

**NM** Public Education Department

# SCIENCE: 8th Grade

END-OF-COURSE EXAM | GRADE 8 | YEAR 17-18

ASSESSMENT BLUEPRINT

# **Purpose Statement**

## **8<sup>th</sup> Grade Science**

*The 8<sup>th</sup> Grade Science End-of-Course (EOC) exam is intended to measure student proficiency of the New Mexico Science Standards. This course-level exam is provided to all students who have completed 8<sup>th</sup> Grade Science or related courses. This exam can be given for the following STARS course codes:*

**1703 - Physical Science**

**1705 - Integrated (General) Science**

**1708 - Physical Science**

**1709 - Elementary Exploratory Science**

*Intended as a final exam for the course, this is a summative assessment covering a range of content, skills, and applications. Scores are reported to the teacher, school, district, and state levels for the purposes of student grades, curriculum review, and NMTeach summative reports.*

***“The EOCs are exams written by New Mexico Teachers for New Mexico Students.”***

*During the 2016-17 school year, teachers were brought together in person or online as part of the blueprint and exam revision process. The NMPED extends our gratitude to all those who contributed to this improvement process. Although we were unable to implement every suggestion due to conflicting viewpoints at times, this blueprint reflects the best collaborative effort among dedicated peers.*

*The NMPED would like to especially recognize the following person(s) who led the revision for this blueprint:*

- *Debbie Dean, Ph.D., Hobbs Municipal Schools, NBCT, Blueprint Lead*
- *Christine Lutz, Southwest Secondary Learning Center (charter), Albuquerque*

## Explanation of Blueprint Layout & Test Specifications Table

Standard	Standards with Test Item Specifications:
<p><i>The standards identified in this portion of the blueprint are aligned to the New Mexico Grade 8 Science Standards:</i></p> <p><a href="http://www.ped.state.nm.us/MathScience/dl08/Standards/G8ScienceStandards.pdf">http://www.ped.state.nm.us/MathScience/dl08/Standards/G8ScienceStandards.pdf</a></p> <p><i>New Mexico Teachers identified the standards to be measured on the EOC exam using the following criteria: 1) a great deal of instructional time is spent on the standard as identified in the curriculum and/or; 2) the standard is important to subsequent learning.</i></p> <p><i>It is important to note that the standards in the blueprint are only a <b>subset</b> of standards to be measured with the understanding that teachers cover more standards during the course of instruction than what has been selected to be measured.</i></p>	<ul style="list-style-type: none"> <li>● <i>This portion of the blueprint identifies the specific skills and knowledge students will have to demonstrate during the exam.</i></li> <li>● <i>Although the standard may be broader, the item specifications may place constraint on portions of the standards in order to provide more transparency as to what specifically will be measured relative to the standard.</i></li> <li>● <i>Item specifications provide guidelines for the item writer so they know what topics to specifically focus on when authoring items.</i></li> <li>● <i>Topics and terms in <b>bold</b> will be emphasized on the exam.</i></li> </ul>
	<p><b>Item Types:</b>  <i>The item types for this EOC exam are limited to:</i>            MC = multiple choice with or without stimulus (e.g., picture, graph, chart)</p>
	<p><b>Sample Question(s):</b></p> <p><i>Sample questions have been provided to assist teachers to correlate the questions with the performance standards and the test item specification, when applicable.</i></p> <ul style="list-style-type: none"> <li>● <i>An * denotes the correct answer</i></li> <li>● <i>DOK = Depth of Knowledge</i></li> <li>● <i>Some sample questions may be items released items from prior EOC exams</i></li> </ul>

