SCIENCE

GRADUATION PROFICIENCIES AND PERFORMANCE INDICATORS FOR RHODE ISLAND

Proficiency #1: Physical Sciences - Structure and Properties of Matter / Forces and Interactions

Proficiency #2: Physical Sciences - Energy, Waves, and Electromagnetic Radiation

Proficiency #3: Life Sciences - Structure, Function, and Information Processing

Proficiency #4: Life Sciences - Matter and Energy in Organisms and Ecosystems

Proficiency #5: Life Sciences - Heredity, Natural Selection and Biodiversity of Organisms

Proficiency #6: Earth and Space Sciences - Earth's Place in the Universe

Proficiency #7: Earth and Space Sciences - Earth Systems and Human Impact
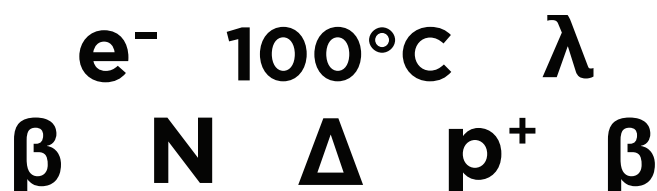
Proficiency #8: Engineering, Technology, and Application of Science

RIDE Rhode Island Department of Education

SCIENCE

**GRADUATION PROFICIENCIES
AND PERFORMANCE INDICATORS**

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GRADUATION PROFICIENCY #1:

PHYSICAL SCIENCES - STRUCTURE AND PROPERTIES OF MATTER / FORCES AND INTERACTIONS

Students will demonstrate an understanding of structure, properties, and interactions of matter (PS1) and explain and predict interactions between objects and within systems of objects (PS2) through the integration of scientific and engineering practices and crosscutting concepts.

Proficiency #1: Physical Sciences - Structure and Properties of Matter / Forces and Interactions

Proficiency #2: Physical Sciences - Energy, Waves, and Electromagnetic Radiation

Proficiency #3: Life Sciences - Structure, Function, and Information Processing

Proficiency #4: Life Sciences - Matter and Energy in Organisms and Ecosystems

Proficiency #5: Life Sciences - Heredity, Natural Selection and Biodiversity of Organisms

Proficiency #6: Earth and Space Sciences - Earth's Place in the Universe

Proficiency #7: Earth and Space Sciences - Earth Systems and Human Impact

Proficiency #8: Engineering, Technology, and Application of Science

PERFORMANCE INDICATORS:
Students will...

	K-2	3-5	6-8	9-12
A	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. (K-PS2-1)	Plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces on the motion of an object. (3-PS2-1)	Develop models to describe the atomic composition of simple molecules and extended structures. (MS-PS1-1)	Use the periodic table as a model to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms. (HS-PS1-1)
B	Analyze data to determine if a design solution works as intended to change the speed or direction of an object with a push or a pull. (K-PS2-2)	Make observations and/or measurements of an object's motion to provide evidence that a pattern can be used to predict future motion. (3-PS2-2)	Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred. (MS-PS1-2)	Construct and revise an explanation for the outcome of a simple chemical reaction based on the outermost electron states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties. (HS-PS1-2)

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GRADUATION PROFICIENCY #3:

LIFE SCIENCES - STRUCTURE, FUNCTION, AND INFORMATION PROCESSING

Students will demonstrate an understanding of how organisms live, grow, respond to their environment, and reproduce using molecular, structural, and chemical biology (LS1) through the integration of scientific and engineering practices and crosscutting concepts.

Proficiency #1: Physical Sciences - Structure and Properties of Matter / Forces and Interactions

Proficiency #2: Physical Sciences - Energy, Waves, and Electromagnetic Radiation

Proficiency #3: Life Sciences - Structure, Function, and Information Processing

Proficiency #4: Life Sciences - Matter and Energy in Organisms and Ecosystems

Proficiency #5: Life Sciences - Heredity, Natural Selection and Biodiversity of Organisms

Proficiency #6: Earth and Space Sciences - Earth's Place in the Universe

Proficiency #7: Earth and Space Sciences - Earth Systems and Human Impact

Proficiency #8: Engineering, Technology, and Application of Science

PERFORMANCE INDICATORS:
Students will...

