Grade 8 Enriched Science Pacing Guide 2025-2026

Topics by Quarter

Quarter 1	Topic 1: Modeling Matter Topic 2: Electricity and Magnetism
Quarter 2	Topic 3: Force and Motion Topic 4: Mechanical and Electromagnetic Waves
Quarter 3	Topic 7: The Universe Topic 8: Earth's Changes Over Time Topic 9: Natural Hazards (Lesson 1)
Quarter 4	Topic 9: Natural Hazards (Lesson 2) Topic 5: Changes in Life Forms Topic 6: Natural Selection and Adaptation

District Assessment Windows

Aug. 18- Sept. 12	Fall Universal Screening
Sept. 29- Oct. 6	Fall MVPA
Dec. 2- Dec. 9	Winter MVPA
Jan. 6- Jan. 23	Winter Universal Screening
Feb. 19- Feb. 26	Spring MVPA
Begins April 13	TCAP
April 27- May 15	Spring Universal Screening

District-Approved Supplemental Resources:
OpenSciEd Units

Science Instructional Model, Shifts, & Practices

The 5 E's Instructional Model Knowledge Refinement vs. Knowledge Replacement		
ENGAGE ➜ **E**XPLORE ➜ **E**XPLAIN & **E**LABORATE ➜ **E**VALUATE		
Instructional Shifts	**Science & Engineering Practices (SEP)**	**Cross-Cutting Concepts (CCC)**
Students identify as scientists Shift instruction to knowledge refinement rather than knowledge replacement. Shift to instruction that provides opportunities for all students to engage in personally relevant learning as scientists and engineers. Shift to instruction that invites and compels them to consider careers as scientists and engineers and to see attributes of science in the ways they understand the world. **Coherence** Science content and practices are organized and follow specified progressions that reflect that science thinking develops over time. Standards are grouped so that content ideas build across the grade band. **Multi-Dimensional** Students should deliberately use the SEPs to form and support explanations and design solutions that incorporate DCIs and reveal CCCs.	**SEP1** Asking questions (for science) and defining problems (for engineering) **SEP2** Developing and using models **SEP3** Planning and carrying out investigations **SEP4** Analyzing and interpreting data **SEP5** Using mathematics and computational thinking **SEP6** Constructing explanations (for science) and designing solutions (for engineering) **SEP7** Engaging in argument from evidence **SEP8** Obtaining, evaluating, and communicating information	**CCC1: Patterns** Observed patterns of forms and events guide organization and classification, and they prompt questions about relationships and the factors that influence them. **CCC2: Cause and Effect: Mechanism and Explanation** Events have causes, sometimes simple, sometimes multifaceted. A major activity of science is investigating and explaining casual relationships and the mechanisms by which they are mediated. Such mechanisms can then be tested across given contexts and used to predict and explain events in new contexts **CCC3: Scale, Proportion, and Quantity** In considering phenomena, it is critical to recognize what is relevant at different measures of size, time, and energy and to recognize how changes in scale, proportion, or quantity affect a system's structure of performance. **CCC4: System and System Models** Defining the system understudy-specifying its boundaries and making explicit a model of that system-provides tools for understanding and testing ideas that are applicable throughout science and engineering. **CCC5: Energy and Matter: Flows, Cycles, and Conservation** Tracking fluxes of energy and matter into, out of, and within systems helps one understand the systems' possibilities and limitations. **CCC6: Structure and Function** The way in which an object or living thing is shaped and its substructure determine many of its properties and functions. **CCC7: Stability and Change** For natural and built systems alike, conditions of stability and determinants of rates of change or evolution of a system are critical elements of study.

Topic 1: Modeling Matter

Topic Opener: Look Closely, what everyday school item is under the microscope?
8.PS1.1 Use a model to understand that atoms are a system composed of a positively charged nucleus surrounded by one or more negatively charged particles called electrons. **8.PS1.2** Develop a model to explain how the light coming from distant stars and the formation of heavier atoms is the result of changes in the composition of the nucleus of the atom and the energy released during the process of nuclear fusion.
uConnect Lab: Modeling Everyday Objects from Microscopic Views
8.PS1.1 Use a model to understand that atoms are a system composed of a positively charged nucleus surrounded by one or more negatively charged particles called electrons. **8.PS1.2** Develop a model to explain how the light coming from distant stars and the formation of heavier atoms is the result of changes in the composition of the nucleus of the atom and the energy released during the process of nuclear fusion.
Quest Kickoff: Decoding the Atom
8.PS1.1 Use a model to understand that atoms are a system composed of a positively charged nucleus surrounded by one or more negatively charged particles called electrons. **8.PS1.2** Develop a model to explain how the light coming from distant stars and the formation of heavier atoms is the result of changes in the composition of the nucleus of the atom and the energy released during the process of nuclear fusion.
Lesson 1-1: Modeling Atoms | Quest Check-In Lab: Decoding the Atom
8.PS1.1 Use a model to understand that atoms are a system composed of a positively charged nucleus surrounded by one or more negatively charged particles called electrons.
uEngineer It: Design Your Own Smartphone!
8.PS1.1 Use a model to understand that atoms are a system composed of a positively charged nucleus surrounded by one or more negatively charged particles called electrons.
Lesson 1-2: How Atoms Form | Quest Check-In Lab: Atomic Puzzle
8.PS1.2 Develop a model to explain how the light coming from distant stars and the formation of heavier atoms is the result of changes in the composition of the nucleus of the atom and the energy released during the process of nuclear fusion.
Case Study: Importance of Isotopes
8.PS1.1 Use a model to understand that atoms are a system composed of a positively charged nucleus surrounded by one or more negatively charged particles called electrons. **8.PS1.2** Develop a model to explain how the light coming from distant stars and the formation of heavier atoms is the result of changes in the composition of the nucleus of the atom and the energy released during the process of nuclear fusion.
Topic 1 Review and Assess

