DCI: Energy

MS.PS3.D: Energy in Chemical Processes and Everyday Life

The chemical reaction by which plants produce complex food molecules (sugars) requires an energy input (i.e., from sunlight) to occur. In this reaction, carbon dioxide and water combine to form carbon-based organic molecules and release oxygen. (MS-LS1-6)

DCI: Energy

MS.PS3.D: Energy in Chemical Processes and Everyday Life

Cellular respiration in plants and animals involve chemical reactions with oxygen that release stored energy. In these processes, complex molecules containing carbon react with oxygen to produce carbon dioxide and other materials. (MS-LS1-7)

DCI: From Molecules to Organisms: Structures and Processes

MS.LS1.A: Structure and Function

All living things are made up of cells, which is the smallest unit that can be said to be alive. An organism may consist of one single cell (unicellular) or many different numbers and types of cells (multicellular). (MS-LS1-1)

DCI: From Molecules to Organisms: Structures and Processes

MS.LS1.A: Structure and Function

Within cells, special structures are responsible for particular functions, and the cell membrane forms the boundary that controls what enters and leaves the cell. (MS-LS1-2)

DCI: From Molecules to Organisms: Structures and Processes

MS.LS1.A: Structure and Function

In multicellular organisms, the body is a system of multiple interacting subsystems. These subsystems are groups of cells that work together to form tissues and organs that are specialized for particular body functions. (MS-LS1-3)

DCI: From Molecules to Organisms: Structures and Processes

MS.LS1.B: Growth and Development of Organisms

Animals engage in characteristic behaviors that increase the odds of reproduction. (MS-LS1-4)

DCI: From Molecules to Organisms: Structures and Processes

MS.LS1.B: Growth and Development of Organisms

Plants reproduce in a variety of ways, sometimes depending on animal behavior and specialized features for reproduction. (MS-LS1-4)

DCI: From Molecules to Organisms: Structures and Processes

MS.LS1.B: Growth and Development of Organisms

Genetic factors as well as local conditions affect the growth of the adult plant. (MS-LS1-5)

DCI: From Molecules to Organisms: Structures and Processes

MS.LS1.C: Organization for Matter and Energy Flow in Organisms

Plants, algae (including phytoplankton), and many microorganisms use the energy from light to make sugars (food) from carbon dioxide from the atmosphere and water through the process of photosynthesis, which also releases oxygen. These sugars can be used immediately or stored for growth or later use. (MS-LS1-6)

DCI: From Molecules to Organisms: Structures and Processes

MS.LS1.C: Organization for Matter and Energy Flow in Organisms

Within individual organisms, food moves through a series of chemical reactions in which it is broken down and rearranged to form new molecules, to support growth, or to release energy. (MS-LS1-7)

DCI: From Molecules to Organisms: Structures and Processes

MS.LS1.D: Information Processing

Each sense receptor responds to different inputs (electromagnetic, mechanical, chemical), transmitting them as signals that travel along nerve cells to the brain. The signals are then processed in the brain, resulting in immediate behaviors or memories. (MS-LS1-8)

DCI: Matter and Its Interactions

MS.PS1.A: Structure and Properties of Matter

Each pure substance has characteristic physical and chemical properties (for any bulk quantity under given conditions) that can be used to identify it. (MS-PS1-2)

DCI: Matter and Its Interactions

MS.PS1.B: Chemical Reactions

Substances react chemically in characteristic ways. In a chemical process, the atoms that make up the original substances are regrouped into different molecules, and these new substances have different properties from those of the reactants. (MS-PS1-2)

DCI: Matter and Its Interactions

MS.PS1.A: Structure and Properties of Matter

Each pure substance has characteristic physical and chemical properties (for any bulk quantity under given conditions) that can be used to identify it. (MS-PS1-3)

DCI: Matter and Its Interactions

MS.PS1.B: Chemical Reactions

Substances react chemically in characteristic ways. In a chemical process, the atoms that make up the original substances are regrouped into different molecules, and these new substances have different properties from those of the reactants. (MS-PS1-3)