	K-2	3-5	6-8	9-12
A	Use observations to describe patterns of what plants and animals (including humans) need to survive. (K-LS1-1)	Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death. (3-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. (MS-LS1-1)	Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins, which carry out the essential functions of life through systems of specialized cells. (HS-LS1-1)
B	Use materials to design a solution to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs. (1-LS1-1)	Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction. (4-LS1-1)	Develop and use a model to identify parts of a cell, describe the function of a cell as a whole, and explain how parts of a cell contribute to the function. (MS-LS1-2)	Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms. (HS-LS1-2)

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GRADUATION PROFICIENCIES AND PERFORMANCE INDICATORS

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GRADUATION PROFICIENCY #3:

LIFE SCIENCES - STRUCTURE, FUNCTION, AND INFORMATION PROCESSING
(CONTINUED)

	K-2	3-5	6-8	9-12
C	Read texts and use media to determine patterns in behavior of parents and offspring that help offspring survive. (1-LS1-2)	Use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways. (4-LS1-2)	Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells. (MS-LS1-3)	Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis. (HS-LS1-3)
D		Support an argument that plants get the materials they need for growth chiefly from air and water. (5-LS1-1)	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. (MS-LS1-4)	Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms. (HS-LS1-4)
E			Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms. (MS-LS1-5)	Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy. (HS-LS1-5)

GRADUATION PROFICIENCY #3:
LIFE SCIENCES - STRUCTURE, FUNCTION, AND INFORMATION PROCESSING
(CONTINUED)

	K-2	3-5	6-8	9-12
F			Construct a scientific explanation based on evidence for the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms. (MS-LS1-6)	Construct and revise an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine with other elements to form amino acids and/or other large carbon-based molecules. (HS-LS1-6)
G			Develop a model to describe how food is rearranged through chemical reactions forming new molecules that support growth and/ or release energy as this matter moves through an organism. (MS-LS1-7)	Use a model to illustrate that cellular respiration is a chemical process whereby the bonds of food molecules and oxygen molecules are broken and the bonds in new compounds are formed resulting in a net transfer of energy. (HS-LS1-7)
H			Gather and synthesize information that sensory receptors respond to stimuli by sending messages to the brain for immediate behavior or storage as memories. (MS-LS1-8)	

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GRADUATION PROFICIENCY #4:

LIFE SCIENCES - MATTER AND ENERGY IN ORGANISMS AND ECOSYSTEMS

Students will demonstrate an understanding of the characteristics, functions, and behavioral interactions within an ecosystem (LS2) through the integration of scientific and engineering practices and crosscutting concepts.

Proficiency #1: Physical Sciences - Structure and Properties of Matter / Forces and Interactions

Proficiency #2: Physical Sciences - Energy, Waves, and Electromagnetic Radiation

Proficiency #3: Life Sciences - Structure, Function, and Information Processing

Proficiency #4: Life Sciences - Matter and Energy in Organisms and Ecosystems

Proficiency #5: Life Sciences - Heredity, Natural Selection and Biodiversity of Organisms

Proficiency #6: Earth and Space Sciences - Earth's Place in the Universe

Proficiency #7: Earth and Space Sciences - Earth Systems and Human Impact

Proficiency #8: Engineering, Technology, and Application of Science

PERFORMANCE INDICATORS:
Students will...

	K-2	3-5	6-8	9-12
A	Plan and conduct an investigation to determine if plants need sunlight and water to grow. (2-LS2-1)	Construct an argument that some animals form groups that help members survive. (3-LS2-1)	Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem. (MS-LS2-1)	Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales. (HS-LS2-1)
B	Develop a simple model that mimics the function of an animal in dispersing seeds or pollinating plants. (2-LS2-2)	Develop model to describe the movement of matter among plants, animals, decomposers, and the environment. (5-LS2-1)	Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems. (MS-LS2-2)	Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales. (HS-LS2-2)

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GRADUATION PROFICIENCY #4:

LIFE SCIENCES - MATTER AND ENERGY IN ORGANISMS AND ECOSYSTEMS
(CONTINUED)

	K-2	3-5	6-8	9-12
C			Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem. (MS-LS2-3)	Construct and revise an explanation based on evidence for the cycling of matter and flow of energy in aerobic and anaerobic conditions. (HS-LS2-3)
D			Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations. (MS-LS2-4)	Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem. (HS-LS2-4)
E			Evaluate competing design solutions for maintaining biodiversity and ecosystem services. (MS-LS2-5)	Develop a model to illustrate the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere. (HS-LS2-5)

GRADUATION PROFICIENCY #4:

LIFE SCIENCES - MATTER AND ENERGY IN ORGANISMS AND ECOSYSTEMS
(CONTINUED)