## Blueprint Table – 8<sup>th</sup> Grade Science

Standard/Learning Outcome	Standards with Test Item Specifications:																								
<p><b>I.1.1.2</b> <b>I.1.1.3</b></p> <p><b>Strand I:</b> Scientific Thinking and Practice</p> <p><b>Standard I:</b> Understand the processes of scientific investigations and use inquiry and scientific ways of observing, experimenting, predicting, and validating to think critically.</p> <p><b>Benchmark I:</b> Use scientific methods to develop questions, design and conduct experiments using appropriate technologies, analyze and evaluate results, make predictions, and communicate findings.</p>	<p style="background-color: #d9ead3;"><b>Standards with Test Item Specifications:</b></p> <p style="background-color: #d9ead3;"><i>Scientific Thinking and Practice</i></p> <p style="background-color: #d9ead3;">2. Use a variety of technologies to gather, <b>analyze</b> and <b>interpret</b> scientific data.</p> <p style="background-color: #d9ead3;">3. Know how to recognize and explain anomalous data.</p> <p style="background-color: #d9ead3;"><b>Specifications:</b></p> <ul style="list-style-type: none"> <li>• None</li> </ul> <p style="background-color: #d9ead3;"><b>Item Types:</b></p> <p style="background-color: #d9ead3;"><i>MC = multiple choice with or without stimulus</i></p> <p><b>Sample Question:</b></p> <p>The graph shows data collected in an experiment comparing the amount of water vapor (H<sub>2</sub>O), in grams per cubic meter, which was held by air at various temperatures. Which is an accurate analysis of the data shown?</p> <div style="display: flex; align-items: flex-start;"> <div style="flex: 1;"> <p>A. Warm air cannot hold as much water vapor as cool air.</p> <p>B. As air temperature increases, it can hold more water vapor.*</p> <p>C. There is no relationship between air temperature and amount of water vapor.</p> <p>D. Air at 10°C can hold more water vapor than air at 50°C.</p> </div> <div style="flex: 1; text-align: center;"> <table border="1" style="margin: 10px auto;"> <caption>Data from Sample Question Graph</caption> <thead> <tr> <th>Air Temperature (°C)</th> <th>Water Vapor (g/m<sup>3</sup>)</th> </tr> </thead> <tbody> <tr><td>5</td><td>5</td></tr> <tr><td>10</td><td>10</td></tr> <tr><td>15</td><td>15</td></tr> <tr><td>20</td><td>20</td></tr> <tr><td>25</td><td>25</td></tr> <tr><td>30</td><td>30</td></tr> <tr><td>35</td><td>35</td></tr> <tr><td>40</td><td>38</td></tr> <tr><td>45</td><td>40</td></tr> <tr><td>50</td><td>42</td></tr> <tr><td>65</td><td>45</td></tr> </tbody> </table> </div> </div> <p style="background-color: #d9ead3;"><i>Standard: I.1.1.2</i></p> <p style="background-color: #d9ead3;"><i>DOK Level: 2</i></p>	Air Temperature (°C)	Water Vapor (g/m <sup>3</sup> )	5	5	10	10	15	15	20	20	25	25	30	30	35	35	40	38	45	40	50	42	65	45
Air Temperature (°C)	Water Vapor (g/m <sup>3</sup> )																								
5	5																								
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<p><b>I.1.1.3</b></p> <p><b>Strand I:</b> Scientific Thinking and Practice</p>	<p style="background-color: #d9ead3;"><b>Standards with Test Item Specifications:</b></p> <p style="background-color: #d9ead3;"><i>Scientific Thinking and Practice</i></p> <p style="background-color: #d9ead3;">3. Know that scientific knowledge is built on questions posed as testable hypotheses,</p>																								

<p><b>Standard I:</b> Understand the processes of scientific investigations and use inquiry and scientific ways of observing, experimenting, predicting, and validating to think critically.</p> <p><b>Benchmark II:</b> Understand the processes of scientific investigation and how scientific inquiry results in scientific knowledge.</p>	<p>which are tested until the results are accepted by peers.</p> <p><b>Specifications:</b></p> <ul style="list-style-type: none"> <li>• Know the components of running a scientific experiment</li> </ul> <p><b>Item Types:</b> <i>MC = multiple choice with or without stimulus</i></p> <p><b>Sample Question:</b></p> <p>When solving a scientific problem, which is the first step?</p> <p>A. perform an experiment B. identify the problem C. form a hypothesis * D. create a graph</p> <p><i>Standard: I.I.II.3</i> <i>DOK Level: 1</i></p>
<p><b>II.I.I.1</b> <b>II.I.I.3</b></p> <p><b>Strand II:</b> Content of Science</p> <p><b>Standard I (Physical Science):</b> Understand the structure and properties of matter, the characteristics of energy, and the interactions between matter and energy.</p> <p><b>Benchmark I:</b> Know the forms and properties of matter and how matter interacts.</p>	<p><b>Standards with Test Item Specifications:</b></p> <p><u>Properties of Matter</u></p> <ol style="list-style-type: none"> <li>1. Know how to use density, boiling point, freezing point, conductivity, and color to identify various substances.</li> <li>3. Understand the differences among elements, compounds, and mixtures by: <ul style="list-style-type: none"> <li>• classification of materials as elements, compounds, or mixtures</li> <li>• interpretation of chemical formulas</li> <li>• separation of mixtures into compounds by methods including evaporation, filtration, screening, magnetism.</li> </ul> </li> </ol> <p><b>Specifications:</b></p> <ul style="list-style-type: none"> <li>• None</li> </ul> <p><b>Item Types:</b> <i>MC = multiple choice with or without stimulus</i></p>

