



LESSON PLAN FOR ROCKS AND MINERALS

Episode Six 306 – Street Science (Earth Science)

Science lessons come easily if you are along a stream bed or road cut. All around you are examples of sedimentary rocks, gravel, sand, and soil. But what if you can't easily make a field trip to a stream or road cut? What if the science laboratory you have to investigate is an urban setting? Sounds like you need a crash course in Street Science – the science of big cities. You will be amazed at all of the earth science there is to explore in the heart of the city.

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Overview

Students will gain an understanding of how rocks and minerals can be classified and identified by their properties. Students will investigate how to study rocks and minerals.

Background Information

Rocks and minerals are all around us. We use them in our buildings, roads, foods, and the things we make. Most rocks and minerals in Indiana are from sedimentary beds of shale, limestone, and clay. Igneous and metamorphic rocks found in Indiana have been deposited here by glaciers and water. Rocks and minerals are natural resources. What is a rock? A rock is a natural substance made up of many minerals. What is a mineral? A mineral is natural substances made up of certain chemicals that have unique properties. For example, granite is a rock made from several minerals – quartz, feldspar, and mica. Rocks and minerals have properties such as:

- Color,
- Streak,
- Hardness,
- Magnetism,
- Crystal shape,
- Length, mass, and volume.

Connections to the Indiana Academic Core Standards for Science, Grades 3 – 7

3.2.1, 3.2.2, 3.2.3, 3.2.6, 4.2.1, 4.2.2, 4.2.3, 4.2.4, 4.2.5, 4.2.6, 7.2.5, 7.2.7

Science Process Skills

- Classifying

- Communicating
- Inferring
- Measuring
- Posing questions

Estimated Time Requirement

One 60 - minute session

Materials

- Student Handout
- Pencils
- One hand lens per student
- One roll of clear tape per group of three students (Note: be sure to use clear cellophane tape, **not** “invisible” tape that is translucent)
- One pair of scissors per student
- One package of 3” x 5” index cards
- Mineral and rock samples – a variety sealed and labeled in plastic bags
- Mineral or rock sample – one per student
- Small paper or foam plates
- Clear plates (hardness)
- Streak plates (color/streak)
- Magnet
- Copper penny
- Steel nail,
- Microscope – optional
- Ruler
- Balance Scale
- Graduate cylinder
- Water source
- Paper towel
- String
- Hammer and goggles – rock crushing station

Objectives

Students will be able to:

- Make and record observations from rocks and minerals,
- Identify properties of rocks and minerals – hardness, color, streak, crystal, magnetic, etc.,
- Sort rocks and minerals and,
- Create a rock and mineral collection.

Procedure

Anticipatory set:

- Visit the website: www.IndianaExpeditions.org
- View the *Street Science* Indiana Expeditions segment
- View the *Earth Science* Indiana Expeditions segment from season one
- View the video lesson from the this episode

Preparation prior to the lesson

- Set up Rock and Mineral Stations -
 - Crush Station - using a hammer crush rock and mineral samples and place them in a plastic bag with a small plate. Make sure to wear goggles for eye protection. Fold a cloth towel over the rock and mineral sample. Crush the sample with a hammer. Collect all the pieces onto the plate. Store in the plastic bag when complete.
 - Magnet Stations (3) – place a magnet and a piece of magnetite at each station. Place a paper clip on the magnetite.
 - Hardness Stations (3) – place a penny, steel nail, and a glass plate at each station.
 - Color and Streak Station (3) – place a white ceramic tile at each station.
 - Length Station (3- 5) – place a ruler at each station.
 - Mass Station – place a balance scale at the station.
 - Volume Station – place water, string, and a graduate cylinder at the station.
 - Paper Microscope Rock & Mineral Slide Stations (10 -12) – place one rock/mineral set on each station. The samples should contain: one large rock or mineral sample, crushed sample of the same rock or mineral sample, foam or paper plate, plastic bag for everything to be stored in.

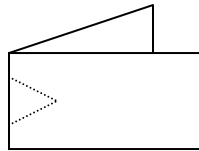
Lesson sequence

- Inform the students that today they are going to learn about rocks and minerals. Ask them to explain the difference between a rock and a mineral. Share with them the difference found in the background information.
- Tell students that they will investigate rocks and mineral by observing their properties.
- Each student desk will become a Rock and Mineral Station. Set up the following stations.
 - Magnet Stations (3) – magnet, magnetite, paper clip
 - Hardness Stations (3) – penny, steel nail, and a glass plate
 - Color and Streak Station (3) – white ceramic tile
 - Length Stations (3-5) – centimeter ruler
 - Mass Station – balance scale
 - Volume Station – graduate cylinder, string, water, paper towels
 - Paper Microscope Rock & Mineral Slide Stations (10) – scissors, clear tape, card stock strips or 3x5”index cards, crushed mineral set
- Each student receives one rock or mineral sample, student worksheet, and a hand lens.
- Students start the project by making and recording observations about their rock/mineral sample on the student handout.
- Rotate students throughout the Rock and Mineral Stations in the room.
- Students make and keep their Paper Microscope Rock & Mineral Slide and use them in the following activities.
- Sorting the Rocks and Minerals
 - When the rocks and minerals slides are made, students should use a hand lens to examine and sort the samples using one of the physical characteristics below.
 - Size (example: small, medium, large or smaller than... and bigger than...)
 - Shape (example: long, branched, symmetrical, flat, round, cylindrical, etc.)
 - Texture (example: smooth, bumpy, patterned like a...)
- Reporting on Progress
 - Instruct students to write sentences about what they have done so far, including working with all the properties of rocks and mineral stations. Students should mention which

criterion they used for sorting their rocks and minerals and what they learned from this process. Encourage students to include drawings and captions to explain what they did.

