

Standard	Performance Expectations	Climate Literacy Principles and Concepts	Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts	Connections to Engineering, Technology and Applications of Science	Connections to Nature of Science
CLIMATE-RELATED ELEMENTARY SCHOOL STANDARDS							
K-ESS2 Earth's Systems							
	K-ESS2-1. Use and share observations of local weather conditions to describe patterns over time.	4a, 4b	SEP4. Analyzing and Interpreting Data	ESS2.D: Weather and Climate	CC1. Patterns		Science Knowledge is Based on Empirical Evidence
K-ESS3 Earth and Human Activity							
	K-ESS3-2. Ask questions to obtain information about the purpose of weather forecasting to prepare for, and respond to, severe weather.	5c, 7c, 8Pb	SEP1. Asking Questions and Defining Problems; SEP8. Obtaining, Evaluating, and Communicating Information	ESS3.B: Natural Hazards; (ETS1.A: Defining and Delimiting an Engineering Problem)		Interdependence of Science, Engineering, and Technology; Influence of Engineering, Technology, and Science on Society and the Natural World	
	K-ESS3-3. Communicate solutions that will reduce the impact of humans on the land, water, air, and/or other living things in the local environment.	7c, 4c	SEP8. Obtaining, Evaluating, and Communicating Information;	ESS3.C: Human Impacts on Earth Systems (ETS1.B: Developing Possible Solutions)	CC2. Cause and Effect		
K-PS3 Energy							
	K-PS3-1. Make observations to determine the effect of sunlight on Earth's surface.	1a	SEP3. Planning and Carrying Out Investigations	PS3.B: Conservation of Energy and Energy Transfer	CC2. Cause and Effect		Scientific Investigations Use a Variety of Methods
2-ESS1 Earth's Place in the Universe							
	2-ESS1-1. Use information from several sources to provide evidence that Earth events can occur quickly or slowly.		SEP6. Constructing Explanations and Designing Solutions	ESS1.C: The History of Planet Earth	CC7. Stability and Change		
2-ESS2 Earth's Systems							
	2-ESS2-3. Obtain information to identify where water is found on Earth and that it can be solid or liquid.		SEP8. Obtaining, Evaluating, and Communicating Information	ESS2.C: The Roles of Water in Earth's Surface Processes	CC1. Patterns		
3-LS4 Biological Evolution: Unity and Diversity							
	3-LS4-4. 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.	3c	SEP7. Engaging in Argument from Evidence	LS4.D: Biodiversity and Humans; LS2.C: Ecosystem Dynamics, Functioning, and Resilience	CC4. Systems and System Models	Interdependence of Science, Engineering, and Technology	
3-ESS2 Earth's Systems							
	3-ESS2-1. Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season.	4b	SEP4. Analyzing and Interpreting Data	ESS2.D: Weather and Climate	CC1. Patterns		
	3-ESS2-2. Obtain and combine information to describe climates in different regions of the world.	4a	SEP8. Obtaining, Evaluating, and Communicating Information	ESS2.D: Weather and Climate	CC1. Patterns		
3-ESS3 Earth and Human Activity							
	3-ESS3-1. Make a claim about the merit of a design solution that reduces the impacts of a weather-related hazard.	GPb	SEP7. Engaging in Argument from Evidence	ESS3.B: Natural Hazards (Note: This Disciplinary Core Idea is also addressed by 4-ESS3-2.)	CC2. Cause and Effect	Influence of Engineering, Technology, and Science on Society and the Natural World	Science is a Human Endeavor
4-ESS3 Earth and Human Activity							
	4-ESS3-1. Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment.		SEP8. Obtaining, Evaluating, and Communicating Information	ESS3.A: Natural Resources	CC2. Cause and Effect	Interdependence of Science, Engineering, and Technology; Influence of Engineering, Technology, and Science on Society and the Natural World	
	4-ESS3-2. Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.	GPb	SEP6. Constructing Explanations and Designing Solutions	ESS3.B: Natural Hazards; (ETS1.B: Designing Solutions to Engineering Problems)	CC2. Cause and Effect	Influence of Engineering, Technology, and Science on Society and the Natural World	