	K-2	3-5	6-8	9-12
F				Evaluate the claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem. (HS-LS2-6)
G				Design, evaluate and refine a solution for reducing the impacts of human activity on the environment and biodiversity. (HS-LS2-7)
H				Evaluate the evidence for the role of group behavior on individual and species' chances to survive and reproduce. (HS-LS2-8)

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GRADUATION PROFICIENCIES AND PERFORMANCE INDICATORS

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GRADUATION PROFICIENCY #5:

LIFE SCIENCES - HEREDITY, NATURAL SELECTION AND BIODIVERSITY OF ORGANISMS

Students will demonstrate an understanding of genetics, variation of traits (LS3), adaptation, natural selection, and biodiversity (LS4) through the integration of scientific and engineering practices, and crosscutting concepts.

Proficiency #1: Physical Sciences - Structure and Properties of Matter / Forces and Interactions

Proficiency #2: Physical Sciences - Energy, Waves, and Electromagnetic Radiation

Proficiency #3: Life Sciences - Structure, Function, and Information Processing

Proficiency #4: Life Sciences - Matter and Energy in Organisms and Ecosystems

Proficiency #5: Life Sciences - Heredity, Natural Selection and Biodiversity of Organisms

Proficiency #6: Earth and Space Sciences - Earth's Place in the Universe

Proficiency #7: Earth and Space Sciences - Earth Systems and Human Impact

Proficiency #8: Engineering, Technology, and Application of Science

PERFORMANCE INDICATORS:
Students will...

	K-2	3-5	6-8	9-12
A	Make observations to construct an evidence-based account that young plants and animals are like, but not exactly like, their parents. (1-LS3-1)	Analyze and interpret data to provide evidence that plants and animals have traits inherited from parents and that variation of these traits exists in a group of similar organisms. (3-LS3-1)	Develop and use a model to describe why structural changes to genes (mutations) located on chromosomes may affect proteins and may result in harmful, beneficial, or neutral effects to the structure and function of the organism. (MS-LS3-1)	Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring. (HS-LS3-1)
B	Make observations of plants and animals to compare the diversity of life in different habitats. (2-LS4-1)	Use evidence to support the explanation that traits can be influenced by the environment. (3-LS3-2)	Develop and use a model to describe why asexual reproduction results in offspring with identical genetic information and sexual reproduction results in offspring with genetic variation. (MS-LS3-2)	Make and defend a claim based on evidence that inheritable genetic variations may result from: (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors. (HS-LS3-2)

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GRADUATION PROFICIENCIES AND PERFORMANCE INDICATORS

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GRADUATION PROFICIENCY #5:

LIFE SCIENCES - HEREDITY, NATURAL SELECTION AND BIODIVERSITY OF ORGANISMS
(CONTINUED)

	K-2	3-5	6-8	9-12
C		Analyze and interpret data from fossils to provide evidence of the organisms and the environments in which they lived long ago. (3-LS4-1)	Analyze and interpret data for patterns in the fossil record that document the existence, diversity, extinction, and change of life forms throughout the history of life on Earth under the assumption that natural laws operate today as in the past. (MS-LS4-1)	Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population. (HS-LS3-3)
D		Use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing. (3 -LS4-2)	Apply scientific ideas to construct an explanation for the anatomical similarities and differences among modern organisms and between modern and fossil organisms to infer evolutionary relationships. (MS-LS4-2)	Communicate scientific information that common ancestry and biological evolution are supported by multiple lines of empirical evidence. (HS-LS4-1)

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GRADUATION PROFICIENCY #5:

LIFE SCIENCES - HEREDITY, NATURAL SELECTION AND BIODIVERSITY OF ORGANISMS
(CONTINUED)

	K-2	3-5	6-8	9-12
E		Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all. (3 -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. (MS-LS4-3)	Construct an explanation based on evidence that the process of evolution primarily results from four factors: (1) the potential for a species to increase in number, (2) the heritable genetic variation of individuals in a species due to mutation and sexual reproduction, (3) competition for limited resources, and (4) the proliferation of those organisms that are better able to survive and reproduce in the environment. (HS-LS4-2)
F		Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change. (3-LS4-4)	Construct an explanation based on evidence that describes how genetic variations of traits in a population increase some individuals' probability of surviving and reproducing in a specific environment. (MS-LS4-4)	Apply concepts of statistics and probability to support explanations that organisms with an advantageous heritable trait tend to increase in proportion to organisms lacking this trait. (HS-LS4-3)

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LIFE SCIENCES - HEREDITY, NATURAL SELECTION AND BIODIVERSITY OF ORGANISMS
(CONTINUED)

	K-2	3-5	6-8	9-12
G			Gather and synthesize information about the technologies that have changed the way humans influence the inheritance of desired traits in organisms. (MS-LS4-5)	Construct an explanation based on evidence for how natural selection leads to adaptation of populations. (HS-LS4-4)
H			Use mathematical representations to support explanations of how natural selection may lead to increases and decreases of specific traits in populations over time. (MS-LS4-6)	Evaluate the evidence supporting claims that changes in environmental conditions may result in: (1) increases in the number of individuals of some species, (2) the emergence of new species over time, and (3) the extinction of other species. (HS-LS4-5)
I				Revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity. (HS-LS4-6)

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**GRADUATION PROFICIENCIES
AND PERFORMANCE INDICATORS**

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GRADUATION PROFICIENCY #6:

EARTH AND SPACE SCIENCES - EARTH'S PLACE IN THE UNIVERSE

Students will demonstrate an understanding of the origins, interactions and relationships between and among the Earth, our solar system, and the Universe (ESS1) through the integration of scientific and engineering practices and crosscutting concepts.

Proficiency #1: Physical Sciences - Structure and Properties of Matter / Forces and Interactions

Proficiency #2: Physical Sciences - Energy, Waves, and Electromagnetic Radiation

Proficiency #3: Life Sciences - Structure, Function, and Information Processing

Proficiency #4: Life Sciences - Matter and Energy in Organisms and Ecosystems

Proficiency #5: Life Sciences - Heredity, Natural Selection and Biodiversity of Organisms

Proficiency #6: Earth and Space Sciences - Earth's Place in the Universe

Proficiency #7: Earth and Space Sciences - Earth Systems and Human Impact

Proficiency #8: Engineering, Technology, and Application of Science

PERFORMANCE INDICATORS:
Students will...

	K-2	3-5	6-8	9-12
A	Use observations of the sun, moon, and stars to describe patterns that can be predicted. (1-ESS1-1)	Identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time. (4-ESS1-1)	Develop and use a model of the Earth-sun-moon system to describe the cyclic patterns of lunar phases, eclipses of the sun and moon, and seasons. (MS-ESS1-1)	Develop a model based on evidence to illustrate the life span of the sun and the role of nuclear fusion in the sun's core to release energy that eventually reaches Earth in the form of radiation. (HS-ESS1-1)
B	Make observations at different times of year to relate the amount of daylight to the time of year. (1-ESS1-2)	Support an argument that differences in the apparent brightness of the sun compared to other stars is due to their relative distances from the Earth. (5-ESS1-1)	Develop and use a model to describe the role of gravity in the motions within galaxies and the solar system. (MS-ESS1-2)	Construct an explanation of the Big Bang theory based on astronomical evidence of light spectra, motion of distant galaxies, and composition of matter in the universe. (HS-ESS1-2)

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GRADUATION PROFICIENCY #6:

EARTH AND SPACE SCIENCES - EARTH'S PLACE IN THE UNIVERSE
(CONTINUED)

	K-2	3-5	6-8	9-12
C	Use information from several sources to provide evidence that Earth events can occur quickly or slowly. (2-ESS1-1)	Represent data in graphical displays to reveal patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky. (5-ESS1-2)	Analyze and interpret data to determine scale properties of objects in the solar system. (MS-ESS1-3)	Communicate scientific ideas about the way stars, over their life cycle, produce elements. (HS-ESS1-3)
D			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. (MS-ESS1-4)	Use mathematical or computational representations to predict the motion of orbiting objects in the solar system. (HS-ESS1-4)
E				Evaluate evidence of the past and current movements of continental and oceanic crust and the theory of plate tectonics to explain the ages of crustal rocks. (HS-ESS1-5)

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GRADUATION PROFICIENCIES AND PERFORMANCE INDICATORS

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GRADUATION PROFICIENCY #6:
EARTH AND SPACE SCIENCES -
EARTH'S PLACE IN THE UNIVERSE
(CONTINUED)

	K-2	3-5	6-8	9-12
F				Apply scientific reasoning and evidence from ancient Earth materials, meteorites, and other planetary surfaces to construct an account of Earth's formation and early history. (HS-ESS1-6)

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GRADUATION PROFICIENCY #7:

EARTH AND SPACE SCIENCES - EARTH SYSTEMS AND HUMAN IMPACT

Students will demonstrate an understanding of how and why Earth is constantly changing (ESS2) and how Earth's surface processes and human activities affect each other (ESS3) through the integration of scientific and engineering practices and crosscutting concepts.

