New Mexico Content Standards, Benchmarks, and Performance Standards

SCIENCE

GRADES
K-8

New Mexico Science Content Standards, Benchmarks, and Performance Standards

Overview

The Science Standards, Benchmarks, and Performance Standards revision process began in October 2002. Writing teams consisting of educators and scientists developed draft standards, which were reviewed by teachers, scientists, parents, and other community members; over 200 responses were received during the review process.
The Science Standards are organized into three strands:

- Scientific thinking and practice
- Content of science
- Science and society

The *scientific thinking and practice* strand prepares students to design a testable scientific question and conduct an investigation to find solutions. Critical thinking is central in this strand. Students are prepared to question existing results and to generate and weigh new options as a result of scientific inquiry. They understand that science is not absolute and that theories should, and are, questioned and challenged.

The *content of science* strand provides the essential concepts and principles in the life sciences, physical sciences, and earth and space sciences. The knowledge and skills in this strand provide the foundation that students need for critical thinking and problem solving. The strand reflects an articulated core of accepted scientific knowledge; important topics are developed over time and are connected with one another to form a cohesive whole.

The *science and society* strand prepares students to understand ways in which science and society influence each other and how scientific understanding impacts decisions at multiple levels. Students combine their critical thinking skills and understanding of science content to examine implications for individuals and societies.

Throughout the standards the integrity of science and its underlying scientific principles are completely sound as students are encouraged to apply their critical thinking skills to examine data and observations, ask questions, investigate, explore alternatives, and seek solutions. The very nature of science is inquiry - the challenge of testing new hypotheses and asking new questions.

Framework

State Board of Education Goal: *Establish clear and high standards in all academic and vocational subjects and ensure that assessments are aligned with content, benchmarks, and performance standards; require alignment of school curricula with performance standards and revise on a regular basis.* (Adopted, August 2003)

The *New Mexico Science Content Standards, Benchmarks, and Performance Standards* was developed by teachers, university professors, and scientists working with staff from the Public Education Department to articulate what students should know and be able to do to be scientifically literate at different grade levels. The science standards represent a common core of learning that contributes to the science literacy of all students. The science standards present a vision of scientific literacy and outline a coherent system of what students need to know, understand, and be able to do to be scientifically literate at different grade levels. The science standards are grouped into three main strands:

- *Scientific Thinking and Practice*
- *Content of Science*
- *Science and Society*

Scientific Thinking and Practice is designed to develop students' understanding and skills in inquiry and scientific experimentation. This strand prepares students to experience science in a form that engages them in the active construction of ideas and explanations.

Content of Science organizes the content areas into earth and space science, life science, and the physical sciences. Each Content Standard details the essential knowledge and skills that students should acquire through the grades.

Science and Society provides a foundation for understanding science in personal and social perspectives and how the connections and interrelationships among scientific discoveries, knowledge, disciplines and societies have implications for contemporary issues.

The *Science Content Standards, Benchmarks, and Performance Standards* has been designed to:

- Establish an articulated, coordinated, and comprehensive description of the content and skills students should learn at specific grade levels in the study of science;
- Help teachers create classroom instruction and authentic assessments that address substantive science curriculum that can be applied to learning across disciplines;
- Serve as the basis for a statewide assessment of student learning; and
- Stimulate thoughtful conversations and policy development regarding the acquisition and application of essential scientific skills and concepts.

Guiding Principles

Scientific literacy has become a necessity for all citizens. Everyone needs to use scientific information to make choices that arise every day. Everyone needs to be able to engage intelligently in public discourse and debate about important issues that involve science and technology. And everyone deserves to share in the excitement and personal fulfillment that can come from understanding and learning about the natural world. An understanding of science and the processes of science contribute in an essential way to scientific literacy and is important in all aspects of our society. Scientific literacy also is of increasing importance in the workplace. Employment now requires advanced skills, the ability to learn, reason, think creatively, make decisions, and solve problems.

The New Mexico Science Content Standards, Benchmarks, and Performance Standards provide a guide for focused, aligned, and sustained efforts to ensure that all students have access to high-quality science education. The standards are based upon a framework that has been informed by the National Science Education Standards, the American Association for the Advancement of Science, the Mid-Continent Research for Education and Learning, the recent Standards for Success: *Understanding University Success*, and the best standards across the nation. The accompanying Guiding Principles are recommended to help influence the development and delivery of successful science education programs. These principles articulate ideals of teaching, learning, assessing, and administering science in New Mexico. They show how educators may create educational environments characterized by curiosity, persistence, respect for evidence, open mindedness balanced with skepticism, and a sense of responsibility. The Guiding Principles, although not unique to science education, establish the foundation for developing students' capabilities to reason scientifically and solve problems. Guiding Principles for effective science education must address issues of equity, curriculum, teaching, learning, assessment, mathematics, and technology.

Equity

Excellence in science education requires equity, including high expectations and strong support for all students.

A comprehensive science education program engages all students K-12 and provides opportunities for all students to access challenging science learning. Students benefit from studying science throughout all levels of schooling. They should learn the fundamental concepts of each content area of science, as well as the connections across those areas. Students learn best in an environment that conveys high academic expectations for all students. A high quality education system simultaneously serves the goals of equity and excellence. At every level of the education system, teachers should act on the belief that students from all backgrounds can learn rigorous science.

Curriculum

Learning science is an active process. Curriculum builds on students' understanding and engages them in important content and connections across domains.

In a coherent curriculum, scientific ideas are linked and build upon each other so that students' understanding and knowledge deepens as their abilities to apply science expands. An effective curriculum focuses on important science that will prepare students for continued study and for understanding phenomena in multiple settings. An articulated curriculum challenges students to learn increasingly more sophisticated science concepts and skills as they progress.
An effective science program builds students' understanding of the fundamental concepts of each content area of science and their understanding of the connections across these areas. Each content area of science has its particular approach and area of concern. Taken together, they present a coherent view of the world. Students need to understand that much of the scientific work done in the world draws on multiple disciplines. Connecting the content areas of natural science with mathematical study and with one another, should be one goal of science education. In the elementary grades, course work should integrate all of the major areas of science every year. At the middle and high school level, science teachers may choose either a discipline-based or an integrated approach in science.

Teaching

Effective science teaching requires understanding what students know and need to learn and then challenging and supporting them to learn it well.

Students' understanding of science, their ability to use science to explore phenomena and explain their surroundings, and their confidence and disposition toward science are all shaped by the learning opportunities they encounter in school. To be effective, teachers must know and understand the science they are teaching and be able to draw on that knowledge with flexibility in their teaching tasks. They need to be committed to their students as learners and as human beings, and be skillful in choosing and using a variety of pedagogical and assessment strategies. Teachers establish and nurture an environment conducive to learning science through the decisions they make, the conversations they orchestrate, and the physical settings they create. Teachers' actions encourage students to think, question, solve problems, and discuss their ideas, strategies and solutions.

An effective program in science addresses students' prior knowledge and misconceptions. Students are innately curious about the world and wonder how things work. They may make spontaneous, perceptive observations about natural objects and processes, and can often be found taking things apart and reassembling them. In many cases, they have developed mental models about how the world works. However, these mental models may be inaccurate even though they may make sense to the students, and the inaccuracies work against learning. Teachers must be skilled at uncovering inaccuracies in students' prior knowledge and observations, and in devising experiences that will challenge inaccurate beliefs and redirect student learning along more productive routes. The students' natural curiosity provides one entry point for learning experiences designed to remove students' misconceptions in science.

Learning

Students learn science actively, using inquiry to acquire new knowledge from experience and by interacting with their teachers and peers.

Investigation, experimentation, and problem solving are central to science education. Investigations introduce students to the nature of original research, increase students' understanding of scientific and technological concepts, promote skill development, and provide entry points for all learners. Teachers should establish learning goals and a context for experimentation by helping students develop their own questions, by guiding student activities, and by helping students focus on important ideas and concepts. Puzzlement and uncertainty are common features in experimentation. Students need time to examine their ideas as they learn how to apply them to explaining a natural phenomenon or solving a problem. Opportunities for students to reflect on their own ideas, collect evidence, make inferences and predictions, and discuss their findings are all crucial to growth in understanding.

Successful science learning engages students in the active construction of ideas and explanations. Effective programs in science give students opportunities to collaborate in scientific endeavors and to communicate their ideas. Science is a human enterprise done by members of professional communities. Ideas are tested, modified, extended, and reevaluated by those professional communities over time. Thus, the ability to convey ideas to others is essential for scientific advances to occur.

Students need similar opportunities to talk about their work in focused discussions with peers and with those who have more experience and expertise. This communication can occur informally, in the context of an ongoing student collaboration or on-line consultation with a scientist or engineer, or more formally, when a student presents findings from an individual or group investigation. Effective communication of scientific and technological ideas requires practice in making written and oral presentations, fielding questions, responding to critiques, and developing replies.

Assessment

Multiple and varied assessment should support the learning and furnish useful information to both teachers and students.

Assessment should enhance students' learning. Good assessment conveys messages to students about what kinds of scientific knowledge and performances are important. These messages influence the decisions students make. Teachers need to move beyond simple factual knowledge and discern how students are thinking about a particular question or investigation. In helping students achieve the standards, teachers should use a variety of questioning and performance-based assessment strategies that allow students to demonstrate what they have learned in the context of solving a complex problem. This kind of assessment requires students to refine a problem, devise a strategy to solve it, conduct sustained work, and address both complex concepts and discrete facts.

Assessment also assists teachers in improving classroom practice, planning curricula, developing self-directed learners, and reporting student progress. It provides students with information about how their knowledge and skills are developing and what can be done to improve them. Assessment informs parents know how well their students are doing with respect to the standards and what needs to be done to help them do better. Assessment should reflect classroom expectations and the outcome of those expectations.

Mathematics

Mathematics is integral to science.