4-PS3 Energy							
	4-PS3-2. Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents.		SEP3. Planning and Carrying Out Investigations	PS3.A: Definitions of Energy; PS3.B: Conservation of Energy and	CC5. Energy and Matter		
5-LS1 From Molecules to Organisms: Structures and Processes							
	5-LS1-1. Support an argument that plants get the materials they need for growth chiefly from air and water.		SEP7. Engaging in Argument from Evidence	LS1.C: Organization for Matter and Energy Flow in Organisms	CC5. Energy and Matter		
5-LS2 Ecosystems: Interactions, Energy, and Dynamics							
	5-LS2-1. Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.		SEP2. Developing and Using Models	LS2.A: Interdependent Relationships in Ecosystems; LS2.B: Cycles of Matter and Energy Transfer in Ecosystems	CC4. Systems and System Models		
5-ESS2 Earth's Systems							
	5-ESS2-1. Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.	2a	SEP2. Developing and Using Models	ESS2.A: Earth Materials and Systems	CC4. Systems and System Models		
5-ESS3 Earth and Human Activity							
	5-ESS3-1. Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.	6c, 6d, 8Pp	SEP8. Obtaining, Evaluating, and Communicating Information	ESS3.C: Human Impacts on Earth Systems	CC4. Systems and System Models		Science Addresses Questions About the Natural and Material World
CLIMATE-RELATED MIDDLE SCHOOL STANDARDS							
MS-PS1 Matter and Its Interactions							
	MS-PS1-3. Gather and make sense of information to describe that synthetic materials come from natural resources and impact society.		SEP8. Obtaining, Evaluating, and Communicating Information	PS1.A: Structure and Properties of Matter; PS1.B: Chemical Reactions	CC6. Structure and Function	Interdependence of Science, Engineering, and Technology; Influence of Engineering, Technology, and Science on Society and the Natural World	
MS-PS4 Waves and their Applications in Technologies for Information Transfer							
	MS-PS4-2. Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials.		SEP2. Developing and Using Models	PS4.A: Wave Properties; PS4.B: Electromagnetic Radiation	CC6. Structure and Function		
MS-LS1 From Molecules to Organisms: Structures and Processes							
	MS-LS1-6. Construct a scientific explanation based on evidence for the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms.		SEP6. Constructing Explanations and Designing Solutions	LS1.C: Organization for Matter and Energy Flow in Organisms; PS3.D: Energy in Chemical Processes and Everyday Life	CC5. Energy and Matter		Science Knowledge is Based on Empirical Evidence
MS-LS2 Ecosystems: Interactions, Energy, and Dynamics							
	MS-LS2-1. Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.		SEP4. Analyzing and Interpreting Data	LS2.A: Interdependent Relationships in Ecosystems	CC2. Cause and Effect		
	MS-LS2-4. Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.	3c	SEP7. Engaging in Argument from Evidence	LS2.C: Ecosystem Dynamics, Functioning, and Resilience	CC7. Stability and Change		
	MS-LS2-5. Evaluate competing design solutions for maintaining biodiversity and ecosystem services.		SEP7. Engaging in Argument from Evidence	LS2.C: Ecosystem Dynamics, Functioning, and Resilience; LS4.D: Biodiversity and Humans; (ETS1.B: Developing Possible Solutions)	CC7. Stability and Change	Influence of Engineering, Technology, and Science on Society and the Natural World	Science Addresses Questions About the Natural and Material World
MS-ESS2 Earth's Systems							
	MS-ESS2-5. Collect data to provide evidence for how the motions and complex interactions of air masses results in changes in weather conditions.		SEP3. Planning and Carrying Out Investigations	ESS2.C: The Roles of Water in Earth's Surface Processes; ESS2.D: Weather and Climate	CC2. Cause and Effect		
	MS-ESS2-6. 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.	5b	SEP2. Developing and Using Models	ESS2.C: The Roles of Water in Earth's Surface Processes; ESS2.D: Weather and Climate	CC4. Systems and System Models		
MS-ESS3 Earth and Human Activity							
	MS-ESS3-1. 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.		SEP6. Constructing Explanations and Designing Solutions	ESS3.A: Natural Resources	CC2. Cause and Effect	Influence of Engineering, Technology, and Science on Society and the Natural World	
	MS-ESS3-2. Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects.		SEP4. Analyzing and Interpreting Data	ESS3.B: Natural Hazards	CC1. Patterns	Influence of Engineering, Technology, and Science on Society and the Natural World	
	MS-ESS3-3. Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.		SEP6. Constructing Explanations and Designing Solutions	ESS3.C: Human Impacts on Earth Systems	CC2. Cause and Effect	Influence of Engineering, Technology, and Science on Society and the Natural World	
	MS-ESS3-4. Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.		SEP7. Engaging in Argument from Evidence	ESS3.C: Human Impacts on Earth Systems	CC2. Cause and Effect	Influence of Engineering, Technology, and Science on Society and the Natural World	Science Addresses Questions About the Natural and Material World
	MS-ESS3-5. Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century.		SEP1. Asking Questions and Defining Problems	ESS3.D: Global Climate Change	CC7. Stability and Change		
MS-ETS1 Engineering Design							
	MS-ETS1-1. 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.		SEP1. Asking Questions and Defining Problems	ETS1.A: Defining and Delimiting Engineering Problems		Influence of Science, Engineering, and Technology on Society and the Natural World	
CLIMATE-RELATED HIGH SCHOOL STANDARDS							
HS-ESS2 Earth's Systems							
	HS-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's systems.	2f	SEP2. Developing and Using Models; SEP4. Analyzing and Interpreting Data	ESS2.A: Earth Materials and Systems; ESS2.D: Weather and Climate	CC7. Stability and Change	Influence of Engineering, and Technology on Society and the Natural World	
	HS-ESS2-4. Use a model to describe how variations in the flow of energy into and out of Earth systems result in changes in climate.	1a, 1d, 1e, 2, 2a, 2b, 2c, 2d, 2e, 2f, 4, 4f, 4g, 5, 5a, 5e	SEP2. Developing and Using Models	ESS2.A: Earth Materials and Systems; ESS2.D: Weather and Climate; (ESS1.B: Earth and the Solar System)	CC2. Cause and Effect		Science Knowledge is Based on Empirical Evidence
	HS-ESS2-6. Develop a quantitative model to describe the cycling of carbon among the hydrosphere, atmosphere, geosphere, and biosphere.	2d	SEP2. Developing and Using Models	ESS2.D: Weather and Climate	CC5. Energy and Matter		
	HS-ESS2-7. Construct an argument based on evidence about the simultaneous coevolution of Earth's systems and life on Earth.	3a	SEP7. Engaging in Argument from Evidence	ESS2.D: Weather and Climate; ESS2.E: Biogeology	CC7. Stability and Change		
HS-ESS3 Earth and Human Activity							
	HS-ESS3-1. 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.		SEP6. Constructing Explanations and Designing Solutions	ESS3.A: Natural Resources; ESS3.B: Natural Hazards	CC2. Cause and Effect	Influence of Science, Engineering, and Technology on Society and the Natural World	
	HS-ESS3-2. Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios.		SEP7. Engaging in Argument from Evidence	ESS3.A: Natural Resources; (ETS1.B: Developing Possible Solutions)		Influence of Science, Engineering, and Technology on Society and the Natural World	Science Addresses Questions About the Natural and Material World
	HS-ESS3-3. Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations, and biodiversity.		SEP5. Using Mathematics and Computational Thinking	ESS3.C: Human Impacts on Earth Systems	CC7. Stability and Change	Influence of Science, Engineering, and Technology on Society and the Natural World	Science is a Human Endeavor
	HS-ESS3-4. Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.		SEP6. Constructing Explanations and Designing Solutions	ESS3.C: Human Impacts on Earth Systems; (ETS1.B: Developing Possible Solutions)	CC7. Stability and Change	Influence of Science, Engineering, and Technology on Society and the Natural World	
