Lab-Aids Correlations
for the
2023 Indiana Academic Standards
Grades 6-8

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This document is intended to show how the SEPUP *Issues and Science, 3rd Edition Redesigned for the NGSS* curriculum materials align with the Grade 6 2023 Indiana Academic Standards, Grade 7 2023 Indiana Academic Standards, and Grade 8 2023 Indiana Academic Standards.

ABOUT LAB-AIDS

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 are able to 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 and navigate to the program of interest.

ABOUT 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.

A suggested listing of units for Indiana in grades 6-8 from *Issues and Science, 3rd Edition Redesigned for the NGSS* is shown below.

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

*Units can be taught in varying orders. Some standards are found in multiple grades. Based on Indiana standards, this is the best scope and sequence suggestion. If your district would like to discuss scope and sequence, please reach out to Lab-aids at www.lab-aids.com.

ABOUT THE LAB-AIDS CITATIONS

Citations included in the correlation document are as follows:

SEPUP Unit title *The Chemistry of Materials:*
Activity Number 2, 12, 14*

* indicates where Performance Expectation is assessed

Performance Expectation	MS-PS1-2
Science and Engineering Practice	Planning and Carrying Out Investigations
Crosscutting Concept	Structure and Function
Disciplinary Core Idea	MS-PS1.A

SIXTH GRADE

Performance Expectation	SEPUP Unit and Activity Number	Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Waves and Their Applications in Technologies for Information Transfer				
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. *[Clarification Statement: Emphasis is on describing waves with both qualitative and quantitative thinking.]*	*Waves:* 1, 2, 3, 7*	SEP.5: Using Mathematics and Computational Thinking *Connections to Nature of Science* Scientific Knowledge is Based on Empirical Evidence	PS4.A: Wave Properties	CC.1: Patterns
Essential MS-PS4-2: Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials. *[Clarification Statement: Emphasis is on both light and mechanical waves. Examples of models could include drawings, simulations, and written descriptions.]*	*Waves:* 3, 4, 8, 9, 10, 11, 12, 13*	SEP.2: Developing and Using Models	PS4.A: Wave Properties PS4.B: Electromagnetic Radiation	CC.6: Structure and Function
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. *[Clarification Statement: Emphasis is on a basic understanding that waves can be used for communication purposes. Examples could include using fiber optic cable to transmit light pulses, radio wave pulses in Wi-Fi devices, and conversion of stored binary patterns to*	*Waves:* 5, 6	SEP.8: Obtaining, Evaluating, and Communicating Information	PS4.C: Information Technologies and Instrumentation	CC.6: Structure and Function *Connections to Engineering, Technology, and Applications of Science* Influence of Science, Engineering, and Technology on Society and the Natural World

* Performance Expectation assessment opportunity

Performance Expectation	SEPUP Unit and Activity Number	Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
make sound or text on a computer screen.]				*Connections to Nature of Science* Science is a Human Endeavor
From Molecules to Organisms: Structures and Processes				
Essential 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. *[Clarification Statement: Emphasis is on tracing movement of matter and flow of energy.]*	*From Cells to Organisms*: 12, 13*	SEP.6: Constructing Explanations and Designing Solutions *Connections to Nature of Science* Scientific Knowledge is Based on Empirical Evidence	LS1.C: Organization for Matter and Energy Flow in Organisms PS3.D: Energy in Chemical Processes and Everyday Life	CC.5: Energy and Matter
Ecosystems: Interactions, Energy, and Dynamics				
MS-LS2-1: Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem. *[Clarification Statement: Emphasis is on cause-and-effect relationships between resources and growth of individual organisms and the numbers of organisms in ecosystems during periods of abundant and scarce resources.]*	*Ecology:* 5, 6, 9*	SEP.4: Analyzing and Interpret Data	LS2.A: Interdependent Relationships in Ecosystems	CC.2: Cause and Effect

* Performance Expectation assessment opportunity

Performance Expectation	SEPUP Unit and Activity Number	Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
MS-LS2-2: Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems. *[Clarification Statement: Emphasis is on predicting consistent patterns of interactions in different ecosystems in terms of the relationships among and between organisms and abiotic components of ecosystems. Examples of types of interactions could include competitive, predatory, and mutually beneficial (symbiosis).]*	*Ecology:* 2, 8, 10*	SEP.6: Constructing Explanations and Designing Solutions	LS2.A: Interdependent Relationships in Ecosystems	CC.1: Patterns
MS-LS2-3: Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem. *[Clarification Statement: Emphasis is on describing the conservation of matter and flow of energy into and out of various ecosystems, and on defining the boundaries of the system.]*	*Ecology:* 7, 8, 11, 12*	SEP.2: Developing and Using Models	LS2.B: Cycle of Matter and Energy Transfer in Ecosystems	CC.5: Energy and Matter *Connections to Nature of Science* Scientific Knowledge Assumes an Order and Consistency in Natural Systems
Essential MS-LS2-4: Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations. *[Clarification Statement: Emphasis is on recognizing patterns in data and making warranted inferences about changes in populations, and on evaluating empirical evidence supporting arguments about changes to ecosystems.]*	*Ecology:* 1, 2, 3, 4, 5, 6, 13, 14*	SEP.7: Engaging in Argument from Evidence *Connections to Nature of Science* Scientific Knowledge is Based on Empirical Evidence	LS2.C: Ecosystem Dynamics, Functioning, and Resilience	CC.7: Stability and Change

