer triggered by over- exposure to sunlight or contact with chemical carcinogens)*
14. organisms are classified into a hierarchy of groups and subgroups based on similarities which reflect their evolutionary relationships
15. mutation, natural selection, and reproductive isolation can lead to new species and affect biodiversity
16. an organism's adaptations *(for example, structure, behavior)* determine its niche (role) in the environment
17. variation within a population improves the chances that the species will survive under new environmental conditions
18. organisms change over time in terms of biological evolution and genetics

**Standard 4:**
Earth and Space 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. *(Focus: Geology, Meteorology, Astronomy, Oceanography)*

## RATIONALE

*By studying Earth, its composition, history, and the processes that shape it, students gain a better understanding of the planet on which they live. Life throughout geologic time has been, and continues to be, affected by changes that occur at a varying rate on Earth's surface. Knowledge of the structure and composition of the Earth provides a basis for understanding the distribution of its resources. Understanding geologic events, such as earthquakes and volcanic eruptions, allows students to evaluate the consequences and predict the impact of future occurrences.*

*Our Earth's atmosphere is vital to life. The Sun and atmosphere affect every aspect of our lives, including food supply, energy use, transportation, recreation, environmental quality, and human health and safety. Weather-related choices we make range from selecting appropriate clothing to more complex situations, including preparing for and responding to hazardous weather. Preparedness and response to weather conditions require knowledge of how energy transfer influences atmospheric changes. The more we know about weather, the greater the chances that we will make informed decisions concerning its impact.*

***The world's water is vital to life. Both minor and major changes in Earth's water can have profound effects on human existence. In order to preserve both the quality and quantity of water for daily living, wise management of water resources is crucial. Knowledge of Earth's oceans is important for an understanding of how they affect weather, climate, and life. Knowing the properties and circulation of water, their influence on weather and climate, and the availability to ecosystems is necessary for understanding its importance to life.***

*Observing the sky has always fascinated human cultures and civilizations. These observations resulted in the development of ways to measure time and predict natural phenomena, such as eclipses and changing of the seasons. All bodies in space, including Earth, are influenced by forces acting throughout the solar system and the universe. Studying the solar system enhances our understanding of Earth's origins, its place in the universe, and its future. Much of what we know about robotics, telecommunications, satellites, and miniaturized components used in computers and other electronic devices can be attributed to exploration of Earth's atmosphere and our solar system.*

## BENCHMARKS

### GRADES K-2

1. there are different types of Earth's materials that come in different shapes and sizes (*for example: rocks and soil*)
2. there are major features of Earth's surface *(for example: mountains, rivers, plains, hills, oceans, plateaus)*
3. the Earth's materials (rocks, soil, water) provide many of the resources that humans use and reuse
4. our activities are affected by the daily weather and changing seasons (*for example: types of clothing, travel plans, recreational activity*)
5. the Sun is the source of Earth's heat and light
6. objects can be readily observed in the daytime and nighttime sky (*for example: the Sun, Moon, stars*)

### GRADES 3-5

1. fossils are evidence of past life
2. natural processes change Earth's surface *(for example: weathering, erosion, mountain building, volcanic activity, earthquakes and floods)*
3. many of the Earth's resources can be conserved, recycled and depleted
4. weather is different from climate
5. most of the Earth's surface is covered by water, that most of the water is salt water in the oceans, and that fresh water is found in rivers, lakes, underground sources and glaciers
6. water exists on Earth in different states (solid, liquid, gas) and changes from one state to another (for example: evaporation, condensation and precipitation)
7. there are basic components of the solar system *(for example: Sun, planets, moons)*
8. the Earth and Sun provide a diversity of resources (*for example: soils, fuels, minerals, medicines and food*)
9. the rotation of the Earth on its axis, in relation to the Sun, produces the day-and-night cycle and the orbit of the Earth around the Sun completes one year

### GRADES 6-8 (Continued on next page)

1. inter-relationships exist between minerals, rocks, and soils
2. humans use renewable and nonrenewable resources *(for example: forests and fossil fuels)*
3. natural processes shape the Earth's surface (*for example: landslides, weathering, erosion, mountain building, volcanic activity*)
4. major geological events such as earthquakes, volcanic eruptions, and mountain building are

**Standard 4: Continued**
Earth and Space 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. *(Focus: Geology, Meteorology, Astronomy, Oceanography)*

