

Spark Science 6: SEMESTER 1

Unit 1: Form and Movement in the Solar System

Lesson: The Solar System	<ul style="list-style-type: none">• Student will use computational thinking and analyze data to discover properties and scales of objects within the solar system.<ul style="list-style-type: none">○ MS-ESS1-3
Lesson: The Moon, Its Phases, and Eclipses	<ul style="list-style-type: none">• Students will create and use a model to describe and understand the cyclical patterns of lunar phases and solar and lunar eclipses.<ul style="list-style-type: none">○ MS-ESS1-1
Lesson: The Seasons	<ul style="list-style-type: none">• Students will create and use a model to describe and understand the cyclical pattern of the seasons.<ul style="list-style-type: none">○ MS-ESS1-1
Lesson: Gravity and Inertia	<ul style="list-style-type: none">• Students will create and use a model to describe and understand the role played by gravity and inertia in the orbital movements of objects in the solar system.<ul style="list-style-type: none">○ MS-ESS1-2

Unit 2: Energy Affecting Matter

Lesson: Atoms and Molecules	<ul style="list-style-type: none">• Students will develop models that show that molecules are comprised of different kinds, proportions, and quantities of atoms.<ul style="list-style-type: none">○ MS-PS1-1
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Lesson: Heat Energy Transfer	<ul style="list-style-type: none"> Students will create a model to predict how heat energy affects states of matter and density, plan and conduct an investigation to determine the relationship between temperature, amount of heat transferred, and the change of average particle motion in various amounts of matter, and design a tool or object that minimizes or maximizes the transfer of heat energy. <ul style="list-style-type: none"> MS-PS1-4
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Spark Science 6: SEMESTER

Unit: Earth's Climate and Weather Patterns

Lesson: The Water Cycle	<ul style="list-style-type: none"> Students will create a model that describes how the cycling of water through the Earth's systems is driven by the sun's energy, gravity, and density. <ul style="list-style-type: none"> MS-ESS2-4
Lesson: Air Masses and Weather	<ul style="list-style-type: none"> Students will investigate how air masses and their interactions with each other cause changes in the weather. They will also collect and analyze weather data in order to provide evidence on how air masses moving from areas of high pressure to those of low pressure changes weather conditions. <ul style="list-style-type: none"> MS-ESS2-5
Lesson: Climate	<ul style="list-style-type: none"> Students will create a model that shows how the unequal heating of Earth's systems creates patterns of circulation in the atmosphere and ocean that determine regional climates. <ul style="list-style-type: none"> MS-ESS2-6
Lesson: The Greenhouse Effect	<ul style="list-style-type: none"> Students will create an explanation, supported by evidence, of the role that the greenhouse effect plays in Earth's energy balance and how it allows life on Earth to exist. <ul style="list-style-type: none"> MS-ESS3-5

Unit: Change and Stability of Ecosystems

Lesson: Resources in Ecosystems	<ul style="list-style-type: none">● Students will analyze data to find evidence for the effects that the availability of resources has on organisms and populations in ecosystems. They will also ask questions about how changes in resource availability impact ecosystems.<ul style="list-style-type: none">○ MS-LS2-1
Lesson: Organism Interactions	<ul style="list-style-type: none">● Students will make an explanation that predicts patterns of how organisms interact with each other across multiple ecosystems.<ul style="list-style-type: none">○ MS-LS2-4
Lesson: Movement of Matter and Energy in Ecosystems	<ul style="list-style-type: none">● Students will create a model that describes how matter cycles and energy flows through living and nonliving elements of an ecosystem.<ul style="list-style-type: none">○ MS-LS2-3
Lesson: Stability of Population in Ecosystems	<ul style="list-style-type: none">● Students will build an argument supported by evidence that population stability is affected when an ecosystem changes.<ul style="list-style-type: none">○ MS-LS2-4
Lesson: Change and Stability	<ul style="list-style-type: none">● Students will evaluate competing solutions for the preservation of ecosystem resources and biodiversity based on how well the solutions support stability within the ecosystem.<ul style="list-style-type: none">○ MS-LS2-4

