Eighth Grade Science "BIG IDEA" Timeline

Building a Science Foundation 3-4 weeks August 16 – Sept. 14, 2018

1. Asking questions, developing and using models, planning and carrying out investigations, analyzing and interpreting data, using math, constructing explanations, engaging in argument based on evidence, and obtaining, evaluating and communicating information.
2. Learn how to use a 2 –coordinate graph in forecasting the track of a hurricane.
3. STEM activity used in teaching mass and acceleration as well as SEP's.
4. One week lab involving data collecting for 5 days and interpreting the data using two types of data tables.

Objectives

MS-ESS3-2 Analyze and interpret data on natural hazards (hurricanes) to forecast future catastrophic events.

MS-PS2-2 Plan an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object.

MS – LS1-7 Develop a model to describe how food is rearranged through chemical reactions, forming new molecules that support growth and /or release energy as this matter moves through an organism.

Physical and Chemical Properties/Chemical Changes 6-7 weeks Sept. 17 –Oct. 31, 2018

1. Evaluate and communicate information to show that each pure substance has characteristic physical and chemical properties.
2. Each pure substance can react chemically in characteristic ways to perform specific functions.
3. In a chemical process, the atoms that make up the original substances are regrouped into different molecules, and these new substances have different properties from those of the reactants.
4. The total number of each type of atom is conserved, and thus the mass does not change.
5. Some chemical reactions release energy, others store energy.
6. A solution needs to be tested, and then modified on the basis of the test results, in order to improve it.
7. Within individual organisms, food moves through a series of chemical reactions in which it is broken down and rearranged to form new molecules, to support growth, or to release energy
8. 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.

Objectives

MS – PS1-3 *G*ather and make sense of information to describe that synthetic materials come from natural resources and impact society.

MS-PS1-5 Develop and use a model to describe how the total number of atoms does not change in a chemical reaction and thus mass is conserved.

MS-PS1-6 *Develop and* design a project to construct, test, and modify a device that either releases or absorbs thermal energy by chemical processes.

MS-LS1-7 Develop a model to describe how food is rearranged through chemical reactions, forming new molecules that support growth and/or release energy as this matter moves through an organism.

Motion and Forces 4 weeks Nov. 1-Dec. 5, 2018

1. For any pair of interacting objects, the force exerted by the first object on the second object is equal in strength to the force that second object exerts on the first, but in the opposite direction.
2. The uses of technologies and any limitations on their use are driven by individual or societal needs, desire and values; by the findings of scientific research and by differences in such factors as climate, natural resources, and economic conditions.
3. The motion of an object is determined by the sum of the forces acting on it; if the total force on the object is not zero, its motion will change.
4. The greater the mass of the object, the greater the forces needed to achieve the same change in motion.
5. For any given object, a larger force causes a larger change in motion.

Objectives

MS- PS2-1 Apply Newton's Third Law to design a solution to a problem involving the motion of two colliding objects.

MS-PS-2 Plan an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object.

Waves and their application for Information transfer

3 weeks Dec. 6, 2018 – Jan. 11, 2019

1. A simple wave has a repeating pattern with a specific wavelength, frequency, and amplitude.
2. A sound wave needs a medium through which it is transmitted.
3. When light shines on an object, it is reflected, absorbed, or transmitted through the object, depending on the object's material and the frequency (color) of the light.
4. The path that light travels can be traced as straight lines, except at surfaces between different transparent materials where the light path bends.
5. A wave model of light is useful for explaining brightness, color, and the frequency-dependent bending of light at a surface between media. However, because light can travel through space, it cannot be a matter wave, like sound or water waves.

Objectives

MS-PS4-1 Use mathematical representations to describe a simple model for waves that includes how the amplitude of a wave is related to the energy in a wave.

MS-PS4-2 Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials.
MS-PS4-3 Integrate qualitative scientific and technical information to support the claim that digitized signals (sent as wave pulses) are a more reliable way to encode and transmit information.

Cycles and Energy Flow 4 weeks Jan. 14-Feb. 8

1. 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.
2. The planet's systems interact over scales that range from microscopic to global in size. These interactions have shaped Earth's history and will determine its future.
3. Water's movements – both on the land and underground – cause weathering and erosion, which change the land's surface features and create underground formations.
4. Mapping the history of natural hazards in a region, combined with an understanding of related geologic forces can help forecast the locations and likelihoods of future events.

Objectives

MS-ESS2-1 Develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process.

MS-ESS2-2 Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales.
MS-ESS3-2 Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects.

Plate Tectonics, Catastrophic Events, Waves in the Earth

3 weeks Feb. 11-March 1, 2019

1. A simple wave has a repeating pattern with a specific wavelength, frequency, and amplitude.
2. Tectonic processes continually generate new ocean sea floor at ridges and destroy old sea floor at trenches.
3. 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.
4. Mapping the history of natural hazards in a region, combined with an understanding of related geologic forces can help forecast the locations and likelihoods of future events.

Objectives

MS – PS4-1 **U**se mathematical representations to describe a simple model for waves that includes how the amplitude of a wave is related to the energy in a wave.

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.
MS-ESS3-2 Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects.

Geological Time Scale and Fossils 2- 3 weeks March 4-March 15, 2019

1. The collection of fossils and their placement in chronological order (e.g., through the location of the sedimentary layers in which they are found) is known as the fossil record. It documents the existence, diversity, extinction, and change of many life forms throughout the history of life on Earth.
2. The Geologic Time Scale interpreted from rock strata provides a way to organize Earth's history.
3. Analyses of rock strata and the fossil record provide only relative dates, not an absolute scale.

Objectives

MS-LS4-1 Analyze and interpret data for patterns in the fossil record that document the existence, diversity, extinction, and change of life forms throughout the history of life on Earth, under the assumption that natural laws operate today as in the past.
MS-LS4-2 Apply scientific ideas to construct an explanation for the anatomical similarities and differences among modern organisms and between modern and fossil organisms to infer ancestral relationships.
MS-ESS1-4 Construct a scientific explanation based on evidence from rock strata for how the geologic time scale is used to organize Earth's geologic history.

Earth and Human Activity 2-3 weeks March 25 – April 12, 2019

1. Humans depend on Earth's land, ocean, atmosphere, and biosphere for many different resources.
2. Minerals, fresh water, and biosphere resources are limited, and many are not renewable or replaceable over human lifetimes.
3. These resources are distributed unevenly around the planet as a result of past geologic processes.
4. Typically as human populations and per-capita consumption of natural resources increase, so do the negative impacts on Earth unless the activities and technologies involved are engineered otherwise.

Objectives

Ms-ESS3-1 Construct a scientific explanation based on evidence for how the uneven distributions of Earth's mineral, energy, and groundwater resources are the result of past and current geoscience processes.
MS-ESS3-4 Construct an argument supported by evidence for how increases inhuman population and per-capita consumption of natural resources impact Earth's systems.