Lab-Aids Correlations for

CALIFORNIA NGSS PREFERRED INTEGRATED MODEL

MIDDLE SCHOOL LEVEL – GRADES 6-8

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October 2018

This document is intended to show how the SEPUP 3rd edition materials, *Issues and Science for California*, align with the *California Preferred Integrated Model*[1] for the *Next Generation Science Standards* and Common Core documents. The California NGSS 6-8 are based on the National 6-8 NGSS, but there are important differences. The *California Preferred Integrated Model*, for example, has additional Ecology content, and the PE statements generally contain fewer SEP and DCI elements, and in a few cases (see for example, the ETS Performance Expectations) the CCC element is not specified. *Issues and Science for California* was recommended for state adoption in September 2018 by the Instructional Quality Commission. At the time of review, only grades 6-7 were ready for submission; grade 8 will be completed in February 2019 and will be submitted for social content review. Even so, as the grade 8 book was not fully reviewed, it does not carry the IQC recommendation as do grades 6 and 7.

ABOUT OUR PROGRAMS

Lab-Aids has maintained its home offices and operations in Ronkonkoma, NY, since 1963. We publish over 200 kits and core curriculum programs to support science teaching and learning, grades 6-12. All core curricula support an inquiry-driven pedagogy, with support for literacy skill development and with assessment programs that clearly show what students know and can do as a result of program use. All programs have extensive support for technology and feature comprehensive teacher support. For more information please visit www.lab-aids.com/california and navigate to the program of interest.

[1] As seen in Chapter 5 of the California Science Framework, https://www.cde.ca.gov/ci/sc/cf/cascienceframework2016.asp.

SEPUP

Materials from the Science Education for Public Understanding Program (SEPUP) are developed at the Lawrence Hall of Science, at the University of California, Berkeley, and distributed nationally by LAB-AIDS, Inc. Since 1987, development of SEPUP materials has been supported by grants from the National Science Foundation and other public and private sources. SEPUP programs include student books, equipment kits, teacher materials, and online digital content, and are available as full year courses, or separately, as units, each taking 3-8 weeks to teach, listed below.

Preferred Integrated Model for the Middle Level, Grades 6-8

Grade 6	**Grade 7**	**Grade 8**
Land, Water, and Human Interactions	Ecology	Evolution
Energy	Geological Processes	Earth's Resources
Weather and Climate	Chemistry of Materials	Solar System and Beyond
Body Systems	Chemical Reactions	Force and Motion
From Cells to Organisms	Biomedical Engineering	Fields and Interactions
Reproduction		Waves

ABOUT THE NEXT GENERATION SCIENCE STANDARDS

The National Academy of Sciences, Achieve, the American Association for the Advancement of Science, and the National Science Teachers Association have collaborated over several years to develop the *Next Generation Science Standards* (NGSS). The first step of the process was led by The National Academies of Science, a non-governmental organization commissioned in 1863 to advise the nation on scientific and engineering issues. On July 19, 2011, the National Research Council (NRC), the functional staffing arm of the National Academy of Sciences, released the *Framework for K-12 Science Education*. The *Framework* was a critical first step because it is grounded in the most current research on science and science learning and it identifies the science all K–12 students should know. The second step in the process was the development of standards grounded in the NRC Framework. A group of 26 lead states and writers, in a process managed by Achieve, has been working since the release of the Framework to develop K-12 *Next Generation Science Standards*. The final release of the Standards was in April 2013. States, districts, and schools have worked to implement these standards since then.

The *Next Generation Science Standards* (NGSS) provide an important opportunity to improve not only science education but also student achievement. Based on the *Framework for K–12 Science Education*, the NGSS are intended to reflect a new vision for American science education. *The Next Generation Science Standards* are student performance expectations – NOT curriculum. These performance expectations clarify the expectations of what students will know and be able to do by the end of the grade or grade band. As the reader knows, the *Standards* represent content from several domains: (1) science and engineering practices; (2) crosscutting concepts; (3) the disciplines of life, earth, and

physical science, as set forth in the *Next Generation Science Framework* (NRC, 2012). The Standards themselves are written as performance indicators, and content from the Common Core (http://www.corestandards.org/) is included.