DCI: Matter and Its Interactions

MS.PS1.B: Chemical Reactions

Substances react chemically in characteristic ways. In a chemical process, the atoms that make up the original substances are regrouped into different molecules, and these new substances have different properties from those of the reactants. (MS-PS1-5)

DCI: Matter and Its Interactions

MS.PS1.B: Chemical Reactions

The total number of each type of atom is conserved, and thus the mass does not change. (MS-PS1-5)

DCI: Matter and Its Interactions

MS.PS1.B: Chemical Reactions

Some chemical reactions release energy, others store energy. (MS-PS1-6)

DCI: Engineering Design

MS.ETS1.B: Developing Possible Solutions

A solution needs to be tested, and then modified on the basis of the test results in order to improve it. (MS-PS1-6)

DCI: Engineering Design

MS.ETS1.C: Optimizing the Design Solution

Although one design may not perform the best across all tests, identifying the characteristics of the design that performed the best in each test can provide useful information for the redesign process - that is, some of the characteristics may be incorporated into the new design. (MS-PS1-6)

DCI: Engineering Design

MS.ETS1.C: Optimizing the Design Solution

The iterative process of testing the most promising solutions and modifying what is proposed on the basis of the test results leads to greater refinement and ultimately to an optimal solution. (MS-PS1-6)

DCI: Ecosystems: Interactions, Energy, and Dynamics

MS.LS2.A: Interdependent Relationships in Ecosystems

Organisms, and populations of organisms, are dependent on their environmental interactions both with other living things and with nonliving factors. (MS-LS2-1)

DCI: Ecosystems: Interactions, Energy, and Dynamics

MS.LS2.A: Interdependent Relationships in Ecosystems

In any ecosystem, organisms and populations with similar requirements for food, water, oxygen, or other resources may compete with each other for limited resources, access to which consequently constrains their growth and reproduction. (MS-LS2-1)

DCI: Ecosystems: Interactions, Energy, and Dynamics

MS.LS2.A: Interdependent Relationships in Ecosystems

Growth of organisms and population increases are limited by access to resources. (MS-LS2-1)

DCI: Ecosystems: Interactions, Energy, and Dynamics

MS.LS2.A: Interdependent Relationships in Ecosystems

Similarly, predatory interactions may reduce the number of organisms or eliminate whole populations of organisms. Mutually beneficial interactions, in contrast, may become so interdependent that each organism requires the other for survival. Although the species involved in these competitive, predatory, and mutually beneficial interactions vary across ecosystems, the patterns of interactions of organisms with their environments, both living and nonliving, are shared. (MS-LS2-2)

DCI: Heredity: Inheritance and Variation of Traits

MS.LS3.A: Inheritance of Traits

Genes are located in the chromosomes of cells, with each chromosome pair containing two variants of each of many distinct genes. Each distinct gene chiefly controls the production of specific proteins, which in turn affects the traits of the individual. Changes (mutations) to genes can result in changes to proteins, which can affect the structures and functions of the organism and thereby change traits. (MS-LS3-1)

DCI: Heredity: Inheritance and Variation of Traits

MS.LS3.B: Variation of Traits

In addition to variations that arise from sexual reproduction, genetic information can be altered because of mutations. Though rare, mutations may result in changes to the structure and function of proteins. Some changes are beneficial, others harmful, and some neutral to the organism. (MS-LS3-1)

DCI: From Molecules to Organisms: Structures and Processes

MS.LS1.B: Growth and Development of Organisms

Organisms reproduce, either sexually or asexually, and transfer their genetic information to their offspring. (MS-LS3-2)

DCI: Heredity: Inheritance and Variation of Traits

MS.LS3.A: Inheritance of Traits

Variations of inherited traits between parent and offspring arise from genetic differences that result from the subset of chromosomes (and therefore genes) inherited. (MS-LS3-2)