- Making Paper Microscope Rock & Mineral Slide

- Distribute these materials to each Paper Microscope station: one roll of clear tape, scissors, one index card, crushed and non-crushed rocks and minerals sample, foam or paper plate. Instruct students to prepare the Paper Microscope Slides by doing the following:
- Cut the index card into four strips. Each strip should measure 1 ¼" X 3".
- Fold each strip in half and cut a small "V" shape out of the folded seam as illustrated below



- Open the strips. A diamond shape will be cut in the strip.
 - Students should write their name on their strips.
 - Instruct students to place one piece of clear tape on the bottom of each strip so it covers the diamond-shaped window. Turn the slide over so the sticky part of the tape is now filling the diamond window and is facing up.
 - Place the sticky side into the crushed rock and mineral sample on the plate. Small grains should stick to the tape. After trapping the rock and mineral on the sticky slide, students should place another piece of clear tape over the rock and mineral specimen. This will secure it in place.
 - The students have now created "slides" on which to save some rocks and minerals.
 - Instruct students to examine their rocks and minerals with a hand lens. Choose one rock and mineral to place on each slide. Rotate to all of the tables – making a new paper slide at each.
- Classifying, Comparing, and Contrasting Rocks and minerals
 - Students will need access to rock and mineral reference materials. The internet is a good source for pictures that can be used to classify the rocks and minerals.
 - Instruct students to examine their rocks and minerals with a hand lens or microscope and to make detailed drawings of what they see.
 - Ask students to compare their rock and minerals to the rock and minerals identified in the reference materials provided. Tell students to label any rock and minerals that can accurately be identified from the reference materials. The following are the main types of rock and minerals that can be found:
 - Sedimentary Rocks
 - Igneous Rocks
 - Metamorphic Rocks
 - Students should write a paragraph about each of their rock and minerals using their observations and any information they have learned from the reference materials provided in class. Challenge students to find ways to measure the size (length, width) of their rocks and minerals using a millimeter scale.
 - Tell students to choose two of their rock and mineral samples and develop a Venn diagram to show how they are similar (compare) and how they are different (contrast).
 - Select several rock and mineral slides and written descriptions. Place five of the written descriptions on the chalkboard. Label them a, b, c, d, and e. Set up five microscopes and place each of the five corresponding rock and mineral slides on a microscope. Instruct the

students to view each rock and mineral and match it to the written descriptions posted on the chalkboard. Switch the sets several times so several students can share their rocks and minerals

Closure:

Tell students to use the following prompt to write about what they have learned:

At first I thought _____ about rocks and minerals but now I know_____.

Suggested Student Assessment:

- Have students trade rock and mineral slides with a partner and then sort the four slides they have based on a physical characteristic. Then, have the student to whom the slides belong try to determine the characteristic was used for sorting the slides. Students self-assess based on answers provided by classmates.
- Provide students with two different rocks and minerals and have them design a Venn diagram to compare and contrast the rocks and minerals based on observations.
- Provide students with a rock and mineral sample and rock and mineral reference materials. Ask them to identify the phylum to which the rock and mineral belongs.

Extending the Lesson:

- Teach the students how to use and design a dichotomous key. Challenge students to design and test a dichotomous key for their rocks and minerals.
- Challenge students to make some additional paper slides to collect other materials. Encourage the students to use their own imagination and resourcefulness to produce a variety of slides around a theme. For example, soil and sand can be crushed to provide materials for hundreds of slides. Spices from the kitchen can also yield several interesting slides. Students can then observe, sort, classify, draw and write about the items on these slides.
- Students can use their rock or mineral in the Science Observation lesson found at:
http://www.childrensmuseum.org/teachers/unitsofstudy/scienceworks/uos_scienceworks.pdf

Source of Lesson:

Rick Crosslin

Educator - M.S.D. Wayne Township

School Liaison for Science Learning - The Children's Museum of Indianapolis

To learn more, visit the website at www.IndianaExpeditions.org

Student Handout: Rocks & Minerals, Grade 3

Name: _____ **Date:** _____ WWW.INDIANAEXPEDITIONS.ORG

Vocabulary: Rock, Mineral, Property, Hardness, Color, Streak, Magnetic, Mass, Volume, Crystal, Graduate Cylinder, Balance Scale

My Rock:

Volume: _____

Mass: _____

Length: _____

Crystal Shape: _____

Magnetic: _____

Color: _____

Streak: _____

Drawing

Select One – My Rock is:

- ____ Sedimentary Rock (layered from Sediments)
- ____ Metamorphic Rock (Heat & Pressure Change)
- ____ Igneous Rock (Fire Formed)

Observations – My Rock is:

Today I discovered:

