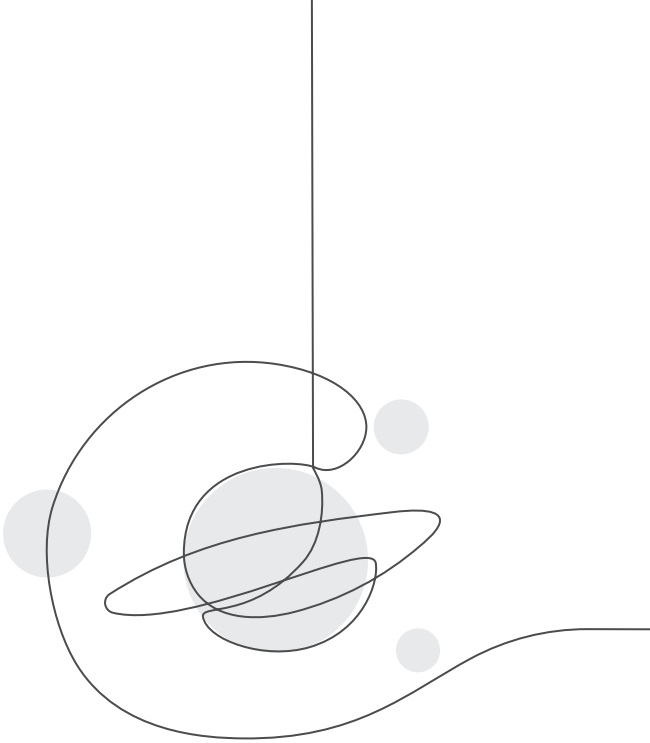
Amplify Science



6–8 performance expectation alignment

Next Generation Science Standards

authored by THE LAWRENCE HALL OF SCIENCE UNIVERSITY OF CALIFORNIA, BERKELEY

Earth and Space Science

Performance expectation	Summary	Amplify unit(s) that focally addresses performance expectation	Amplify unit(s) that additionally addresses performance expectation
ESS1-1: Earth's Place in the Universe	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.	**Earth, Moon, and Sun**	
ESS1-2: Earth's Place in the Universe	Develop and use a model to describe the role of gravity in the motions within galaxies and the solar system.	**Earth, Moon, and Sun**	
ESS1-3: Earth's Place in the Universe	Analyze and interpret data to determine scale properties of objects in the solar system.	**Geology on Mars** **Earth, Moon, and Sun**	Rock Transformations Phase Change
ESS1-4: Earth's Place in the Universe	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.	**Plate Motion**	
ESS2-1: Earth's Systems	Develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process.	**Rock Transformations**	Weather Patterns Matter and Energy in Ecosystems
ESS2-2: Earth's Systems	Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales.	**Geology on Mars** **Plate Motion** **Rock Transformations**	Plate Motion: Engineering Internship
ESS2-3: Earth's Systems	Analyze and interpret data on the distribution of fossils and rocks, continental shapes, and seafloor structures to provide evidence of the past plate motions.	**Plate Motion**	Ocean, Atmosphere, and Climate Plate Motion: Engineering Internship Rock Transformations
ESS2-4: Earth's Systems	Develop a model to describe the cycling of water through Earth's systems, driven by energy from the sun and the force of gravity.	**Weather Patterns**	Earth, Moon, and Sun
ESS2-5: Earth's Systems	Collect data to provide evidence for how the motions and complex interactions of air masses result in changes in weather conditions.	**Weather Patterns**	Ocean, Atmosphere, and Climate
ESS2-6: Earth's Systems	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.	**Ocean, Atmosphere, and Climate**	Weather Patterns
ESS3-1: Earth and Human Activity	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.	**Rock Transformations**	Harnessing Human Energy Chemical Reactions

Performance expectation	Summary	Amplify unit(s) that focally addresses performance expectation	Amplify unit(s) that additionally addresses performance expectation
ESS3-2: Earth and Human Activity	Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects.	**Plate Motion: Engineering Internship**	Ocean, Atmosphere, and Climate Weather Patterns Earth's Changing Climate
ESS3-3: Earth and Human Activity	Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.	**Earth's Changing Climate: Engineering Internship**	Earth's Changing Climate Populations and Resources Chemical Reactions
ESS3-4: Earth and Human Activity	Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.	**Earth's Changing Climate**	
ESS3-5: Earth and Human Activity	Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century.	**Earth's Changing Climate**	Earth's Changing Climate: Engineering Internship Matter and Energy in Ecosystems Chemical Reactions