Proficiency #1: Physical Sciences - Structure and Properties of Matter / Forces and Interactions

Proficiency #2: Physical Sciences - Energy, Waves, and Electromagnetic Radiation

Proficiency #3: Life Sciences - Structure, Function, and Information Processing

Proficiency #4: Life Sciences - Matter and Energy in Organisms and Ecosystems

Proficiency #5: Life Sciences - Heredity, Natural Selection and Biodiversity of Organisms

Proficiency #6: Earth and Space Sciences - Earth's Place in the Universe

Proficiency #7: Earth and Space Sciences - Earth Systems and Human Impact

Proficiency #8: Engineering, Technology, and Application of Science

PERFORMANCE INDICATORS:
Students will...

	K-2	3-5	6-8	9-12
A	Use and share observations of local weather conditions to describe patterns over time. (K-ESS2-1)	Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season. (3-ESS2-1)	Develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process. (MS-ESS2-1)	Develop a model to illustrate how Earth's internal and surface processes operate at different spatial and temporal scales to form continental and ocean-floor features. (HS-ESS2-1)
B	Construct an argument supported by evidence for how plants and animals (including humans) can change the environment to meet their needs. (K-ESS2-2)	Obtain and combine information to describe climates in different regions of the world. (3-ESS2-2.)	Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales. (MS-ESS2-2)	Analyze geoscience data to make the claim that one change to Earth's surface can create feedbacks that cause changes to other Earth systems. (HS-ESS2-2)

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GRADUATION PROFICIENCY #7:
EARTH AND SPACE SCIENCES -
EARTH SYSTEMS AND HUMAN IMPACT
(CONTINUED)

	K-2	3-5	6-8	9-12
C	Use a model to represent the relationship between the needs of different plants or animals (including humans) and the places they live. (K-ESS3-1)	Make a claim about the merit of a design solution that reduces the impacts of a weather-related hazard. (3-ESS3-1)	Analyze and interpret data on the distribution of fossils and rocks, continental shapes, and seafloor structures to provide evidence of the past plate motions. (MS-ESS2-3)	Develop a model based on evidence of Earth's interior to describe the cycling of matter by thermal convection. (HS-ESS2-3)
D	Ask questions to obtain information about the purpose of weather forecasting to prepare for, and respond to, severe weather. (K-ESS3-2)	Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation. (4-ESS2-1)	Develop a model to describe the cycling of water through Earth's systems driven by energy from the sun and the force of gravity. (MS-ESS2-4)	Use a model to describe how variations in the flow of energy into and out of Earth's systems result in changes in climate. (HS-ESS2-4)
E	Communicate solutions that will reduce the impact of humans on the land, water, air, and/or other living things in the local environment. (K-ESS3-3)	Analyze and interpret data from maps to describe patterns of Earth's features. (4-ESS2-2)	Collect data to provide evidence for how the motions and complex interactions of air masses results in changes in weather conditions. (MS-ESS2-5)	Plan and conduct an investigation of the properties of water and its effects on Earth materials and surface processes. (HS-ESS2-5)

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GRADUATION PROFICIENCY #7:

EARTH AND SPACE SCIENCES - EARTH SYSTEMS AND HUMAN IMPACT
(CONTINUED)

	K-2	3-5	6-8	9-12
F	Compare multiple solutions designed to slow or prevent wind or water from changing the shape of the land. (2-ESS2-1)	Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment. (4-ESS3-1)	Develop and use a model to describe how unequal heating and rotation of the Earth cause patterns of atmospheric and oceanic circulation that determine regional climates. (MS-ESS2-6)	Develop a quantitative model to describe the cycling of carbon among the hydrosphere, atmosphere, geosphere, and biosphere. (HS-ESS2-6)
G	Develop a model to represent the shapes and kinds of land and bodies of water in an area. (2-ESS2-2)	Generate and compare multiple solutions to reduce the impacts of natural earth processes on humans. (4-ESS3-2)	Construct a scientific explanation based on evidence for how the uneven distributions of Earth's mineral, energy, and groundwater resources are the result of past and current geoscience processes. (MS-ESS3-1)	Construct an argument based on evidence about the simultaneous coevolution of Earth's systems and life on Earth. (HS-ESS2-7)
H	Obtain information to identify where water is found on Earth and that it can be solid or liquid. (2-ESS2-3)	Develop a model, using an example, to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact. (5-ESS2-1)	Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects. (MS-ESS3-2)	Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity. (HS-ESS3-1)

