Grade 6
Physical Science:

Students develop an understanding of forces and energy and how energy can transfer from one object to another or be converted from one form to another. They also develop an understanding of the nature of matter.

State Standard	FOSS Program
6.P1U1.1 Analyze and interpret data to show that changes in states of matter are caused by different rates of movement of atoms in solids, liquids, and gases (Kinetic Theory).	**FOSS Next Generation Weather and Water** **TE:** Investigation 1: Part 2 Investigation 2; Part 1 Investigation 3; Part 2 Investigation 4; Part 2 Investigation 5; Part 1 **SE:** *What's in Air; A Thin Blue Veil, What is Air Pressure?* **DR:** Gas in a Syringe, Fluid Convection, Particles in Solids, Liquids and Gases, Energy Transfer: Conduction, Radiation, Convection, Energy Transfer by Collision
6.P1U1.2 Plan and carry out an investigation to demonstrate that variations in temperature and/or pressure affect changes in state of matter.	**FOSS Next Generation Weather and Water** **TE:** Investigation 2; Part 1 Investigation 5; Part 1 Investigation 6; Part 1,3 Investigation 7; All Parts **SE:** *What is air pressure?, Density , Heating the Atmosphere, Wind on Earth* **DR:** Temperature Change Under Pressure, Barometer in a bottle, Energy Transfer: Conduction, Radiation, Convection, Energy Transfer by Collision, NOAA Ridge, Red Spot Movie, Cloud in a Bottle
6.P1U1.3 Develop and use models to represent that matter is made up of smaller particles called atoms.	**FOSS Next Generation Weather and Water** **TE:** Investigation 1; Part 2,3 Investigation 3; Part 1,2 Investigation 6; Part 3 Investigation 7; Part 2 **SE:** *What's in Air; A Thin Blue Veil, Density* **DR:** Gas in a Syringe, Particles in Solids, Liquids and Gases
6.P2U1.4 Develop and use a model to predict how forces act on objects at a distance.	**FOSS Planetary Science** **TE:** Investigation 5 All Parts; Investigation 6; All Parts **SE:** *Craters, Real and Simulated, The Cosmos in a Nutshell, How Earth Got and Held onto its Moon, Finding Exoplanets* **DR:** Crater formation on the Moon, Origins of the Moon, Tides
6.P4U2.5 Analyze how humans use technology to store (potential) and/or use (kinetic) energy.	**FOSS Weather and Water** **TE:** Investigation 5 Part 2, 3 **SE:** *Home Insulation; Engineering Design Process,* **DR:** Particles in Solids, Liquids, Gases

Grade 6
Earth and Space Science

Students develop an understanding of the scale and properties of objects in the solar system and how forces (gravity) and energy cause observable patterns in the Sun-Earth-Moon system.