Life Science

Performance expectation	Summary	Amplify unit(s) that focally addresses performance expectation	Amplify unit(s) that additionally addresses performance expectation
LS1-1: From Molecules to Organisms: Structures and Processes	Conduct an investigation to provide evidence that living things are made of cells; either one cell or many different numbers and types of cells.	**Microbiome** **Metabolism**	Light Waves
LS1-2: From Molecules to Organisms: Structures and Processes	Develop and use a model to describe the function of a cell as a whole and ways the parts of cells contribute to the function.	**Microbiome** **Metabolism** **Traits and Reproduction**	Matter and Energy in Ecosystems Light Waves
LS1-3: From Molecules to Organisms: Structures and Processes	Use an argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells.	**Microbiome** **Metabolism**	Traits and Reproduction
LS1-4: From Molecules to Organisms: Structures and Processes	Use an 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.	**Traits and Reproduction**	
LS1-5: From Molecules to Organisms: Structures and Processes	Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.	**Metabolism** **Traits and Reproduction**	
LS1-6: From Molecules to Organisms: Structures and Processes	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.	**Matter and Energy in Ecosystems**	Chemical Reactions Light Waves
LS1-7: From Molecules to Organisms: Structures and Processes	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.	**Metabolism** **Matter and Energy in Ecosystems**	Metabolism: Engineering Internship Populations and Resources Chemical Reactions
LS1-8: From Molecules to Organisms: Structures and Processes	Gather and synthesize information that sensory receptors respond to stimuli by sending messages to the brain for immediate behavior or storage as memories.	**Metabolism**	Light Waves
LS2-1: Ecosystems: Interactions, Energy, and Dynamics	Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.	**Populations and Resources**	Earth's Changing Climate Microbiome
LS2-2: Ecosystems: Interactions, Energy, and Dynamics	Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.	**Populations and Resources** **Matter and Energy in Ecosystems**	Microbiome
LS2-3: Ecosystems: Interactions, Energy, and Dynamics	Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.	**Populations and Resources** **Matter and Energy in Ecosystems**	

Performance expectation	Summary	Amplify unit(s) that focally addresses performance expectation	Amplify unit(s) that additionally addresses performance expectation
LS2-4: Ecosystems: Interactions, Energy, and Dynamics	Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.	**Populations and Resources** **Matter and Energy in Ecosystems**	Earth's Changing Climate Natural Selection
LS2-5: Ecosystems: Interactions, Energy, and Dynamics	Evaluate competing design solutions for maintaining biodiversity and ecosystem services.	**Populations and Resources**	
LS3-1: Heredity: Inheritance and Variation of Traits	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.	**Traits and Reproduction** **Natural Selection**	Natural Selection: Engineering Internship
LS3-2: Heredity: Inheritance and Variation of Traits	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.	**Traits and Reproduction**	
LS4-1: Biological Evolution: Unity and Diversity	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.	**Evolutionary History**	
LS4-2: Biological Evolution: Unity and Diversity	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.	**Evolutionary History**	
LS4-3: Biological Evolution: Unity and Diversity	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.	**Evolutionary History**	
LS4-4: Biological Evolution: Unity and Diversity	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.	**Natural Selection**	Natural Selection: Engineering Internship
LS4-5: Biological Evolution: Unity and Diversity	Gather and synthesize information about technologies that have changed the way humans influence the inheritance of desired traits in organisms.	**Traits and Reproduction**	Natural Selection
LS4-6: Biological Evolution: Unity and Diversity	Use mathematical representations to support explanations of how natural selection may lead to increases and decreases of specific traits in populations over time.	**Natural Selection**	Natural Selection: Engineering Internship Evolutionary History

Physical Science

Performance expectation	Summary	Amplify unit(s) that focally addresses performance expectation	Amplify unit(s) that additionally addresses performance expectation
PS1-1: Matter and Its Interactions	Develop models to describe the atomic composition of simple molecules and extended structures.	**Phase Change** **Chemical Reactions**	Matter and Energy in Ecosystems Thermal Energy
PS1-2: Matter and Its Interactions	Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred.	**Chemical Reactions**	
PS1-3: Matter and Its Interactions	Gather and make sense of information to describe how synthetic materials come from natural resources and impact society.	**Chemical Reactions**	
PS1-4: Matter and Its Interactions	Develop a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed.	**Phase Change**	Ocean, Atmosphere, and Climate Weather Patterns Thermal Energy Phase Change: Engineering Internship
PS1-5: Matter and Its Interactions	Develop and use a model to describe how the total number of atoms does not change in a chemical reaction and thus mass is conserved.	**Chemical Reactions**	
PS1-6: Matter and Its Interactions	Undertake a design project to construct, test, and modify a device that either releases or absorbs thermal energy by chemical processes.	**Chemical Reactions**	Matter and Energy in Ecosystems
PS2-1: Motion and Stability: Forces and Interactions	Apply Newton's Third Law to design a solution to a problem involving the motion of two colliding objects.	**Force and Motion**	Force and Motion: Engineering Internship Thermal Energy
PS2-2: Motion and Stability: Forces and Interactions	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.	**Force and Motion**	Plate Motion: Engineering Internship Force and Motion: Engineering Internship
PS2-3: Motion and Stability: Forces and Interactions	Ask questions about data to determine the factors that affect the strength of electric and magnetic forces.	**Magnetic Fields**	Plate Motion: Engineering Internship
PS2-4: Motion and Stability: Forces and Interactions	Construct and present arguments using evidence to support the claim that gravitational interactions are attractive and depend on the masses of interacting objects.	**Magnetic Fields**	Force and Motion: Engineering Internship Phase Change
PS2-5: Motion and Stability: Forces and Interactions	Conduct an investigation and evaluate the experimental design to provide evidence that fields exist between objects exerting forces on each other even though the objects are not in contact.	**Magnetic Fields**	