Mathematics is an essential tool for scientists. Mathematics facilitates precise analysis and prediction.
Many scientific concepts and skills are grounded in an understanding of the quantifiable attributes of objects, their composition, functions, motions, and the forces that act upon them in complex environments. Mathematical expressions and relationships are key to understanding scientific relationships and to being able to use those relationships to explain the natural world. Because of the importance of mathematics to science, all teachers, curriculum coordinators, and others who help implement science education must be aware of the level of mathematical knowledge needed at each grade level to ensure that the appropriate mathematical knowledge has already been taught or, at the least, is being taught concurrently.

Technology

Technology is essential; it influences the science that is taught and enhances students' learning.

Modern technologies are essential tools for teaching, learning, and doing science. These tools furnish visual images of scientific ideas, facilitate organizing and analyzing data, and compute efficiently and accurately. They support investigation by students in every area of science and allow students to focus on inquiry through experimentation, reflection, reasoning, and problem-solving. Technology also supports effective science teaching and learning. In this context, technology is not used as a replacement for basic understanding; rather it can, and should be, used to foster greater understanding. Technology provides a means of viewing scientific ideas and relationships from multiple perspectives by extending the range and quality of investigations. Technology can assist students understand information from investigations and can provide opportunities for students to discuss with one another the scientific information they examine.

Adapted from the Massachusetts Science and Technology/Engineering Curriculum Framework, Adopted 2001.

New Mexico Science Content Standards, Benchmarks, and Performance Standards

Approved 2003
New Mexico State Department of Education

New Mexico Science Content Standards, Benchmarks, and Performance Standards identify what students should know and be able to do across all grade levels. They form a spiraling network in the sense that many concepts and skills, once introduced, develop over time.

Each strand is developed into Content Standards:

Strand I: Scientific Thinking and Practice:

Standard I: Understand the processes of scientific investigations and use inquiry and scientific ways of observing, experimenting, predicting, and validating to think critically.

Strand II: Content of Science:

Standard I (Physical Science) Understand the structure and properties of matter, the characteristics of energy, and the interactions between matter and energy.

Standard II (Life Science) Understand the properties, structures, and processes of living things and the interdependence of living things and their environments.

Standard III (Earth and Space Science) Understand the structure of the Earth, the solar system, and the universe, the interconnections among them, and the processes and interactions of Earth's systems.

Strand III: Science and Society:

Standard I: Understand how scientific discoveries, inventions, practices, and knowledge influence, and are influenced by, individuals and societies.

The Content Standards are further elaborated into three grade-span Benchmarks (K-4, 5-8, and 9-12) that are defined by specific grade level Performance Standards. While the Performance Standards are set forth at grade-specific levels, they do not exist in isolation; each exists in relation to the others. They illustrate how learners at every level apply science concepts and skills with increasing sophistication, refinement, and independence. In the 9-12 grade band, while the Performance Standards describe essential learning for all high schools students, they do not indicate grade-specific requirements because students are not required to enroll in specific courses in any particular grade.

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Strands and Benchmarks

Strand I: Scientific Thinking and Practice

Standard I: Understand the processes of scientific investigations and use inquiry and scientific ways of observing, experimenting, predicting, and validating to think critically.

K-4 Benchmark I:	Use scientific methods to observe, collect, record, analyze, predict, interpret, and determine reasonableness of data.
5-8 Benchmark I:	Use scientific methods to develop questions, design and conduct experiments using appropriate technologies, analyze and evaluate results, make predictions, and communicate findings.
9-12 Benchmark I:	Use accepted scientific methods to collect, analyze, and interpret data and observations and to design and conduct scientific investigations and communicate results.
K-4 Benchmark II:	Use scientific thinking and knowledge and communicate findings.
5-8 Benchmark II:	Understand the processes of scientific investigation and how scientific inquiry results in scientific knowledge.
9-12 Benchmark II:	Understand that scientific processes produce scientific knowledge that is continually evaluated, validated, revised, or rejected.
K-4 Benchmark III:	Use mathematical skills and vocabulary to analyze data, understand patterns and relationships, and communicate findings.
5-8 Benchmark III:	Use mathematical ideas, tools, and techniques to understand scientific knowledge.
9-12 Benchmark III:	Use mathematical concepts, principles, and expressions to analyze data, develop models, understand patterns and relationships, evaluate findings, and draw conclusions.

Strand II: Content of Science

Standard I (Physical Science): Understand the structure and properties of matter, the characteristics of energy, and the interactions between matter and energy.

K-4 Benchmark I:	Recognize that matter has different forms and properties.
5-8 Benchmark I:	Know the forms and properties of matter and how matter interacts.
9-12 Benchmark I:	Understand the properties, underlying structure, and reactions of matter.
K-4 Benchmark II:	Know that energy is needed to get things done and that energy has different forms.
5-8 Benchmark II:	Explain the physical processes involved in the transfer, change, and conservation of energy.
9-12 Benchmark II:	Understand the transformation and transmission of energy and how energy and matter interact.
K-4 Benchmark III:	Identify forces and describe the motion of objects.
5-8 Benchmark III:	Describe and explain forces that produce motion in objects.
9-12 Benchmark III:	Understand the motion of objects and waves, and the forces that cause them.

Standard II (Life Science): Understand the properties, structures, and processes of living things and the interdependence of living things and their environments.

K-4 Benchmark I:	Know that living things have diverse forms, structures, functions, and habitats.
5-8 Benchmark I:	Explain the diverse structures and functions of living things and the complex relationships between living things and their environments.
9-12 Benchmark I:	Understand how the survival of species depends on biodiversity and on complex interactions, including the cycling of matter and the flow of energy.
K-4 Benchmark II:	Know that living things have similarities and differences and that living things change over time.
5-8 Benchmark II:	Understand how traits are passed from one generation to the next and how species evolve.
9-12 Benchmark II:	Understand the genetic basis for inheritance and the basic concepts of biological evolution.

K-4 Benchmark III:	Know the parts of the human body and their functions.
5-8 Benchmark III:	Understand the structure of organisms and the function of cells in living systems.
9-12 Benchmark III:	Understand the characteristics, structures, and functions of cells.

Standard III (Earth and Space Science): Understand the structure of Earth, the solar system, and the universe, the interconnections among them, and the processes and interactions of Earth's systems.

K-4 Benchmark I:	Know the structure of the solar system and the objects in the universe.
5-8 Benchmark I:	Describe how the concepts of energy, matter, and force can be used to explain the observed behavior of the solar system, the universe, and their structures.
9-12 Benchmark I:	Examine the scientific theories of the origin, structure, contents, and evolution of the solar system and the universe, and their interconnections.
K-4 Benchmark II:	Know the structure and formation of Earth and its atmosphere and the processes that shape them.
5-8 Benchmark II:	Describe the structure of Earth and its atmosphere and explain how energy, matter, and forces shape Earth's systems.
9-12 Benchmark II:	Examine the scientific theories of the origin, structure, energy, and evolution of Earth and its atmosphere, and their interconnections.

Strand III: Science and Society

Standard I: Understand how scientific discoveries, inventions, practices, and knowledge influence, and are influenced by, individuals and societies.

K-4 Benchmark I:	Describe how science influences decisions made by individuals and societies.
5-8 Benchmark I:	Explain how scientific discoveries and inventions have changed individuals and societies.
9-12 Benchmark I:	Examine and analyze how scientific discoveries and their applications affect the world, and explain how societies influence scientific investigations and applications.

Content Standards for Science

Strand: Scientific Thinking and Practice

Content Standard I: Understand the processes of scientific investigations and use inquiry and scientific ways of observing, experimenting, predicting, and validating to think critically.

Strand: Content of Science

Content Standard I (Physical Science): Understand the structure and properties of matter, the characteristics of energy, and the interactions between matter and energy.

Content Standard II (Life Science): Understand the properties, structures, and processes of living things and the interdependence of living things and their environments.

Content Standard III (Earth and Space Science): Understand the structure of Earth, the solar system, and the universe, the interconnections among them, and the processes and interactions of Earth's systems.

Strand: Science and Society

Content Standard I: Understand how scientific discoveries, inventions, practices, and knowledge influence, and are influenced by, individuals and societies.

Strand I: **Scientific Thinking and Practice**
Standard I: **Understand the processes of scientific investigations and use inquiry and scientific ways of observing, experimenting, predicting, and validating to think critically.**

K-4 Benchmark I: **Use scientific methods to observe, collect, record, analyze, predict, interpret, and determine reasonableness of data.**

Grade	Performance Standards
K	1. Use observation and questioning skills in science inquiry (e.g., What happens when something is pushed or pulled?). 2. Ask and answer questions about surroundings and share findings with classmates. 3. Record observations and data with pictures, numbers, and/or symbols.
1	1. Make observations, develop simple questions, and make comparisons of familiar situations (e.g., What does the seed look like when it starts to grow?). 2. Describe relationships between objects (e.g., above, next to, below) and predict the results of changing the relationships (e.g., When that block moves, what will happen to the one next to it?).
2	1. Conduct simple investigations (e.g., measure the sizes of plants of the same kind that are grown in sunlight and in shade). 2. Use tools to provide information not directly available through only the senses (e.g., magnifiers, rulers, thermometers). 3. Make predictions based on observed patterns as opposed to random guessing. Follow simple instructions for a scientific investigation.
3	1. Make new observations when discrepancies exist between two descriptions of the same object or phenomenon to improve accuracy. 2. Recognize the difference between data and opinion. 3. Use numerical data in describing and comparing objects, events, and measurements. 4. Collect data in an investigation and analyze those data. 5. Know that the same scientific laws govern investigations in different times and places (e.g., gravity, growing plants).