ABOUT THE CALIFORNIA PREFERRED INTEGRATED MODEL

The California Next Generation Science Standards (CA NGSS) define two possible progressions for the middle grades: the Preferred Integrated Course Model (Integrated Model), which interweaves science disciplines in a developmentally appropriate progression; and the Discipline Specific Course Model, in which each grade level focuses in depth on a different science discipline. The two models differ only in the sequence; every student is expected to meet each middle grades' performance expectation (PE) by the end of the grade. "Sequence" here refers to in which course (grade 6-8) a particular performance expectation is mastered; the *Framework* makes no requirements about the order in which performance expectations are taught within a given year. As stated above, there are important differences in the CA NGSS vs the National NGSS.

ABOUT THE LAB-AIDS CITATIONS

The following tables are presented in a Disciplinary Core Idea arrangement – Earth Space Science (ESS), Life Science (LS), Physical Science (PS) and Engineering, Technology and Applications of Science (ETS).

Citations included in the correlation document are as follows:

* indicates where Performance Expectation is assessed
† indicates unit in development
Unit title, Activity Number
The Chemistry of Materials, 14

NGSS Performance Expectations	MS-PS1-2
Science and Engineering Practices	Planning and Carrying Out Investigations
Crosscutting Concepts	Structure and Function
Disciplinary Core Ideas	MS-PS1.A
Common Core English-Language Arts	RST.6-8.3
Common Core Mathematics	MP.2

GRADE 6

CA Performance Expectation	SEPUP Unit and Activity Number	Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts	Common Core ELA/Math
MS-LS1-1: Conduct an investigation to provide evidence that living things are made of cells; either one cell or many different numbers and types of cells.	*From Cells to Organisms*: 1, 2, 3, 4, 5, 6, 7, 8, 9*	Planning and Carrying Out Investigations	MS-LS1.A	Scale, Proportion, and Quantity Interdependence of Science, Engineering and Technology	RST.6-8.3 RST.6-8.7 RST.6-8.9 WHST.6-8.2 WHST.6-8.7 WHST.6-8.9 SL.8.5
MS-LS1-2: Develop and use a model to describe the function of a cell as a whole and ways the parts of cells contribute to the function.	*From Cells to Organisms*: 4, 6, 7, 8*, 11	Developing and Using Models	MS-LS1.A	Structure and Function	RST.6-8.3 RST.6-8.7 RST.6-8.9 WHST.6-8.2 WHST.6-8.7 WHST.6-8.9 SL.8.5
MS-LS1-3: Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells.	*From Cells to Organisms*: 10, 14, 15 Body Systems 3, 4, 9, 11, 12, 13	Engaging in Argument from Evidence	MS-LS1.A	Systems and System Models NOS – Science is a Human Endeavor	RST.6-8.2 RST.6-8.3 RST.6-8.7 RST.6-8.9 WHST.6-8.9
MS-LS1-4: Use argument based on	*Reproduction:* 9, 10*, 11*	Engaging in Argument from Evidence	MS-LS1.B	Cause and Effect	RI.6.8 RST.6-8.1

CA Performance Expectation	SEPUP Unit and Activity Number	Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts	Common Core ELA/Math
empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants respectively.					RST.6-8.4 WHST.6-8.1 6.SP.A.2 6.SP.B.4 6.SP.B.5
MS-LS1-5: Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.	*Reproduction:* 1, 7*, 9	Constructing Explanations and Designing Solutions	MS-LS1.B	Cause and Effect	RST.6-8.2 SL.8.1 WHST.6-8.9 6.RP.A.1 6.SP.B.5
MS-LS1-8: Gather and synthesize information that sensory receptors respond to stimuli by sending messages to the brain for immediate behavior or storage as memories.	*Body Systems:* 6, 7, 8*	Obtaining, Evaluating, and Communicating Information	MS-LS1.D	Cause and Effect	RST.6-8.4 6.SP.B.4

CA Performance Expectation	SEPUP Unit and Activity Number	Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts	Common Core ELA/Math
MS-LS3-2: Develop and use a model to describe why asexual reproduction results in offspring with identical genetic information and sexual reproduction results in offspring with genetic variation.	*Reproduction:* 1, 2, 3, 4, 5, 6, 7, 8, 9*	Developing and Using Models	MS-LS1.B MS-LS3.A MS-LS3.B	Cause and Effect	RST.6-8.1 RST.6-8.2 RST.6-8.4 RST.6-8.7 RST.6-8.9 SL.8.1 WHST.6-8.2 WHST.6-8.9 6.RP.A.1 6.SP.B.5
MS-ESS2-4: Develop a model to describe the cycling of water through Earth's systems driven by energy from the sun and the force of gravity.	*Land, Water, and Human Interaction:* 2, 5, 7, 8, 9*	Developing and Using Models	MS-ESS2.C	Energy and Matter	RST.6-8.1 RST.6-8.3 RST.6-8.9 WHST.6-8.2
MS-ESS2-5: Collect data to provide evidence for how the motions and complex interactions of air masses result in changes in weather conditions.	*Weather and Climate:* 2, 3, 4, 6, 7, 9, 10, 11, 12, 13*	Planning and Carrying Out Investigations	MS-ESS2.C MS-ESS2.D	Cause and Effect	RST.6-8.3 RST.6-8.7 RST.6-8.9 WHST.6-8.7 SL.8.1 SL.8.4 MP.2