	<p><b>Sample Question:</b></p> <p>In the formula <math>\text{NH}_4</math>, how many of each atom is represented?</p> <p>A. 1 Nitrogen: 4 Hydrogen *</p> <p>B. 1 Nickel : 4 Hydrogen</p> <p>C. 1 Nitrogen : 4 Helium</p> <p>D. 0 Nitrogen: 4 Hydrogen</p> <p><i>Standard: II.1.1.3</i></p> <p><i>DOK Level: 1</i></p>
<p>II.1.1.4 II.1.1.5 II.1.1.6</p> <p><b>Strand II:</b> Content of Science</p> <p><b>Standard I (Physical Science):</b> Understand the structure and properties of matter, the characteristics of energy, and the interactions between matter and energy.</p> <p><b>Benchmark I:</b> Know the forms and properties of matter and how matter interacts.</p>	<p><b>Standards with Item Specifications:</b></p> <p><u>Structure of Matter</u></p> <p>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.)</p> <p>5. Explain that elements are organized in the periodic table according to their properties.</p> <p>6. Know that compounds are made of two or more elements, but not all sets of elements can combine to form compounds.</p> <p><b>Specifications:</b></p> <ul style="list-style-type: none"> <li>Describe the placement of metals, nonmetals, and metalloids on the periodic table</li> <li>Identify and describe families, periods, and groups on the periodic table</li> </ul> <p><b>Item Types:</b> <i>MC = multiple choice with or without stimulus</i></p> <p><b>Sample Question:</b></p> <p>Which of the following families in the periodic table have complete outer shells and do not bond?</p> <p>A. Boron Family</p> <p>B. Halogen Family</p> <p>C. Noble Gases *</p> <p>D. Alkali Earth Metals</p>

	<p><i>Standard: II.1.1.5</i> <i>DOK Level: 2</i></p>
<p><b>II.1.1.8</b> <b>II.1.1.9</b></p> <p><b>Strand II:</b> Content of Science</p> <p><b>Standard I (Physical Science):</b> Understand the structure and properties of matter, the characteristics of energy, and the interactions between matter and energy.</p> <p><b>Benchmark I:</b> Know the forms and properties of matter and how matter interacts.</p>	<p><b>Standards with Test Item Specifications:</b></p> <p><u>Changes of Matter</u></p> <p>8. Describe various familiar physical and chemical changes that occur naturally (e.g., snow melting, photosynthesis, rusting, burning).</p> <p>9. Identify factors that influence the rate at which chemical reactions occur (i.e., temperature, concentration, surface area, pressure).</p> <p><b>Specifications:</b></p> <ul style="list-style-type: none"> <li>• None</li> </ul> <p><b>Item Types:</b> <i>MC = multiple choice with or without stimulus</i></p> <p><b>Sample Question:</b></p> <p>Which of the following is an example of a physical change?</p> <p>A. rusting B. oxidation C. combustion D. evaporation *</p> <p><i>Standard: II.1.1.8</i> <i>DOK Level: 1</i></p>
<p><b>II.1.11.1</b> <b>II.1.11.2</b></p> <p><b>Strand II:</b> Content of Science</p> <p><b>Standard I (Physical Science):</b> Understand the structure and properties of matter, the characteristics of energy, and the</p>	<p><b>Standards with Test Item Specifications:</b></p> <p><u>Energy Transformation</u></p> <p>1. Know that energy exists in many forms that when energy is transformed some energy is usually converted to heat.</p> <p>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</p> <ul style="list-style-type: none"> <li>• Transformation of gravitational potential energy of position into kinetic energy of motion by a falling object.</li> </ul>

<p>interactions between matter and energy</p> <p><b>Benchmark II:</b> Explain the physical processes involved in the transfer, change, and conservation of energy.</p>	<p><b>Specifications:</b></p> <ul style="list-style-type: none"> <li>Indicator 2: Conceptual with no calculations</li> </ul> <p><b>Item Types:</b> <i>MC = multiple choice with or without stimulus</i></p> <p><b>Sample Question:</b></p> <p>A bike resting at the top of a hill is an example of what type of energy?</p> <p>A. kinetic B. potential * C. residual D. topical</p> <p><i>Standard: II.1.1.1</i> <i>DOK Level: 1</i></p>
<p><b>II.1.11.5</b> <b>II.1.11.6</b></p> <p><b>Strand II:</b> Content of Science</p> <p><b>Standard I (Physical Science):</b> Understand the structure and properties of matter, the characteristics of energy, and the interactions between matter and energy</p> <p><b>Benchmark II:</b> Explain the physical processes involved in the transfer, change, and conservation of energy.</p>	<p><b>Standards with Test Item Specifications:</b></p> <p><u>Waves</u></p> <p>5. Understand how light and radio waves carry energy through vacuum or matter by:</p> <ul style="list-style-type: none"> <li>Straight-line travel unless an object is encountered</li> <li><b>Reflection by a mirror, refraction by a lens, absorption by a dark object</b></li> <li><b>Separation of white light into different wavelengths by prisms</b></li> <li>Visibility of objects due to light emission or scattering.</li> </ul> <p>6. Understand that vibrations of matter (e.g., sound, earthquakes, water waves) carry wave energy, including:</p> <ul style="list-style-type: none"> <li><b>Sound transmission through solids, liquids and gases</b></li> <li><b>Relationship of pitch and loudness of sound to rate and distance (amplitude) of vibration</b></li> <li>Ripples made by objects dropped in water</li> </ul> <p><b>Specifications:</b></p> <ul style="list-style-type: none"> <li>None</li> </ul>



	<p><b>Item Types:</b>  <i>MC = multiple choice with or without stimulus</i></p>
	<p><b>Sample Question:</b></p> <p>Which of the following requires a medium?</p> <p>A. electromagnetic waves  B. radio waves  C. sound waves*  D. microwaves</p> <p><i>Standard: II.1.II.5</i>  <i>DOK Level: 1</i></p>
<p><b>II.1.III.3</b>  <b>II.1.III.4</b>  <b>II.1.III.5</b></p> <p><b>Strand II:</b> Content of Science</p> <p><b>Standard I (Physical Science):</b>  Understand the structure and properties of matter, the characteristics of energy, and the interactions between matter and energy</p> <p><b>Benchmark III:</b> Describe and explain forces that produce motion in objects.</p>	<p><b>Standards with Test Item Specifications:</b></p> <p><u>Forces</u></p> <p>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.</p> <p>4. Know that electric charge produces electrical fields and magnets produce magnetic fields.</p> <p>5. Know how a moving magnetic field can produce an electric current (generator) and how an electric current can produce a magnetic field (electromagnet).</p> <p><b>Specifications:</b></p> <ul style="list-style-type: none"> <li>• None</li> </ul>
	<p><b>Item Types:</b>  <i>MC = multiple choice with or without stimulus</i></p>
	<p><b>Sample Question:</b></p> <p>Which forces are equal in size and opposite in direction?</p> <p>A. balanced forces *  B. net forces  C. friction forces</p>

	<p>D. unbalanced forces</p> <p><i>Standard: II.1.III.3</i> <i>DOK Level: 1</i></p>
<p><b>II.1.III.8</b></p> <p><b>Strand II:</b> Content of Science</p> <p><b>Standard I (Physical Science):</b> Understand the structure and properties of matter, the characteristics of energy, and the interactions between matter and energy</p> <p><b>Benchmark III:</b> Describe and explain forces that produce motion in objects.</p>	<p><b>Standards with Test Item Specifications:</b></p> <p><u>Motion</u></p> <p>8. Understand and apply Newton’s Laws of Motion</p> <ul style="list-style-type: none"> <li>• Objects in motion will continue in motion and objects at rest will remain at rest unless acted upon by an unbalanced force (inertia).</li> <li>• If a greater force is applied to an object, a proportionally greater acceleration will occur.</li> <li>• If an object has more mass, the effect of an applied force is proportionally less.</li> </ul> <p><b>Specifications:</b></p> <ul style="list-style-type: none"> <li>• Basic computation may required</li> </ul> <p><b>Item Types:</b> <i>MC = multiple choice with or without stimulus</i></p> <p><b>Sample Question:</b></p> <p>A student launches a bottle rocket. Which of Newton’s Laws of Motion is being represented?</p> <p>A. Newton’s 1<sup>st</sup> Law of Motion B. Newton’s 2<sup>nd</sup> Law of Motion C. Newton’s 3<sup>rd</sup> Law of Motion * D. Newton’s 4<sup>th</sup> Law of Motion</p> <p><i>Standard: II.1.III.8</i> <i>DOK Level: 1</i></p>
<p><b>II.II.I.1</b> <b>II.II.I.3</b></p> <p><b>Strand II:</b> Content of Science</p>	<p><b>Standards with Test Item Specifications:</b></p> <p>1. Describe how matter moves through ecosystems (e.g., water cycle, carbon cycle). 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).</p>