4	1. Use instruments to perform investigations (e.g., timers, balances) and communicate findings. 2. Differentiate observation from interpretation and understand that a scientific explanation comes in part from what is observed and in part from how the observation is interpreted. 3. Conduct multiple trials to test a prediction, draw logical conclusions, and construct and interpret graphs from measurements. 4. Collect data in an investigation using multiple techniques, including control groups, and analyze those data to determine what other investigations could be conducted to validate findings.

5-8 Benchmark I: **Use scientific methods to develop questions, design and conduct experiments using appropriate technologies, analyze and evaluate results, make predictions, and communicate findings.**

Grade	Performance Standards
5	1. Plan and conduct investigations, including formulating testable questions, making systematic observations, developing logical conclusions, and communicating findings. 2. Use appropriate technologies (e.g., calculators, computers, balances, spring scales, microscopes) to perform scientific tests and to collect and display data. 3. Use graphic representations (e.g., charts, graphs, tables, labeled diagrams) to present data and produce explanations for investigations. 4. Describe how credible scientific investigations use reproducible elements including single variables, controls, and appropriate sample sizes to produce valid scientific results. 5. Communicate the steps and results of a scientific investigation.
6	1. Construct appropriate graphs from data and develop qualitative and quantitative statements about the relationships between variables being investigated. 2. Examine the reasonableness of data supporting a proposed scientific explanation. 3. Justify predictions and conclusions based on data.
7	1. Use a variety of print and web resources to collect information, inform investigations, and answer a scientific question or hypothesis. 2. Use models to explain the relationships between variables being investigated.
8	1. Evaluate the accuracy and reproducibility of data and observations. 2. Use a variety of technologies to gather, analyze and interpret scientific data. 3. Know how to recognize and explain anomalous data.

Strand I: **Scientific Thinking and Practice**
Standard I: **Understand the processes of scientific investigations and use inquiry and scientific ways of observing, experimenting, predicting, and validating to think critically.**

K-4 Benchmark II: **Use scientific thinking and knowledge and communicate findings.**

Grade	Performance Standards
K	1. Communicate observations and answer questions about surroundings.
1	1. Know that simple investigations do not always turn out as planned.
2	1. Understand that in doing science it is often helpful to work with a team and share findings. 2. Make accurate observations and communicate findings about investigations.
3	1. Use a variety of methods to display data and present findings. 2. Understand that predictions are based on observations, measurements, and cause-and-effect relationships.
4	1. Communicate ideas and present findings about scientific investigations that are open to critique from others. 2. Describe how scientific investigations may differ from one another (e.g., observations of nature, measurements of things changing over time). 3. Understand how data are used to explain how a simple system functions (e.g., a thermometer to measure heat loss as water cools).

5-8 Benchmark II: **Understand the processes of scientific investigation and how scientific inquiry results in scientific knowledge.**

Grade	Performance Standards
5	1. Understand that different kinds of investigations are used to answer different kinds of questions (e.g., observations, data collection, controlled experiments). 2. Understand that scientific conclusions are subject to peer and public review.

6	1. Understand that scientific knowledge is continually reviewed, critiqued, and revised as new data become available. 2. Understand that scientific investigations use common processes that include the collection of relevant data and observations, accurate measurements, the identification and control of variables, and logical reasoning to formulate hypotheses and explanations. 3. Understand that not all investigations result in defensible scientific explanations.
7	1. Describe how bias can affect scientific investigation and conclusions. 2. Critique procedures used to investigate a hypothesis. 3. Analyze and evaluate scientific explanations.
8	1. Examine alternative explanations for observations. 2. Describe ways in which science differs from other ways of knowing and from other bodies of knowledge (e.g., experimentation, logical arguments, skepticism). 3. Know that scientific knowledge is built on questions posed as testable hypotheses, which are tested until the results are accepted by peers.

Strand I: **Scientific Thinking and Practice**
Standard I: **Understand the processes of scientific investigations and use inquiry and scientific ways of observing, experimenting, predicting, and validating to think critically.**

K-4 Benchmark III: **Use mathematical skills and vocabulary to analyze data, understand patterns and relationships, and communicate findings.**

Grade	Performance Standards
K	1. Observe and describe the relative sizes and characteristics of objects (e.g., bigger, brighter, louder, smellier).
1	1. Use numbers and mathematical language (e.g., “addition” instead of “add to,” “subtraction” instead of “take away”) to describe phenomena.
2	1. Record observations on simple charts or diagrams. 2. Measure length, weight, and temperature with appropriate tools and express those measurements in accurate mathematical language.

3	1. Use numerical data in describing and comparing objects, events, and measurements. 2. Pose a question of interest and present observations and measurements with accuracy. 3. Use various methods to display data and present findings and communicate results in accurate mathematical language.
4	1. Conduct multiple trials using simple mathematical techniques to make and test predictions. 2. Use mathematical equations to formulate and justify predictions based on cause-and-effect relationships. 3. Identify simple mathematical relationships in a scientific investigation (e.g., the relationship of the density of materials that will or will not float in water to the density of water).

5-8 Benchmark III: **Use mathematical ideas, tools, and techniques to understand scientific knowledge.**

Grade	Performance Standards
5	1. Use appropriate units to make precise and varied measurements. 2. Use mathematical skills to analyze data. 3. Make predictions based on analyses of data, observations, and explanations. 4. Understand the attributes to be measured in a scientific investigation and describe the units, systems, and processes for making the measurement.
6	1. Evaluate the usefulness and relevance of data to an investigation. 2. Use probabilities, patterns, and relationships to explain data and observations.
7	1. Understand that the number of data (sample size) influences the reliability of a prediction. 2. Use mathematical expressions to represent data and observations collected in scientific investigations. 3. Select and use an appropriate model to examine a phenomenon.
8	1. Use mathematical expressions and techniques to explain data and observations and to communicate findings (e.g., formulas and equations, significant figures, graphing, sampling, estimation, mean). 2. Create models to describe phenomena.

Strand II: **Content of Science**
Standard I (Physical Science): **Understand the structure and properties of matter, the characteristics of energy, and the interactions between matter and energy.**

K-4 Benchmark I: **Recognize that matter has different forms and properties.**

Grade	Performance Standards
K	1. Observe that objects are made of different types of materials (e.g., metal, plastic, cloth, wood). 2. Observe that different materials have different properties (e.g., color, odor).
1	1. Observe that the three states of matter (i.e., solids, liquids, and gases) have different properties (e.g., water can be liquid, ice, or steam). 2. Describe simple properties of matter (e.g., hardness, flexibility, transparency).
2	1. Observe that properties of substances can change when they are mixed, cooled, or heated (e.g., salt dissolves in water, ice melts). 2. Describe the changes that occur when substances are heated or cooled and change from one state of matter to another (i.e., solid, liquid, and gas).
3	1. Identify and compare properties of pure substances and mixtures (e.g., sugar, fruit juice). 2. Separate mixtures based on properties (e.g., by size or by substance; rocks and sand, iron filings and sand, salt and sand).
4	1. Know that changes to matter may be chemical or physical and when two or more substances are combined, a new substance may be formed with properties that are different from those of the original substances (e.g., white glue and borax, cornstarch and water, vinegar and baking soda). 2. Know that materials are made up of small particles (atoms and molecules) that are too small to see with the naked eye. 3. Know that the mass of the same amount of material remains constant whether it is together, in parts, or in a different state.

5-8 Benchmark I: **Know the forms and properties of matter and how matter interacts.**

Grade	Performance Standards
5	1. Describe properties (e.g., relative volume, ability to flow) of the three states of matter. 2. Describe how matter changes from one phase to another (e.g., condensation, evaporation). 3. Know that matter is made up of particles (atoms) that can combine to form molecules and that these particles are too small to see with the naked eye. 4. Know that the periodic table is a chart of the pure elements that make up all matter. 5. Describe the relative location and motion of the particles (atoms and molecules) in each state of matter. 6. Explain the relationship between temperature and the motion of particles in each state of matter.
6	1. Understand that substances have characteristic properties and identify the properties of various substances (e.g., density, boiling point, solubility, chemical reactivity). 2. Use properties to identify substances (e.g., for minerals: the hardness, streak, color, reactivity to acid, cleavage, fracture). 3. Know that there are about 100 known elements that combine to produce compounds in living organisms and nonliving substances. 4. Know the differences between chemical and physical properties and how these properties can influence the interactions of matter.
7	1. Explain how matter is transferred from one organism to another and between organisms and their environment (e.g., consumption, the water cycle, the carbon cycle, the nitrogen cycle). 2. Know that the total amount of matter (mass) remains constant although its form, location, and properties may change (e.g., matter in the food web). 3. Identify characteristics of radioactivity, including: • decay in time of some elements to others • release of energy • damage to cells. 4. Describe how substances react chemically in characteristic ways to form new substances (compounds) with different properties (e.g., carbon and oxygen combine to form carbon dioxide in respiration). 5. Know that chemical reactions are essential to life processes.

8	**Properties of Matter** 1. Know how to use density, boiling point, freezing point, conductivity, and color to identify various substances. 2. Distinguish between metals and non-metals. 3. Understand the differences among elements, compounds, and mixtures by: • classification of materials as elements, compounds, or mixtures • interpretation of chemical formulas • separation of mixtures into compounds by methods including evaporation, filtration, screening, magnetism. **Structure of Matter** 4. Identify the protons, neutrons, and electrons within an atom and describe their locations (i.e., in the nucleus or in motion outside the nucleus). 5. Explain that elements are organized in the periodic table according to their properties. 6. Know that compounds are made of two or more elements, but not all sets of elements can combine to form compounds. **Changes in Matter** 7. Know that phase changes are physical changes that can be reversed (e.g., evaporation, condensation, melting). 8. Describe various familiar physical and chemical changes that occur naturally (e.g., snow melting, photosynthesis, rusting, burning). 9. Identify factors that influence the rate at which chemical reactions occur (e.g., temperature, concentration). 10. Know that chemical reactions can absorb energy (endothermic reactions) or release energy (exothermic reactions).