8.PS1.1 Use a model to understand that atoms are a system composed of a positively charged nucleus surrounded by one or more negatively charged particles called electrons. **8.PS1.2** Develop a model to explain how the light coming from distant stars and the formation of heavier atoms is the result of changes in the composition of the nucleus of the atom and the energy released during the process of nuclear fusion.	
uDemonstrate Lab: Model Nuclear Fusion	
8.PS1.1 Use a model to understand that atoms are a system composed of a positively charged nucleus surrounded by one or more negatively charged particles called electrons. **8.PS1.2** Develop a model to explain how the light coming from distant stars and the formation of heavier atoms is the result of changes in the composition of the nucleus of the atom and the energy released during the process of nuclear fusion.	
Quest Findings: Reflect on Decoding the Atom	
8.PS1.1 Use a model to understand that atoms are a system composed of a positively charged nucleus surrounded by one or more negatively charged particles called electrons. **8.PS1.2** Develop a model to explain how the light coming from distant stars and the formation of heavier atoms is the result of changes in the composition of the nucleus of the atom and the energy released during the process of nuclear fusion.	
Topic 1 High School Science Extensions	
PWC.PS1.1 Using the Bohr model of an atom, describe the following features and components of an atom: protons, neutrons, electrons, mass, number and types of particles, structure, and organization. **PWC.PS1.5** Create a model that illustrates the difference between nuclear fission and nuclear fusion in terms of transmutation. **ESS.ESS1.1** Construct an explanation regarding the rapid expansion of the universe based on astronomical evidence of light spectra, motion of distant galaxies, and composition of matter in the universe. **ESS.ESS1.4** Communicate scientific ideas to explain the nuclear fusion process and how elements with an atomic number greater than helium have been formed in stars, supernova explosions, or exposure to cosmic rays.	

Topic 2: Electricity and Magnetism

Topic Opener: How can the strength of a magnet be controlled?
8.PS2.1 Conduct an investigation to provide evidence that the size of force fields (electric and magnetic) depends on the magnitudes of the charges, current, or magnetic strengths involved and the distances between interacting objects. **8.PS2.2** Ask scientific questions about data to determine how manipulating variables can increase or diminish the electric current and magnetic field strength in electromagnets, generators, and electric motors. **8.PS2.3** Construct an argument using evidence to support the claim that gravitational interactions in a large-scale system (e.g., galaxies and solar system) are attractive and depend on the masses of and distance between interacting objects. **8.ETS1.1** Use a model of a device that incorporates an electromagnet to test solutions to a design problem with specific criteria and constraints.
uConnect Lab: Magnetic Poles
8.PS2.1 Conduct an investigation to provide evidence that the size of force fields (electric and magnetic) depends on the magnitudes of the charges, current, or magnetic strengths involved and the distances between interacting objects. **8.PS2.2** Ask scientific questions about data to determine how manipulating variables can increase or diminish the electric current and magnetic field strength in electromagnets, generators, and electric motors. **8.PS2.3** Construct an argument using evidence to support the claim that gravitational interactions in a large-scale system (e.g., galaxies and solar system) are attractive and depend on the masses of and distance between interacting objects. **8.ETS1.1** Use a model of a device that incorporates an electromagnet to test solutions to a design problem with specific criteria and constraints.
Quest Kickoff: Light as a Feather
8.PS2.1 Conduct an investigation to provide evidence that the size of force fields (electric and magnetic) depends on the magnitudes of the charges, current, or magnetic strengths involved and the distances between interacting objects. **8.PS2.2** Ask scientific questions about data to determine how manipulating variables can increase or diminish the electric current and magnetic field strength in electromagnets, generators, and electric motors. **8.ETS1.1** Use a model of a device that incorporates an electromagnet to test solutions to a design problem with specific criteria and constraints.
Lesson 2-1: Magnetic Force | Quest Check-in Interactivity: Apply Electrical Forces | Quest Check-in Lab: Tracking Levitation
8.PS2.1 Conduct an investigation to provide evidence that the size of force fields (electric and magnetic) depends on the magnitudes of the charges, current, or magnetic strengths involved and the distances between interacting objects.
Lesson 2-2: Electromagnetic Force | Quest Check-in Lab: Building an Electromagnet
8.PS2.1 Conduct an investigation to provide evidence that the size of force fields (electric and magnetic) depends on the magnitudes of the charges, current, or magnetic strengths involved and the distances between interacting objects.
Lesson 2-3: Electromagnets, Generators, and Electric Motors | Quest Check-in Lab: Electrifying Levitation
8.PS2.2 Ask scientific questions about data to determine how manipulating variables can increase or diminish the electric current and magnetic field strength in electromagnets, generators, and electric motors. **8.ETS1.1** Use a model of a device that incorporates an electromagnet to test solutions to a design problem with specific criteria and constraints