* Performance Expectation assessment opportunity

Performance Expectation	SEPUP Unit and Activity Number	Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
MS-LS2-5: Evaluate competing design solutions for maintaining biodiversity and ecosystem services. *[Clarification Statement: Examples of ecosystem services could include water purification, nutrient recycling, and prevention of soil erosion. Examples of design solution constraints could include scientific, economic, and social considerations.]*	*Ecology:* 2, 4, 15*	SEP.7: Engaging in Argument from Evidence	LS2.C: Ecosystem Dynamics, Functioning, and Resilience LS4.D: Biodiversity and Humans ETS1.B: Developing Possible Solutions	CC.7: Stability and Change *Connections to Engineering, Technology, and Applications of Science* Influence of Science, Engineering, and Technology on Society and the Natural World *Connections to Nature of Science* Science Addresses Questions About the Natural and Material World
Earth's Place in the Universe				
Essential 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. *[Clarification Statement: Examples of models can be physical, graphical, or conceptual.]*	*Solar System and Beyond:* 2, 3, 4, 5*, 6, 7, 8, 9*	SEP.2: Developing and Using Models	ESS1.A: The Universe and Its Stars ESS1.B: Earth and the Solar System	CC.1: Patterns *Connections to Nature of Science* Scientific Knowledge Assumes an Order and Consistency in Natural Systems
MS-ESS1-2: Develop and use a model to describe the role of gravity in the motions within galaxies and the solar system. *[Clarification Statement: Emphasis for the model is on gravity as the force that holds together the solar system and Milky Way galaxy and controls orbital motions within them. Examples of models can be physical (such as the analogy of distance along a*	*Solar System and Beyond:* 10, 11, 12, 14, 15, 16*	SEP.2: Developing and Using Models	ESS1.A: The Universe and Its Stars ESS1.B: Earth and the Solar System	CC.4: Systems and System Models *Connections to Nature of Science* Scientific Knowledge Assumes an Order and Consistency in Natural Systems

* Performance Expectation assessment opportunity

Performance Expectation	SEPUP Unit and Activity Number	Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
football field or computer visualizations of elliptical orbits) or conceptual (such as mathematical proportions relative to the size of familiar objects such as students' school or state.]				
MS-ESS1-3: Analyze and interpret data to determine scale properties of objects in the solar system. *[Clarification Statement: Emphasis is on the analysis of data from Earth-based instruments, space-based telescopes, and spacecraft to determine similarities and differences among solar system objects. Examples of scale properties include the sizes of an object's layers (such as crust and atmosphere), surface features (such as volcanoes), and orbital radius. Examples of data include statistical information, drawings and photographs, and models].*	*Solar System and Beyond:* 1, 10, 11, 12, 13*	SEP.4: Analyze and Interpreting Data	ESS1.B: Earth and the Solar System	CC.3: Scale, Proportion, and Quantity *Connections to Engineering, Technology, and Applications of Science* Interdependence of Science, Engineering, and Technology
Engineering Design				
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*	SEP.1: Asking Questions and Defining Problems	ETS1.A: Defining and Delimiting Engineering Problems	Influence of Science, Engineering, and Technology on Society and the Natural World

* Performance Expectation assessment opportunity

Performance Expectation	SEPUP Unit and Activity Number	Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
MS-ETS1-2: Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.	*Biomedical Engineering:* 4, 5, 7*	SEP.7: Engaging in Argument from Evidence	ETS1.B: Developing Possible Solutions	
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**	SEP.4: Analyzing and Interpreting Data	ETS1.B: Developing Possible Solutions ETS1.C: Optimizing the Design Solution	
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*	SEP.2: Developing and Using Models	ETS1.B: Developing Possible Solutions ETS1.C: Optimizing the Design Solution	

