NM Public Education Department

SCIENCE:
6th Grade Integrated

END-OF-COURSE EXAM | GRADE 6 | YEAR 18–19

ASSESSMENT BLUEPRINT

Purpose Statement
6th Grade Integrated Science

The 6th Grade Integrated Science End-of-Course (EOC) exam is intended to measure student proficiency of the New Mexico STEM Ready! Science Standards. This course-level exam is provided to all students who have completed an integrated 6th Grade Science program or related course. This exam can be given for the following STARS course code:

1705 - Integrated (General) 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 2018 summer, teachers were brought together in person or online as part of the blueprint and exam revision process. The NM PED 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 NM PED would like to especially recognize the following people who led the revision of this blueprint:

- *Joe Dan Lovato, La Resolana Leadership Academy, Content Lead*
- *Sandra Beaudet, The ASK Academy*
- *Tammy Hernandez, North Valley Academy*
- *Christy Krenek, Santa Fe Public Schools*
- *Ella Rael, Taos Municipal Schools*
- *Saji Sebastian, Gallup-McKinley County Schools*
- *Nancy Smith, Tucumcari Public Schools*

Explanation of Blueprint Layout & Test Specifications Table

Topics	Clarifications on Test Item Specifications:
The performance expectations (PEs) identified in this portion of the blueprint are aligned to the New Mexico STEM Ready! Science Standards. *The PEs have been deconstructed to highlight the three dimensionality. Consult your NM STEM Ready! Standards for the full PE:* *https://webnew.ped.state.nm.us/bureaus/math-science/nm-STEM Ready-science/nm-STEM Ready-science-standards/* *and Middle School Recommended Integrated Course Map:* *https://webnew.ped.state.nm.us/bureaus/math-science/nm-STEM Ready-science/nm-STEM Ready-science-standards/recommended-secondary-course-maps/* *New Mexico Teachers identified the PEs to be measured on the EOC exam using the following criteria: 1) a great deal of instructional time is spent on the PE as identified in the curriculum and/or; 2) the PE is important to subsequent learning.* *It is important to note that the PEs in the blueprint are only a **subset** of PEs to be measured with the understanding that teachers cover more PEs during the course of instruction than what has been selected to be measured.*	● *This portion of the blueprint identifies the DCI that students will have to demonstrate knowledge of during the exam. These items are not fully aligned to the Science and Engineering Practices (SEPs) and the Crosscutting Concepts (CCCs).* ● *Although the PE measures other dimensions, the item specifications may place constraints on portions of the DCI in order to provide more transparency as to what specifically will be measured relative to the PE.* ● *Items on this year's NM STEM Ready! transition EOC are content aligned and are items from the existing EOC and/or SBA item banks. PED will be field testing NM STEM Ready! cluster items for EOCs, which are optional for school participation.*
	Item Types: *The item types for this EOC exam are limited to:* *MC = multiple choice with or without stimulus (e.g., picture, graph, chart)*
	Sample Question: *A sample questions has been provided for some PEs to assist teachers to correlate the questions with the performance standards and the test item specification, when applicable. Sample questions could not be provided for all PEs due to the limitations in the existing EOC and SBA item bank.* ● *An * or a box denotes the correct answer* ● *DOK = Depth of Knowledge* ● *Some sample questions may be items released items from prior EOC exams*

Blueprint Table – 6th Grade
Integrated Science

Topic: Engineering Design	DCI with Test Item Specifications:
MS-ETS1-2 **SEP**: Evaluate competing design solutions **DCI**: using a systematic process to determine how well they meet the criteria and constraints of the problem. **CCC**: None **Clarification Statement:** None **Assessment Boundary:** None	**<u>ETS1.B: Developing Possible Solutions</u>** There are systematic processes for evaluating solutions with respect to how well they meet the criteria and constraints of a problem. **Essential Question:** **What is the process for developing potential design solutions?**
	Item Type: *MC = multiple choice with or without stimulus*
	Sample Question: A student models the relationship between populations of predators and prey in an ecosystem. Which method is *best* for the student to choose for this model? (A) Show a video about how predators hunt their prey in the ecosystem. (B) Estimate the number of predators and prey in a given area at any one time. (C) Provide a written description of the feeding habits of the predators and prey. (D) Make a graph that shows the change in the number of predators and prey over 10 years. *