uEngineer It: Electromagnetism in Action
8.PS2.2 Ask scientific questions about data to determine how manipulating variables can increase or diminish the electric current and magnetic field strength in electromagnets, generators, and electric motors.
Lesson 2-4: Gravitational Interactions
8.PS2.3 Construct an argument using evidence to support the claim that gravitational interactions in a large-scale system (e.g., galaxies and solar system) are attractive and depend on the masses of and distance between interacting objects.
Case Study: The X-57 Maxwell
8.PS2.3 Construct an argument using evidence to support the claim that gravitational interactions in a large-scale system (e.g., galaxies and solar system) are attractive and depend on the masses of and distance between interacting objects.
Topic 2 Review and Assess
8.PS2.1 Conduct an investigation to provide evidence that the size of force fields (electric and magnetic) depends on the magnitudes of the charges, current, or magnetic strengths involved and the distances between interacting objects. **8.PS2.2** Ask scientific questions about data to determine how manipulating variables can increase or diminish the electric current and magnetic field strength in electromagnets, generators, and electric motors. **8.PS2.3** Construct an argument using evidence to support the claim that gravitational interactions in a large-scale system (e.g., galaxies and solar system) are attractive and depend on the masses of and distance between interacting objects. **8.ETS1.1** Use a model of a device that incorporates an electromagnet to test solutions to a design problem with specific criteria and constraints.
uDemonstrate Lab: Planetary Detective
8.PS2.1 Conduct an investigation to provide evidence that the size of force fields (electric and magnetic) depends on the magnitudes of the charges, current, or magnetic strengths involved and the distances between interacting objects.
Quest Findings: Reflect on Your Levitating Device
8.PS2.1 Conduct an investigation to provide evidence that the size of force fields (electric and magnetic) depends on the magnitudes of the charges, current, or magnetic strengths involved and the distances between interacting objects. **8.PS2.2** Ask scientific questions about data to determine how manipulating variables can increase or diminish the electric current and magnetic field strength in electromagnets, generators, and electric motors. **8.ETS1.1** Use a model of a device that incorporates an electromagnet to test solutions to a design problem with specific criteria and constraints.

Topic 2 High School Science Extensions	
PSCI.PS2.6 Plan and conduct an investigation to provide evidence that an electric current can produce a magnetic field. **PWC.PS3.4** Describe various ways in which energy is transferred from one system to another (mechanical contact, thermal conduction, and electromagnetic radiation). **PWC.PS3.10** Analyze the relationship between energy transfer and disorder in the universe (second law of thermodynamics).	**OpenSciEd Unit** C.2 Structure & Properties of Matter

Topic 3: Force and Motion

Topic Opener: What affects the motion of these skydivers?
8.PS2.4 Construct an explanation to describe why the position and motion of object(s) in a system, and the effects of forces on those objects, vary with respect to the observer. **8.PS2.5** Plan and conduct an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object. **8.PS2.6** Evaluate and interpret that for every force exerted on an object there is an equal force exerted in the opposite direction.
uConnect Lab: Identifying Motion
8.PS2.4 Construct an explanation to describe why the position and motion of object(s) in a system, and the effects of forces on those objects, vary with respect to the observer. **8.PS2.5** Plan and conduct an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object. **8.PS2.6** Evaluate and interpret that for every force exerted on an object there is an equal force exerted in the opposite direction.
Quest Kickoff: Build a Better Bumper Car
8.PS2.4 Construct an explanation to describe why the position and motion of object(s) in a system, and the effects of forces on those objects, vary with respect to the observer. **8.PS2.5** Plan and conduct an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object. **8.PS2.6** Evaluate and interpret that for every force exerted on an object there is an equal force exerted in the opposite direction.
Lesson 3-1: Describing Force and Motion | Quest Check-in Interactivity: Define Criteria and Constraints
8.PS2.4 Construct an explanation to describe why the position and motion of object(s) in a system, and the effects of forces on those objects, vary with respect to the observer.
Case Study: Finding Your Way with GPS
8.PS2.4 Construct an explanation to describe why the position and motion of object(s) in a system, and the effects of forces on those objects, vary with respect to the observer.
Lesson 3-2: Speed Velocity, and Acceleration | Quest Check-in Lab: Mass, Speed, and Colliding Cars
8.PS2.5 Plan and conduct an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object.

Lesson 3-3: Action and Reaction Forces **Quest Check-in Interactivity: Apply Newton's Laws of Motion | Quest Check-in Lab: Bumping Cars, Bumper Solutions**	
8.PS2.6 Evaluate and interpret that for every force exerted on an object there is an equal force exerted in the opposite direction.	
uEngineer It: Generating Energy from Potholes	
8.PS2.4 Construct an explanation to describe why the position and motion of object(s) in a system, and the effects of forces on those objects, vary with respect to the observer. **8.PS2.5** Plan and conduct an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object.	
Topic 3 Review and Assess	
8.PS2.4 Construct an explanation to describe why the position and motion of object(s) in a system, and the effects of forces on those objects, vary with respect to the observer. **8.PS2.5** Plan and conduct an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object. **8.PS2.6** Evaluate and interpret that for every force exerted on an object there is an equal force exerted in the opposite direction.	
uDemonstrate Lab: Stopping on a Dime	
8.PS2.4 Construct an explanation to describe why the position and motion of object(s) in a system, and the effects of forces on those objects, vary with respect to the observer. **8.PS2.5** Plan and conduct an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object. **8.PS2.6** Evaluate and interpret that for every force exerted on an object there is an equal force exerted in the opposite direction.	
Quest Findings: Reflect on Your Bumper Car Solution	
8.PS2.4 Construct an explanation to describe why the position and motion of object(s) in a system, and the effects of forces on those objects, vary with respect to the observer. **8.PS2.5** Plan and conduct an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object. **8.PS2.6** Evaluate and interpret that for every force exerted on an object there is an equal force exerted in the opposite direction.	

Topic 3 High School Science Extensions	
PSCI.PS2.3 Plan and carry out an investigation to gather evidence, and provide a mathematical explanation, about the relationship among force, mass, and acceleration using F=ma. **PWC.PS2.2** Explore characteristics of rectilinear motion and create distance-time graphs and velocity-time graphs. **PWC.PS2.4** Using Newton's second law, analyze the relationship among the net force acting on a body, the mass of the body, and the resulting acceleration through mathematical and graphical methods. **PWC.PS2.5** Apply Newton's third law to identify the interacting forces between two bodies.	**OpenSciEd Unit** P.3 Collisions & Momentum *What can we do to make driving safer for everyone?*

Topic 4: Mechanical and Electromagnetic Waves (20 Days) Nov. 17 - Dec. 19

Topic Opener: How can a lighthouse send a message at a distance?

8.PS4.1 Develop and use models to represent the basic properties of waves in a system including frequency, amplitude, wavelength, and speed.
8.PS4.2 Construct explanations from observed patterns of wave behaviors to compare and contrast mechanical waves and electromagnetic waves based on refraction, reflection, transmission, absorption, and their behavior through a vacuum and/or various media.
8.PS4.3 Engage in argument from evidence to support the claim that digitized signals, sent as wave pulses, are more reliable than analog signals to transmit information in a system.

uConnect Lab: What Are Waves?

8.PS4.1 Develop and use models to represent the basic properties of waves in a system including frequency, amplitude, wavelength, and speed.
8.PS4.2 Construct explanations from observed patterns of wave behaviors to compare and contrast mechanical waves and electromagnetic waves based on refraction, reflection, transmission, absorption, and their behavior through a vacuum and/or various media.
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Quest Kickoff: Design to Stop a Thief

8.PS4.1 Develop and use models to represent the basic properties of waves in a system including frequency, amplitude, wavelength, and speed.
8.PS4.2 Construct explanations from observed patterns of wave behaviors to compare and contrast mechanical waves and electromagnetic waves based on refraction, reflection, transmission, absorption, and their behavior through a vacuum and/or various media.

Lesson 4-1: Wave Properties | Quest Check-in Interactivity: Light Behavior

8.PS4.1 Develop and use models to represent the basic properties of waves in a system including frequency, amplitude, wavelength, and speed.

Case Study: Sound and Light at the Ballpark

8.PS4.2 Construct explanations from observed patterns of wave behaviors to compare and contrast mechanical waves and electromagnetic waves based on refraction, reflection, transmission, absorption, and their behavior through a vacuum and/or various media.

Lesson 4-2: Mechanical Waves | Quest Check-in Interactivity: Virtual Optics

8.PS4.2 Construct explanations from observed patterns of wave behaviors to compare and contrast mechanical waves and electromagnetic waves based on refraction, reflection, transmission, absorption, and their behavior through a vacuum and/or various media.

uEngineer It!: Say "Cheese!"
8.PS4.2 Construct explanations from observed patterns of wave behaviors to compare and contrast mechanical waves and electromagnetic waves based on refraction, reflection, transmission, absorption, and their behavior through a vacuum and/or various media.
Lesson 4-3: Electromagnetic Waves | Quest Check-in Interactivity: Optical Demonstration
8.PS4.2 Construct explanations from observed patterns of wave behaviors to compare and contrast mechanical waves and electromagnetic waves based on refraction, reflection, transmission, absorption, and their behavior through a vacuum and/or various media.
Lesson 4-4: Waves and Information Transfer | Quest Check-in Lab: An Optimal Optical Demonstration
8.PS4.3 Engage in argument from evidence to support the claim that digitized signals, sent as wave pulses, are more reliable than analog signals to transmit information in a system.
Topic 4 Review and Assess
8.PS4.1 Develop and use models to represent the basic properties of waves in a system including frequency, amplitude, wavelength, and speed. **8.PS4.2** Construct explanations from observed patterns of wave behaviors to compare and contrast mechanical waves and electromagnetic waves based on refraction, reflection, transmission, absorption, and their behavior through a vacuum and/or various media. **8.PS4.3** Engage in argument from evidence to support the claim that digitized signals, sent as wave pulses, are more reliable than analog signals to transmit information in a system.
uDemonstrate Lab: Over and Out
8.PS4.3 Engage in argument from evidence to support the claim that digitized signals, sent as wave pulses, are more reliable than analog signals to transmit information in a system.
Quest Findings: Reflect on Your Demonstration
8.PS4.1 Develop and use models to represent the basic properties of waves in a system including frequency, amplitude, wavelength, and speed. **8.PS4.2** Construct explanations from observed patterns of wave behaviors to compare and contrast mechanical waves and electromagnetic waves based on refraction, reflection, transmission, absorption, and their behavior through a vacuum and/or various media. **8.PS4.3** Engage in argument from evidence to support the claim that digitized signals, sent as wave pulses, are more reliable than analog signals to transmit information in a system.

Topic 4 High School Science Extensions	Supplemental Resources
PWC.PS4.1 Build a model of a wave that describes the following characteristics of longitudinal waves and transverse waves: wavelength, frequency, period, amplitude, and velocity. **PWC.PS4.3** Compare and contrast the properties and the applications of mechanical and electromagnetic waves.	**OpenSciEd Unit** P.5 Electromagnetic Radiation *How do we use radiation in our lives, and is it safe for humans?*