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associated with plate boundaries and attributed to plate motions

5. fossils are formed and used as evidence to indicate that life has changed through time
6. successive layers of sedimentary rock and the fossils contained within them can be used to confirm age, geologic time, history, and changing life forms of the Earth; this evidence is affected by the folding, breaking and uplifting of layers
7. the atmosphere has basic composition, properties, and structure (*for example: the range and distribution of temperature and pressure in the troposphere and stratosphere*)
8. atmospheric circulation is driven by solar heating (*for example: the transfer of energy by radiation, convection, conduction*)
9. there are quantitative changes in weather conditions over time and space (*for example: humidity, temperature, air pressure, cloud cover, wind, precipitation*)
10. there are large-scale and local weather systems (f*or example: fronts, air masses, storms*)
11. the world's water is distributed and circulated through oceans, glaciers, rivers, groundwater, and atmosphere
12. the ocean has a certain composition and physical characteristics *(for example: currents, waves, features of the ocean floor, salinity, and tides)*
13. there are characteristics (components, composition, size) and scientific theories of origin of the solar system
14. relative motion, axes tilt and positions of the Sun, Earth, and Moon have observable effects (*for example: seasons, eclipses, moon phases*)
15. the universe consists of many billions of galaxies (each containing many billions of stars) and that vast distances separate these galaxies and stars from one another and from the Earth
16. technology is needed to explore space *(for example: telescopes, spectroscopes, spacecraft, life support systems)*

**GRADES 9-12**

1. the Earth's interior has a composition and structure
2. the theory of plate tectonics helps to explain relationships among earthquakes, volcanoes, mid-ocean ridges, and deep-sea trenches
3. the feasibility of predicting and controlling natural events can be evaluated *(for example: earthquakes, floods, landslides)*
4. there are costs, benefits, and consequences of natural resource exploration, development, and consumption (*for example: geosphere, biosphere, hydrosphere, atmosphere and greenhouse gas*)
5. there are consequences for the use of renewable and nonrenewable resources
6. evidence is used (*for example: fossils, rock layers, ice cores, radiometric dating)* to investigate how Earth has changed or remained constant over short and long periods of time *(for example: Mount St. Helen's' eruption, Pangaea, and geologic time)*
7. the atmosphere has a current structure and composition and has evolved over geologic time (*for example: effects of volcanic activity and the change of life forms*)
8. energy transferred within the atmosphere influences weather *(for example: the role of conduction, radiation, convection, and heat of condensation in clouds, precipitation, winds, storms)*
9. weather is caused by differential heating, the spin of the Earth and changes in humidity (air pressure, wind patterns, coriolis effect)
10. there are interrelationships between the circulation of oceans and weather and climate
11. there are factors that may influence weather patterns and climate and their effects within ecosystems *(for example: elevation, proximity to oceans, prevailing winds, fossil fuel burning, volcanic eruptions)*
12. water and other Earth systems interact (*for example: the biosphere, lithosphere, and atmosphere*)
13. continental water resources are replenished and purified through the hydrologic cycle
14. gravity governs the motions observed in the solar system and beyond
15. there is electromagnetic radiation produced by the Sun and other stars *(for example: X- ray, ultraviolet, visible light, infrared, radio)*
16. stars differ from each other in mass, color, temperature and age
17. the scales of size and separation of components of the solar system are complex

**Standard 5:**
Students understand that the nature of science involves a particular way of building knowledge and making

## RATIONALE

*Human societies have long asked questions about, observed and collected data on, and offered explanations for natural phenomena. Scientific evidence and knowledge are distinguished from other ways of knowing and other bodies of knowledge in terms of the criteria that must be met. These criteria include the use of empirical standards and rules of evidence, a logical structure, rational thought, questioning, and openness to criticism. Scientific disciplines differ from one another in what is studied, techniques and technologies used, and outcomes sought. They share a common purpose -- to explain and predict events and phenomena -- and offer strategies to solve defined problems.*

