NM Public Education Department

SCIENCE:
7th Grade Integrated

END-OF-COURSE EXAM | GRADE 7 | YEAR 18–19

ASSESSMENT BLUEPRINT

Purpose Statement
7th Grade Integrated Science

The 7th Grade Integrated 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 an integrated 7th 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 Beaudret, 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: *Sample questions have 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 boxed marking denotes the correct answer* ● *DOK = Depth of Knowledge* ● *Some sample questions may be items released items from prior EOC exams*

Blueprint Table – 7th 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	**ETS1.B: Developing Possible Solutions** 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 Types: *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.*

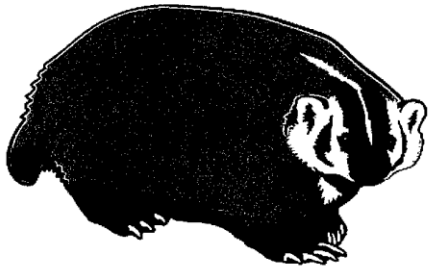
Topic: Engineering Design	DCI with Test Item Specifications:
MS-ETS1-3 **SEP**: Analyze data from tests to determine similarities and differences **DCI**: among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for 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	**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. Models of all kinds are important for testing solutions. **ETS1.C: Optimizing the Design Solution** 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: Chemical Reactions	DCI with Test Item Specifications:
MS-PS1-2 **SEP**: Analyze and interpret data **DCI**: on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred. **CCC**: on the properties of substances **Clarification Statement:** Examples of reactions could include burning sugar or steel wool, fat reacting with sodium hydroxide, and mixing zinc with hydrogen chloride. **Assessment Boundary:** Assessment is limited to analysis of the following properties: density, melting point, boiling point, solubility, flammability, and odor.	**PS1.A: Structure and Properties of Matter** Each pure substance has characteristic physical and chemical properties (for any bulk quantity under given conditions) that can be used to identify it. **PS1.B: Chemical Reactions** Substances react chemically in characteristic ways. In a chemical process, the atoms that make up the original substances are regrouped into different molecules, and these new substances have different properties from those of the reactants. **Essential Questions:** **How do particles combine to form the variety of matter one observes?** **How do substances combine or change (react) to make new substances?** **How does one characterize and explain these reactions and make predictions about them?**
	Item Types: *MC = multiple choice with or without stimulus*
	Sample Question: Which of the following processes represents a chemical change? (A) mixing sugar and water (B) evaporation of ocean water (C) a log burning* (D) painting a fence

Topic: Metabolic Reactions in Organisms	DCI with Test Item Specifications:
MS-LS1-7 **SEP**: Develop a model to describe how **DCI**: food is rearranged through chemical reactions forming new molecules that support growth and/or release energy as this matter moves through an organism. **CCC**: food is rearranged through chemical reactions forming new molecules… as this matter moves **Clarification Statement:** Clarification Statement: Emphasis is on describing that molecules are broken apart and put back together and that in this process, energy is released. **Assessment Boundary:** Assessment does not include details of the chemical reactions for photosynthesis or respiration.	**<u>LS1.C: Organization for Matter and Energy Flow in Organisms</u>** Within individual organisms, food moves through a series of chemical reactions in which it is broken down and rearranged to form new molecules, to support growth, or to release energy. **<u>PS3.D: Energy in Chemical Processes and Everyday Life</u>** Cellular respiration in plants and animals involve chemical reactions with oxygen that release stored energy. In these processes, complex molecules containing carbon react with oxygen to produce carbon dioxide and other materials. **Essential Questions:** **How do organisms obtain and use the matter and energy they need to live and grow?** **How do food and fuel provide energy?** **If energy is conserved, why do people say it is produced or used?**
	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: Ecosystem Interactions and Competition	DCI with Test Item Specifications:
MS-LS2-1 **SEP**: Analyze and interpret data to provide evidence for **DCI**: resource availability on organisms and populations of organisms in an ecosystem. **CCC**: the effects of **Clarification Statement:** Emphasis is on cause and effect relationships between resources and growth of individual organisms and the numbers of organisms in ecosystems during periods of abundant and scarce resources. **Assessment Boundary:** None	**<u>LS2.A: Interdependent Relationships in Ecosystems</u>** Organisms, and populations of organisms, are dependent on their environmental interactions both with other living things and with nonliving factors. In any ecosystem, organisms and populations with similar requirements for food, water, oxygen, or other resources may compete with each other for limited resources, access to which consequently constrains their growth and reproduction. Growth of organisms and population increases are limited by access to resources. **Essential Question:** **How do organisms interact with the living and nonliving environments to obtain matter and energy?**
	Item Types: *MC = multiple choice with or without stimulus*
	Sample Question:  Together, all of the organisms shown in the illustration make up a — A. niche B. family C. species $\boxed{\text{D.}}$ community