CA Performance Expectation	SEPUP Unit and Activity Number	Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts	Common Core ELA/Math
MS-ESS2-6: Develop and use a model to describe how unequal heating and rotation of the Earth cause patterns of atmospheric and oceanic circulation that determine regional climates.	*Weather and Climate:* 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 13, 14*	Developing and Using Models	MS-ESS2.C MS-ESS2.D	Systems and System Models	RST.6-8.3 RST.6-8.7 WHST.6-8.7 SL.8.1 SL.8.4 MP.2
MS-ESS3-3: Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.	*Land, Water, and Human Interactions:* 2, 3, 4, 5, 6, 9, 13, 14, 15, 16*	Constructing Explanations and Designing Solutions	MS-ESS3.C	Cause and Effect Connections to Engineering, Technology, and Applications of Science -- Influence of Science, Engineering, and Technology and the Natural World	RST.6-8.1 RST.6-8.3 RST.6-8.9 WHST.6-8.2 WHST.6-8.9 SL.8.4 6.RP.A.1 6.SP.B.5 MP.4
MS-ESS3-5: Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century.	*Weather and Climate:* 1, 14, 15, 16*	Asking Questions and Defining Problems	MS-ESS3.D	Stability and Change	RST.6-8.7 WHST.6-8.1 SL.8.1 MP.4

CA Performance Expectation	SEPUP Unit and Activity Number	Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts	Common Core ELA/Math
MS-PS3-3: Apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer.	*Energy:* 1, 7, 8, 9, 10, 11, 12, 13*	Constructing Explanations and Designing Solutions	MS-ETS1.A MS-ETS1.B MS-PS3.A MS-PS3.B	Energy and Matter	RST.6-8.1 RST.6-8.3 SL.8.4 WHST.6-8.9 EE.6.A.2 EE.6.C.9 MP.2
MS-PS3-4: Plan an investigation to determine the relationships among the energy transferred, the type of matter, the mass, and the change in the average kinetic energy of the particles as measured by the temperature of the sample.	*Energy:* 1, 4, 6, 7, 8*	Planning and Carrying Out Investigations NOS – Scientific Knowledge is Based on Empirical Evidence	MS-PS3.A MS-PS3.B	Scale, Proportion, and Quantity	RST.6-8.3 WHST.6-8.1 WHST.6-8.9 EE.6.C.9 MP.2
MS-PS3-5: Construct, use, and present arguments to support the claim that when the kinetic energy of an object changes, energy	*Energy:* 2, 3, 4, 5, 6*	Engaging in Argument from Evidence NOS – Scientific Knowledge is Based on Empirical Evidence	MS-PS3.B	Energy and Matter	RST.6-8.3 WHST.6-8.1 WHST.6-8.9 EE.6.C.9 MP.2

CA Performance Expectation	SEPUP Unit and Activity Number	Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts	Common Core ELA/Math
is transferred to or from the object.					
MS-ETS1-1: Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.	*Weather and Climate 6, 12*	Asking Questions and Defining Problems	MS-ETS1.A	Influence of Science, Engineering and Technology on the Natural World	RI.8.8 RST.6-8.8 SL.8.4 SL.8.5 WHST.6-8.1 WHST.6-8.2 RST.6-8.3 SL.8.4
MS-ETS1-2. Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.	*Land, Water and Human Interactions 7, 12, 16**	Engaging in Argument from Evidence	MS-ETS1.B	None cited in CA standards maps	RST.6-8.1 RST.6-8.3 RST.6-8.8 SL.8.1 SL.8.4

