NEW MEXICO
Public Education Department

SCIENCE:
INTEGRATED SCIENCE III

END-OF-COURSE EXAM | GRADES 9–12 | YEAR 19-20

ASSESSMENT BLUEPRINT

EoC
NEW MEXICO END-OF-COURSE EXAMS

Purpose Statement – Integrated Science III

The Integrated Science III 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 Integrated Science III or related courses. This exam can be given for the following STARS course codes:

1711 - Biology-First Year
1712 - Biology Advanced Studies
1715 - AP Biology

EoCs are intended to serve as a summative exam covering a range of content, skills, and applications. Scores are reported to the teacher, school, district, and state levels and may be used to contribute to a portion of the student's course grade and for graduation determinations.

"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 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 NM PED would like to especially recognize the following people who led the revision of this blueprint:

- *Katherine Barnett Rivas, La Academia de Esperanza Charter School, Content Lead*
- *Alan Daugherty, Melrose Public Schools*
- *Azza Ezzat, Socorro Consolidated Schools*
- *Janet Bruelhart, Lovington Schools*
- *Kimberly Vigil, Espanola*
- *Melissa Burnett, Artesia*

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 High 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 disciplinary core idea (DCI) that students will have to demonstrate knowledge of during the exam. These items are not fully aligned to the science and engineering practices (SEP) and crosscutting concepts (CCC).* • *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 * denotes the correct answer* • *DOK = Depth of Knowledge* • *Some sample questions may be items released items from prior EOC exams*

Blueprint Table –
Integrated Science III

Topic: Motion and Stability: Forces and Interactions	DCI with Test Item Specifications:
HS-PS2-1 **SEP**: Analyze data to support the claim **DCI**: that Newton's second law of motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration. **CCC**: the mathematical relationship among **Clarification Statement:** Examples of data could include tables or graphs of position or velocity as a function of time for objects subject to a net unbalanced force, such as a falling object, an object sliding down a ramp, or a moving object being pulled by a constant force. **Assessment Boundary:** Assessment is limited to one-dimensional motion and to macroscopic objects moving at non-relativistic speeds.	**<u>PS2.A: Forces and Motion</u>** Newton's second law accurately predicts changes in the motion of macroscopic objects. **Essential Question:** **How can one predict an object's continued motion, changes in motion, or stability?** **Item Types:** *MC = multiple choice with or without stimulus* **Sample Question:** A net force of 10N is applied to a physics textbook causing it to accelerate $2 m/s^2$. What is the mass of the textbook? (A) 5 kg * (B) 0.5 kg (C) 20 kg (D) 2.5 kg

Topic: Motion and Stability: Forces and Interactions	DCI with Test Item Specifications:
HS-PS2-2 **SEP**: Use mathematical representations to support the claim that **DCI**: the total momentum of a system of objects is conserved when there is no net force on the system. **CCC**: a system of objects…there is no net force on the system **Clarification Statement:** Emphasis is on the quantitative conservation of momentum in interactions and the qualitative meaning of this principle. **Assessment Boundary:** Assessment is limited to systems of two macroscopic bodies moving in one dimension.	**PS2.A: Forces and Motion** Momentum is defined for a particular frame of reference; it is the mass times the velocity of the object. If a system interacts with objects outside itself, the total momentum of the system can change; however, any such change is balanced by changes in the momentum of objects outside the system. **Essential Questions:** **How can one predict an object's continued motion, changes in motion, or stability?** **Item Types:** *MC = multiple choice with or without stimulus*