State Standard	FOSS Program
6.E1U1.6 Investigate and construct an explanation demonstrating that radiation from the Sun provides energy and is absorbed to warm the Earth's surface and atmosphere.	**FOSS Next Generation Weather and Water** **TE:** Investigation 4 All parts **SE:** *Seasons; Thermometer: A Device to Measure Temperature* **DR:** Longitude and Latitude; Energy Transfer: Conduction, Radiation, Convections, Seasons *Note: Weather and Water Investigation8, 9 and 10 can be taught in Grade 7.*
6.E2U1.7 Use ratios and proportions to analyze and interpret data related to scale, properties, and relationships among objects in our solar system.	**FOSS Next Generation Planetary Science** **TE:** Investigation 1; All Parts Investigation 7; All Parts; Investigation 8; All Parts Investigation 9; All Parts **SE:** *Earth's Systems, A Tour of the Solar System, Earth's Changing Systems, The Hunt for Water, Finding Exoplanets* **DR:** White House Views Collection, Astroblog, US Naval Moon Phase Calendar, Earth Systems Images, Community Scale Model, Model of Jupiter's Atmosphere, Space Missions, Exoplanet Archive, Solar System, Earth Images Comparisons, World Population, Comparing Spectra, Astroblog, Hubble's Amazing Universe, Properties of Light, Galileo's Notes, Exoplanet Transit Hunt, Orrey Video 1 and 2, Venus Transit
6.E2U1.9 Develop and use models to explain how constellations and other night sky patterns to move due to Earth's rotation and revolution	**FOSS Next Generation Planetary Science** **TE:** Investigation 2; Part 1 **SE:** *First Voyage of Columbus* **DR:** Earth Models, Day/Night, Round Earth/Flat Earth
6.E2U1.9 Develop and use models to construct an explanation of how eclipses, moon phases, and tides occur within the Sun-Earth-Moon system	**FOSS Next Generation Planetary Science** **TE:** Investigation 1; Part 3 Investigation 3; All Parts Investigation 4; All Parts **SE:** *Earth Systems ,Lunar Myths, Measuring Time with Calendars, Calculating the Observance of Ramadan, Earth's Moon* **DR:** Tides, Lunar Calendar, Jupiter's Moons, Moon Orientation, Moon Puzzle, Moons of Jupiter Video, Origin of the Moon, Phases of the Moon, Rona and Moon Animation
6.E2U1.10 Use a model to show how the tilt of Earth's axis causes variations in the length of the day and gives rise to seasons.	**FOSS Next Generation Planetary Science** **TE:** Investigation 2; All Parts **SE:** *The First Voyage of Columbus, Earth/Sun Relationships, Seasons on Earth, Eratosthenes: First to Measure Earth* **DR:** Seasons, Day/Night Simulation, Complete Sun and Moon Data for One Day **FOSS Next Generation Weather and Water** **TE:** Investigation 4; Part 2 **SE:** *Seasons* **DR:** Seasons

TE: Teacher Editions-Investigations Guide, Teacher Resources • **SE:** Student Edition-Science Resources Book • **DR:** Digital Resources

Grade 6
Life Science

Students develop an understanding of how energy from the Sun is transferred through ecosystems.

State Standard	FOSS Program
6.L2U3.11 Use evidence to construct an argument regarding the impact of human activities on the environment and how they can positively and negatively affect the competition for energy and resources in ecosystems.	**FOSS Next Generation Populations & Ecosystems** **TE:** Investigation 8; All Parts Investigation 9; All Parts **SE:** *Biodiversity, Invasive Species, Mono Lake in the Spotlight, Ecoscenario Introductions* **DR:** Hawaii: Strangers in Paradise, The Mono Lake Story, Ecoscenario Research Center
6.L2U3.12 Engage in argument from evidence to support a claim about the factors that cause species to change and how humans can impact those factors.	**FOSS Next Generation Populations & Ecosystems** **TE**: Investigation 1; All Parts Investigation 7; All Parts Investigation 8; Part 3 Investigation 9; All Parts **SE:** *Limiting Factors; Biodiversity, Invasive Species, Ecoscenario Introductions* **DR:** Hawaii: Strangers in Paradise, The Mono Lake Story, Ecoscenario Research Center
6.L2U1.13 Develop and use models to demonstrate the interdependence of organisms and their environment including biotic and abiotic factors.	**FOSS Next Generation Populations & Ecosystems** **TE:** Investigation 2; All Parts Investigation 3; All Parts Investigation 4; All Parts **SE:** *Life in a Community, Ecoscenario Introductions, Defining a Biome, An Introduction to Mono Lake, Biosphere 2: An Experiment in Isolation* **DR:** Ecoscenarios; Biomes; Among the Wild Chimpanzees; Plant and Animal Care; Organisms Database
6.L2U1.14 Construct a model that shows the cycling of matter and flow of energy in ecosystems.	**FOSS Next Generation Populations & Ecosystems** **TE:** Investigation 5; All Parts Investigation 6; All Parts **SE:** *Where Does Food Come From, Energy and Life, What Does Water Do, Wangari Maathai: Being a Hummingbird, Rachel Carson and the Silent Spring, Trophic Levels, Decomposers* **DR:** Ecoscenarios; Biomes

Grade 6
STEM Engineering

Engineering is a systematic and often iterative approach to designing objects, processes, and systems to meet human needs and wants. This includes defining and delimiting an engineering problem, developing possible solutions and optimizing the design solution (*A Framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas. (2012). Washington: The National Academies Press. P. 202-203).*

State Standard	FOSS Program
Core Idea U2: The knowledge produced by science is used in engineering and technologies to solve problems and/or create products.	**FOSS Next Generation Weather and Water** **TE:** Investigation 5; Part 1,2 **FOSS Next Generation Populations & Ecosystems** **TE:** Investigation 9 Part 1,2 **FOSS Next Generation Planetary Science** **TE:** Investigation 5; Part 2 Investigation 9; Part 2

Grade 7
Physical Science

Students will explore how cause and effect take place within and between a wide variety of force and motion systems from forces on individual objects to the forces that shape our Earth.

