

LESSON 1

ROCK STARS

How are gems formed?

Rocks get a bad rap for being boring – but when you open your eyes to the wonders of geology, each pebble contains a story about how the earth was made. In this introductory lesson, students will learn about the dramatic science of geology and get their hands dirty with a fun, hands-on science lab. This lesson sets the foundation for the rest of the curriculum by providing a basic understanding of rocks, minerals, and gems. (Please note that this is not a lesson on the rock cycle or rock formation.)



Tourmaline

TOPICS

Intro to Rocks, Minerals and Gems

SUBJECT CONNECTIONS

Science, English Language Arts

TIME REQUIRED

One 60-minute class period
(Note: Lesson can be divided into two shorter sessions after *The Story of a Gem* activity.)

SUPPLIES

- Folder for each student, or section of an existing binder, to be used as Gemology Folders
- 3–4 sticky notes per student
- Lined paper (2 sheets per student)
- Chart paper, overhead, or SMART Board (for *Anchor Chart*)

PREPARATION

- Print and cut out *Gem Nametags* (**Appendix A**, p. 39) for whole class
- Copy student handouts (1 per student)
- Set up *Anchor Chart: Rocks, Minerals, and Gems* (see Image 1.1, p. 8)
- Gather materials for demonstration: 4 different colors of clay, sugar cookie (1), chocolate chip cookie (1 for today, whole box for Lesson 2)
- Gather materials for *Crystal Geode Egg-speriment*: eggs, tissues, table salt, sugar, baking soda, metal spoons, muffin pan, hot water, measuring cup, paper cups or small containers, and food coloring (optional). See activity on p. 10 for specific quantities
- Review script for *The Story of a Gem* activity (**Appendix B**, pp. 40–41)

STUDENT HANDOUTS

- *Show What You Know!* (p. 13)
- *Crystal Geode Egg-speriment* (p. 14)

KEY VOCABULARY

rock, mineral, gem, gemology, rare, durable

LEARNING OBJECTIVES

Students will be able to...

- Define rocks, minerals, and gems
- Summarize in their own words how gems are formed
- Work collaboratively to make scientific predictions about minerals and gems

ESSENTIAL QUESTIONS

- *What is a rock?*
- *What is a mineral?*
- *What is a gem? How is it formed?*

“Diamond” comes from the Greek word *adamas*, which means “invincible.” For being the hardest material on earth, that is the perfect name for this gem!



Diamond

DID YOU KNOW?



LESSON 1: ROCK STARS

WARM-UP (10 MINUTES)

1) GEMOLOGIST MEET AND GREET

Distribute *Gem name tags* (Appendix A, p. 39). Tell students that the names represent famous “rock stars” that they will be learning about during the lessons. Give students five minutes to walk around the room and greet each other with their new names. Older students can memorize their names.

When students are seated, ask them for guesses about what the names represent. Reveal that the “rock stars” are famous gems and students are going to be learning about the science, art, and history of gems. Distribute Gemology Folders and have students write gem names on folders. Throughout the lessons, students will compile their work into these folders.



Garnet

Red garnet necklaces were worn by Egypt's pharaohs.

DID YOU KNOW?

