KAS-Science Standards Revision Changes

Compare and contrast the 2015 KAS-S document and the 2022 KAS-S version for 2023-2024 implementation

Elementary Performance Expectation Change

New to 4th Grade

4-LS4-1 (moved to 4th from 3rd)

Previous 2015 KAS for Science Document	Current 2022 KAS for Science Document
3-LS4-1. Analyze and interpret data from fossils to provide evidence of the organisms and the environments in which they lived long ago. [Clarification Statement: Examples of data could include type, size, and distributions of fossil organisms. Examples of fossils and environments could include marine fossils found on dry land, tropical plant fossils found in Arctic areas, and fossils of extinct organisms.] [Assessment Boundary: Assessment does not include identification of specific fossils or present plants and animals. Assessment is limited to major fossil types and relative ages.]	**4-LS4-1. Analyze and interpret data from fossils to provide evidence of the organisms and the environments in which they lived long ago.** Clarification Statement: Examples of data could include type, size, and distributions of fossil organisms. Examples of fossils and environments could include marine fossils found on dry land, tropical plant fossils found in Arctic areas, and fossils of extinct organisms. Assessment Boundary: Assessment does not include identification of specific fossils or present plants and animals. Assessment is limited to major fossil types and relative ages.

Elementary Modifications to Performance Expectations

Kindergarten - K-PS2-1 Clarification Statement modified

Previous 2015 KAS for Science Document	Current 2022 KAS for Science Document
K-PS2-1. Plan and conduct an investigation to compare the effects of different strengths or different directions of pushes and pulls on the motion of an object. [Clarification Statement: Examples of pushes or pulls could include a string attached to an object being pulled, a person pushing an object, a person stopping a rolling ball, and two objects colliding and pushing on each other.] [Assessment Boundary: Assessment is limited to different relative strengths or different directions, but not both at the same time. Assessment does not include non-contact pushes or pulls such as those produced by magnets.]	**K-PS2-1. Plan and conduct an investigation to compare the effects of different strengths or different directions of pushes and pulls on the motion of an object.** Clarification Statement: Examples of pushes or pulls could include a string attached to an object being pulled, swings on a playground, a person pushing an object, a person stopping a rolling ball, and two objects colliding and pushing on each other. Assessment Boundary: Assessment is limited to different relative strengths or different directions, but not both at the same time. Assessment does not include non-contact pushes or pulls such as those produced by magnets.

K-LS1-1 Clarification Statement

Previous 2015 KAS for Science Document	Current 2022 KAS for Science Document

K-LS1-1. Use observations to describe patterns of what plants and animals (including humans) need to survive. [Clarification Statement: Examples of patterns could include that animals need to take in food but plants do not; the different kinds of food needed by different types of animals; the requirement of plants to have light; and that all living things need water.]	**K-LS1-1. Use observations to describe patterns of what plants and animals (including humans) need to survive.** Clarification Statement: Examples of patterns could include that animals need to take in food but plants make their food, the different kinds of food needed by different types of animals, the requirement of plants to have light, and that all living things need water. Assessment Boundary: None provided.

modified

1st Grade - No modifications

2nd Grade - 2-LS4-1 New CCC added (Patterns)

Previous 2015 KAS for Science Document	Current 2022 KAS for Science Document
2-LS4-1. Make observations of plants and animals to compare the diversity of life in different habitats. [Clarification Statement: Emphasis is on the diversity of living things in each of a variety of different habitats.] [Assessment Boundary: Assessment does not include specific animal and plant names in specific habitats.] **No CCC**	**2-LS4-1. Make observations of plants and animals to compare the diversity of life in different habitats.** Clarification Statement: Emphasis is on the diversity of living things in each of a variety of different habitats. Assessment Boundary: Assessment does not include specific animal and plant names in specific habitats. Patterns: Patterns in the natural world can be observed.

3rd Grade - 3-PS2-4 New CCC added (Cause and Effect)

Previous 2015 KAS for Science Document	Current 2022 KAS for Science Document
3-PS2-4. Define a simple design problem that can be solved by applying scientific ideas about magnets.* [Clarification Statement: Examples of problems could include constructing a latch to keep a door shut and creating a device to keep two moving objects from touching each other.] No CCC	**3-PS2-4. Define a simple design problem that can be solved by applying scientific ideas about magnets.*** Clarification Statement: Examples of problems could include constructing a latch to keep a door shut and creating a device to keep two moving objects from touching each other. Assessment Boundary: None provided. **Cause and Effect:** Identify and test causal relationships and use these relationships to explain change.