State Standard	FOSS Program
7.P2U1.1 Collect and analyze data demonstrating how electromagnetic forces can be attractive or repulsive and can vary in strength.	**FOSS Next Generation Electromagnetic Force** **TE:** Investigation 2; All Parts Investigation 3; All Parts **SE:** *Magnetic Force, Electromagnetism, Electromagnetic Engineering* **DR:** Virtual Electromagnetic, Adding Magnetic Fields, Magnetism
7.P2U1.2 Develop and use a model to predict how forces act on objects at a distance.	**FOSS Next Generation Electromagnetic Force** **TE:** Investigation 2; Part 3 **SE:** *Magnetic Force* **DR:** Adding Magnetic Fields **FOSS Next Generation Gravity and Kinetic Energy** **TE:** Investigation 1; Part 3 Investigation 2; Part 2 **SE:** *A Weighty Matter; Gravity in Space* **DR:** Falling Ball; Hammer and Feather in Space
7.P3U1.3 Plan and carry out an investigation that can support an evidence-based explanation of how objects on Earth are affected by gravitational force.	**FOSS Next Generation Gravity and Kinetic Energy** **TE:** Investigation 1; Part 3 Investigation 2, Parts 1 and 2 **SE:** *A Weighty Matter, Gravity in Space* **DR:** Falling Ball
7.P3U1.4 Use non-algebraic mathematics and computational thinking to explain Newton's laws of motion	**FOSS Next Generation Gravity and Kinetic Energy** **TE:** Investigation 1; All Parts Investigation 2; Part 2 Investigation 3; Part 3 **SE:** *Gravity: It's the Law; Newton's Laws; Avoiding Car Crashes* **DR:** Falling Ball; Hammer and Feather in Space; Understanding Car Crashes: It's Basic Physics

Earth and Space Science

Students develop an understanding of the patterns of energy flowing along with matter cycling within and among the Earth's systems.

State Standard	FOSS Program
7.E1U1.5 Construct a model that shows the cycling of matter and flow of energy in the atmosphere, hydrosphere, and geosphere.	**FOSS Next Generation Diversity of Life** **TE:** Investigation 5; Part 3 **SE:** *Water, Light, and Energy* **DR:** Level of Complexity: Plant Vascular System **FOSS Next Generation Weather and Water** **TE:** Investigation 8 All Parts, 9 All Parts