CA Performance Expectation	SEPUP Unit and Activity Number	Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts	Common Core ELA/Math
MS-ETS1-3. Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.	*Weather and Climate 6, 12**	Analyzing and Interpreting Data	MS-ETS1.B MS-ETS1.C	None cited in CA standards maps	SL.8.4 6.RP.A.1 6.RP.A.3 MP.2
MS-ETS1-4. Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.	*Energy 13* *Weather and Climate 12**	Developing and Using Models	MS-ETS1.B MS-ETS1.C	None cited in CA standards maps	RST.6-8.3

GRADE 7

CA Performance Expectation	SEPUP Unit and Activity Number	Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts	Common Core ELA/Math
MS-LS1-6: Construct a scientific explanation based on evidence for the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms.	*Ecology 8, 11*	Constructing Explanations and Designing Solutions NOS – Scientific Knowledge is based on Empirical Evidence	MS-LS1.C MS-PS3.D	Energy and Matter	RST.6-8.3
MS-LS1-7: Develop a model to describe how food is rearranged through chemical reactions forming new molecules that support growth and/or release energy as this matter moves through an organism.	*Ecology 10*	Developing and Using Models	MS-LS1.C MS-PS3.D	Energy and Matter	RST.6-8.2 RST.6-8.3 RST.6-8.9
MS-LS2-1: Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of	*Ecology:* 5, 6, 7, 8, 9*, 12	Analyzing and Interpret Data	MS-LS2.A	Cause and Effect	RST.6-8.1 RST.6-8.3 RST.6-8.7 RST.6-8.8 SL.8.4 SL.8.5 WHST.6-8.1

CA Performance Expectation	SEPUP Unit and Activity Number	Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts	Common Core ELA/Math
organisms in an ecosystem.					WHST.6-8.9 6.EE.C.9 6.RP.A.1 6.RP.A.3 6.SP.B.5 MP.2 MP.4
MS-LS2-2: Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.	*Ecology:* 2, 6, 7, 8, 10*, 13, 14	Constructing Explanations and Designing Solutions	MS-LS2.A	Patterns	RST.6-8.1 RST.6-8.3 RST.6-8.8 SL.8.4 SL.8.5 WHST.6-8.9 6.RP.A.1 6.RP.A.3 MP.2 MP.4
MS-LS2-3: Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.	*Ecology:* 7, 8, 11, 12*, 15, 16	Developing and Using Models	MS-LS2.B	Energy and Matter NOS – Scientific Knowledge Assumes Order and Constancy in Natural Systems	RST.6-8.3 RST.6-8.7 WHST.6-8.9 6.RP.A.1 6.RP.A.3 MP.2 MP.4

CA Performance Expectation	SEPUP Unit and Activity Number	Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts	Common Core ELA/Math
MS-LS2-4: Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.	*Ecology:* 1, 2, 3, 4, 5, 6, 12, 13, 14*	Analyzing and Interpreting Data NOS – Scientific Knowledge is based on Empirical Evidence Engaging in Argument from Evidence	MS-LS2.C	Cause and Effect Stability and Change	RST.6-8.1 RST.6-8.3 RST.6-8.8 SL.8.5 WHST.6-8.1 WHST.6-8.9 6.EE.C.9 6.SP.B.5 MP.2
MS-LS2-5: Evaluate competing design solutions for maintaining biodiversity and ecosystem services.	*Ecology:* 2, 3, 4, 5, 13, 14, 15*, 18	Engaging in Argument from Evidence	MS-ETS1.B MS-LS2.C MS-LS4.D	Stability and Change Connections to Engineering, Technology, and Applications of Science -- Influence of Science, Engineering, and Technology on Society and the Natural World NOS – Science Addresses Questions About the Natural and Material World	RST.6-8.1 RST.6-8.3 RST.6-8.8 SL.8.5 WHST.6-8.1 WHST.6-8.9 6.SP.B.5
MS-ESS2-1: Develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process.	*Geological Processes:* 2, 5, 8, 9, 10, 11, 13, 14, 15*	Developing and Using Models	MS-ESS2.A	Stability and Change	RST.6-8.2 RST.6-8.3 RST.6-8.4 WHST.6-8.1 WHST.6-8.2 SL.8.1

