

## Web Unit Plan

**Title:** Rock Our Town

**Description:** Student geologists present proposals to the town planning committee regarding the types of native materials planners might use to create and enhance streets, buildings, pathways, and other structures.

### At a Glance

**Grade Level:** 6–8

**Subject sort (for Web site index):** Science

**Subject(s):** Geology, Earth Science

**Topics:** Rocks and Minerals, Mining

**Higher-Order Thinking Skills:** Analysis, Synthesis

**Key Learnings:** Properties of Rocks and Minerals, Rock Cycle, Mining

**Time Needed:** Minimum of 10 class periods, 45–55 minutes each

### Unit Summary

Rocks and minerals are all around us and are used in our daily lives in more ways than we think. In this unit, students study the properties of rocks and minerals, and how they are used in our daily lives. Using their new-found knowledge, students take on the roles of geologists, and research the rocks and minerals in an assigned area. Their task is to put together a proposal for their area's local town planning committee on the native materials that can be used in the town's growth and why the town should be using native materials. Students present their proposals using multimedia in a Town Planning Night.

### Curriculum-Framing Questions

- **Essential Question**

What changes do you see?

- **Unit Questions**

Where does this rock in my hand fit into my life?

Why are rocks and minerals important to us?

- **Content Questions**

What are igneous, sedimentary, and metamorphic rocks?

How are different rocks formed?

How do various types of rocks fit into the rock cycle?

Why are rocks different?

What are some properties of minerals?

### Assessment Processes

View how a variety of student-centered [assessments](#) are used in the Rock Our Town Unit Plan. These assessments help students and teachers set goals; monitor student progress; provide feedback; assess thinking, processes, performances, and products; and reflect on learning throughout the learning cycle.

## Instructional Procedures

### Day 1

To tap prior knowledge, show students three different rocks (preferably examples of igneous, sedimentary, and metamorphic) and ask the Unit Question, *Where does this rock in my hand fit into my life?* Write student responses down on chart paper and post on a wall dedicated to this unit.

Lead a discussion to answer, *Why are rocks different?* Instruct students to research igneous, metamorphic, and sedimentary rocks. As students conduct research, ask probing questions to make sure they understand how each rock type is formed, can identify a couple examples of each, and can explain how each type of rock is used in the world. Note that there are many Web sites on the Internet that show how each rock type is formed (see this unit's [Internet Resources](#) for some suggested Web sites). After research is complete, have students create a class list of how each type of rock is used in the world and post it on the wall.

### Day 2

Have students explore minerals. Pose the Unit Questions, *Why are rocks and minerals important to us?* and *Where does this rock in my hand fit into my life?* Lead a discussion that addresses how minerals make up many of the materials we have around us in our daily lives. Have students research on the Internet different minerals and their uses in our lives. For example, the mineral talc is made into talcum powder, fluoride is in our toothpaste, and gypsum is in the walls of our houses. Ask students what our lives might be like without these minerals.

Set up conferences as students conduct research and work on labs to monitor progress, check for understanding, and provide additional help as needed.

### Day 3

Give students a variety of rocks to examine. Discuss how rocks are a combination of minerals, and how identifying rocks requires identifying the minerals and the proportions of those minerals in each rock. Introduce students to ways scientists identify minerals. Show students some examples of minerals. Post pictures of rocks and minerals on the wall dedicated to this unit. Have students conduct a lab to see if they can identify their rocks. A number of Web labs and commercial labs are available. See [Internet Resources](#) for suggested sites.

### Day 4

Pose the Essential Question, *What changes do you see?* Discuss with students that our world, the Earth, is constantly changing—mostly at a very slow pace. Land masses are being formed and broken down as a part of a process known as the *rock cycle*. The rock cycle is a hard concept for students. Students should understand that rock types can change into other rock types as the rocks go through the rock cycle. Students should also understand that there is no prescribed route for the changes; rocks can take many different paths during this process. Have students demonstrate their understanding by drawing a diagram of the rock cycle and identifying all the paths a rock undergoing change can take. Assess students' understanding by looking at their diagrams. Provide additional instruction as necessary.

### Day 5

Introduce students to the following scenario:

You are taking on the role of geologists and have been hired by your town to help the town planners identify the native materials they might use to create and enhance sidewalks, buildings, pathways, and other structures. You will present your proposal in a [slideshow presentation](#) to the town planners.

Generate a discussion on why using materials native to the area would be advantageous.

Discuss that mining is a very expensive venture. Geologists need to know the percentage of minerals within a certain rock in order to figure out whether mining in the area would be worthwhile. If they are looking for copper and their sample has only 1% copper in it, then mining where the sample came from would not be feasible. On the other hand, if their sample has 35% copper in it, then mining at the location would be worthwhile—they would be able to turn a profit.