*Scientific knowledge is dynamic. Although some scientific theories have withstood the test of time and are still used, other knowledge claims have been altered by new scientific evidence. Change, continuity, and stability are characteristic features of science. Although acquiring scientific knowledge of laws, concepts, and theories is central to learning science, it does not necessarily lead to an understanding of how science itself works. Students need to understand that science works by weaving different aspects of science together so that they reinforce one another. Unifying concepts and processes such as change, systems, models, evolution, equilibrium and form and function bring coherence to seemingly diverse sets of ideas or facts involving natural phenomena. These concepts can encompass and connect large quantities of basic data and evidence in science and can be used to integrate science with other disciplines.*

## BENCHMARKS

### GRADES K-2

1. basic observable patterns and changes in the world can help to predict future events based on those patterns (*for example: seasonal weather patterns, day/night*)

### GRADES 3-5

1. when a science experiment is repeated with the same conditions, the experiment generally works the same way
2. models are used to represent events and objects (*for example: comparing a map of the school to the actual school; a model of the Earth to the Earth itself*)

### GRADES 6-8

1. a controlled experiment must have comparable results when repeated
2. scientific knowledge changes as new knowledge is acquired and previous ideas are modified *(for example: through space exploration)*
3. contributions to the advancement of science have been made by people in different cultures and at different times in history
4. models can be used to predict change *(for example: computer simulation, video sequence, stream table)*
5. there are interrelationships among science, technology and human activity that affect the world

### GRADES 9-12

1. print and visual media can be evaluated for scientific evidence, bias, or opinion
2. the scientific way of knowing uses a critique and consensus process *(for example: peer review, openness to criticism, logical arguments, skepticism)*
3. graphs, equations or other models are used to analyze systems involving change and constancy *(for example: comparing the geologic time scale to shorter time frame, exponential growth, a mathematical expression for gas behavior; constructing a closed ecosystem such as an aquarium)*
4. there are cause-effect relationships within systems *(for example: the effect of temperature on gas volume, effect of carbon dioxide level on the greenhouse effect, effects of changing nutrients at the base of a food pyramid)*
5. scientific knowledge changes and accumulates over time; usually the changes that take place are small modifications of prior knowledge but major shifts in the scientific view of how the world works do occur
6. interrelationships among science, technology and human activity lead to further discoveries that impact the world in positive and negative ways
7. there is a difference between a scientific theory and a scientific hypothesis

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# Colorado Model Content Standards for Science

## Glossary of Terms

**Adaptation** – a change by which an organism becomes better suited to its environment.

**Air** – the invisible gaseous substance surrounding the earth, a mixture mainly of oxygen and nitrogen.

**Air mass** – a body of air extending hundreds or thousands of miles horizontally and sometimes as high as the stratosphere and maintaining as it travels nearly uniform conditions of temperature and humidity at any given level

**Air pressure** – the pressure exerted by the atmosphere

**Amino Acid** – of a class of about twenty organic compounds which form the basic constituents of proteins and contain both acid and amine groups.

**Amplitude** – the maximum extent of a vibration or oscillation from the point of equilibrium.

**Anatomy** – the science of the shape and structure of organisms and their parts.

**Asexual reproduction** – reproduction without the fusion of gametes

**Astronomy** – the science of celestial objects, space, and the physical universe.

**Atmosphere** – the envelope of gases surrounding the earth or another planet.

**Atom** – the smallest particle of a chemical element, consisting of a positively charged nucleus surrounded by negatively charged electrons.

**Axis** – an imaginary line through a body, about which it rotates.

**Binary fission** – a method of asexual reproduction, involves the splitting of a parent cell into two approximately equal parts.

**Biodiversity** – the variability among living organisms on the earth, including the variability within and between species and within and between ecosystems.

**Biology** – the scientific study of living organisms.

**Biosphere** – the part of the earth and its atmosphere in which living organisms exist or that is capable of supporting life.

**Boiling point** – the temperature at which a liquid boils at a fixed pressure, especially under standard atmospheric conditions.

**Botany** – the scientific study of plants.

**Carbohydrate** – any of a group of organic compounds that includes sugars, starches, celluloses, and gums and serves as a major energy source in the diet of animals. These compounds are produced by photosynthetic plants and contain only carbon, hydrogen, and oxygen, usually in the ratio 1:2:1.

**Carcinogen** – a cancer-causing substance or agent.

**Cell** – the smallest structural and functional unit of an organism.

**Cell division** – the process in reproduction and growth by which a cell divides to form daughter cells

**Cellular respiration** – the series of metabolic processes by which living cells produce energy through the oxidation of organic substances.

