Kaboom! Volunteers in Classrooms

Presentation Summaries and Related Next Generation Standards

Middle School, Grades 6 - 8

PRESENTATION SUMMARIES

Mount St Helens 1980 Eruption

This presentation begins by discussing tectonic plates, plate boundaries, different types of volcanoes, and the process of volcano formation at a convergent plate boundary. Students will map out different volcanoes to observe the "Ring of Fire." Then, the presenter will discuss the details of the 1980 eruption with a lot of photographs, statistics and interesting facts. Students will also learn that Mount St. Helens will erupt again and that scientists are monitoring the volcano. Afterward, students use a topographic map to draw a cross-section of the mountain before and after the 1980 eruption, and then use their drawing to answer questions.

Return to Life

This presentation begins with a brief review of the 1980 eruption and the effects it had on the landscape. Then, the presenter will discuss succession, food webs and photosynthesis. Students will learn how certain organisms on Mount St Helens played very special roles (elk, lupine, gophers, spiders, frogs), and that just because an organism survived, does not mean it persisted. Students will also learn about different types of disturbance. In the activity, students roll dice to represent the roll of chance in survival and to develop a set of situations and characteristics for an organism. They can use this information to do a follow-up activity (examples are to write a story, letter or comic strip)

Rocks

This presentation discusses how 3 types of rock are formed (igneous, sedimentary, and metamorphic) and the rock cycle. We delve deeper into the igneous rock topic to discuss how color and texture can help determine how a rock was formed, largely focusing on intrusive vs. extrusive and how silica affects the color. In the activity, students walk to different rock stations where they try to identify at least 8 rocks (there are about 16 available) using color and texture clues, and by comparing rocks. Students are given a color/texture chart as a guide.

Related Next Generation Standards: Mount St Helens 1980 Eruption

MS-ESS2-2. Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales. [Clarification Statement: Emphasis is on how processes change Earth's surface at time and spatial scales that can be large (such as slow plate motions or the uplift of large mountain ranges) or small (such as rapid landslides or microscopic geochemical reactions), and how many geoscience processes (such as earthquakes, volcanoes, and meteor impacts) usually behave gradually but are punctuated by catastrophic events. Examples of geoscience processes include surface weathering and deposition by the movements of water, ice, and wind. Emphasis is on geoscience processes that shape local geographic features, where appropriate.]

MS-ESS2-3. Analyze and interpret data on the distribution of fossils and rocks, continental shapes, and seafloor structures to provide evidence of the past plate motions. [Clarification Statement: Examples of data include similarities of rock and fossil types on different continents, the shapes of the continents (including continental shelves), and the locations of ocean structures (such as ridges, fracture zones, and trenches).]

Science and Engineering Practices:	**Disciplinary Core Ideas**	**Crosscutting Concepts**
<u>Developing and Using Models</u> in 6–8 builds on K–5 experiences and progresses to developing, using, and revising models to describe, test, and predict more abstract phenomena and design systems. • Develop and use a model to describe phenomena. (MS-ESS2-1),(MS-ESS2-6) <u>Planning and Carrying Out Investigations</u> in 6-8 builds on K-5 experiences and progresses to include investigations that use multiple variables and provide evidence to support explanations or solutions. • Collect data to produce data to serve as the basis for evidence to answer scientific questions or test design solutions under a range of conditions. (MS-ESS2-5) <u>Analyzing and Interpreting Data</u> in 6–8 builds on K–5 experiences and progresses to extending quantitative analysis to investigations, distinguishing between correlation and causation, and basic statistical techniques of data and error analysis. • Analyze and interpret data to provide evidence for phenomena. (MS-ESS2-3)	<u>ESS1.C: The History of Planet Earth</u> • Tectonic processes continually generate new ocean sea floor at ridges and destroy old sea floor at trenches. (HS.ESS1.C GBE), (secondary to MS-ESS2-3) <u>ESS2.A: Earth's Materials and Systems</u> • All Earth processes are the result of energy flowing and matter cycling within and among the planet's systems. This energy is derived from the sun and Earth's hot interior. The energy that flows and matter that cycles produce chemical and physical changes in Earth's materials and living organisms. (MS-ESS2-1) <u>ESS2.B: Plate Tectonics and Large-Scale System Interactions</u> • Maps of ancient land and water patterns, based on investigations of rocks and fossils, make clear how Earth's plates have moved great distances, collided, and spread apart. (MS-ESS2-3)	<u>Cause and Effect</u> • Cause and effect relationships may be used to predict phenomena in natural or designed systems. (MS-ESS2-5) <u>Systems and System Models</u> • Models can be used to represent systems and their interactions—such as inputs, processes and outputs—and energy, matter, and information flows within systems. (MS-ESS2-6) <u>Stability and Change</u> • Explanations of stability and change in natural or designed systems can be constructed by examining the changes over time and processes at different scales, including the atomic scale. (MS-ESS2-1)