Grade 7

	SE: Earth: *Water Planet, Ocean Currents and Gyres, El Nino, Climates: Past, Present and Future* **DR:** Water Cycle, Perpetual Ocean, Climate Blog, CO2 in the Ice Core Record, Earth's Climate Over Time**,** Greenhouse Gas Simulator, Human Caused Sources of Carbon Dioxide, Carbon Cycle *Note: Investigations 1-7 are taught in 6th Grade-No equipment is needed for Investigation 8 and 9.* **FOSS Next Generation Earth History** **TE:** Investigation 5 All Parts **SE:** *Minerals, Crystals and Rocks* **DR:** Earth's Interior; Extrusive Formation; Intrusive Formation *Note: Earth History Investigation 8 is taught at Grade 8.*
7.E1U1.6 Construct a model to explain how the distribution of fossils and rocks, continental shapes, and seafloor structures provides evidence of the past plate motions.	**FOSS Next Generation Earth History** **TE:** Investigation 1; All Parts Investigation 2; All Parts Investigation 3; All Parts Investigation 4; All Parts Investigation 6; All Parts Investigation 7; All Parts **SE:** *Seeing Earth; Grand Canyon Flood! Weathering and Erosion; Where in the World is Calcium Carbonate? A Fossil Primer; Rocks, Fossils, and Time; Floating on a Prehistoric Sea,The History of the Theory of Plate Tectonics; Historical Debates about a Dynamic Earth; Earth's Dynamic Systems; Rock Transformations;* **DR:** Grand Canyon Correlation; Stream Table; Debris Flow; Frost Wedging; Rock Fall; Sandstone Formation; Limestone Formation; Rock Column Movie Maker; Rock Database; Latitude and Longitude; Volcano-Plotting Activity; Volcanoes Around the World; Volcanoes; Earth-quake Plotting Activity; Earthquakes Around the World; Plate-Boundaries Map; Mount St. Helens: Eruption Impact; Shake Alert; Wegener; Plate Boundaries Map; Convection Tank; NOAA Plate Tectonics; Convection; Plate Tectonics; Convergent Boundary; Divergent Boundary; Transform Boundary; Folding; Mountain Types; Shale Formation; Timeliner; Index-Fossil Correlation; Dating Rock Layers *Note: Some Earth History Investigations are also taught at Grade 7*.
7.E1U2.7 Analyze and interpret data to construct an explanation for how advances in technology has improved weather prediction**.**	**FOSS Next Generation Weather and Water** **TE:** Investigation 10; All Parts **SE:** *Thermometer: A Device to Measure Temperature; Severe Weather; Weather Balloons and Radiosonde;* **DR:** Weather Maps *Note: Investigations 1-7 are taught in 6th Grade-Only weather boards are needed from the module for Inv 10.*

Grade 7
Life Science

Students develop an understanding of the structure and function of cells.

State Standard	FOSS Program
7.L1U1.8 Obtain, evaluate, and communicate information to provide evidence that all living things are made of cells, cells come from existing cells, and cells are the basic structural and functional unit of all living things.	**FOSS Next Generation Diversity of Life** **TE:** Investigation 1; All Parts Investigation 3; All Parts Investigation 4; All Parts **SE:** *Characteristics of Life on Earth; The Amazing Paramecium* **DR:** Levels of Complexity: Plant Cell, Protist Cell; Database: Elodea Cells, Paramecium Collection; Virtual Microscope
7.L1U1.9 Construct an explanation to demonstrate the relationship between major cell structures and cell functions (plant and animal)	**FOSS Next Generation Diversity of Life** **TE:** Investigation 3; All Parts Investigation 4; All Parts Investigation 9; Part 2 **SE:** *Cells; Viruses: Living or Nonliving?* **DR:** Levels of Complexity Plant Cell Protist Cell; Bacterial Cell; Flu Attack; Viruses on Attack
7.L1U1.10 Develop and use a model to explain how cells, tissues, and organ systems maintain life (animals)**.**	**FOSS Next Generation Diversity of Life** **TE:** Investigation 3; Parts 1-3 Investigation 4; Part 1 Investigation 5; Part 3 Investigation 8; Part 2 **SE:** *Water, Light, and Energy, Levels of Complexity Research* **DR:** Levels of Complexity
7.L1U1.11 Explain how organisms maintain internal stability and evaluate the effect of the external factors on organisms' internal stability.	**FOSS Next Generation Diversity of Life** **TE:** Investigation 5; Parts 1-2 **SE:** *Characteristics of Life; The Water-Conservation Problem* **DR:** Database: Stem Collection, Stomata Collection
7.L2U1.12 Construct an explanation for how some plant cells convert light energy into food energy**.**	**FOSS Next Generation Diversity of Life** **TE:** Investigation 5 Part 3 **SE:** *Water, Light, and Energy* **DR:** Levels of Complexity: Plant Vascular System

STEM Engineering

Engineering is a systematic and often iterative approach to designing objects, processes, and systems to meet human needs and wants. This includes defining and delimiting an engineering problem, developing possible solutions and optimizing the design solution (*A Framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas. (2012). Washington: The National Academies Press. P. 202-203).*

State Standard	FOSS Program
Core Idea U2: The knowledge produced by science is used in engineering and technologies to solve problems and/or create products.	**FOSS Next Generation Electromagnetic Force** **TE:** Investigation 3; Parts 2-3 Investigation 4 Part 1 and 2 **FOSS Next Generation Gravity and Kinetic Energy** **TE:** Investigation 4; Parts 1-2

Grade 8
Physical Science

Students apply stability and change to explore chemical properties of matter and chemical reactions to further understand energy and matter.