CA Performance Expectation	SEPUP Unit and Activity Number	Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts	Common Core ELA/Math
					6.RP.A.1 MP.2
MS-ESS2-2: Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales.	*Geological Processes:* 2, 3, 4, 6, 10, 11, 12, 13*	Constructing Explanations and Designing Solutions	MS-ESS2.A MS-ESS2.C	Scale, Proportion, and Quantity	RST.6-8.1 RST.6-8.2 RST.6-8.3 WHST.6-8.1 WHST.6-8.2 WHST.6-8.9 SL.8.1 6.RP.A.1 6.NS.C.5 7.RP.A.2 MP.4
MS-ESS2-3: Analyze and interpret data on the distribution of fossils and rocks, continental shapes, and seafloor structures to provide evidence of the past plate motions.	*Geological Processes:* 10, 11, 12, 13, 14*, 16	Analyze and Interpret Data Connections to the Nature of Science – Scientific Knowledge is Open to Revision in Light of New Evidence	MS-ESS1.C MS-ESS2.B	Patterns	RST.6-8.2 WHST.6-8.1 WHST.6-8.2 SL.8.1 6.RP.A.1 7.RP.A.2 MP.2
MS-ESS3-1: Construct a scientific explanation based on evidence for how the uneven distributions of Earth's mineral, energy, and	*Geological Processes: 1*2, 16, 17*	Constructing Explanations and Designing Solutions	MS-ESS3.A	Cause and Effect Connections to Engineering, Technology, and Applications of Science – Influence of Science Engineering and	RST.6-8.2 RST.6-8.3 WHST.6-8.1 WHST.6-8.7 SL.8.1

CA Performance Expectation	SEPUP Unit and Activity Number	Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts	Common Core ELA/Math
groundwater resources are the result of past and current geoscience processes.				Technology on Society and the Natural World	
MS-ESS3-2: Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects.	*Geological Processes:* 1, 3, 4, 6, 7, 8, 11, 18*	Analyzing and Interpreting Data	MS-ESS3.B	Patterns Connections to Engineering, Technology, and Applications of Science -- Influence of Science, Engineering, and Technology on Society and the Natural World	RST.6-8.1 RST.6-8.2 RST.6-8.3 RST.6-8.4 WHST.6-8.1 WHST.6-8.2 WHST.6-8.9 SL.8.1 6.NS.C.5 MP.2 MP.4
MS-PS1-1: Develop models to describe the atomic composition of simple molecules and extended structures.	*Chemistry of Materials:* 2, 6, 7, 11, 12*	Developing and Using Models	MS-PS1.A	Scale, Proportion, and Quantity	RST.6-8.2 RST.6-8.3 RST.6-8.7
MS-PS1-2: Analyze and interpret data on the properties of substances before and after the substances interact to determine if	*Chemical Reactions:* 1, 2, 3, 4, 5*, 11	Analyzing and Interpreting Data Connections to the Nature of Science – Scientific Knowledge is Based on Empirical Evidence	MS-PS1.A MS-PS1.B	Patterns	RST.6-8.1 RST.6-8.3 RST.6-8.4 RST.6-8.7 RST.6-8.9 SL.8.1 WHST.6-8.9

CA Performance Expectation	SEPUP Unit and Activity Number	Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts	Common Core ELA/Math
a chemical reaction has occurred.					
MS-PS1-3: Gather and make sense of information to describe that synthetic materials come from natural resources and impact society.	*Chemistry of Materials:* 1, 2, 3, 4, 5, 11, 12, 13*	Obtaining, Evaluating, and Communicating Information	MS-PS1.A MS-PS1.B	Structure and Function Connections to Engineering, Technology, and Applications of Science -- Interdependence of Science, Engineering and Technology and Influence of Science, Engineering and Technology on the Natural World	RST.6-8.3 RST.6-8.7 WHST.6-8.1 WHST.6-8.9 7.RP.A.2
MS-PS1-4: Develop a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed.	*Chemistry of Materials:* 7, 8, 9, 10	Developing and Using Models	MS-PS1.A MS-PS3.A	Cause and Effect	RST.6-8.3
MS-PS1-5: Develop and use a model to describe how the total number of atoms does not change in a chemical reaction and thus mass is conserved.	*Chemical Reactions:* 1, 2, 3, 4, 5, 6, 7*	Developing and Using Models Science Models, Laws, Mechanisms, and Theories Explain Natural Phenomena	MS-PS1.B	Energy and Matter	RST.6-8.1 RST.6-8.3 RST.6-8.4 RST.6-8.7 RST.6-8.9 SL.8.1 WHST.6-8.9

CA Performance Expectation	SEPUP Unit and Activity Number	Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts	Common Core ELA/Math
MS-PS1-6: Undertake a design project to construct, test, and modify a device that either releases or absorbs thermal energy by chemical processes.	*Chemical Reactions:* 2, 3, 5, 8, 9, 10, 11*	Constructing Explanations and Designing Solutions	MS-ETS1.B MS-ETS1.C MS-PS1.B	Energy and Matter	RST.6-8.1 RST.6-8.3 RST.6-8.4 RST.6-8.7 SL.8.1 WHST.6-8.9
MS-ETS1-1: Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.	*Biomedical Engineering:* 1, 2, 3*, 4, 5, 7, 9	Asking Questions and Defining Problems	MS-ETS1.A	Influence of Science, Engineering, and Technology on Society and the Natural World	
MS-ETS1-2: Evaluate competing design solutions using a systematic process to determine how well they meet the criteria	*Biomedical Engineering:* 4, 5, 7*	Engaging in Argument from Evidence	MS-ETS1.B	No CCC cited in the CA standard	SL.8.4 6.RP.A.1 6.RP.A.3 MP.2

CA Performance Expectation	SEPUP Unit and Activity Number	Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts	Common Core ELA/Math
and constraints of the problem.					
MS-ETS1-3: Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.	*Biomedical Engineering:* 1, 2, 4, 5*	Analyzing and Interpreting Data	MS-ETS1.B MS-ETS1.C	No CCC cited in the CA standard	SL.8.4 6.RP.A.1 6.RP.A.3 MP.2
MS-ETS1-4: Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.	*Biomedical Engineering:* 2, 4, 5, 8, 9*	Developing and Using Models	MS-ETS1.B MS-ETS1.C	No CCC cited in the CA standard	SL.8.4 6.RP.A.1 6.RP.A.3 MP.2

GRADE 8

CA Performance Expectation	SEPUP Unit and Activity Number	Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts	Common Core ELA/Math
MS-LS3-1: Develop and use a model to describe why structural changes to genes (mutations) located on chromosomes may affect proteins and may result in harmful, beneficial, or neutral effects to the structure and function of the organism.	*Reproduction:* 1, 3, 7, 8, 12, 13*	Analyzing and Interpreting Data Asking Questions and Defining Problems Connections to the Nature of Science Constructing Explanations and Designing Solutions Developing and Using Models Obtaining, Evaluating, and Communicating Information Planning and Carrying Out Investigations	MS-LS1.B MS-LS3.A MS-LS3.B	Cause and Effect Connections to the Nature of Science Patterns Scale, Proportion, and Quantity Structure and Function	RST.6-8.1 RST.6-8.2 RST.6-8.4 RST.6-8.7 SL.8.1 WHST.6-8.2 WHST.6-8.9 6.SP.B.5 6.RP.A.1
MS-LS4-1: Analyze and interpret data for patterns in the fossil record that document the existence, diversity, extinction, and change	*Evolution:* 7, 8, 9, 10 11*	Analyzing and Interpreting Data Scientific Knowledge is Based on Empirical Evidence	MS-LS4.A	Cause and Effect Connections to the Nature of Science: Scientific Knowledge Assumes an Order and Consistency in	RST.6-8.3 RST.6-8.7 RST.6-8.9 WHST.6-8.2 6.SP.B.5

CA Performance Expectation	SEPUP Unit and Activity Number	Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts	Common Core ELA/Math
of life forms throughout the history of life on Earth under the assumption that natural laws operate today as in the past.				Natural Systems Patterns	
MS-LS4-2: Apply scientific ideas to construct an explanation for the anatomical similarities and differences among modern organisms and between modern and fossil organisms to infer evolutionary relationships.	*Evolution:* 7, 8, 9, 10 11, 12*	Constructing Explanations and Designing Solutions	MS-LS4.A	Patterns Connections to the Nature of Science: Scientific Knowledge Assumes an Order and Consistency in Natural Systems	RST.6-8.3 RST.6-8.7 RST.6-8.9 WHST.6-8.2 6.SP.B.5
MS-LS4-3: Analyze displays of pictorial data to compare patterns of similarities in the embryological development across multiple species to identify relationships not evident in the fully formed anatomy.	*Evolution:* 12, 13*	Analyzing and Interpreting Data	MS-LS4.A	Patterns	RST.6-8.7 6.SP.B.5