DCI: Heredity: Inheritance and Variation of Traits

MS.LS3.B: Variation of Traits

In sexually reproducing organisms, each parent contributes half of the genes acquired (at random) by the offspring. Individuals have two of each chromosome and hence two alleles of each gene, one acquired from each parent. These versions may be identical or may differ from each other. (MS-LS3-2)

DCI: Earth's Systems

MS.ESS2.A: Earth Materials and Systems

All Earth processes are the result of energy flowing and matter cycling within and among the planet's systems. This energy is derived from the sun and Earth's hot interior. The energy that flows and matter that cycles produce chemical and physical changes in Earth's materials and living organisms. (MS-ESS2-1)

DCI: Earth's Systems

MS.ESS2.A: Earth Materials and Systems

The planet's systems interact over scales that range from microscopic to global in size, and they operate over fractions of a second to billions of years. These interactions have shaped Earth's history and will determine its future. (MS-ESS2-2)

DCI: Earth's Systems

MS.ESS2.C: The Roles of Water in Earth's Surface Processes

Water's movements—both on the land and underground—cause weathering and erosion, which change the land's surface features and create underground formations. (MS-ESS2-2)

Performance Expectation

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.
Assessment Boundary: none

Performance Expectation

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.
Assessment Boundary: Assessment of organelle structure/function relationships is limited to the cell wall and cell membrane. Assessment of the function of the other organelles is limited to their relationship to the whole cell. Assessment does not include the biochemical function of cells or cell parts.

Performance Expectation

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.
Assessment Boundary: Assessment does not include the mechanism of one body system independent of others. Assessment is limited to the circulatory, excretory, digestive, respiratory, muscular, and nervous systems.

Performance Expectation

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 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.
Assessment Boundary: none

Performance Expectation

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.
Assessment Boundary: Assessment does not include genetic mechanisms, gene regulation, or biochemical processes.

Performance Expectation

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.
Assessment Boundary: Assessment does not include the biochemical mechanisms of photosynthesis.

Performance Expectation

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.
Assessment Boundary: Assessment does not include details of the chemical reactions for photosynthesis or respiration.

Performance Expectation

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.

Clarification Statement: none
Assessment Boundary: Assessment does not include mechanisms for the transmission of this information.

Performance Expectation

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.
Assessment Boundary: Assessment is limited to analysis of the following properties: density, melting point, boiling point, solubility, flammability, and odor.

Performance Expectation

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 syntheic material. Examples of new materials could include new medicine, foods, and alternative fuels.
Assessment Boundary: Assessment is limited to qualitative information.

Performance Expectation

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.
Assessment Boundary: Assessment does not include the use of atomic masses, balancing symbolic equations, or intermolecular forces.

Performance Expectation

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.
Assessment Boundary: Assessment is limited to the criteria of amount, time, and temperature of substance in testing the device.

** This performance expectation integrates traditional science content with engineering through a practice or disciplinary code idea.*

Performance Expectation

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.
Assessment Boundary: none

Performance Expectation

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.
Assessment Boundary: none

Performance Expectation

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.
Assessment Boundary: Assessment does not include specific changes at the molecular level, mechanisms for protein synthesis, or specific types of mutations.

Performance Expectation

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.
Assessment Boundary: none

Performance Expectation

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.
Assessment Boundary: Assessment does not include the identification and naming of minerals.

Performance Expectation

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.
Assessment Boundary: none

Science and Engineering Practices

Developing and Using Models

Modeling in 6–8 builds on K–5 experiences and progresses to developing, using, and revising models to describe, test, and predict more abstract phenomena and design systems.

Develop a model to describe phenomena. (MS-LS1-2)

Science and Engineering Practices

Developing and Using Models

Modeling in 6–8 builds on K–5 experiences and progresses to developing, using, and revising models to describe, test, and predict more abstract phenomena and design systems.

Develop a model to describe unobservable mechanisms. (MS-LS1-7)

Science and Engineering Practices

Planning and Carrying Out Investigations

Planning and carrying out investigations to answer questions or test solutions to problems in 6–8 builds on K–5 experiences and progresses to include investigations that use multiple variables and provide evidence to support explanations or design solutions.