State Standard	FOSS Program
8.P1U1.1 Develop and use a model to demonstrate that atoms and molecules can be combined or rearranged in chemical reactions to form new compounds with the total number of each type of atom conserved.	**FOSS Next Generation Chemical Interactions** **TE:** Investigation 2; Parts 1-2 Investigation 8; All Parts Investigation 9; All Parts Investigation 10 Part 1 **SE:** *Elements; Elements in the Universe; Substances on Earth; Particles; Better Living Through Chemistry; How Do Atoms Rearrange? Fireworks; Antoine-Laurent Lavoisier; Organic Compounds, Rock Solid* **DR:** Periodic Table of Elements; Burning Sugar, Hoar Frost, Particles in Solids, Liquids, Gases
8.P1U1.2 Obtain and evaluate information regarding how scientists identify substances based on unique physical and chemical properties.	**FOSS Next Generation Chemical Interactions** **TE:** Investigation 1; Parts 1-2 Investigation 7; Parts 1-2 Investigation 9; Parts 2-3 **SE:** *White Substances Information; How Things Dissolve; Concentration; How Do Atoms Rearrange; Fireworks; Antoine-Laurent Lavoisier; Organic Compounds* **DR:** Two Substances Reaction; Explore Dissolving; Burning Sugar
8.P4U1.3 Construct an explanation on how energy can be transferred from one energy store to another.	**FOSS Next Generation Chemical Interactions** **TE:** Investigation 4; All Parts Investigation 5; All Parts Investigation 6; All Parts Investigation 8; All Parts **SE:** *Particles in Motion; The Three Phases of Matter; Expansion and Contraction; Energy on the Move; Engineering a Better Design; Science Practices; Engineering Practices; Rock Solid; Heat of Fusion* **DR:** Particles in Solids, Liquids, and Gases; Energy Transferred by Collision; Mixing Hot and Cold Water; Thermometer; Energy Flow; Hoar Frost **FOSS Next Generation Waves** **TE:** Investigation 1; Part 2 Investigation 2; Parts 1-2 **SE:** *Transverse and Compression Waves, The Tacoma Narrows Bridge Disaster* **DR:** Standing Waves, Tacoma Narrows Bridge Collapse
8.P4U1.4 Develop and use mathematical models to explain wave characteristics and interactions.	**FOSS Next Generation Waves** **TE:** Investigation 1; All Parts Investigation 2; Part 1 Investigation 3; All Parts Investigation 4; Parts 2-3 **SE:** *Transverse and Compression Waves; Ocean Waves; Tsunamis! Reflecting on Light, Electromagnetic Spectra, Throw a Little Light on Sight, Seismic Waves,*

Grade 8

	DR: Standing Wave; Big Waves, Refraction, Digitized Images
8.P4U2.5 Develop a solution to increase efficiency when transferring energy from one source to another.	**FOSS Next Generation Chemical Interactions** **TE:** Investigation 6; All Parts **SE:** *Engineering a Better Design; Science Practices; Engineering Practices* **DR:** Particles in Solids, Liquids, and Gases; Energy Flow **FOSS Next Generation Waves** **TE:** Investigation 2; Parts 2-3 Investigation 4; Parts 2-3 **SE:** *Engineering Design Process; Sound Waves; Acoustic Engineering; Digital Communication; Telecommunication: From Telegraph to Smartphone* **DR:** Oscilloscope; Soundproof Engineering; Digitized Images

Earth and Space Science

Students explore natural and human-induced cause-and-effect changes in Earth systems over time.

