

Illinois State Museum

School Program

Changes: Dynamic Illinois Environments



Rocks and Minerals

Grades 2-5

Developed with support from a Learning Opportunities Grant from the Institute of Museum and Library Services

Dear Educator:

Thank you for reserving the *Rocks and Minerals* program for your students. This packet is designed to help you prepare your group for the program and make the most of your field trip time at the Museum. For your convenience we've included:

General background materials for your use;
Pre and post trip activities;
Suggested books and Web sites; and
State Learning Standards for this program.

We are eager for your feedback on this packet, especially what is useful and what is not. Please feel free to contact Nina Walthall, Associate Curator of Education, at walthall@museum.state.il.us with comments or suggestions.

Sincerely,

ISM Education Section

Changes: Dynamic Illinois Environments

Rocks and Minerals Grades 2-5

Preparing for Your Visit

Getting Here

The Illinois State Museum is located on the corner of Spring and Edwards Streets in the Capitol Complex. Routes into Springfield and to the Museum are well marked. Buses may unload and load directly in front of the Museum on Edwards Street westbound. Bus parking is available at the State of Illinois Visitor Center Parking Area. When you arrive at the Museum, please register your group at the Front Desk in the Lobby.

Visit Guidelines

Please bring one adult for every ten students. Backpacks, food, beverages, gum, and candy are not allowed in the building. Adult chaperones are required to be with students in the Museum Store and *A Place for Discovery*.

Accessibility

The Museum is accessible to visitors with special needs. Wheelchairs are available at the Front Desk. Please let us know if you have a student with special needs.

Food Service

Food service and vending machines are not available at the Museum. There is a picnic area at the State of Illinois Visitor's Center, one block away. There are a number of fast-food restaurants within one mile of the Museum.

Photographs

Visitors are welcome to take photographs in all areas of the Museum except the Art Gallery (depending on the exhibition).

Program Introduction

Rocks and Minerals is designed to give a broad overview of rocks and minerals, including: the three rock groups and how they formed, the definition of a mineral, basic mineral properties, and practical uses of rocks and minerals. Illinois examples and connections to the *Changes* exhibit are emphasized. Teachers who schedule this program will receive a complimentary Rocks and Minerals poster during their Museum visit.

This program includes two activities. Your class may do one or both activities:

Guided Program: A 30 minute presentation in the *Changes* exhibit by a Museum educator featuring hands-on materials.

Independent Activity: An unguided activity in the *Changes* exhibit, where students explore rocks, minerals, and other geologic features in the exhibit. The Museum will provide activity

sheets, clipboards, and pencils for your group.

Rocks and Minerals can serve as an introductory lesson or serve as a summative review for your students.

IL State Goals for Learning

Rocks and Minerals addresses the following Illinois State Goals for Learning:

Skills: Listening, drawing conclusions, speculating, observing, gathering data, synthesizing

State Goals, Early Elementary:

- **4.A.1b** Ask questions and respond to questions from the teacher and from group members to improve comprehension.
- **5.C.1a** Write letters, reports and stories based on acquired information.
- **12.E.1a** Identify components and describe diverse features of the Earth's land, water and atmospheric systems.
- **13.A.1c** Explain how knowledge can be gained by careful observation.
- **13.B.1c** Describe contributions men and women have made to science and technology.
- **17.C.1a** Identify ways people depend on and interact with the physical environment (e.g. farming, fishing, hydroelectric power).

State Goals, Late Elementary:

- **4.A.2b** Ask and respond to questions related to oral presentations and messages in small and large group settings.
- **5.C.2b** Prepare and deliver oral presentations based on inquiry or research.
- **12.E.2a** Identify and explain natural cycles of the Earth's land, water and atmospheric systems (e.g., rock cycle, water cycle, weather patterns).
- **12.E.2b** Describe and explain short-term and long-term interactions of the Earth's components (e.g., earthquakes, types of erosion).
- **13.B.2b** Describe the effect on society of scientific and technological innovations (e.g. antibiotics, steam engine, digital computer).
- **13.B.2c** Identify and explain ways that science and technology influence the lives and careers of people.
- **17.C.2b** Describe the relationships among location of resources, population distribution and economic activities (e.g., transportation, trade, communications).

