

Rockin' Geologist

Grades: 2nd - 8th

Duration: 60 minutes

Program Description

Students work in small groups to observe the physical properties of mineral samples. Teams observe and/or measure the minerals' luster, cleavage structure, color, streak color, and hardness. After recording their observations, the students compare these to a chart to identify the minerals. Students then examine rock samples to find different minerals within the rock and to sort rocks into igneous, metamorphic, and sedimentary categories.

Louisiana GLE:

Science

2nd Grade:

1. Ask questions about objects and events in the environment
2. Pose questions that can be answered by using students' own observations and scientific knowledge
3. Use observations to design and conduct simple investigations or experiments to answer testable questions (SI-E-A2)
4. Predict and anticipate possible outcomes (SI-E-A2)
5. Use a variety of methods and materials and multiple trials to investigate ideas (observe, measure, accurately record data) (SI-E-A2)
6. Use the five senses to describe observations (SI-E-A3)
36. Observe and record the properties of rocks, minerals, and soils gathered from their surroundings (e.g., color, texture, odor) (ESS-E-A1)
42. Identify and use appropriate tools to gather and study rocks, minerals, and fossils (ESS-E-A5)

English Language Arts

Reading and Responding

Standard 7

20. Apply basic reasoning skills

Writing

Standard 2

21. Use a greater variety of action and descriptive words

Speaking and Listening

Standard 4

38. Adjust speaking tone and volume to suit purpose and audience
42. Deliver informal presentations that demonstrate an understanding of a topic
44. Use active listening strategies, including asking for clarification and explanations

Science

3rd Grade:

1. Ask questions about objects and events in the environment (e.g., plants, rocks, storms) (SI-E-A1)
2. Pose questions that can be answered by using students' own observations, scientific knowledge, and testable scientific investigations (SI-E-A1)
3. Use observations to design and conduct simple investigations or experiments to answer testable questions (SI-E-A2)
4. Predict and anticipate possible outcomes (SI-E-A2)
5. Use a variety of methods and materials and multiple trials to investigate ideas (observe, measure, accurately record data) (SI-E-A2)
6. Use the five senses to describe observations (SI-E-A3)
45. Recognize and describe that rock is composed of different combinations of minerals (ESS-E-A1) (ESS-E-A5)
50. Compare and group common rocks according to their characteristics (i.e., igneous, metamorphic, sedimentary) (ESS-E-A5)

English Language Arts

Reading and Responding

Standard 7

22. Apply basic reasoning skills

Speaking and Listening

Standard 4

38. Give and follow precise directions and instructions
42. Use active listening strategies
43. Assume the role of contributor and active listener

Science

4th Grade:

1. Ask questions about objects and events in the environment (e.g., plants, rocks, storms) (SI-E-A1)
2. Pose questions that can be answered by using students' own observations, scientific knowledge, and testable scientific investigations (SI-E-A1)
3. Use observations to design and conduct simple investigations or experiments to answer testable questions (SI-E-A2)
4. Predict and anticipate possible outcomes (SI-E-A2)
5. Identify variables to ensure that only one experimental variable is tested at a time (SI-E-A2)
6. Use a variety of methods and materials and multiple trials to investigate ideas (observe, measure, accurately record data) (SI-E-A2)
7. Use the five senses to describe observations (SI-E-A3)
55. Recognize that sedimentary rocks are composed of particles that result from weathering and erosion (e.g., sandstones, conglomerates) (ESS-E-A1)
62. Classify rocks and minerals according to texture, color, luster, hardness, and effervescence (ESS-E-A5)

English Language Arts

Speaking and Listening

Standard 4

34. Adjust pacing to suit purpose, audience, and setting when speaking
35. Interpret, follow, and give multi-step directions
37. Demonstrate active listening strategies, including asking questions, responding to cues, and making eye contact
38. Adjust speaking content according to the needs of the audience