Topic: Ecosystem Interactions and Competition	DCI with Test Item Specifications:
MS-LS2-2 **SEP**: Construct an explanation that predicts **DCI**: interactions among organisms across multiple ecosystems. **CCC**: patterns of **Clarification Statement:** Emphasis is on predicting consistent patterns of interactions in different ecosystems in terms of the relationships among and between organisms and abiotic components of ecosystems. Examples of types of interactions could include competitive, predatory, and mutually beneficial. **Assessment Boundary:** None	**<u>LS2.A: Interdependent Relationships in Ecosystems</u>** Similarly, predatory interactions may reduce the number of organisms or eliminate whole populations of organisms. Mutually beneficial interactions, in contrast, may become so interdependent that each organism requires the other for survival. Although the species involved in these competitive, predatory, and mutually beneficial interactions vary across ecosystems, the patterns of interactions of organisms with their environments, both living and nonliving, are shared. **Essential Question:** **How do organisms interact with the living and nonliving environments to obtain matter and energy?**
	Item Types: *MC = multiple choice with or without stimulus*
	Sample Question: A badger is shown below.  Which characteristic of badgers is *most* likely a result of their environment? A. Badgers produce one litter of offspring each year. B. Badgers release an unpleasant odor when they are threatened. C. Badgers have a stripe along their backs between their nose and tail. D. Badgers become active at night when they are disturbed by human activities.

<table>
<tr><th>Topic: Ecosystem Interactions and Competition</th><th>DCI with Test Item Specifications:</th></tr>
<tr><td rowspan="3">MS-LS2-4

SEP: Construct an argument supported by empirical evidence that

DCI: physical or biological components of an ecosystem affect populations.

CCC: changes to

Clarification Statement: Emphasis is on recognizing patterns in data and making warranted inferences about changes in populations, and on evaluating empirical evidence supporting arguments about changes to ecosystems.

Assessment Boundary: None</td><td><u>LS2.C: Ecosystem Dynamics, Functioning, and Resilience</u>
Ecosystems are dynamic in nature; their characteristics can vary over time. Disruptions to any physical or biological component of an ecosystem can lead to shifts in all its populations.

Essential Question:
What happens to ecosystems when the environment changes?</td></tr>
<tr><td>Item Types:
MC = multiple choice with or without stimulus</td></tr>
<tr><td>Sample Question:
The table below shows the alleles that determine fur color in a species of rabbit.

Alleles and Fur Color in Rabbits
<table><tr><th>Alleles</th><th>Fur Color</th></tr><tr><td>GG</td><td>Gray</td></tr><tr><td>Gg</td><td>Gray</td></tr><tr><td>gg</td><td>White</td></tr></table>
Predators catch approximately 30% of the gray rabbits and 90% of the white rabbits that are born in each generation.

Which statement describes how predation will most likely affect the rabbit species over time?

A. Genetic diversity of the species will decrease.
B. White rabbits will become faster than gray rabbits.
C. More white rabbits than gray rabbits will be produced.
D. Genetic diversity will increase due to sexual reproduction.</td></tr>
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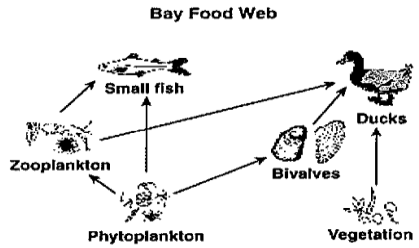
Topic: Ecosystem Interactions and Competition	DCI with Test Item Specifications:
MS-LS2-5 **SEP**: Evaluate competing design solutions for **DCI**: biodiversity and ecosystem services. **CCC**: maintaining **Clarification Statement:** Examples of ecosystem services could include water purification, nutrient recycling, and prevention of soil erosion. Examples of design solution constraints could include scientific, economic, and social considerations. **Assessment Boundary:** None	**<u>LS2.C: Ecosystem Dynamics, Functioning, and Resilience</u>** Biodiversity describes the variety of species found in Earth's terrestrial and oceanic ecosystems. The completeness or integrity of an ecosystem's biodiversity is often used as a measure of its health. **<u>LS4.D: Biodiversity and Humans</u>** Changes in biodiversity can influence humans' resources, such as food, energy, and medicines, as well as ecosystem services that humans rely on—for example, water purification and recycling. **<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 Questions:** **What happens to ecosystems when the environment changes?** **What is biodiversity, how do humans affect it, and how does it affect humans?** **What is the process for developing potential design solutions?**
	Item Types: *MC = multiple choice with or without stimulus*
	Sample Question: The two species of lizard shown below live in the same habitat. The brown lizards are found on the ground and on the trunks of trees. The green lizards are found mostly in and around vegetation.  Brown lizard Green lizard Which statement *best* describes how these two species of lizard successfully live in the same habitat? A. Each species competes for available resources. [B.] Each species fills a different niche within the ecosystem. C. Each species produces offspring that can be either green or brown. D. Each species inherits the same traits from interactions with the ecosystem.

