

Rocks and Minerals

Narrative Summary

Students explore the differences and similarities between rocks and minerals by investigating samples of these earth materials, performing a series of tests similar to geologists' field tests, and reading about rocks and minerals and how they are used. The first lessons focus on rocks. The students then turn their attention to a set of 12 minerals and test them to identify properties such as streak color, luster, transparency, hardness, shape, and magnetism. After completing these observations, students compile them into their own "Minerals Field Guide." In a culminating activity, they are challenged to apply their knowledge and skills to identify new minerals. They then report on how rocks and minerals are used.

Science Content

Students investigate the properties of earth materials using techniques similar to those of a geologist. As part of their investigations of rocks, they read about how rocks are changed by heat and pressure. Students then explore the color, transparency, crystal form, luster, hardness, and magnetism of a set of 12 minerals and, on the basis of these tests, identify the minerals by name. Through a variety of reading selections, the history and nature of science are explored in depth as students learn more about the origin of common rock and mineral names and the various uses of minerals over the centuries. Science in personal and social perspectives is addressed as students examine and report



on ways in which minerals and rocks are used as a resource.

Assessment

During brainstorming sessions in Lessons 1 and 5, students share what they know and want to know about rocks and minerals, respectively. Throughout the unit and following Lesson 16, students revisit their brainstorming lists to assess their prior thinking and address misconceptions, if needed. Problem solving and reasoning can be

assessed throughout this unit as students perform field tests to identify minerals. Students' observations, data collection, and recordkeeping also provide evidence of their understanding. In Lesson 15, students' investigations of three "mystery minerals" serve as an embedded assessment and allow the teacher to assess growth in concepts, skills, and attitudes developed throughout the unit. Additional assessments include a class presentation in which students share with visitors what they have learned in the unit, guidelines for conducting student/teacher conferences in which students share their knowledge of rocks and minerals, and a paper-and-pencil student self-assessment that helps students reflect on the unit.

Goals for *Rocks and Minerals*

In this unit, students investigate rocks and minerals. Through their experiences, students are introduced to the following concepts, skills, and attitudes.

Concepts

- Rocks are aggregates of minerals, and they may also contain organic matter.
- Different rocks have different properties.
- The properties of rocks reflect the way they were formed and the minerals in them.
- Each mineral is composed of only one substance, and that substance is the same in all samples of the mineral.
- Minerals differ in color, texture, smell, luster, transparency, hardness, shape, and reaction to magnets.
- The properties of rocks and minerals determine how they are used.

Skills

- Using senses to observe and describe rocks and minerals.
- Recording and discussing observations of rocks and minerals.
- Sorting minerals on the basis of similarities and differences in identified properties.
- Performing and interpreting results of the following tests on minerals: streak, transparency, luster, hardness, and magnetism.
- Recording and discussing results of tests on minerals.
- Reading for more information on minerals and rocks.
- Communicating observations and test results through writing and discussion.
- Reflecting on experiences through writing and discussion.
- Applying previously learned concepts and skills to solve a problem.

Attitudes

- Developing an interest in investigating rocks and minerals.
- Recognizing the importance of using multiple tests to create a profile of a mineral.
- Valuing scientific information that has been collected and verified over time.



Rocks and Minerals

Fundamental Concepts and Principles Addressed (K–4)

Science as Inquiry

Abilities necessary to do scientific inquiry

- Ask a question about objects, organisms, and events in an environment.
- Plan and conduct a simple investigation.
- Employ simple equipment and tools to gather data and extend the senses.
- Use data to construct a reasonable explanation.
- Communicate investigations and explanations.

Understandings about scientific inquiry

- Scientific investigations involve asking and answering a question and comparing the answer with what scientists already know.
- Scientists use different kinds of investigations, depending on the questions they are trying to answer.
- Simple instruments, such as magnifiers, provide more information than scientists obtain using only their senses.
- Scientists develop explanations using observations (evidence) and what they already know about the world (scientific knowledge).
- Scientists make the results of their investigations public.
- Scientists review and ask questions about the results of other scientists' work.

Physical Science

Properties of objects and materials

- Objects have many observable properties, including size, weight, shape, color, and the ability to react with other substances. These properties can be measured using tools.
- Objects are made of one or more materials. Objects can be described by the properties of the materials from which they are made, and those properties can be used to separate or sort a group of objects or materials.

Light, heat, electricity, and magnetism

- Light travels in a straight line until it strikes an object.
- Magnets attract and repel each other and certain kinds of other materials.

Earth and Space Science

Properties of earth materials

- Earth materials include solid rocks and soils. The varied materials have different physical and chemical properties, which make them useful in different ways, for example, as building materials and as resources for fuel. Earth materials provide many of the resources that humans use.
- Fossils provide evidence about plants and animals that lived long ago and the nature of the environment at that time.

Changes in the earth and sky

- The surface of the earth changes. Some changes are due to slow processes, such as erosion and weathering, and some changes are due to rapid processes, such as landslides, volcanic eruption, and earthquakes.

Science and Technology

Understandings about science and technology

- People have always had questions about their world. Science is one way of answering questions and explaining the natural world.
- People have always had problems and invented tools and techniques (ways of doing something) to solve problems.
- Scientists and engineers often work in teams with different individuals doing different things that contribute to the results.

- Tools help scientists make better observations, measurements, and equipment for investigations. They help scientists see, measure, and do things that they could not otherwise see, measure, and do.

Abilities to distinguish between natural objects and objects made by humans

- Some objects occur in nature; others have been designed and made by people.
- Objects can be categorized into two groups, natural and designed.

Science in Personal and Social Perspectives

Types of resources

- Resources are things that we get from the living and nonliving environment to meet the needs and wants of a population.
- Some resources are basic materials, such as air, water, and soil; some are produced from basic resources, such as food, fuel, and building materials.
- The supply of many resources is limited.

Changes in environments

- Some environmental changes occur slowly, and others occur rapidly.

History and Nature of Science

Science as a human endeavor

- Science and technology have been practiced by people for a long time.
- Men and women have made a variety of contributions throughout the history of science and technology.
- Many people choose science as a career and devote their entire lives to studying it. Many people derive great pleasure from doing science.

Unifying Concepts and Processes

Systems, order, and organization

Evidence, models, and explanation

Constancy, change, and measurement

Evolution and equilibrium

Form and function