

New Mexico Science Content Standards, Benchmarks, and Performance Standards Strands and Benchmarks

Kindergarten – 4th Grade

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** Use observation and questioning skills in science inquiry (e.g., What happens when something is pushed or pulled?).
Ask and answer questions about surroundings and share findings with classmates.
- 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?).
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** Conduct simple investigations (e.g., measure the sizes of plants of the same kind that are grown in sunlight and in shade).
- 3** Use tools to provide information not directly available through only the senses (e.g., magnifiers, rulers, thermometers).
Follow simple instructions for a scientific investigation.
Make new observations when discrepancies exist between two descriptions of the same object or phenomenon to improve accuracy.
Recognize the difference between data and opinion.
Use numerical data in describing and comparing objects, events, and measurements.
Collect data in an investigation and analyze those data.
Know that the same scientific laws govern investigations in different times and places (e.g., gravity, growing plants).
- 4** Use instruments to perform investigations (e.g., timers, balances) and communicate findings.
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.
Conduct multiple trials to test a prediction, draw logical conclusions, and construct and interpret graphs from measurements.
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.

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

Grade Performance Standards

- K** Communicate observations and answer questions about surroundings.
- 1** Know that simple investigations do not always turn out as planned.

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- 2 Understand that in doing science it is often helpful to work with a team and share findings. Make accurate observations and communicate findings about investigations.
- 3 Understand that predictions are based on observations, measurements, and cause-and-effect relationships.
- 4 Communicate ideas and present findings about scientific investigations that are open to critique from others.
Describe how scientific investigations may differ from one another (e.g., observations of nature, measurements of things changing over time).
Understand how data are used to explain how a simple system functions (e.g., a thermometer to measure heat loss as water cools).

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

Grade Performance Standards

- K Observe and describe the relative sizes and characteristics of objects (e.g., bigger, brighter, louder, smellier).
- 1 Use numbers and mathematical language (e.g., “addition” instead of “add to,” “subtraction” instead of “take away”) to describe phenomena.
- 3 Use numerical data in describing and comparing objects, events, and measurements.
Pose a question of interest and present observations and measurements with accuracy.
- 4 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).

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 Observe that objects are made of different types of materials (e.g., metal, plastic, cloth, wood).
Observe that different materials have different properties (e.g., color, odor).
- 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).
Describe simple properties of matter (e.g., hardness, flexibility, transparency).
- 2 Observe that properties of substances can change when they are mixed, cooled, or heated (e.g., salt dissolves in water, ice melts).
Describe the changes that occur when substances are heated or cooled and change from one state matter to another (i.e., solid, liquid, gas).
- 3 Separate mixtures based on properties (e.g., by size or by substance; rocks and sand, iron filings and sand, salt and sand).
- 4 Know that the mass of the same amount of material remains constant whether it is together, in parts, or in a different state.

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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** Observe how energy does things (e.g., batteries, the sun, wind, electricity).
- 1** Observe and describe how energy produces changes (e.g., heat melts ice, gas makes car go uphill, electricity makes TV work).
- 2** Describe how heat can be produced (e.g., burning, rubbing, mixing some substances).
Know that heat moves more rapidly in thermal conductors (e.g., metal pan) than in insulators (e.g., plastic handle).
- 3** Know that light travels in a straight line until it strikes an object and then it is reflected, refracted, or absorbed.
- 4** 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).

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.

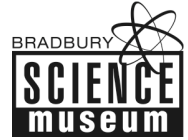
K-4 Benchmark III: Identify forces and describe the motion of objects.

Grade Performance Standards

- K** Observe that things move in many different ways (e.g., straight line, vibration, circular).
Know that the position and motion of an object (direction or speed) are changed by pushing or pulling it.
- 1** Describe ways to make things move, what causes them to stop, and what causes a change of speed, or change of direction.
Observe that gravity makes things fall to the ground unless something holds them up.
- 2** 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. Observe that electrically charged materials and magnets attract and repel each other, and observe their effects on other kinds of materials).
- 3** Recognize that magnets can produce motion by attracting some materials (e.g., steel) and have no effect on others (e.g., plastics).
Describe how magnets have poles (N and S) and that like poles repel each other while unlike poles attract.
Observe that some forces produce motion without objects touching (e.g., magnetic force on nails).
- 4** 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.



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Describe the motion of an object by measuring its change of position over a period of time.

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).

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).

New Mexico Science Content Standards, Benchmarks, and Performance Standards Strands and Benchmarks

5th – 8th Grade

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.

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** Plan and conduct investigations, including formulating testable questions, making systematic observations, developing logical conclusions, and communicating findings.
Describe how credible scientific investigations use reproducible elements including single variables, controls, and appropriate sample sizes to produce valid scientific results.
Communicate the steps and results of a scientific investigation.
- 6** Examine the reasonableness of data supporting a proposed scientific explanation.
Justify predictions and conclusions based on data.
- 7** Use models to explain the relationships between variables being investigated.
- 8** Evaluate the accuracy and reproducibility of data and observations.
Know how to recognize and explain anomalous data.

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

Grade Performance Standards

- 5** Understand that different kinds of investigations are used to answer different kinds of questions (e.g., observations, data collection, controlled experiments).
Understand that scientific conclusions are subject to peer and public review.
- 6** Understand that scientific knowledge is continually reviewed, critiqued, and revised as new data become available.
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.
Understand that not all investigations result in defensible scientific explanations.
- 7** Describe how bias can affect scientific investigation and conclusions.
Critique procedures used to investigate a hypothesis.
Analyze and evaluate scientific explanations.
- 8** Examine alternative explanations for observations.
Describe ways in which science differs from other ways of knowing and from other bodies of knowledge (e.g., experimentation, logical arguments, skepticism).
Know that scientific knowledge is built on questions posed as testable hypotheses, which are tested until the results are accepted by peers.

Strand II: Content of Science

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New Mexico Science Content Standards, Benchmarks, and Performance Standards Strands and Benchmarks

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

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

Grade Performance Standards

- 5** Describe properties (e.g., relative volume, ability to flow) of the three states of matter.
- 6** Understand that substances have characteristic properties and identify the properties of various substances (e.g., density, boiling point, solubility, chemical reactivity).
Know the differences between chemical and physical properties and how these properties can influence the interactions of matter.
- 7** 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).
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).
- 8** **Properties of Matter**
Distinguish between metals and non-metals.

Changes in Matter

Know that phase changes are physical changes that can be reversed (e.g., evaporation, condensation, melting).
Identify factors that influence the rate at which chemical reactions occur (e.g., temperature, concentration).
Know that chemical reactions can absorb energy (endothermic reactions) or release energy (exothermic reactions).

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

Grade Performance Standards

- 5** Know that heat is transferred from hotter to cooler materials or regions until both reach the same temperature.
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).
Know that there are different forms of energy.
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** Identify various types of energy (e.g., heat, light, mechanical, electrical, chemical, nuclear).
Understand that heat energy can be transferred through conduction, radiation and convection.
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).
- 8** **Energy Transformation**

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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

Know that energy exists in many forms and that when energy is transformed some energy is usually converted to heat.

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

Grade Performance Standards

- 5** Understand how the rate of change of position is the velocity of an object in motion. Recognize that acceleration is the change in velocity with time. Identify forces in nature (e.g., gravity, magnetism, electricity, friction). 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. Identify simple machines and describe how they give advantage to users (e.g., levers, pulleys, wheels and axles, inclined planes, screws, wedges).

8 Forces

- Know that there are fundamental forces in nature (e.g., gravity, electromagnetic forces, nuclear forces).
Know that a force has both magnitude and direction.
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.
Know that electric charge produces electrical fields and magnets produce magnetic fields.
Know that Earth has a magnetic field.

Motion

Know that an object's motion is always described relative to some other object or point (i.e., frame of reference).

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.

[The State appears to be confused about Newton's third law of motion.]