Topic: Motion and Stability: Forces and Interactions	DCI with Test Item Specifications:
HS-PS2-3 **SEP**: Apply science and engineering ideas to design, evaluate, and refine a device **DCI**: that minimizes the force on a macroscopic object during a collision. **CCC**: that minimizes the force **Clarification Statement:** Examples of evaluation and refinement could include determining the success of the device at protecting an object from damage and modifying the design to improve it. Examples of a device could include a football helmet or a parachute. **Assessment Boundary:** *Assessment is limited to qualitative evaluations and/or algebraic manipulations.*	**PS2.A: Forces and Motion** If a system interacts with objects outside itself, the total momentum of the system can change; however, any such change is balanced by changes in the momentum of objects outside the system. **ETS1.A: Defining and Delimiting an Engineering Problem** Criteria and constraints also include satisfying any requirements set by society, such as taking issues of risk mitigation into account, and they should be quantified to the extent possible and stated in such a way that one can tell if a given design meets them. *(secondary)* **ETS1.C: Optimizing the Design Solution** Criteria may need to be broken down into simpler ones that can be approached systematically, and decisions about the priority of certain criteria over others (trade-offs) may be needed. *(secondary)* **Essential Questions:** **How can one predict an object's continued motion, changes in motion, or stability?** **What is a design for?** **What are the criteria and constraints of a successful solution?** **How can the various proposed design solutions be compared and improved?**
	Item Types: *MC = multiple choice with or without stimulus*

Topic: Motion and Stability: Forces and Interactions	DCI with Test Item Specifications:
HS-PS2-4 **SEP**: Use mathematical representations … to describe and predict **DCI**: Newton's Law of Gravitation and Coulomb's Law … the gravitational and electrostatic forces between objects. **CCC**: to describe and predict **Clarification Statement:** Emphasis is on both quantitative and conceptual descriptions of gravitational and electric fields **Assessment Boundary:** Assessment is limited to systems with two objects.	**<u>PS2.B: Types of Interactions</u>** Newton's law of universal gravitation and Coulomb's law provide the mathematical models to describe and predict the effects of gravitational and electrostatics forces between distant objects. Forces at a distance are explained by fields (gravitational, electric, and magnetic) permeating space that can transfer energy through space. Magnets or electric currents cause magnetic fields; electric charges or changing magnetic fields cause electric fields. **Essential Question:** **What underlying forces explain the variety of interactions observed?**
	Item Types: *MC = multiple choice with or without stimulus*
	Sample Question: What is the gravitational force between the Earth (5.97×10^{24} kg) and the moon (7.35×10^{22} kg) when the distance between the Earth and moon is the average 3.8×10^{8} m? A) 2.03×10^{20} N * B) 1.15×10^{39} N C) 7.99×10^{21} N D) 6.32×10^{32} N

Topic: Motion and Stability: Forces and Interactions	DCI with Test Item Specifications:
HS-PS2-5 **SEP**: Plan and conduct an investigation to provide evidence that **DCI**: an electric current can produce a magnetic field and that a changing magnetic field can produce an electric current. **CCC**: can produce **Clarification Statement:** None **Assessment Boundary:** Assessment is limited to designing and conducting investigations with provided materials and tools.	**<u>PS2.B: Types of Interactions</u>** Newton's law of universal gravitation and Coulomb's law provide the mathematical models to describe and predict the effects of gravitational and electrostatics forces between distant objects. Forces at a distance are explained by fields (gravitational, electric, and magnetic) permeating space that can transfer energy through space. Magnets or electric currents cause magnetic fields; electric charges or changing magnetic fields cause electric fields. **<u>PS3.A: Definitions of Energy</u>** "Electrical energy" may mean energy stored in a battery or energy transmitted by electric currents. *(secondary)* **Essential Question:** **What underlying forces explain the variety of interactions observed?** **What is energy?**
	Item Types: *MC = multiple choice with or without stimulus*
	Sample Question: What is the gravitational force between the Earth (5.97×10^{24} kg) and the moon (7.35×10^{22} kg) when the distance between the Earth and moon is the average 3.8×10^{8}-m? A) 2.03×10^{20} N * B) 1.15×10^{39} N C) 7.99×10^{21} N D) 6.32×10^{32} N

