

Rock On!

Science: Minerals

4th Grade Level

3 90-minute periods plus independent study

Materials:

- Copies of handouts
- Mineral and Rock Samples
- Styrofoam bowl for each student
- 2 pieces of charcoal for each student broken up in pieces
- Laundry bluing - 6 Tbsp. per student
- Table salt - 6 Tbsp. per student
- Ammonia - 1 Tbsp. per student
- Large Dixie cup per student
- Food coloring

Technology equipment needed:

- Computer with Internet access
- Computer with access to grade level web sites
- Digital camera and/or video camera

Standards for 4th Grade

State Goal 11:

Understand the processes of scientific inquiry and technological design to investigate questions, conduct experiments and solve problems.

- 11.A.2a Formulate questions on a specific science topic and choose the steps needed to answer the questions
- 11.A.2c Construct charts and visualizations to display data
- 11.A.2e Report and display the results of individual and group investigations
- 11.B.2b Develop a plan, design and procedure to address the problem identifying constraints...time, materials, technology

State Goal 12:

Understand the fundamental concepts, principles and interconnections of the life, physical and earth/space sciences.

- 12.C.1b Compare large-scale physical properties of matter (e.g. size, shape, color)
- 12.E.2a Identify and explain natural cycles of the Earth's land, water, and atmospheric systems (e.g. rock cycle)

Day 1:

Make copies of Pre-test found at:

http://www5.unitedstreaming.com/videos/11288/11288_BM.pdf

Pre-Test/Anticipation Guide

Directions: Circle the best answer to the following questions before viewing the program. Don't worry; you may not know all of the answers. The answers will be reviewed following the program.

1. Minerals are living.

True False

2. Valuable minerals are distributed evenly around the world.

True False

3. Minerals are often aggregated, or collected together, with other minerals in a rock.

True False

4. Once minerals are together in a rock, they form new minerals.

True False

5. Color and luster are two physical properties used to identify a mineral.

True False

6. Minerals can break apart, or cleave, in a specific way.

True False

7. Elements are not Earth's basic building blocks.

True False

8. Minerals are made of elements.

True False

9. Most minerals grow in water or magma.

True False

10. Minerals grow in unpredictable patterns.

True False

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View United Streaming Video

[Geologist's Notebook What Exactly Are Minerals?](#) 10 min.

Plus: Video Quiz (5 questions)

Focus Questions: Use questions from the black line master found at http://www5.unitedstreaming.com/videos/11288/11288_BM.pdf page 2. There are differentiated activities included if you want to incorporate those. Answers are on page 10 at the same site.

1. What are minerals?
2. Why are minerals important to people?
3. Where can geologists find minerals?
5. How can minerals be separated from the rock of which they are part?
6. How are minerals identified?
7. You are a geologist trying to identify two minerals. What should you do if two rocks contain yellow minerals but you know they are different minerals?
8. Why did geologists come up with so many ways to identify minerals?
9. What are elements?
10. How do elements make minerals?
11. How many kinds of minerals are there? Provide a few examples.
12. Describe a crystal.
13. How do crystals grow?
14. Give examples of minerals used in everyday life.

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Start crystal gardens with the class. Pass out a Styrofoam bowl for each student. Have students write their name on the bowl. Add the broken charcoal pieces to each one. In a large Dixie cup, mix the blueing with 1-2 Tbsp. of water. Add the salt and ammonia. Pour over the pieces of charcoal. You should see salt that hasn't dissolved on the charcoal. You can add a few drops of food coloring to the top if you'd like. This bowl must be set in a place where it won't get bumped. Now just sit back and watch for the "flowers" to appear.

Day 2:

Make a master for vocabulary words similar to the one on page 4 at

http://www5.unitedstreaming.com/videos/11288/11288_BM.pdf

Put 6 cards per page. The students will look up the words and fill in each card. Cut them apart and punch a hole in the upper left hand corner of each card. Connect each set with a ring for future reference. Due tomorrow.

Important vocabulary relevant to this unit:

- | | | |
|-------------|-----------------------|-----------------|
| 1. Minerals | 9. Igneous Rocks | 17. Crust |
| 2. Luster | 10. Magma | 18. Mantle |
| 3. Hardness | 11. Lava | 19. Inner Core |
| 4. Streak | 12. Sedimentary Rocks | 20. Outer Core |
| 5. Cleavage | 13. Metamorphic Rocks | 21. Cast |
| 6. Quartz | 14. Fossils | 22. Mold |
| 7. Ores | 15. Weathering | 23. Mohs' Scale |
| 8. Rocks | 16. Crust | |

Properties of Minerals Read E12- E16 from their science book

Definition of mineral

| | |
|----------|-------------|
| Luster | Streak |
| Hardness | Cleavage |
| Color | Mohs' Scale |

Demonstrate each test as you read about it.

Distribute sample minerals from the kit in the science lab

http://www5.unitedstreaming.com/videos/11288/11288_BM.pdf

Use black line master page 5 as a graphic organizer to write down their results.

Day 3:

Mineral Project

Discuss project idea:

1. Hand out project contracts
2. Hand out project idea sheets
3. Discuss ideas and whether or not they lend themselves to doing the project alone or with a partner.
4. Have students fill out contract
5. Discuss time table of due dates

Project contract is approved _____

Project rough draft is due _____

Project is due _____

Student M.I. Project Contract

Name: _____ Today's Date: _____

Topic of Study: _____ Due Date: _____

Project Title: _____

I will be working:(circle one) alone with a partner in a group

My partner(s): _____

I will share my talents through the following MI strength.