Strand II: **Content of Science**
Standard I (Physical Science): **Understand the structure and properties of matter, the characteristics of energy, and the interactions between matter and energy.**

K-4 Benchmark II: **Know that energy is needed to get things done and that energy has different forms.**

Grade	Performance Standards
K	1. Observe how energy does things (e.g., batteries, the sun, wind, electricity).
1	1. Observe and describe how energy produces changes (e.g., heat melts ice, gas makes car go uphill, electricity makes TV work).
2	1. Describe how heat can be produced (e.g., burning, rubbing, mixing some substances). 2. Know that heat moves more rapidly in thermal conductors (e.g., metal pan) than in insulators (e.g., plastic handle). 3. Describe the usefulness of some forms of energy (e.g., electricity, sunlight, wind, sound) and how energy (e.g., heat, light,) can affect common objects (e.g., sunlight warms dark objects, heat melts candles). 4. Observe that sound is made by vibrating objects and describe it by its pitch and loudness. 5. Recognize that moving objects carry energy (kinetic energy).
3	1. Understand that light is a form of energy and can travel through a vacuum. 2. Know that light travels in a straight line until it strikes an object and then it is reflected, refracted, or absorbed. 3. Measure energy and energy changes (e.g., temperature changes). 4. Construct charts or diagrams that relate variables associated with energy changes (e.g., melting of ice over time).

4	1. Identify the characteristics of several different forms of energy and describe how energy can be converted from one form to another (e.g., light to heat, motion to heat, electricity to heat, light, or motion). 2. Recognize that energy can be stored in many ways (e.g., potential energy in gravity or springs, chemical energy in batteries). 3. Describe how some waves move through materials (e.g., water, sound) and how others can move through a vacuum (e.g., x-ray, television, radio). 4. Demonstrate how electricity flows through a simple circuit (e.g., by constructing one).

5-8 Benchmark II: **Explain the physical processes involved in the transfer, change, and conservation of energy.**

Grade	Performance Standards
5	1. Know that heat is transferred from hotter to cooler materials or regions until both reach the same temperature. 2. Know that heat is often produced as a by-product when one form of energy is converted to another form (e.g., when machines or organisms convert stored energy into motion). 3. Know that there are different forms of energy. 4. Describe how energy can be stored and converted to a different form of energy (e.g., springs, gravity) and know that machines and living things convert stored energy to motion and heat.
6	1. Identify various types of energy (e.g., heat, light, mechanical, electrical, chemical, nuclear). 2. Understand that heat energy can be transferred through conduction, radiation and convection. 3. Know that there are many forms of energy transfer but that the total amount of energy is conserved (i.e., that energy is neither created nor destroyed). 4. Understand that some energy travels as waves (e.g., seismic, light, sound), including: • the sun as source of energy for many processes on Earth • different wavelengths of sunlight (e.g., visible, ultraviolet, infrared) • vibrations of matter (e.g., sound, earthquakes) • different speeds through different materials.

7	1. Know how various forms of energy are transformed through organisms and ecosystems, including: • sunlight and photosynthesis • energy transformation in living systems (e.g., cellular processes changing chemical energy to heat and motion) • effect of mankind's use of energy and other activities on living systems (e.g., global warming, water quality).
8	**Energy Transformation** 1. Know that energy exists in many forms and that when energy is transformed some energy is usually converted to heat. 2. Know that kinetic energy is a measure of the energy of an object in motion and potential energy is a measure of an object's position or composition, including: • transformation of gravitational potential energy of position into kinetic energy of motion by a falling object. 3. Distinguish between renewable and nonrenewable sources of energy. 4. Know that electrical energy is the flow of electrons through electrical conductors that connect sources of electrical energy to points of use, including: • electrical current paths through parallel and series circuits • production of electricity by fossil-fueled and nuclear power plants, wind generators, geothermal plants, and solar cells • use of electricity by appliances and equipment (e.g., calculators, hair dryers, light bulbs, motors). **Waves** 5. Understand how light and radio waves carry energy through vacuum or matter by: • straight-line travel unless an object is encountered • reflection by a mirror, refraction by a lens, absorption by a dark object • separation of white light into different wavelengths by prisms • visibility of objects due to light emission or scattering. 6. Understand that vibrations of matter (e.g., sound, earthquakes, water waves) carry wave energy, including: • sound transmission through solids, liquids, and gases • relationship of pitch and loudness of sound to rate and distance (amplitude) of vibration • ripples made by objects dropped in water.

Strand II: **Content of Science**
Standard I (Physical Science): **Understand the structure and properties of matter, the characteristics of energy, and the interactions between matter and energy.**

K-4 Benchmark III: **Identify forces and describe the motion of objects.**

Grade	Performance Standards
K	1. Observe that things move in many different ways (e.g., straight line, vibration, circular). 2. Know that the position and motion of an object (direction or speed) are changed by pushing or pulling it.
1	1. Describe ways to make things move, what causes them to stop, and what causes a change of speed, or change of direction. 2. Observe that gravity makes things fall to the ground unless something holds them up.
2	1. Describe how the strength of a push or pull affects the change in an object's motion (e.g., how a big or small push affects how high a swing rises). 2. Observe that electrically charged materials and magnets attract and repel each other, and observe their effects on other kinds of materials.
3	1. Recognize that magnets can produce motion by attracting some materials (e.g., steel) and have no effect on others (e.g., plastics). 2. Describe how magnets have poles (N and S) and that like poles repel each other while unlike poles attract. 3. Observe that some forces produce motion without objects touching (e.g., magnetic force on nails). 4. Describe motion on different time scales (e.g., the slow motion of a plant toward light, the fast motion of a tuning fork).
4	1. Know that energy can be carried from one place to another by waves (e.g., water waves, sound waves), by electric currents, and by moving objects. 2. Describe the motion of an object by measuring its change of position over a period of time. 3. Describe that gravity exerts more force on objects with greater mass (e.g., it takes more force to hold up a heavy object than a lighter one). 4. Describe how some forces act on contact and other forces act at a distance (e.g., a person pushing a rock versus gravity acting on a rock).

5-8 Benchmark III: **Describe and explain forces that produce motion in objects.**

Grade	Performance Standards
5	1. Understand how the rate of change of position is the velocity of an object in motion. 2. Recognize that acceleration is the change in velocity with time. 3. Identify forces in nature (e.g., gravity, magnetism, electricity, friction). 4. Understand that when a force (e.g., gravity, friction) acts on an object, the object speeds up, slows down, or goes in a different direction. 5. Identify simple machines and describe how they give advantage to users (e.g., levers, pulleys, wheels and axles, inclined planes, screws, wedges).
6	1. Know that every object exerts gravitational force on every other object dependent on the masses and distance of separation (e.g., motions of celestial objects, tides). 2. Know that gravitational force is hard to detect unless one of the objects (e.g., Earth) has a lot of mass.
7	1. Know that forces cause motion in living systems, including: • the principle of a lever and how it gives mechanical advantage to a muscular/skeletal system to lift objects • forces in specific systems in the human body (e.g., how the heart generates blood pressure, how muscles contract and expand to produce motion).
8	**Forces** 1. Know that there are fundamental forces in nature (e.g., gravity, electromagnetic forces, nuclear forces). 2. Know that a force has both magnitude and direction. 3. Analyze the separate forces acting on an object at rest or in motion (e.g., gravity, elastic forces, friction), including how multiple forces reinforce or cancel one another to result in a net force that acts on an object. 4. Know that electric charge produces electrical fields and magnets produce magnetic fields. 5. Know how a moving magnetic field can produce an electric current (generator) and how an electric current can produce a magnetic field (electromagnet). 6. Know that Earth has a magnetic field. **Motion** 7. Know that an object's motion is always described relative to some other object or point (i.e., frame of reference). 8. Understand and apply Newton's Laws of Motion: • Objects in motion will continue in motion and objects at rest will remain at rest unless acted upon by an unbalanced force (inertia). • If a greater force is applied to an object a proportionally greater acceleration will occur. • If an object has more mass the effect of an applied force is proportionally less.

Strand II: **Content of Science**
Standard II (Life Science): **Understand the properties, structures, and processes of living things and the interdependence of living things and their environments.**

K-4 Benchmark I: **Know that living things have diverse forms, structures, functions, and habitats.**

Grade	Performance Standards
K	1. Identify major structures of common living organisms (e.g., stems, leaves, and roots of plants; arms, wings, and legs of animals). 2. Observe that differences exist among individual living organisms (e.g., plants, animals) of the same kind.
1	1. Know that living organisms (e.g., plants, animals) have needs (e.g., water, air, food, sunlight). 2. Know that living organisms (e.g., plants, animals) inhabit various environments and have various external features to help them satisfy their needs (e.g., leaves, legs, claws). 3. Describe the differences and similarities among living organisms (e.g., plants, animals). 4. Observe that living organisms (e.g., plants, animals) have predictable but varied life cycles.
2	1. Observe that diversity exists among individuals within a population. 2. Observe and describe various shapes of fungi. 3. Know that bacteria and viruses are germs.
3	1. Know that an adaptation in physical structure or behavior can improve an organism's chance for survival (e.g., horned toads, chameleons, cacti, mushrooms). 2. Observe that plants and animals have structures that serve different functions (e.g., shape of animals' teeth). 3. Classify common animals according to their observable characteristics (e.g., body coverings, structure). 4. Classify plants according to their characteristics (e.g., tree leaves, flowers, seeds).