Topic: Motion and Stability: Forces and Interactions	DCI with Test Item Specifications:
HS-PS3-1 **SEP**: Create a computational model **DCI**: to calculate the change in the energy of one component in a system when the change in energy of the other component(s) and energy flows in and out of the system are known. **CCC**: to calculate the change … in and out of the system are known. **Clarification Statement:** Emphasis is on explaining the meaning of mathematical expressions used in the model **Assessment Boundary:** Assessment is limited to basic algebraic expressions or computations; to systems of two or three components; and to thermal energy, kinetic energy, and/or the energies in gravitational, magnetic, or electric fields.	**PS3.A: Definitions of Energy** Energy is a quantitative property of a system that depends on the motion and interactions of matter and radiation within that system. That there is a single quantity called energy is due to the fact that a system's total energy is conserved, even as, within the system, energy is continually transferred from one object to another and between its various possible forms. **PS3B: Definitions of Energy** Conservation of energy means that the total change of energy in any system is always equal to the total energy transferred into or out of the system. Energy cannot be created nor destroyed, but it can be transported from one place to another and transferred between systems. Mathematical expressions, which can quantify how the stored energy in a system depends on its configuration (e.g., relative positions of charged particles, compression of a spring) and how kinetic energy depends upon mass and speed, allow the concept of conservation of energy to be used to predict and describe system behavior. The availability of energy limits what can occur in any system. **Essential Questions:** **What is energy?** **What is meant by conservation of energy?** **How is energy transferred between objects or systems?**
	Item Types: *MC = multiple choice with or without stimulus*

Topic: Earth's Place in the Universe	DCI with Test Item Specifications:
HS-ESS1-1 **SEP**: Develop a model based on evidence to illustrate **DCI**: the life span of the sun and the role of nuclear fusion in the sun's core to release energy that eventually reaches Earth in the form of radiation. **CCC**: the life span **Clarification Statement:** Emphasis is on the energy transfer mechanisms that allow energy from nuclear fusion in the sun's core to reach Earth. Examples of evidence for the model include observations of the masses and lifetimes of other stars, as well as the ways that the sun's radiation varies due to sudden solar flares ("space weather"), the 11-year sunspot cycle, and non-cyclic variations over centuries. **Assessment Boundary:** Assessment does not include details of the atomic and sub-atomic processes involved with the sun's nuclear fusion.	**<u>ESS1.A: The Universe and Its Stars</u>** The star called the sun is changing and will burn out over a lifespan of approximately 10 billion years. **<u>PS3.D: Energy in Chemical Processes and Everyday Life</u>** Nuclear Fusion processes in the center of the sun release the energy that ultimately reaches Earth as radiation. *(secondary)* **Essential Question:** **What is the universe, and what is Earth's place in it?** **Item Types:** *MC = multiple choice with or without stimulus* **Sample Question:** Which of the following is true of the sun's energy? (A) It is generated by the fusion of helium into hydrogen. (B) It moves inward toward the core. (C) It is released by nuclear fission. (D) It reaches Earth in the form of radiation. *

Topic: Earth's Place in the Universe	DCI with Test Item Specifications:
HS-ESS1-2 **SEP**: Construct an explanation of **DCI:** the Big Bang theory based on astronomical evidence of light spectra, motion of distant galaxies, and the composition of matter in the universe. **CCC**: astronomical evidence of light spectra, … and composition of matter **Clarification Statement:** Emphasis is on the astronomical evidence of the red shift of light from galaxies as an indication that the universe is currently expanding, the cosmic microwave background as the remnant radiation from the Big Bang, and the observed composition of ordinary matter of the universe, primarily found in stars and interstellar gasses (from the spectra of electromagnetic radiation from stars), which matches that predicted by the Big Bang theory ($\frac{3}{4}$ hydrogen and ¼ helium).	**<u>ESS1.A: The Universe and its Stars</u>** The study of stars' light spectra and brightness is used to identify compositional elements of stars, their movements, and their distance from Earth. The Big Bang Theory is supported by observations of distant galaxies receding from our own, of the measured composition of stars and non-stellar gases, and of the maps of spectra of the primordial radiation (cosmic microwave background) that fills the universe. Other than the hydrogen and helium formed at the time of the Big Bang, nuclear fusion within stars produces all atomic nuclei lighter than and including iron, and the process releases electromagnetic energy. Heavier elements are produced when certain massive stars achieve a supernova stage and explode. **<u>PS4.B Electromagnetic Radiation</u>** Atoms of each element emit and absorb characteristic frequencies of light. These characteristics allow identification of the presence of an element, even in microscopic quantities. *(secondary)* **Essential Questions:** **What is the universe, and what goes on in stars?** **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*