Topic: Ecosystems: Matter and Energy	DCI with Test Item Specifications:
MS-LS1-6 **SEP**: Construct a scientific explanation based on evidence for **DCI**: the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms. **CCC**: the cycling of matter and flow of energy **Clarification Statement:** Emphasis is on tracing movement of matter and flow of energy. **Assessment Boundary:** Assessment does not include the biochemical mechanisms of photosynthesis.	**<u>LS1.C: Organization for Matter and Energy Flow in Organisms</u>** Plants, algae (including phytoplankton), and many microorganisms use the energy from light to make sugars (food) from carbon dioxide from the atmosphere and water through the process of photosynthesis, which also releases oxygen. These sugars can be used immediately or stored for growth or later use. **<u>PS3.D: Energy in Chemical Processes and Everyday Life</u>** The chemical reaction by which plants produce complex food molecules (sugars) requires an energy input (i.e., from sunlight) to occur. In this reaction, carbon dioxide and water combine to form carbon-based organic molecules and release oxygen. **Essential Questions:** **How do organisms obtain and use the matter and energy they need to live and grow?** **How do food and fuel provide energy?** **If energy is conserved, why do people say it is produced or used?**
	Item Types: *MC = multiple choice with or without stimulus*
	Sample Question: Phytoplankton are microscopic organisms that live in the ocean and make their own food. Zooplankton eat phytoplankton, and zooplankton are then eaten by krill or small fish. What is the *original* source of energy the small fish use to live? A. The krill [B.] The sun C. The ocean D. The phytoplankton

Topic: Ecosystems: Matter and Energy	DCI with Test Item Specifications:
MS-LS2-3 **SEP**: Develop a model to describe **DCI**: among living and nonliving parts of an ecosystem. **CCC**: the cycling of matter and flow of energy **Clarification Statement:** Emphasis is on describing the conservation of matter and flow of energy into and out of various ecosystems, and on defining the boundaries of the system. **Assessment Boundary:** Assessment does not include the use of chemical reactions to describe the processes.	**<u>LS2.B: Cycle of Matter and Energy Transfer in Ecosystems</u>** Food webs are models that demonstrate how matter and energy is transferred between producers, consumers, and decomposers as the three groups interact within an ecosystem. Transfers of matter into and out of the physical environment occur at every level. Decomposers recycle nutrients from dead plant or animal matter back to the soil in terrestrial environments or to the water in aquatic environments. The atoms that make up the organisms in an ecosystem are cycled repeatedly between the living and nonliving parts of the ecosystem. **Essential Question:** **How do matter and energy move through an ecosystem?**
	Item Types: *MC = multiple choice with or without stimulus*
	Sample Question: The food web below shows some organisms living in a bay ecosystem.  Some metals are carried into the bay by runoff. Based on this food web, which statement describes the *most* likely path by which the ducks could ingest the metals? A. The vegetation absorbs the metals; then the ducks eat the vegetation. B. The phytoplankton filter the metals out of the water; then the ducks eat the phytoplankton. C. The phytoplankton absorb the metals; then the small fish eat the phytoplankton and the ducks eat the small fish. D. The bivalves filter the metals out of the water; then the zooplankton eat the bivalves and the ducks eat the zooplankton.