Topic 7: The Universe

Topic Opener: How do we learn about Mars when it is, on average, 225 million kilometers away?
8.ESS1.1 Research, analyze, and communicate that the universe began with a period of rapid expansion using evidence from the motion of galaxies (i.e., redshift and blueshift), elemental concentrations of hydrogen and helium, and cosmic background radiation. **8.ETS2.1** Research and communicate information to describe how data from technologies (e.g., telescopes, satellites, space probes, seismographs) provide information about Earth and objects in space and how those scientific discoveries have in turn led to improved technologies.
uConnect Lab: Rocket Science
8.ETS2.1 Research and communicate information to describe how data from technologies (e.g., telescopes, satellites, space probes, seismographs) provide information about Earth and objects in space and how those scientific discoveries have in turn led to improved technologies.
Quest Kickoff: Searching for a Star
8.ESS1.1 Research, analyze, and communicate that the universe began with a period of rapid expansion using evidence from the motion of galaxies (i.e., redshift and blueshift), elemental concentrations of hydrogen and helium, and cosmic background radiation. **8.ETS2.1** Research and communicate information to describe how data from technologies (e.g., telescopes, satellites, space probes, seismographs) provide information about Earth and objects in space and how those scientific discoveries have in turn led to improved technologies.
Lesson 7-1: Space and Technology **Quest Check-in Interactivity: Space Invaders | Quest Check-in Interactivity: Anybody Out There?**
8.ETS2.1 Research and communicate information to describe how data from technologies (e.g., telescopes, satellites, space probes, seismographs) provide information about Earth and objects in space and how those scientific discoveries have in turn led to improved technologies.
Lesson 7-2: The Big Bang | Quest Check-in Interactivity: Searching for the Unknown
8.ESS1.1 Research, analyze, and communicate that the universe began with a period of rapid expansion using evidence from the motion of galaxies (i.e., redshift and blueshift), elemental concentrations of hydrogen and helium, and cosmic background radiation.
Case Study: Determining the Age of the Universe
8.ESS1.1 Research, analyze, and communicate that the universe began with a period of rapid expansion using evidence from the motion of galaxies (i.e., redshift and blueshift), elemental concentrations of hydrogen and helium, and cosmic background radiation.
uEngineer It: Blast Off!
8.ETS2.1 Research and communicate information to describe how data from technologies (e.g., telescopes, satellites, space probes, seismographs) provide information about Earth and objects in space and how those scientific discoveries have in turn led to improved technologies.

Topic 7 Review and Assess	
8.ESS1.1 Research, analyze, and communicate that the universe began with a period of rapid expansion using evidence from the motion of galaxies (i.e., redshift and blueshift), elemental concentrations of hydrogen and helium, and cosmic background radiation. **8.ETS2.1** Research and communicate information to describe how data from technologies (e.g., telescopes, satellites, space probes, seismographs) provide information about Earth and objects in space and how those scientific discoveries have in turn led to improved technologies.	
uDemonstrate Lab: Inflation Theory	
8.ESS1.1 Research, analyze, and communicate that the universe began with a period of rapid expansion using evidence from the motion of galaxies (i.e., redshift and blueshift), elemental concentrations of hydrogen and helium, and cosmic background radiation.	
Quest Findings: Reflect on Searching for a Star	
8.ESS1.1 Research, analyze, and communicate that the universe began with a period of rapid expansion using evidence from the motion of galaxies (i.e., redshift and blueshift), elemental concentrations of hydrogen and helium, and cosmic background radiation. **8.ETS2.1** Research and communicate information to describe how data from technologies (e.g., telescopes, satellites, space probes, seismographs) provide information about Earth and objects in space and how those scientific discoveries have in turn led to improved technologies.	
Topic 7 High School Science Extensions	**Supplemental Resources** **OpenSciEd Unit** P.6 Stars & The Big Bang *Why do stars shine and will they shine forever?*
ESS.ESS1.1 Construct an explanation regarding the rapid expansion of the universe based on astronomical evidence of light spectra, motion of distant galaxies, and composition of matter in the universe. **ESS.ESS1.8** Use mathematical or computational representations to predict motions of the various kinds of objects in our solar system, including planets, satellites, comets, and asteroids, and the influence of gravity, inertia, and collisions on these motions.	

Topic 8: Earth's Changes Over Time

Topic Opener: Why is this island in the middle of the ocean?
8.ESS2.1 Analyze and interpret data to support the assertion that rapid or gradual geographic changes lead to drastic population changes and extinction events. **8.ESS2.2** Evaluate data collected from seismographs to create a model of Earth's structure and to understand how energy is derived from Earth's hot interior. **8.ESS2.3** Gather and evaluate evidence that energy from the earth's interior drives convection cycles within the asthenosphere which creates changes within the lithosphere including plate movements, plate boundaries, and seafloor spreading. **8.ESS2.4** Construct a scientific explanation using data that explains the gradual process of plate tectonics accounting for (a) the distribution of fossils on different continents, and (b) continental and ocean floor features (i.e., mountains, volcanoes, faults, and trenches).
uConnect Lab: How are Earth's Continents Linked Together?
8.ESS2.1 Analyze and interpret data to support the assertion that rapid or gradual geographic changes lead to drastic population changes and extinction events. **8.ESS2.2** Evaluate data collected from seismographs to create a model of Earth's structure and to understand how energy is derived from Earth's hot interior. **8.ESS2.3** Gather and evaluate evidence that energy from the earth's interior drives convection cycles within the asthenosphere which creates changes within the lithosphere including plate movements, plate boundaries, and seafloor spreading. **8.ESS2.4** Construct a scientific explanation using data that explains the gradual process of plate tectonics accounting for (a) the distribution of fossils on different continents, and (b) continental and ocean floor features (i.e., mountains, volcanoes, faults, and trenches).
Quest Kickoff: Ingenious Island
8.ESS2.2 Evaluate data collected from seismographs to create a model of Earth's structure and to understand how energy is derived from Earth's hot interior. **8.ESS2.3** Gather and evaluate evidence that energy from the earth's interior drives convection cycles within the asthenosphere which creates changes within the lithosphere including plate movements, plate boundaries, and seafloor spreading. **8.ESS2.4** Construct a scientific explanation using data that explains the gradual process of plate tectonics accounting for (a) the distribution of fossils on different continents, and (b) continental and ocean floor features (i.e., mountains, volcanoes, faults, and trenches).
Lesson 8-1: Earth's Structures | Quest Check-in Lab: Breaking It Down
8.ESS2.2 Evaluate data collected from seismographs to create a model of Earth's structure and to understand how energy is derived from Earth's hot interior.
Lesson 8-2: Evidence of Plate Tectonics | Quest Check-in Lab: Ingenious Island Part I
8.ESS2.4 Construct a scientific explanation using data that explains the gradual process of plate tectonics accounting for (a) the distribution of fossils on different continents, and (b) continental and ocean floor features (i.e., mountains, volcanoes, faults, and trenches).
Lesson 8-3: Changes in the Lithosphere **Quest Check-in Interactivity: Changing Landscapes | Quest Check-in Lab: Ingenious Island Lab Part II**
8.ESS2.3 Gather and evaluate evidence that energy from the earth's interior drives convection cycles within the asthenosphere which creates changes within the lithosphere including plate movements, plate boundaries, and seafloor spreading.