4	1. Explain that different living organisms have distinctive structures and body systems that serve specific functions (e.g., walking, flying, swimming). 2. Know that humans and other living things have senses to help them detect stimuli, and that sensations (e.g., hunger) and stimuli (e.g., changes in the environment) influence the behavior of organisms. 3. Describe how roots are associated with the intake of water and soil nutrients and green leaves are associated with making food from sunlight (photosynthesis). 4. Describe the components of and relationships among organisms in a food chain (e.g., plants are the primary source of energy for living systems). 5. Describe how all living things are made up of smaller units that are called cells.

5-8 Benchmark I: **Explain the diverse structures and functions of living things and the complex relationships between living things and their environments.**

Grade	Performance Standards
5	1. Identify the components of habitats and ecosystems (e.g., producers, consumers, decomposers, predators). 2. Understand how food webs depict relationships between different organisms. 3. Know that changes in the environment can have different effects on different organisms (e.g., some organisms move, some survive, some reproduce, some die). 4. Describe how human activity impacts the environment.
6	1. Understand how organisms interact with their physical environments to meet their needs (i.e., food, water, air) and how the water cycle is essential to most living systems. 2. Describe how weather and geologic events (e.g., volcanoes, earthquakes) affect the function of living systems. 3. Describe how organisms have adapted to various environmental conditions.

7	**Populations and Ecosystems** 1. Identify the living and nonliving parts of an ecosystem and describe the relationships among these components. 2. Explain biomes (i.e., aquatic, desert, rainforest, grasslands, tundra) and describe the New Mexico biome. 3. Explain how individuals of species that exist together interact with their environment to create an ecosystem (e.g., populations, communities, niches, habitats, food webs). 4. Explain the conditions and resources needed to sustain life in specific ecosystems. 5. Describe how the availability of resources and physical factors limit growth (e.g., quantity of light and water, range of temperature, composition of soil) and how the water, carbon, and nitrogen cycles contribute to the availability of those resources to support living systems. **Biodiversity** 6. Understand how diverse species fill all niches in an ecosystem. 7. Know how to classify organisms: domain, kingdom, phylum, class, order, family, genus, species.
8	1. Describe how matter moves through ecosystems (e.g., water cycle, carbon cycle). 2. Describe how energy flows through ecosystems (e.g., sunlight, green plants, food for animals). 3. Explain how a change in the flow of energy can impact an ecosystem (e.g., the amount of sunlight available for plant growth, global climate change).

Strand II: **Content of Science**
Standard II (Life Science): **Understand the properties, structures, and processes of living things and the interdependence of living things and their environments.**

K-4 Benchmark II: Know that living things have similarities and differences and that living things change over time.

Grade	Performance Standards
K	1. Observe and describe similarities and differences in the appearance and behavior of living organisms (e.g., plants, animals). 2. Observe that living organisms (e.g., plants, animals) closely resemble their parents.

1	1. Identify differences between living and nonliving things. 2. Recognize the differences between mature and immature plants and animals (e.g., trees/seedlings, dogs/puppies, cats/kittens).
2	1. Explain that stages of the life cycle are different for different animals (e.g., mouse, cat, horse, butterfly, frog). 2. Observe that many characteristics of the offspring of living organisms (e.g., plants or animals) are inherited from their parents. 3. Observe how the environment influences some characteristics of living things (e.g., amount of sunlight required for plant growth).
3	1. Identify how living things cause changes to the environments in which they live, and that some of these changes are detrimental to the organism and some are beneficial. 2. Know that some kinds of organisms that once lived on Earth have become extinct (e.g., dinosaurs) and that others resemble those that are alive today (e.g., alligators, sharks).
4	1. Know that in any particular environment some kinds of plants and animals survive well, some survive less well, and others cannot survive at all. 2. Know that a change in physical structure or behavior can improve an organism's chance of survival (e.g., a chameleon changes color, a turtle pulls its head into its shell, a plant grows toward the light). 3. Describe how some living organisms have developed characteristics from generation to generation to improve chances of survival (e.g., spines on cacti, long beaks on hummingbirds, good eyesight on hawks).

5-8 Benchmark II: **Understand how traits are passed from one generation to the next and how species evolve.**

Grade	Performance Standards
5	1. Know that plants and animals have life cycles that include birth, growth and development, reproduction, and death and that these cycles differ for different organisms. 2. Identify characteristics of an organism that are inherited from its parents (e.g., eye color in humans, flower color in plants) and other characteristics that are learned or result from interactions with the environment. 3. Understand that heredity is the process by which traits are passed from one generation to another.
6	1. Understand that the fossil record provides data for how living organisms have evolved. 2. Describe how species have responded to changing environmental conditions over time (e.g., extinction, adaptation).

7	**Reproduction** 1. Know that reproduction is a characteristic of all living things and is essential to the continuation of a species. 2. Identify the differences between sexual and asexual reproduction. 3. Know that, in sexual reproduction, an egg and sperm unite to begin the development of a new individual. 4. Know that organisms that sexually reproduce fertile offspring are members of the same species. **Heredity** 5. Understand that some characteristics are passed from parent to offspring as inherited traits and others are acquired from interactions with the environment. 6. Know that hereditary information is contained in genes that are located in chromosomes, including: • determination of traits by genes • traits determined by one or many genes • more than one trait sometimes influenced by a single gene. **Biological Evolution** 7. Describe how typical traits may change from generation to generation due to environmental influences (e.g., color of skin, shape of eyes, camouflage, shape of beak). 8. Explain that diversity within a species is developed by gradual changes over many generations. 9. Know that organisms can acquire unique characteristics through naturally occurring genetic variations. 10. Identify adaptations that favor the survival of organisms in their environments (e.g., camouflage, shape of beak). 11. Understand the process of natural selection. 12. Explain how species adapt to changes in the environment or become extinct and that extinction of species is common in the history of living things. 13. Know that the fossil record documents the appearance, diversification, and extinction of many life forms.
8	1. Understand that living organisms are made mostly of molecules consisting of a limited number of elements (e.g., carbon, hydrogen, nitrogen, oxygen). 2. Identify DNA as the chemical compound involved in heredity in living organisms. 3. Describe the widespread role of carbon in the chemistry of living systems.

Strand II: **Content of Science**
Standard II (Life Science): **Understand the properties, structures, and processes of living things and the interdependence of living things and their environments.**

K-4 Benchmark III: **Know the parts of the human body and their functions.**

Grade	Performance Standards
K	1. Use the senses (e.g., sight, hearing, smell, taste, touch) to observe surroundings, and describe the observations. 2. Identify the parts of the human body (e.g., legs, arms, head, hands) and the functions of these parts.
1	1. Describe simple body functions (e.g., breathing, eating). 2. Describe the basic food requirements for humans. 3. Describe how some parts of human bodies differ from similar parts of other animals (e.g., hands and feet/paws; ears).
2	1. Identify a variety of human organs (e.g., lungs, heart, stomach, brain). 2. Know that various nutrients are required for specific parts and functions of the body (e.g., milk for bones and teeth, protein for muscles, sugar for energy). 3. Identify the functions of human systems (e.g., respiratory, circulatory, digestive).
3	1. Know that bacteria and viruses are germs that affect the human body. 2. Describe the nutrients needed by the human body.
4	1. Know that the human body has many parts that interact to function as systems (e.g., skeletal, muscular) and describe the parts and their specific functions in selected systems (e.g., the nose, lungs, and diaphragm in the respiratory system). 2. Recognize that the human body is organized from cells, to tissues, to organs, to systems, to the organism.

5-8 Benchmark III: **Understand the structure of organisms and the function of cells in living systems.**

Grade	Performance Standards
5	1. Understand that all living organisms are composed of cells from one to many trillions, and that cells are usually only visible through a microscope. 2. Know that some organisms are made of a collection of similar cells that cooperate (e.g., algae) while other organisms are made of cells that are different in appearance and function (e.g., corn, birds). 3. Describe the relationships among cells, tissues, organs, organ systems, whole organisms, and ecosystems.
6	1. Explain how fossil fuels were formed from animal and plant cells. 2. Describe the differences between substances that were produced by living organisms (e.g., fossil fuels) and substances that result from nonliving processes (e.g., igneous rocks).
7	**Structure of Organisms** 1. Understand that organisms are composed of cells and identify unicellular and multicellular organisms. 2. Explain how organs are composed of tissues of different types of cells (e.g., skin, bone, muscle, heart, intestines). **Function of Cells** 3. Understand that many basic functions of organisms are carried out in cells, including: • growth and division to produce more cells (mitosis) • specialized functions of cells (e.g., reproduction, nerve-signal transmission, digestion, excretion, movement, transport of oxygen). 4. Compare the structure and processes of plant cells and animal cells. 5. Describe how some cells respond to stimuli (e.g., light, heat, pressure, gravity). 6. Describe how factors (radiation, UV light, drugs) can damage cellular structure or function.
8	1. Describe how cells use chemical energy obtained from food to conduct cellular functions (i.e., respiration). 2. Explain that photosynthesis in green plants captures the energy from the sun and stores it chemically. 3. Describe how chemical substances can influence cellular activity (e.g., pH).

Strand II: **Content of Science**
Standard III (Earth and Space Science): **Understand the structure of Earth, the solar system, and the universe, the interconnections among them, and the processes and interactions of Earth's systems.**

K-4 Benchmark I: **Know the structure of the solar system and the objects in the universe.**

Grade	Performance Standards
K	1. Observe that there are many objects in the night sky and that some are brighter than others. 2. Describe the location and movements of objects in the sky (e.g., stars, sun, moon).
1	1. Observe the changes that occur in the sky as day changes into night and night into day. 2. Describe the basic patterns of objects as they move through the sky: • sun appears in the day • moon appears at night but can sometimes be seen during the day • sun and moon appear to move across the sky • moon appears to change shape over the course of a month. 3. Recognize that the sun, moon, and stars all appear to move slowly across the sky.
2	1. Observe that the phase of the moon appears a little different every day but looks the same again after about four weeks. 2. Observe that some objects in the night sky are brighter than others. 3. Know that the sun is a star.
3	1. Describe the objects in the solar system (e.g., sun, Earth and other planets, moon) and their features (e.g., size, temperature). 2. Describe the relationships among the objects in the solar system (e.g., relative distances, orbital motions). 3. Observe that the pattern of stars stays the same as they appear to move across the sky nightly. 4. Observe that different constellations can be seen in different seasons. 5. Know that telescopes enhance the appearance of some distant objects in the sky (e.g., the moon, planets).

