F.15 Biology - Grades 9-12

New Mexico Public Education Department

PUBLISHER/PROVIDER MATERIAL INFORMATION (TO BE COMPLETED BY PUBLISHER/PROVIDER)			
Publisher/Provider Name/Imprint:		Grade(s):	
Title of Student Edition:		Student Edition ISBN:	
Title of Teacher Edition:		Teacher Edition ISBN:	
Title of SE Workbook:		SE Workbook ISBN:	

PUBLISHER/PROVIDER CITATION VIDEO: Reviewer must view video before starting the review of this set of materials.			
Citation Video Link:			
Reviewer citation video certification:	I certify that I have viewed the citation video for this specific publisher and set of materials.		
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SCORING (TO BE COMPLETED BY REVIEWER AND FACILITATOR)			
Reviewer Number:		Date:	

Section 1: Standards Review: Science

Abbreviations for the Form F Standards Review Tab:
- PE: Performance Expectation
- DCI: Disciplinary Core Idea
- SEP: Science and Engineering Practices
- CCC: Crosscutting Concepts
- CONN: Connections
- NM: NM STEM Ready Standard
- CCSS: Common Core State Standards for ELA/Literacy in Science and Common Core State Standards for Math in Science as identified in the NGSS

PUBLISHER/PROVIDER INSTRUCTIONS:
- Publisher/Provider citations for this section will refer to the **Teacher Edition (teacher-facing core material).** The cited Teacher Edition should correspond with the title and ISBN entered on the Form F cover page, whether in print, online, or both. The review set submitted to the summer review institute should also correspond with what is cited on the Form F. If the review set is an online platform only, then that is what should be cited on the Form F and submitted for review by the review teams. If the review set is in print only, then that is what should be cited on the Form F and submitted for review by the review teams.
- For this section, the publisher/provider will enter one citation per DCI, SEP, CCC, CONN, and NM standard in Column D. Each citation should direct the reviewer to a specific location in the materials that best meets the standard. The citations should be concise and should allow the reviewer to easily determine that all components of the standard have been met. Each citation should cover no more than 3 pages within the materials. ***Any cells grayed out do not require a citation.***
  - o **Column D:** Enter one citation in Column D from the **Teacher Edition (teacher-facing core material)**. Each citation should direct the reviewer to a specific location in the materials that best meets the standard. The cited material for each DCI, SEP, CCC, and CONN must directly relate to the PE under which they fall.
- The material will be scored for alignment with each DCI, SEP, CCC, CONN, and NM standard within each PE as "Meets expectations", "Partially meets expectations", or "Does not meet expectations" based on the citations provided. A score for the PE will be derived from the related DCIs, SEPS, CCCs, CONNs, and NM Standards within the PE.
  - o **NOTE: You may not use a citation more than once across ALL sections of the rubric.**

Abbreviations for the Form F Standards Review Tab:
- **PE:** Performance Expectation
- **DCI:** Disciplinary Core Idea
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- **NM:** NM STEM Ready Standard
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Reviewer directions for Science Standards Review:

Columns D-G: The publisher/provider will provide a citation from the **Teacher Edition (teacher-facing core material)** (print and/or digital) for each DCI, SEP, CCC, CONN, and NM standard in column D. Review the cited material and score the material by determining the degree to which it meets the standard:
- o M = Meets the standard
- o P = Partially meets the standard
- o D = Does not meet the standard

Start by scoring the DCI(s) for the PE. If all DCIs within the PE score a D (columns E *AND* I), score all other components within the PE with a D and move on to the next PE.
Evidence for the publisher citations is required *only* if you score the materialswith a D. For your evidence for each standard that scores a D, choose one of the options from the dropdown menu in Column G. If the reason for scoring the materials with a D is not one of the dropdown options, enter your own evidence statement in the cell in Column G.
- ***o Any cells grayed out do not require a citation or evidence. The score cells in those rows will automatically populate if formulated to do so.***
- ***o Each cell in the Score column (column E) will turn purple as you score the materials.***

Columns H-K: Using the **Student Edition, Student Workbook, or other student-facing materials**, provide a citation for each DCI, SEP, CCC, CONN, and NM standard in Column H from the student materials that best meets the standard and addresses all components of the standard. Review the cited material, score the material by determining the degree to which it meets the standard, and provide evidence to support your determination:
- o M = Meets the standard
- o P = Partially meets the standard
- o D = Does not meet the standard

Start by scoring the DCI(s) for the PE. If all DCIs within the PE score a D (columns E AND I), score all other components within the PE with a D and move on to the next PE.
- ***o Any cells grayed out do not require a citation or evidence. The score cells in those rows will automatically populate if formulated to do so.***
- ***o Each cell in the Reviewer Citation column, Score column, and Reviewer Evidence column (columns H, I, and K) will turn purple as you score the materials.***

Criteria #	Standard Identifier	F.15 Grades 9-12 Biology Standards Review:	Publisher/Provider Citation from Teacher Edition	Score	If Scored D: Reviewer's Evidence for Publisher Citation	Reviewer Citation from Student Edition/Workbook	Score	Required: Reviewer's Evidence	Comments, other citations, notes
From Molecules to Organisms: Structures and Processes									
1	PE	**HS-LS1-1. Students who demonstrate understanding can: Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells.**							
2	DCI	**LS1.A: Structure and Function** • Systems of specialized cells within organisms help them perform the essential functions of life.							
3	DCI	**LS1.A: Structure and Function** • 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, which carry out most of the work of cells.							
4	SEP	**Constructing Explanations and Designing Solutions** *Constructing explanations and designing solutions in 9–12 builds on K–8 experiences and progresses to explanations and designs that are supported by multiple and independent student-generated sources of evidence consistent with scientific ideas, principles, and theories.* • Construct an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future.							
5	CCC	**Structure and Function** • Investigating or designing new systems or structures requires a detailed examination of the properties of different materials, the structures of different components, and connections of components to reveal its function and/or solve a problem.							
6	PE	**HS-LS1-2. Students who demonstrate understanding can: Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.**							
7	DCI	**LS1.A: Structure and Function** • Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level.							
8	SEP	**Developing and Using Models** *Modeling in 9–12 builds on K–8 experiences and progresses to using, synthesizing, and developing models to predict and show relationships among variables between systems and their components in the natural and designed worlds.* • Develop and use a model based on evidence to illustrate the relationships between systems or between components of a system.							
9	CCC	**Systems and System Models** • Models (e.g., physical, mathematical, computer models) can be used to simulate systems and interactions—including energy, matter, and information flows—within and between systems at different scales.							
10	PE	**HS-LS1-3. Students who demonstrate understanding can: Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.**							
11	DCI	**LS1.A: Structure and Function** • Feedback mechanisms maintain a living system's internal conditions within certain limits and mediate behaviors, allowing it to remain alive and functional even as external conditions change within some range. Feedback mechanisms can encourage (through positive feedback) or discourage (negative feedback) what is going on inside the living system.							
12	SEP	**Planning and Carrying Out Investigations** *Planning and carrying out investigations in 9-12 builds on K-8 experiences and progresses to include investigations that provide evidence for and test conceptual, mathematical, physical, and empirical models.* • Plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy of data needed to produce reliable measurements and consider limitations on the precision of the data (e.g., number of trials, cost, risk, time), and refine the design accordingly.							
13	CONN	**Scientific Investigations Use a Variety of Methods** • Scientific inquiry is characterized by a common set of values that include: logical thinking, precision, open-mindedness, objectivity, skepticism, replicability of results, and honest and ethical reporting of findings.							