	HS-ESS3-5. Analyze geoscience data and the results from global climate models to make an evidence based forecast of the current rate of global or regional climate changes and associated future impacts to Earth systems.	5c, 8Pp, 8Pb, 8Pe	SEP4. Analyzing and Interpreting Data	ESS3.D: Global Climate Change	CC7. Stability and Change		Scientific Investigations Use a Variety of Methods; Science Knowledge is Based on Empirical Evidence
	HS-ESS3-6. Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity.		SEP5. Using Mathematics and Computational Thinking	(ESS2.D: Weather and Climate); ESS3.D: Global Climate Change	CC4. Systems and System Models		
HS-ETS1 Engineering Design							
	HS-ETS1-1. Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.		SEP1. Asking Questions and Defining Problems	ETS1.A: Defining and Delimiting Engineering Problems		Influence of Science, Engineering, and Technology on Society and the Natural World	
	HS-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.		SEP6. Constructing Explanations and Designing Solutions	ETS1.C: Optimizing the Design Solution			
	HS-ETS1-3. Evaluate a solution to a complex real-world problem based on prioritized criteria and tradeoffs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.		SEP6. Constructing Explanations and Designing Solutions	ETS1.B: Developing Possible Solutions		Influence of Science, Engineering, and Technology on Society and the Natural World	
	HS-ETS1-4. Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with changing criteria and constraints on interactions within and between systems relevant to the problem.		SEP5. Using Mathematics and Computational Thinking	ETS1.B: Developing Possible Solutions	CC4. Systems and System Models		
HS-LS2 Ecosystems: Interactions, Energy, and Dynamics							
	HS-LS2-1. Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales.		SEP5. Using Mathematics and Computational Thinking	LS2.A: Interdependent Relationships in Ecosystems	CC3. Scale, Proportion, and Quantity		
	HS-LS2-2. Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales.		SEP5. Using Mathematics and Computational Thinking	LS2.A: Interdependent Relationships in Ecosystems; LS2.C: Ecosystem Dynamics, Functioning, and Resilience	CC3. Scale, Proportion, and Quantity		Scientific Knowledge is Open to Revision in Light of New Evidence
	HS-LS2-5. Develop a model to illustrate the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere.	3e	SEP2. Developing and Using Models	LS2.B: Cycles of Matter and Energy Transfer in Ecosystems; (PS3.D: Energy in Chemical Processes)	CC4. Systems and System Models		
	HS-LS2-6. Evaluate the claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively stable numbers and types of organisms in consistent conditions, but changing conditions may result in a new ecosystem.		SEP7. Engaging in Argument from Evidence	LS2.C: Ecosystem Dynamics, Functioning, and Resilience	CC7. Stability and Change		Scientific Knowledge is Open to Revision in Light of New Evidence
	HS-LS2-7. Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.	7d, 7e, 8Pp	SEP6. Constructing Explanations and Designing Solutions	LS2.C: Ecosystem Dynamics, Functioning, and Resilience; LS4.D: Biodiversity and Humans; (ETS1.B: Developing Possible Solutions)	CC7. Stability and Change		
HS-LS4 Biological Evolution: Unity and Diversity							
	HS-LS4-4. Construct an explanation based on evidence for how natural selection leads to adaptation of populations.		SEP6. Constructing Explanations and Designing Solutions	LS4.C: Adaptation	CC2. Cause and Effect		Scientific Knowledge Assumes an Order and Consistency in Natural Systems
	HS-LS4-5. 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.	1e	SEP7. Engaging in Argument from Evidence	LS4.C: Adaptation	CC2. Cause and Effect		
	HS-LS4-6. Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity.		SEP5. Using Mathematics and Computational Thinking	LS4.C: Adaptation; LS4.D: Biodiversity and Humans; (ETS1.B: Developing Possible Solutions)	CC2. Cause and Effect		