4	1. Understand that the number of stars visible through a telescope is much greater than the number visible to the naked eye. 2. Know that there are various types of telescopes that use different forms of light to observe distant objects in the sky. 3. Know that the pattern of stars (e.g., constellations) stays the same although they appear to move across the sky nightly due to Earth's rotation.

5-8 Benchmark I: **Describe how the concepts of energy, matter, and force can be used to explain the observed behavior of the solar system, the universe, and their structures.**

Grade	Performance Standards
5	1. Know that many objects in the universe are huge and are separated from one another by vast distances (e.g., many stars are larger than the sun but so distant that they look like points of light). 2. Understand that Earth is part of a larger solar system, which is part of an even larger galaxy (Milky Way), which is one of many galaxies. 3. Know that there have been manned and unmanned journeys to space and to the moon.
6	**Universe** 1. Describe the objects in the universe, including: • billions of galaxies, each containing billions of stars • different sizes, temperatures, and colors of stars in the Milky Way galaxy. **Solar System** 2. Locate the solar system in the Milky Way galaxy. 3. Identify the components of the solar system, and describe their defining characteristics and motions in space, including: • sun as a medium sized star • sun's composition (i.e., hydrogen, helium) and energy production • nine planets, their moons, asteroids. 4. Know that the regular and predictable motions of the Earth-moon-sun system explain phenomena on Earth, including: • Earth's motion in relation to a year, a day, the seasons, the phases of the moon, eclipses, tides, and shadows • moon's orbit around Earth once in 28 days in relation to the phases of the moon.

7	1. Explain why Earth is unique in our solar system in its ability to support life. 2. Explain how energy from the sun supports life on Earth.
8	1. Understand how energy from the sun and other stars, in the form of light, travels long distances to reach Earth. 2. Explain how the properties of light (e.g., emission, reflection, refraction) emitted from the sun and stars are used to learn about the universe, including: • distances in the solar system and the universe • temperatures of different stars. 3. Understand how gravitational force acts on objects in the solar system and the universe, including: • similar action on masses on Earth and on other objects in the solar system • explanation of the orbits of the planets around the sun.

Strand II: **Content of Science**

Standard III (Earth and Space Science): **Understand the structure of Earth, the solar system, and the universe, the interconnections among them, and the processes and interactions of Earth's systems.**

K-4 Benchmark II: **Know the structure and formation of Earth and its atmosphere and the processes that shape them.**

Grade	Performance Standards
K	1. Observe that changes in weather occur from day to day and season to season. 2. Observe that the sun warms the land and water and they warm the air.
1	1. Know that simple tools can be used to measure weather conditions (e.g., thermometer, wind sock, hand held anemometer, rain gauge) and that measurements can be recorded from day to day and across seasons. 2. Know that there are different climates (e.g., desert, arctic, rainforest).
2	1. Know that rocks have different shapes and sizes (e.g., boulders, pebbles, sand) and that smaller rocks result from the breaking and weathering of larger rocks. 2. Understand that rocks are made of materials with distinct properties. 3. Know that soil is made up of weathered rock and organic materials, and that soils differ in their capacity to support the growth of plants. 4. Recognize the characteristics of the seasons.

3	1. Know that Earth's features are constantly changed by a combination of slow and rapid processes that include the action of volcanoes, earthquakes, mountain building, biological changes, erosion, and weathering. 2. Know that fossils are evidence of earlier life and provide data about plants and animals that lived long ago. 3. Know that air takes up space, is colorless, tasteless, and odorless, and exerts a force. 4. Identify how water exists in the air in different forms (e.g., in clouds and fog as tiny droplets; in rain, snow, and hail) and changes from one form to another through various processes (e.g., freezing/condensation, precipitation, evaporation).
4	1. Know that the properties of rocks and minerals reflect the processes that shaped them (i.e., igneous, metamorphic, and sedimentary rocks). 2. Describe how weather patterns generally move from west to east in the United States. 3. Know that local weather information describes patterns of change over a period of time (e.g., temperature, precipitation symbols, cloud conditions, wind speed/direction).

5-8 Benchmark II: **Describe the structure of Earth and its atmosphere and explain how energy, matter, and forces shape Earth's systems.**

Grade	Performance Standards
5	1. Understand that water and air relate to Earth's processes, including: • how the water cycle relates to weather • how clouds are made of tiny droplets of water, like fog or steam. 2. Know that air is a substance that surrounds Earth (atmosphere), takes up space, and moves, and that temperature fluctuations and other factors produce wind currents. 3. Know that most of Earth's surface is covered by water, that most of that water is salt water in oceans, and that fresh water is found in rivers, lakes, underground sources, and glaciers. 4. Recognize that the seasons are caused by Earth's motion around the sun and the tilt of Earth's axis of rotation.

6	**Structure of Earth** 1. Know that Earth is composed of layers that include a crust, mantle, and core. 2. Know that Earth's crust is divided into plates that move very slowly, in response to movements in the mantle. 3. Know that sedimentary, igneous, and metamorphic rocks contain evidence of the materials, temperatures, and forces that created them. **Weather and Climate** 4. Describe the composition (i.e., nitrogen, oxygen, water vapor) and strata of Earth's atmosphere, and differences between the atmosphere of Earth and those of other planets. 5. Understand factors that create and influence weather and climate, including: • heat, air movement, pressure, humidity, oceans • how clouds form by condensation of water vapor • how weather patterns are related to atmospheric pressure • global patterns of atmospheric movement (e.g., El Niño) • factors that can impact Earth's climate (e.g., volcanic eruptions, impacts of asteroids, glaciers). 6. Understand how to use weather maps and data (e.g., barometric pressure, wind speeds, humidity) to predict weather. **Changes to Earth** 7. Know that landforms are created and change through a combination of constructive and destructive forces, including: • weathering of rock and soil, transportation, deposition of sediment, and tectonic activity • similarities and differences between current and past processes on Earth's surface (e.g., erosion, plate tectonics, changes in atmospheric composition) • impact of volcanoes and faults on New Mexico geology. 8. Understand the history of Earth and how information about it comes from layers of sedimentary rock, including: • sediments and fossils as a record of a very slowly changing world • evidence of asteroid impact, volcanic and glacial activity.
7	1. Understand how the remains of living things give us information about the history of Earth, including: • layers of sedimentary rock, the fossil record, and radioactive dating showing that life has been present on Earth for more than 3.5 billion years. 2. Understand how living organisms have played many roles in changes of Earth's systems through time (e.g., atmospheric composition, creation of soil, impact on Earth's surface). 3. Know that changes to ecosystems sometimes decrease the capacity of the environment to support some life forms and are difficult and/or costly to remediate.

8	1. Describe the role of pressure (and heat) in the rock cycle. 2. Understand the unique role water plays on Earth, including: • ability to remain liquid at most Earth temperatures • properties of water related to processes in the water cycle: evaporation, condensation, precipitation, surface run-off, percolation • dissolving of minerals and gases and transport to the oceans • fresh and salt water in oceans, rivers, lakes, and glaciers • reactant in photosynthesis. 3. Understand the geologic conditions that have resulted in energy resources (e.g., oil, coal, natural gas) available in New Mexico.

Strand III: **Science and Society**
Standard I: **Understand how scientific discoveries, inventions, practices, and knowledge influence, and are influenced by, individuals and societies.**

K-4 Benchmark I: **Describe how science influences decisions made by individuals and societies.**

Grade	Performance Standards
K	1. Recognize that germs exist and may cause disease. 2. Describe how science helps provide products we use every day (e.g., gasoline for cars; electricity for lights, refrigerators, TVs; gas or electricity for heating, cooking).
1	1. Know that germs can be transmitted by touching, breathing, and coughing, and that washing hands helps prevent the spread of germs. 2. Describe how science has assisted in creating tools (e.g., plows, knives, telephones, cell phones, computers) to make life easier and more efficient. 3. Describe how tools and machines can be helpful, harmful, or both (e.g., bicycles, cars, scissors, stoves). 4. Know that men and women of all ethnic and social backgrounds practice science and technology.

2	1. Describe ways to prevent the spread of germs (e.g., soap, bleach, cooking). 2. Know that science has ways to help living things avoid sickness or recover from sickness (e.g., vaccinations, medicine) and adult supervision is needed to administer them. 3. Know that some materials are better than others for making particular things (e.g., paper, cardboard, plastic, metal, fiberglass, wood). 4. Understand that everybody can do science, invent things, and formulate ideas. 5. Know that science has discovered many things about objects, events, and nature and that there are many more questions to be answered.
3	1. Describe how food packaging (e.g., airtight containers, date) and preparation (heating, cooling, salting, smoking, drying) extend food life and the safety of foods (e.g., elimination of bacteria). 2. Know that science produces information for the manufacture and recycling of materials (e.g., materials that can be recycled [aluminum, paper, plastic] and others that cannot [gasoline]). 3. Know that naturally occurring materials (e.g., wood, clay, cotton, animal skins) may be processed or combined with other materials to change their properties. 4. Know that using poisons can reduce the damage to crops caused by rodents, weeds, and insects, but their use may harm other plants, animals, or the environment.
4	1. Know that science has identified substances called pollutants that get into the environment and can be harmful to living things. 2. Know that, through science and technology, a wide variety of materials not appearing in nature have become available (e.g., steel, plastic, nylon, fiber optics). 3. Know that science has created ways to store and retrieve information (e.g., paper and ink, printing press, computers, CD ROMs) but that these are not perfect (e.g., faulty programming, defective hardware). 4. Know that both men and women of all races and social backgrounds choose science as a career.