* Performance Expectation assessment opportunity

SEVENTH GRADE

Performance Expectation	SEPUP Unit and Activity Number	Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Motion and Stability: Forces and Interactions				
Essential MS-PS2-1: Apply Newton's Third Law to design a solution to a problem involving the motion of two colliding objects. *[Clarification Statement: Examples of practical problems could include the impact of collisions between two cars, between a car and stationary objects, and between a meteor and a space vehicle.]*	*Force and Motion:* 1, 10, 11, 12*	SEP.6: Constructing Explanations and Designing Solutions	PS2.A: Forces and Motion	CC.4: Systems and System Models *Connections to Engineering, Technology, and Applications of Science* Influence of Science, Engineering, and Technology on Society and the Natural World
Essential 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. *[Clarification Statement: Emphasis is on balanced (Newton's First Law) and unbalanced forces in a system, qualitative comparisons of forces, mass and changes in motion (Newton's Second Law), frame of reference, and specification of units.]*	*Force and Motion:* 1, 6, 7, 8, 9, 13*	SEP.3: Planning and Carrying Out Investigations *Connections to Nature of Science* Scientific Knowledge is Based on Empirical Evidence	PS2.A: Forces and Motion	CC.7: Stability and Change

* Performance Expectation assessment opportunity

Performance Expectation	SEPUP Unit and Activity Number	Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
MS-PS2-3: Ask questions and design a plan to determine the factors that affect the strength of electric and magnetic forces. *[Clarification Statement: Examples of devices that use electric and magnetic forces could include electromagnets, electric motors, or generators. Examples of data could include the effect of the number of turns of wire on the strength of an electromagnet, or the effect of increasing the number or strength of magnets on the speed of an electric motor.]*	*Fields and Interactions:* 7, 8, 9, 12, 13*, 14	SEP.1: Asking Questions and Defining Problems	PS2.B: Types of Interactions	CC.2: Cause and Effect
MS-PS2-4: Construct and present arguments using evidence to support the claim that gravitational interactions are attractive and depend on the masses of interacting objects. *[Clarification Statement: Examples of evidence for arguments could include data generated from simulations or digital tools; and charts displaying mass, strength of interaction, distance from the sun, and orbital periods of objects within the solar system.]*	*Fields and Interactions:* 3, 4, 7*	SEP.7: Engaging in Argument from Evidence *Connections to Nature of Science* Scientific Knowledge is Based on Empirical Evidence	PS2.B: Types of Interactions	CC.4: Systems and System Models

* Performance Expectation assessment opportunity

Performance Expectation	SEPUP Unit and Activity Number	Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
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. *[Clarification Statement: Examples of this phenomenon could include the interactions of magnets, electrically-charged strips of tape, and electrically-charged pith balls. Examples of investigations could include first-hand experiences or simulations.]*	*Fields and Interactions:* 5, 7, 9, 10, 12*	SEP.3: Planning and Carrying Out Investigations	PS2.B: Types of Interactions	CC.2: Cause and Effect
Energy				
Essential 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. *[Clarification Statement: Emphasis is on descriptive relationships between kinetic energy and mass separately from kinetic energy and speed. Examples could include riding a bicycle at different speeds, rolling different sizes of rocks downhill, and getting hit by a whiffle ball versus a tennis ball.]*	*Force and Motion:* 1, 2, 3, 4, 5*	SEP.4: Analyzing and Interpreting Data	PS3.A: Definitions of Energy	CC.3: Scale, Proportion, and Quantity

* Performance Expectation assessment opportunity

Performance Expectation	SEPUP Unit and Activity Number	Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
MS-PS3-2: Develop a model to describe what happens when the arrangement of objects interacting at a distance changes, different amounts of potential energy are stored in the system. *[Clarification Statement: Emphasis is on relative amounts of potential energy, not on calculations of potential energy. Examples of objects within systems interacting at varying distances could include: the Earth and either a roller coaster cart at varying positions on a hill or objects at varying heights on shelves, changing the direction/orientation of a magnet, and a balloon with static electrical charge being brought closer to a classmate's hair. Examples of models could include representations, diagrams, pictures, and written descriptions of systems.]*	*Fields and Interactions:* 3, 4, 6, 7, 10, 11* *Force and Motion:* 1, 3, 4, 5, 10, 14	Analyzing and Interpreting Data Asking Questions and Defining Problems SEP.2: Developing and Using Models	PS3.A: Definitions of Energy PS3.C: Relationship Between Energy and Forces	CC.4: Systems and System Models
Essential MS-PS3-3: Apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer. *[Clarification Statement: Examples of devices could include an insulated box, a solar cooker, and a Styrofoam cup.]*	*Energy:* 1, 7, 8, 10, 11, 12, 13*	SEP.6: Constructing Explanations and Designing Solutions	PS3.A: Definitions of Energy PS3.B: Conservation of Energy and Energy Transfer ETS1.A: Defining and Delimiting an Engineering Problem ETS1.B: Developing Possible Solutions	CC.5: Energy and Matter

