Rocks and Minerals

TABLE OF CONTENTS

About **Rocks and Minerals**

DeltaScienceModules, THIRD EDITION

Students explore the properties, uses, and origins of rocks and minerals. Throughout the unit, they investigate assorted stony specimens by observing, experimenting, and recording results. Students begin by creating rocks embedded with fossils and growing salt crystals to model minerals. Then, they practice geology by performing four standard field tests on ten mineral samples, for luster, hardness, true color, and the presence of calcium carbonate. The collected data show the distinguishing properties of each type and help students become expert identifiers. Students also explore the three ways rocks are made and infer the origins of the kit specimens. As on-site geologists, they collect samples and test findings in the field.

In the Delta Science Reader *Rocks and Minerals,* students read about the types, properties, and uses of various rocks and minerals. They learn how a mineral's properties help with its identification. They also read about a pioneering geologist—Florence Bascom—and her contributions to the field of geology. Finally, students learn about fossils.

Overview Chart for Hands-on Activities

Hands-on Activity	Student Objectives
1 **Rock and Mineral Properties** *page 13*	• describe properties of classroom objects • observe samples of rocks and minerals • discuss properties of rock and mineral samples
2 **Making a Rock** *page 21*	• discuss the Earth processes involved in rock formation • compare and contrast the process they will use to form their rock models with the processes by which rocks form naturally in the Earth • follow directions to make their own rocks
3 **The Luster of Minerals** *page 29*	• observe and describe the luster of minerals • classify minerals according to their luster • record data to be used later in identifying the minerals
4 **The Hardness of Minerals** *page 35*	• conduct a scratch test on each mineral • determine the relative hardness of each mineral based on the results of the scratch test
5 **The Streak Test** *page 41*	• conduct a streak test on each mineral specimen • determine the true color of each mineral specimen based on the color of its streak • record streak-test observations
6 **The Acid Test** *page 47*	• perform an acid test on the mineral specimens • observe and record the effect of the acid (vinegar) on each mineral specimen • infer that the acid test is useful for identifying certain minerals • use the results of all four tests to identify each mineral specimen
7 **Crystal Forms** *page 55*	• construct models of crystal shapes • assign a crystal shape to each of the mineral specimens • observe the crystal formation of salt
8 **Growing Crystals** *page 61*	• discuss the process of crystallization • grow salt crystals • observe the formation of salt crystals on sponges
9 **Investigating the Rock Models** *page 69*	• dissect the rock models and perform tests to identify their mineral content • examine layers of sediment that form after particles of the rock models are mixed with water • observe the crystals that form from a solution made from particles of the rock models
10 **Identifying Rocks** *page 77*	• observe rock specimens 11–24 • predict the properties of a rock based on the rock's origin • infer the origin of a rock based on the rock's properties • identify a rock based on its origin and properties
11 **Applications—Past and Present** *page 85*	• discuss the uses of rocks and minerals in prehistoric and ancient times • discuss the uses of rocks and minerals in modern times • discuss the applications of rocks and minerals based on their properties
12 **A Field Trip** *page 93*	• plan a field trip • observe rocks and minerals in the field • record and interpret the data they gather
Assessment *page 99*	• See page 99.

Process Skills	Vocabulary	Delta Science Reader
communicate; observe; collect, record, display, or interpret data	**fossil, mineral, property, rock**	pages 2, 9
communicate, compare, make and use models	**igneous, metamorphic, petrification, sedimentary**	pages 9–12, 15
observe; classify; collect, record, display, or interpret data	**luster, metallic luster, nonmetallic luster**	pages 4–5
experiment, measure, compare	**hardness, Mohs Scale of Hardness**	page 6
experiment; compare; collect, record, display, or interpret data	**streak, weathering**	pages 4–5, 10
experiment; observe; collect, record, display, or interpret data; infer	**acid rain**	pages 4–5
make and use models, observe	**crystal, cubic, hexagonal, monoclinic, orthorhombic, tetragonal, triclinic**	page 3
communicate, define based on observations, observe	**crystallization, evaporation**	page 3
experiment, predict, observe	**conglomerate**	pages 2, 15
observe, predict, infer, classify	**lava, magma**	pages 9–12, 13
communicate, classify	**laser, piezoelectric, silicon**	pages 7–8
observe; collect, record, display, or interpret data	**indigenous**	page 14

See the following page for the Delta Science Reader Overview Chart.

Overview Chart for Delta Science Reader
Rocks and Minerals

Selections	Vocabulary	Related Activity
Think About...		
What Are Minerals? • Crystals • Mineral Properties • Mineral Resources *page 2*	**cleavage, core, crust, crystal, crystal structure, fracture, gemologist, gemstone, hardness, luster, mantle, metallic luster, mineral, Mohs scale, nonmetallic luster, ore, streak**	Activities 1, 3, 4, 5, 6, 7, 8, 9
What Are Rocks? • Igneous Rocks • Sedimentary Rocks • Metamorphic Rocks *page 9*	**cementation, chemical rock, clastic rock, compaction, deposition, erosion, fossil fuel, igneous rock, lava, magma, metamorphic rock, nonrenewable resource, organic rock, rock, sediments, sedimentary rock, weathering**	Activities 1, 2, 5, 9, 10
What Is the Rock Cycle? *page 13*	**rock cycle**	Activity 4
People in Science		
• **Florence Bascom, Geologist** *page 14*	**geologist**	Activity 12
Did You Know?		
• **About Fossils** *page 15*	**fossil**	Activities 2, 9

See pages 107–117 for teaching suggestions for the Delta Science Reader.

MATERIALS LIST

Rocks and Minerals

Quantity	Description
1	alum, 200 g*
2	ammonia, 5%, 2 oz*
1	bluing, 8 oz*
1	calcite pieces, p/50*
1	chart, Classes of Rock
1	clay, powdered, 3 lb*
1	cloth, rayon, 25 cm × 25 cm
32	collecting bags*
16	containers, 1-qt
32	cups, calibrated
8	cups, plastic
16	glass plates
1	gravel, 2 lb*
8	lids, for containers
16	magnifiers
32	nails, steel
2	pearls
1	pyrite pieces, p/50*
1	quartz pieces, p/50*
8	rock and mineral specimens, p/24
1	*Rock Guide*
1	salt, 26 oz*
1	sand, 2 lb*
3	sponges*
7	spoons, measuring, 1-Tbsp
16	streak plates
1	talc, 1 lb*
16	tongue depressors*
8	trays, evaporating
16	trays, plastic
32	vials, with caps
1	video, *Rocks and Minerals*
8	vinegar, 2 oz*
1	**Teacher's Guide**
8	**Delta Science Readers**

Quantity	Description
TEACHER-PROVIDED ITEMS	
2	chalk pieces
1	glass, drinking
–	metal pieces, unpainted (polished and unpolished)
–	newspaper*
–	paper towels*
–	objects to fossilize
1	pencil (graphite)
16	pennies, copper
1	pitcher
32	safety goggles
32	scissors
–	tape, masking*
–	tape, transparent*
1	VCR and monitor
–	water, tap*

* = consumable item

† = in separate box

Activity Summary

In this Delta Science Module, students investigate the properties and uses of rocks and minerals. Like real geologists, they attempt to identify the names, origins, and structures of their specimens. Students also research and discuss how humans have used rocks and minerals in industry, medicine, and art both in the past and today.

ACTIVITY 1 Students begin by describing the properties of classroom objects, looking for the combination of words that best describes each object. They then describe and record the properties of each of the rock and mineral specimens in the kit.

ACTIVITY 2 Students create their own model rocks. To the rocks, students add their own fossils that will be "discovered" later when they dissect the rocks and separate their contents.

ACTIVITY 3 Students perform a series of tests on their mineral specimens. The minerals are first classified according to their luster. Some have metallic lusters while others may have greasy or glassy lusters.

ACTIVITY 4 Students use the scratch test to classify the specimens according to their relative hardness.

ACTIVITY 5 Students conduct the streak test to reveal the true color of each specimen. This is because weathering can distort the color of a mineral's surface.

ACTIVITY 6 Students perform the acid test in order to determine whether a specimen contains calcium carbonate. Minerals that contain calcium carbonate produce bubbles in a drop of vinegar that is placed on them.

ACTIVITY 7 Students learn that minerals occur naturally in crystal form. Because these different shapes are often difficult to discern through a magnifier, students construct 3-dimensional models of them. In this way, they are able to see how the shape of the crystals that make up a mineral determines the shape of the mineral specimen they hold in their hand.

ACTIVITY 8 Students discuss the process of crystallization and then grow their own salt crystals.

ACTIVITY 9 Students apply what they've learned about investigating specimens to a new situation in which they are asked to take apart and identify the constituent parts of the model rock they assembled in an earlier activity. They conduct the same tests used in previous activities to determine the identity of the mineral pieces found in the model rocks. They then dissolve the model rock remains in water to observe settling patterns of different elements, and finally evaporate off the solution to observe which crystal shapes form.

ACTIVITY 10 Students discuss the three ways in which rocks are formed in nature. They learn that rocks can be divided into three categories (igneous, sedimentary, or metamorphic) according to the processes by which they were formed. Based on what they observe, they are then able to infer the origin of each of their rock specimens.

ACTIVITY 11 Throughout the module, students develop a list of how different rocks and minerals have been used by humans through time. In this activity, students compare their lists in a class discussion.

ACTIVITY 12 Students are given the opportunity to venture out and become real on-site geologists as they collect their own, local samples and perform tests on them right in the field.