**Chemistry** – the branch of science concerned with the properties and interactions of the substances of which matter is composed.

**Chloroplast** – a structure in algal and green plant cells which contains chlorophyll and in which photosynthesis takes place.

**Chromosome** – a thread-like structure found in the nuclei of most living cells, carrying genetic information in the form of genes.

**Circuit** – a closed path followed or capable of being followed by an electric current.

**Classification** – the systematic grouping of organisms into categories on the basis of evolutionary or structural relationships between them; taxonomy.

**Climate** – meteorological conditions including temperature, precipitation, and wind, which characteristically prevail in a particular region.

**Cloud** – a visible body of very fine water droplets or ice particles suspended in the atmosphere at altitudes ranging up to several miles above sea level.

**Cohesion** – the intermolecular attraction by which the elements of a body are held together.

# Colorado Model Content Standards for Science

## Glossary of Terms

**Communicable disease** – a disease that can be communicated from one person to another

**Community** – a group of interdependent plants or animals growing or living together or occupying a specified habitat.

**Composition** – the combining of distinct parts or elements to form a whole.

**Compound** - a pure, macroscopically homogeneous substance consisting of atoms or ions of two or more different elements in definite proportions that cannot be separated by physical means. A compound usually has properties unlike those of its constituent elements.

**Conclusion** – a judgment or decision reached by reasoning.

**Condensation** – the process by which a gas or vapor changes to a liquid.

**Condensation**, heat of – heat liberated by a unit mass of gas at its boiling point as it condenses into a liquid.

**Conduction** – the transmission or conveying of something through a medium or passage, especially the transmission of electric charge or heat through a conducting medium without perceptible motion of the medium itself.

**Conductivity** – the ability or power to conduct or transmit heat, electricity, or sound.

**Conservation of energy** – a principle stating that the total energy of an isolated system remains constant regardless of changes within the system

**Conservation of mass** – a principle in classical physics stating that the total mass of an isolated system is unchanged by interaction of its parts

**Conservation of matter** – a fundamental principle of classical physics that matter cannot be created or destroyed in an isolated system

**Controlled experiment** – an experiment that isolates the effect of one variable on a system by holding constant all variables but the one under observation

**Convection** – heat transfer in a gas or liquid by the circulation of currents from one region to another.

**Coriolis effect** – result of an apparent force that as a result of the earth's rotation deflects moving objects (as projectiles or air currents) to the right in the northern hemisphere and to the left in the southern hemisphere

**Data** – factual information (as measurements or statistics) used as a basis for reasoning, discussion, or calculation

**Decomposition** – breakdown or decay of organic materials.

**Density** – the mass of a substance per unit volume

**DNA** (Deoxyribonucleic Acid) – a substance which is present in the cell nuclei of nearly all living organisms and is the carrier of genetic information.

**Earthquake** – a sudden movement of the earth's crust caused by the release of stress accumulated within the earth's crust.

**Eclipse** – the partial or complete obscuring, relative to a designated observer, of one celestial body by another

**Ecology** – the branch of biology concerned with the relations of organisms to one another and to their physical surroundings.

**Ecosystem** – a biological community of interacting organisms and their physical environment.

**Electricity** – a form of energy resulting from the existence of charged particles (such as electrons or protons), either statically as an accumulation of charge or dynamically as a current.

**Electromagnetic radiation** – a kind of radiation including visible light, radio waves, gamma rays, and X-rays, in which electric and magnetic fields vary simultaneously

**Electron** – a stable negatively charged subatomic particle with a mass less than that of the proton, found in all atoms and acting as the primary carrier of electricity in solids

**Element** – a substance composed of atoms having an identical number of protons in each nucleus. Elements cannot be reduced to simpler substances by normal chemical means.

**Elevation** – height above a given level, especially sea level.

**Energy** – the capacity of a physical system to do work

**Environment** – the complex of physical, chemical, and biotic factors (as climate, soil, and living things) that act upon an organism or an ecological community and ultimately determine its form and survival

# Colorado Model Content Standards for Science

## Glossary of Terms

**Equilibrium** – the state of a chemical reaction in which its forward and reverse reactions occur at equal rates so that the concentration of the reactants and products does not change with time.