Topic: Earth's Place in the Universe	DCI with Test Item Specifications:
HS-ESS2-7 **SEP**: Construct an argument based on evidence about **DCI:** the simultaneous coevolution of Earth's systems and life on Earth. **CCC**: the simultaneous coevolution **Clarification Statement:** Emphasis is on the dynamic causes, effects, and feedbacks between the biosphere and Earth's other systems, whereby geoscience factors control the evolution of life, which in turn continuously alters Earth's surface. Examples include how photosynthetic life altered the atmosphere through the production of oxygen, which in turn increased weathering rates and allowed for the evolution of animal life; how microbial life on land increased the formation of soil, which in turn allowed for the evolution of land plants; or how the evolution of corals created reefs that altered patterns of erosion and deposition along coastlines and provided habitats for the evolution of new life forms. **Assessment Boundary:** Assessment does not include a comprehensive understanding of the mechanisms of how the biosphere interacts with all of Earth's other systems.	**ESS2.D: Weather and Climate** Gradual atmospheric changes were due to plants and other organisms that captured carbon dioxide and released oxygen. **ESS2.E Biogeology** The many dynamic and delicate feedbacks between the biosphere and other Earth systems cause a continual co-evolution of Earth's surface and the life that exists on it. **Essential Questions:** **What regulates weather and climate?** **How do living organisms alter Earth's processes and structures?** **Item Types:** *MC = multiple choice with or without stimulus*

Topic: Biological Evolution: Unity and Diversity	DCI with Test Item Specifications:
HS-LS4-1 **SEP**: Communicate scientific information that **DCI**: common ancestry and biological evolution are supported by multiple lines of empirical evidence. **CCC**: are supported by multiple lines of empirical evidence. **Clarification Statement:** Emphasis is on a conceptual understanding of the role each line of evidence has relating to common ancestry and biological evolution. Examples of evidence could include similarities in DNA sequences, anatomical structures, and order of appearance of structures in embryological development. **Assessment Boundary:** None	**<u>LS4.A: Evidence of Common Ancestry and Diversity</u>** Genetic information, like the fossil record, provides evidence of evolution. DNA sequences vary among species, but there are many overlaps; in fact, the ongoing branching that produces multiple lines of descent can be inferred by comparing the DNA sequences of different organisms. Such information is also derivable from the similarities and differences in amino acid sequences and from anatomical and embryological evidence. **Essential Question:** **What evidence shows that different species are related?** **Item Types:** *MC = multiple choice with or without stimulus* **Sample Question:** What do the earliest cellular life forms appear to have been? (A) fungi (B) prokaryotes * (C) one-celled plants (D) one-celled animals

