Grade 7 Science	
From Molecules to Organisms: Structure and Processes	
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.
MS-LS 1-7	*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.
Ecosystems: Interactions, Energy, and Dynamics	
MS-LS 2-2	*Construct an explanation that predicts* patterns of interactions among organisms across multiple ecosystems.
MS-LS 2-3	*Develop a model to describe* the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.
MS-LS2-4	*Construct an argument supported by empirical evidence* that changes to physical or biological components of an ecosystem affect populations.
Matter and its Interactions	
MS-PS 1-1	*Develop models to describe* the atomic composition of simple molecules and extended structures
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.
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.
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.
Earth's Systems	
MS-ESS2-1	*Develop a model to describe* the cycling of Earth's materials and the flow of energy that drives this process.
MS-ESS2-2	*Construct an explanation based on evidence* for how geoscience processes have changed Earth's surface at varying time and spatial scales.
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.

Grade 8 Science	
Heredity: Inheritance and Variation of Traits	
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
Biological Evolution: Unity and Diversity	
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.
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.
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.
Earth's Place in the Universe	
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.
MS-ESS1-2.	*Develop and use a model to describe* the role of gravity in the motions within galaxies and the solar system.
Earth and Human Activity	
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.
Motion and Stability: Forces and Interaction	
MS-PS2-1.	*Apply* Newton's Third Law *to design a solution* to a problem involving the motion of two colliding objects.
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.
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.
Energy	
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.
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.

Biology and the Living Earth	
From Molecules to Organisms: Structures and Processes	
HS-LS1-1	*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.
HS-LS1-2	*Develop and use a model to illustrate* the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.
HS-LS1-6	*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.
Ecosystems: Interactions, Energy, and Dynamics	
HS-LS2-2	*Use mathematical representations to support and revise explanations based on evidence* about factors affecting biodiversity and populations in ecosystems of different scales.
HS-LS2-3	*Construct and revise an explanation based on evidence* for the cycling of matter and flow of energy in aerobic and anaerobic conditions.
HS-LS2-5	*Develop a model to illustrate* the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere.
Heredity: Inheritance and Variation of Traits	
HS-LS3-1	*Ask questions to clarify relationships* about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.
HS-LS3-2.	*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
Biological Evolution: Unity and Diversity	
HS-LS4-2.	*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.
HS-LS4-3	*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.
Earth and Human Activity	
HS-ESS3-4	*Evaluate or refine a technological solution* that reduces impacts of human activities on natural systems.
HS-ESS3–5	*Analyze geoscience data* and the results from global climate models *to make an evidence-based forecast* of the current rate of global or regional climate change and associated future impacts to Earth systems.

Chemistry in the Earth System	
Matter and Its Interactions	
HS-PS1-1.	*Use the periodic table as a model to predict* the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms.
HS-PS1-2.	*Construct and revise an explanation* for the outcome of a simple chemical reaction based on the outermost electron states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties.
HS-PS1-3.	*Plan and conduct an investigation to gather evidence to compare* the structure of substances at the bulk scale to infer the strength of electrical forces between Particles.
HS-PS1-4.	*Develop a model to illustrate* that the release or absorption of energy from a chemical reaction system depends upon the changes in total bond energy.
HS-PS1-5.	*Apply scientific principles and evidence to provide an explanation* about the effects of changing the temperature or concentration of the reacting particles on the rate at which a reaction occurs.
HS-PS1-6.	*Refine the design* of a chemical system by specifying a change in conditions that would produce increased amounts of products at equilibrium.
HS-PS1-7.	*Use mathematical representations to support the claim* that atoms, and therefore mass, are conserved during a chemical reaction.
Energy	
HS-PS3-2.	*Develop and use models to illustrate* that energy at the macroscopic scale can be accounted for as either motions of particles or energy stored in fields
HS-PS3-4.	*Plan and conduct an investigation to provide evidence* that the transfer of thermal energy when two components of different temperature are combined within a closed system results in a more uniform energy distribution among the components in the system (second law of thermodynamics).
Earth's Systems	
HS-ESS2-2	*Analyze geoscience data to make the claim* that one change to Earth's surface can create feedback that causes changes to other Earth's systems.
HS-ESS2-3	*Develop a model based on evidence* of Earth's interior to describe the cycling of matter by thermal convection
Earth and Human Activity	
HS-ESS3–5	*Analyze geoscience data and the results* from global climate models *to make an evidence-based forecast* of the current rate of global or regional climate change and associated future impacts to Earth systems.

Physics in the Universe	
Matter and Its Interactions	
PS1-8	*Develop models to illustrate* the changes in the composition of the nucleus of the atom and the energy released during the processes of fission, fusion, and radioactive decay.
Motion and Stability: Forces and Interactions	
PS2-1	Analyze data to support the claim that Newton's second law of motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration.
PS2-2	Use mathematical representations to support the claim that the total momentum of a system of objects is conserved when there is no net force on the system.
PS2-4	Use mathematical representations of Newton's Law of Gravitation and Coulomb's Law to describe and predict the gravitational and electrostatic forces between objects.
Energy	
PS3-1	Create a computational model to calculate the change in the energy of one component in a system when the change in energy of the other component(s) and energy flows in and out of the system are known.
PS3-2	Develop and use models to illustrate that energy at the macroscopic scale can be accounted for as a combination of energy associated with the motions of particles (objects) and energy associated with the relative position of particles (objects).
Waves and Their Applications in Technologies for Information Transfer	
PS4-1	Use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves traveling in various media.
PS4-3	Evaluate the claims, evidence, and reasoning behind the idea that electromagnetic radiation can be described either by a wave model or a particle model, and that for some situations one model is more useful than the other.
Earth's Place in the Universe	
ESS1-1	Develop a model based on evidence to illustrate the life span of the sun and the role of nuclear fusion in the sun's core to release energy that eventually reaches Earth in the form of radiation.
ESS1-2	Construct an explanation of the Big Bang theory based on astronomical evidence of light spectra, motion of distant galaxies, and composition of matter in the universe.
ESS1-4	Use mathematical or computational representations to predict the motion of orbiting objects in the solar system.
ESS2-1	Develop a model to illustrate how Earth's internal and surface processes operate at different spatial and temporal scales to form continental and ocean-floor features.