* Performance Expectation assessment opportunity

Performance Expectation	SEPUP Unit and Activity Number	Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
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. *[Clarification Statement: Examples of experiments could include comparing final water temperatures after different masses of ice melted in the same volume of water with the same initial temperature, the temperature change of samples of different materials with the same mass as they cool or heat in the environment, or the same material with different masses when a specific amount of energy is added.]*	*Energy:* 1, 4, 6, 7, 8*	SEP.3: Planning and Carrying Out Investigations *Connections to Nature of Science* Scientific Knowledge is Based on Empirical Evidence	PS3.A: Definitions of Energy PS3.B: Conservation of Energy and Energy Transfer	CC.3: Scale, Proportion, and Quantity
MS-PS3-5: Construct, use, and present arguments to support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object. *[Clarification Statement: Examples of empirical evidence used in arguments could include an inventory or other representation of the energy before and after the transfer in the form of temperature changes or motion of object.]*	*Energy:* 2, 3, 4, 5, 6*	SEP.7: Engaging in Argument from Evidence *Connections to Nature of Science* Scientific Knowledge is Based on Empirical Evidence	PS3.B: Conservation of Energy and Energy Transfer	CC.5: Energy and Matter

* Performance Expectation assessment opportunity

Performance Expectation	SEPUP Unit and Activity Number	Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
From Molecules to Organisms: Structures and Processes				
Essential 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. *[Clarification Statement: Emphasis is on developing evidence that living things are made of cells, distinguishing between living and non-living things, and understanding that living things may be made of one cell or many and varied cells.]*	*From Cells to Organisms:* 1, 2, 3, 4, 9*	SEP.3: Planning and Carrying Out Investigations	LS1.A: Structure and Function	CC.3: Scale, Proportion, and Quantity *Connections to Engineering, Technology and Applications of Science* Interdependence of Science, Engineering, and Technology
Essential MS-LS1-2: Develop and use a model to describe the function of a cell as a whole and ways parts of cells contribute to the function. *[Clarification Statement: Emphasis is on the cell functioning as a whole system and the primary role of identified parts of the cell, specifically the nucleus, chloroplasts, mitochondria, cell membrane, and cell wall.]*	*From Cells to Organisms:* 6, 7, 8*	SEP.2: Developing and Using Models	LS1.A: Structure and Function	CC.6: Structure and Function

* Performance Expectation assessment opportunity

Performance Expectation	SEPUP Unit and Activity Number	Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
MS-LS1-3: Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells. *[Clarification Statement: Emphasis is on the conceptual understanding that cells form tissues and tissues form organs specialized for particular body functions. Examples could include the interaction of subsystems within a system and the normal functioning of those systems.]*	*From Cells to Organisms*: 10, 14, 15 *Body Systems:* 1, 2, 3, 4, 9, 10, 11, 12*	SEP.7: Engaging in Argument from Evidence	LS1.A: Structure and Function	CC.4: Systems and System Models *Connections to Nature of Science* Science is a Human Endeavor
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. *[Clarification Statement: Emphasis is on describing that molecules are broken apart and put back together and that in this process, energy is released.]*	*From Cells to Organisms:* 5, 11* *Body Systems:* 5	SEP.2: Developing and Using Models	LS1.C: Organization for Matter and Energy Flow in Organisms PS3.D: Energy in Chemical Processes and Everyday Life	CC.5: Energy and Matter
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*	SEP.8: Obtaining, Evaluating, and Communicating Information	LS1.D: Information Processing	CC.2: Cause and Effect

* Performance Expectation assessment opportunity

Performance Expectation	SEPUP Unit and Activity Number	Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Earth's Place in the Universe				
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. *[Clarification Statement: Emphasis is on how analyses of rock formations and the fossils they contain are used to establish relative ages of major events in Earth's history. Examples of Earth's major events could range from being very recent (such as the last Ice Age or the earliest fossils of homo sapiens) to very old (such as the formation of Earth or the earliest evidence of life). Examples can include the formation of mountain chains and ocean basins, the evolution or extinction of particular living organisms, or significant volcanic eruptions.]*	*Earth's Resources:* 9, 10, 11, 12*	SEP.2: Developing and Using Models	ESS1.C: The History of Planet Earth	CC.3: Scale, Proportion, and Quantity
Essential MS-ESS2-1: Develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process. *[Clarification Statement: Emphasis is on the processes of melting, crystallization, weathering, deformation, and sedimentation, which act together to form minerals and rocks through the cycling of Earth's materials.]*	*Geological Processes:* 2, 5, 8, 9, 10, 11, 13, 14, 15*	SEP.2: Developing and Using Models	ESS2.A: Earth's Materials and Systems	CC.7: Stability and Change