14	CCC	**Stability and Change** • Feedback (negative or positive) can stabilize or destabilize a system.							
Matter and Energy in Organisms and Ecosystems									
15	PE	**HS-LS1-5. Students who demonstrate understanding can: Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy.**							
16	DCI	**LS1.C: Organization for Matter and Energy Flow in Organisms** • The process of photosynthesis converts light energy to stored chemical energy by converting carbon dioxide plus water into sugars plus released oxygen.							
17	SEP	**Developing and Using Models** *Modeling in 9–12 builds on K–8 experiences and progresses to using, synthesizing, and developing models to predict and show relationships among variables between systems and their components in the natural and designed worlds.* • Use a model based on evidence to illustrate the relationships between systems or between components of a system.							
18	CCC	**Energy and Matter** • Changes of energy and matter in a system can be described in terms of energy and matter flows into, out of, and within that system.							
19	PE	**HS-LS1-6. Students who demonstrate understanding can: Construct and revise an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine with other elements to form amino acids and/or other large carbon-based molecules.**							
20	DCI	**LS1.C: Organization for Matter and Energy Flow in Organisms** • The sugar molecules thus formed contain carbon, hydrogen, and oxygen: their hydrocarbon backbones are used to make amino acids and other carbon-based molecules that can be assembled into larger molecules (such as proteins or DNA), used for example to form new cells.							
21	DCI	**LS1.C: Organization for Matter and Energy Flow in Organisms** • As matter and energy flow through different organizational levels of living systems, chemical elements are recombined in different ways to form different products.							
22	SEP	**Constructing Explanations and Designing Solutions** *Constructing explanations and designing solutions in 9–12 builds on K–8 experiences and progresses to explanations and designs that are supported by multiple and independent student-generated sources of evidence consistent with scientific ideas, principles, and theories.* • Construct and revise an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future.							
23	CCC	**Energy and Matter** • Changes of energy and matter in a system can be described in terms of energy and matter flows into, out of, and within that system.							
24	PE	**HS-LS1-7. Students who demonstrate understanding can: Use a model to illustrate that cellular respiration is a chemical process whereby the bonds of food molecules and oxygen molecules are broken and the bonds in new compounds are formed resulting in a net transfer of energy.**							
25	DCI	**LS1.C: Organization for Matter and Energy Flow in Organisms** • As matter and energy flow through different organizational levels of living systems, chemical elements are recombined in different ways to form different products.							
26	DCI	**LS1.C: Organization for Matter and Energy Flow in Organisms** • As a result of these chemical reactions, energy is transferred from one system of interacting molecules to another. Cellular respiration is a chemical process in which the bonds of food molecules and oxygen molecules are broken and new compounds are formed that can transport energy to muscles. Cellular respiration also releases the energy needed to maintain body temperature despite ongoing energy transfer to the surrounding environment.							
27	SEP	**Developing and Using Models** *Modeling in 9–12 builds on K–8 experiences and progresses to using, synthesizing, and developing models to predict and show relationships among variables between systems and their components in the natural and designed worlds.* • Use a model based on evidence to illustrate the relationships between systems or between components of a system.							
28	CCC	**Energy and Matter** • Energy cannot be created or destroyed; it only moves between one place and another place, between objects and/or fields, or between systems.							
29	PE	**HS-LS2-3. Students who demonstrate understanding can: Construct and revise an explanation based on evidence for the cycling of matter and flow of energy in aerobic and anaerobic conditions.**							
30	DCI	**LS2.B: Cycle of Matter and Energy Transfer in Ecosystems** • Photosynthesis and cellular respiration (including anaerobic processes) provide most of the energy for life processes.							
31	SEP	**Constructing Explanations and Designing Solutions** *Constructing explanations and designing solutions in 9–12 builds on K–8 experiences and progresses to explanations and designs that are supported by multiple and independent student-generated sources of evidence consistent with scientific ideas, principles, and theories.* • Construct and revise an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, and peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future.							
32	CONN	**Scientific Knowledge is Open to Revision in Light of New Evidence** • Most scientific knowledge is quite durable, but is, in principle, subject to change based on new evidence and/or reinterpretation of existing evidence.							
33	CCC	**Energy and Matter** • Energy drives the cycling of matter within and between systems.							
34	PE	**HS-LS2-4. Students who demonstrate understanding can: Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem.**							