Topic: Earth Resources and Climate Change	DCI with Test Item Specifications:
MS-ESS3-3 **SEP**: Apply scientific principles to design **DCI**: a human impact on the environment. **CCC**: a method for monitoring and minimizing **Clarification Statement:** Examples of the design process include examining human environmental impacts, assessing the kinds of solutions that are feasible, and designing and evaluating solutions that could reduce that impact. Examples of human impacts can include water usage (such as the withdrawal of water from streams and aquifers or the construction of dams and levees), land usage (such as urban development, agriculture, or the removal of wetlands), and pollution (such as of the air, water, or land). **Assessment Boundary:** None	**<u>ESS3.C: Human Impacts on Earth Systems</u>** Human activities have significantly altered the biosphere, sometimes damaging or destroying natural habitats and causing the extinction of other species. But changes to Earth's environments can have different impacts (negative and positive) for different living things. Typically as human populations and per-capita consumption of natural resources increase, so do the negative impacts on Earth unless the activities and technologies involved are engineered otherwise. **Essential Question:** **How do humans change the planet?** **Item Types:** *MC = multiple choice with or without stimulus* **Sample Question:** In some tropical areas, people burn acres of rain forest habitat to grow food and feed farm animals for a short time. Once the area is no longer productive, the people leave. Which statement describes what will *most* likely happen next? (A) The soil that remains will need a long time to replenish nutrients.* (B) The farm plants will grow, spread, and produce more food. (C) The main source of food for most of the rain forest animals will be ash. (D) The rain forest animals will return and adapt to the conditions they find.

Topic: Earth Resources and Climate Change	DCI with Test Item Specifications:
MS-ESS3-4 **SEP**: Construct an argument supported by evidence for how **DCI**: increases in human population and per-capita consumption of natural resources **CCC**: impact Earth's systems. **Clarification Statement:** Examples of evidence include grade-appropriate databases on human populations and the rates of consumption of food and natural resources (such as freshwater, mineral, and energy). Examples of impacts can include changes to the appearance, composition, and structure of Earth's systems as well as the rates at which they change. The consequences of increases in human populations and consumption of natural resources are described by science, but science does not make the decisions for the actions society takes. **Assessment Boundary:** None	**ESS3.C: Human Impacts on Earth Systems** Typically as human populations and per-capita consumption of natural resources increase, so do the negative impacts on Earth unless the activities and technologies involved are engineered otherwise. **Essential Question:** **How do humans change the planet?** **Item Types:** *MC = multiple choice with or without stimulus* **Sample Question:** A teacher explains to her class that the number of lions in Africa has been decreasing. She reads the following information to her class. "Scientists found that a number of lions in Africa has declined over the past 50 years. Images from satellites show that only 25% of the lion's original habitat remains untouched. Scientists explain that human activity has caused this loss of habitat and has therefore decreased the number of lions." Four students comment on the scientists' explanation. Which comment shows the *best* scientific reasoning? (A) It is not possible for humans to change habitats in such a big way, so scientists must be mistaken. (B) Humans typically change landscape where they live, so the scientists are likely correct.* (C) The populations of other living things decrease whenever humans live, so the scientists are correct. (D) It is likely that the data gathered by the satellites was completely inaccurate, so the scientists are likely mistaken.

7th Grade Integrated Science - EoC Reporting Category Alignment Framework					
Reporting Category	**Performance Expectation**	**DOK (Count by DOK)**			**Grand Total**
		1	**2**	**3**	
Engineering Design (repeat)	MS-ETS1-1				
	MS-ETS1-2		1		
	MS-ETS1-3		1		
	MS-ETS1-4		1		
Chemical Reactions	MS-PS1-1		-		
	MS-PS1-2	1	-		
	MS-PS1-3		-		
	MS-PS1-5		-		
	MS-PS1-6		-		
Metabolic Reactions in Organisms	MS-LS1-5		-		
	MS-LS1-7		1		
Ecosystem Interactions and Competition	MS-LS2-1	2	4		
	MS-LS2-2	3	2	1	
	MS-LS2-4	3	3		
	MS-LS2-5	2			
Ecosystems: Matter and Energy	MS-LS1-6	1	2		
	MS-LS2-3	2	4		
Earth Resources and Climate Change	MS-ESS3-1		-		
	MS-ESS3-3	1			
	MS-ESS3-3 NM		-		
	MS-ESS3-4			1	
	MS-ESS3-5		-		
	Grand Total	**15**	**19**	**2**	**36**