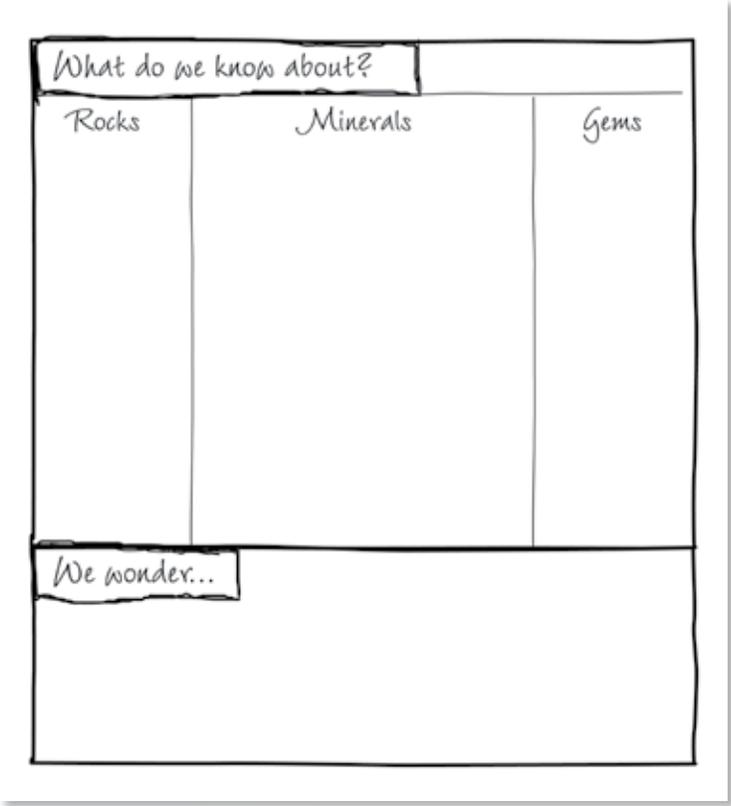


Image 1.1:
Rocks, Minerals, and Gems
Anchor Chart

INTRODUCTION (15 MINUTES)

2) SHOW WHAT YOU KNOW (KNOW, WONDER, LEARN (KWL) PRE-ASSESSMENT) A

Distribute the *Show What You Know!* handout (p. 13), and have students fill in what they already **know** about rocks, minerals, and gems. Give each student two sticky notes to write his or her two best ideas to place on the *Anchor Chart*.

Come to rug or meeting place, and unveil *Rocks, Minerals, and Gems Anchor Chart*. Invite students to place sticky notes and share their prior knowledge.



LESSON 1: ROCK STARS

DEMONSTRATION (10–15 MINUTES)

3) THE STORY OF A GEM

In the first part of this presentation, you will use cookies to introduce your students to the basic definitions of rock, mineral, and gem.

In the second part, you will use pieces of clay and videos to teach them about how a gem is formed in the earth. For a more hands-on version of the demonstration, you may opt to provide clay for your students to make their own “earth”s.

A complete script is available in **Appendix B**, pp. 40–41.

Get Ready

- 1) Gather these items to have nearby for demonstration: *Rocks, Minerals, and Gems Anchor Chart*, chart marker(s), sugar cookie, chocolate chip cookie, 4 colors of clay, butter knife, pencil.
- 2) Prepare key definitions (optional): Write the key definitions on sentence strips, chart paper, or SMART Board in advance.
 - **Minerals** are natural, nonliving parts of the earth, made up of elements.
 - **Rocks** are made up of minerals.
 - **Gems** are beautiful, rare, and durable. They come from nature: rocks, plants, or animals.
 - **Rare:** Not common and hard to find
 - **Durable:** Hard, tough, and stable

3) Cue up GIA videos:

- *How Peridot Is Formed* (0:46)
www.youtube.com/watch?v=VypY_4dJUoU&list=UUAf_vBJ2i1Qfol8GAuBHTw
- *How Opal Is Formed* (0:57)
www.youtube.com/watch?v=a2r4ZV_q8OY

Optional: Use the following search engine terms to find other great video resources online: “how gems are made,” “rocks and gems and minerals,” “how pearls are formed.” There are many student-friendly videos about gemology available online.

- 4) Preview your script: A step-by-step script can be found in **Appendix B**, pp. 40–41.

The incredible colors of amethyst cover different shades of purple—from light purple to reddish purple to purple.



Amethyst

DID YOU KNOW?



MAIN ACTIVITY (20 MINUTES)

4) CRYSTAL GEODE EGG-SPERIMENT

Now that students have a basic understanding of rocks, minerals, and gems, invite them to deepen their understanding with this hands-on science activity to grow minerals.