35	**DCI**	**LS2.B: Cycles of Matter and Energy Transfer in Ecosystems** • Plants or algae form the lowest level of the food web. At each link upward in a food web, only a small fraction of the matter consumed at the lower level is transferred upward, to produce growth and release energy in cellular respiration at the higher level. Given this inefficiency, there are generally fewer organisms at higher levels of a food web. Some matter reacts to release energy for life functions, some matter is stored in newly made structures, and much is discarded. The chemical elements that make up the molecules of organisms pass through food webs and into and out of the atmosphere and soil, and they are combined and recombined in different ways. At each link in an ecosystem, matter and energy are conserved.							
36	**SEP**	**Using Mathematical and Computational Thinking** *Mathematical and computational thinking in 9-12 builds on K-8 experiences and progresses to using algebraic thinking and analysis; a range of linear and nonlinear functions including trigonometric functions, exponentials and logarithms; and computational tools for statistical analysis to analyze, represent, and model data. Simple computational simulations are created and used based on mathematical models of basic assumptions.* • Use mathematical representations of phenomena or design solutions to support claims.							
37	**CCC**	**Energy and Matter** • Energy cannot be created or destroyed; it only moves between one place and another place, between objects and/or fields, or between systems.							
38	**PE**	**HS-LS2-5. Students who demonstrate understanding can: Develop a model to illustrate the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere.**							
39	**DCI**	**LS2.B: Cycles of Matter and Energy Transfer in Ecosystems** • Photosynthesis and cellular respiration are important components of the carbon cycle, in which carbon is exchanged among the biosphere, atmosphere, oceans, and geosphere through chemical, physical, geological, and biological processes.							
40	**DCI**	**PS3.D: Energy in Chemical Processes** • The main way that solar energy is captured and stored on Earth is through the complex chemical process known as photosynthesis.							
41	**SEP**	**Developing and Using Models** *Modeling in 9–12 builds on K–8 experiences and progresses to using, synthesizing, and developing models to predict and show relationships among variables between systems and their components in the natural and designed world(s).* • Develop a model based on evidence to illustrate the relationships between systems or components of a system.							
42	**CCC**	**Systems and System Models** • Models (e.g., physical, mathematical, computer models) can be used to simulate systems and interactions — including energy, matter and information flows — within and between systems at different scales.							
Interdependence in Ecosystems									
43	**PE**	**HS-LS2-1. Students who demonstrate understanding can: Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales.**							
44	**DCI**	**LS2.A: Interdependent Relationships in Ecosystems** • Ecosystems have carrying capacities, which are limits to the numbers of organisms and populations they can support. These limits result from such factors as the availability of living and nonliving resources and from such challenges such as predation, competition, and disease. Organisms would have the capacity to produce populations of great size were it not for the fact that environments and resources are finite. This fundamental tension affects the abundance (number of individuals) of species in any given ecosystem.							
45	**SEP**	**Using Mathematics and Computational Thinking** *Mathematical and computational thinking in 9-12 builds on K-8 experiences and progresses to using algebraic thinking and analysis; a range of linear and nonlinear functions including trigonometric functions, exponentials and logarithms; and computational tools for statistical analysis to analyze, represent, and model data. Simple computational simulations are created and used based on mathematical models of basic assumptions.* • Use mathematical and/or computational representations of phenomena or design solutions to support explanations.							
46	**CCC**	**Scale, Proportion, and Quantity** • The significance of a phenomenon is dependent on the scale, proportion, and quantity at which it occurs.							
47	**PE**	**HS-LS2-2. Students who demonstrate understanding can: Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales.**							
48	**DCI**	**LS2.A: Interdependent Relationships in Ecosystems** • Ecosystems have carrying capacities, which are limits to the numbers of organisms and populations they can support. These limits result from such factors as the availability of living and nonliving resources and from such challenges such as predation, competition, and disease. Organisms would have the capacity to produce populations of great size were it not for the fact that environments and resources are finite. This fundamental tension affects the abundance (number of individuals) of species in any given ecosystem.							
49	**DCI**	**LS2.C: Ecosystem Dynamics, Functioning, and Resilience** • A complex set of interactions within an ecosystem can keep its numbers and types of organisms relatively constant over long periods of time under stable conditions. If a modest biological or physical disturbance to an ecosystem occurs, it may return to its more or less original status (i.e., the ecosystem is resilient), as opposed to becoming a very different ecosystem. Extreme fluctuations in conditions or the size of any population, however, can challenge the functioning of ecosystems in terms of resources and habitat availability.							
50	**SEP**	**Using Mathematics and Computational Thinking** *Mathematical and computational thinking in 9-12 builds on K-8 experiences and progresses to using algebraic thinking and analysis; a range of linear and nonlinear functions including trigonometric functions, exponentials and logarithms; and computational tools for statistical analysis to analyze, represent, and model data. Simple computational simulations are created and used based on mathematical models of basic assumptions.* • Use mathematical representations of phenomena or design solutions to support and revise explanations.							

51	CONN	**Scientific Knowledge is Open to Revision in Light of New Evidence** • Most scientific knowledge is quite durable, but is, in principle, subject to change based on new evidence and/or reinterpretation of existing evidence.						
52	CCC	**Scale, Proportion, and Quantity** • Using the concept of orders of magnitude allows one to understand how a model at one scale relates to a model at another scale.						
53	PE	**HS-LS2-6. Students who demonstrate understanding can: Evaluate the claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem.**						
54	DCI	**LS2.C: Ecosystem Dynamics, Functioning, and Resilience** • A complex set of interactions within an ecosystem can keep its numbers and types of organisms relatively constant over long periods of time under stable conditions. If a modest biological or physical disturbance to an ecosystem occurs, it may return to its more or less original status (i.e., the ecosystem is resilient), as opposed to becoming a very different ecosystem. Extreme fluctuations in conditions or the size of any population, however, can challenge the functioning of ecosystems in terms of resources and habitat availability.						
55	SEP	**Engaging in Argument from Evidence** *Engaging in argument from evidence in 9–12 builds on K–8 experiences and progresses to using appropriate and sufficient evidence and scientific reasoning to defend and critique claims and explanations about the natural and designed world(s). Arguments may also come from current scientific or historical episodes in science.* • Evaluate the claims, evidence, and reasoning behind currently accepted explanations or solutions to determine the merits of arguments.						
56	CONN	**Scientific Knowledge is Open to Revision in Light of New Evidence** • Scientific argumentation is a mode of logical discourse used to clarify the strength of relationships between ideas and evidence that may result in revision of an explanation.						
57	CCC	**Stability and Change** • Much of science deals with constructing explanations of how things change and how they remain stable.						
58	PE	**HS-LS2-7. Students who demonstrate understanding can: Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.**						
59	DCI	**LS2.C: Ecosystem Dynamics, Functioning, and Resilience** • Moreover, anthropogenic changes (induced by human activity) in the environment-including habitat destruction, pollution, introduction of invasive species, overexploitation, and climate change-can disrupt an ecosystem and threaten the survival of some species.						
60	DCI	**LS4.D: Biodiversity and Humans** • Biodiversity is increased by the formation of new species (speciation) and decreased by the loss of species (extinction).						
61	DCI	**LS4.D: Biodiversity and Humans** • 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.						
62	DCI	**ETS1.B: Developing Possible Solutions** • 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.						
63	SEP	**Constructing Explanations and Designing Solutions** *Constructing explanations and designing solutions in 9–12 builds on K–8 experiences and progresses to explanations and designs that are supported by multiple and independent student-generated sources of evidence consistent with scientific ideas, principles, and theories.* • Design, evaluate, and refine a solution to a complex real-world problem, based on scientific knowledge, student-generated sources of evidence, prioritized criteria, and tradeoff considerations.						
64	CCC	**Stability and Change** • Much of science deals with constructing explanations of how things change and how they remain stable.						
65	NM	**HS-LS2-7 NM:** • Using a local issue in your solution design, describe and analyze the advantages and disadvantages of human activities that support the local population such as reclamation projects, building dams, and habitat restoration.						
66	PE	**HS-LS2-8. Students who demonstrate understanding can: Evaluate the evidence for the role of group behavior on individual and species' chances to survive and reproduce.**						
67	DCI	**LS2.D: Social Interactions and Group Behavior** • Group behavior has evolved because membership can increase the chances of survival for individuals and their genetic relatives.						
68	SEP	**Engaging in Argument from Evidence** *Engaging in argument from evidence in 9–12 builds on K–8 experiences and progresses to using appropriate and sufficient evidence and scientific reasoning to defend and critique claims and explanations about the natural and designed world(s). Arguments may also come from current scientific or historical episodes in science.* • Evaluate the evidence behind currently accepted explanations to determine the merits of arguments.						
69	CONN	**Scientific Knowledge is Open to Revision in Light of New Evidence** • Scientific argumentation is a mode of logical discourse used to clarify the strength of relationships between ideas and evidence that may result in revision of an explanation.						
70	CCC	**Cause and Effect** • Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects.						
71	PE	**HS-LS4-6. Students who demonstrate understanding can: Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity.**						

72	**DCI**	**LS4.C: Adaptation** • 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.							
73	**DCI**	**LS4.D: Biodiversity and Humans** • 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.							
74	**DCI**	**ETS1.B: Developing Possible Solutions** • 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.							
75	**DCI**	**ETS1.B: Developing Possible Solutions** • 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.							
76	**SEP**	**Using Mathematics and Computational Thinking** *Mathematical and computational thinking in 9-12 builds on K-8 experiences and progresses to using algebraic thinking and analysis, a range of linear and nonlinear functions including trigonometric functions, exponentials and logarithms, and computational tools for statistical analysis to analyze, represent, and model data. Simple computational simulations are created and used based on mathematical models of basic assumptions.* • Create or revise a simulation of a phenomenon, designed device, process, or system.							
77	**CCC**	**Cause and Effect** • Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects.							
Inheritance and Variation of Traits									
78	**PE**	**HS-LS1-4. Students who demonstrate understanding can: Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms.**							
79	**DCI**	**LS1.B: Growth and Development of Organisms** • 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.							
80	**SEP**	**Developing and Using Models** *Modeling in 9–12 builds on K–8 experiences and progresses to using, synthesizing, and developing models to predict and show relationships among variables between systems and their components in the natural and designed worlds.* • Use a model based on evidence to illustrate the relationships between systems or between components of a system.							
81	**CCC**	**Systems and System Models** • Models (e.g., physical, mathematical, computer models) can be used to simulate systems and interactions — including energy, matter, and information flows — within and between systems at different scales.							
82	**PE**	**HS-LS3-1. Students who demonstrate understanding can: Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.**							
83	**DCI**	**LS1.A: Structure and Function** • 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.							
84	**DCI**	**LS3.A: Inheritance of Traits** • 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.							
85	**SEP**	**Asking Questions and Defining Problems** *Asking questions and defining problems in 9-12 builds on K-8 experiences and progresses to formulating, refining and evaluating empirically testable questions and design problems using models and simulations.* • Ask questions that arise from examining models or a theory to clarify relationships.							
86	**CCC**	**Cause and Effect** • Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects.							
87	**PE**	**HS-LS3-2. Students who demonstrate understanding can: Make and defend a claim based on evidence that 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.**							
88	**DCI**	**LS3.B: Variation of Traits** • 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.							
89	**DCI**	**LS3.B: Variation of Traits** • 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.							

90	**SEP**	**Engaging in Argument from Evidence** *Engaging in argument from evidence in 9-12 builds on K-8 experiences and progresses to using appropriate and sufficient evidence and scientific reasoning to defend and critique claims and explanations about the natural and designed world(s). Arguments may also come from current scientific or historical episodes in science.* • Make and defend a claim based on evidence about the natural world that reflects scientific knowledge and student-generated evidence.							
91	**CCC**	**Cause and Effect** • Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects.							
92	**PE**	**HS-LS3-3. Students who demonstrate understanding can: Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population.**							
93	**DCI**	**LS3.B: Variation of Traits** • 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.							
94	**SEP**	**Analyzing and Interpreting Data** *Analyzing data in 9-12 builds on K-8 experiences and progresses to introducing more detailed statistical analysis, the comparison of data sets for consistency, and the use of models to generate and analyze data.* • Apply concepts of statistics and probability (including determining function fits to data, slope, intercept, and correlation coefficient for linear fits) to scientific and engineering questions and problems, using digital tools when feasible.							
95	**CCC**	**Scale, Proportion, and Quantity** • Algebraic thinking is used to examine scientific data and predict the effect of a change in one variable on another (e.g., linear growth vs. exponential growth).							
96	**CONN**	**Science is a Human Endeavor** • Technological advances have influenced the progress of science and science has influenced advances in technology.							
97	**CONN**	**Science is a Human Endeavor** • Science and engineering are influenced by society and society is influenced by science and engineering.							
Natural Selection and Evolution									
98	**PE**	**HS-LS4-1. Students who demonstrate understanding can: Communicate scientific information that common ancestry and biological evolution are supported by multiple lines of empirical evidence.**							
99	**DCI**	**LS4.A: Evidence of Common Ancestry and Diversity** • 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.							
100	**SEP**	**Obtaining, Evaluating, and Communicating Information** *Obtaining, evaluating, and communicating information in 9–12 builds on K–8 experiences and progresses to evaluating the validity and reliability of the claims, methods, and designs.* • Communicate scientific information (e.g., about phenomena and/or the process of development and the design and performance of a proposed process or system) in multiple formats (including orally, graphically, textually, and mathematically).							
101	**CONN**	**Science Models, Laws, Mechanisms, and Theories Explain Natural Phenomena** • A scientific theory is a substantiated explanation of some aspect of the natural world, based on a body of facts that have been repeatedly confirmed through observation and experiment and the science community validates each theory before it is accepted. If new evidence is discovered that the theory does not accommodate, the theory is generally modified in light of this new evidence.							
102	**CCC**	**Patterns** • Different patterns may be observed at each of the scales at which a system is studied and can provide evidence for causality in explanations of phenomena.							
103	**CONN**	**Scientific Knowledge Assumes an Order and Consistency in Natural Systems** • Scientific knowledge is based on the assumption that natural laws operate today as they did in the past and they will continue to do so in the future.							
104	**PE**	**HS-LS4-2. Students who demonstrate understanding can: Construct an explanation based on evidence that 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.**							
105	**DCI**	**LS4.B: Natural Selection** • 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.							
106	**DCI**	**LS4.C: Adaptation** • 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.							
107	**SEP**	**Constructing Explanations and Designing Solutions** *Constructing explanations and designing solutions in 9–12 builds on K–8 experiences and progresses to explanations and designs that are supported by multiple and independent student-generated sources of evidence consistent with scientific ideas, principles, and theories.* • Construct an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future.							

108	CCC	**Cause and Effect** • Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects.							
109	PE	**HS-LS4-3. Students who demonstrate understanding can: Apply concepts of statistics and probability to support explanations that organisms with an advantageous heritable trait tend to increase in proportion to organisms lacking this trait.**							
110	DCI	**LS4.B: Natural Selection** • 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.							
111	DCI	**LS4.B: Natural Selection** • The traits that positively affect survival are more likely to be reproduced, and thus are more common in the population.							
112	DCI	**LS4.C: Adaptation** • 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.							
113	DCI	**LS4.C: Adaptation** • Adaptation also means that the distribution of traits in a population can change when conditions change.							
114	SEP	**Analyzing and Interpreting Data** *Analyzing data in 9–12 builds on K–8 experiences and progresses to introducing more detailed statistical analysis, the comparison of data sets for consistency, and the use of models to generate and analyze data.* • Apply concepts of statistics and probability (including determining function fits to data, slope, intercept, and correlation coefficient for linear fits) to scientific and engineering questions and problems, using digital tools when feasible.							
115	CCC	**Patterns** • Different patterns may be observed at each of the scales at which a system is studied and can provide evidence for causality in explanations of phenomena.							
116	PE	**HS-LS4-4. Students who demonstrate understanding can: Construct an explanation based on evidence for how natural selection leads to adaptation of populations.**							
117	DCI	**LS4.C: Adaptation** • 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.							
118	SEP	**Constructing Explanations and Designing Solutions** *Constructing explanations and designing solutions in 9–12 builds on K–8 experiences and progresses to explanations and designs that are supported by multiple and independent student-generated sources of evidence consistent with scientific ideas, principles, and theories.* • Construct an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future.							
119	CCC	**Cause and Effect** • Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects.							
120	CONN	**Scientific Knowledge Assumes an Order and Consistency in Natural Systems** • Scientific knowledge is based on the assumption that natural laws operate today as they did in the past and they will continue to do so in the future.							
121	PE	**HS-LS4-5. Students who demonstrate understanding can: Evaluate the evidence supporting claims that changes in environmental conditions may result in: (1) increases in the number of individuals of some species, (2) the emergence of new species over time, and (3) the extinction of other species.**							
122	DCI	**LS4.C: Adaptation** • 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.							
123	DCI	**LS4.C: Adaptation** • Species become extinct because they can no longer survive and reproduce in their altered environment. If members cannot adjust to change that is too fast or drastic, the opportunity for the species' evolution is lost.							
124	SEP	**Engaging in Argument from Evidence** *Engaging in argument from evidence in 9-12 builds on K-8 experiences and progresses to using appropriate and sufficient evidence and scientific reasoning to defend and critique claims and explanations about the natural and designed world(s). Arguments may also come from current or historical episodes in science.* • Evaluate the evidence behind currently accepted explanations or solutions to determine the merits of arguments.							
125	CCC	**Cause and Effect** • Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects.							
Earth's Systems									
126	PE	**HS-ESS2-4. Students who demonstrate understanding can: Use a model to describe how variations in the flow of energy into and out of Earth's systems result in changes in climate.**							
127	DCI	**ESS1.B: Earth and the Solar System** • Cyclical changes in the shape of Earth's orbit around the sun, together with changes in the tilt of the planet's axis of rotation, both occurring over hundreds of thousands of years, have altered the intensity and distribution of sunlight falling on the earth. These phenomena cause a cycle of ice ages and other gradual climate changes.							

128	DCI	**ESS2.A: Earth Materials and System** • The geological record shows that changes to global and regional climate can be caused by interactions among changes in the sun's energy output or Earth's orbit, tectonic events, ocean circulation, volcanic activity, glaciers, vegetation, and human activities. These changes can occur on a variety of time scales from sudden (e.g., volcanic ash clouds) to intermediate (ice ages) to very long-term tectonic cycles.							
129	DCI	**ESS2.D: Weather and Climate** • The foundation for Earth's global climate systems is the electromagnetic radiation from the sun, as well as its reflection, absorption, storage, and redistribution among the atmosphere, ocean, and land systems, and this energy's re-radiation into space.							
130	SEP	**Developing and Using Models** *Modeling in 9–12 builds on K–8 experiences and progresses to using, synthesizing, and developing models to predict and show relationships among variables between systems and their components in the natural and designed world(s).* • Use a model to provide mechanistic accounts of phenomena.							
131	CONN	**Scientific Knowledge is Based on Empirical Evidence** • Science arguments are strengthened by multiple lines of evidence supporting a single explanation.							
132	CCC	**Cause and Effect** • Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects.							
133	PE	**HS-ESS2-7. Students who demonstrate understanding can: Construct an argument based on evidence about the simultaneous coevolution of Earth's systems and life on Earth.**							
134	DCI	**ESS2.D: Weather and Climate** • Gradual atmospheric changes were due to plants and other organisms that captured carbon dioxide and released oxygen.							
135	DCI	**ESS2.E Biogeology** • The many dynamic and delicate feedbacks between the biosphere and other Earth systems cause a continual coevolution of Earth's surface and the life that exists on it.							
136	SEP	**Engaging in Argument from Evidence** *Engaging in argument from evidence in 9–12 builds on K–8 experiences and progresses to using appropriate and sufficient evidence and scientific reasoning to defend and critique claims and explanations about the natural and designed world(s). Arguments may also come from current scientific or historical episodes in science.* • Construct an oral and written argument or counter-arguments based on data and evidence.							
137	CCC	**Stability and Change** • Much of science deals with constructing explanations of how things change and how they remain stable.							
Earth and Human Activity									
138	PE	**HS-ESS3-1. Students who demonstrate understanding can: Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.**							
139	DCI	**ESS3.A: Natural Resources** • Resource availability has guided the development of human society.							
140	DCI	**ESS3.B: Natural Hazards** • Natural hazards and other geologic events have shaped the course of human history; [they] have significantly altered the sizes of human populations and have driven human migrations.							
141	SEP	**Constructing Explanations and Designing Solutions** *Constructing explanations and designing solutions in 9–12 builds on K–8 experiences and progresses to explanations and designs that are supported by multiple and independent student-generated sources of evidence consistent with scientific knowledge, principles, and theories.* • Construct an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future.							
142	CCC	**Cause and Effect** • Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects.							
143	CONN	**Influence of Science, Engineering, and Technology on Society and the Natural World** • Modern civilization depends on major technological systems.							
144	PE	**HS-ESS3-3. Students who demonstrate understanding can: Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations, and biodiversity.**							
145	DCI	**ESS3.C: Human Impacts on Earth Systems** • The sustainability of human societies and the biodiversity that supports them requires responsible management of natural resources.							
146	SEP	**Using Mathematics and Computational Thinking** *Mathematical and computational thinking in 9–12 builds on K–8 experiences and progresses to using algebraic thinking and analysis; a range of linear and nonlinear functions including trigonometric functions, exponentials and logarithms; and computational tools for statistical analysis to analyze, represent, and model data. Simple computational simulations are created and used based on mathematical models of basic assumptions.* • Create a computational model or simulation of a phenomenon, designed device, process, or system.							
147	CCC	**Stability and Change** • Change and rates of change can be quantified and modeled over very short or very long periods of time. Some system changes are irreversible.							
148	CONN	**Influence of Science, Engineering, and Technology on Society and the Natural World** • Modern civilization depends on major technological systems.							
149	CONN	**Influence of Science, Engineering, and Technology on Society and the Natural World** • New technologies can have deep impacts on society and the environment, including some that were not anticipated.							
150	CONN	**Science is a Human Endeavor** • Science is a result of human endeavors, imagination, and creativity.							