Word Smart: _____

Math Smart: _____

Picture Smart: _____

Nature Smart: _____

Music Smart: _____

Body Smart: _____

Self Smart: _____

People Smart: _____

Research Question (What I want to learn about this topic): _____

?

Things I need to do in order to complete this project: _____

Materials I will need: _____

References I used: (Minimum of 3) _____

Rock On Project Using Multiple Intelligences

I. Multiple intelligences with suggested activities

A. Verbal/Linguistic-Word Smart

Introduce vocabulary terms by making a rocks and minerals dictionary

Write about places that have unusual rocks and minerals

Write a booklet describing each of the rock groups and rock s that are included in the category

Research the [meanings of idioms](#) that have rock correlations: "People who live in glass houses, shouldn't throw stones", "A rolling stone gathers no moss".

B. Logical/Mathematical-Math Smart

Graph class rock samples brought in by students using excel.

Graph class what students pick as their favorite rocks using excel

Complete [data sheets](#) on rock samples using the data sheet at:

C. Visual/Spatial-Picture Smart

Create a model of the Earth showing the different layers

Draw a picture of the Rock Cycle

Arrange pictures of rocks in a collage

Create a mobile, showing rocks from the 3 different groups: i.e. Igneous, sedimentary, metamorphic

United Streaming: [Geologist's Notebook: Three Rocks](#)

D. Musical/Rhythmic-music smart

Change words to an existing song so that it teaches something about a rock topic

Lead a choral reading about rocks

Use the song from Bill Nye's "Rocks" video...and chart the words to teach the class

Create different sounds from rocks

Sing the ["Rock Song"](#)

Rock Cycle Song
(Sing to the tune of "Row, Row, Row Your Boat")

SEDIMENTARY rock
Has been formed in layers
Often found near water sources
With fossils from decayers

Then there's IGNEOUS rock
Here since Earth was born
Molten Lava, cooled and hardened
That's how it is formed

These two types of rocks
Can also be transformed
With pressure, heat and chemicals
METAMORPHIC they'll become.

E. Bodily/Kinesthetic-Body Smart

Build or construct a model of the Earth
Gather rocks in the area and determine the type
Demonstrate how to test for rocks for the following: hardness, luster, streak
Make a model of a fossil and explain cast and mold
Use a rock tumbler to see what happens
United Streaming: [Rocks and Minerals: The Hard Facts](#)

F. Naturalist-Nature Smart

United Streaming [Natural Phenomena: Rocks Fossils and Earth History](#)
[Geologist's Notebook: Three Rocks](#)
Start a rock collection
Start a fossil collection
Create a display with rocks
Find areas where weathering or erosion is taking place and photograph it
Collect tiny specimens of things like shells, sand, leaves, pine needles, nuts, etc.
and study them under a microscope...found in science room

G. Intrapersonal-Self Smart

Explain why minerals are important to our daily lives
Develop a journal for note taking for other students to
use during the study of rocks
Explore career options in the area of geology at:

- [Website 1](#)
- [Website 2](#)
- [Website 3](#)
- [Website 4](#)

United Streaming: [Basics of Geology: All About Rocks and Minerals](#)
[Careers for the 21st Century: Building Trades](#)

H. Interpersonal-People Smart

Create a classroom learning center about rocks
Interview a local geologist, gemologist, etc.

Assessments:

- A. Worksheets that are assigned
- B. Rubric for project
- C. Classroom participation
- D. District CRT

Web Sites

<http://wrgis.wr.usgs.gov/docs/usgsnps/pltec/index.html>

http://interactive2.usgs.gov/learningweb/explorer/topic_rocks.htm

<http://www.cotf.edu/ete/modules/msese/earthsysflr/rock.html>

<http://www.idahoptv.org/dialogue4kids/season3/rocks/facts.html#mineral>

<http://www.fi.edu/fellows/payton/rocks/expert/index.html>

<http://www.desertusa.com/Thingstodo/geo/geology.html>

<http://mineral.galleries.com/minerals/gemstone/class.htm>

Uses of Minerals

<http://www.chariho.k12.ri.us/curriculum/MISmart/rocks/rocks.html>

Sands of the World
Samples Data Sheet



| Source of Sample | Color(s) | Luster: Shiny or Dull | Clarity: Translucent, Transparent, or Opaque | Texture: Rough or Smooth | Possible Rock or Mineral Composition |
|------------------|----------|-----------------------|--|--------------------------|--------------------------------------|
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

Name: _____ Class: _____ Date: _____

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Mineral Definitions

Name _____

1. Mineral _____

2. Luster _____

3. Hardness _____

4. Streak _____
5. Cleavage _____
6. Quartz _____
7. Ores _____

Match the definitions to the right words.

- | | |
|----------------|--|
| ___1. Minerals | A. is the tendency of a mineral to split along a flat surface. |
| ___2. Quartz | B. are solid elements or compounds from Earth's crust that have definite chemical compositions and crystal shapes. |
| ___3. Luster | C. are minerals from which metals can be removed. |
| ___4. Hardness | D. is the powder made by rubbing a mineral against a ceramic surface. |
| ___5. Ores | E. refers to the way light reflects from the surface of the mineral. |
| ___6. Streak | F. is a measure of how easily a mineral can be scratched |
| ___7. Cleavage | G. is the most common sand in the world. It is made up of silicon and oxygen. |