Subject: 8th Grade Earth Science

Objectives

For Inquiry all students will:

- Formulate questions, design investigations, execute investigations, interpret data, use evidence to generate explanations, propose alternative explanations, and critique explanations and procedures
- Develop descriptions, explanations, predictions, and models using evidence
- Identify scientific ideas, concepts, and qualitative and quantitative relationships that guide investigation.
- Access, gather, store, retrieve, and organize data, using hardware and software designed for these purposes.
- Base their explanation on what they observed by providing causes for affects and establishing relationships based on evidence and logical argument.
- Interpret the relationship between two or more variables in developing explanations and reasoning.
- Acknowledge different ideas and explanations, be able to accept the skepticism of others, and consider alternative explanations.
- Communicate experimental methods, follow instructions, describe observations, summarize the results of other groups, and tell other students about investigations and explanations.

In order to demonstrate their understanding of the Earth System students will:

- Understand the interaction between the Earth, sun, moon system.
- Develop an understanding of the Earth’s gravity and the relationship between distance, mass and the gravitational force between objects.
- Develop an understanding of the Sun’s gravity and its affect on the Earth and other planets.
- Explain that night/day, seasons, year and tides result form the predictable motion of the Earth, sun, moon system.
- Develop an understanding of the Big Bang Theory as the creation of all matter.
- Develop an understanding of the Nebular theory as an explanation for the formation of the solar system and the earth.
- Understand that knowledge about the structure of the Universe has changed as a result of advances in technology.
- Develop an understanding of the interaction between the atmosphere and hydrosphere as the cause for global weather patterns and specifically hurricane formation.
- Understand the role that air pressure has on the development of wind in hurricane formation and other weather patterns.
- Understand that differential heating and convection is the force behind hurricane formation.
- Global patterns of atmospheric movement influence local weather.
- Understand that oceans have a major effect on climate, because water in the oceans holds a large amount of heat.
- Differentiate between minerals and rocks.
- Develop an understanding of the processes responsible for mineral formation.
- Explain/ describe the processes that occur when rocks form and change from one form into another. (Rock Cycle)
- Understand that conservation in the amount of earth materials occurs in the rock cycle.
- Compare the various methods of dating rock (relative, C-dating, K-Ar dating).
- Compare and contrast the Earth’s crust, mantle, and core: including temperature, density, and composition.
- Analyze seismic waves as the tool scientists use to draw inferences about earth’s interior.
- Develop an understanding of the Theory of Plate Tectonics including Isthostasy, Continental Drift, and Sea Floor Spreading.
- Recognize that lithospheric plates constantly move and cause major geological events on the earth’s surface such as earthquakes and volcanic eruptions.
- Understand that convection in the earth’s mantle is the driving force behind plate motion.
- Explain the effects of physical processes (plate tectonics, erosion, deposition, volcanic eruption, gravity) on geological features.
- Understand that earth has a history that is preserved in the rock of the earth.
- Describe how fossils show evidence of the changing surface and climate of the Earth.
- Develop an understanding of geologic history. Understand that earth processes we see today, including erosion, movement of lithospheric plates, and changes in atmospheric composition, are similar to those that occurred in the past.
- Understand that Earth history is also influenced by occasional catastrophes, such as the impact of an asteroid or comet.
- Understand that earthquakes are sudden motions along breaks in the crust called faults and that volcanoes and fissures are locations where magma reaches the surface.
- Describe how volcanoes are formed and differentiate between the three basic types and the effect type of magma/lava has on eruption style.

Performance Indicators

The students will:

- Create models of Earth, sun, moon system to show their relative position/motion, rotation and revolution.
- Develop a controlled scientific investigation testing the effect of mass on gravity and distance on gravity.
- Use a model that recreates the phases of the moon.
- Analyze current local tidal data vs phases of the moon.
- Create a unique model of convection in the atmosphere as the force behind hurricane formation.
- Compare the specific heat of water, and soil as a model of how the land and oceans retain energy from the sun.
- Diagram and explain wind systems such as land and sea breezes, global wind patterns, and the Coriolis Effect.
- Classify samples of earth materials as rocks or minerals based on physical characteristics of each.
- Develop a model of the rock cycle and explain the processes that are responsible for the formation of each type.
- Classify unknown rock samples into the three basic types based on skills of observation and utilizing background research.
- Determine the relative ages of fossils within sedimentary rocks from their locations in the strata.
- Analyze samples of rock sequences to determine the relative age of rock.
- Utilize a stream table to model the effects of flowing water on landforms and the local environment.
- Write a pet rock narrative incorporating ELA standards with science content.
- Identify examples of geological changes in the local environment (including fast and slow).
- Create a liquid model of the interior of the earth differentiating between the physical and the chemical properties between the layers.
- Model the motion of seismic waves using a slinky and then calculate the travel time between p-waves and s-waves as they travel through the earth’s interior.
- Develop a model of mantle convection and use this to infer about its effect on the lithosphere, specifically earthquake and volcanic activity.
- Create maps and plot the location of past and present earthquakes and volcanoes in order to identify existing patterns.
- Argue for plate movement using geologic evidence such as fossil clues, layers of sedimentary rock, mineral deposits, climate clues, and shape of continents.
- Determine the epicenter of an earthquake by triangulation and know that the effects of an earthquake on any region vary, depending on the size of the earthquake, the depth of the quake, and the distance from the epicenter, the local geology, and the type of construction in the region.
- Develop a unique investigation testing the effect of silica content on the viscosity of magma.
- Develop an investigation that tests magma/lava composition against eruption style.
- Research past and present natural disasters such as earthquakes, volcanic eruptions, tsunamis etc.
- Develop a hazard mitigation plan for a US danger zone using geologic evidence from the past and present.
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