Conduct a lab where each group of students is given a cookie with several types of materials in it. Instruct students to find the mass of their cookies, separate the materials they can identify (raisins, nuts, chocolate chips, and so forth), find the mass of each of the groups of ingredients, and find the percentage of each of the ingredients.

Have students imagine that those materials were minerals, such as copper, gold, and nickel. Pose the following questions to the students:

- *Depending on the ingredients in your cookie, do you think the geologists should do any mining? Why do you think that?*
- *Why should you first take a sample of the area you are interested in, instead of starting to mine right away?*

### Days 6-8

Have students work in groups to conduct research for their presentations. Assign students towns located in different areas of the country so that they can get a good look at materials throughout the country and not just in their state. Give students the [native materials scoring guide](#) to guide them as they work on their presentations.

In the presentations, have students address the following:

- Rocks and minerals native to the state (and abundant enough to be mined)
- How rocks and minerals can be used in the town
- Why the townspeople should use native rocks and minerals
- Why rocks and minerals are important to us

### Days 9-10

Have students present their proposals to the planning committee. Ask students to peer review the presentations using the [native materials scoring guide](#). Set up conferences for students to provide feedback to the teams using the [peer feedback form](#). Then allow students an opportunity to refine their presentations based on the feedback.

As a form of affirmation, invite parents, school personnel, and other community members to participate in a Town Planning Night. If possible, hold the event in a computer lab where several students can show their presentations at once. As guests walk around to view the slideshows, students should be available to answer questions. Other possibilities may include students printing one or two of their favorite slides and posting them around the room. The guests could do a gallery walk and view the student work while students are there to answer questions or have a

conversation about what the project entailed and what they learned. Example rocks and minerals would be a good way for guests to get a “real” look at the materials being considered for use in the town. The Town Planning Night would give students an opportunity to celebrate their work and receive affirmation from others for the time and energy put into the learning experience. As students are presenting during the Town Planning Night, assess their ability to answer the questions posed using the [native materials scoring guide](#).

After the Town Planning Night, refer students back to the chart paper they logged responses to the Unit Question, *Where does this rock in my hand fit into my life?* at the beginning of the unit. Ask students to respond to the question in writing now that they have had the opportunity to learn more about rocks.

<b>Prerequisite Skills</b>
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- Knowledge of multimedia presentation software

<b>Differentiated Instruction</b>
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**Resource Student**

- Select learning groups to give every student a chance to excel
- Provide a broad variety of resource materials to accommodate learning modalities
- Provide more guidance and support during Internet searching to promote successful learning
- Make modifications to include extended computer and study time, use of presentation templates, dictation, and assistance from an instructional aide
- Make modifications as needed to reflect each student's Individualized Education Plan

**Gifted Student**

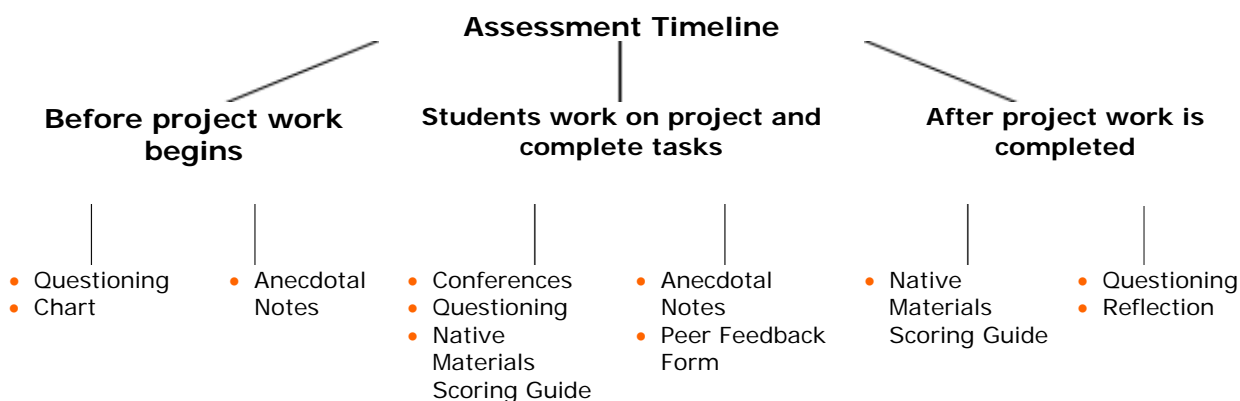
- Have the student put together a more in-depth presentation using various forms of technology
- Have the student contact guest speakers or set up e-mail correspondence with experts in the field

**English Language Learner**

- Pair the student with a bilingual student if possible or a community volunteer
- Provide templates in the student's first language
- Provide texts and Web sites in the student's first language if available

## THINGS YOU NEED (highlight box)

### Assessment Plan



Informally check for understanding through questioning, conferencing, and referring to anecdotal notes throughout the unit as students participate in discussions, complete lab reports, complete drawings, collect and summarize research, and design final proposal presentations.