Related Next Generation Standards: Return to Life

MS-LS1-5. Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms. [Clarification Statement: Examples of local environmental conditions could include availability of food, light, space, and water. Examples of genetic factors could include large breed cattle and species of grass affecting growth of organisms. Examples of evidence could include drought decreasing plant growth, fertilizer increasing plant growth, different varieties of plant seeds growing at different rates in different conditions, and fish growing larger in large ponds than they do in small ponds.]
MS-LS1-6. Construct a scientific explanation based on evidence for the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms. [Clarification Statement: Emphasis is on tracing movement of matter and flow of energy.]
MS-LS2-1. Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem. [Clarification Statement: Emphasis is on cause and effect relationships between resources and growth of individual organisms and the numbers of organisms in ecosystems during periods of abundant and scarce resources.]
MS-LS2-2. Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems. [Clarification Statement: Emphasis is on predicting consistent patterns of interactions in different ecosystems in terms of the relationships among and between organisms and abiotic components of ecosystems. Examples of types of interactions could include competitive, predatory, and mutually beneficial.]
MS-LS2-4. Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations. [Clarification Statement: Emphasis is on recognizing patterns in data and making warranted inferences about changes in populations, and on evaluating empirical evidence supporting arguments about changes to ecosystems.]

Related Next Generation Standards: Return to Life (continued)

Science and Engineering Practices:	Disciplinary Core Ideas	Crosscutting Concepts
Developing and Using Models Modeling in 6–8 builds on K–5 experiences and progresses to developing, using, and revising models to describe, test, and predict more abstract phenomena and design systems. • Develop and use a model to describe phenomena. (MS-LS1-2) Constructing Explanations and Designing Solutions in 6–8 builds on K–5 experiences and progresses to include constructing explanations and designing solutions supported by multiple sources of evidence consistent with scientific ideas, principles, and theories. • Construct an explanation that includes qualitative or quantitative relationships between variables that predict phenomena. (MS-LS2-2)	PS3.D: Energy in Chemical Processes and Everyday Life • The chemical reaction by which plants produce complex food molecules (sugars) requires an energy input (i.e., from sunlight) to occur. In this reaction, carbon dioxide and water combine to form carbon-based organic molecules and release oxygen. (secondary to MS-LS1-6) • Cellular respiration in plants and animals involve chemical reactions with oxygen that release stored energy. In these processes, complex molecules containing carbon react with oxygen to produce carbon dioxide and other materials. (secondary to MS-LS1-7) LS2.A: Interdependent Relationships in Ecosystems • Organisms, and populations of organisms, are dependent on their environmental interactions both with other living things and with nonliving factors. (MS-LS2-1) • In any ecosystem, organisms and populations with similar requirements for food, water, oxygen, or other resources may compete with each other for limited resources, access to which consequently constrains their growth and reproduction. (MS-LS2-1) • Similarly, predatory interactions may reduce the number of organisms or eliminate whole populations of organisms. Mutually beneficial interactions, in contrast, may become so interdependent that each organism requires the other for survival. Although the species involved in these competitive, predatory, and mutually beneficial interactions vary across ecosystems, the patterns of interactions of organisms with their environments, both living and nonliving, are shared. (MS-LS2-2) LS2.C: Ecosystem Dynamics, Functioning, and Resilience • Ecosystems are dynamic in nature; their characteristics can vary over time. Disruptions to any physical or biological component of an ecosystem can lead to shifts in all its populations. (MS-LS2-4)	Cause and Effect • Cause and effect relationships may be used to predict phenomena in natural systems. (MS-LS1-8) • Phenomena may have more than one cause, and some cause and effect relationships in systems can only be described using probability. (MS-LS1-4), (MS-LS1-5) Systems and System Models • Systems may interact with other systems; they may have sub-systems and be a part of larger complex systems. (MS-LS1-3) Structure and Function • Complex and microscopic structures and systems can be visualized, modeled, and used to describe how their function depends on the relationships among its parts, therefore complex natural structures/systems can be analyzed to determine how they function. (MS-LS1-2) Stability and Change • Small changes in one part of a system might cause large changes in another part. (MS-LS2-4),(MS-LS2-5)