**Erosion** – the group of natural processes, including weathering, dissolution, abrasion, corrosion, and transportation, by which material is worn away from the earth's surface

**Evaporation** – to convert or change into a vapor

**Experiment** – a test under controlled conditions that is made to demonstrate a known truth, examine the validity of a hypothesis, or determine the efficacy of something previously untried

**Food chain** – a succession of organisms in an ecological community that constitutes a continuation of food energy from one organism to another as each usually consumes a lower member and in turn is preyed upon by a higher member.

**Food pyramid** – a graphic representation of the structure of a food chain, depicted as a pyramid having a broad base formed by producers and tapering to a point formed by end consumers. Between successive levels, total biomass decreases as energy is lost from the system.

**Food web** – a complex of interrelated food chains in an ecological community

**Force** – an influence tending to change the motion of a body or produce motion or stress in a stationary body.

**Fossil** – a remnant or trace of an organism of a past geologic age, such as a skeleton or leaf imprint, embedded and preserved in the earth's crust.

**Fossil fuel** – a hydrocarbon deposit, such as petroleum, coal, or natural gas, derived from living matter of a previous geologic time and used for fuel.

**Frequency** – the number of complete cycles of a periodic process occurring per unit time.

**Front** – the interface between air masses of different temperatures or densities.

**Galaxy** – a system of millions or billions of stars, together with gas and dust, held together by gravitational attraction

**Gas** – the state of matter distinguished from the solid and liquid states by relatively low density and viscosity, relatively great expansion and contraction with changes in pressure and temperature, the ability to diffuse readily, and the spontaneous tendency to become distributed uniformly throughout any container.

**Genetics** – the branch of biology that deals with heredity, especially the mechanisms of hereditary transmission and the variation of inherited characteristics among similar or related organisms.

**Geologic time** – the period of time covering the physical formation and development of Earth, especially the period prior to human history

**Geology** – the scientific study of the origin, history, and structure of the earth.

**Geosphere** – the solid part of the earth consisting of the crust and outer mantle

**Glacier** – a huge mass of ice slowly flowing over a land mass, formed from compacted snow in an area where snow accumulation exceeds melting and sublimation.

**Gravity** – the force that attracts a body towards the center of the earth, or towards any other physical body having mass.

**Greenhouse effect** – the phenomenon whereby the earth's atmosphere traps solar radiation, caused by the presence in the atmosphere of gases such as carbon dioxide, water vapor, and methane that allow incoming sunlight to pass through but absorb heat radiated back from the earth's surface.

**Greenhouse gas** – a gas, such as carbon dioxide, that contributes to the greenhouse effect by absorbing infrared radiation

**Groundwater** – water beneath the earth's surface, often between saturated soil and rock, which supplies wells and springs.

**Habitat** – the area or environment where an organism or ecological community normally lives or occurs

**Heat** – a form of energy associated with the motion of atoms or molecules and capable of being transmitted through solid and fluid media by conduction, through fluid media by convection, and through empty space by radiation.

**Heat of condensation** – heat liberated by a unit mass of gas at its boiling point as it condenses into a liquid

# Colorado Model Content Standards for Science

## Glossary of Terms

**Homeostasis** – the ability or tendency of an organism or cell to maintain internal equilibrium by adjusting its physiological processes.

**Humidity** – the amount of water suspended in the air in tiny droplets

**Hydrologic cycle** – the cycle of evaporation and condensation that controls the distribution of the earth's water as it evaporates from bodies of water, condenses, precipitates, and returns to those bodies of water.

**Hydrosphere** – the watery layer of the earth's surface; includes water vapor

**Hypothesis** – a tentative explanation for an observation, phenomenon, or scientific problem that can be tested by further investigation.

**Infrared** – electromagnetic radiation having a wavelength just greater than that of red light but less than that of microwaves, emitted particularly by heated objects.

**Inquiry** – a systematic search for the truth or facts about something

**Invertebrate** – an animal, such as an insect or mollusk, which lacks a backbone or spinal column

**Investigation** – a detailed inquiry or systematic examination

**Kinetic energy** – energy which a body possesses by virtue of being in motion

**Life cycle** – the course of developmental changes in an organism from fertilized zygote to maturity when another zygote can be produced

**Light** – electromagnetic radiation that can produce a visual sensation

**Liquid** – the state of matter in which a substance exhibits a characteristic readiness to flow, little or no tendency to disperse, and relatively high incompressibility.

**Lithosphere** – the rigid outer part of the earth, consisting of the crust and upper mantle.

**Macromolecule** – a very large molecule, such as a polymer or protein, consisting of many smaller structural units linked together.

**Macroscopic** – large enough to be perceived or examined by the unaided eye

**Magnetism** – the property displayed by magnets and produced by the motion of electric charges, which results in attraction or repulsion between objects.

**Mass** – the quantity of matter which a body contains, as measured by its acceleration under a given force or by the force exerted on it by a gravitational field.

**Matter** – physical substance or material in general, that which occupies space and possesses mass.

**Meiosis** – the process of cell division in sexually reproducing organisms that reduces the number of chromosomes in reproductive cells from diploid to haploid, leading to the production of gametes in animals and spores in plants.

**Melting point** – the temperature at which a solid becomes a liquid at standard atmospheric pressure.

**Meteorology** – the science that deals with the phenomena of the atmosphere, especially weather and weather conditions.

**Microscopic** – too small to be seen by the unaided eye but large enough to be studied under a microscope

**Mineral** – a naturally occurring, homogeneous inorganic solid substance having a definite chemical composition and characteristic crystalline structure, color, and hardness.

**Mitosis** – a type of cell division in which daughter cells have the same number and kind of chromosomes as the parent nucleus.

**Mixture** – a composition of two or more substances that are not chemically combined with each other and are capable of being separated.

**Molecule** – the smallest particle of a substance that retains the chemical and physical properties of the substance and is composed of two or more atoms; a group of like or different atoms held together by chemical forces.

**Moon** – the natural satellite of the earth, orbiting it every 28 days and shining by reflected light from the sun.

**Moon** (lunar) phases – one of the cyclically recurring apparent forms of the moon

# Colorado Model Content Standards for Science

## Glossary of Terms

**Motion** – a natural event that involves a change in the position or location of something

**Multicellular** – having or consisting of many cells

**Mutation** – a change in genetic structure which results in a variant form and may be transmitted to subsequent generations.

**Natural resources** – a material source of wealth, such as timber, fresh water, or a mineral deposit, that occurs in a natural state and has economic value.

**Natural selection** – the process in nature by which only the organisms best adapted to their environment tend to survive and transmit their genetic characteristics in increasing numbers to succeeding generations while those less adapted tend to be eliminated.

**Neutron** – a subatomic particle of about the same mass as a proton but without an electric charge.

**Niche** – the function or position of an organism or population within an ecological community.

**Nonrenewable resource** – of or relating to an energy source, such as oil or natural gas, or a natural resource, such as a metallic ore, that is not replaceable after it has been used.

**Observation** – the act of making and recording a measurement

**Oceanography** – the branch of science concerned with the physical and biological properties and phenomena of the sea

**Orbit** – the path of a celestial body or an artificial satellite as it revolves around another body.

**Organism** – a living thing that has (or can develop) the ability to act or function independently

**Organ** – a differentiated part of an organism, such as an eye, wing, or leaf, which performs a specific function.

**Pangaea** – (plate tectonics) a hypothetical super-continent that included all the landmasses of the earth before the Triassic Period. When continental drift began, Pangaea broke up into Laurasia and Gondwanaland.

**Parasite** (parasitic) – an organism that grows, feeds, and is sheltered on or in a different organism while contributing nothing to the survival of its host.

**Periodic table** – a table of the chemical elements arranged in order of atomic number, usually in rows, with elements having similar atomic structure appearing in vertical columns.

**pH** – p(otential of) H(ydrogen); a measure of the acidity or alkalinity of a solution, numerically equal to 7 for neutral solutions, increasing with increasing alkalinity and decreasing with increasing acidity. The pH scale commonly in use ranges from 0 to 14.

**Photosynthesis** – the process in green plants and certain other organisms by which carbohydrates are synthesized from carbon dioxide and water using light as an energy source. Most forms of photosynthesis release oxygen as a byproduct.

**Physical change** – a change from one state (solid or liquid or gas) to another without a change in chemical composition

**Physics** – the science of matter and energy and of interactions between the two.

**Physiology** – the branch of biology concerned with the normal functions of living organisms and their parts.

**Planet** – a non-luminous celestial body larger than an asteroid or comet, illuminated by light from a star, such as the sun, around which it revolves.