Case Study: Australia on the Move
8.ESS3.1 Collect data, map, and describe patterns in the locations of volcanoes and earthquakes related to tectonic plate boundaries, interactions, and hotspots in order to forecast the locations and likelihoods of future events.
Lesson 8-4: Extinction Events
8.ESS2.1 Analyze and interpret data to support the assertion that rapid or gradual geographic changes lead to drastic population changes and extinction events.
Topic 8 Review and Assess
8.ESS2.1 Analyze and interpret data to support the assertion that rapid or gradual geographic changes lead to drastic population changes and extinction events. **8.ESS2.2** Evaluate data collected from seismographs to create a model of Earth's structure and to understand how energy is derived from Earth's hot interior. **8.ESS2.3** Gather and evaluate evidence that energy from the earth's interior drives convection cycles within the asthenosphere which creates changes within the lithosphere including plate movements, plate boundaries, and seafloor spreading. **8.ESS2.4** Construct a scientific explanation using data that explains the gradual process of plate tectonics accounting for (a) the distribution of fossils on different continents, and (b) continental and ocean floor features (i.e., mountains, volcanoes, faults, and trenches).
uDemonstrate Lab: Modeling Sea-Floor Spreading
8.ESS2.3 Gather and evaluate evidence that energy from the earth's interior drives convection cycles within the asthenosphere which creates changes within the lithosphere including plate movements, plate boundaries, and seafloor spreading. **8.ESS2.4** Construct a scientific explanation using data that explains the gradual process of plate tectonics accounting for (a) the distribution of fossils on different continents, and (b) continental and ocean floor features (i.e., mountains, volcanoes, faults, and trenches).
Quest Findings: Reflect on Your Ingenious Island
8.ESS2.2 Evaluate data collected from seismographs to create a model of Earth's structure and to understand how energy is derived from Earth's hot interior. **8.ESS2.3** Gather and evaluate evidence that energy from the earth's interior drives convection cycles within the asthenosphere which creates changes within the lithosphere including plate movements, plate boundaries, and seafloor spreading. **8.ESS2.4** Construct a scientific explanation using data that explains the gradual process of plate tectonics accounting for (a) the distribution of fossils on different continents, and (b) continental and ocean floor features (i.e., mountains, volcanoes, faults, and trenches).

Topic 8 High School Science Extensions	Supplemental Resources
GEO.ESS1.3 Evaluate the geologic evidence (including index fossils, absolute and relative dating methods, superposition, and/or crosscutting relationships) used to infer the age of the Earth. Design a research study to confirm or refute one aspect of such evidence. **GEO.ESS2.14** Apply scientific principles regarding thermal convection and gravitational movement of dense materials to predict the outcomes of continued development and movement of lithospheric plates from their growing margins at a divergent boundary (mid-ocean ridge) to their destructive margin at a convergent boundary (subduction zone). **GEO.ESS2.13** Communicate scientific and technical information to explain how evidence from deep probes and seismic waves, reconstructions of historical changes in Earth's surface and its magnetic field, and an understanding of physical and chemical processes lead to a model of Earth with a hot but solid inner core, a liquid outer core, a solid mantle, and crust. **EVSC.ESS2.1** Research the development of the theory of plate tectonics. Use the theory to construct an explanation for how changes in Earth's crust cause mountain formation, volcanoes, earthquakes, and tsunamis. Provide evidence to support the explanation using information pertaining to plate boundary types (divergent, convergent, transform). **EVSC.ESS2.5** Plan and carry out an investigation examining the chemical and physical properties of water and the impact of water on Earth's topography. Analyze data and share findings. **EVSC.ESS3.2** Interpret graphical data representing global human population growth over time. Look for patterns within this data and construct possible explanations for the patterns. Revise the explanations as needed based on research.	**OpenSciEd Unit** P.2 Energy, Forces, & Earth's Crust *How do forces in Earth's interior determine what will happen to the surface we see?*

Topic 9: Natural Hazards

Topic Opener: Why is this island in the middle of the ocean?
8.ESS3.1 Collect data, map, and describe patterns in the locations of volcanoes and earthquakes related to tectonic plate boundaries, interactions, and hotspots in order to forecast the locations and likelihoods of future events.
uConnect Lab: Map It!
8.ESS3.1 Collect data, map, and describe patterns in the locations of volcanoes and earthquakes related to tectonic plate boundaries, interactions, and hotspots in order to forecast the locations and likelihoods of future events.
Quest Kickoff: To Hike or Not to Hike
8.ESS3.1 Collect data, map, and describe patterns in the locations of volcanoes and earthquakes related to tectonic plate boundaries, interactions, and hotspots in order to forecast the locations and likelihoods of future events.
Lesson 9-1: Earthquakes | Quest Check-in Lab: Patterns in the Cascade Range | Quest Check-in Interactivity: Mount Rainier's Threat
8.ESS3.1 Collect data, map, and describe patterns in the locations of volcanoes and earthquakes related to tectonic plate boundaries, interactions, and hotspots in order to forecast the locations and likelihoods of future events.
uEngineer It: Designing to Prevent Destruction
8.ESS3.1 Collect data, map, and describe patterns in the locations of volcanoes and earthquakes related to tectonic plate boundaries, interactions, and hotspots in order to forecast the locations and likelihoods of future events.
Lesson 9-2: Volcanoes | Quest Check-in Interactivity: Monitoring a Volcano | Quest Check-in Lab: Signs of Eruption?
8.ESS3.1 Collect data, map, and describe patterns in the locations of volcanoes and earthquakes related to tectonic plate boundaries, interactions, and hotspots in order to forecast the locations and likelihoods of future events.
Case Study: Hawaii Under Construction
8.ESS3.1 Collect data, map, and describe patterns in the locations of volcanoes and earthquakes related to tectonic plate boundaries, interactions, and hotspots in order to forecast the locations and likelihoods of future events.