Conduct an investigation to produce data to serve as the basis for evidence that meet the goals of an investigation. (MS-LS1-1)

Science and Engineering Practices

Constructing Explanations and Designing Solutions

Constructing explanations and designing solutions in 6–8 builds on K–5 experiences and progresses to include constructing explanations and designing solutions supported by multiple sources of evidence consistent with scientific ideas, principles, and theories.

Construct a scientific explanation based on valid and reliable evidence obtained from sources (including the students' own experiments) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future. (MS-LS1-5), (MS-LS1-6)

Science and Engineering Practices

Engaging in Argument from Evidence

Engaging in argument from evidence in 6–8 builds on K–5 experiences and progresses to constructing a convincing argument that supports or refutes claims for either explanations or solutions about the natural and designed world(s).

Use an oral and written argument supported by evidence to support or refute an explanation or a model for a phenomenon. (MS-LS1-3)

Science and Engineering Practices

Engaging in Argument from Evidence

Engaging in argument from evidence in 6–8 builds on K–5 experiences and progresses to constructing a convincing argument that supports or refutes claims for either explanations or solutions about the natural and designed world(s).

Use an oral and written argument supported by empirical evidence and scientific reasoning to support or refute an explanation or a model for a phenomenon or a solution to a problem. (MS-LS1-4)

Science and Engineering Practices

Obtaining, Evaluating, and Communicating Information

Obtaining, evaluating, and communicating information in 6–8 builds on K–5 experiences and progresses to evaluating the merit and validity of ideas and methods.

Gather, read, and synthesize information from multiple appropriate sources and assess the credibility, accuracy, and possible bias of each publication and methods used, and describe how they are supported or not supported by evidence. (MS-LS1-8)

Science and Engineering Practices

Analyzing and Interpreting Data

Analyzing data in 6–8 builds on K–5 experiences and progresses to extending quantitative analysis to investigations, distinguishing between correlation and causation, and basic statistical techniques of data and error analysis.

Analyze and interpret data to determine similarities and differences in findings. (MS-PS1-2)

Science and Engineering Practices

Obtaining, Evaluating, and Communicating Information

Obtaining, evaluating, and communicating information in 6–8 builds on K–5 experiences and progresses to evaluating the merit and validity of ideas and methods.

Gather, read, and synthesize information from multiple appropriate sources and assess the credibility, accuracy, and possible bias of each publication and methods used, and describe how they are supported or not supported by evidence. (MS-PS1-3)

Science and Engineering Practices

Developing and Using Models

Modeling in 6–8 builds on K–5 experiences and progresses to developing, using, and revising models to describe, test, and predict more abstract phenomena and design systems.

Develop a model to describe unobservable mechanisms. (MS-PS1-5)

Science and Engineering Practices

Constructing Explanations and Designing Solutions

Constructing explanations and designing solutions in 6–8 builds on K–5 experiences and progresses to include constructing explanations and designing solutions supported by multiple sources of evidence consistent with scientific ideas, principles, and theories.

Undertake a design project, engaging in the design cycle, to construct and/or implement a solution that meets specific design criteria and constraints. (MS-PS1-6)

Science and Engineering Practices

Analyzing and Interpreting Data

Analyzing data in 6–8 builds on K–5 experiences and progresses to extending quantitative analysis to investigations, distinguishing between correlation and causation, and basic statistical techniques of data and error analysis.

Analyze and interpret data to provide evidence for phenomena. (MS-LS2-1)

Science and Engineering Practices

Constructing Explanations and Designing Solutions

Constructing explanations and designing solutions in 6–8 builds on K–5 experiences and progresses to include constructing explanations and designing solutions supported by multiple sources of evidence consistent with scientific ideas, principles, and theories.

Construct an explanation that includes qualitative or quantitative relationships between variables that predict phenomena. (MS-LS2-2)

Science and Engineering Practices

Developing and Using Models

Modeling in 6–8 builds on K–5 experiences and progresses to developing, using, and revising models to describe, test, and predict more abstract phenomena and design systems.