**Plasma** - a phase of matter distinct from solids, liquids, and normal gases

**Plate tectonics** - a theory that explains the global distribution of geological phenomena such as seismicity, volcanism, continental drift, and mountain building in terms of the formation, destruction, movement, and interaction of the earth's lithospheric plates.

**Plateau** – an elevated, comparatively level expanse of land

**Polarity** – the state of having poles or opposites.

**Pollination** – transfer of pollen from the anther to the stigma of a plant

**Population** – all the organisms that constitute a specific group or occur in a specified habitat

# Colorado Model Content Standards for Science

## Glossary of Terms

**Potential energy** – energy possessed by a body by virtue of its position or state.

**Precipitation** – any form of water, such as rain, snow, sleet, or hail, which falls to the earth's surface.

**Pressure** – force applied uniformly over a surface, measured as force per unit of area.

**Prevailing wind** – a wind from the predominant or most usual direction

**Proton** – a stable subatomic particle occurring in all atomic nuclei, with a positive electric charge equal in magnitude to that of an electron.

**Radiation** – energy emitted as electromagnetic waves or subatomic particles.

**Radiometric dating** – a method of determining the age of objects or material using the decay rates of radioactive components such as potassium-argon

**Renewable resource** – any natural resource (as wood or solar energy) that can be replenished naturally with the passage of time

**Replication** – the process whereby DNA makes a copy of itself before cell division

**Reproduction** – the sexual or asexual process by which organisms generate new individuals of the same kind; procreation

**RNA** (Ribonucleic Acid) – a substance in living cells which carries instructions from DNA for controlling the synthesis of proteins and in some viruses carries genetic information instead of DNA.

**Rock** – any natural material with a distinctive composition of minerals.

**Rotation** – the act or process of turning around a center or an axis

**Salinity** – the relative proportion of salt in a solution

**Satellite** – any celestial body orbiting around a planet or star

**Science** – the intellectual and practical activity encompassing the systematic study of the structure and behavior of the physical and natural world through observation and experiment.

**Scientific law** – a phenomenon of nature that has been proven to invariably occur whenever certain conditions exist or are met

**Scientific theory** – a well-substantiated explanation of some aspect of the natural world; an organized system of accepted knowledge that applies in a variety of circumstances to explain a specific set of phenomena; "scientific theories must be falsifiable"

**Season** – one of the natural periods into which the year is divided by the equinoxes and solstices or atmospheric conditions

**Sedimentary** – (rock) that has formed from sediment deposited by water or wind

**Sexual reproduction** – reproduction by the union or fusion of two differing gametes

**Soil** – the top layer of the earth's surface, consisting of rock and mineral particles mixed with organic matter.

**Solar system** – a system of planets or other bodies orbiting another star

**Solid** – the state in which a substance has no tendency to flow under moderate stress; resists forces (such as compression) that tend to deform it; and retains a definite size and shape

**Solubility** – the quality or condition of being soluble.

**Soluble** – that can be dissolved, especially easily dissolved

**Sound** – vibrations transmitted through an elastic solid or a liquid or gas, capable of being detected by human organs of hearing.

**Space** – the expanse in which the solar system, stars, and galaxies exist; the universe.

**Species** – a fundamental category of taxonomic classification, ranking below a genus or subgenus and consisting of related organisms capable of interbreeding.

**Specific heat** – the ratio of the amount of heat required to raise the temperature of a unit mass of a substance by one unit of temperature to the amount of heat required to raise the temperature of a similar mass of a reference material, usually water, by the same amount.

# Colorado Model Content Standards for Science

## Glossary of Terms

**Spectroscope** – an instrument for producing and observing spectra, the entire range of wavelengths of electromagnetic radiation.

**Speed** – the rate or a measure of the rate of motion

**Star** – a celestial body of hot gases that radiates energy derived from thermonuclear reactions in the interior

**Storm** – a violent disturbance of the atmosphere with strong winds and usually rain, thunder, lightning, or snow.

**Stratosphere** – the atmospheric layer between the troposphere and the mesosphere

**Substance** – a particular kind of matter with uniform properties.

**Sun** – the star round which the earth orbits.

**Symbiotic** – a close, prolonged association between two or Ultraviolet – electromagnetic radiation having a wavelength just shorter than that of violet light but longer than that of X-rays.