Structure and Function of Living Organisms

Lesson 6-1: Living Things Are Made of Cells	<ul style="list-style-type: none"> • In this lesson students will learn about cells, the basic building blocks of all life. Students will gain a better understanding of how small cells are and become more comfortable with using scientific notation to describe very large and very small things. <ul style="list-style-type: none"> ○ MS-LS1-1
Lesson 6-2a: Organelles	<ul style="list-style-type: none"> • In this lesson students will learn about the internal structure and components of plant and animal cells. Students will build a 3D model of a cell. <ul style="list-style-type: none"> ○ MS-LS1-2
Lesson 6-2b: Cell Function	<ul style="list-style-type: none"> • In this lesson students will learn about homeostasis and the different kinds of cell transport. Students will complete a lab exploring why drinking salt water can kill you. <ul style="list-style-type: none"> ○ MS-LS1-2
Lesson 6-3: The Human Body	<ul style="list-style-type: none"> • In this lesson students will learn how a human body is organized from tiny cells to complex organ systems. Students will be introduced to several different human body systems. <ul style="list-style-type: none"> ○ MS-LS1-3
Lesson 6-4: Sensory Receptors in the Human Brain	<ul style="list-style-type: none"> • In this lesson students will learn how the human brain processes information from the environment and can either respond with an immediate behavior or store the information as a memory. <ul style="list-style-type: none"> ○ MS-LS1-8

Spark Science 7 (2018): SEMESTER 1

Unit 1: Structure and Properties of Matter

Lesson 1-1a: Atomic Structure	<ul style="list-style-type: none"> ● In this lesson students will learn how atoms are the building blocks of matter. Students will learn how to recognize how the particles in an element, molecule, compound, and mixture are different. <ul style="list-style-type: none"> ○ MS-PS1-1
Lesson 1-1b: Molecular Structure	<ul style="list-style-type: none"> ○ Students will learn how to recognize how the particles in an element, molecule, compound, and mixture are different. ○ MS-PS1-1
Lesson 1-2: Physical and Chemical Properties	<ul style="list-style-type: none"> ● In this lesson students will learn about physical and chemical properties and synthetic materials. <ul style="list-style-type: none"> ○ MS-PS1-3
Lesson 1-2b: The Periodic Table	<ul style="list-style-type: none"> ● Students will gain a basic introduction to the periodic table. <ul style="list-style-type: none"> ○ MS-PS1-3
Lesson 1-2c: Synthetic Materials	<ul style="list-style-type: none"> ● In this lesson students will learn about synthetic materials. <ul style="list-style-type: none"> ○ MS-PS1-3
Lesson 1-3: States of Matter	<ul style="list-style-type: none"> ● In this lesson students will learn about three different states of matter and how thermal energy controls whether a substance will be a gas, liquid, or solid. Emphasis is on the states of matter for water. <ul style="list-style-type: none"> ○ MS-PS1-4

Unit 2: Chemical Reactions

Lesson 1-1: Chemical Reactions	<ul style="list-style-type: none"> ● Students should be able to describe chemical reactions and the signs indicating a chemical reaction has occurred. <ul style="list-style-type: none"> ○ MS-PS1-2
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Lesson 1-1b: Properties of Chemical Reactions	<ul style="list-style-type: none"> Students should be able to describe signs indicating a chemical reaction has occurred, and calculate density given mass and volume. <ul style="list-style-type: none"> MS-PS1-2
Lesson 1-1c: Chemical Equations	<ul style="list-style-type: none"> Students should be able to distinguish between chemical symbol, chemical formula, and chemical compound. <ul style="list-style-type: none"> MS-PS1-2
Lesson 1-2: Mass Is Conserved	<ul style="list-style-type: none"> Students will be able to describe the difference between mass and weight. Students will be able to describe and demonstrate that mass is neither created nor destroyed during a chemical reaction. <ul style="list-style-type: none"> MS-PS1-5
Lesson 1-3: Chemical Reactions and Energy	<ul style="list-style-type: none"> Students will be able to differentiate between endothermic and exothermic chemical reactions. Students will complete an engineering design challenge where they perform iterations of a chemical reaction experiment to achieve a specified goal. <ul style="list-style-type: none"> MS-PS1-6