* Performance Expectation assessment opportunity

Performance Expectation	SEPUP Unit and Activity Number	Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
MS-ESS2-2: Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales. *[Clarification Statement: Emphasis is on how processes change Earth's surface at time and spatial scales that can be large (such as slow plate motions or the uplift of large mountain ranges) or small (such as rapid landslides or microscopic geochemical reactions), and how many geoscience processes (such as earthquakes, volcanoes, and meteor impacts) usually behave gradually but are punctuated by catastrophic events. Examples of geoscience processes include surface weathering and deposition by the movements of water, ice, and wind. Emphasis is on geoscience processes that shape local geographic features, where appropriate.]*	*Geological Processes:* 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13* *Land, Water, and Human Interactions:* *3*, 4, 6, 7, 8, 10, 11, 12, 13, 14*	SEP.6: Constructing Explanations and Designing Solutions	ESS2.A: Earth's Materials and Systems ESS2.C: The Roles of Water in Earth's Surface Processes	CC.3: Scale, Proportion, and Quantity
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. *[Clarification Statement: Examples of data include similarities of rock and fossil types on different continents, the shapes of the continents (including continental shelves), and the locations of ocean structures (such as ridges, fracture zones, and trenches).]*	*Geological Processes: 10, 11, 12, 13, 14**	SEP.4: Analyzing and Interpret Data *Connections to Nature of Science* Scientific Knowledge is Open to Revision in Light of New Evidence	ESS1.C: The History of Planet Earth ESS2.B: Plate Tectonics and Large-Scale System Interactions	CC.1: Patterns

* Performance Expectation assessment opportunity

Performance Expectation	SEPUP Unit and Activity Number	Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Earth and Human Activity				
Essential MS-ESS3-1: Construct a scientific explanation based on evidence for how the uneven distributions of Earth's mineral, energy, and groundwater resources are the result of past and current geoscience processes. *[Clarification Statement: Emphasis is on how these resources are limited and typically non-renewable, and how their distributions are significantly changing as a result of removal by humans. Examples of uneven distributions of resources as a result of past processes include but are not limited to petroleum (locations of the burial of organic marine sediments and subsequent geologic traps), metal ores (locations of past volcanic and hydrothermal activity associated with subduction zones), and soil (locations of active weathering and/or deposition of rock).]*	*Geological Processes:* 2, 16*, 17* *Earth's Resources:* *1, 2, 3, 5, 7, 8, 14**	SEP.6: Constructing Explanations and Designing Solutions	ESS3.A: Natural Resources	CC.2: Cause and Effect *Connections to Engineering, Technology, and Applications of Science* Influence of Science, Engineering, and 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. *[Clarification Statement: Emphasis is on how some natural hazards, such as volcanic eruptions and severe weather, are preceded by phenomena that allow for reliable predictions, but others, such as earthquakes, occur suddenly and with no notice, and thus are not yet predictable. Examples of natural hazards can be taken from interior processes (such as*	*Geological Processes:* 1, 3, 4, 6, 7, 8, 11, 18*	SEP.4: Analyzing and Interpreting Data	ESS3.B: Natural Hazards	CC.1: Patterns *Connections to Engineering, Technology, and Applications of Science* Influence of Science, Engineering, and Technology on Society and the Natural World

* Performance Expectation assessment opportunity

Performance Expectation	SEPUP Unit and Activity Number	Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
earthquakes and volcanic eruptions), surface processes (such as mass wasting and tsunamis), or severe weather events (such as hurricanes, tornadoes, and floods). Examples of data can include the locations, magnitudes, and frequencies of the natural hazards. Examples of technologies can be global (such as satellite systems to monitor hurricanes or forest fires) or local (such as building basements in tornado-prone regions or reservoirs to mitigate droughts).]				
Engineering Design				
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, 13, 14, 15* *Fields and Interactions:* 2, 3, 6*	SEP.1: Asking Questions and Defining Problems	ETS1.A: Defining and Delimiting Engineering Problems	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 and constraints of the problem.	*Fields and Interactions:* 6, 13, 15	SEP.7: Engaging in Argument from Evidence	ETS1.B: Developing Possible Solutions	

* Performance Expectation assessment opportunity

Performance Expectation	SEPUP Unit and Activity Number	Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
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.	*Fields and Interactions:* 6, 11, 13, 15*	SEP.4: Analyzing and Interpreting Data	ETS1.B: Developing Possible Solutions ETS1.C: Optimizing the Design Solution	
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*	SEP.2: Developing and Using Models	ETS1.B: Developing Possible Solutions ETS1.C: Optimizing the Design Solution	

* Performance Expectation assessment opportunity

EIGHTH GRADE

Performance Expectation	SEPUP Unit and Activity Number	Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Matter and Its Interactions				
Essential MS-PS1-1: Develop models to describe the atomic composition of simple molecules and extended structures. *[Clarification Statement: Emphasis is on developing models of molecules that vary in complexity. Examples of simple molecules could include ammonia and methanol. Examples of extended structures could include sodium chloride or diamonds. Examples of molecular-level models could include drawings, 3D ball and stick structures, or computer representations showing different molecules with different types of atoms.]*	*Chemistry of Materials:* 2, 6, 7, 12*	SEP.2: Developing and Using Models	PS1.A: Structure and Properties of Matter	CC.3: Scale, Proportion, and Quantity
Essential MS-PS1-2: Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred. *[Clarification Statement: Examples of reactions could include burning sugar or steel wool, fat reacting with sodium hydroxide, and mixing zinc with hydrogen chloride.]*	*Chemical Reactions:* 1, 2, 3, 4, 5* *Chemistry of Materials:* 4	SEP.4: Analyzing and Interpreting Data *Connections to the Nature of Science* Scientific Knowledge is Based on Empirical Evidence	PS1.A: Structure and Properties of Matter PS1.B: Chemical Reactions	CC.1: Patterns

* Performance Expectation assessment opportunity

Performance Expectation	SEPUP Unit and Activity Number	Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
MS-PS1-3: Gather and make sense of information to describe that synthetic materials come from natural resources and impact society. *[Clarification Statement: Emphasis is on natural resources that undergo a chemical process to form the synthetic material. Examples of new materials could include new medicine, foods, and alternative fuels.]*	*Chemistry of Materials:* 1, 2, 3, 4, 5, 11, 12, 13*	SEP.8: Obtaining, Evaluating, and Communicating Information	PS1.A: Structure and Properties of Matter PS1.B: Chemical Reactions	CC.6: Structure and Function *Connections to Engineering, Technology, and Applications of Science* Interdependence of Science, Engineering, and Technology Influence of Science, Engineering and Technology on Society and the Natural World
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. *[Clarification Statement: Emphasis is on qualitative molecular-level models of solids, liquids, and gases to show that adding or removing thermal energy increases or decreases kinetic energy of the particles until a change of state occurs. Examples of models could include drawing and diagrams. Examples of particles could include molecules or inert atoms. Examples of pure substances could include water, carbon dioxide, and helium.]*	*Chemistry of Materials:* 8, 9, 10*	SEP.2: Developing and Using Models	PS1.A: Structure and Properties of Matter PS3.A: Definitions of Energy	CC.2: Cause and Effect

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Performance Expectation	SEPUP Unit and Activity Number	Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
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. [Clarification Statement: Emphasis is on law of conservation of matter and on physical models or drawings, including digital forms, that represent atoms.]	*Chemical Reactions:* 1, 2, 3, 4, 5, 6, 7*	SEP.2: Developing and Using Models *Connections to Nature of Science* Science Models, Laws, Mechanisms, and Theories Explain Natural Phenomena	PS1.B: Chemical Reactions	CC.5: Energy and Matter
MS-PS1-6: Undertake a design project to construct, test, and modify a device that either releases or absorbs thermal energy by chemical processes. *[Clarification Statement: Emphasis is on the design, controlling the transfer of energy to the environment, and modification of a device using factors such as type and concentration of a substance. Examples of designs could involve chemical reactions such as dissolving ammonium chloride or calcium chloride.]*	*Chemical Reactions:* 2, 3, 5, 8, 9, 10, 11*	SEP.6: Constructing Explanations and Designing Solutions	PS1.B: Chemical Reactions ETS1.B: Developing Possible Solutions ETS1.C: Optimizing the Design Solution	CC.5: Energy and Matter
From Molecules to Organisms: Structures and Processes				
MS-LS1-4: Use argument based on 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. *[Clarification Statement: Examples of behaviors that affect the probability of animal reproduction could*	*Reproduction:* 10*, 11*	SEP.7: Engaging in Argument from Evidence Constructing Explanations and Designing Solutions Developing and Using Models	LS1.B: Growth and Development of Organisms	CC.2: Cause and Effect

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Performance Expectation	SEPUP Unit and Activity Number	Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
include nest building to protect young from cold, herding of animals to protect young from predators, and vocalization of animals and colorful plumage to attract mates for breeding. Examples of animal behaviors that affect the probability of plant reproduction could include transferring pollen or seeds and creating conditions for seed germination and growth. Examples of plant structures could include bright flowers attracting butterflies that transfer pollen, flower nectar and odors that attract insects that transfer pollen, and hard shells on nuts that squirrels bury.]				
MS-LS1-5: Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms. *[Clarification Statement: Examples of local environmental conditions could include availability of food, light, space, and water. Examples of genetic factors could include large breed cattle and species of grass affecting growth of organisms. Examples of evidence could include drought decreasing plant growth, fertilizer increasing plant growth, different varieties of plant seeds growing at different rates in different conditions, and fish growing larger in large ponds than they do in small ponds.]*	*Reproduction:* 1, 7*	SEP.6: Constructing Explanations and Designing Solutions Asking Questions and Defining Problems Obtaining, Evaluating, and Communicating Information	LS1.B: Growth and Development of Organisms	CC.2: Cause and Effect
Heredity: Inheritance and Variation of Traits				

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Performance Expectation	SEPUP Unit and Activity Number	Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
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. *[Clarification Statement: Emphasis is on conceptual understanding that changes in genetic material may result in making different proteins.]*	*Reproduction:* 1, 3, 8, 12, 13* *Evolution:* 3, 4, 5*	SEP.2: Developing and Using Models	LS3.A: Inheritance of Traits LS3.B: Variation of Traits	CC.6: Structure and Function
Essential 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. *[Clarification Statement: Emphasis is on using models such as Punnett squares, diagrams, and simulations to describe the cause-and-effect relationship of gene transmission from parent(s) to offspring and resulting genetic variation.]*	*Reproduction:* 1, 2, 3, 4, 5, 6, 8, 9*	SEP.2: Developing and Using Models	LS1.B: Growth and Development of Organisms LS3.A: Inheritance of Traits LS3.B: Variation of Traits	CC.2: Cause and Effect
Biological Evolution: Unity and Diversity				

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Performance Expectation	SEPUP Unit and Activity Number	Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
MS-LS4-1: Analyze and interpret data for patterns in the fossil record that document the existence, diversity, extinction, and change of life forms throughout the history of life on Earth under the assumption that natural laws operate today as in the past. *[Clarification Statement: Emphasis is on finding patterns of changes in the level of complexity of anatomical structures in organisms and the chronological order of fossil appearance in the rock layers.]*	*Evolution:* 7, 8, 9, 10, 11*	SEP.4: Analyzing and Interpreting Data *Connections to Nature of Science* *Scientific* Knowledge is Based on Empirical Evidence	LS4.A: Evidence of Common Ancestry and Diversity	CC.1: Patterns *Connections to Nature of Science* Scientific Knowledge Assumes an Order and Consistency in Natural Systems
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. *[Clarification Statement: Emphasis is on explanations of the evolutionary relationships among organisms in terms of similarity or differences of the gross appearance of anatomical structures.]*	*Evolution:* 7, 8, 9, 10 11, 12*	SEP-6: Constructing Explanations and Designing Solutions	LS4.A: Evidence of Common Ancestry and Diversity	CC.1: Patterns *Connections to Nature of Science* Scientific Knowledge Assumes an Order and Consistency in Natural Systems
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. *[Clarification Statement: Emphasis is on inferring general patterns of relatedness among embryos of different organisms by comparing the macroscopic appearance of diagrams or pictures.]*	*Evolution:* 12, 13*	SEP.4: Analyzing and Interpreting Data	LS4.A: Evidence of Common Ancestry and Diversity	CC.1: Patterns

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Performance Expectation	SEPUP Unit and Activity Number	Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Essential 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. *[Clarification Statement: Emphasis is on using simple probability statements and proportional reasoning to construct explanations.]*	*Evolution:* 1, 2, 3, 4*	SEP.6: Constructing Explanations and Designing Solutions	LS4.B: Natural Selection	CC.2: Cause and Effect
MS-LS4-5: Gather and synthesize information about the technologies that have changed the way humans influence the inheritance of desired traits in organisms. *[Clarification Statement: Emphasis is on synthesizing information from reliable sources about the influence of humans on genetic outcomes in artificial selection (such as genetic modification, animal husbandry, gene therapy); and, on the impacts these technologies have on society as well as the technologies leading to these scientific discoveries.]*	*Evolution:* 14, 15, 16*	SEP.8: Obtaining, Evaluating, and Communicating Information	LS4.B: Natural Selection	CC.2: Cause and Effect *Connections to Engineering, Technology, and Applications of Science* Interdependence of Science, Engineering, and Technology *Connections to the Nature of Science* Science Addresses Questions About the Natural and Material World
MS-LS4-6: Use mathematical representations to support explanations of how natural selection may lead to increases and decreases of specific traits in populations over time. *[Clarification Statement: Emphasis is on using mathematical models, probability statements, and proportional reasoning to support explanations of trends in changes to populations over time.]*	*Evolution:* 1, 2, 3, 4, 5, 6*	SEP.5: Using Mathematics and Computational Thinking	LS4.C: Adaptation	CC.2: Cause and Effect