4th Grade –

4-PS4-1 Clarification Statement modified-this was left out- it is not a major change though

Previous 2015 KAS for Science Document	Current 2022 KAS for Science Document
4-PS4-1. Develop a model of waves to describe patterns in terms of amplitude and wavelength	**4-PS4-1. Develop a model of waves to describe patterns in terms of amplitude and wavelength**

and that waves can cause objects to move. [Clarification Statement: Examples of models could include diagrams, analogies, and physical models ~~using wire~~ to illustrate wavelength and amplitude of waves.] [Assessment Boundary: Assessment does not include interference effects, electromagnetic waves, non-periodic waves, or quantitative models of amplitude and wavelength.]	**and that waves can cause objects to move.** Clarification Statement: Examples of models could include diagrams, analogies, and physical models to illustrate wavelength and amplitude of waves. Assessment Boundary: Assessment does not include interference effects, electromagnetic waves, non-periodic waves, or quantitative models of amplitude and wavelength.

4-PS4-2 Clarification statement added

Previous 2015 KAS for Science Document	Current 2022 KAS for Science Document
4-PS4-2. Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen. [Assessment Boundary: Assessment does not include knowledge of specific colors reflected and seen, the cellular mechanisms of vision, or how the retina works.]	**4-PS4-2. Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen.** Clarification Statement: Examples of models could include diagrams, analogies, and physical models that illustrate light reflecting from objects and entering the eye. Assessment Boundary: Assessment does not include knowledge of specific colors reflected and seen, the cellular mechanisms of vision, or how the retina works.

4-PS4-3 New DCI added (ETS1.C was listed as secondary previously, now listed as a 2nd DCI)

Previous 2015 KAS for Science Document	Current 2022 KAS for Science Document
4-PS4-3. Generate and compare multiple solutions that use patterns to transfer information.* [Clarification Statement: Examples of solutions could include drums sending coded information through sound waves, using a grid of 1's and 0's representing black and white to send information about a picture, and using Morse code to send text.] DCI **PS4.C: Information Technologies and Instrumentation** □ Digitized information transmitted over long distances without significant degradation. High-tech devices, such as computers or cell phones, can receive and decode information— convert it from digitized form to voice—and vice versa. (4-PS4-3) **ETS1.C: Optimizing The Design Solution** Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints. *(secondary to 4-PS4-3)*	**4-PS4-3. Generate and compare multiple solutions that use patterns to transfer information.** Clarification Statement: Examples of solutions could include drums sending coded information through sound waves, using a grid of 1's and 0's representing black and white to send information about a picture, and using Morse code to send text. Assessment Boundary: None provided. DCI PS4.C: Information Technologies and Instrumentation Patterns can encode, send, receive, and decode information. ETS1.C: Optimizing the Design Solution Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints. (No longer secondary)

4-ESS3-1 Clarification Statement modified

Previous 2015 KAS for Science Document	Current 2022 KAS for Science Document

4-ESS3-1. Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment. [Clarification Statement: Examples of renewable energy resources could include wind energy, water behind dams, and sunlight; nonrenewable energy resources are fossil fuels and fissile materials. Examples of environmental effects could include loss of habitat due to dams, loss of habitat due to surface mining, and air pollution from burning of fossil fuels.]	**4-ESS3-1. Obtain and combine information to describe that energy and fuels are derived from natural resources and that their uses affect the environment.** Clarification Statement: Natural resources are derived from both renewable energy (e.g., wind, water, biomass) and non-renewable energy (e.g., fossil fuels and fissile materials). Examples of environmental effects could include loss of habitat, soil erosion, or air pollution. Assessment Boundary: None provided.

5th Grade - 5-ESS3-1 Performance Expectation modified new Clarification Statement added, new DCI added (ETS1.A Defining and Delimiting Engineering Problems)

Previous 2015 KAS for Science Document	Current 2022 KAS for Science Document
5-ESS3-1. Obtain and combine information about ways individual communities use ~~science ideas~~ to protect the Earth's resources and environment. Clarification- None provided Assessment Boundary-None provided DCI- **ESS3.C: Human Impacts on Earth Systems** Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, ocean, air, and even outer space. But individuals and communities are doing things to help protect Earth's resources and environments.	**5-ESS3-1. Obtain and combine information about solutions individual communities use to protect the Earth's resources and environment.*** Clarification Statement: Examples could include agricultural solutions to prevent fertilizer runoff or using goats to control invasive plant species. Assessment Boundary: None provided. DCI- **ESS3.C:** Human Impacts on Earth Systems Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, oceans, air, and even outer space. But individuals and communities are doing things to help protect Earth's resources and environments. **ETS1.A**: Defining and Delimiting Engineering Problems Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account.