Ask students to use the [native materials scoring guide](#) to guide their work and to provide peer feedback. Schedule conferences for students to provide feedback using the [peer feedback form](#) and then allow time for students to use the suggestions to revise final presentations. Use the same [native materials scoring guide](#) to assess final student samples and students' ability to answer questions posed by the audience.

## Content Standards and Objectives

### Targeted National Content Standards and Benchmarks

#### Science: Earth and Space

As a result of their activities in grades 5–8, all students should develop an understanding of

- Structure of the Earth's system

#### Arizona State Standards

- Identify ways materials are cycled within the Earth's system
- Understand the processes acting on the Earth and their interaction with the Earth's systems
- Distinguish the components and characteristics of the rock cycle
- Describe the processes that create and change rocks
- Collect sufficient data to investigate a question, clarify information, and support an analysis
- Develop descriptions, explanations, predictions, and models using evidence

## Student Objectives

Students will be able to:

- Explain the properties of igneous, sedimentary, and metamorphic rocks
- Compare the three types of rocks and the processes that form and reform them
- Show understanding of the rock cycle
- Identify ways minerals are used in our daily lives
- Formulate a proposal for usage of native rocks locally
- Understand financial parameters for mining

<b>Resources</b>
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### Materials and Resources

#### Printed Materials

- Geology textbooks
- Books on geology of the area

#### Supplies

Lab materials for:

- Rock Lab: Rock labs can be purchased, found on the Web, or made by the teacher (materials will vary)
- Cookie Mining Activity: Requires metric scales; cookies with a variety of ingredients, such as raisins, chocolate chips, and nuts; and paper clip for dissecting cookie

### Internet Resources

- Mineral Information Institute  
[www.mii.org/commonminerals.html](http://www.mii.org/commonminerals.html)\*  
Common minerals and their uses
- RocksForKids: Mineral Identification List  
<http://rocksforkids.com/RFK/identification.html#Mineral>\*  
Identifying minerals
- RocksForKids  
<http://rocksforkids.com>\*  
Rocks for kids
- Exploring the Environment Team  
[www.cotf.edu/ete/modules/mse/earthsysflr/rock.html](http://www.cotf.edu/ete/modules/mse/earthsysflr/rock.html)\*  
Description of the rock cycle

- Rocks and Minerals Laboratory  
[www.gpc.edu/~pgore/geology/historical\\_lab/rocks\\_minerals.php](http://www.gpc.edu/~pgore/geology/historical_lab/rocks_minerals.php)\*  
Tables on rocks and minerals
- Colorado State University: Science  
[www.csmate.colostate.edu/cltw/cohortpages/viney/dynamicearthch4.html](http://www.csmate.colostate.edu/cltw/cohortpages/viney/dynamicearthch4.html)\*  
Web lab
- Natural Resources of Canada: Minerals and Metals Section  
[www.nrcan.gc.ca/mms/wealth/home.htm](http://www.nrcan.gc.ca/mms/wealth/home.htm)\*  
Minerals and metals at home
- Mine Safety and Health Administration  
[www.msha.gov/KIDS/KIDSHP.HTM](http://www.msha.gov/KIDS/KIDSHP.HTM)\*  
MSHA's kid's page
- Science Kit and Boreal Laboratories  
[www.sciencekit.com/category.asp\\_Q\\_c\\_E\\_433675](http://www.sciencekit.com/category.asp_Q_c_E_433675)\*  
Labs for becoming a rock detective
- BBC: Essential Guide to Rocks  
[www.bbc.co.uk/education/rocks](http://www.bbc.co.uk/education/rocks)\*  
Rock facts, links, virtual walks, and more

### Other Resources

- *Rock Odyssey* (Video).  
Media, PA: Media Incorporated.
- Experts from local geological society

### Technology—Hardware

- Computers for conducting Internet research and creating multimedia presentations
- Projection system to present plan to town committee (class)

### Technology—Software

- Multimedia presentation software for planning presentation
- Internet connectivity for research
- E-mail for gifted students to use to contact experts