Unit 3: History of the Earth

Lesson 5-1: Geologic Time	<ul style="list-style-type: none"> In this lesson students will learn how the geologic time scale is used to organize Earth's 4.5-billion-year-old history. <ul style="list-style-type: none"> MS-ESS1-4
Lesson 5-2: Mass Extinction Events	<ul style="list-style-type: none"> In this lesson students will learn how the geologic time scale is used to organize Earth's 4.5-billion-year-old history. Students will also learn how geologic processes caused five mass extinction events throughout Earth's history. <ul style="list-style-type: none"> MS-ESS1-4

Lesson 5-3: Geologic Processes Occur Over a Large Range of Timescales	<ul style="list-style-type: none"> • In this lesson students will learn how geologic processes occur over a range of time and spatial scales. <ul style="list-style-type: none"> ○ MS-ESS2-2
Lesson 5-4: Fundamental Geologic Principles	<ul style="list-style-type: none"> • In this lesson students will learn how geologists have used observations of the natural world to develop fundamental geologic principles and make interpretations about what ancient environments and landscapes looked like. <ul style="list-style-type: none"> ○ MS-ESS2-2

Unit 4: Earth's Systems

Lesson 6-1: The Theory of Plate Tectonics	<ul style="list-style-type: none"> • In this lesson students will learn the interior structure of the Earth. <ul style="list-style-type: none"> ○ MS-ESS2-3
Lesson 6-2: Plate Movements	<ul style="list-style-type: none"> • In this lesson students will learn how the interior structure of the Earth results in movement of tectonic plates on the Earth's surface. <ul style="list-style-type: none"> ○ MS-ESS2-1 • Students will also learn how the movement of these tectonic plates results in different plate boundaries and geologic features. <ul style="list-style-type: none"> ○ MS-ESS2-3
Lesson 6-3: From Plate Movements to Rock Formation	<ul style="list-style-type: none"> • In this lesson students will learn how different types of rocks are formed at different plate boundaries. <ul style="list-style-type: none"> ○ MS-ESS2-3 • Students will also learn how rocks can be transformed from one type of rock to another through a variety of geologic processes. <ul style="list-style-type: none"> ○ MS-ESS2-1

Lesson 6-4: Earth's Limited and Non-Renewable Resources	<ul style="list-style-type: none"> • In this lesson students will learn about natural resources that humans depend upon for survival, and that the locations of these natural resources are a function of past and present geologic processes. <ul style="list-style-type: none"> ○ MS-ESS3-1 • Students will also learn about how certain types of rocks are capable of holding liquids and gases within the rock. <ul style="list-style-type: none"> ○ MS-ESS3-1
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Spark Science 7 (2018): SEMESTER 2

Unit 5: Natural Disasters & Prediction

Lesson 1: Earth Interior Natural Disasters	<ul style="list-style-type: none"> • Students will be able to describe disasters related to the Earth's interior processes and how they affect humans. <ul style="list-style-type: none"> ○ MS-ESS3-2
Lesson 2: Severe Weather Natural Disasters	<ul style="list-style-type: none"> • Students will be able to describe different types of severe weather natural disasters and how they affect humans. <ul style="list-style-type: none"> ○ MS-ESS3-2
Lesson 3: Predicting Natural Disasters	<ul style="list-style-type: none"> • Students will be able to differentiate between natural disasters humans can predict before they occur, and those disasters that are unpredictable. <ul style="list-style-type: none"> ○ MS-ESS3-2
Unit Project Instructions: Natural Disaster Warning Systems	<ul style="list-style-type: none"> • Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem. <ul style="list-style-type: none"> ○ MS-ESS3-2; MS-ETS1-2