Topic: Biological Evolution: Unity and Diversity	DCI with Test Item Specifications:
HS-LS4-2 **SEP:** Construct an explanation based on evidence that **DCI**: the process of evolution primarily results from four factors: (1) the potential for a species to increase in number, (2) the heritable genetic variation of individuals in a species due to mutation and sexual reproduction, (3) competition for limited resources, and (4) the proliferation of those organisms that are better able to survive and reproduce in the environment. **CCC**: primarily results from **Clarification Statement:** Emphasis is on using evidence to explain the influence each of the four factors has on number of organisms, behaviors, morphology, or physiology in terms of ability to compete for limited resources and subsequent survival of individuals and adaptation of species. Examples of evidence could include mathematical models such as simple distribution graphs and proportional reasoning. **Assessment Boundary:** Assessment does not include other mechanisms of evolution, such as genetic drift, gene flow through migration, and co-evolution.	**<u>LS4.B: Natural Selection</u>** Natural selection occurs only if there is both (1) variation in the genetic information between organisms in a population and (2) variation in the expression of that genetic information—that is, trait variation—that leads to differences in performance among individuals. **<u>LS4.C: Adaptation</u>** Evolution is a consequence of the interaction of four factors: (1) the potential for a species to increase in number, (2) the genetic variation of individuals in a species due to mutation and sexual reproduction, (3) competition for an environment's limited supply of the resources that individuals need in order to survive and reproduce, and (4) the ensuing proliferation of those organisms that are better able to survive and reproduce in that environment. **Essential Questions:** **How does genetic variation among organisms affect survival and reproduction?** **How does the environment influence populations of organisms over multiple generations?** **Item Types:** *MC = multiple choice with or without stimulus*

Topic: Biological Evolution: Unity and Diversity	DCI with Test Item Specifications:
HS-LS4-3 **SEP:** Apply concepts of statistics and probability to support explanations that **DCI**: organisms with an advantageous heritable trait tend to increase in proportion to organisms lacking this trait. **CCC**: tend to **Clarification Statement:** Emphasis is on analyzing shifts in numerical distribution of traits and using these shifts as evidence to support explanations. **Assessment Boundary:** Assessment is limited to basic statistical and graphical analysis. Assessment does not include allele frequency calculations.	**<u>LS4.B: Natural Selection</u>** Natural selection occurs only if there is both (1) variation in the genetic information between organisms in a population and (2) variation in the expression of that genetic information—that is, trait variation—that leads to differences in performance among individuals. The traits that positively affect survival are more likely to be reproduced, and thus are more common in the population. **<u>LS4.C: Adaptation</u>** Natural selection leads to adaptation, that is, to a population dominated by organisms that are anatomically, behaviorally, and physiologically well suited to survive and reproduce in a specific environment. That is, the differential survival and reproduction of organisms in a population that have an advantageous heritable trait leads to an increase in the proportion of individuals in future generations that have the trait and to a decrease in the proportion of individuals that do not. Adaptation also means that the distribution of traits in a population can change when conditions change. **Essential Questions:** **How does genetic variation among organisms affect survival and reproduction?** **How does the environment influence populations of organisms over multiple generations?**
	Item Types: *MC = multiple choice with or without stimulus*

Topic: Biological Evolution: Unity and Diversity	DCI with Test Item Specifications:
HS-LS4-4 **SEP:** Construct an explanation based on evidence for how **DCI**: natural selection leads to adaptation of populations. **CCC**: leads to **Clarification Statement:** Emphasis is on using data to provide evidence for how specific biotic and abiotic differences in ecosystems (such as ranges of seasonal temperature, long-term climate change, acidity, light, geographic barriers, or evolution of other organisms) contribute to a change in gene frequency over time, leading to adaptation of populations. **Assessment Boundary:** None	**<u>LS4.C: Adaptation</u>** **Natural selection leads to adaptation, that is, to a population dominated by organisms that are anatomically, behaviorally, and physiologically well suited to survive and reproduce in a specific environment. That is, the differential survival and reproduction of organisms in a population that have an advantageous heritable trait leads to an increase in the proportion of individuals in future generations that have the trait and to a decrease in the proportion of individuals that do not.** **Essential Questions:** **How does the environment influence populations of organisms over multiple generations?** **Item Types:** *MC = multiple choice with or without stimulus*

