

# Earth & Space Science Strand Map

MA Department of Elementary & Secondary Education  
2009

TOPIC

PreK-2

3-5

6-8

High School

LS 2. Differentiate between living and nonliving things. Group both living and nonliving things according to the characteristics that they share.

ii:  
Material  
&  
Energy  
Resources

1. Recognize that water, rocks, soil, and living organisms are found on the earth's surface.

1. Give a simple explanation of what a mineral is and some examples, e.g., quartz, mica.

2. Identify the physical properties of minerals (hardness, color, luster, cleavage, and streak), and explain how minerals can be tested for these different physical properties.

5. Recognize and discuss the different properties of soil, including color, texture (size of particles), the ability to retain water, and the ability to support the growth of plants.

4. Explain and give examples of the ways in which soil is formed (the weathering of rock by water and wind and from the decomposition of plant and animal remains).

3. Identify the three categories of rocks (metamorphic, igneous, and sedimentary) based on how they are formed, and explain the natural and physical processes that create these rocks.

LS 16. Recognize that producers (plants that contain chlorophyll) use the energy from sunlight to make sugars from carbon dioxide and water through a process called photosynthesis. This food can be used immediately, stored for later use, or used by other organisms.

6a. Describe and give examples of ways in which the earth's surface is built up by natural processes, including deposition of sediments and rock formation.

LS 17

2.1. Recognize, describe, and compare renewable energy resources (e.g., solar, wind, water, biomass) and nonrenewable energy resources (e.g., fossil fuels, nuclear energy).

2.2. Describe the effects on the environment and on the carbon cycle of using both renewable and nonrenewable sources of energy.

3.2. Describe the carbon cycle.

3.3. Describe the nitrogen cycle.

LS 6.4a

3.6a. Describe the rock cycle, and the processes that are responsible for the formation of igneous, sedimentary, and metamorphic rocks.

3.6b. Compare the physical properties of these rock types and the physical properties of common rock-forming minerals.

PS-Chem 1.1.c. Distinguish between physical and chemical changes.

iii:  
Earth  
Processes



1. Understand that the Earth system is a complex system of interacting components that exchange energy and matter.

i. Energy in the Earth System

LS 5. Recognize that fossils provide us with information about living things that inhabited the earth years ago.

4. Recognize that the sun supplies heat and light to the earth and is necessary for life.

2. Understand that air is a mixture of gases that is all around us and that wind is moving air.

3. Describe the weather changes from day to day and across the seasons.

7. Explain and give examples of how physical evidence, such as fossils and surface features of glaciation, supports theories that the earth has evolved over geologic time.

LS 11

PS-IP 14. Recognize that heat is a form of energy and that temperature change results from adding or taking away heat energy from a system.

3. Differentiate among radiation, conduction, and convection, the three mechanisms by which heat is transferred through the earth's system.

8. Describe how global patterns such as the jet stream and water currents influence local weather in measurable terms such as temperature, wind direction and speed, and precipitation.

PS-IP 5. Give examples of how energy can be transferred from one form to another.

6. Explain how air temperature, moisture, wind speed and direction, and precipitation make up the weather in a particular place and time.

7. Distinguish among the various forms of precipitation (rain, snow, sleet, and hail), making connections to the weather in a particular place and time.

PS-IP 16. Give examples of how heat moves in predictable ways, moving from warmer objects to cooler ones until they reach equilibrium.

11. Explain how the tilt of the earth and its revolution around the sun result in an uneven heating of the earth, which is the cause of the seasons.

magnitude and the relative damage that is incurred by earthquakes of a given magnitude.

3.7. Describe the absolute and relative dating methods used to measure geologic time, such as index fossils, radioactive dating, law of superposition, and crosscutting relationships.

PS-Chem 2.6. Describe the process of radioactive decay by using nuclear equations, and explain the concept of half-life for an isotope (for example, C-14 is a powerful tool in determining the age of objects).

PS-Chem 2.5. Identify the three main types of radioactive decay (alpha, beta, and gamma) and compare their properties (composition, mass, charge, and penetrating power).

1.1. Identify Earth's principal sources of internal and external energy, such as radioactive decay, gravity, and solar energy.

PS-IP 6.2. Describe the electromagnetic spectrum in terms of frequency and wavelength, and identify the locations of radio waves, microwaves, infrared radiation, visible light (red, orange, yellow, green, blue, indigo, and violet), ultraviolet rays, x-rays, and gamma rays on the spectrum.

1.2. Describe the characteristics of electromagnetic radiation and give examples of its impact on life and Earth's systems.

1.3. Explain how the transfer of energy through radiation, conduction, and convection contributes to global atmospheric processes, such as storms, winds, and currents.

1.7. Explain the dynamics of oceanic currents, including upwelling, deep-water currents, the Labrador Current and the Gulf Stream, and their relationship to global circulation within the marine environment and climate.

1.6. Describe the various conditions associated with frontal boundaries and cyclonic storms (e.g., thunderstorms, winter storms [nor'easters], hurricanes, tornadoes) and their impact on human affairs, including storm preparations.

1.5. Explain how the revolution of Earth around the Sun and the inclination of Earth on its axis cause Earth's seasonal variations (continues and colorless)

v:  
Earth  
in  
Solar  
System

v:  
Earth  
in  
Solar  
System

vi:  
Origin  
&  
Evolution  
of Earth

and over the seasons.

Earth, which in turn causes the seasons.

(equinoxes and solstices).