CA Performance Expectation	SEPUP Unit and Activity Number	Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts	Common Core ELA/Math
MS-LS4-4: Construct an explanation based on evidence that describes how genetic variations of traits in a population increase some individuals' probability of surviving and reproducing in a specific environment.	*Evolution:* 1, 2, 3, 4*	Constructing Explanations and Designing Solutions Developing and Using Models Engaging in Argument from Evidence Using Mathematics and Computational Thinking	MS-LS4.B	Cause and Effect	RST.6-8.2 RST.6-8.3 WHST.6-8.2 WHST.6-8.9 6.RP.A.1 6.SP.B.5
MS-LS4-5: Gather and synthesize information about the technologies that have changed the way humans influence the inheritance of desired traits in organisms.	*Evolution:* 14, 15, 16*	Obtaining, Evaluating, and Communicating Information	MS-LS4.B	Cause and Effect Connections to the Engineering, Technology and Applications of Science – Interdependence of Science, Engineering and Technology Connections to NOS – Interdependence of Science, Engineering and Technology	RST.6-8.1 RST.6-8.7 WHST.6-8.2 WHST.6-8.8 WHST.6-8.9
MS-LS4-6: Use mathematical representations to support explanations of how natural selection may lead to increases and	*Evolution:* 1, 2, 3, 4, 5, 6*	Using Mathematics and Computational Thinking	MS-LS4.C	Cause and Effect	RST.6-8.2 RST.6-8.3 SL.8.1 SL.8.4 WHST.6-8.2 WHST.6-8.9

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decreases of specific traits in populations over time.					6.RP.A.1 6.SP.B.5
MS-ESS1-1: Develop and use a model of the Earth-sun-moon system to describe the cyclic patterns of lunar phases, eclipses of the sun and moon, and seasons.	*Solar System and Beyond:* 2, 3, 4, 5, 6, 7, 9*	Developing and Using Models	MS-ESS1.A MS-ESS1.B	Connections to the Nature of Science – Scientific Knowledge Assumes an Order and Consistency in Natural Systems	RST.6-8.2 WHST.6-8.2 SL.8.5 6.RP.A.1
MS-ESS1-2: Develop and use a model to describe the role of gravity in the motions within galaxies and the solar system.	*Solar System and Beyond:* 1, 10, 11, 12, 13, 14, 15, 16*	Developing and Using Models	MS-ESS1.A MS-ESS1.B	Systems and System Models NOS -- Scientific Knowledge Assumes an Order and Consistency in Natural Systems	RST.6-8.1 WHST.6-8.2 WHST.6-8.9 SL.8.4 6.RP.A.1 6.RP.A.3 MP.2 MP.4
MS-ESS1-3: Analyze and interpret data to determine scale properties of objects in the solar system.	*Solar System and Beyond:* 10, 11, 12, 13*	Analyze and Interpret Data	MS-ESS1.B	Connections to Engineering, Technology, and Applications of Science – Interdependence of Science, Engineering and Technology	WHST.6-8.2 SL.8.4 6.RP.A.1 6.RP.A.3 MP.2 MP.4

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MS-ESS1-4: Construct a scientific explanation based on evidence from rock strata for how the geologic time scale is used to organize Earth's 4.6-billion-year-old history.	*Earth's Resources:* 9, 10, 11, 12*	Constructing Explanations and Designing Solutions	MS-ESS1.C	Scale, Proportion, and Quantity	RST.6-8.3 WHST.6-8.1 WHST.6-8.9
MS-ESS3-4: Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.	*Earth's Resources:* 2, 4, 6, 13*	Engaging in Argument from Evidence	MS-ESS3.C	Cause and Effect Connections to Engineering, Technology, and Applications of Science – Influence of Science, Engineering and Technology and the Natural World NOS – Science Addresses Questions About the Natural and Material World	RST.6-8.1 RST.6-8.3 WHST.6-8.1 WHST.6-8.9 6.SP.B.5 7.RP.A.2
MS-PS2-1: Apply Newton's Third Law to design a solution to a problem involving the	*Force and Motion:* 1, 10, 11, 12*	Constructing Explanations and Designing Solutions	MS-PS2.A	Systems and System Models Connections to Engineering, Technology, and Applications of Science – Influence of	RST.6-8.1 RST.6-8.3 RST.6-8.7 MP.2