Develop and use a model to describe phenomena. (MS-LS3-1)

Science and Engineering Practices

Developing and Using Models

Modeling in 6–8 builds on K–5 experiences and progresses to developing, using, and revising models to describe, test, and predict more abstract phenomena and design systems.

Develop and use a model to describe phenomena. (MS-LS3-2)

Science and Engineering Practices

Developing and Using Models

Modeling in 6–8 builds on K–5 experiences and progresses to developing, using, and revising models to describe, test, and predict more abstract phenomena and design systems.

Develop and use a model to describe phenomena. (MS-ESS2-1)

Science and Engineering Practices

Constructing Explanations and Designing Solutions

Constructing explanations and designing solutions in 6–8 builds on K–5 experiences and progresses to include constructing explanations and designing solutions supported by multiple sources of evidence consistent with scientific ideas, principles, and theories.

Construct a scientific explanation based on valid and reliable evidence obtained from sources (including the students' own experiments) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future. (MS-ESS2-2)

Crosscutting Concepts

Cause and Effect

Cause and effect relationships may be used to predict phenomena in natural systems. (MS-LS1-8)

Crosscutting Concepts

Cause and Effect

Phenomena may have more than one cause, and some cause and effect relationships in systems can only be described using probability. (MS-LS1-4), (MS-LS1-5)

Crosscutting Concepts

Scale, Proportion, and Quantity

Phenomena that can be observed at one scale may not be observable at another scale. (MS-LS1-1)

Crosscutting Concepts

Systems and System Models

Systems may interact with other systems; they may have sub-systems and be a part of larger complex systems. (MS-LS1-3)

Crosscutting Concepts

Energy and Matter

Matter is conserved because atoms are conserved in physical and chemical processes. (MS-LS1-7)

Crosscutting Concepts

Energy and Matter

Within a natural system, the transfer of energy drives the motion and/or cycling of matter. (MS-LS1-6)

Crosscutting Concepts

Structure and Function

Complex and microscopic structures and systems can be visualized, modeled, and used to describe how their function depends on the relationships among its parts, therefore complex natural structures/systems can be analyzed to determine how they function. (MS-LS1-2)

Crosscutting Concepts

Patterns

Macroscopic patterns are related to the nature of microscopic and atomic-level structure. (MS-PS1-2)

Crosscutting Concepts

Structure and Function

Structures can be designed to serve particular functions by taking into account properties of different materials, and how materials can be shaped and used. (MS-PS1-3)

Crosscutting Concepts

Energy and Matter

Matter is conserved because atoms are conserved in physical and chemical processes. (MS-PS1-5)

Crosscutting Concepts

Energy and Matter

The transfer of energy can be tracked as energy flows through a designed or natural system. (MS-PS1-6)

Crosscutting Concepts

Cause and Effect

Cause and effect relationships may be used to predict phenomena in natural or designed systems. (MS-LS2-1)

Crosscutting Concepts

Patterns

Patterns can be used to identify cause-and-effect relationships. (MS-LS2-2)

Crosscutting Concepts

Structure and Function

Complex and microscopic structures and systems can be visualized, modeled, and used to describe how their function depends on the shapes, composition, and relationships among its parts, therefore complex natural structures/systems can be analyzed to determine how they function. (MS-LS3-1)

Crosscutting Concepts

Cause and Effect

Cause and effect relationships may be used to predict phenomena in natural systems. (MS-LS3-2)

Crosscutting Concepts

Stability and Change

Explanations of stability and change in natural or designed systems can be constructed by examining the changes over time and processes at different scales, including the atomic scale. (MS-ESS2-1)

Crosscutting Concepts

Scale, Proportion, and Quantity

Time, space, and energy phenomena can be observed at various scales using models to study systems that are too large or too small. (MS-ESS2-2)

Connections to Nature of Science

Science Knowledge Is Based on Empirical Evidence

Science knowledge is based upon logical connections between evidence and explanations. (MS-LS1-6)