5-8 Benchmark I: **Explain how scientific discoveries and inventions have changed individuals and societies.**

Grade	Performance Standards
5	1. Describe the contributions of science to understanding local or current issues (e.g., watershed and community decisions regarding water use). 2. Describe how various technologies have affected the lives of individuals (e.g., transportation, entertainment, health).

6	1. Examine the role of scientific knowledge in decisions (e.g., space exploration, what to eat, preventive medicine and medical treatment). 2. Describe the technologies responsible for revolutionizing information processing and communications (e.g., computers, cellular phones, Internet).
7	1. Analyze the contributions of science to health as they relate to personal decisions about smoking, drugs, alcohol, and sexual activity. 2. Analyze how technologies have been responsible for advances in medicine (e.g., vaccines, antibiotics, microscopes, DNA technologies). 3. Describe how scientific information can help individuals and communities respond to health emergencies (e.g., CPR, epidemics, HIV, bio-terrorism).
8	1. Analyze the interrelationship between science and technology (e.g., germ theory, vaccines). 2. Describe how scientific information can help to explain environmental phenomena (e.g., floods, earthquakes, volcanoes, fire, extreme weather). 3. Describe how technological revolutions have significantly influenced societies (e.g., energy production, warfare, space exploration). 4. Critically analyze risks and benefits associated with technologies related to energy production.

Science Glossary

Asexual Reproduction	Involving or reproducing by reproductive processes (as cell division, spore formation, fission or budding) that do not involve the union of germ cells or egg and sperm.
Asteroid	A small rocky body orbiting the sun.
Atom	The smallest particle of an element which can take part in a chemical reaction.
Atomic Number	The number of protons in the nucleus of an atom.
ATP	(adenosine triphosphate) A phosphorylated nucleoside of adenine that supplies energy for many biochemical cellular processes by undergoing enzymatic hydrolysis.
Bacteria	The domain of microscopic organisms that multiply by splitting or by growing from spores. They come in a variety of forms and though some may cause diseases, many are important in human processes.
Big Bang	According to standard cosmology, the explosion that started the universe expanding 10 to 15 billion years ago.
Biological Evolution	Changes in the genetic composition of a population through successive generations. (See also “Evolution.”)
Biome	The world’s major communities, classified according to the predominant vegetation and characterized by adaptations of organisms to that particular environment (i.e., aquatic, deserts, rainforests, grasslands, and tundra).
Biotic	Relating to life.
Body System	A system of the body (e.g., digestive system, circulatory system).
Carnivore	A flesh-eating animal.
Centripetal	Proceeding or acting in a direction toward a center or axis.
Cell	The smallest structural and functional unit of an organism.

Characteristic	A distinguishing trait, feature, quality or property.
Chromosome	The smallest structural and functional unit of an organism.
Class	See “classification.”
Classification	A hierarchical scheme for organizing all living things into groups. The levels of the hierarchy are domain, kingdom, phylum, class, order, family, genus, species. For example, dogs are classified as Eukarya, Animalia, Chordata, Vertebrata, Mammalia, Carnivora, Canidae, Canis familiaris.
Climate	The average course or condition of the weather at a place usually over a period of years as exhibited by temperature, wind velocity and precipitation.
Compound	A substance formed from two or more elements chemically united in fixed proportions.
Conduction	Process by which heat or electricity is transmitted through a material or body without movement of the medium itself.
Conservation	In life science, a careful preservation and protection of something; especially planned management of a natural resource to prevent exploitation, destruction or neglect. In physical science, a unifying principle of constancy.
Consumer	An organism requiring complex organic compounds for food, which it obtains by preying on other organisms or by eating particles of organic matter.
Convection	The circulatory motion that occurs in a fluid at a non-uniform temperature owing to the variation of its density and the action of gravity.
Cycle	An interval of time during which a sequence of a recurring succession of events or phenomena is completed.

Decomposers	Organisms such as bacteria and fungi that feed and break down dead organisms, returning constituents of organic substances to the environment.
Domain	See “classification.” This is the highest-level grouping of living things. All living things fall into one of three domains: Eukaryotes, Bacteria, and Archaea.
DNA	(Deoxyribonucleic acid) A double strand of nucleotides that is a self-replicating material present in living organisms as the main constituent of chromosomes. It contains the genetic code and transmits the heredity pattern.
Ecological	The interactions and relationships between organisms and their environment.
Ecosystem	A system of relationships between organisms in an environment, and between organisms and the environment.
Egg	Female gamete; ovum.
Electrical Field	A region associated with a distribution of electric charge or a varying magnetic field, in which forces due to that charge or field act upon other electric charges.
Electric Force	A force that exists between two charged objects.
Electromagnetic Radiation	A kind of radiation including visible light, radio waves, infrared rays, gamma rays and x-rays in which electric and magnetic field vary simultaneously.
Electron	Negatively charged particle in an atom.
Element	Any of more than 100 fundamental substances that consist of atoms of only one kind and that singly or in combination constitute all matter.
Endothermic	Referring to a chemical reaction that absorbs heat.
Energy	The capacity for doing work, which can be in various forms (i.e., nuclear, sound, thermal and light).

Environment	The complex of physical, chemical and biotic factors that act upon an organism or an ecological community and ultimately determine its form and survival.
Eukaryotic	Referring to a cell with a nucleus and other internal structure.
Evolution	The series of changes over time, some gradual and some sporadic, that account for the present form and function of objects organisms, and natural and designed systems. The term may refer to biological changes, geological changes, and/or technological changes. In the context of biological changes, “evolution” refers to the theory explaining the history and present characteristics of life on Earth in terms of natural processes including natural selection.
Exothermic	Referring to a chemical reaction that releases heat.
Experiment	Something one does deliberately to see what happens.
Family	See “classification.”
Fission	The splitting of an atomic nucleus resulting in the release of large amounts of energy.
Food Chain	An arrangement of the organisms of an ecological community according to the order of predation in which each uses the next as a food source.
Food Web	The totality of interacting food chains in an ecological community.
Force	A vector quantity that tends to produce an acceleration of a body in the direction of its application; push or pull.
Fossil	Any evidence of life from a previous geological age (i.e., petrified bones, plant parts, and imprints).
Fossil Fuel	A fuel (e.g., coal, oil, natural gas) that is formed in Earth from plant or animal remains.
Friction	The force that resists relative motion between two bodies in contact.

Fungi	Plant like organisms that lack chlorophyll and absorb their food from dead or living organisms (i.e., yeast, mushrooms, and molds).
Fusion	The union of atomic nuclei to form heavier nuclei resulting in the release of enormous quantities of energy.
Galaxy	Any of the very large groups of stars and associated matter that are found throughout the universe.
Gas	A state of matter that does not have a definite shape or volume and that is much less dense than a liquid.
Gene	A functional hereditary unit located at a particular point on a chromosome that controls or acts in the transmission of hereditary characteristics.
Genetic Drift	The process by which gene frequencies are changed.
Genotype	The particular combination of genes in an organism.
Genus	See “classification.”
Gravity	The gravitational attraction of the mass of the Earth, the moon or a planet for bodies at or near its surface.
Habitat	The place or environment where a plant or animal naturally or normally lives and grows.
Half Life	The time it takes for half of the nuclei of a radioactive substance to decay.
Herbivore	A plant-eating animal.
Heredity	The sum of the qualities and potentialities genetically derived from one’s ancestors; the relation between successive generations, by which characteristics persist.

Hypothesis	The testable hypothesis is an important part of the scientific method of advancing knowledge. A scientifically testable hypothesis must be "falsifiable," which means that there must in principle be some outcome of the test that would prove the hypothesis to be false. For example, imagine that your neighbor says "small Martians visit my garden sometimes." This is not a scientific hypothesis, because he has not made a testable statement. However, if he says "if you look in my garden at midnight, you will see small purple two-legged things looking back at you" he has posed a testable hypothesis. You can test it, and you might thereby prove it to be false. Einstein introduced what has come to be known as his theory of general relativity by proposing two testable hypotheses: that beams of light traveling through vacuum would be bent by gravity, and that the color of a light beam would also be affected by gravity. (In both cases, he also predicted exactly how large the effect would be.) Scientists-some hoping to prove Einstein wrong, others hoping to confirm his predictions-have tested these and other hypotheses of relativity many times, and thus far the hypotheses of relativity have passed the tests.
Igneous	Relating to, resulting from, or suggestive of the intrusion or extrusion of magma or volcanic activity.
Ion	An atom or group of atoms that carries a positive or negative electric charge as a result of having lost or gained one or more electrons.
Isotope	Any of two or more species of atoms of a chemical element with the same atomic number and nearly identical chemical behavior, but with differing atomic mass or mass number and different physical properties.
Kinetic Energy	Energy associated with motion.
Kingdom	See "classification."
Law	See "Theory."

Life Cycle	The series of stages in form and functional activity through which an organism passes from fertilized ovum to the fertilized ovum of the next generation.
Life Zones	A geographic region or area defined by its characteristic life forms. (i.e., Alpine, Subalpine, Coniferous Forest Zones, Transitional (Mountain) Zones, Grasslands/Woodlands Zone, Desert Zones, and Ocean and Coast Zones.)
Mass	The property of a body that is a measure of its inertia and that is commonly taken as a measure of the amount of material it contains causing it to have weight in a gravitational field.
Matter	Something that has mass and exists as a solid, liquid, or gas.
Meiosis	A special kind of cell division that occurs during the reproduction of diploid organisms to produce the gametes. The double set of genes and chromosomes of the normal diploid cells is reduced during meiosis to a single haploid set in the gametes. Crossing-over and therefore recombination occur during a phase of meiosis.
Mitosis	Cell division. All cell division in multicellular organisms occurs by mitosis except for the special division called meiosis that generates the gametes.
Metamorphic	A change in the constitution of rock; specifically, a pronounced change affected by pressure, heat and water that results in a more compact and more highly crystalline condition.
Metric System	A decimal system of weights and measures based on the meter and on the kilogram.
Milky Way	The galaxy in which our solar system resides, appearing from Earth's perspective as a broad, luminous, irregular band of light that stretches completely around the celestial sphere and is caused by the light of myriads of faint stars.