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motion of two colliding objects.				Science, Engineering and Technology and the Natural World	
MS-PS2-2: Plan an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object.	*Force and Motion:* 1, 6, 7, 8, 9, 13*	Planning and Carrying Out Investigations NOS – Scientific Knowledge is Based on Empirical Evidence	MS-PS2.A	Stability and Change	RST.6-8.1 RST.6-8.2 RST.6-8.3 RST.6-8.7 6.RP.AP.2 6.SP.B.5 7.EE.B.4 7.RP.A.2 MP.2
MS-PS2-3: Ask questions about data to determine the factors that affect the strength of electric and magnetic forces.	*Fields and Interactions:* 7, 8, 9, 12, 13*	Asking Questons and Defining Problems	MS-PS2.B	Cause and Effect	RST.6-8.1 MP.2
MS-PS2-4: Construct and present arguments using evidence to support the claim that gravitational interactions are attractive and depend	*Fields and Interactions:* 3, 4, 7*	Engaging in Argument from Evidence NOS - Scientific Knowledge is Based on Empirical Evidence	MS-PS2.B	Systems and System Models	WHST.6-8.1

CA Performance Expectation	SEPUP Unit and Activity Number	Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts	Common Core ELA/Math
on the masses of interacting objects.					
MS-PS2-5: Conduct an investigation and evaluate the experimental design to provide evidence that fields exist between objects exerting forces on each other even though the objects are not in contact.	*Fields and Interactions:* 5, 7, 9, 10, 12*	Planning and Carrying Out Investigations	MS-PS2.B	Cause and Effect	RST.6-8.3 WHST.6-8.7
MS-PS3-1: Construct and interpret graphical displays of data to describe the relationships of kinetic energy to the mass of an object and to the speed of an object.	*Force and Motion:* 1, 2, 3, 4, 5*	Analyzing and Interpreting Data	MS-PS3.A	Scale, Proportion, and Quantity	RST.6-8.7 WHST.6-8.2 6.SP.B.5 7.RP.A.2
MS-PS3-2: Develop a model to describe that when the arrangement of objects interacting at a distance changes, different amounts of potential energy are stored in the system.	*Fields and Interactions:* 3, 4, 6, 7, 10, 11*	Developing and Using Models	MS-PS3.A MS-PS3.C	Systems and System Models	SL.8.5

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MS-PS4-1: Use mathematical representations to describe a simple model for waves that includes how the amplitude of a wave is related to the energy in a wave.	*Waves:* 1, 2, 3, 4, 7*	Using Mathematics and Computational Thinking NOS – Scientific Knowledge is Based on Empirical Evidence	MS-PS4.A	Patterns	RST.6-8.1 RST.6-8.3 RST.6-8.9 6.RP.A.1 7.RP.A.2 MP.2 MP.4
MS-PS4-2: Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials.	*Waves:* 3, 8, 9, 10, 11, 12, 13*	Developing and Using Models	MS-PS4.A MS-PS4.B	Structure and Function	RST.6-8.1 RST.6-8.3 RST.6-8.9 MP.2
MS-PS4-3: Integrate qualitative scientific and technical information to support the claim that digitized signals are a more reliable way to encode and transmit information than analog signals.	*Waves:* 5, 6	Obtaining, Evaluating, and Communicating Information	MS-PS4.C	Connections to Engineering, Technology, and Applications of Science – Influence of SET on Society and the Natural World Structure and Function NOS – Science is a Human Endeavor	RST.6-8.1 RST.6-8.3 RST.6-8.9 WHST.6-8.9

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MS-ETS1-1: Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.	*Force and Motion*: 1, 10, 11, 12, 13, 14, 15* *Fields and Interactions:* 2, 3, 6*	Asking Questions and Defining Problems	MS-ETS1.A	Influence of SET on Society and the Natural World	RST.6-8.1 WHST.6-8.8 MP.2 7.EE.3
MS-ETS1-2: Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.	*Fields and Interactions:* 6, 15*	Engaging in Argument from Evidence	MS-ETS1.B	No CCC cited in the CA standard	RST.6-8.1 RST.6-8.9 WHST.6-8.7 WHST.6-8.9 MP.2 7.EE.3
MS-ETS1-3: Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics	*Fields and Interactions:* 6, 11, 13, 15*	Analyzing and Interpreting Data	MS-ETS1.B MS-ETS1.C	No CCC cited in the CA standard	RST.6-8.1 RST.6-8.7 RST.6-8.9 MP.2 7.EE.3

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of each that can be combined into a new solution to better meet the criteria for success.					
MS-ETS1-4: Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.	*Fields and Interactions:* 1, 2, 3, 6, 11, 13*	Developing and Using Models	MS-ETS1.B MS-ETS1.C	No CCC cited in the CA standard	SL.8.5 MP.2 7.SP.7.a,b