<p><b>Standard II (Life Science):</b> Understand the properties, structures, and processes of living things and the interdependence of living things and their environments.</p> <p><b>Benchmark I:</b> Explain the diverse structures and functions of living things and the complex relationships between living things and their environments.</p>	<p><b>Specifications:</b></p> <ul style="list-style-type: none"> <li>• None</li> </ul> <p><b>Item Types:</b> <i>MC = multiple choice with or without stimulus</i></p> <p><b>Sample Question:</b></p> <p>Through which of these processes is energy lost in a food web?</p> <p>A. heat* B. temperature C. decomposers D. consumers</p> <p><i>Standard: II.II.II.3</i> <i>DOK Level: 1</i></p>
<p><b>II.III.I.2</b></p> <p><b>Strand II:</b> Content of Science</p> <p><b>Standard III (Earth and Space Science):</b> Understand the structure of Earth, the solar system, and the universe, the interconnections among them, and the processes and interactions of Earth’s systems.</p> <p><b>Benchmark I:</b> 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.</p>	<p><b>Standards with Test Item Specifications:</b></p> <p>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:</p> <ul style="list-style-type: none"> <li>• Distances in the solar system and the universe</li> <li>• <b>Temperatures of different stars</b></li> </ul> <p><b>Specifications:</b></p> <ul style="list-style-type: none"> <li>• None</li> </ul> <p><b>Item Types:</b> <i>MC = multiple choice with or without stimulus</i></p> <p><b>Sample Question:</b></p> <p>What is the process of bending a beam of light obliquely from one medium to another medium?</p> <p>A. reflection</p>

	<p>B. refraction *</p> <p>C. dispersion</p> <p>D. deviation</p> <p><i>Standard: II.III.I.2</i></p> <p><i>DOK Level: 1</i></p>
<p><b>II.III.II.1</b></p> <p><b>II.III.II.2</b></p> <p><b>Strand II:</b> Content of Science</p> <p><b>Standard III (Earth and Space Science):</b> Understand the structure of Earth, the solar system, and the universe, the interconnections among them, and the processes and interactions of Earth’s systems.</p> <p><b>Benchmark II:</b> Describe the structure of Earth and its atmosphere and explain how energy, matter, and forces shape Earth’s systems.</p>	<p><b>Standards with Test Item Specifications:</b></p> <ol style="list-style-type: none"> <li>Describe the role of pressure (and heat) in the rock cycle.</li> <li>Understand the unique role water plays on Earth, including: <ul style="list-style-type: none"> <li>Ability to remain liquid at most Earth temperatures</li> <li><b>Properties of water related to processes in the water cycle: evaporation, condensation, precipitation, surface run-off, percolation</b></li> <li>Dissolving of minerals and gases and transport to the oceans</li> <li><b>Fresh and salt water in oceans, rivers, lakes, and glaciers</b></li> <li>Reactant in photosynthesis.</li> </ul> </li> </ol> <p><b>Specifications:</b></p> <ul style="list-style-type: none"> <li>None</li> </ul> <p><b>Item Types:</b></p> <p><i>MC = multiple choice with or without stimulus</i></p> <p><b>Sample Question:</b></p> <p>Which part of the water cycle is hindered due to the attractive properties of water?</p> <ol style="list-style-type: none"> <li>condensation</li> <li>evaporation *</li> <li>precipitation</li> <li>percolation</li> </ol> <p><i>Standard: II.III.II.2</i></p> <p><i>DOK Level: 2</i></p>

8 <sup>th</sup> Grade Science - EoC Reporting Category Alignment Framework					
Reporting Category	Standard	DOK (Count by DOK)			Grand Total
		1	2	3	
Scientific Thinking and Practice	I.I.I.2	1		1	2
	I.I.I.3		1		1
	I.I.II.3		1		1
Properties of Matter	II.I.I.1		2		2
	II.I.I.3		2		2
Structure of Matter	II.I.I.4	2			2
	II.I.I.5		2		2
	II.I.I.6		2		2
Changes of Matter	II.I.I.8	3			3
	II.I.I.9		2		2
Energy Transformation and Waves	II.I.II.1	1			1
	II.I.II.2		1		1
	II.I.II.5	1	1		2
	II.I.II.6	2			2
Forces and Motion	II.I.III.3	1	1		2
	II.I.III.4	1	2		3
	II.I.III.5	1			1
	II.I.III.8	3	1		4
Life Science	II.II.I.1		1		1
	II.II.I.3		1		1
Earth Science	II.III.I.2		1		1

	II.III.II.1	1			1
	II.III.II.2	1			1
	Grand Total	18	21	1	40