Connections to Nature of Science

Science Is a Human Endeavor

Scientists and engineers are guided by habits of mind such as intellectual honesty, tolerance of ambiguity, skepticism, and openness to new ideas. (MS-LS1-3)

Connections to Engineering, Technology, and Applications of Science

Interdependence of Science, Engineering, and Technology

Engineering advances have led to important discoveries in virtually every field of science and scientific discoveries have led to the development of entire industries and engineered systems. (MS-LS1-1)

Connections to Engineering, Technology, and Applications of Science

Science Knowledge Is Based on Empirical Evidence

Science knowledge is based upon logical and conceptual connections between evidence and explanations. (MS-PS1-2)

Connections to Engineering, Technology, and Applications of Science

Science Models, Laws, Mechanisms, and Theories Explain Natural Phenomena

Laws are regularities or mathematical descriptions of natural phenomena. (MS-PS1-5)

Connections to Engineering, Technology, and Applications of Science

Influence of Science, Engineering, and Technology on Society and the Natural World

The uses of technologies and any limitations on their use are driven by individual or societal needs, desires, and values; by the findings of scientific research; and by differences in such factors as climate, natural resources, and economic conditions. Thus technology use varies from region to region and over time. (MS-PS1-3)

Connections to Engineering, Technology, and Applications of Science

Interdependence of Science, Engineering, and Technology

Engineering advances have led to important discoveries in virtually every field of science and scientific discoveries have led to the development of entire industries and engineered systems. (MS-PS1-3)

Common Core State Standards for ELA/Literacy

Reading Informational Text

RI.6.8 - Integration of Knowledge and Ideas

Trace and evaluate the argument and specific claims in a text, distinguishing claims that are supported by reasons and evidence from claims that are not. (MS-LS1-3), (MS-LS1-4)

Common Core State Standards for ELA/Literacy

Reading in Science

RST.6-8.1 - Key Ideas and Details

Cite specific textual evidence to support analysis of science and technical texts. (MS-LS1-3), (MS-LS1-4), (MS-LS1-5), (MS-LS1-6)

Common Core State Standards for ELA/Literacy

Reading in Science

RST.6-8.2 - Key Ideas and Details

Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions. (MS-LS1-5), (MS-LS1-6)

Common Core State Standards for ELA/Literacy

Speaking & Listening

SL.8.5 - Presentation of Knowledge and Ideas

Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest. (MS-LS1-2), (MS-LS1-7)

Common Core State Standards for ELA/Literacy

Writing in Science

WHST.6-8.1 - Text Types and Purposes

Cite specific textual evidence to support analysis of science and technical texts. (MS-LS1-3), (MS-LS1-4)

Common Core State Standards for ELA/Literacy

Writing in Science

WHST.6-8.2 - Text Types and Purposes

Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. (MS-LS1-5), (MS-LS1-6)

Common Core State Standards for ELA/Literacy

Writing in Science

WHST.6-8.7 - Research to Build and Present Knowledge

Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration. (MS-LS1-1)

Common Core State Standards for ELA/Literacy

Writing in Science

WHST.6-8.8 - Research to Build and Present Knowledge

Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation. (MS-LS1-8)

Common Core State Standards for ELA/Literacy

Writing in Science

WHST.6-8.9 - Research to Build and Present Knowledge

Draw evidence from informational texts to support analysis reflection, and research. (MS-LS1-5), (MS-LS1-6)

Common Core State Standards for Mathematics

Expressions & Equations

6.EE.C.9 - Represent and analyze quantitative relationships between dependent and independent variables.

Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation. (MS-LS1-1), (MS-LS1-2), (MS-LS1-3), (MS-LS1-6)

Common Core State Standards for Mathematics

Statistics & Probability

6.SP.A.2 - Develop understanding of statistical variability.

Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape. (MS-LS1-4), (MS-LS1-5)

Common Core State Standards for Mathematics

Statistics & Probability

6.SP.B.4 - Summarize and describe distributions.

Display numerical data in plots on a number line, including dot plots, histograms, and box plots. (MS-LS1-4), (MS-LS1-5)