Topic 9 Review and Assess	
8.ESS3.1 Collect data, map, and describe patterns in the locations of volcanoes and earthquakes related to tectonic plate boundaries, interactions, and hotspots in order to forecast the locations and likelihoods of future events.	
uDemonstrate Lab: Mapping Volcanoes and Earthquakes	
8.ESS3.1 Collect data, map, and describe patterns in the locations of volcanoes and earthquakes related to tectonic plate boundaries, interactions, and hotspots in order to forecast the locations and likelihoods of future events.	
Quest Findings: Reflect on Mount Rainier's Safety	
8.ESS3.1 Collect data, map, and describe patterns in the locations of volcanoes and earthquakes related to tectonic plate boundaries, interactions, and hotspots in order to forecast the locations and likelihoods of future events.	
Topic 9 High School Science Extensions	**Supplemental Resources**
EVSC.ESS2.1 Research the development of the theory of plate tectonics. Use the theory to construct an explanation for how changes in Earth's crust cause mountain formation, volcanoes, earthquakes, and tsunamis. Provide evidence to support the explanation using information pertaining to plate boundary types (divergent, convergent, transform). **GEO.ESS2.1** Analyze surface features of Earth in order to identify geologic processes (including weathering, erosion, deposition, and glaciation) that are likely to have been responsible for their formation. **GEO.ESS2.9** Develop a model that combines the rock cycle and the carbon cycle, which explains what leads up to and follows a major volcanic eruption and its effect on carbon storage and fluxes. **GEO.ESS2.15** Using maps and other data types, predict how plate tectonics cause earthquake activity, volcanic eruptions, and mountain building. **GEO.ESS2.16** Analyze the effect of an earthquake upon the geosphere, hydrosphere, atmosphere, and/or biosphere, including sphere-to-sphere interactions. Analysis should conclude with an identification of future research to improve our ability to predict such interactions.	**OpenSciEd Unit** C.1 Thermodynamics in Earth's Systems *How can we slow the flow of energy on Earth to protect vulnerable coastal communities?*

Topic 5: Changes in Life Forms

Topic Opener: How have crocodiles changed over time?
8.LS4.1 Using evidence from the geologic timescale, analyze and interpret data for patterns in the fossil record that document the existence, diversity, extinction, and change in life forms throughout Earth's history. **8.LS4.2** Construct an explanation addressing similarities and differences of the anatomical structures and genetic information between extinct and extant organisms using evidence of common ancestry and patterns between taxa.
uConnect Lab: The Mystery of Hooves
8.LS4.1 Using evidence from the geologic timescale, analyze and interpret data for patterns in the fossil record that document the existence, diversity, extinction, and change in life forms throughout Earth's history.
Quest Kickoff: The Big Fossil Hunt
8.LS4.1 Using evidence from the geologic timescale, analyze and interpret data for patterns in the fossil record that document the existence, diversity, extinction, and change in life forms throughout Earth's history.
Lesson 5-1: Patterns in the Fossil Record **Quest Check-in Interactivity: Clues in the Rock Layers | Quest Check-in Interactivity: Fossils Around the World**
8.LS4.1 Using evidence from the geologic timescale, analyze and interpret data for patterns in the fossil record that document the existence, diversity, extinction, and change in life forms throughout Earth's history.
uEngineer It: How Do Scientists Recover Fossils Without Destroying the Fossil?
8.LS4.1 Using evidence from the geologic timescale, analyze and interpret data for patterns in the fossil record that document the existence, diversity, extinction, and change in life forms throughout Earth's history. **8.LS4.2** Construct an explanation addressing similarities and differences of the anatomical structures and genetic information between extinct and extant organisms using evidence of common ancestry and patterns between taxa.
Lesson 5-2: Evidence of Common Ancestry **Quest Check-in Lab: A Matter of Time | Quest Check-in Interactivity: Time to Choose the Dig Site**
8.LS4.2 Construct an explanation addressing similarities and differences of the anatomical structures and genetic information between extinct and extant organisms using evidence of common ancestry and patterns between taxa.
Case Study: Does the Canine Have Any Vestigial Structures?
8.LS4.1 Using evidence from the geologic timescale, analyze and interpret data for patterns in the fossil record that document the existence, diversity, extinction, and change in life forms throughout Earth's history. **8.LS4.2** Construct an explanation addressing similarities and differences of the anatomical structures and genetic information between extinct and extant organisms using evidence of common ancestry and patterns between taxa.