Unit 6: Human Impacts

Lesson 1: Freshwater Crisis	<ul style="list-style-type: none"> Students will be able to describe the concept of water scarcity, how much of the world's population is affected, and how the crisis increases as the world's population increases. <ul style="list-style-type: none"> MS-ESS3-3 MS-ESS3-4
Lesson 2a: Feeding A Growing Population - Fish Farming	<ul style="list-style-type: none"> Students will be able to describe fish farming and aquaponics, which might help alleviate human hunger. <ul style="list-style-type: none"> MS-ESS3-3 MS-ESS3-4
Lesson 2b: Feeding A Growing Population - GMOs	<ul style="list-style-type: none"> Students will be able to describe genetically-modified organisms, which might help alleviate human hunger. <ul style="list-style-type: none"> MS-ESS3-3 MS-ESS3-4 Students will gain experience performing original research and using information they collect to form opinions. <ul style="list-style-type: none"> MS-ETS1-1
Lesson 3: Global Climate Change	<ul style="list-style-type: none"> In this lesson students will learn about the interconnectedness between humans and the Earth. Students will learn to clarify the factors that are causing global temperatures to rise. <ul style="list-style-type: none"> MS-ESS3-5

Spark Science 8 (2018): SEMESTER 1

Unit 1: Contact Forces and Motion

Lesson 1-1: Newton's First Law	<ul style="list-style-type: none"> Students will be able to describe Newton's First Law, and identify and label forces for simple situations and drawings. <ul style="list-style-type: none"> MS-PS2-2
Lesson 1-2: Newton's Second Law	<ul style="list-style-type: none"> Students will be able to describe Newton's Second Law and develop and understanding of acceleration. <ul style="list-style-type: none"> MS-PS2-2

Lesson 1-3: Newton's Third Law	<ul style="list-style-type: none"> Students will be able to describe Newton's Third Law and be able to explain and draw forces and accelerations for simple situations. <ul style="list-style-type: none"> MS-PS2-2
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Unit 2: Non-Contact Forces

Lesson 2-1: Gravitational Force	<ul style="list-style-type: none"> Students will be able to explain that the gravitational force is always attractive and that the acceleration due to gravity is the same for all objects on Earth. <ul style="list-style-type: none"> MS-PS2-4
Lesson 2-2: Electric Forces	<ul style="list-style-type: none"> Students will be able to describe non-contact forces, specifically electric forces, and identify how static electricity works. <ul style="list-style-type: none"> MS-PS2-3; MS-PS2-5
Lesson 2-3a: Magnetic Forces	<ul style="list-style-type: none"> Students will be able to describe non-contact forces, specifically magnetic forces. <ul style="list-style-type: none"> MS-PS2-3; MS-PS2-5
Lesson 2-3b: Electromagnets	<ul style="list-style-type: none"> Students will be able to describe non-contact forces, specifically magnetic forces, and identify how electromagnets work. <ul style="list-style-type: none"> MS-PS2-3; MS-PS2-5

Unit 3: Energy and Momentum

Lesson 3-1: Kinetic and Potential Energy	<ul style="list-style-type: none"> Students will be able to describe kinetic and potential energy and the factors that control each type of energy. <ul style="list-style-type: none"> MS-PS3-1; MS-PS3-2
Lesson 3-2: Transforming Energy	<ul style="list-style-type: none"> Students will be able to describe how the total energy in a system can change from kinetic energy to potential energy and back to kinetic energy. <ul style="list-style-type: none"> MS-PS3-1; MS-PS3-2; MS-PS3-5
Lesson 3-3: Momentum, Impulse, and Conservation of Momentum	<ul style="list-style-type: none"> Students will be able to describe momentum, impulse, and how the total momentum in a system stays constant. <ul style="list-style-type: none"> MS-PS3-1

