Earth and Space Science

In earth and space science, students study the origin, structure, and physical phenomena of the earth and the universe. Earth and space science studies include concepts in geology, meteorology, oceanography, and astronomy. These studies integrate previously or simultaneously gained understandings in physical and life science with the physical environment. Through the study of earth and space, students learn about the nature and interactions of oceans and the atmosphere, and of earth processes, including plate tectonics, changes in topography over time, and the place of the earth in the universe.

- In **grades PreK–2**, students are naturally interested in everything around them. This curiosity leads them to observe, collect, and record information about the earth and about objects visible in the sky. Teachers should encourage their students' observations without feeling compelled to offer precise scientific reasons for these phenomena. Young children bring these experiences to school and learn to extend and focus their explorations. In the process, they learn to work with tools like magnifiers and simple measuring devices.

  Learning standards for grades PreK–2 fall under the following four subtopics: *Earth's Materials; The Weather; The Sun as a Source of Light and Heat;* and *Periodic Phenomena.*

- In **grades 3–5**, students explore properties of geological materials and how they change. They conduct tests to classify materials by observed properties, make and record sequential observations, note patterns and variations, and look for factors that cause change. Students observe weather phenomena and describe them quantitatively using simple tools. They study the water cycle, including the forms and locations of water. The focus is on having students generate questions, investigate possible solutions, make predictions, and evaluate their conclusions.

  Learning standards for grades 3–5 fall under the following six subtopics: *Rocks and Their Properties; Soil; Weather; The Water Cycle; Earth's History;* and *The Earth in the Solar System.*

- In **grades 6–8**, students gain sophistication and experience in using models, satellite images, and maps to represent and interpret processes and features. In the early part of this grade span, students continue to investigate geological materials' properties and methods of origin. As their experiments become more quantitative, students should begin to recognize that many of the earth's natural events occur because of processes such as heat transfer.

  Students in these grades should recognize the interacting nature of the earth's four major systems: the geosphere, hydrosphere, atmosphere, and biosphere. They should begin to see how the earth's movement affects both the living and nonliving components of the world. Attention shifts from the properties of particular objects toward an understanding of the place of the earth in the solar system and changes in the earth's composition and topography over time. Middle school students grapple with the importance and methods of obtaining direct and indirect evidence to support current thinking. They recognize that new technologies and observations change our explanations about how things in the natural world behave.

  Learning standards for grades 6–8 fall under the following five subtopics: *Mapping the Earth; Earth's Structure; Heat Transfer in the Earth System; Earth's History;* and *The Earth in the Solar System.*