Related Next Generation Standards: Rocks

MS-ESS2-1. Develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process. [Clarification Statement: Emphasis is on the processes of melting, crystallization, weathering, deformation, and sedimentation, which act together to form minerals and rocks through the cycling of Earth's materials.]

MS-ESS2-2. Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales. [Clarification Statement: Emphasis is on how processes change Earth's surface at time and spatial scales that can be large (such as slow plate motions or the uplift of large mountain ranges) or small (such as rapid landslides or microscopic geochemical reactions), and how many geoscience processes (such as earthquakes, volcanoes, and meteor impacts) usually behave gradually but are punctuated by catastrophic events. Examples of geoscience processes include surface weathering and deposition by the movements of water, ice, and wind. Emphasis is on geoscience processes that shape local geographic features, where appropriate.]

Science and Engineering Practices:	Disciplinary Core Ideas	Crosscutting Concepts
<u>Developing and Using Models</u> in 6–8 builds on K–5 experiences and progresses to developing, using, and revising models to describe, test, and predict more abstract phenomena and design systems. • Develop and use a model to describe phenomena. (MS-ESS2-1) <u>Analyzing and Interpreting Data</u> in 6–8 builds on K–5 experiences and progresses to extending quantitative analysis to investigations, distinguishing between correlation and causation, and basic statistical techniques of data and error analysis. • Analyze and interpret data to provide evidence for phenomena. (MS-ESS2-3) <u>Constructing Explanations and Designing Solutions</u> in 6–8 builds on K–5 experiences and progresses to include constructing explanations and designing solutions supported by multiple sources of evidence consistent with scientific ideas, principles, and theories. • Construct a scientific explanation based on valid and reliable evidence obtained from sources (including the students' own experiments) and the assumption that theories and laws that describe nature operate today as they did in the past and will continue to do so in the future. (MS-ESS2-2)	<u>ESS2.A: Earth's Materials and Systems</u> • All Earth processes are the result of energy flowing and matter cycling within and among the planet's systems. This energy is derived from the sun and Earth's hot interior. The energy that flows and matter that cycles produce chemical and physical changes in Earth's materials and living organisms. (MS-ESS2-1) • The planet's systems interact over scales that range from microscopic to global in size, and they operate over fractions of a second to billions of years. These interactions have shaped Earth's history and will determine its future. (MS-ESS2-2)	<u>Patterns</u> • Patterns in rates of change and other numerical relationships can provide information about natural systems. (MS-ESS2-3) <u>Scale Proportion and Quantity</u> • Time, space, and energy phenomena can be observed at various scales using models to study systems that are too large or too small. (MS-ESS2-2) <u>Stability and Change</u> • Explanations of stability and change in natural or designed systems can be constructed by examining the changes over time and processes at different scales, including the atomic scale. (MS-ESS2-1)