Topic: Biological Evolution: Unity and Diversity	DCI with Test Item Specifications:
HS-LS4-6 **SEP:** Create or revise **DCI**: a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity. **CCC**: impacts **Clarification Statement:** Emphasis is on testing solutions for a proposed problem related to threatened or endangered species, or to genetic variation of organisms for multiple species. **Assessment Boundary:** None	**<u>LS4.C: Adaptation</u>** Changes in the physical environment, whether naturally occurring or human induced, have thus contributed to the expansion of some species, the emergence of new distinct species as populations diverge under different conditions, and the decline–and sometimes the extinction–of some species. **<u>LS4.D: Biodiversity and Humans</u>** Humans depend on the living world for the resources and other benefits provided by biodiversity. But human activity is also having adverse impacts on biodiversity through overpopulation, overexploitation, habitat destruction, pollution, introduction of invasive species, and climate change. Thus sustaining biodiversity so that ecosystem functioning and productivity are maintained is essential to supporting and enhancing life on Earth. Sustaining biodiversity also aids humanity by preserving landscapes of recreational or inspirational value. (Note: This Disciplinary Core Idea is also addressed by HS-LS2-7.) **<u>ETS1.B: Developing Possible Solutions</u>** When evaluating solutions, it is important to take into account a range of constraints, including cost, safety, reliability, and aesthetics, and to consider social, cultural, and environmental impacts. *(secondary)* Both physical models and computers can be used in various ways to aid in the engineering design process. Computers are useful for a variety of purposes, such as running simulations to test different ways of solving a problem or to see which one is most efficient or economical; and in making a persuasive presentation to a client about how a given design will meet his or her needs. *(secondary)* **Essential Questions:** **How does the environment influence populations of organisms over multiple generations?** **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*

Topic: Heredity: Inheritance and Variation of Traits	DCI with Test Item Specifications:
HS-LS1-4 **SEP:** Use a model to illustrate the role of **DCI**: cellular division (mitosis) and differentiation in producing and maintaining complex organisms. **CCC**: to illustrate the role of **Clarification Statement:** None **Assessment Boundary:** Assessment does not include specific gene control mechanisms or rote memorization of the steps of mitosis.	**<u>LS1.B: Growth and Development of Organisms</u>** In multicellular organisms individual cells grow and then divide via a process called mitosis, thereby allowing the organism to grow. The organism begins as a single cell (fertilized egg) that divides successively to produce many cells, with each parent cell passing identical genetic material (two variants of each chromosome pair) to both daughter cells. Cellular division and differentiation produce and maintain a complex organism, composed of systems of tissues and organs that work together to meet the needs of the whole organism. **Essential Questions:** **How do organisms grow and develop?** **Item Types:** *MC = multiple choice with or without stimulus*

Topic: Heredity: Inheritance and Variation of Traits	DCI with Test Item Specifications:
HS-LS3-1 **SEP**: Ask questions to clarify relationships about **DCI**: the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring. **CCC**: the role of DNA and chromosomes in coding the instructions for **Clarification Statement:** None **Assessment Boundary:** Assessment does not include the phases of meiosis or the biochemical mechanism of specific steps in the process.	**<u>LS1.A: Structure and Function</u>** All cells contain genetic information in the form of DNA molecules. Genes are regions in the DNA that contain the instructions that code for the formation of proteins. *(secondary to HS-LS3-1) (Note: This Disciplinary Core Idea is also addressed by HS-LS1-1.)* **<u>LS3.A: Inheritance of Traits</u>** Each chromosome consists of a single very long DNA molecule, and each gene on the chromosome is a particular segment of that DNA. The instructions for forming species' characteristics are carried in DNA. All cells in an organism have the same genetic content, but the genes used (expressed) by the cell may be regulated in different ways. Not all DNA codes for a protein; some segments of DNA are involved in regulatory or structural functions, and some have no as-yet known function. **Essential Questions:** **How do the structures of organisms enable life's functions?** **How are characteristics of one generation related to the previous generation?**
	Item Types: *MC = multiple choice with or without stimulus*
	Sample Question: *What would be the complementary sequence of nucleotides for an mRNA molecule created from the following DNA sequence: CAT GGG?* *a) CTU CCC* *b) GTA CCC* *c) CUA GGG* *d) GUA CCC **