151	PE	**HS-ESS3-4. Students who demonstrate understanding can: Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.**							
152	DCI	**ESS3.C: Human Impacts on Earth Systems** • Scientists and engineers can make major contributions by developing technologies that produce less pollution and waste and that preclude ecosystem degradation.							
153	DCI	**ETS1.B: Developing Possible Solutions** • 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.							
154	SEP	**Constructing Explanations and Designing Solutions** *Constructing explanations and designing solutions in 9–12 builds on K–8 experiences and progresses to explanations and designs that are supported by multiple and independent student-generated sources of evidence consistent with scientific knowledge, principles and theories.* • Design or refine a solution to a complex real-world problem based on scientific knowledge, student-generated sources of evidence, prioritized criteria, and tradeoff considerations.							
155	CCC	**Stability and Change** • Feedback (negative or positive) can stabilize or destabilize a system.							
156	CONN	**Influence of Science, Engineering, and Technology on Society and the Natural World** • Engineers continuously modify these technological systems by applying scientific knowledge and engineering design practices to increase benefits while decreasing costs and risks.							
Engineering Design									
157	PE	**HS-ETS1-1. Students who demonstrate understanding can: Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.**							
158	DCI	**ETS1.A: Defining and Delimiting Engineering Problems** • 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.							
159	DCI	**ETS1.A: Defining and Delimiting Engineering Problems** • Humanity faces major global challenges today, such as the need for supplies of clean water and food or for energy sources that minimize pollution, which can be addressed through engineering. These global challenges also may have manifestations in local communities.							
160	SEP	**Asking Questions and Defining Problems** *Asking questions and defining problems in 9–12 builds on K–8 experiences and progresses to formulating, refining, and evaluating empirically testable questions and design problems using models and simulations.* • Analyze complex real-world problems by specifying criteria and constraints for successful solutions.							
161	CONN	**Influence of Science, Engineering, and Technology on Society and the Natural World** • New technologies can have deep impacts on society and the environment, including some that were not anticipated. Analysis of costs and benefits is a critical aspect of decisions about technology.							
162	PE	**HS-ETS1-2. Students who demonstrate understanding can: Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.**							
163	DCI	**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 (tradeoffs) may be needed.							
164	SEP	**Constructing Explanations and Designing Solutions** *Constructing explanations and designing solutions in 9–12 builds on K–8 experiences and progresses to explanations and designs that are supported by multiple and independent student-generated sources of evidence consistent with scientific ideas, principles and theories.* • Design a solution to a complex real-world problem based on scientific knowledge, student-generated sources of evidence, prioritized criteria, and tradeoff considerations.							
165	PE	**HS-ETS1-3. Students who demonstrate understanding can: Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics as well as possible social, cultural, and environmental impacts.**							
166	DCI	**ETS1.B: Developing Possible Solutions** • 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.							
167	SEP	**Constructing Explanations and Designing Solutions** *Constructing explanations and designing solutions in 9–12 builds on K–8 experiences and progresses to explanations and designs that are supported by multiple and independent student-generated sources of evidence consistent with scientific ideas, principles and theories.* • Evaluate a solution to a complex real-world problem, based on scientific knowledge, student-generated sources of evidence, prioritized criteria, and tradeoff considerations.							
168	CONN	**Influence of Science, Engineering, and Technology on Society and the Natural World** • New technologies can have deep impacts on society and the environment, including some that were not anticipated. Analysis of costs and benefits is a critical aspect of decisions about technology.							
169	PE	**HS-ETS1-4. Students who demonstrate understanding can: Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem.**							
170	DCI	**ETS1.B: Developing Possible Solutions** • 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.							

171	SEP	**Using Mathematics and Computational Thinking** *Mathematical and computational thinking in 9-12 builds on K-8 experiences and progresses to using algebraic thinking and analysis, a range of linear and nonlinear functions including trigonometric functions, exponentials and logarithms, and computational tools for statistical analysis to analyze, represent, and model data. Simple computational simulations are created and used based on mathematical models of basic assumptions.* • Use mathematical models and/or computer simulations to predict the effects of a design solution on systems and/or the interactions between systems.							
172	CCC	**Systems and System Models** • Models (e.g., physical, mathematical, computer models) can be used to simulate systems and interactions — including energy, matter, and information flows — within and between systems at different scales.							
CCSS for ELA/Literacy and Math in Grades 9-12 NGSS **• NOTE: The standards noted at the end of each CCSS (such as *(HS-ESS1-1), (HS-ESS1-2), (HS-ESS1-5)*) are the occurrences of the CCSS within the NGSS.**									
Grades 9-12 CCSS ELA/Literacy									
173	CCSS ELA/ Literacy	**RST.9-10.8** Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem. *(HS-LS2-6), (HS-LS2-7), (HS-LS2-8)*							
174	CCSS ELA/ Literacy	**RST.11-12.1** Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. *(HS-LS1-1), (HS-LS1-6), (HS-LS2-1), (HS-LS2-2), (HS-LS2-3), (HS-LS2-6), (HS-LS2-8), (HS-LS3-1), (HS-LS3-2), (HS-LS4-1), (HS-LS4-2), (HS-LS4-3), (HS-LS4-4), (HS-ESS3-1), (HS-ESS3-4)*							
175	CCSS ELA/ Literacy	**RST.11-12.7** Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem. *(HS-LS2-6), (HS-LS2-7), (HS-LS2-8), (HS-ETS1-1), (HS-ETS1-3)*							
176	CCSS ELA/ Literacy	**RST.11-12.8** Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. *(HS-LS2-6), (HS-LS2-7), (HS-LS2-8), (HS-LS2-1), (HS-LS2-2), (HS-LS2-3), (HS-LS4-5), (HS-ETS1-1), (HS-ETS1-3), (HS-ESS3-4)*							
177	CCSS ELA/ Literacy	**RST.11-12.9** Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. *(HS-LS3-1), (HS-ETS1-1), (HS-ETS1-3)*							
178	CCSS ELA/ Literacy	**WHST.9-12.1** Write arguments focused on discipline-specific content. *(HS-LS3-2), (HS-ESS2-7)*							
179	CCSS ELA/ Literacy	**WHST.9-12.2** Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. *(HS-LS1-1), (HS-LS1-6), (HS-LS4-1), (HS-LS4-2), (HS-LS4-3), (HS-LS4-4), (HS-ESS3-1)*							
180	CCSS ELA/ Literacy	**WHST.9-12.5** Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. *(HS-LS1-6), (HS-LS2-3), (HS-LS4-6)*							
181	CCSS ELA/ Literacy	**WHST.9-12.7** Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. *(HS-LS1-3), (HS-LS2-7), (HS-LS4-6)*							
182	CCSS ELA/ Literacy	**WHST.9-12.9** Draw evidence from informational texts to support analysis, reflection, and research. *(HS-LS-1-1), (HS-LS1-6), (HS-LS4-1), (HS-LS4-2), (HS-LS4-3), (HS-LS4-4), (HS-LS4-5)*							
183	CCSS ELA/ Literacy	**WHST.11-12.8** Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. *(HS-LS1-3)*							
184	CCSS ELA/ Literacy	**SL.11-12.4** Present claims and findings, emphasizing salient points in a focused, coherent manner with relevant evidence, sound valid reasoning, and well-chosen details; use appropriate eye contact, adequate volume, and clear pronunciation. *(HS-LS4-1), (HS-LS4-2)*							
185	CCSS ELA/ Literacy	**SL.11-12.5** Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest. *(HS-LS1-2), (HS-LS1-4), (HS-LS1-5), (HS-LS1-7), (HS-ESS2-4)*							
Grades 9-12 CCSS Math									
186	CCSS Math	**MP.2** Reason abstractly and quantitatively. *(HS-LS2-1), (HS-LS2-2), (HS-LS2-4), (HS-LS2-6), (HS-LS2-7), (HS-LS3-2), (HS-LS3-3), (HS-LS4-1), (HS-LS4-2), (HS-LS4-3), (HS-LS4-4), (HS-LS4-5), (HS-ESS2-4), (HS-ESS3-1), (HS-ESS3-3), (HS-ESS3-4), (HS-ETS1-1), (HS-ETS1-3), (HS-ETS1-4)*							
187	CCSS Math	**MP.4** Model with mathematics. *(HS-LS1-4), (HS-LS2-1), (HS-LS2-2), (HS-LS2-4), (HS-LS4-2), (HS-ESS3-3), (HS-ETS1-1), (HS-ETS1-2), (HS-ETS1-3), (HS-ETS1-4)*							
188	CCSS Math	**HSN-Q.A.1** Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. *(HS-LS2-1), (HS-LS2-2), (HS-LS2-4),(HS-LS2-7), (HS-ESS2-4), (HS-ESS3-1), (HS-ESS3-4)*							
189	CCSS Math	**HSN-Q.A.2** Define appropriate quantities for the purpose of descriptive modeling. *(HS-LS2-1), (HS-LS2-2), (HS-LS2-4), (HS-LS2-7), (HS-ESS2-4), (HS-ESS3-1), (HS-ESS3-4)*							