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Performance Expectation	SEPUP Unit and Activity Number	Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Earth's Systems				
Essential 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. *[Clarification Statement: Emphasis is on the ways water changes its state as it moves through the multiple pathways of the hydrologic cycle. Examples of models can be conceptual or physical.]*	*Land, Water, and Human Interactions:* 2, 5, 7, 8, 9*	SEP.2: Developing and Using Models	ESS2.C: The Roles of Water in Earth's Surface Processes	CC.5: Energy and Matter
Essential MS-ESS2-5: Collect data to provide evidence for how the motions and complex interactions of air masses results in changes in weather conditions. *[Clarification Statement: Emphasis is on how air masses flow from regions of high pressure to low pressure, causing weather (defined by temperature, pressure, humidity, precipitation, and wind) at a fixed location to change over time, and how sudden changes in weather can result when different air masses collide. Emphasis is on how weather can be predicted within probabilistic ranges. Examples of data can be provided to students (such as weather maps, diagrams, and visualizations) or obtained through laboratory experiments (such as with condensation).]*	*Weather and Climate:* *2, 3, 7, 9, 10, 11, 12, 13**	SEP.3: Planning and Carrying Out Investigations	ESS2.C: The Roles of Water in Earth's Surface Processes ESS2.D: Weather and Climate	CC.2: Cause and Effect

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Performance Expectation	SEPUP Unit and Activity Number	Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
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. *[Clarification Statement: Emphasis is on how patterns vary by latitude, altitude, and geographic land distribution. Emphasis of atmospheric circulation is on the sunlight-driven latitudinal banding, the Coriolis effect, and resulting prevailing winds; emphasis of ocean circulation is on the transfer of heat by the global ocean convection cycle, which is constrained by the Coriolis effect and the outlines of continents. Examples of models can be diagrams, maps and globes, or digital representations.]*	*Weather and Climate:* *2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 13, 14**	SEP.2: Developing and Using Models	ESS2.C: The Roles of Water in Earth's Surface Processes E SS2.D: Weather and Climate	CC.4: Systems and System Models
Earth and Human Activity				
MS-ESS3-3: Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment. *[Clarification Statement: Examples of the design process include examining human environmental impacts, assessing the kinds of solutions that are feasible, and designing and evaluating solutions that could reduce that impact. Examples of human impacts can include water usage (such as the withdrawal of water from streams and aquifers or the construction of dams and levees), land usage (such as urban development, agriculture, or the removal of wetlands), and pollution (such as of the air, water, or land).]*	*Land, Water, and Human Interactions:* 1, 3, 4, 5, 6, 9, 13, 14, 15, 16*	SEP.6: Constructing Explanations and Designing Solutions	ESS3.C: Human Impacts on Earth Systems	CC.2: Cause and Effect *Connections to Engineering, Technology, and Applications of Science* Influence of Science, Engineering, and Technology on Society and the Natural World

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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. *[Clarification Statement: Examples of evidence include grade-appropriate databases on human populations and the rates of consumption of food and natural resources (such as freshwater, mineral, and energy). Examples of impacts can include changes to the appearance, composition, and structure of Earth's systems as well as the rates at which they change. The consequences of increases in human populations and consumption of natural resources are described by science, but science does not make the decisions for the actions society takes.]*	*Earth's Resources:* 2, 4, 6, 13* *Evolution:* 14	SEP.7: Engaging in Argument from Evidence	ESS3.C: Human Impacts on Earth Systems	CC.2: Cause and Effect *Connections to Engineering, Technology, and Applications of Science* Influence of Science, Engineering, and Technology on Society and the Natural World *Connections to the Nature of Science* Science Addresses Questions About the Natural and Material World
Essential MS-ESS3-5: Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over time. *[Clarification Statement: Examples of factors include human activities (such as fossil fuel combustion, cement production, and agricultural activity) and natural processes (such as changes in incoming solar radiation or volcanic activity). Examples of evidence can include tables, graphs, and maps of global and regional temperatures, atmospheric levels of gases such as carbon dioxide and methane, and the rates of human activities. Emphasis is on the major role that human activities play in causing the rise in global temperatures.]*	*Weather and Climate:* 1, 10, 14, 15, 16*	SEP.1: Asking Questions and Defining Problems	ESS3.D: Global Climate Change	CC.7: Stability and Change

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Performance Expectation	SEPUP Unit and Activity Number	Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Engineering Design				
Essential 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.	*Land, Water, and Human Interactions:* 7, 12*	SEP.1: Asking Questions and Defining Problems	ETS1.A: Defining and Delimiting Engineering Problems	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 and constraints of the problem.	*Land, Water, and Human Interactions: 12, 16**	SEP.7: Engaging in Argument from Evidence	ETS1.B: Developing Possible Solutions	
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.	*Chemical Reactions:* *8, 9, 10, 11* *Weather and Climate:* *12**	SEP.4: Analyzing and Interpreting Data	ETS1.B: Developing Possible Solutions ETS1.C: Optimizing the Design Solution	
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.	*Chemical Reactions*: 8, 9, 10, 11 *Weather and Climate*: 12*	SEP.2: Developing and Using Models	ETS1.B: Developing Possible Solutions ETS1.C: Optimizing the Design Solution	

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Performance Expectation	SEPUP Unit and Activity Number	Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
	Fields and Interactions: 1, 2, 3, 6, 11, 13*			

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