Performance expectation	Summary	Amplify unit(s) that focally addresses performance expectation	Amplify unit(s) that additionally addresses performance expectation
PS3-1: Energy	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.	**Harnessing Human Energy**	Force and Motion Magnetic Field
PS3-2: Energy	Develop a model to describe that when the arrangement of objects interacting at a distance changes, different amounts of potential energy are stored in the system.	**Harnessing Human Energy** **Magnetic Fields**	Thermal Energy
PS3-3: Energy	Apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer.	**Thermal Energy**	Ocean, Atmosphere, and Climate Weather Patterns Phase Change: Engineering Internship
PS3-4: Energy	Plan an investigation to determine the relationships among the energy transferred, the type of matter, the mass, and the change in the average kinetic energy of the particles as measured by the temperature of the sample.	**Thermal Energy**	Phase Change Phase Change: Engineering Internship
PS3-5: Energy	Construct, use, and present arguments to support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object.	**Thermal Energy**	Harnessing Human Energy Magnetic Fields Phase Change
PS4-1: Waves and their Applications in Technologies for Information Transfer	Use mathematical representations to describe a simple model for waves that includes how the amplitude of a wave is related to the energy in a wave.	**Light Waves**	
PS4-2: Waves and their Applications in Technologies for Information Transfer	Develop and use a model to describe how waves are reflected, absorbed, or transmitted through various materials.	**Light Waves**	Earth's Changing Climate: Engineering Internship
PS4-3: Waves and their Applications in Technologies for Information Transfer	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.	**Light Waves**	

Engineering and Design

Performance expectation	Summary	Amplify unit(s) that focally addresses performance expectation	Amplify unit(s) that additionally addresses performance expectation
ETS1-1: Engineering Design	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.	**Plate Motion: Engineering Internship** **Earth's Changing Climate: Engineering Internship** **Metabolism: Engineering Internship** **Natural Selection: Engineering Internship** **Force and Motion: Engineering Internship** **Phase Change: Engineering Internship**	Harnessing Human Energy
ETS1-2: Engineering Design	Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.	**Plate Motion: Engineering Internship** **Earth's Changing Climate: Engineering Internship** **Metabolism: Engineering Internship** **Natural Selection: Engineering Internship** **Force and Motion: Engineering Internship** **Phase Change: Engineering Internship**	
ETS1-3: Engineering Design	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.	**Plate Motion: Engineering Internship** **Earth's Changing Climate: Engineering Internship** **Metabolism: Engineering Internship** **Natural Selection: Engineering Internship** **Force and Motion: Engineering Internship** **Phase Change: Engineering Internship**	
ETS1-4: Engineering Design	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.	**Plate Motion: Engineering Internship** **Earth's Changing Climate: Engineering Internship** **Metabolism: Engineering Internship** **Natural Selection: Engineering Internship** **Force and Motion: Engineering Internship** **Phase Change: Engineering Internship**	

Middle school curriculum course structure

Integrated model*

Grade 6

- Launch: Microbiome
- Metabolism
- Engineering Internship: Metabolism
- Traits and Reproduction
- Thermal Energy
- Ocean, Atmosphere, and Climate
- Weather Patterns
- Earth's Changing Climate
- Engineering Internship: Earth's Changing Climate

Grade 7

- Launch: Geology on Mars
- Plate Motion
- Engineering Internship: Plate Motion
- Rock Transformations
- Phase Change
- Engineering Internship: Phase Change
- Chemical Reactions
- Populations and Resources
- Matter and Energy in Ecosystems

Grade 8

- Launch: Harnessing Human Energy
- Force and Motion
- Engineering Internship: Force and Motion
- Magnetic Fields
- Light Waves
- Earth, Moon, and Sun
- Natural Selection
- Engineering Internship: Natural Selection
- Evolutionary History

* This is an example sequence. Amplify Science will work with you to design a sequence that fits your school's or district's needs.

For more information on Amplify Science, visit **amplify.com/science**.

Amplify.

THE LAWRENCE HALL OF SCIENCE
UNIVERSITY OF CALIFORNIA, BERKELEY

AMP-SC-071918-1058AM