Information Resources

Standard 5

45. Paraphrase or summarize information from a variety of sources

Science as inquiry 5-8

1. Generate testable questions about objects, organisms, and events that can be answered through scientific investigation.
4. Design, predict outcomes, and conduct experiments to answer guiding questions (SI-M-A2)
6. Select and use appropriate equipment, technology, tools, and metric system units of measurement to make observations (SI-M-A3)
7. Record observations using methods that complement investigations (e.g., journals, tables, charts) (SI-M-A3)
12. Use data and information gathered to develop an explanation of experimental results (SI-M-A4)
19. Communicate ideas in a variety of ways (e.g., symbols, illustrations, graphs, charts, spreadsheets, concept maps, oral and written reports, equations) (SI-M-A7)
22. Use evidence and observations to explain and communicate the results of investigations (SI-M-A7)
23. Use relevant safety procedures and equipment to conduct scientific investigations (SI-M-A8)

Science

5th Grade

1. Measure a variety of objects in metric system units (PS-M-A1)
4. Identify the physical and chemical properties of various substances and group substances according to their observable and measurable properties (e.g., conduction, magnetism, light transmission) (PS-M-A3)
31. Identify common rocks and minerals and explain their uses and economic significance (ESS-M-A5)

English Language Arts

Speaking and Listening

Standard 4

32. Adjust diction and enunciation to suit the purpose for speaking
33. Use complete sentences and standard English grammar, diction, syntax, and pronunciation when speaking
35. Restate or describe oral directions/procedures for tasks
36. Adjust volume and inflection to suit the audience and purpose of presentations
38. Demonstrate active listening strategies
39. Deliver formal and informal presentations for a variety of purposes, including:
41. Participate in group and panel discussions

Information Resources

Standard 5

48. Interpret information from a variety of grade-appropriate sources, including timelines, charts, schedules, tables, diagrams, and maps

Science

8th Grade

16. Compare the physical characteristics of rock and mineral specimens to observe that a rock is a mixture of minerals (ESS-M-A5)
17. Describe the properties of minerals (e.g., color, luster, hardness, streak) (ESS-M-A5)
18. Describe how sedimentary, igneous, and metamorphic rocks form and change in the rock cycle (ESS-M-A6)

Key Terms:

Crystal – mineral with symmetrical smooth, plane surfaces

Fossil –hardened remains of a plant or animal

Igneous Rock-A rock formed by the crystallization of magma or lava

Luster – how shiny a rock or mineral appears

Magma – molten, or melted, rock below the earth's surface

Metamorphic Rock-rock formed from preexisting solid rocks by mineralogical, structural, and chemical changes, in response to extreme changes in temperature, pressure, and shearing stress.

Mineral – material from within the earth that has the same chemical makeup throughout

Mohs Hardness Scale-this scale characterizes the scratch resistance of various [minerals](#) through the ability of a harder material to scratch a softer material. It was created in 1812 by the German [mineralogist Friedrich Mohs](#) and is one of several definitions of [hardness](#) in [materials science](#). [1] The method of comparing hardness by seeing which minerals can scratch others, however, is of great antiquity, having first been mentioned by [Theophrastus](#) in his treatise *On Stones* in ca 300 BC, followed by [Pliny the Elder](#) in his [Naturalis Historia](#) circa A.D. 77

Rock – solidified mixture of minerals

Sediment –very small weathered pieces of rock carried by wind or water

Sedimentary Rock-A rock formed from the accumulation and consolidation of sediment, usually in layered deposits.

Connections to Permanent Exhibits:

Resistivity -- compare resistivity for current flowing through a variety of minerals found in Red River Gallery, on the 1st floor

Rock density -- check the relative density of different rock samples by immersing them in water found in Red River Gallery, on the 1st floor

Porosity -- discover how oil flows through formations of different found in Red River Gallery, on the 1st floor

Web Resources:

Ask-A-Geologist-USGS

E-mail your question and receive a reply within a few days from the USGS.

<http://walrus.wr.usgs.gov/ask-a-geologist/>

The Mineral & Gemstone Kingdom-Complete Information Guide to Rocks, Minerals, and Gem Stones

The Mineral and Gemstone Kingdom is a free, interactive, educational guide to rocks, minerals and gemstones. Extensive information has been researched and categorized, and we plan to make it a complete, comprehensive reference. An incredible database of minerals—searchable by color, hardness, or elements—with many images and loads of information! The content is geared for both amateurs and experts.

<http://www.minerals.net/>

Rocks for Kids-Elfie and Rick of GMB Services

This site is for kids of all ages who love rocks. Here you will find out stuff about rocks & minerals and where to go to find out more. If you already collect rocks then this is the place for you! Find out where you can get more rocks, look at some super pictures of rocks, learn how to identify the rocks you already have and discover neat things you can do with rocks.