Topic 5 Review and Assess	
8.LS4.1 Using evidence from the geologic timescale, analyze and interpret data for patterns in the fossil record that document the existence, diversity, extinction, and change in life forms throughout Earth's history. **8.LS4.2** Construct an explanation addressing similarities and differences of the anatomical structures and genetic information between extinct and extant organisms using evidence of common ancestry and patterns between taxa.	
uDemonstrate Lab: Is an Ostrich a Dinosaur?	
8.LS4.1 Using evidence from the geologic timescale, analyze and interpret data for patterns in the fossil record that document the existence, diversity, extinction, and change in life forms throughout Earth's history. **8.LS4.2** Construct an explanation addressing similarities and differences of the anatomical structures and genetic information between extinct and extant organisms using evidence of common ancestry and patterns between taxa.	
Quest Findings: Reflect on The Big Fossil Hunt	
8.LS4.1 Using evidence from the geologic timescale, analyze and interpret data for patterns in the fossil record that document the existence, diversity, extinction, and change in life forms throughout Earth's history. **8.LS4.2** Construct an explanation addressing similarities and differences of the anatomical structures and genetic information between extinct and extant organisms using evidence of common ancestry and patterns between taxa.	
Topic 5 High School Science Extensions	**Supplemental Resources**
BIO1.LS4.1 Analyze and interpret scientific data that common ancestry and biological evolution are supported by multiple lines of empirical evidence (e.g. DNA sequences, amino acid sequences, anatomical structures, the fossil record, biogeography, or order of appearance of structures during embryological development). **BIO1.LS4.2** Apply concepts of statistics (i.e. probability) to support explanations that organisms in a population with an advantageous heritable trait tend to increase in proportion to organisms lacking this trait. **BIO1.LS4.5** Obtain, evaluate, and communicate information about how 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.	**OpenSciEd Unit** B.5 Common Ancestry & Speciation *What will happen to Arctic bear populations as their environment changes?* B.4 Natural Selection & Evolution of Populations *How does urbanization affect nonhuman populations, and how can we minimize harmful effects?*

Topic 6: Natural Selection and Adaptation

Topic Opener: How have dragonflies changed over time?
8.LS4.3 Construct an explanation based on evidence that explains how genetic variations of traits in a population increase some individuals' probability of surviving and reproducing. **8.LS4.4** Develop a scientific explanation of how natural selection plays a role in determining the survival and reproduction of a species in a changing environment. **8.LS4.5** Obtain, evaluate, and communicate information about the technologies that have changed the way humans use artificial selection to influence the inheritance of desired traits in other organisms.
uConnect Lab: Walking Whales?
8.LS4.3 Construct an explanation based on evidence that explains how genetic variations of traits in a population increase some individuals' probability of surviving and reproducing. **8.LS4.4** Develop a scientific explanation of how natural selection plays a role in determining the survival and reproduction of a species in a changing environment. **8.LS4.5** Obtain, evaluate, and communicate information about the technologies that have changed the way humans use artificial selection to influence the inheritance of desired traits in other organisms.
Quest Kickoff: A Migration Puzzle
8.LS4.3 Construct an explanation based on evidence that explains how genetic variations of traits in a population increase some individuals' probability of surviving and reproducing. **8.LS4.4** Develop a scientific explanation of how natural selection plays a role in determining the survival and reproduction of a species in a changing environment.
Lesson 6-1: Variation, Survival, and Reproduction | Quest Check-in Interactivity: Meet the Blackcaps
8.LS4.3 Construct an explanation based on evidence that explains how genetic variations of traits in a population increase some individuals' probability of surviving and reproducing.
uEngineer It: Fossils from Bedrock
8.LS4.3 Construct an explanation based on evidence that explains how genetic variations of traits in a population increase some individuals' probability of surviving and reproducing.
Lesson 6-2: The Process of Evolution **Quest Check-in Interactivity: Evolution of the Blackcaps | Quest Check-in Interactivity: Prepare Your Report**
8.LS4.4 Develop a scientific explanation of how natural selection plays a role in determining the survival and reproduction of a species in a changing environment.

Case Study: Could Dinosaurs Roar?
8.LS4.4 Develop a scientific explanation of how natural selection plays a role in determining the survival and reproduction of a species in a changing environment.
Lesson 6-3: Genetic Technologies
8.LS4.5 Obtain, evaluate, and communicate information about the technologies that have changed the way humans use artificial selection to influence the inheritance of desired traits in other organisms.
Topic 6 Review and Assess
8.LS4.3 Construct an explanation based on evidence that explains how genetic variations of traits in a population increase some individuals' probability of surviving and reproducing. **8.LS4.4** Develop a scientific explanation of how natural selection plays a role in determining the survival and reproduction of a species in a changing environment. **8.LS4.5** Obtain, evaluate, and communicate information about the technologies that have changed the way humans use artificial selection to influence the inheritance of desired traits in other organisms.
uDemonstrate Lab: A Bony Puzzle
8.LS4.3 Construct an explanation based on evidence that explains how genetic variations of traits in a population increase some individuals' probability of surviving and reproducing. **8.LS4.4** Develop a scientific explanation of how natural selection plays a role in determining the survival and reproduction of a species in a changing environment. **8.LS4.5** Obtain, evaluate, and communicate information about the technologies that have changed the way humans use artificial selection to influence the inheritance of desired traits in other organisms.
Quest Findings: Reflect on Blackcap Migration
8.LS4.3 Construct an explanation based on evidence that explains how genetic variations of traits in a population increase some individuals' probability of surviving and reproducing. **8.LS4.4** Develop a scientific explanation of how natural selection plays a role in determining the survival and reproduction of a species in a changing environment.

Topic 6 High School Science Extensions	Supplemental Resources
BIO1.LS4.1 Analyze and interpret scientific data that common ancestry and biological evolution are supported by multiple lines of empirical evidence (e.g. DNA sequences, amino acid sequences, anatomical structures, the fossil record, biogeography, or order of appearance of structures during embryological development). **BIO1.LS4.3)** Analyze and interpret data that natural selection is influenced by (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. **BIO.LS4.4** Construct an explanation based on evidence for how natural selection leads to adaptation in populations.	**OpenSciEd Unit** B.4 Natural Selection & Evolution of Populations *How does urbanization affect nonhuman populations, and how can we minimize harmful effects?*