Topic: Heredity: Inheritance and Variation of Traits	DCI with Test Item Specifications:
HS-LS3-2 **SEP:** Make and defend a claim based on evidence that **DCI**: inheritable genetic variations may result from (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors. **CCC**: may result from **Clarification Statement:** Emphasis is on using data to support arguments for the way variation occurs. **Assessment Boundary:** Assessment does not include the phases of meiosis or the biochemical mechanism of specific steps in the process.	**<u>LS3.B: Variation of Traits</u>** In sexual reproduction, chromosomes can sometimes swap sections during the process of meiosis (cell division), thereby creating new genetic combinations and thus more genetic variation. Although DNA replication is tightly regulated and remarkably accurate, errors do occur and result in mutations, which are also a source of genetic variation. Environmental factors can also cause mutations in genes, and viable mutations are inherited. Environmental factors also affect expression of traits, and hence affect the probability of occurrences of traits in a population. Thus the variation and distribution of traits observed depends on both genetic and environmental factors. **Essential Questions:** **Why do individuals of the same species vary in how they look, function, and behave?** **Item Types:** *MC = multiple choice with or without stimulus*

Topic: Heredity: Inheritance and Variation of Traits	DCI with Test Item Specifications:
HS-LS3-3 **SEP:** Apply concepts of statistics and probability to explain **DCI**: the variation and distribution of expressed traits in a population. **CCC**: the variation and distribution **Clarification Statement:** Emphasis is on the use of mathematics to describe the probability of traits as it relates to genetic and environmental factors in the expression of traits. **Assessment Boundary:** Assessment does not include Hardy-Weinberg calculations.	**<u>LS3.B: Variation of Traits</u>** Environmental factors also affect expression of traits, and hence affect the probability of occurrences of traits in a population. Thus the variation and distribution of traits observed depends on both genetic and environmental factors. **Essential Questions:** **Why do individuals of the same species vary in how they look, function, and behave?** **Item Types:** *MC = multiple choice with or without stimulus*

Integrated Science III Science - EoC Reporting Category Alignment Framework					
Reporting Category	**Performance Expectation**	**DOK (Count by DOK)**			**Grand Total**
		1	**2**	**3**	
Motion and Stability: Forces and Interactions	HS-PS2-1		3	1	**4**
	HS-PS2-2	1	2	1	**4**
	HS-PS2-3	1	1		**2**
	HS-PS2-4		1		**1**
	HS-PS2-5	1			**1**
	HS-PS3-1	2	2		**4**
	HS-PS3-2				
	HS-ETS1-4				
Earth's Place in the Universe	HS-ESS1-1			1	**1**
	HS-ESS1-2		1		**1**
	HS-ESS1-3				
	HS-ESS1-4				
	HS-ESS1-6				
	HS-ESS2-7		1		**1**
	HS-SS-1				
	HS-ETS1-2				
Biological Evolution: Unity and Diversity	HS-LS4-1	3	1		**4**
	HS-LS4-2		3		**3**
	HS-LS4-3		1		**1**
	HS-LS4-4		3		**3**
	HS-LS4-5				
	HS-LS4-6		1		**1**

	HS-ETS1-1				
Heredity: Inheritance and Variation of Traits	HS-LS1-4	1		1	**2**
	HS-LS3-1	1		1	**2**
	HS-LS3-2	3	1		**4**
	HS-LS3-3		1		**1**
	HS-ETS1-3				
	Grand Total	**13**	**22**	**5**	**40**