Middle School Performance Expectation Changes (new grades)

New to 6th grade

6-PS2-4 (moved to 6th from 7th)

Previous 2015 KAS for Science Document	Current 2022 KAS for Science Document

07-PS2-4. Construct and present arguments using evidence to support the claim that gravitational interactions are attractive and depend on the masses of interacting objects. [Clarification Statement: Examples of evidence for arguments could include data generated from simulations or digital tools; and charts displaying mass, strength of interaction, distance from the Sun, and orbital periods of objects within the solar system.] [Assessment Boundary: Assessment does not include Newton's Law of Gravitation or Kepler's Laws.]	**6-PS2-4. Construct and present arguments using evidence to support the claim that gravitational interactions are attractive and depend on the masses of interacting objects.** Clarification Statement: Examples of evidence for arguments could include data generated from simulations or digital tools and also charts displaying mass, strength of interaction, distance from the sun, and orbital periods of objects within the solar system. Assessment Boundary: Assessment does not include Newton's law of gravitation or Kepler's laws.

6-LS1-6 (moved to 6th from 7th)

Previous 2015 KAS for Science Document	Current 2022 KAS for Science Document
07-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.]	**6-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.

New to 7th grade

7-PS2-2 (moved to 7th from 6th)

Previous 2015 KAS for Science Document	Current 2022 KAS for Science Document
06-PS2-2. Plan an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object. [Clarification Statement: Emphasis is on balanced (Newton's First Law) and unbalanced forces in a system, qualitative comparisons of forces, mass and changes in motion (Newton's Second Law), frame of reference, and specification of units.] [Assessment Boundary: Assessment is limited to forces and changes in motion in one-dimension in an inertial reference frame, and to change in one variable at a time. Assessment does not include the use of trigonometry.]	**7-PS2-2. Plan an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object.** Clarification Statement: Emphasis is on balanced (Newton's first law) and unbalanced forces in a system, qualitative comparisons of forces, mass and changes in motion (Newton's second law), frame of reference, and specification of units. Assessment Boundary: Assessment is limited to forces and changes in motion in one-dimension in an inertial reference frame and to change in one variable at a time. Assessment does not include the use of trigonometry.

7-PS3-1 (moved to 7th from 8th)

Previous 2015 KAS for Science Document	Current 2022 KAS for Science Document

08-PS3-1. Construct and interpret graphical displays of data to describe the relationships of kinetic energy to the mass of an object and to the speed of an object. [Clarification Statement: Emphasis is on descriptive relationships between kinetic energy and mass separately from kinetic energy and speed. Examples could include riding a bicycle at different speeds, rolling different sizes of rocks downhill, and getting hit by a wiffle ball versus a tennis ball.]	**7-PS3-1. Construct and interpret graphical displays of data to describe the relationships of kinetic energy to the mass of an object and to the speed of an object.** Clarification Statement: Emphasis is on descriptive relationships between kinetic energy and mass separately from kinetic energy and speed. Examples could include riding a bicycle at different speeds, rolling different sizes of rocks downhill, and getting hit by a whiffle ball versus a tennis ball. Assessment Boundary: None provided.

7-LS1-8 (moved to 7th from 8th)

Previous 2015 KAS for Science Document	Current 2022 KAS for Science Document
08-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. [Assessment Boundary: Assessment does not include mechanisms for the transmission of this information.]	**7-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 provided. Assessment Boundary: Assessment does not include mechanisms for the transmission of this information.

New to 8th grade

8-PS1-3 (moved to 8th from 6th)

Previous 2015 KAS for Science Document	Current 2022 KAS for Science Document
06-PS1-3. Gather and make sense of information to describe that synthetic materials come from natural resources and impact society. [Clarification Statement: Emphasis is on natural resources that undergo a chemical process to form the synthetic material. Examples of new materials could include new medicine, foods, and alternative fuels.] [Assessment Boundary: Assessment is limited to qualitative information.]	**8-PS1-3. Gather and make sense of information to describe that synthetic materials come from natural resources and impact society.** Clarification Statement: Emphasis is on natural resources that undergo a chemical process to form the synthetic material. Examples of new materials could include new medicine, foods, and alternative fuels. Assessment Boundary: Assessment is limited to qualitative information.

8-LS1-4 (moved to 8th from 7th)

Previous 2015 KAS for Science Document	Current 2022 KAS for Science Document
07-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	**8-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.]	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 provided.

8-LS1-5 (moved to 8th from 7th)

Previous 2015 KAS for Science Document	Current 2022 KAS for Science Document
07-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.]	**8-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.

Middle School Modifications to Performance Expectations

6th Grade - 6-ESS2-2 Performance Expectation Modified, Clarification Statement Modified, new

DCI (ESS2.E Biogeology)

Previous 2015 KAS for Science Document	Current 2022 KAS for Science Document
06-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	**6-ESS2-2. Construct an explanation based on evidence for how biological and 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

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.] DCI- **ESS2.A: Earth's 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. **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.	as rapid landslides, biological 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 caused by the movements of water, ice, and wind. Examples of biological processes could include the decomposition of living organisms resulting in soil formation, the effect of vegetation on erosion, and the impact of beaver dams on the natural flow of waterways. Emphasis is on biological processes and geoscience processes that shape local geographic features, where appropriate. Assessment Boundary: None provided. DCI- ESS2.A: Earth's 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. 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. ESS2.E: Biogeology The evolution and proliferation of living things over geological time have in turn changed the rates of weathering and erosion of land surfaces, altered the composition of Earth's soils and atmosphere, and affected the distribution of water in the hydrosphere.

7th Grade - 7-PS4-3 Performance Expectation Modified, new DCI (new element of PS4.C is identified)

Previous 2015 KAS for Science Document	Current 2022 KAS for Science Document
07-PS4-3. Integrate qualitative scientific and technical information to support the claim that ~~digitized signals are a more reliable way to encode and transmit information than analog signals.~~ [Clarification Statement: Emphasis is on a basic understanding that waves can be used for communication purposes. Examples could include using fiber optic cable to transmit light pulses, radio wave pulses in wifi devices, and conversion of stored binary patterns to make sound or text on a computer screen.] [Assessment Boundary: Assessment does not include binary counting. Assessment does not include the specific mechanism of any given device.]	**7-PS4-3. Integrate qualitative scientific and technical information to support the claim that designed technologies can transmit digital information as wave pulses.** Clarification Statement: Emphasis is on a basic understanding that waves can be used for communication purposes. Examples could include using fiber optic cable to transmit light pulses, radio wave pulses in Wi-Fi devices, and conversion of stored binary patterns to make sound or text on a computer screen. Assessment Boundary: Assessment does not include binary counting. Assessment does not include the specific mechanism of any given device.

DCI- **PS4.C: Information Technologies and Instrumentation** ~~Digitized signals (sent as wave pulses) are a more reliable way to encode and transmit information.~~	DCI- PS4.C: **Information Technologies and Instrumentation** Technologies allow us to detect and interpret waves and signals in waves that cannot be detected directly.

7-LS1-1 CS Modified

Previous 2015 KAS for Science Document	Current 2022 KAS for Science Document
07-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 cells, and understanding that living things may be made of one cell or many and varied cells.]	**7-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 provided.

8th Grade - 8-LS2-4 new DCI (LS2.D Social Interactions and Group Behavior),

Previous 2015 KAS for Science Document	Current 2022 KAS for Science Document
08-LS2-4. Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations. [Clarification Statement: Emphasis is on recognizing patterns in data and making warranted inferences about changes in populations, and on evaluating empirical evidence supporting arguments about changes to ecosystems.] DCI- **LS2.C: Ecosystem Dynamics, Functioning, and Resilience** Ecosystems are dynamic in nature; their characteristics can vary over time. Disruptions to any physical or biological component of an ecosystem can lead to shifts in all its populations.	**8-LS2-4. Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.** Clarification Statement: Emphasis is on recognizing patterns in data and making warranted inferences about changes in populations, and on evaluating empirical evidence supporting arguments about changes to ecosystems. Assessment Boundary: None provided. DCI- **LS2.C: Ecosystem Dynamics, Functioning, and Resilience** Ecosystems are dynamic in nature; their characteristics can vary over time. Disruptions to any physical or biological component of an ecosystem can lead to shifts in all its populations **LS2.D: Social Interactions and Group Behavior** Groups often dissolve if they no longer function to meet individuals' needs, if dominant members lose their place, or if other key members are removed from the group through death, predation, or exclusion by other members.

8-LS4-3 Performance Expectation modified

Previous 2015 KAS for Science Document	Current 2022 KAS for Science Document
08-LS4-3. Analyze ~~displays of pictorial~~ data to compare patterns ~~of similarities~~ in the	8-LS4-3. Analyze data to compare patterns in the embryological development across multiple

embryological development across multiple species to identify relationships not evident in the fully formed anatomy. [Clarification Statement: Emphasis is on inferring general patterns of relatedness among embryos of different organisms by comparing the macroscopic appearance of diagrams or pictures.] [Assessment Boundary: Assessment of comparisons is limited to gross appearance of anatomical structures in embryological development.]	species to identify relationships not evident in the fully formed adult anatomy. Clarification Statement: Emphasis is on inferring general patterns of relatedness among embryos of different organisms by comparing the macroscopic appearance of diagrams or pictures. Assessment Boundary: Assessment of comparisons is limited to gross appearance of anatomical structures in embryological development.

8-ESS3-2 Performance Expectation modified

Previous 2015 KAS for Science Document	Current 2022 KAS for Science Document
08-ESS3-2. Analyze and interpret data ~~on natural hazards~~ to forecast future catastrophic events and inform the development of technologies to mitigate their effects. [Clarification Statement: Emphasis is on how some natural hazards, such as volcanic eruptions and severe weather, are preceded by phenomena that allow for reliable predictions, but others, such as earthquakes, occur suddenly and with no notice, and thus are not yet predictable. Examples of natural hazards can be taken from interior processes (such as earthquakes and volcanic eruptions), surface processes (such as mass wasting and tsunamis), or severe weather events (such as hurricanes, tornadoes, and floods). Examples of data can include the locations, magnitudes, and frequencies of the natural hazards. Examples of technologies can be global (such as satellite systems to monitor hurricanes or forest fires) or local (such as building basements in tornado-prone regions or reservoirs to mitigate droughts).]	**8-ESS3-2. Analyze and interpret data to forecast future catastrophic events to inform the development of technologies to mitigate the effects of natural hazards.** Clarification Statement: Emphasis is on how some natural hazards, such as volcanic eruptions and severe weather, are preceded by phenomena that allow for reliable predictions, but others, such as earthquakes, occur suddenly and with no notice, and thus are not yet predictable. Examples of natural hazards can be taken from interior processes (such as earthquakes and volcanic eruptions), surface processes (such as mass wasting and tsunamis), or severe weather events (such as hurricanes, tornadoes, and floods). Examples of data can include the locations, magnitudes, and frequencies of the natural hazards. Examples of technologies can be global (such as satellite systems to monitor hurricanes or forest fires) or local (such as building basements in tornado prone regions or reservoirs to mitigate droughts). Assessment Boundary: None provided.

High School Modifications to Performance Expectations

HS-PS1-3 Performance Expectation and Clarification Statement modified

Previous 2015 KAS for Science Document	Current 2022 KAS for Science Document
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. [Clarification Statement: Emphasis is on understanding the strengths of forces between particles, ~~and~~ not on naming specific intermolecular forces (such as dipole-dipole).	**HS-PS1-3. Plan and conduct an investigation to gather evidence to compare the structure of substances at the macro and micro scale to infer the strength of electrical forces between particles.** Clarification Statement: Emphasis is on understanding the strengths of forces between particles, not on naming specific intermolecular forces (such as dipole-dipole). Examples of

Examples of particles could include ions, atoms, molecules, and networked materials (such as graphite). Examples of ~~bulk~~ properties of substances could include the melting point and boiling point, vapor pressure, and surface tension.] [Assessment Boundary: Assessment does not include Raoult's law calculations of vapor pressure.]	particles could include ions, atoms, molecules, and networked materials (such as graphite). Examples of properties of substances could include the melting point and boiling point, vapor pressure, and surface tension. Assessment Boundary: Assessment does not include Raoult's law calculations of vapor pressure.

HS-PS3-1 Clarification Statement modified

Previous 2015 KAS for Science Document	Current 2022 KAS for Science Document
HS-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. [Clarification Statement: Emphasis is on explaining the meaning of mathematical expressions used in the model.] [Assessment Boundary: Assessment is limited to basic algebraic expressions or computations; to systems of two or three components; and to thermal energy, kinetic energy, and/or the energies in gravitational, magnetic, or electric fields.]	**HS-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.** Clarification Statement: Emphasis is on explaining the meaning of mathematical expressions modeled in common phenomena. Assessment Boundary: Assessment is limited to basic algebraic expressions or computations; to systems of two or three components; and to thermal energy, kinetic energy, and/or the energies in gravitational, magnetic, or electric fields.

HS-LS1-2 new DCI, **CCC modified- no evidence of this**

Previous 2015 KAS for Science Document	Current 2022 KAS for Science Document
HS-LS1-2. Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms. [Clarification Statement: Emphasis is on functions at the organism system level such as nutrient uptake, water delivery, and organism movement in response to neural stimuli. An example of an interacting system could be an artery depending on the proper function of elastic tissue and smooth muscle to regulate and deliver the proper amount of blood within the circulatory system.] [Assessment Boundary: Assessment does not include interactions and functions at the molecular or chemical reaction level.] DCI- **LS1.A: Structure and Function** Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level.	**HS-LS1-2. Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.** Clarification Statement: Emphasis is on functions at the organism system level such as nutrient uptake, water delivery, organism movement and behavioral response to neural stimuli. An example of an interacting system could be an artery depending on the proper function of elastic tissue and smooth muscle to regulate and deliver the proper amount of blood within the circulatory system. Assessment Boundary: Assessment does not include interactions and functions at the molecular or chemical reaction level. DCI- LS1.A: Structure and Function Multicellular organisms have a hierarchical structural organization in which any one system is made up of numerous parts and is itself a component of the next level.

CCC- **Systems and System Models** Models (e.g., physical, mathematical, computer models) can be used to simulate systems and interactions—including energy, matter, and information flows—within and between systems at different scales.	LS1.D: Information Processing In a more complex organism, the systems become more complex to provide more input to allow for decision making regarding events around the organism. The organism begins to develop memories that motivate it to seek rewards and avoid punishments. The integration of the systems is important for the successful interpretation of inputs and generation of behaviors in response to them. CCC- Systems and System Models Models (e.g., physical, mathematical, computer models) can be used to simulate systems and interactions—including energy, matter, and information flows—within and between systems at different scales.

HS-LS1-3 new DCI

Previous 2015 KAS for Science Document	Current 2022 KAS for Science Document
HS-LS1-3. Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis. [Clarification Statement: Examples of investigations could include heart rate response to exercise, stomate response to moisture and temperature, and root development in response to water levels.] [Assessment Boundary: Assessment does not include the cellular processes involved in the feedback mechanism.] DCI- **LS1.A: Structure and Function** Feedback mechanisms maintain a living system's internal conditions within certain limits and mediate behaviors, allowing it to remain alive and functional even as external conditions change within some range. Feedback mechanisms can encourage (through positive feedback) or discourage (negative feedback) what is going on inside the living system.	**HS-LS1-3. Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.** Clarification Statement: Examples of investigations could include heart rate response to exercise, stomate response to moisture and temperature, and root development in response to water levels. Assessment Boundary: Assessment does not include the cellular processes involved in the feedback mechanism. DCI- LS1.A: Structure and Function Feedback mechanisms maintain a living system's internal conditions within certain limits and mediate behaviors, allowing it to remain alive and functional even as external conditions change within some range. Feedback mechanisms can encourage (through positive feedback) or discourage (negative feedback) what is going on inside the living system. LS1.D: Information Processing Some circuits give rise to emotions and memories that motivate organisms to seek rewards, avoid punishments, develop fears, or form attachments to members of their own species and, in some cases, to individuals of other species (e.g., mixed herds of mammals, mixed flocks of birds). The integrated functioning of all parts of the brain is important for successful interpretation of inputs and generation of behaviors in response to them.

HS-ESS1-4 Clarification Statement modified.

Previous 2015 KAS for Science Document	Current 2022 KAS for Science Document
HS-ESS1-4. Use mathematical or computational representations to predict the motion of orbiting objects in the solar system. [Clarification Statement: Emphasis is on Newtonian gravitational laws governing orbital motions, which apply to human-made satellites as well as planets and moons.] [Assessment Boundary: Mathematical representations for the gravitational attraction of bodies and Kepler's Laws of orbital motions should not deal with more than two bodies, nor involve calculus.]	**HS-ESS1-4. Use mathematical or computational representations to predict the motion of orbiting objects in the solar system.** Clarification Statement: Emphasis is on Newtonian gravitational laws and Kepler's Laws governing orbital motions, which apply to human-made satellites as well as planets and moons. Assessment Boundary: Mathematical representations for the gravitational attraction of bodies and Kepler's Laws of orbital motions should not deal with more than two bodies, nor involve calculus.