**Synthesis** – formation of a compound from simpler compounds or elements.

**System** – a group of interacting, interrelated, or interdependent elements forming a complex whole.

**Telescope** – a scientific instrument designed to collect and record electromagnetic radiation from cosmic sources

**Temperature** – a measure of the average kinetic energy of the particles in a sample of matter, expressed in terms of units or degrees designated on a standard scale.

**Theory** (scientific) – a well-substantiated explanation of some aspect of the natural world; an organized system of accepted knowledge that applies in a variety of circumstances to explain a specific set of phenomena; "scientific theories must be falsifiable"

**Thermal** (energy) – of, relating to, using, producing, or caused by heat

**Tide** – the alternate rising and falling of the sea due to the attraction of the moon and sun.

**Tissue** – any of the distinct types of material of which animals or plants are made, consisting of specialized cells and their products.

**Troposphere** – the lowest region of the atmosphere between the earth's surface and the tropopause, characterized by decreasing temperature with increasing altitude. Ultraviolet – electromagnetic radiation having a wavelength just shorter than that of violet light but longer than that of X-rays.

**Unicellular** – consisting of a single cell.

**Universe** – all matter and energy, including the earth, the galaxies, and the contents of intergalactic space, regarded as a whole.

**Velocity** – the speed of something in a given direction.

**Vertebrate** – animals having a bony or cartilaginous skeleton with a segmented spinal column and a large brain enclosed in a skull or cranium

**Visible light** (spectrum) – electromagnetic radiation that can produce a visual sensation

**Volcano** – an opening in the earth's crust through which molten lava, ash, and gases are ejected.

**Volcanic eruption** – the sudden occurrence of a violent discharge of steam and volcanic material

**Volume** – the amount of 3-dimensional space occupied by an object

**Wavelength** – the distance between successive crests of a wave, especially as a distinctive feature of sound, light, radio waves, etc.

**Weather** – the state of the atmosphere at a given time and place, with respect to variables such as temperature, moisture, wind velocity, and barometric pressure

**Weathering** – any of the chemical or mechanical processes by which rocks exposed to the weather undergo changes in character and break down.

**Weight** – the vertical force exerted by a mass as a result of gravity

**White light** – apparently colorless light containing all the wavelengths of the visible spectrum at equal intensity (such as ordinary daylight).

**Wind** – moving air, especially a natural and perceptible movement of air parallel to or along the ground.

# Colorado Model Content Standards for Science

## Glossary of Terms

**X-ray** – an electromagnetic wave of very short wavelength, able to pass through many materials opaque to light.

**Year** – the time taken by the earth to make one revolution around the sun.

**Zoology** – the scientific study of the behavior, structure, physiology, classification, and distribution of animals.

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# Colorado Model Content Standards for Science

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| Jason Katzmann | Harrison School District | Harrison |
| Jan Lytle | Montezuma-Cortez High School | Montezuma-Cortez |
| Gloria McVaugh | Harrison District 2 | Harrison |
| Cheryl Manning | Evergreen High School | Jefferson County |
| Linda Morris | Jefferson County School District | Jefferson County |
| Leslie Newell | Denver Museum of Nature & Science | Denver |
| Christine Nichols | Englewood High School | Englewood |
| Yvette Ochoa | Mountainside Elementary | Fountain-Fort Carson |
| Ryann Patrick | Aurora Public Schools | Aurora |
| Lisa Pitot | Poudre School District | Ft. Collins |
| Harold Pratt | Educational Consultants, Inc. | Littleton |
| Rick Reid | Ben Franklin Elementary | Littleton |
| Robert Reinsvold | Dept of Biological Sciences | University of Northern CO |
| Colleen Roach | Waller K-8 | Denver |
| Carmen Romero | Columbian Elementary | Pueblo 60 |
| Karen Ortega-Sedlar | Colorado School for the Deaf and Blind | CO School for Deaf/Blind |
| Lesley Smith | Cooperative Institute for Research in Environmental Science | Boulder |
| Amy Stevermer | Sciential Communications | Broomfield |
| Sara Walter | Rampart High School | Academy 20 |
| David Ward | Elizabeth High School | Elizabeth |
| Bev Devore-Wedding | Meeker High School | Meeker RE-1 |
| Andrew Zapotoczny | Wheat Ridge Middle School | Jefferson County |

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