Educator's Background Information

Rocks and **minerals** are related, but different. Minerals are the materials from which rocks are made and are naturally occurring compounds or elements found in the Earth's crust. Unlike rocks, minerals have the same chemical composition throughout. A rock is composed of one or more minerals.

An introduction to rocks and minerals is fundamental to the study and understanding of natural history and leads to a greater appreciation of nature. Rocks and minerals are tangible, enduring, and often beautiful objects that can be preserved in collections. They do not fade or lose their beauty. The gathering of specimens from the field (with permission of the landowner) conserves them for future generations.

Minerals

Some minerals are chemical **elements**. Gold is a mineral that is an element. Its chemical symbol is Au. So is copper (symbol Cu). Most minerals occur as **compounds**. Our Illinois state mineral, fluorite, is a compound, a combination of calcium and fluoride. Its chemical formula is CaF_2 .

Minerals are made of atoms that are arranged in perfect, orderly patterns. This order (at a visible scale) often appears in the form of **crystals**. Every crystal has an orderly, internal pattern of atoms with a distinctive way of locking new atoms into that pattern to repeat it again and again into specific shapes. For example, fluorite's crystals are cube-shaped.

Minerals are important resources. Many are important commercially and industrially, like fluorite, galena, gypsum, bauxite, and many, many others. Mineral crystals fascinated early man. Crystals are still imbued with special properties by some people. Gemstones, most of which are crystals, have been considered valuable throughout history.

Rocks

Rocks are formed in one of three basic ways. Using this knowledge, geologists group rocks into three broad classes based on their origin: **sedimentary**, **igneous**, and **metamorphic**.

Sedimentary rocks are “layered rocks.” They are formed by the accumulation and burial of sediments—gravel, sand, mud, and plant and animal remains. Most of the rocks at the surface in Illinois are in this category.

Igneous rocks are “borne from fire.” They form when melted rock material, **magma**, from deep beneath the earth's surface cools and becomes solid. Sometimes the magma forces its way up to Earth's surface and spills onto the land through a volcano. This forms **extrusive** igneous rocks. This kind of igneous rock cools quickly and has very small crystals. In other cases, pools of magma become trapped at the top of the earth's mantle and cool slowly over thousands of years. Some of the largest and most beautiful crystals in the world were formed this way.

Metamorphic rocks are “changing rocks.” They form when heat or pressure changes the minerals within sedimentary, igneous, or another metamorphic rock. This often happens when Earth's plates collide and push up tall mountain ranges. Metamorphic rock also forms when a stream of magma bursts into the earth's crust and heats the surrounding rock.

After Your Visit

Here are some activities that you can do with your students after the *Rocks and Minerals* program:

- review the rocks and minerals seen at the Museum and discuss students' questions;
- have students select an Illinois rock or mineral from the DNR Rocks and Minerals poster, do some more research about it, and present their findings to the class. They could also create a presentation using HyperStudio or PowerPoint that includes pictures of other samples;
- have students write a story or poem about their favorite rock or mineral (sample poems and rubric are enclosed);
- have students create a poster on Illinois' State Mineral (fluorite) that includes its various

- forms, colors, uses, places where it is found, and mining history in Illinois;
- have students create their own rhyming peg mnemonic device to learn the Mohs' Scale of hardness (see attached article from the *Journal of Geoscience Education*).

Suggested Trade and Reference Books

Blobaum, Cindy. 1999. *Geology Rocks!: 50 Hands-On Activities to Explore the Earth (Kaleidoscope Kids)*. Charlotte, VT: Williamson. 96 pp. ISBN 1885593295.

Christian, Peggy. 2000. *If You Find a Rock*. San Diego: Harcourt. 32 pp. ISBN 0152393390.

Cuff, Kevin. 1999. *Stories in Stone*. Peterborough, NH: Cobblestone Publishing. 164 pp. ISBN 092488620X.

Deike, Ruth. 1998. *Stone Wall Secrets Teacher's Guide: Exploring Geology in the Classroom*. Gardiner, ME: Tilbury House. 90 pp. ISBN 0884481964.

Erickson, Jon. 1992. *The Living Earth: An Introduction to Fossils and Minerals*. New York: Facts on File. 184 pp. ISBN 0816025878.

Evert, Laura, and Linda Garrow. 2002. *Rocks, Fossils and Arrowheads (Take-Along Guides)*. Minnetonka, MN: NorthWord Press. 47 pp. ISBN 1559717866.

Hurst, Carol Otis. 2001. *Rocks in His Head*. New York: Greenwillow Books. 29 pp. ISBN 0060294043.

Kerley, Barbara, and Brian Szelznick. 2001. *The Dinosaurs of Waterhouse Hawkins*. New York: Scholastic. 48 pp. ISBN 0439114942.

Kusugak, Michael Arvaarluk. 1999. *Who Wants Rocks?* Toronto: Annick Press. 24 pp. ISBN 155037589X.

Morris, Neil. 1998. *Rocks and Minerals*. New York: Crabtree Pub. Co. 32 pp. ISBN 0865058350.

Murphy, Stuart J. and Cat Bowman Smith. 2000. *Dave's Down-to-Earth Rock Shop*. New York: Harper Collins. 33 pp. ISBN 0060280182.

National Wildlife Federation. *Ranger Rick's NatureScope - Geology: The Active Earth*. 1988. 68 pp.

Pellant, Chris. 2003. *Rocks and Fossils*. Boston: Kingfisher. 47 pp. ISBN 0753456192.

Pough, Frederick H. 1996. *A Field Guide to Rocks & Minerals*. Peterson Field Guide Series. Boston: Houghton Mifflin Co. 542 pp. ISBN: 039591096X.

Silver, Donald, and Patricia Wynne. 1997. *Amazing Earth Model Book*. New York: Scholastic Professional Books. 128 pp. ISBN 0590930893.

Sneider, Cary. 2001. *Earth, Moon, and Stars: A Teachers' Guide*. Berkeley, CA: Lawrence Hall of

Science, University of California. 72 pp. ISBN 0924886056.

Steffee, John, Sydnie Harmen, and Karl Barksdale. 1999. *Science with Computers*. Cincinnati, OH: Computer Literacy Press. 278 pp. ISBN 1574260588.

Stewart, Melissa. 2002. *Igneous Rocks*. Chicago: Heinemann Library. 32 pp. ISBN 1588102564.

Stewart, Melissa. 2002. *Metamorphic Rocks*. Chicago: Heinemann Library. 32 pp. ISBN 1588102572.

Stewart, Melissa. 2002. *Sedimentary Rocks*. Chicago: Heinemann Library. 32 pp. ISBN 1588102599.

Symes, R. F. 1988. *Eyewitness books: Rocks & Minerals, Fossils*. New York: Knopf. 63 pp. ISBN 0394896211.

Thorson, Kristine and Robert. 1998. *Stone Wall Secrets*. Gardiner, ME: Tilbury House. 40 pp. ISBN 0884482294.

Van Cleave, Janice. 1996. *Rocks and Minerals*. New York: Wiley. 90 pp. ISBN 0585304084.

Other Teaching Resources

ISM Geology Online. GeoGallery of images of rocks and minerals from the Illinois State Museum's collections, lesson plans, and distance learning courses for teachers.

<http://geologyonline.museum.state.il.us>

The Science Spot. Teacher-created Web site with great activities. <http://sciencespot.net>

Poster – Illinois Rocks, Minerals & Fossils. Kids for Conservation (Fall 2000)
Illinois Department of Natural Resources, One Natural Resources Way, Springfield, IL, 62702-1271,
217-782-6302

GeoActivities Series. Activities and resources for teaching geology, Grades 4-12.

Illinois State Geological Survey, 217-333-4747,

<http://www.isgs.uiuc.edu/isgshome/isgshome.html>

Rocks & Minerals of Illinois. A set of specimens. Illinois State Geological Survey.

Illinois State Geological Survey, 217-333-4747, <http://www.isgs.uiuc.edu/isgshome/isgshome.html>

GeoBit #4 Fluorite - Illinois' State Mineral. Illinois State Geological Survey, 217-333-4747.

<http://www.isgs.uiuc.edu/servs/pubs/geobits-pub/geobit4/geobit4.htm>

Posters and lesson plans available from the Mineral Information Institute at <http://www.mii.org>

Rock Odyssey, a video introducing rocks and minerals. Mineral Information Institute.

<http://www.mii.org>

The National Energy Foundation. *Out of the Rock*. Teacher's Kit.

<http://www.nef1.org/outoftherock/index.html>