190	**CCSS Math**	**HSN-Q.A.3** Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. *(HS-LS2-1), (HS-LS2-2), (HS-LS2-4), (HS-LS2-7), (HS-ESS2-4), (HS-ESS3-1), (HS-ESS3-4)*							
191	**CCSS Math**	**HSF-IF.C.7** Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. *(HS-LS1-4)*							
192	**CCSS Math**	**HSF-BF.A.1** Write a function that describes a relationship between two quantities. *(HS-LS1-4)*							
193	**CCSS Math**	**HSS-ID.A.1** Represent data with plots on the real number line. *(HS-LS2-6)*							
194	**CCSS Math**	**HSS-IC.A.1** Understand statistics as a process for making inferences about population parameters based on a random sample from that population. *(HS-LS2-6)*							
195	**CCSS Math**	**HSS-IC.B.6** Evaluate reports based on data. *(HS-LS2-6)*							

Section 2: Science Content Review

PUBLISHER/PROVIDER INSTRUCTIONS:

- Publisher/provider citations for this section will refer to the **Teacher Edition (teacher-facing core material)** and/or **Student Edition/Student Workbook (student-facing core material)**. The cited Teacher Edition, Student Edition, and/or Student Workbook should correspond with titles and ISBNs entered on the Form F cover page, whether in print, online, or both. The review set submitted to the summer review institute should also correspond with what is cited on the Form F. If the review set is an online platform only, then that is what should be cited on the Form F and submitted for review by the review teams. If the review set is in print only, then that is what should be cited on the Form F and submitted for review by the review teams.
- For this section, the publisher/provider will enter one citation per criterion (Column C). Each citation should direct the reviewer to a specific location in the materials that best meets the criterion. The citations should be concise and should allow the reviewer to easily determine that all components of the criterion have been met. Each citation should cover no more than 3 pages within the materials.
    - o **Column C:** Enter one citation in Column C from either the **Teacher Edition (teacher-facing core material)** OR **Student Edition/Student Workbook (student-facing core material)**. Each citation should direct the reviewer to a specific location in the materials that best meets the criterion.
- The material will be scored for alignment with each criterion as "Meets expectations", "Partially meets expectations", or "Does not meet expectations" based on the citations provided.
    - **o NOTE: You may not use a citation more than once across ALL sections of the rubric.**

Reviewer directions for Science Content Review:

Columns C-F: The publisher/provider will provide a citation from the **Teacher Edition (teacher-facing core material) OR Student Edition/Student Workbook (student-facing core material) (print and/or digital)** for each criterion. Review the cited material and score the material by determining the degree to which it meets the criterion:
- o M = Meets the criterion
- o P = Partially meets the criterion
- o D = Does not meet the criterion

Evidence for the publisher citations is required *only* if you score the materials with a D. For your evidence for each criterion that scores a D, choose one of the options from the dropdown menu in Column F. If the reason for scoring the materials with a D is not one of the dropdown options, enter your own evidence statement in the cell in Column F.
- ***o Each cell in the Score column (column D) will turn purple as you score the materials.***

Columns G-J: Using either the **Teacher Edition (teacher-facing core material) OR Student Edition/Student Workbook (student-facing core material)** (print and/or digital), provide a citation for each criterion that best meets the criterion and addresses all components of the criterion. Review the cited material, score the material by determining the degree to which it meets the criterion, and **provide evidence from the material to support your determination:**
- o M = Meets the criterion
- o P = Partially meets the criterion
- o D = Does not meet the criterion
- ***o Each cell in the Reviewer Citation column, Score column, and Reviewer Evidence column (columns G, H, and J) will turn purple as you score the materials.***

Criteria #	Grade K-12 Science Content Criteria	Publisher/Provider Citation	Score	If Scored D: Reviewer's Evidence for Publisher Citation	Reviewer Citation	Score	Required: Reviewer's Evidence	Comments, other citations, notes
FOCUS AREA 1: PHENOMENA-/PROBLEM-BASED AND THREE-DIMENSIONAL APPROACH Instructional materials are centered around high quality phenomena and/or problems and require a three dimensional approach to make sense of the phenomena or to solve the problems.								
1	Materials clearly integrate and describe the three-dimensional NM STEM Ready! Standards via appropriate grade-band, interdisciplinary progressions that center around the phenomena, utilizing aligned SEPs, CCCs, DCIs and the common core math and ELA standards' connections.							
2	Materials consistently support meaningful student sensemaking with the three dimensions, including discourse, that is appropriate to grade band progressions, instruction and assessment.							
3	Natural and designed phenomena and/or problems that are meaningful and apparent to students drive coherent lessons and activities in all three dimensions.							
FOCUS AREA 2: THREE-DIMENSIONAL ASSESSMENT Assessments provide tools, guidance and support for teachers to collect, interpret and act on data about student progress toward the learning goals of the 3 dimensional standards.								
4	Materials engage students in meaningful tasks as well as multiple assessment types and opportunities, across all dimensions, in order to make sense of phenomena and/or design solutions to problems.							
5	Materials include opportunities for students to obtain feedback from teachers and peers as well as opportunities for student self-reflection.							
FOCUS AREA 3: TEACHER SUPPORTS Materials include opportunities for teachers to effectively plan and utilize materials.								
6	Materials provide a comprehensive list of supplies and teacher guidance needed to support instructional activities in a safe manner.							
7	Materials provide teacher guidance for the use of embedded and meaningful technology to support and enhance student learning, when applicable.							
8	Materials and assessments include teacher guidance for students at, approaching, or exceeding grade level expectations.							
9	Materials provide teacher guidance for interpreting student evidence of learning, monitoring student progress and providing feedback to guide student learning and to modify instruction.							
FOCUS AREA 4: STUDENT CENTERED INSTRUCTION Materials are designed for each student's regular and active participation in science content.								
10	Materials provide opportunities to engage students' curiosity and participation in a way that pulls from their prior knowledge and connects their learning to relevant phenomena and problems.							
11	The flow of lessons from one unit to the next is coherent, meaningful, direct, and apparent to students.							
FOCUS AREA 5: EQUITY Materials are designed for all learners.								
12	Materials provide extensions and/or opportunities for all students to engage in learning grade-level/band science and engineering in greater depth.							
13	Materials and assessments are designed in an accessible manner and include multiple ways for all students to build and reflect on science knowledge; multiple ways for all students to access content (Universal Design for Learning); and multiple opportunities for student self-reflection.							