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GRADUATION PROFICIENCY #7:

EARTH AND SPACE SCIENCES - EARTH SYSTEMS AND HUMAN IMPACT
(CONTINUED)

	K-2	3-5	6-8	9-12
I		Describe and graph the amounts and percentages of water and fresh water in various reservoirs to provide evidence about the distribution of water on Earth. (5-ESS2-2)	Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment. (MS-ESS3-3)	Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios. (HS-ESS3-2)
J			Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems. (MS-ESS3-4)	Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations and biodiversity. (HS-ESS3-3)
K			Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century. (MS-ESS3-5)	Evaluate or refine a technological solution that reduces impacts of human activities on natural systems. (HS-ESS3-4)

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e⁻ 100°C λ
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EARTH AND SPACE SCIENCES - EARTH SYSTEMS AND HUMAN IMPACT
(CONTINUED)

	K-2	3-5	6-8	9-12
L				Analyze geoscience data and the results from global climate models to make an evidence based forecast of the current rate of global or regional climate change and associated future impacts to Earth systems. (HS-ESS3-5)
M				Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity. (HS-ESS3-6)

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AND PERFORMANCE INDICATORS**

e⁻ 100°C λ
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GRADUATION PROFICIENCY #8:

ENGINEERING, TECHNOLOGY, AND APPLICATION OF SCIENCE

Students will apply the engineering design process to define, develop and optimize a solution to a real world problem and demonstrate understanding of how engineering, technology, science, and society are interconnected (ETS) through the integration of science and engineering practices, crosscutting concepts and disciplinary core ideas.

Proficiency #1: Physical Sciences - Structure and Properties of Matter / Forces and Interactions

Proficiency #2: Physical Sciences - Energy, Waves, and Electromagnetic Radiation

Proficiency #3: Life Sciences - Structure, Function, and Information Processing

Proficiency #4: Life Sciences - Matter and Energy in Organisms and Ecosystems

Proficiency #5: Life Sciences - Heredity, Natural Selection and Biodiversity of Organisms

Proficiency #6: Earth and Space Sciences - Earth's Place in the Universe

Proficiency #7: Earth and Space Sciences - Earth Systems and Human Impact

Proficiency #8: Engineering, Technology, and Application of Science

PERFORMANCE INDICATORS:
Students will...

	K-2	**3-5**	**6-8**	**9-12**
A	Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool. (K-2-ETS-1-1)	Define a simple design problem reflecting a need of want that includes specified criteria for success and constraints on materials, time and cost. (3-5-ETS-1-1)	Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions. (MS-ETS1-1)	Analyze a major global challenge to specify qualitative criteria and constraints for solutions that account for societal needs and wants. (HS-ETS1-1)
B	Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem. (K-2-ETS-1-2)	Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem. (3-5-ETS-1-2)	Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem. (MS-ETS1-2)	Design a solution to a complex real world problem by breaking it down into smaller, more manageable problems that can be solved through engineering. (HS-ETS1-2)

SCIENCE

GRADUATION PROFICIENCIES AND PERFORMANCE INDICATORS

e⁻ 100°C λ
β N Δ p⁺ β

	K-2	3-5	6-8	9-12
C	Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs. (K-2-ETS-1-3)	Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved. (3-5-ETS-1-3)	Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success. (MS-ETS1-3)	Evaluate a solution to a complex real world problem by breaking it down into smaller, more manageable problems that can be solved through engineering. (HS-ETS1-2)
D			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. (MS-ETS1-4)	Evaluate a solution to a complex real world problem based on prioritized criteria and trade-offs that account for a range of constraints, including costs, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts. (HS-ETS1-3)

SCIENCE

**GRADUATION PROFICIENCIES
AND PERFORMANCE INDICATORS**

e⁻ 100°C λ
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GRADUATION PROFICIENCY #8:

ENGINEERING, TECHNOLOGY, AND APPLICATION OF SCIENCE
(CONTINUED)

	K-2	3-5	6-8	9-12
E				Use a computer simulation to model the impact of proposed solutions to a complex real world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem. (HS-ETS1-4)

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