THE STATE EDUCATION DEPARTMENT / THE UNIVERSITY OF THE STATE OF NEW YORK / ALBANY, NY 12234

INTERMEDIATE SCIENCE PERFORMANCE LEVEL DESCRIPTIONS

NYS P12 Science Learning Standards

Performance Level Descriptions

Performance level descriptions (PLDs) help communicate to students, families, educators, and the public the specific knowledge and skills expected of students when they demonstrate proficiency of a learning standard. The PLDs serve several purposes in classroom instruction and assessment. They are the foundation of rich discussion around what students need to do to perform at higher levels and to explain the progression of learning within a subject area. PLDs are also crucial in explaining student performance on the New York State (NYS) assessments since they make a connection between the scale score, the performance level, and specific knowledge and skills typically demonstrated at that level.

Policy Definitions of Performance Levels

For each subject area, students perform along a continuum of the knowledge and skills necessary to meet the demands of the New York State P-12 Science Learning Standards. There are students who excel in standards, students who are proficient, students who are partially proficient, and students who are below proficient. New York State assessments are designed to classify student performance into one of four levels based on the knowledge and skills the student has demonstrated. These performance levels for the Elementary- and Intermediate-level Science Tests are defined as:

NYS Level 4

Students performing at this level **excel** in standards for their grade. They demonstrate knowledge, skills, and practices embodied by the Learning Standards that are considered **more than sufficient** for the expectations at this grade.

NYS Level 3

Students performing at this level are **proficient** in standards for their grade. They demonstrate knowledge, skills, and practices embodied by the Learning Standards that are considered **sufficient** for the expectations at this grade.

NYS Level 2

Students performing at this level are **partially proficient** in standards for their grade. They demonstrate knowledge, skills, and practices embodied by the Learning Standards that are considered partial but insufficient for the expectations at this grade. Students performing at Level 2 are considered on track to meet current New York high school graduation requirements but are **not yet proficient** in Learning Standards at this grade.

NYS Level 1

Students performing at this level are **below proficient** in standards for their grade. They may demonstrate **limited** knowledge, skills, and practices embodied by the Learning Standards that are considered **insufficient** for the expectations at this grade.

How were the PLDs developed?

Following best practice for the development of PLDs, the number of performance levels and their definitions were specified prior to the articulation of the full descriptions. New York State educators certified in the appropriate grade-levels and subject areas convened in separate meetings to develop the initial draft PLDs. In developing PLDs, participants considered policy definitions of the performance level and the knowledge and skill expectations in the Learning Standards. Once they established the appropriate knowledge and skills from a particular performance expectation (PE) for NYS Level 3 (i.e., proficient in standards), panelists worked together to parse the knowledge and skills across the other performance levels in such a way that the progression of the knowledge and skills was clearly seen moving from Level 1 to Level 4. This process was repeated for all of the PEs associated with each test. The drafts then went through additional rounds of review and edits from a number of NYS-certified educators, content specialists, and assessment experts under NYSED supervision.

How can the PLDs be used by Educators and in Instruction?

The PLDs should be used as a guidance document to show the overall continuum of learning of the knowledge and skills from the Learning Standards. NYSED encourages the use of the PLDs for a variety of purposes, including differentiating instruction to maximize individual student outcomes, creating formative classroom assessments and rubrics to help identify target performance levels for individual or groups of students, and tracking student growth along the proficiency continuum as described by the PLDs. The knowledge and skills shown in the PLDs describe *typical* performance and progression, however the order in which students will demonstrate the knowledge and skills within and between performance levels may be staggered (i.e. a student who predominantly demonstrates Level 2 knowledge and skills may simultaneously demonstrate certain knowledge and skills indicative of Level 3). It is important to realize that the knowledge and skills as well as *some* of the subject-area knowledge are found in the PLDS. Science concepts must be elaborated beyond what is found in the PLDs for instruction and assessment purposes. Because the Learning Standards for science have three dimensions, each of them must be examined in depth.

How are the PLDs used in Assessment?

PLDs are essential in setting performance standards (i.e., “cut scores”) for New York State assessments. Standard setting panelists use PLDs to determine the expectations for students to demonstrate the knowledge and skills necessary to *just barely* attain a Level 2, Level 3, or Level 4 on the assessment. These knowledge and skills drive discussions that influence the panelists as they recommend the cut scores on the assessment.

PLDs are also used in question development. Question writers are assigned to write questions that draw on the specific knowledge and skills from a PLD. This ensures that each test has questions that distinguish performance all along the continuum. Teachers can use the PLDs in the same manner when developing both formative and summative classroom assessments. Tasks that require students to demonstrate knowledge and skills from the PLDs can be tied back to the performance level with which the PLD is associated, providing the teacher with feedback about the students’ progress as well as a wealth of other skills that the student is likely able to demonstrate (or can aspire to in the case of the next-highest PLD).

Intermediate Science
Performance Level Descriptions

Topic and PE	NYS Level 4	NYS Level 3	NYS Level 2	NYS Level 1
MS Structure and Properties of Matter MS-PS1-1	Develop models and evaluate limitations for the models to describe the atomic composition of complex molecules and extended structures.	Develop models to describe the atomic composition of simple molecules and extended structures.	Interpret models to describe the atomic composition of simple molecules or extended structures.	Interpret a model to describe the atomic composition of simple molecules.
MS Structure and Properties of Matter MS-PS1-3	Gather and make sense of information from multiple sources to describe how synthetic materials that come from natural resources can be designed to serve a particular function that has positive and/or negative impacts on society.	Gather and make sense of information to describe that synthetic materials come from natural resources and impact society	Read and interpret information to describe that synthetic materials come from natural resources and/or impact society.	Given information, identify one synthetic material that comes from natural resources and/or how the synthetic material impacts society.
MS Structure and Properties of Matter MS-PS1-4	Develop a model that predicts and describes changes in the patterns of particle motion, temperature, pressure, and phase (state) of a substance when thermal energy is added or removed and evaluate the limitations of that model.	Develop a model that predicts and describes changes in particle motion, temperature, phase (state) of a substance when thermal energy is added or removed.	Given a model, predict or describe the changes in particle motion and temperature, or particle motion and phase (state) of a substance when thermal energy is added or removed.	Given a model, identify the change in particle motion or temperature or phase (state) of a substance when thermal energy is added or removed.
MS Structure and Properties of Matter MS-PS1-7 NYSED	Using measurements, calculations and observations as evidence, construct an argument, using density values, that either supports or refutes the identity of various samples of matter.	Use evidence to illustrate that density is a property that can be used to identify samples of matter.	Given evidence, identify the argument that illustrates that density is a property that can be used to identify a given sample(s) of matter.	Given an argument, identify the evidence that illustrates that density is a property that can be used to identify a given sample(s) of matter.
MS Structure and Properties of Matter MS-PS1-8 NYSED	Plan and conduct multiple scientific investigations to provide evidence that mixtures are physical combinations of substances.	Plan and conduct an investigation to demonstrate that mixtures are combinations of substances.	Conduct a given investigation to provide evidence that mixtures are physical combinations of substances.	Given an investigation and data, identify the substances that were physically combined to create the mixture.

Topic and PE	NYS Level 4	NYS Level 3	NYS Level 2	NYS Level 1
MS Chemical Reactions MS-PS1-2	Plan and conduct an investigation to gather, analyze, and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred.	Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred.	Given a chemical reaction, identify properties of the substances that are different before and after the reaction has taken place.	Given information about a reaction, identify the statement, from those provided, that provides evidence that a chemical reaction took place.
MS Chemical Reactions MS-PS1-5	Develop and use a model (including balanced equations and/or atomic masses) to describe how the total number of each type of atom does not change in a chemical reaction and because of this, mass is conserved.	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.	Given a model, describe how the total number of each type of atom does not change in a chemical reaction and/or that mass is conserved.	Given a model showing a chemical reaction, identify evidence that proves the total number of atoms is conserved.
MS Chemical Reactions MS-PS1-6	Undertake design projects to construct, test, and modify devices – one that will release thermal energy and one that will absorb thermal energy during a chemical and/or physical process.	Undertake a design project to construct, test, and modify a device that either releases or absorbs thermal energy during a chemical and/or physical process.	Given a project design, test and identify one modification to the device that would improve the release or absorption of thermal energy during a chemical and physical process.	Given a project design, test a device to determine whether it releases or absorbs thermal energy during a chemical or physical process.

Topic and PE	NYS Level 4	NYS Level 3	NYS Level 2	NYS Level 1
MS Forces and Interactions MS-PS2-1	Plan and carry out an investigation, applying Newton's Third Law, to design solutions to problems involving the motion of two colliding objects.	Apply Newton's Third Law to design a solution to a problem involving the motion of two colliding objects.	Given a problem, describe the motion of one of the objects when two objects collide applying Newton's Third Law.	Given a problem and given possible solutions involving the motion of two colliding objects, determine the best solution by using Newton's Third Law.
MS Forces and Interactions MS-PS2-2	Plan and conduct multiple investigations under various conditions 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.	Plan and conduct 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.	Given an investigation, provide evidence that shows the change in an object's motion depends on the sum of the forces on the object and the mass of the object.	Given an investigation and the data collected, identify the change in an object's motion that depended on the sum of the forces on the object and the mass of the object.
MS Forces and Interactions MS-PS2-3	Ask testable questions to carry out investigations to gather data required to determine the factors that affect the strength of electric and magnetic forces based on cause and effect relationships.	Ask questions about data to determine the factors that affect the strength of electric and magnetic forces.	Given data, determine one factor that affects the strength of an electric or magnetic force.	Identify a question about given information and data that would help determine the factors that affect the strength of electric or magnetic forces.
MS Forces and Interactions MS-PS2-4	Construct and present arguments using multiple pieces of evidence and scientific reasoning to support the claim that gravitational interactions are attractive and depend on mass and distance.	Construct and present arguments using evidence to support the claim that gravitational interactions are attractive and depend on the masses of interacting objects and the distance between them.	Identify the evidence that supports the claim that gravitational interactions are attractive and depend on the masses of interacting objects or the distance between them.	Identify the argument, from those provided, that supports the claim that gravitational interactions are attractive and depend on the masses of interacting objects and the distance between them.
MS Forces and Interactions MS-PS2-5	Plan and 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.	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.	Given an investigation, identify the evidence that fields exist between objects exerting forces on each other even though the objects are not in contact.	Given an investigation and evidence, identify the argument from those provided, that supports the claim that fields exist between objects exerting forces on each other even though the objects are not in contact.

Topic and PE	NYS Level 4	NYS Level 3	NYS Level 2	NYS Level 1
MS Energy MS-PS3-1	Construct and interpret multiple graphical displays of data to describe the relationships of kinetic energy to the mass of multiple objects and kinetic energy to the speed of multiple objects.	Construct and interpret graphical displays of data to describe the relationships of kinetic energy to the mass of the object and the speed of an object.	Construct or interpret a graphical display of data to describe the relationship of kinetic energy to the mass of the object or to the speed of an object.	Identify the relationship shown in a graphical display that exists between kinetic energy and the mass of the object or between kinetic energy and the speed of an object.
MS Energy MS-PS3-2	Develop a model to describe that when the arrangement of objects interacting at a distance changes, the relative amounts of potential energy and kinetic energy in the system also changes.	Develop a model to describe that when the arrangement of objects interacting at a distance changes, different amounts of potential energy are stored in the system.	Given a model, use evidence from the model to describe how the amount of potential energy stored in the system changes as the relative positions of the interacting objects change.	Given a model, identify the evidence from the model that describes how the amount of potential energy stored in the system changes as the relative positions of the interacting objects change.
MS Energy MS-PS3-3	Apply scientific principles to design, construct and test a device that minimizes or maximizes thermal energy transfer through a designed or natural system and explain how this device could be used to solve a real-world problem.	Apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer.	Given a simple design, construct and test a device that either minimizes or maximizes thermal energy transfer in a designed system.	Given a device, test the device and determine whether it minimizes or maximizes thermal energy transfer in a designed system.
MS Energy MS-PS3-4	Plan and conduct an investigation to calculate the total amount of energy transferred, based on the type of matter, the mass, and the change in the temperature of the sample of matter in order to determine the relationships between the variables.	Plan and conduct an investigation to determine the relationships among the energy transferred, the type of matter, the mass, and the change in the temperature of the sample of matter.	Given the results of an investigation, determine the design variables or relationships among the energy transferred and the type of matter, the mass, or the change in the temperature of the sample of matter.	Given an investigation and the data collected, identify the design variables or relationship between the temperature and total energy of a system when the type or amount of matter is changed.

Topic and PE	NYS Level 4	NYS Level 3	NYS Level 2	NYS Level 1
MS Energy MS-PS3-5	Construct, use, and present an argument, using multiple pieces of evidence, calculations and reasoning, to support the claim that when work is done on or by a system, the energy of the system changes as energy is transferred to or from the system.	Construct, use, and present an argument to support the claim that when work is done on or by a system, the energy of the system changes as energy is transferred to or from the system.	Identify the evidence that supports the argument that when work is done on or by a system, the energy of the system changes as energy is transferred to or from the system.	Using evidence, identify the argument that best supports the claim that when work is done on or by a system, the energy of the system changes as energy is transferred to or from the system.
MS Energy MS-PS3-6 NYSED	Make qualitative and quantitative observations to provide evidence that energy can be transferred by electric currents and predict how a change in circuit components would change the data.	Make observations to provide evidence that energy can be transferred by electric currents.	Given observations, provide evidence that energy can be transferred by electric currents.	Using evidence, identify the observation, from those given, that indicates that energy can be transferred by electric currents.

Topic and PE	NYS Level 4	NYS Level 3	NYS Level 2	NYS Level 1
MS Waves and Electromagnetic Radiation MS-PS4-1	Develop a model and use mathematical representations to describe waves that includes frequency, wavelength, and how the amplitude of a wave is related to the energy in a wave and predict what would happen if one of these variables was changed.	Develop a model and use mathematical representations to describe waves that includes frequency, wavelength, and how the amplitude of a wave is related to the energy in a wave.	Given a model, qualitatively identify the frequency, wavelength, or amplitude of a wave or explain the relationship between the amplitude and energy in a wave.	Given a model, identify the frequency, wavelength, or amplitude of a wave or identify a relationship between them.
MS Waves and Electromagnetic Radiation MS-PS4-2	Develop and use models to describe that light and mechanical waves are reflected, absorbed, or transmitted through various materials.	Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials.	Use a model to describe that waves are reflected, absorbed, or transmitted through various materials.	Given a model, identify whether a wave is being reflected, absorbed or transmitted through one material.
MS Waves and Electromagnetic Radiation MS-PS4-3	Integrate multiple pieces of 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 and how these digitized signals are used for communication purposes.	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.	Identify one piece of qualitative evidence and one piece of technical information that supports the claim that digitized signals are a more reliable way to encode and transmit information than analog signals.	Identify one piece of qualitative evidence or one piece of technical information that supports the claim that digitized signals are a more reliable way to encode and transmit information than analog signals.

Topic and PE	NYS Level 4	NYS Level 3	NYS Level 2	NYS Level 1
MS Structure, Function and Information Processing MS-LS1-1	Plan and conduct multiple investigations to provide evidence that living things (in all major kingdoms) are made of cells (and non-living things are not); either one cell or many different numbers and types of cells.	Plan and conduct an investigation to provide evidence that living things are made of cells; either one cell or many different numbers and types of cells.	Given an investigation with data, provide evidence that living things are made of cells (and non-living things are not); either one cell or many different numbers or types of cells.	Given an investigation with data, identify whether an organism is made of one cell or many different numbers or types of cells or distinguish between living and non-living things.
MS Structure, Function and Information Processing MS-LS1-2	Develop and use a model to describe the function of a cell as a whole and the ways that parts of cells contribute to its function, including any simple biochemical details of its function.	Develop and use a model to describe the function of a cell as a whole and ways parts of cells contribute to the function.	Given a model, describe the function of a cell as a whole, or ways that parts of a cell contribute to the cell's function.	Given a model, identify the function, from those provided, of various parts of a cell.
MS Structure, Function and Information Processing MS-LS1-3	Construct an explanation supported by evidence for how major body systems function and interact and that these systems are composed of cells, tissues, and organs working together to maintain homeostasis.	Construct an explanation supported by evidence for how the body is composed of interacting systems consisting of cells, tissues, and organs working together to maintain homeostasis.	Support a given explanation by providing evidence for how the body is composed of interacting systems consisting of cells, tissues, and organs working together to maintain homeostasis.	Using given evidence, identify the explanation, from those provided, to support the claim that the body is composed of interacting systems consisting of cells, tissues, and organs working together to maintain homeostasis.
MS Structure, Function and Information Processing MS-LS1-8	Gather and synthesize information from multiple sources to explain how all sensory receptors work to detect stimuli, and describe how organisms respond to these stimuli in terms of immediate behaviors and/or as memories.	Gather and synthesize information that sensory receptors respond to stimuli, resulting in immediate behavior and/or storage as memories.	Given information about a sensory receptor that responded to a stimulus, describe the organism's immediate behavior and/or storage as memories as a result of this stimulus.	Given information, identify a sensory receptor and the resulting response (immediate behavior) of the organism, from those provided, due to the stimuli detected.

Topic and PE	NYS Level 4	NYS Level 3	NYS Level 2	NYS Level 1
MS Matter and Energy in Organisms and Ecosystems MS-LS1-6	Plan and carry out an investigation to gather evidence to construct a scientific explanation for the role of photosynthesis in the cycling of matter and the flow of energy into and out of organisms.	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.	Identify the evidence that supports an explanation that organisms directly use photosynthesis to cycle matter and energy.	Identify the 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 Matter and Energy in Organisms and Ecosystems MS-LS1-7	Develop multiple models to describe how food molecules are rearranged through chemical reactions to release energy during cellular respiration and describe how new molecules are formed that support growth as this matter moves through an organism.	Develop a model to describe how food molecules are rearranged through chemical reactions to release energy during cellular respiration and/or form new molecules that support growth as this matter moves through an organism.	Given a model, identify evidence that shows how food molecules are rearranged through chemical reactions to release energy during cellular respiration and/or form new molecules that support growth as this matter moves through an organism.	Given a model, identify the new molecules that form when food molecules are rearranged through chemical reactions to release energy during cellular respiration or identify the new molecules that support growth as this matter moves through an organism.
MS Matter and Energy in Organisms and Ecosystems MS-LS2-1	Gather, analyze and interpret data to distinguish between correlation and causation relationships and to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.	Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.	Identify the evidence from given data for the effects of resource availability on organisms and/or populations of organisms in an ecosystem.	Given evidence from data, identify a resource that an organism or a population of organisms needs.
MS Matter and Energy in Organisms and Ecosystems MS-LS2-3	Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem and to predict the effect on the ecosystem when a component of the ecosystem changes.	Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem	Given a model, describe the cycling of matter or the flow of energy among living and/or nonliving parts of an ecosystem.	Given a model, identify a substance that is being cycled among the living or nonliving parts of an ecosystem.
MS Matter and Energy in Organisms and Ecosystems MS-LS2-4	Construct an argument, supported by empirical evidence, that supports the claim that human activities cause changes to physical and biological components of an ecosystem, which affect populations.	Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.	Identify the empirical evidence that supports the argument that changes to physical or biological components of an ecosystem affect populations.	Identify an argument that describes how a change in a physical or biological component of an ecosystem will have an effect on a population.

Topic and PE	NYS Level 4	NYS Level 3	NYS Level 2	NYS Level 1
MS Interdependent Relationships in Ecosystems MS-LS2-2	Construct an explanation that predicts multiple patterns of interactions, both positive and negative, among organisms in a variety of ecosystems.	Construct an explanation that predicts patterns of interactions among organisms in a variety of ecosystems.	Given a pattern of interaction (interdependent relationship) in an ecosystem, identify which organisms display this interaction.	Identify the type of interaction (interdependent relationship) from those provided, between two different organisms in an ecosystem.
MS Interdependent Relationships in Ecosystems MS-LS2-5	Given criteria, evaluate competing design solutions, using empirical evidence, scientific reasoning, and design constraints, that maintain biodiversity and protect ecosystem stability.	Evaluate competing design solutions for maintaining biodiversity and protecting ecosystem stability.	Given criteria, evaluate or describe a design solution, or possible solution, that maintains biodiversity or can protect the stability of the ecosystem.	Identify a given design solution, or possible solution, that addresses a problem to maintain biodiversity or that can protect the stability of an ecosystem.

Topic and PE	NYS Level 4	NYS Level 3	NYS Level 2	NYS Level 1
MS Growth, Development and Reproduction of Organisms MS-LS1-4	Use argument based on empirical evidence and scientific reasoning to support an explanation for how a specific animal behavior and a specialized plant structure directly interact to affect the probability of successful reproduction of the animal and plant.	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.	Support a given argument by providing evidence of how animal behaviors and specialized plant structures increase the probability of successful reproduction of animals and plants, respectively.	Using the evidence provided, identify an animal behavior or a specialized plant structure that helps the organism increase the probability of successful reproduction.
MS Growth, Development and Reproduction of Organisms MS-LS1-5	Construct scientific explanations, using multiple sources of evidence, for how local environmental and genetic factors influence the growth of organisms.	Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.	Given a scientific explanation, identify the supporting evidence in the explanation that shows how an environmental or genetic factor influences the growth of organisms.	Given a scientific explanation and evidence, identify an environmental or a genetic factor that can affect the growth of organisms.
MS Growth, Development and Reproduction of Organisms MS-LS3-1	Develop and use a model, through the lens of natural selection, to explain 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.	Develop and use a model to explain 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.	Given a model that shows a structural change to genes (mutations) located on chromosomes, describe how the change would result in harmful, beneficial, or neutral effects to the structure and/or function of the organism.	Given a model that shows a structural change to a gene (mutations) located on chromosomes, identify if the change would be harmful or beneficial to the structure and/or function of the organism.

Topic and PE	NYS Level 4	NYS Level 3	NYS Level 2	NYS Level 1
MS Growth, Development and Reproduction of Organisms MS-LS3-2	Develop and use a model to describe how asexual reproduction results in offspring with identical genetic information and sexual reproduction results in offspring with genetic variation. Construct an argument about the merits and limitations of each type of reproduction.	Develop and use a model to describe how asexual reproduction results in offspring with identical genetic information and sexual reproduction results in offspring with genetic variation.	Given models, identify the genetic evidence that asexual reproduction results in offspring with identical genetic information and/or sexual reproduction results in offspring with genetic variation.	Given models, identify the processes of asexual reproduction and/or sexual reproduction.
MS Growth, Development and Reproduction of Organisms MS-LS4-5	Gather and synthesize information about the technologies that have changed the way humans influence the inheritance of desired traits in organisms and describe situations in which these technologies should and should not be applied.	Gather and synthesize information about the technologies that have changed the way humans influence the inheritance of desired traits in organisms.	Given information, describe how a specific technology has changed the way humans influence the inheritance of desired traits in organisms.	Given information, identify a trait that has been changed in an organism by technology or human influence.

Topic and PE	NYS Level 4	NYS Level 3	NYS Level 2	NYS Level 1
MS Natural Selection and Adaptations MS-LS4-1	Analyze and interpret data for patterns in the fossil record from multiple locations 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.	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.	Identify a data pattern in the fossil record that illustrates the existence, or diversity, or extinction, or change of life forms throughout the history of life on Earth under the assumption that natural laws operate today as in the past.	Identify a data pattern in the fossil record that describes a change in a life form throughout the history of life on Earth.
MS Natural Selection and Adaptations MS-LS4-2	Apply scientific ideas to construct an explanation, using qualitative and quantitative data, for the anatomical similarities and differences among modern organisms and between modern and fossil organisms to infer evolutionary relationships.	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.	Identify the evidence that supports an explanation for anatomical similarities and/or differences among modern organisms or between modern and fossil organisms, to infer evolutionary relationships.	Identify the explanation, from those provided, that supports the evidence for anatomical similarities and/or differences among modern organisms or between modern and fossil organisms, to infer evolutionary relationships.
MS Natural Selection and Adaptations 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, and infer how closely organisms are related, based on the duration of these patterns.	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.	Analyze displays of pictorial data to identify similarities in the embryological development across multiple species not evident in the fully formed anatomy.	Analyze displays of pictorial data to identify a similarity or a difference in the embryological development across multiple species.

Topic and PE	NYS Level 4	NYS Level 3	NYS Level 2	NYS Level 1
MS Natural Selection and Adaptations MS-LS4-4	Construct an explanation based on evidence that describes how genetic variations of traits in a population causes an increase in some individuals' probability of surviving and reproducing in a specific environment, and explain why these traits would appear more frequently in future generations.	Construct an explanation based on evidence that describes how genetic variations of traits in a population causes an increase in some individuals' probability of surviving and reproducing in a specific environment.	Identify the evidence that supports the explanation that a variation in a genetic trait in a given population increases some individuals' probability of surviving and/or reproducing in a specific environment.	Identify an explanation based on evidence that describes how a variation in a genetic trait in a given population may cause an increase in some individuals' probability of surviving and/or reproducing.
MS Natural Selection and Adaptations MS-LS4-6	Use mathematical representations and other empirical data to support explanations of how natural selection may lead to increases and decreases of specific traits in populations over time.	Use mathematical representations to support explanations of how natural selection may lead to increases and decreases of specific traits in populations over time.	Use a given mathematical representation to describe the evidence that supports the explanation that natural selection causes an increase and/or decrease in a specific trait in a population.	Use a given mathematical representation to identify the evidence that supports the explanation, from those provided, that natural selection causes an increase or decrease in a specific trait in a population.

Topic and PE	NYS Level 4	NYS Level 3	NYS Level 2	NYS Level 1
MS Space Systems MS-ESS1-1	Develop and use multiple models of the Earth-Sun-Moon system to explain why the patterns of lunar phases, eclipses of the Sun and Moon, and seasons are cyclic.	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.	Use a given model of the Earth-Sun-Moon system to describe the cyclic pattern of either lunar phases, eclipses of the Sun and Moon, or seasons.	Use a given model of the Earth-Sun-Moon system to describe why seasons or the changing Moon's appearance are cyclic in nature.
MS Space Systems MS-ESS1-2	Develop and use a model to describe the role of gravity, both qualitatively and quantitatively, in the formation and motions within galaxies and the solar system.	Develop and use a model to describe the role of gravity in the motions within galaxies and the solar system.	Given a model, describe the role of gravity in the motions within galaxies and/or the solar system.	Given a model, identify the force that controls motions within galaxies and/or the solar system.
MS Space Systems MS-ESS1-3	Analyze and interpret multiple data sets to determine scale properties of objects, including surface features and inner layers, in the solar system.	Analyze and interpret data to determine scale properties of objects in the solar system.	Interpret data to determine the relative sizes and/or relative distances of objects in the solar system.	Use data to determine the relative sizes and/or relative distances in the Earth-Sun-Moon system.

Topic and PE	NYS Level 4	NYS Level 3	NYS Level 2	NYS Level 1
MS History of Earth MS-ESS1-4	Construct a scientific explanation, based on evidence from multiple sources, for how the geologic time scale is used to organize Earth's 4.6-billion-year-old history, and determine patterns of relative age for rock strata, fossils and past geologic events.	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.	Given a scientific explanation, use evidence from rock strata to determine that rock formations and the fossils they contain are used to establish relative ages of major events in Earth's history.	Given evidence from rock strata, identify the explanation, from those provided, that the analysis of rock formation and the fossils they contain are used to establish relative ages of major events in Earth's history.
MS History of Earth MS-ESS2-2	Construct an explanation, based on evidence from multiple sources, for how geoscience processes have changed Earth's surface at varying temporal and spatial scales, and determine the rates of change of these different geoscience processes.	Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying temporal and spatial scales.	Given a scientific explanation, identify the evidence that supports how one geoscience process has changed features on Earth's surface at varying temporal and/or spatial scales.	Identify an explanation, based on the evidence provided, for how one geoscience process has changed features on Earth's surface at varying temporal or spatial scales.
MS History of Earth MS-ESS2-3	Analyze and interpret data on the distribution of fossils and rocks, continental shapes, and seafloor structures to provide evidence of past plate motion. Describe the different patterns of past plate motions and explain why these past plate motions have occurred.	Analyze and interpret data on the distribution of fossils and rocks, continental shapes, and seafloor structures to provide evidence of the past plate motions.	Using data, identify the evidence that supports past plate motions using either the distribution of fossils, rocks, continental shapes, or seafloor structures.	Using data as evidence, identify the explanation, from those provided, that supports past plate motion based on either the distribution of fossils, rocks, continental shapes, or seafloor structures.

Topic and PE	NYS Level 4	NYS Level 3	NYS Level 2	NYS Level 1
MS Earth's Systems MS-ESS2-1	Develop and use multiple models to describe the cycling of Earth's materials and the flow of internal energy that drives these processes.	Develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process.	Use a model to describe a process that cycles Earth's materials and/or the flow of energy that drives this process.	Use a model to identify one process responsible for the formation of sedimentary, igneous and/or metamorphic rocks.
MS Earth's Systems MS-ESS2-4	Develop a model to describe the cycling of water, and its phase changes, through all Earth's systems driven by energy from the Sun and the force of gravity.	Develop a model to describe the cycling of water through Earth's systems driven by energy from the Sun and the force of gravity.	Given a model, describe one process in the cycling of water through one or more of Earth's systems and describe how this process is driven by energy from the Sun or by the force of gravity.	Given a model, identify one process in the cycling of water that is driven by energy from the Sun or identify one process in the cycling of water that is driven by the force of gravity.
MS Earth's Systems MS-ESS3-1	Construct a scientific explanation based on evidence for how the uneven distributions of Earth's mineral, energy, and groundwater resources are caused by past and current geologic processes and how the sustainability of these resources has impacted society.	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 geologic processes.	Given a scientific explanation, identify the evidence that shows how past or current geologic processes have contributed to the uneven distribution of Earth's resources.	Given evidence, identify the explanation, from those provided, that supports how one past or current geologic process has contributed to the uneven distribution of Earth's resources.

Topic and PE	NYS Level 4	NYS Level 3	NYS Level 2	NYS Level 1
MS Weather and Climate MS-ESS2-5	Collect data from multiple sources to provide evidence for how motions and complex interactions of different air masses, and the interrelationship of weather variables, results in different changes in weather conditions.	Collect data to provide evidence for how the motions and complex interactions of air masses results in changes in weather conditions.	Given data, identify the evidence for how the motions or interactions of complex air masses results in changes to a weather condition.	Given data and the motions or interactions of air masses, identify a resulting change in weather conditions.
MS Weather and Climate MS-ESS2-6	Develop and use a model to describe how unequal heating and the rotation of Earth cause patterns of atmospheric and oceanic circulation that determine regional climates, and explain how a change in this model can be used to predict future climate changes.	Develop and use a model to describe how unequal heating and rotation of Earth cause patterns of atmospheric and oceanic circulation that determine regional climates.	Given a model, identify one way unequal heating of Earth surfaces and/or the rotation of Earth cause patterns of atmospheric or oceanic circulation that determine regional climates.	Given a model, identify a pattern in the atmospheric or oceanic circulation that determines a regional climate.
MS Weather and Climate MS-ESS3-5	Ask questions to clarify evidence about factors that have caused the rise in global temperatures over the past century and offer solutions to these factors that caused the rise in global temperatures.	Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century.	Ask a question to clarify evidence of a factor that has caused the rise in global temperatures over the past century.	Identify a question, from those provided, that includes a factor that has caused the rise in global temperatures over the past century.

Topic and PE	NYS Level 4	NYS Level 3	NYS Level 2	NYS Level 1
MS Human Impacts MS-ESS3-2	Analyze and interpret data on locations and patterns of natural hazards to forecast future catastrophic events and provide a real-world example of how a hazard has resulted in the development of technologies to mitigate their effects.	Analyze and interpret data on the patterns of natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects.	Given patterns of data for a natural hazard, describe the predictability of that natural hazard and how society could work to mitigate its effects.	Given patterns of data for a natural hazard, describe one appropriate action that could be taken to limit the negative effects from that hazard.
MS Human Impacts MS-ESS3-3	Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment and identify constraints of the designed method.	Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.	Given the design of a method that monitors and minimizes a human impact on the environment, identify one positive or one negative impact of the design.	Identify how a given design method that monitors a human impact on the environment could minimize a human impact on the environment.
MS Human Impacts MS-ESS3-4	Construct, compare, and critique arguments supported by evidence for how increases in human population and per capita consumption of natural resources cause multiple impacts on Earth's systems.	Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.	Identify the evidence that supports a given argument that human population and consumption of natural resources impact Earth's systems.	Identify an argument that describes a relationship between human consumption of a natural resource and the impact on an Earth's system.

Topic and PE	NYS Level 4	NYS Level 3	NYS Level 2	NYS Level 1
MS Engineering Design MS-ETS1-1	Define the criteria and constraints of a design problem, specifying the importance of each, 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.	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.	Define the constraints of a design problem, taking into account relevant scientific principles, or potential impacts on people or the natural environment, that may limit possible solutions.	Identify one criterium or constraint to a design problem, from those provided, that best ensures a successful solution to a potential impact on people or the natural environment.
MS Engineering Design MS-ETS1-2	Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem and defend the best design solution based on the criteria and constraints.	Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.	Evaluate a design solution using a systematic process based on whether it meets the criteria and/or constraints of the problem.	Identify a design solution, from those provided, that best meets the criteria and/or constraints for a given problem.
MS Engineering Design MS-ETS1-3	Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each design solution, based on scientific ideas and engineering principles, that can be combined into a new solution, with justification, to better meet the criteria for success.	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.	Given the similarities and differences between two different design solutions, identify the best characteristics of each solution.	Given data from tests, determine the similarities or differences between two design solutions.
MS Engineering Design 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, and compare this design to other solutions to the same problem.	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.	Given a model, collect data using iterative testing and identify one modification of a proposed object, tool, or process that can improve the design.	Given a model and data collected from iterative testing, identify one modification that could improve the design.