Section 2: All Content Review				
PUBLISHER/PROVIDER INSTRUCTIONS: • The All Content tab will be completed solely by the reviewers. They will score each criterion and provide evidence for their score from the material based on their overall review of the material. You will not provide any citations for this tab. • The material will be scored for alignment with each criterion as “Meets expectations", “Partially meets expectations", or “Does not meet expectations”.				
	Reviewer directions for All Content Review:	**Columns C-F: The criteria presented on this tab will be scored and evidence provided based on your overall review of the materials.** Review the material, score the material by determining the degree to which it meets each criterion, and **provide evidence from the material to support your determination:** o M = Meets the criterion o P = Partially meets the criterion o D = Does not meet the criterion Your evidence should speak to where in the materials you have found the evidence as well as what is in the materials that supports the score given. ***o Each cell in the Score column and the Reviewer's Evidence column (columns C and E) will turn purple as you score the materials.***		
Criteria #	**All Content Criteria Review**	Score	Required: Reviewer's Evidence from Material	Comments, citations, notes
FOCUS AREA 1: COHERENCE **Instructional materials are coherent and consistent with the New Mexico Content Standards that all students should study in order to be college- and career-ready.**				
1	Instructional materials address the full content contained in the standards for all students by grade level.			
2	Instructional materials support students to show mastery of each standard.			
3	Instructional materials require students to engage at a level of maturity appropriate to the grade level under review.			
4	Instructional materials are coherent, making meaningful connections for students by linking the standards within a lesson and unit.			
FOCUS AREA 2: WELL-DESIGNED LESSONS **Instructional materials take into account effective lesson structure and pacing.**				
5	The Teacher Edition presents learning progressions to provide an overview of the scope and sequence of skills and concepts. The design of the assignments shows a purposeful sequencing of teaching and learning expectations.			
6	Within each lesson of the instructional materials, there are clear, measurable, standards-aligned content objectives.			
7	Within each lesson of the instructional materials, there are clear, measurable language objectives tied directly to the content objectives.			
8	Instructional materials provide focused resources to support students’ acquisition of both general academic vocabulary and content-specific vocabulary.			
9	The visual design of the instructional materials (whether in print or digital) maintains a consistent layout that supports student engagement with the subject.			
10	Instructional materials incorporate features that aid students and teachers in making meaning of the text.			
11	Instructional materials provide students with ongoing review and practice for the purpose of retaining previously acquired knowledge.			
FOCUS AREA 3: RESOURCES FOR PLANNING **Instructional materials provide teacher resources to support planning, learning, and understanding of the New Mexico Content Standards.**				
12	Instructional materials provide a list of lessons in the Teacher Edition (in print or clearly distinguished/ accessible as a teacher's edition in digital materials), cross-referencing the standards addressed and providing an estimated instructional time for each lesson, chapter, and unit.			
13	Instructional materials support teachers with instructional strategies to help guide students’ academic development.			
14	Instructional materials include a teacher edition/ teacher-facing material with useful annotations and suggestions on how to present the content in the student edition/student-facing material and in the supporting material.			

15	Instructional materials integrate opportunities for digital learning, including interactive digital components.			
FOCUS AREA 4: ASSESSMENT **Instructional materials offer teachers a variety of assessment resources and tools to collect ongoing data about student progress related to the standards.**				
16	Instructional materials provide a variety of assessments that measure student progress in all strands of the standards for the content under review. *(Adopted New Mexico Content Standards for 2024: NM STEM Ready Science Standards)*			
17	Instructional materials provide multiple formative and summative assessments, clearly defining which standards are being assessed through content and language objectives.			
18	Instructional materials provide scoring guides for assessments that are aligned with the standards they address, and that offer teachers guidance in interpreting student performance and suggestions for further instruction, differentiation, remediation and/or acceleration.			
19	Instructional materials provide appropriate assessment alternatives for English Learners, Culturally and Linguistically Diverse students, advanced students, and special needs students.			
20	Instructional materials include opportunities to assess student understanding and knowledge of the standards using technology.			
FOCUS AREA 5: EXTENSIVE SUPPORT **Instructional materials give all students extensive opportunities and support to explore key concepts.**				
21	Instructional materials can be customized or adapted to meet the needs of different student populations.			
22	Instructional materials provide differentiated strategies and/or activities to meet the needs of students working below proficiency and those of advanced learners.			
23	Instructional materials provide appropriate linguistic support for English Learners and Culturally and Linguistically Diverse students, and accommodations and modifications for other special populations that will support their regular and active participation in learning content.			
24	Instructional materials provide strategies and resources for teachers to inform and engage parents, family members, and caregivers of all learners about the program and provide suggestions for how they can help support student progress and achievement.			
25	Instructional materials include opportunities for all students that encourage and support critical and creative thinking, inquiry, and complex problem-solving skills.			
FOCUS AREA 6: CULTURAL AND LINGUISTIC PERSPECTIVES **Instructional materials represent a variety of cultural and linguistic perspectives.**				
26	Instructional materials inform culturally and linguistically responsive pedagogy by affirming students' backgrounds in the materials themselves and in the student discussions.			
27	Instructional materials provide a collection of images, stories, and information, representing a broad range of demographic groups, and do not make generalizations or reinforce stereotypes.			
28	Instructional materials provide context, illustrations, and activities for students to make interdisciplinary connections and/or connections to real-life experiences and diverse cultural and linguistic backgrounds.			
FOCUS AREA 7: INCLUSION OF CULTURALLY AND LINGUISTICALLY RESPONSIVE LENS **Instructional materials highlight diversity in culture and language through multiple perspectives.**				
29	Instructional materials include tools and resources to relate the content area appropriately to diversity in culture and language.			
30	Instructional materials include tools and resources that demonstrate multiple perspectives in a specific concept.			

31	Instructional materials engage students in critical reflection about their own lives and societies, including cultures past and present in New Mexico.			
32	Instructional materials address multiple ethnic descriptions, interpretations, or perspectives of events and experiences.			