<http://www.rocksforkids.com/>

Pre-Visit Activity:

SHAKE, RATTLE, & ROLL

Students gain experience observing the properties of rocks and minerals AND classifying by attributes.

MATERIALS (PER GROUP): large tin can, variety of rock and/or mineral samples

PROCEDURE:

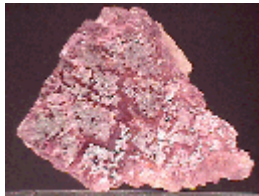
- 1) Place 4 to 8 rock samples in the can.
- 2) One student should shake the can and roll the rocks out onto the floor or a desk top (protect with newspaper).
- 3) As quickly as possible, they should sort the rocks into two or more groups based on an attribute such as texture, color, density, etc.
- 4) The rest of the group should try to figure out which property was used to sort the samples.
- 5) Continue taking turns among the group.



Feldspar



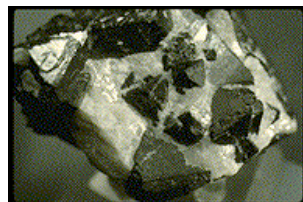
Mica



Fluorite



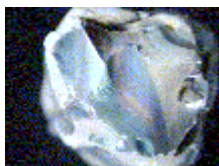
Galena



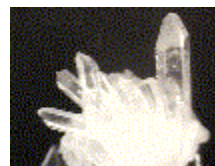
Magnetite



Halite



Obsidian



Quartz

Post- Visit Activity:

MODELING THE ROCK CYCLE

Wax crayons are used to model the processes of the rock cycle.

MATERIALS (PER GROUP): sheet of waxed paper; 2 4"x4" x 1/2" wooden blocks; wax crayons—6 each red, blue, yellow, & green; crayon sharpener; 10 small aluminum pie pans; sheet heavy-duty aluminum foil; C-clamp; hotplate; newspaper; crushed ice; heat resistant gloves or tongs

PROCEDURE:

- 1) Remove paper wrappers from the crayons. Mechanically “weather” them by shaving them with the sharpener over a sheet of waxed paper. Keep the shavings of each color in a separate pile and set aside.
- 2) Fold an 18” x 18” sheet of foil in half and lay across one of the wooden blocks. Using your hands as “erosive agents”, transfer one color of your crayon shavings “rock fragments” onto the foil. Carefully sprinkle the fragments onto the foil, spreading them in a uniform layer within the outline of the block. Continue to “sediment” each of the four colors in turn, carefully spreading them into layers.

What is weathering? How did you weather your “rocks”, and what type of weathering did this process represent?

Are the particles of “sediment “ all the same size? Do natural sediments vary in size? Why or why not?

What aspect of weathering does the process of shaving the crayons not demonstrate?

- 3) Gently cover the assembled layers of “sediment” with the aluminum foil. Set the other wooden block on top of the foil to sandwich the layers between the blocks.
- 4) Carefully pick up the stack of blocks, foil, and crayon shavings and place it between the jaws of a C-clamp. Hold the blocks tightly together by hand until the clamp is seated. Turn the screw on the clamp a few turns to bring the jaws lightly into contact with the blocks.
- 5) Lithify the “sediment” pile into sedimentary rock by tightening the clamp a few turns. DO NOT overtighten the blocks at this point, as you merely wish to compress the crayon fragments, reducing the air spaces between them enough to squeeze the sediment together.
- 6) Release the clamp and remove the block/foil assembly. Carefully lift one block and peel back the top foil flap to expose the “lithified” shavings. Gently remove the sedimentary rock cake from the foil and observe its appearance. Break off some edges and note how it has changed. Save the pieces for later comparison.
- 7) Wrap the remaining cake of your newly formed “sedimentary rock” back into the wooden blocks and foil and place it between the jaws of the clamp. Tighten the clamp by turning the screw, but this time apply as much pressure as possible. Allow the compressed materials to sit a minute or two between turns to simulate metamorphic conditions.
- 8) Release the clamp and remove the “metamorphic rock”. Break off a few pieces and save for study.

How is sediment turned into rock? How did the sediments in this activity become “rock”?

What aspects of this activity are not like the formation of natural sedimentary rock?

Compare and contrast the “sedimentary” and “metamorphic rocks” that you created.