

Rocks, Weathering, Erosion, and Soil Standard III

STANDARD III:

Students will understand the basic properties of rocks, the processes involved in the formation of soils, and the needs of plants provided by soil.

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Science Benchmark:

Earth materials include rocks, soils, water, and gases. Rock is composed of minerals. Earth materials change over time from one form to another. These changes require energy. Erosion is the movement of materials and weathering is the breakage of bedrock and larger rocks into smaller rocks and soil materials. Soil is continually being formed from weathered rock and plant remains. Soil contains many living organisms. Plants generally get water and minerals from soil.

STANDARD III: Students will understand the basic properties of the processes involved in the formation of soils, and the needs of plants provided by soil.

Objective 1: Identify basic properties of minerals and rocks.

- a. Describe the differences between minerals and rocks.
- b. Observe rocks using a magnifying glass and draw shapes and colors of the minerals.
- c. Sort rocks by appearance according to the three basic types: sedimentary, igneous and metamorphic (e.g., sedimentary – round-appearing mineral and rock particles that are cemented together, often in layers; igneous – with or without observable crystals that are not in layers or with or without air holes or glasslike; metamorphic – crystals/minerals, of the in layers).
- d. Classify common rocks found in Utah as sedimentary (i.e., sandstone, conglomerate, shale), igneous (i.e., basalt, granite, obsidian, pumice) and metamorphic (i.e., marble, gneiss, schist).

Objective 2: Explain how the processes of weathering and erosion change and move materials that become soil.

- a. Identify the processes of physical weathering that break down rocks at Earth's surface (i.e., water movement, freezing, plant growth, wind).
- b. Distinguish between weathering (i.e., wearing down and breaking of rock surfaces) and erosion (i.e., the movement of materials).
- c. Model erosion of Earth materials and collection of these materials as part of the process that leads to soil (e.g., water moving sand in a playground area and depositing this sand in another area).
- d. Investigate layers of soil in the local area and predict the sources of the sand and rocks in the soil.

- Objective 3:* Observe the basic components of soil and relate the components of plant growth.
- a. Observe and list the components of soil (i.e., minerals, rocks, air, water, living and dead organisms) and distinguish between the living, non-living, and once-living components of soil.
 - b. Diagram or model a soil profile showing topsoil, subsoil, and bedrock, and how the layers differ in composition.
 - c. Relate the components of soils to the growth of plants in soil (e.g., mineral nutrients, water).
 - d. Explain how plants may help control the erosion of soil.
 - e. Research and investigate ways to provide mineral nutrients for plants to grow without soil (e.g., grow plants in wet towels, grow plants in wet gravel, grow plants in water).

Science language students should use:

mineral, weathering, erosion, sedimentary, igneous, metamorphic, topsoil, subsoil, bedrock, organism, freezing, thaw, profile, non-living, structural support, nutrients.

Intended Learning Outcomes for Fourth Grade Science

The Intended Learning Outcomes (ILOs) describe the skills and attitudes students should learn as a result of science instruction. They are an essential part of the Science Core Curriculum and provide teachers with a standard for evaluation of student learning in science. Instruction should include significant science experiences that lead to student understanding using ILOs.

The main intent of science instruction in Utah is that students will value and use science as a process of obtaining knowledge based upon observable evidence.

By the end of fourth grade students will be able to:

- 1. Use Science Process and Thinking Skills**
 - a. Observe simple objects and patterns and report their observations.
 - b. Sort and sequence data according to a given criterion.
 - c. Make simple predictions and inferences based upon observation.
 - d. Compare things and events.
 - e. Use instruments to measure length, temperature, volume, and weight using appropriate units.
 - f. Conduct a simple investigation when given directions.
 - g. Develop and use simple classification systems.
 - h. Use observations to construct a reasonable explanation.
- 2. Manifest Science Attitudes and Interests**
 - a. Demonstrate a sense of curiosity about nature.
 - b. Voluntarily read or look at books and other materials about science.
 - c. Pose questions about objects, events, and processes.
- 3. Understand Science Concepts and Principles**
 - a. Know science information specified for their grade level.
 - b. Distinguish between examples and non-examples of science concepts taught.
 - c. Explain science concepts and principles using their own words and explanations.
- 4. Communicate Effectively Using Science Language and Reasoning**
 - a. Record data accurately when given the appropriate form and format (e.g., table, graph, chart).
 - b. Report observations with pictures, sentences, and models.
 - c. Use scientific language appropriate to grade level in oral and written communication.
 - d. Use available reference sources to obtain information.

• Instruction should include significant science experiences that lead to student understanding using ILOs.