State Standard	FOSS Program
8.E1U1.6 Analyze and interpret data about the Earth's geological column to **communicate r**elative ages of rock layers and fossils.	**FOSS Next Generation Heredity and Adaptation** **TE:** Investigation 1; Parts 1-2 **SE:** *Fossil Dating; Mass Extinctions; An Interview with Jennifer Clack; Transitions* **DR:** Biodiversity Slide Show; Fossils Slide Show; Fish with Fingers; Great Transitions: The Origin of Tetrapods *Extended from Grade 7 FOSS Next Generation Earth History Investigations 1-4*
8.E1U3.7 Obtain, evaluate, and communicate information about data and historical patterns to predict natural hazards and other geological events.	**FOSS Next Generation Earth History** **TE:** Investigation 8; Geoscenario Projects **SE:** *Geoscenarios Introduction: Glaciers, Coal, Yellowstone Hotspot, Oil; Research Careers in the Lab and Field* **DR:** Geoscenarios; Timeliner *Note: Earth History Investigations 1-7, 9 are taught at Grade 7. No equipment from the module is needed for this investigation.*
8.E1U3.8 Construct and support an argument about how human consumption of limited resources impacts the biosphere.	**FOSS Next Generation Heredity and Adaptations** **TE:** Investigation 1; Part 1 Investigation 3; Part 3 **SE:** *Mass Extinctions, Influencing Evolution* **DR:** Biodiversity, Genetic Technology Resources **FOSS Next Generation Earth History** **TE:** Investigation 8; Geoscenario Projects **SE:** *Geoscenarios Introduction: Glaciers, Coal, Yellowstone Hotspot, Oil; Research Careers in the Lab and Field* **DR:** Geoscenarios; Timeliner *Note: Earth History Investigations 1-7, 9 are taught at Grade 7. No equipment from the module is needed for this investigation.*

Grade 8

	Middle School Capstone Project **FOSS Next Generation Planetary Science** **TE:** Investigation 7; Part 4 **SE:** *Earth's Changing Systems* **DR:** World Populations, Earth's Images Comparison *Note: FOSS Planetary Science is taught at Grade 6. No equipment from the module is needed for the capstone project.*

Life Science

Students develop an understanding of patterns and how genetic information is passed from generation to generation. They also develop the understanding of how traits within populations change over time.

State Standard	FOSS Program
8.L3U1.9 Construct an explanation of how genetic variations occur in offspring through the inheritance of traits or through mutations	**FOSS Next Generation Heredity and Adaptations** **TE:** Investigation 2; Parts 1-3 **SE:** *Tree Thinking; Understanding Heredity;* **DR:** Heredity Slide Show
8.L3U3.10 Communicate how advancements in technology have furthered the field of genetic research and use evidence to support an argument about the positive and negative effects of genetic research on human lives.	**FOSS Next Generation Heredity and Adaptations** **TE:** Investigation 3; Part 3 **SE:** *Influencing Evolution* **DR:** Genetic Technology Resource
8.L4U1.11 Develop and use a model to explain how natural selection may lead to increases and decreases of specific traits in populations over time.	**FOSS Next Generation Heredity and Adaptations** **TE:** Investigation 3; Parts 1-2 **SE:** *Adaptation; Natural Selection* **DR:** Walking Sticks: Eat Insects; Find Insects in Three Environments; Larkey Natural Selection
8.L4U1.12 Gather and communicate evidence on how the process of natural selection provides an explanation of how new species can evolve.	**FOSS Next Generation Heredity and Adaptations** **TE:** Investigation 3; All Parts **SE:** *Adaptation; Natural Selection; What Makes a Scientific Theory? Influencing Evolution* **DR:** Walking Sticks: Eat Insects; Find Insects in Three Environments; Larkey Natural Selection; Genetic Technology Resources; The Making of the Fittest: Natural Selection and Adaptation; The Origin of Species: The Beak of the Finch; Biodiversity Slide Show

Grade 8

STEM Engineering

Engineering is a systematic and often iterative approach to designing objects, processes, and systems to meet human needs and wants. This includes defining and delimiting an engineering problem, developing possible solutions and optimizing the design solution (*A Framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas. (2012). Washington: The National Academies Press. P. 202-203).*

State Standard	FOSS Program
Core Idea U2: The knowledge produced by science is used in engineering and technologies to solve problems and/or create products.	**FOSS Next Generation Chemical Interactions** **TE:** Investigation 6; Parts 1-2 Investigation 8; Part 3 **FOSS Next Generation Waves** **TE:** Investigation 2; Parts 2-3 **FOSS Next Generation Heredity and Adaptations** **TE:** Investigation 3; Part 3