Unit 4: Energy Transfer

Lesson 4-1: Collisions	<ul style="list-style-type: none"> Students will be able to describe how momentum is conserved during collisions. <ul style="list-style-type: none"> MS-PS3-1; MS-PS3-5
Lesson 4-2: Heat and Temperature	<ul style="list-style-type: none"> Students will be able to describe the differences between heat and temperature. <ul style="list-style-type: none"> MS-PS3-3; MS-PS3-4
Lesson 4-3: Heat Transfer	<ul style="list-style-type: none"> Students will be able to identify, describe, and provide examples of the three different types of heat transfer: conduction, convection, and radiation. <ul style="list-style-type: none"> MS-PS3-3; MS-PS3-4
Lesson 4-4: Conservation of Energy	<ul style="list-style-type: none"> Students will be able to describe how energy is always conserved -- it is never created or destroyed, but it can change forms. <ul style="list-style-type: none"> MS-PS3-5

Spark Science 8: SEMESTER 2

Unit: Development and Reproduction

Lesson: Genes, Traits, and DNA	<ul style="list-style-type: none"> Students will learn how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants respectively. Students will learn about genes, traits, and DNA <ul style="list-style-type: none"> MS-LS1-4; 8-LS1-4
Lesson: Genetic Variation	<ul style="list-style-type: none"> Students will learn how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants respectively. <ul style="list-style-type: none"> MS-LS1-4; 8-LS1-4
Lesson: Types of Reproduction	<ul style="list-style-type: none"> Students will develop an understanding of and be able to describe why asexual reproduction results in offspring with identical genetic information and sexual reproduction results in offspring with genetic variation. Students will learn to use punnett squares to describe the cause and effect of gene transmission from parent to child. Students will also begin to understand how genetic variation among organisms in a species affects survival and reproduction. <ul style="list-style-type: none"> MS-LS3-2

Unit: Adaptations and Mutations

Lesson: Adaptations for Reproduction and Survival	<ul style="list-style-type: none"> Students will learn how environmental and genetic factors influence the growth of organisms. <ul style="list-style-type: none"> MS-LS1-5
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Lesson: Mutations	<ul style="list-style-type: none"> Students will learn 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. <ul style="list-style-type: none"> MS-LS3-1; 8-LS3-1
Lesson: Genetic Changes Caused By Humans	<ul style="list-style-type: none"> Students will learn about some of the technologies that have changed the way humans influence the inheritance of desired traits in organisms. <ul style="list-style-type: none"> MS-LS4-5; 8-LS4-5

Unit: Evolution by Natural Selection

Lesson: Changes Over Time	<ul style="list-style-type: none"> Students will learn how genetic variations of traits in a population increase some individuals' probability of surviving and reproducing in a specific environment. <ul style="list-style-type: none"> MS-LS4-4; 8-LS4-4 Students will also learn how natural selection may lead to increases and decreases of specific traits in populations over time. <ul style="list-style-type: none"> MS-LS4-6; 8-LS4-6 Students will analyze output data from a model, recognize similarities and differences between each simulation run, and identify the best-suited values of each variable <ul style="list-style-type: none"> MS-ETS1-3
Lesson: Fossils Document Evolution	<ul style="list-style-type: none"> Students will learn about 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. <ul style="list-style-type: none"> MS-LS4-1; 8-LS4-1

<p>Lesson: Connecting Modern Organisms to Ancient Organisms</p>	<ul style="list-style-type: none"> Students will learn about the anatomical similarities and differences among modern organisms and between modern and fossil organisms to infer evolutionary relationships. This lesson will use dinosaurs and the evolution of birds from dinosaurs as an example. <ul style="list-style-type: none"> MS-LS4-2
<p>Lesson: Comparative Embryology</p>	<ul style="list-style-type: none"> Students will learn how to analyze pictorial data to compare patterns of similarities in the embryological development across multiple species to identify relationships not evident in the fully formed anatomy. <ul style="list-style-type: none"> MS-LS4-3