Topic: Engineering Design	DCI with Test Item Specifications:
MS-ETS1-3 **SEP**: Analyze data from tests to determine similarities and differences **DCI**: among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success. **CCC**: None **Clarification Statement:** None **Assessment Boundary:** None	**<u>ETS1.B: Developing Possible Solutions</u>** There are systematic processes for evaluating solutions with respect to how well they meet the criteria and constraints of a problem. Sometimes parts of different solutions can be combined to create a solution that is better than any of its predecessors. **<u>ETS1.C: Optimizing the Design Solution</u>** Although one design may not perform the best across all tests, identifying the characteristics of the design that performed the best in each test can provide useful information for the redesign process—that is, some of those characteristics may be incorporated into the new design. **Essential Questions:** **What is the process for developing potential design solutions?** **How can the various proposed design solutions be compared and improved?**
	Item Types: *MC = multiple choice with or without stimulus*
	Sample Question: Why is it necessary for scientists to compare results from scientific investigations? (A) To make certain that the results are reliable and unbiased. * (B) To ensure that the conclusion is popular. (C) To find a consumer application for the results. (D) To show that the hypothesis should become a scientific law.

Topic: Engineering Design	DCI with Test Item Specifications:
MS-ETS1-4 **SEP**: Develop a model to generate data **DCI**: for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved. **CCC**: None **Clarification Statement:** None **Assessment Boundary:** None	**<u>ETS1.B: Developing Possible Solutions</u>** A solution needs to be tested, and then modified on the basis of the test results, in order to improve it. Models of all kinds are important for testing solutions. **<u>ETS1.C: Optimizing the Design Solution</u>** The iterative process of testing the most promising solutions and modifying what is proposed on the basis of the test results leads to greater refinement and ultimately to an optimal solution. **Essential Questions** **What is the process for developing potential design solutions?** **How can the various proposed design solutions be compared and improved?**
	Item Types: *MC = multiple choice with or without stimulus*
	Sample Question: A scientist studies how many species of songbirds build nests in a forest during the spring. Which model would be best for the scientist to use to record her observations? (A) A photograph showing each species and its nests. (B) A map showing the locations of the nests of each species. (C) A table showing the quantities of each species and its nests. * (D) A calendar showing the dates that each species made its nests.

Topic: Light Waves, Particles, Temperature, States of Matter, Thermal Energy Transfer	DCI with Test Item Specifications:
MS-PS4-2 **SEP**: Develop and use a model to describe **DCI**: that waves are reflected, absorbed, or transmitted **CCC**: through various materials. **Clarification Statement:** Emphasis is on both light and mechanical waves. Examples of models could include drawings, simulations, and written descriptions. **Assessment Boundary:** Assessment is limited to qualitative applications pertaining to light and mechanical waves.	**<u>PS4.A: Wave Properties</u>** A sound wave needs a medium through which it is transmitted. **<u>PS4.B: Electromagnetic Radiation</u>** When light shines on an object, it is reflected, absorbed, or transmitted through the object, depending on the object's material and the frequency (color) of the light. The path that light travels can be traced as straight lines, except at surfaces between different transparent materials (e.g., air and water, air and glass) where the light path bends. A wave model of light is useful for explaining brightness, color, and the frequency-dependent bending of light at a surface between media. However, because light can travel through space, it cannot be a matter wave, like sound or water waves. **Essential Questions:** **What are the characteristic properties and behaviors of waves?** **What is light?** **How can one explain the varied effects that involve light?** **What other forms of electromagnetic radiation are there?**
	Item Types: *MC = multiple choice with or without stimulus*
	Sample Question: What kind of waves travel through the Earth's layers and are caused by an earthquake, explosion, or a volcanic eruption? (A) electromagnetic waves (B) sound waves (C) tidal waves (D) seismic waves *

