

## EARTH SCIENCE STANDARDS:

### Science Standards

#### *Scientific Inquiry (used in all units)*

- Scientific inquiry is a thoughtful and coordinated attempt to search out, describe, explain and predict natural phenomena.
- Scientific inquiry progresses through a continuous process of questioning, data collection, analysis and interpretation.
- Scientific inquiry requires the sharing of findings and ideas for critical review by colleagues and other scientists.

#### *Scientific Literacy (used in all units)*

- Scientific literacy includes the ability to read, write, discuss and present coherent ideas about science.
- Scientific literacy also includes the ability to search for and assess the relevance and credibility of scientific information found in various print and electronic media.

#### *Scientific Numeracy*

**Scientific numeracy includes the ability to use mathematical operations and procedures to calculate, analyze and present scientific data and ideas.**

Students will identify questions that can be answered through scientific investigation.

Students will read, interpret and examine the credibility and validity of scientific claims in different sources of information.

Students will formulate a testable hypothesis and demonstrate logical connections between the scientific concepts guiding the hypothesis and the design of the experiment.

Students will design and conduct appropriate types of scientific investigations to answer different questions.

Students will identify independent and dependent variables, including those that are kept constant and those used as controls.

Students will assess the reliability of the data that was generated in the investigation.

***Energy Transformations – Energy Transfer and Transformations***

**Energy cannot be created or destroyed; however, energy can be converted from one form to another.**

Students will describe the effects of adding energy to matter in terms of motion of atoms and molecules, and the resulting phase changes.

Students will explain how energy is transferred by conduction, convection and radiation.

Students will describe energy transformations among heat, light, electricity and motion.

***Energy Transformations - Energy Transfer and Transformations***

**The electrical force is a universal force that exists between any two charged objects.**

Students will explain the relationship among voltage, current and resistance in a simple series circuit.

Students will explain how electricity is used to produce heat and light in incandescent bulbs and heating elements.

Students will describe the relationship between current and magnetism.

***Energy Transformations - Science and Technology in Society***

**Various sources of energy are used by humans and all have advantages and disadvantages**

Students will explain how heat is used to generate electricity.

Students will describe the availability, current uses and environmental issues related to the use of fossil and nuclear fuels to produce electricity.

Students will describe the availability, current uses and environmental issues related to the use of hydrogen fuel cells, wind and solar energy to produce electricity.

***Chemical Structures and Properties – Properties of Matter***

**Due to its unique chemical structure, carbon forms many organic and inorganic compounds.**

Students will describe combustion reactions of hydrocarbons and their resulting by-products

***Chemical Structures and Properties - Science and Technology in Society***

**Chemical technologies present both risks and benefits to the health and well being of humans, plants and animals.**

Students will explain how simple chemical monomers can be combined to create linear, branched and/or cross-linked polymers.

Students will explain how the chemical structure of polymers affects their physical properties.

Students will explain the short- and long-term impacts of landfills and incineration of waste materials on the quality of the environment.

***Global Interdependence – The Changing Earth***

**Elements on Earth move among reservoirs in the solid earth, oceans, atmosphere and organisms as part of biogeochemical cycles.**

Students will explain how chemical and physical processes cause carbon to cycle through the major earth reservoirs.

Students will explain how solar energy causes water to cycle through the major earth reservoirs.

Students will explain how internal energy of the Earth causes matter to cycle through the magma and the solid Earth.

***Global Interdependence – Science and Technology in Society***

**The use of resources by human populations may affect the quality of the environment.**

Students will explain how the release of sulfur dioxide (SO<sub>2</sub>) into the atmosphere can form acid rain, and how acid rain affects water sources, organisms and human made structures.

Students will explain how the accumulation of carbon dioxide (CO<sub>2</sub>) in the atmosphere increases Earth's greenhouse effect and may cause climate change.

Students will explain how the accumulation of mercury, phosphates and nitrates affects the quality of water and the organisms that live in rivers, lakes and oceans.

**Some materials can be recycled, but others accumulate in the environment and may affect the balance of the Earth systems.**

Students will explain how land development, transportation options and consumption of resources may affect the environment.

Students will describe human efforts to reduce the consumption of raw materials and improve air and water quality.