Mineral	A solid homogeneous crystalline chemical element or compound that results from the inorganic processes of nature.
Mixture	A portion of matter consisting of two or more components in varying proportions that retain their own properties.
Molecule	The smallest particle of a substance that retains all the properties of the substance and is composed of one or more atoms.
Motion	An act, process or instance of changing position through time.
Mutation	A relatively permanent change in hereditary material.
Natural Selection	The process by which, in a given environment, individuals having characteristics that aid survival will produce more offspring, so the proportion of individuals having such characteristics will increase with each succeeding generation.
Nebula	Any of many immense bodies of highly rarefied gas or dust in interstellar space.
Neutrons	An uncharged elementary particle that has a mass nearly equal to that of the proton and is present in atomic nuclei.
Nuclear	Used in or produced by a nuclear reaction; referring to particles or properties of an atomic nucleus.
Nucleus	The central region of an atom which contains more than 99% of the atom's mass.
Nutrient	A nutritive substance or ingredient.
Observe	To watch carefully, especially with attention to details or behavior for the purpose of arriving at a judgment.
Omnivore	An animal that feeds on both animal and vegetable substances.
Order	See "classification."
Organ	A differentiated structure (e.g., heart, kidney, leaf, stem) consisting of cells and tissues, and performing some specific function in an organism.

Organ Systems	Organs working together for a specific function.
Organic	Compounds containing carbon and chiefly or ultimately of biological origin.
Organism	An individual constituted to carry on the activities of life by means of organs separate in function but mutually dependent; a living being.
Ozone	An atmospheric gas consisting of three atoms of oxygen in the molecule.
Particle	Any of the basic units of matter (e.g., molecule, atom, proton, or electron).
Pattern	A reliable sample of traits, acts, tendencies or other observable characteristics.
Periodic Table	Arrangement of the chemical elements by atomic number, starting with hydrogen in the upper left-hand corner and continuing in ascending order from left to right, arranged in columns according to similar chemical properties.
Phenomena	Occurrences, circumstances, or facts perceptible by the senses.
pH Scale	A numerical measure of the acidity or alkalinity of a chemical solution.
Phenotype	Physical or visible characteristics of a living organism that are determined by its genotype.
Photosynthesis	The chemical process by which chlorophyll-containing plants use light to convert carbon dioxide and water into carbohydrates, releasing oxygen as a by-product.
Phylum	See “classification.”
Pitch	The property of a sound, especially a musical tone, that is determined by the frequency of the waves producing it; highness or lowness of sound.
Plasma	A gas so hot that all electrons are stripped away from the atoms. As such, the gas has a positive charge and can be confined in a magnetic field. High-temperature plasma is used in controlled fusion experiments.

Plate Tectonics	The theory that the earth's crust is broken into fragments (plates,) which move in relation to one another, shifting continents, forming new crust, and causing volcanic eruptions.
Population	All the plants or animals of the same kind found in a given area.
Potential Energy	The energy that matter has because of its position or because of the arrangement of atoms or parts.
Producer	Any of various organisms (e.g., green plant) which produce their own organic compounds from simple precursors (such as carbon dioxide and inorganic nitrogen) and many of which are food sources for other organisms.
Prokaryotic	Referring to a cell with no nucleus (e.g., a bacterium).
Properties	Characteristics unique to a particular set of living or nonliving things.
Proton	A stable subatomic particle occurring in all atomic nuclei, with a positive electric charge equal in magnitude to that of an electron.
Qualitative	Involving quality or kind.
Quantitative	Involving the measurement of quantity or amount.
Radiation	The transfer of heat by radiation (e.g., energy transfer). The process of emitting energy in the form of waves or particles (e.g., visible light, X-rays).
Refraction	Deflection from a straight path undergone by light or other wave in passing obliquely from one medium (e.g., air) into another (e.g., glass) in which its velocity is different.
Reproduction	The process by which organisms give rise to offspring and which fundamentally consists of the segregation of a portion of the parental body by a sexual or an asexual process, and its subsequent growth and differentiation into a new individual.

RNA	(ribonucleic acid) Any of various nucleic acid that contains ribose and Uralic as structural components and is associated with the control of cellular chemical activities.
Respiration	The physical and chemical processes by which an organism supplies its cells and tissues with the oxygen needed for metabolism and relieves them of the carbon dioxide formed in energy-producing reactions.
Rotation	The turning of a body part about its long axis as if on a pivot.
Scaffolding	Providing or supporting.
Science	Science is both a body of knowledge and a set of processes for advancing that knowledge. More specifically, science is mankind's interconnected, internally consistent, growing body of knowledge about natural and man-made objects and phenomena of the past, present, and future; a body of knowledge that is based on repeatable experimentation with, or observation of, these natural and man-made objects and phenomena, that is organized and extended using logic and mathematics, and that is validated by the testing of hypotheses.
Scientific Data	Facts (e.g., numerical values, quantities given by an instrument) from which other information may be inferred.
Scientific Explanations	Incorporate existing scientific knowledge and new evidence from observations, experiments, or models into internally consistent, logical statements.
Scientific Hypothesis	See "Hypothesis."
Scientific Inquiry	Full inquiry involves asking a simple question, completing an investigation, answering the question, and presenting the results to others.
Scientific Investigation	Involve asking and answering a question and comparing the answer with what scientists already know about the world.
Scientific Knowledge	Facts, concepts, principles, laws, theories, and models acquired through scientific inquiry and investigation.

Scientific Method	Principles and procedures for the systematic pursuit of knowledge involving the recognition and formulation of a problem, the collection of data through observation and experiment, and the formulation and testing of hypotheses.
Scientific Model	Tentative scheme or structure that corresponds to real objects, events, or classes of events, which has explanatory power.
Scientific Notation	A method of representing a number as a decimal number between 1 and 10 multiplied by a power of 10, (e.g., 1.0492 x 10 to the 4 for 10,492).
Scientific Literacy	The knowledge and understanding of scientific concepts and processes required for personal decision making, participation in civic and cultural affairs, and economic productivity.
Scientific Thinking	A way of figuring something out, a way of understanding something through thought (critical thinking). To learn any body of content, therefore, it is necessary to learn to think accurately and reasonably with the concepts that define the content.
Sediment	Material deposited by water, wind or glaciers.
Solar System	The Sun and the collection of celestial bodies that orbit it. These include the nine planets (Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune and Pluto) and their 60 moons, the asteroid belt, the comets and the Kuiper belt.
Species	A group of organisms consisting of similar individuals capable of exchanging genes or interbreeding. See also “classification.”
Sperm	A male gamete.
Spiraling Framework	Concepts and skills introduced and acquired at a particular time continue to be reinforced and enhanced.
Structure	The arrangement of particles or parts in a substance or body.

System	1. A group of body organs that together perform one or more vital functions. 2. An organized group of devices, parts or factors that together perform a function or drive a process (e.g., weather systems, mechanical systems).
Technology	Tools and techniques.
Theory	An accepted collection of ideas, explanations, and testable hypotheses describing a broad, important set of phenomena. The acceptance arises from repeated successful testing of a theory's many hypotheses. Examples are Einstein's theory of relativity, quantum theory, atomic theory, and evolutionary theory. Unlike the common American usage of the word "theory," its scientific usage implies no disrespect. Historically, the word "law" has come into use for some theories, such as Newton's laws of motion and gravity. Every theory has limits to its applicability. For example, evolutionary theory does not explain the origin of life (only its subsequent development), and Newton's laws of motion and gravity are only low-speed approximations to the more modern and more complete Einstein's theory of relativity. Growth of scientific knowledge often occurs at the boundary of applicability of a theory.
Tool	A device that aids in accomplishing a task, a form of technology.
Trait	An inherited characteristic.
Transform	To change in composition or structure.
Universe	All matter and energy, including Earth, the galaxies, and all the contents of intergalactic space, regarded as a whole.
Vector	Representation of a quantity having both magnitude and direction, such as velocity or force.
Velocity	The rate of change of position and direction with respect to time.
Virus	Any of various submicroscopic pathogens consisting essentially of a particle of nucleic acid enclosed in protein and able to replicate only within a living cell.

Volcano	A vent in the crust of the Earth or another planet from which usually molten rock, ash and steam are ejected.
Water Cycle	The sequence of conditions through which water passes from vapor in the atmosphere through precipitation upon land or water surfaces and ultimately back into the atmosphere as a result of evaporation and transpiration.
Wave	A disturbance or variation that transfers energy progressively from point to point in a medium and that may take the form of an elastic deformation of matter or of a variation of pressure, electric or magnetic intensity, electric potential, or temperature.
Weather	The state of the atmosphere with respect to heat or cold, wetness or dryness, calm or storm, clearness or cloudiness.

References:

The American Association for the Advancement of Science. http://www.aaas.org/

The American Heritage College Dictionary. Houghton Mifflin Company. New York , 1997.

Chambers, Dictionary of Science and Technology. New York : Chambers Harrap Publishers Ltd., 1999.

Habitats and Life Zones. eNature.com.

Merriam-Websters' Collegiate Dictionary, 10th Ed. Springfield , Mass. : Merriam-Webster, 1993.

National Science Education Standards . National Academy Press. Washington, DC., 1996.

The New Oxford American Dictionary. New York : Oxford University Press, 2001.