Divide students into groups of 3–5 and give each group a set of gemologist supplies. Keep a set of group supplies at a central Teacher Table.

GEMOLOGIST SUPPLIES (per group)

- 3 eggs
- 3 tissues
- 1/8 cup of each “mineral” in a paper cup:
table salt, regular sugar, baking soda
- Metal spoon
- Trash bowl (to discard egg yolks)

TEACHER TABLE SUPPLIES

- Muffin pan
- Tissues
- Hot water in cups (1 per group)
- Red, blue, green food coloring (optional)

Explain to students that, today they will be growing minerals from basic elements, and seeing what they can make. Introduce the materials. Distribute hot water to older students. Distribute *Crystal Geode Egg-speriment* handout, p. 14.

Give students time to follow the directions on the handout. Younger students can be led through the steps one at a time with teacher modeling, whereas older students can work in small groups at their own pace. The first step should be modeled for all ages.

Keep the eggs in a visible place in the room for students to check daily. By the end of the week, you should see small mineral crystals.



Sapphire

DIG DEEPER!

NOTES FOR THE TEACHER

In this experiment, you’ll be dissolving the “mineral” in hot water to create a super-saturated mineral-water mixture inside a “geode.” When the hot mixture cools and the H₂O evaporates, the remaining molecules will begin to bond together, forming crystals.

In nature, geodes are crystals that form in hollow spaces inside of certain rocks. When water seeps into the hollow space, it brings along dissolved minerals, which eventually form into a lining of crystals. Most geodes contain quartz crystals, but they can also contain other mineral crystals.

The atoms in each mixture will form the same crystal shape each time. The salt will form into cube-like crystals. Sugar will form into hexagonal prisms. Baking soda crystals will be small and white, and look like frost or icing. Epsom salts will produce delicate, slivery shapes, and alum powder will make large, boxy shapes.



REFLECTION & WRAP-UP (15 MINUTES)

5) WHO, WHAT, HOW? (ASSESSMENT) A

Instruct students to divide a paper into three sections, and write “rocks,” “minerals,” and “gems” in each section (see Image 1.2). On top, they should write their name (Who); in each section, they define (What) and write how rocks, minerals, and gems form (How). Papers can be collected for assessment and returned to students’ Gemology Folders the next day.

6) CIRCLE OF WONDERINGS

It’s time to come together and reflect on your learning. Ask students to record new and lingering questions about gems in the “W” section of their KWL chart. Then ask them to sit in a circle and share one question or add it to the class chart. Collect KWL papers to assess prior knowledge, respond to questions, and return to students for post-assessment at the end of the unit.



Moonstone

In Hindu legend, moonstone is made of solid moonbeams. Many cultures link this gem with moonlight.

DID YOU KNOW?

Who, What, How?

Name: Date:	
Rocks	Minerals
Gems	

Image 1.2: Who, What, How? Student Assessment



Spessartine Garnet

TEACHER TIPS

Science Journals — If your students use science or lab journals, encourage them to record their observations each day.

Supersize Your Crystals — For truly impressive crystals, try the activity with Epsom salts (used for soaking sore muscles) and alum powder (used for pickling and preserving food). Both are relatively easy to find in pharmacies or grocery stores.

Data Table — Consider making a large data table (with dates) for students to collaboratively chart and track their scientific observations over time.



EXTENSION ACTIVITIES

COMMON CORE READING PASSAGE

The **Birthstones and Lore** handout (**Appendix C**, pp. 42–43) can be assigned for homework, used during Guided Reading, or as an independent assignment. With a Lexile score of 710, this is an appropriate Common Core text for 3rd and 4th grade. A 5th-grade teacher may choose to modify the assignment to include a more rigorous prompt.

HOME CONNECTION: ROCK COLLECTION

Encourage students to seek out and collect a variety of rocks after school and on the weekend. Rocks can be exhibited in the classroom.

