

Eighth Grade Science Standards and Benchmarks

Standard #1: Scientific Thinking and Practice Definition I: Understand the processes of scientific investigations and use inquiry and scientific ways of observing, experimenting, predicting, and validating to think critically.		
<u>Benchmark #1-A:</u> Use scientific methods to develop questions, design and conduct experiments using appropriate technologies, analyze and evaluate results, make predictions, and communicate findings.	Performance Definition 1	<input type="checkbox"/> Evaluate the accuracy and reproducibility of data and observations.
	Performance Definition 2	<input type="checkbox"/> Use a variety of technologies to gather, analyze and interpret scientific data.
	Performance Definition 3	<input type="checkbox"/> Know how to recognize and explain anomalous data.
<u>Benchmark #1-B:</u> Understand the processes of scientific investigation and how scientific inquiry results in scientific knowledge.	Performance Definition 1	<input type="checkbox"/> Examine alternative explanations for observations.
	Performance Definition 2	<input type="checkbox"/> Describe ways in which science differs from other ways of knowing and from other bodies of knowledge (e.g., experimentation, logical arguments, skepticism).
	Performance Definition 3	<input type="checkbox"/> Know that scientific knowledge is built on questions posed as testable hypotheses, which are tested until the results are accepted by peers.
<u>Benchmark #1-C:</u> Use mathematical ideas, tools, and techniques to understand scientific knowledge.	Performance Definition 1	<input type="checkbox"/> 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).
	Performance Definition 2	<input type="checkbox"/> Create models to describe phenomena.

Standard #2: Content of Science

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

<p>Benchmark #2-A:</p> <p>Know the forms and properties of matter and how matter interacts.</p>	Performance Definition 1	<p>Properties of Matter</p> <input type="checkbox"/> Know how to use density, boiling point, freezing point, conductivity, and color to identify various substances.
	Performance Definition 2	<input type="checkbox"/> Distinguish between metals and non-metals.
	Performance Definition 3	<input type="checkbox"/> Understand the differences among elements, compounds, and mixtures by: <ul style="list-style-type: none"> <input type="checkbox"/> classification of materials as elements, compounds, or mixtures <input type="checkbox"/> interpretation of chemical formulas <input type="checkbox"/> separation of mixtures into compounds by methods including evaporation, filtration, screening, magnetism.
	Performance Definition 4	<p>Structure of Matter</p> <input type="checkbox"/> Identify the protons, neutrons, and electrons within an atom and describe their locations (i.e., in the nucleus or in motion outside the nucleus).
	Performance Definition 5	<input type="checkbox"/> Explain that elements are organized in the periodic table according to their properties.
	Performance Definition 6	<input type="checkbox"/> Know that compounds are made of two or more elements, but not all sets of elements can combine to form compounds.
	Performance Definition 7	<p>Changes in Matter</p> <input type="checkbox"/> Know that phase changes are physical changes that can be reversed (e.g., evaporation, condensation, melting).
	Performance Definition 8	<input type="checkbox"/> Describe various familiar physical and chemical changes that occur naturally (e.g., snow melting, photosynthesis, rusting, burning).
	Performance Definition 9	<input type="checkbox"/> Identify factors that influence the rate at which chemical reactions occur (e.g., temperature, concentration).
	Performance Definition 10	<input type="checkbox"/> Know that chemical reactions can absorb energy (endothermic reactions) or release energy (exothermic reactions).
<p>Benchmark #2-B:</p> <p>Explain the physical processes involved in the transfer, change, and conservation of energy.</p>	Performance Definition 1	<p>Energy Transformation</p> <input type="checkbox"/> Know that energy exists in many forms and that when energy is transformed some energy is usually converted to heat.
	Performance Definition 2	<input type="checkbox"/> 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: <ul style="list-style-type: none"> <input type="checkbox"/> transformation of gravitational potential energy of position into kinetic energy of motion by a falling object.
	Performance Definition 3	<input type="checkbox"/> Distinguish between renewable and nonrenewable sources of energy.

	Performance Definition 4	<input type="checkbox"/> Know that electrical energy is the flow of electrons through electrical conductors that connect sources of electrical energy to points of use, including: <ul style="list-style-type: none"> <input type="checkbox"/> electrical current paths through parallel and series circuits <input type="checkbox"/> production of electricity by fossil-fueled and nuclear power plants, wind generators geothermal plants, and solar cells <input type="checkbox"/> use of electricity by appliances and equipment (e.g., calculators, hair dryers, light bulbs, motors).
	Performance Definition 5	Waves <input type="checkbox"/> Understand how light and radio waves carry energy through vacuum or matter by: <ul style="list-style-type: none"> <input type="checkbox"/> straight-line travel unless an object is encountered <input type="checkbox"/> reflection by a mirror, refraction by a lens, absorption by a dark object <input type="checkbox"/> separation of white light into different wavelengths by prisms <input type="checkbox"/> visibility of objects due to light emission or scattering.
	Performance Definition 6	<input type="checkbox"/> Understand that vibrations of matter (e.g., sound, earthquakes, water waves) carry wave energy, including: <ul style="list-style-type: none"> <input type="checkbox"/> sound transmission through solids, liquids, and gases <input type="checkbox"/> relationship of pitch and loudness of sound to rate and distance (amplitude) of vibration <input type="checkbox"/> ripples made by objects dropped in water.
<u>Benchmark #2-C:</u> Describe and explain forces that produce motion in objects.	Performance Definition 1	Forces <input type="checkbox"/> Know that there are fundamental forces in nature (e.g., gravity, electromagnetic forces, nuclear forces).
	Performance Definition 2	<input type="checkbox"/> Know that a force has both magnitude and direction.
	Performance Definition 3	<input type="checkbox"/> 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.
	Performance Definition 4	<input type="checkbox"/> Know that electric charge produces electrical fields and magnets produce magnetic fields.
	Performance Definition 5	<input type="checkbox"/> Know how a moving magnetic field can produce an electric current (generator) and how an electric current can produce a magnetic field (electromagnet).
	Performance Definition 6	<input type="checkbox"/> Know that Earth has a magnetic field.
	Performance Definition 7	Motion <input type="checkbox"/> Know that an object's motion is always described relative to some other object or point (i.e., frame of reference).
	Performance Definition 8	<input type="checkbox"/> Understand and apply Newton's Laws of Motion: <ul style="list-style-type: none"> <input type="checkbox"/> Objects in motion will continue in motion and objects at rest will remain at rest unless acted upon by an unbalanced force (inertia). <input type="checkbox"/> If a greater force is applied to an object a proportionally greater acceleration will occur. <input type="checkbox"/> If an object has more mass the effect of an applied force is proportionally less.

Standard #2: Content of Science**Definition II (Life Science):** Understand the properties, structures, and processes of living things and the interdependence of living things and their environments.

<u>Benchmark #2-A:</u> Explain the diverse structures and functions of living things and the complex relationships between living things and their environments.	Performance Definition 1	<input type="checkbox"/> Describe how matter moves through ecosystems (e.g., water cycle, carbon cycle).
	Performance Definition 2	<input type="checkbox"/> Describe how energy flows through ecosystems (e.g., sunlight, green plants, food for animals).
	Performance Definition 3	<input type="checkbox"/> 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).
<u>Benchmark #2-B:</u> Understand how traits are passed from one generation to the next and how species evolve.	Performance Definition 1	<input type="checkbox"/> Understand that living organisms are made mostly of molecules consisting of a limited number of elements (e.g., carbon, hydrogen, nitrogen, oxygen).
	Performance Definition 2	<input type="checkbox"/> Identify DNA as the chemical compound involved in heredity in living organisms.
	Performance Definition 3	<input type="checkbox"/> Describe the widespread role of carbon in the chemistry of living systems.
<u>Benchmark #2-C:</u> Understand the structure of organisms and the function of cells in living systems.	Performance Definition 1	<input type="checkbox"/> Describe how cells use chemical energy obtained from food to conduct cellular functions (i.e., respiration).
	Performance Definition 2	<input type="checkbox"/> Explain that photosynthesis in green plants captures the energy from the sun and stores it chemically.
	Performance Definition 3	<input type="checkbox"/> Describe how chemical substances can influence cellular activity (e.g., pH).

Standard #2: Content of Science**Definition 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.

<u>Benchmark #2-A:</u> 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.	Performance Definition 1	<input type="checkbox"/> Understand how energy from the sun and other stars, in the form of light, travels long distances to reach Earth.
	Performance Definition 2	<input type="checkbox"/> 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: <input type="checkbox"/> temperatures of different stars. <input type="checkbox"/> distances in the solar system and the universe
	Performance Definition 3	<input type="checkbox"/> Understand how gravitational force acts on objects in the solar system and the universe, including: <input type="checkbox"/> similar action on masses on Earth and on other objects in the solar system <input type="checkbox"/> explanation of the orbits of the planets around the sun.
<u>Benchmark #2-B:</u> Describe the structure of Earth and its atmosphere and explain how energy, matter, and forces shape Earth's systems.	Performance Definition 1	<input type="checkbox"/> Describe the role of pressure (and heat) in the rock cycle.
	Performance Definition 2	<input type="checkbox"/> Understand the unique role water plays on Earth, including: <input type="checkbox"/> ability to remain liquid at most Earth temperatures <input type="checkbox"/> properties of water related to processes in the water cycle: evaporation, condensation, precipitation, surface run-off, percolation <input type="checkbox"/> dissolving of minerals and gases and transport to the oceans <input type="checkbox"/> fresh and salt water in oceans, rivers, lakes, and glaciers <input type="checkbox"/> reactant in photosynthesis.

	Performance Definition 3	<input type="checkbox"/> Understand the geologic conditions that have resulted in energy resources (e.g., oil, coal, natural gas) available in New Mexico.
--	--------------------------	------------------------------------------------------------------------------------------------------------------------------------------------------------

Standard #3: Science and Society

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

<u>Benchmark #3-A:</u> Explain how scientific discoveries and inventions have changed individuals and societies.	Performance Definition 1	<input type="checkbox"/> Analyze the interrelationship between science and technology (e.g., germ theory, vaccines).
	Performance Definition 2	<input type="checkbox"/> Describe how scientific information can help to explain environmental phenomena (e.g., floods, earthquakes, volcanoes, fire, extreme weather).
	Performance Definition 3	<input type="checkbox"/> Describe how technological revolutions have significantly influenced societies (e.g., energy production, warfare, space exploration).
	Performance Definition 4	<input type="checkbox"/> Critically analyze risks and benefits associated with technologies related to energy production.