Topic: Light Waves, Particles, Temperature, States of Matter, Thermal Energy Transfer	DCI with Test Item Specifications:
MS-PS1-4 **SEP**: Develop a model that predicts and describes changes **DCI**: in particle motion, temperature, and state of a pure substance when thermal energy is added or removed. **CCC**: predicts and describes changes…when thermal energy is added or removed. **Clarification Statement:** Emphasis is on qualitative molecular-level models of solids, liquids, and gases to show that adding or removing thermal energy increases or decreases kinetic energy of the particles until a change of state occurs. Examples of models could include drawing and diagrams. Examples of particles could include molecules or inert atoms. Examples of pure substances could include water, carbon dioxide, and helium. **Assessment Boundary:** None	**PS1.A: Structure and Properties of Matter** Gases and liquids are made of molecules or inert atoms that are moving about relative to each other. In a liquid, the molecules are constantly in contact with others; in a gas, they are widely spaced except when they happen to collide. In a solid, atoms are closely spaced and may vibrate in position but do not change relative locations. The changes of state that occur with variations in temperature or pressure can be described and predicted using these models of matter. **PS3.A: Definitions of Energy** The term "heat" as used in everyday language refers both to thermal energy (the motion of atoms or molecules within a substance) and the transfer of that thermal energy from one object to another. In science, heat is used only for this second meaning; it refers to the energy transferred due to the temperature difference between two objects. The temperature of a system is proportional to the average internal kinetic energy and potential energy per atom or molecule (whichever is the appropriate building block for the system's material). The details of that relationship depend on the type of atom or molecule and the interactions among the atoms in the material. Temperature is not a direct measure of a system's total thermal energy. The total thermal energy (sometimes called the total internal energy) of a system depends jointly on the temperature, the total number of atoms in the system, and the state of the material. **Essential Questions:** **How do particles combine to form the variety of matter one observes?** **What is energy?**
	Item Types: *MC = multiple choice with or without stimulus*
	Sample Question: Which statement correctly describes a substance changing from a liquid to a solid? (A) The number of particles increases (B) The number of particles decreases (C) The particles speed up (D) The particles slow down*

Topic: Light Waves, Particles, Temperature, States of Matter, Thermal Energy Transfer	DCI with Test Item Specifications:
MS-PS3-3 **SEP**: Apply scientific principles to design, construct, and test **DCI**: test a device that either minimizes or maximizes thermal energy transfer. **CCC**: thermal energy transfer. **Clarification Statement:** Examples of devices could include an insulated box, a solar cooker, and a Styrofoam cup. **Assessment Boundary:** Assessment does not include calculating the total amount of thermal energy transferred.	**PS3.A: Definitions of Energy** Temperature is a measure of the average kinetic energy of particles of matter. The relationship between the temperature and the total energy of a system depends on the types, states, and amounts of matter present. **PS3.B: Conservation of Energy and Energy Transfer** Energy is spontaneously transferred out of hotter regions or objects and into colder ones. **ETS1.A: Defining and Delimiting an Engineering Problem** The more precisely a design task's criteria and constraints can be defined, the more likely it is that the designed solution will be successful. Specification of constraints includes consideration of scientific principles and other relevant knowledge that is likely to limit possible solutions. **ETS1.B: Developing Possible Solutions** A solution needs to be tested, and then modified on the basis of the test results in order to improve it. There are systematic processes for evaluating solutions with respect to how well they meet criteria and constraints of a problem. **Essential Questions:** **What is energy?** **What is meant by conservation of energy?** **How is energy transferred between objects or systems?** **What is a design for?** **What are the criteria and constraints of a successful solution?** **What is the process for developing potential design solutions?**
	Item Types: *MC = multiple choice with or without stimulus*
	Sample Question: The air above the top bunk of a bunk bed is warmer than the air above the bottom bunk. Which of the following describes the method of heating that causes this difference in temperature? (A) radiation from the room (B) heat transfer through the walls (C) convection currents in the room * (D) conduction through the bed

Topic: Water Cycle, Weather, Climate	DCI with Test Item Specifications:
MS-ESS2-4 **SEP**: Develop a model to describe **DCI**: the cycling of water through Earth's systems, from the sun and the force of gravity. **CCC**: driven by energy. **Clarification Statement:** Emphasis is on the ways water changes its state as it moves through the multiple pathways of the hydrologic cycle. Examples of models can be conceptual or physical. **Assessment Boundary:** A quantitative understanding of the latent heats of vaporization and fusion is not assessed.	**<u>ESS2.C: The Roles of Water in Earth's Surface Processes</u>** Water continually cycles among land, ocean, and atmosphere via transpiration, evaporation, condensation and crystallization, and precipitation, as well as downhill flows on land. Global movements of water and its changes in form are propelled by sunlight and gravity. **Essential Question:** **How do the properties and movements of water shape Earth's surface and affect its systems?**
	Item Types: *MC = multiple choice with or without stimulus*
	Sample Question: Which process adds carbon dioxide to Earth's atmosphere? (A) cellular respiration * (B) photosynthesis (C) protein synthesis (D) none of the above

Topic: Water Cycle, Weather, Climate	DCI with Test Item Specifications:
MS-ESS2-6 **SEP**: Develop and use a model to describe how **DCI**: unequal heating and rotation of the Earth cause patterns of atmospheric and oceanic circulation that determine regional climates. **CCC**: model to describe…atmospheric and oceanic circulation that determine **Clarification Statement:** Emphasis is on how patterns vary by latitude, altitude, and geographic land distribution. Emphasis of atmospheric circulation is on the sunlight-driven latitudinal banding, the Coriolis effect, and resulting prevailing winds; emphasis of ocean circulation is on the transfer of heat by the global ocean convection cycle, which is constrained by the Coriolis effect and the outlines of continents. Examples of models can be diagrams, maps and globes, or digital representations. **Assessment Boundary:** Assessment does not include the dynamics of the Coriolis effect.	**<u>ESS2.C: The Roles of Water in Earth's Surface Processes</u>** Variations in density due to variations in temperature and salinity drive a global pattern of interconnected ocean currents. **<u>ESS2.D: Weather and Climate</u>** Weather and climate are influenced by interactions involving sunlight, the ocean, the atmosphere, ice, landforms, and living things. These interactions vary with latitude, altitude, and local and regional geography, all of which can affect oceanic and atmospheric flow patterns. The ocean exerts a major influence on weather and climate by absorbing energy from the sun, releasing it over time, and globally redistributing it through ocean currents. **Essential Questions:** **How do the properties and movements of water shape Earth's surface and affect its systems?** **What regulates weather and climate?** **Item Types:** *MC = multiple choice with or without stimulus* **Sample Question:** In which layer of the atmosphere does weather occur? (A) exosphere (B) hydrosphere (C) troposphere * (D) mesosphere

Topic: Rock Cycling, Plate Tectonics	DCI with Test Item Specifications:
MS-ESS2-2 **SEP**: Construct an explanation based on evidence for how **DCI**: geoscience processes have changed Earth's surface at varying time and spatial scales. **CCC**: at varying time and spatial scales. **Clarification Statement:** Emphasis is on how processes change Earth's surface at time and spatial scales that can be large (such as slow plate motions or the uplift of large mountain ranges) or small (such as rapid landslides or microscopic geochemical reactions), and how many geoscience processes (such as earthquakes, volcanoes, and meteor impacts) usually behave gradually but are punctuated by catastrophic events. Examples of geoscience processes include surface weathering and deposition by the movements of water, ice, and wind. Emphasis is on geoscience processes that shape local geographic features, where appropriate. **Assessment Boundary:** None	**<u>ESS2.A: Earth's Materials and Systems</u>** The planet's systems interact over scales that range from microscopic to global in size, and they operate over fractions of a second to billions of years. These interactions have shaped Earth's history and will determine its future. **<u>ESS2.C: The Roles of Water in Earth's Surface Processes</u>** Water's movements—both on the land and underground—cause weathering and erosion, which change the land's surface features and create underground formations. **Essential Questions:** **How do Earth's major systems interact?** **How do the properties and movements of water shape Earth's surface and affect its systems?** **Item Types:** *MC = multiple choice with or without stimulus* **Sample Question:** When a sedimentary rock goes though the rock cycle, what process changes it into an igneous rock? (A) melting, cooling and crystallization * (B) folding and faulting (C) deformation and deposition (D) heat and pressure

Topic: Rock Cycling, Plate Tectonics	DCI with Test Item Specifications:
MS-ESS2-3 **SEP**: Analyze and interpret data **DCI**: of fossils and rocks, continental shapes, and seafloor structures to provide evidence of the past plate motions. **CCC**: on the distribution of…to provide evidence of **Clarification Statement:** Examples of data include similarities of rock and fossil types on different continents, the shapes of the continents (including continental shelves), and the locations of ocean structures (such as ridges, fracture zones, and trenches). **Assessment Boundary:** Paleomagnetic anomalies in oceanic and continental crust are not assessed.	**<u>ESS1.C: The History of Planet Earth</u>** Tectonic processes continually generate new ocean sea floor at ridges and destroy old sea floor at trenches. *(secondary)* **<u>ESS2.B: Plate Tectonics and Large-Scale System Interactions</u>** Maps of ancient land and water patterns, based on investigations of rocks and fossils, make clear how Earth's plates have moved great distances, collided, and spread apart. **Essential Question:** **Why do the continents move, and what causes earthquakes and volcanoes?**
	Item Types: *MC = multiple choice with or without stimulus*
	Sample Question: The Rio Grande Valley (here in New Mexico) is located on a divergent plate boundary which is creating what type of land feature? (A) island arc (B) rift valley * (C) mountain (D) trenches