GEE, A GEODE

Extend the learning with a mini-lesson on geodes. Show students images of geodes and let them research independently or in small groups. Order a kit of geodes and break them open in class! **DO** be careful and be sure to use protective eyewear!

ROCK CYCLE LABS

To teach the rock cycle, make edible rocks. **Metamorphic rock**: squeeze together soft candies. **Igneous rock**: melt together chocolate chips and let them harden. **Sedimentary rock**: spread treats into layers. There are a number of other hands-on labs to choose from.

Search for “rock cycle activities” online and you’ll find dozens!

PEARLS OF WISDOM

Post “Pearls of Wisdom” (found throughout this curriculum) in the classroom and have students write comments on what the quotes mean to them.



Tanzanite

In 1967, a Tanzanian tribesman came across a cluster of very clear and very blue crystals. The gem would soon be called “tanzanite.”

DID YOU KNOW?



Many large amethyst geodes come from volcanic deposits. The deposits provide a steady supply for cut gems of all sizes.

TEACHER TIP Rise and Shine with Gemology

If your school has adopted the Morning Meeting structure to begin each day, consider integrating gems into your routine.

Greetings

- Greet each other with your Gem name tags.
- Draw Gem name tags out of a hat and greet whomever you drew.
- Crumple Gem name tags into rocks, throw them in the center of the circle, and choose a rock star to greet.

Sharing Topics

- Ask, “Have you ever seen a gem in real life?”
- Discuss, “Would you rather have a gem collection that you would never sell, or one expensive gem to sell? Why?”
- Read *Everybody Needs a Rock* by Byrd Baylor. Invite students to bring in a special rock to share.

Pearls of Wisdom

There are worlds
in an opal.

ASTRID ALAUDA



NAME: _____

DATE: _____

SHOW WHAT YOU KNOW!

What do you already KNOW about...?		
ROCKS	MINERALS	GEMS
What do you WONDER about rocks, minerals, and gems?		
What did you LEARN about rocks, minerals, and gems?		



NAME: _____

DATE: _____

CRYSTAL GEODE EGG-SPERIMENT

1) Check to make sure that you have all the supplies you need:

- | | |
|---|--|
| <input type="checkbox"/> 3 eggs | <input type="checkbox"/> 1/8 cup of each “mineral” in a separate paper cup: table salt, regular sugar, baking soda |
| <input type="checkbox"/> 3 tissues | <input type="checkbox"/> Metal spoon |
| <input type="checkbox"/> Cup of hot water | |
| <input type="checkbox"/> Trash bowl | |

2) Prepare the eggs. WATCH YOUR TEACHER FIRST! Use the metal spoon to gently tap the top of each egg. Use your fingers to remove the top of the egg and empty the insides into the trash bowl. Use a tissue to gently dry the inside of each egg. Using a pencil, gently write your team number on each egg. Label the eggs A, B, C.

3) Mix the minerals. WORK TOGETHER AND GO SLOWLY! Use the recipe to create three different “mineral” mixtures, one for each paper cup. Stir each mixture with your finger or clean metal spoon. Raise your hand when you are ready to add the food coloring. Your teacher will share it with you. Pour one mineral mixture into each of the eggs and record which “mineral” was poured into which egg. Take turns holding the eggs so they don’t spill! Bring your eggs to the teacher table and place them in the muffin tin. Gently stuff a tissue around each shell to keep it upright.



EGG A



EGG B



EGG C

Mineral: _____ Mineral: _____ Mineral: _____

Color: _____ Color: _____ Color: _____

4) Make predictions. Answer these questions in complete sentences on a piece of lined paper.

- 1) *What is a mineral crystal?*
- 2) *Which “mineral” mixture will produce the most eye-visible crystals? Why?*
- 3) *What is a gem?*
- 4) *Do you think you will grow a gem? Why or why not?*