Topic: Rock Cycling, Plate Tectonics	DCI with Test Item Specifications:
MS-ESS1-4 **SEP**: Construct a scientific explanation based on evidence **DCI**: from rock strata for how the geologic time scale is used to organize Earth's 4.6-billion-year-old history. **CCC**: time scale is used **Clarification Statement:** Emphasis is on how analyses of rock formations and the fossils they contain are used to establish relative ages of major events in Earth's history. Examples of Earth's major events could range from being very recent (such as the last Ice Age or the earliest fossils of homo sapiens) to very old (such as the formation of Earth or the earliest evidence of life). Examples can include the formation of mountain chains and ocean basins, the evolution or extinction of particular living organisms, or significant volcanic eruptions. **Assessment Boundary:** Assessment does not include recalling the names of specific periods or epochs and events within them.	**<u>ESS1.C: The History of Planet Earth</u>** The geologic time scale interpreted from rock strata provides a way to organize Earth's history. Analyses of rock strata and the fossil record provide only relative dates, not an absolute scale. **Essential Question:** **How do people reconstruct and date events in Earth's planetary history?** **Item Types:** *MC = multiple choice with or without stimulus* **Sample Question:** What are fossils? (A) The oldest layers of rock in a region. (B) The remains or traces of an organism preserved from the geological past. * (C) Living creatures with habitats in or around rock. (D) Objects that people of long ago left behind as artifacts.

Topic: Natural Hazards	DCI with Test Item Specifications:
MS-ESS3-2 **SEP**: Analyze and interpret data on **DCI**: natural hazards to forecast future catastrophic events **CCC**: data on…and inform the development of technologies to mitigate their effects on data **Clarification Statement:** Emphasis is on how some natural hazards, such as volcanic eruptions and severe weather, are preceded by phenomena that allow for reliable predictions, but others, such as earthquakes, occur suddenly and with no notice, and thus are not yet predictable. Examples of natural hazards can be taken from interior processes (such as earthquakes and volcanic eruptions), surface processes (such as mass wasting and tsunamis), or severe weather events (such as hurricanes, tornadoes, and floods). Examples of data can include the locations, magnitudes, and frequencies of the natural hazards. Examples of technologies can be global (such as satellite systems to monitor hurricanes or forest fires) or local (such as building basements in tornado-prone regions or reservoirs to mitigate droughts). **Assessment Boundary:** None	**<u>ESS3.B: Natural Hazards</u>** Mapping the history of natural hazards in a region, combined with an understanding of related geologic forces can help forecast the locations and likelihoods of future events. **Essential Question:** **How do natural hazards affect individuals and societies?** **Item Types:** *MC = multiple choice with or without stimulus* **Sample Question:** Scientists have learned that some natural disasters, such as earth quakes and hurricanes, can damage electrical and water systems. This damage can cause microorganisms to get into drinking water and cause diseases. Which statement describes a precaution for people in such situations? (A) Tap water should be boiled before anyone drinks it.* (B) Backup generators should be on hand to provide electricity. (C) Cell phones should be used sparingly to conserve battery power. (D) Cars should be packed with food, water, and clothes in case of an evacuation order.

6th Grade Integrated Science - EoC Reporting Category Alignment Framework					
Reporting Category	**Performance Expectation**	**DOK (Count by DOK)**			**Grand Total**
		1	**2**	**3**	
Engineering Design	MS-ETS1-1	-	-	-	**-**
	MS-ETS1-2	-	1	-	**1**
	MS-ETS1-3	-	1	-	**1**
	MS-ETS1-4	-	1	-	**1**
Light Waves, Particles, Temperature, States of Matter, Thermal Energy Transfer	MS-PS4-2	-	2	-	**2**
	MS-PS1-4	-	5	-	**5**
	MS-PS3-3	-	1	-	**1**
	MS-PS3-4	-	-	-	**-**
	MS-PS3-5	-	-	-	**-**
Water Cycling, Weather, Climate	MS-ESS2-4	1	2	2	**5**
	MS-ESS2-5	-	-	-	**-**
	MS-ESS2-6	-	1	-	**1**
Rock Cycling, Plate Tectonics	MS-ESS2-1	-	-	-	**-**
	MS-ESS2-2	1	1	-	**2**
	MS-ESS2-3	-	2	1	**3**
	MS-ESS1-4	2	4	-	**6**
Natural Hazards	MS-ESS3-2	-	1	-	**1**
	MS-PS4-1	-	-	-	**-**
Organism Growth, Cells, and Systems	MS-LS1-1	-	-	-	**-**
	MS-LS1-2	-	-	-	**-**
	MS-LS1-3	-	-	-	**-**
	MS-LS1-8	-	-	-	**-**
	Grand Total	**4**	**22**	**3**	**29**