



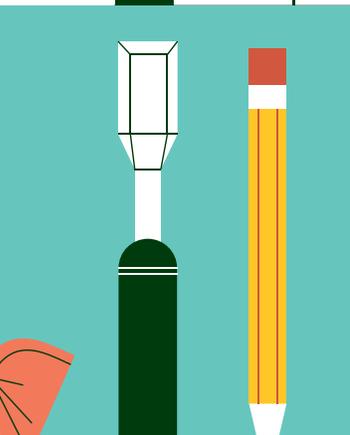
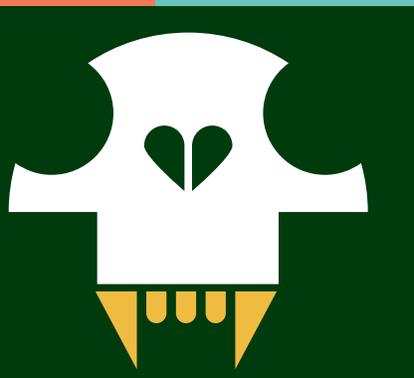
ROCKS & MINERALS

An Exploratory Guide

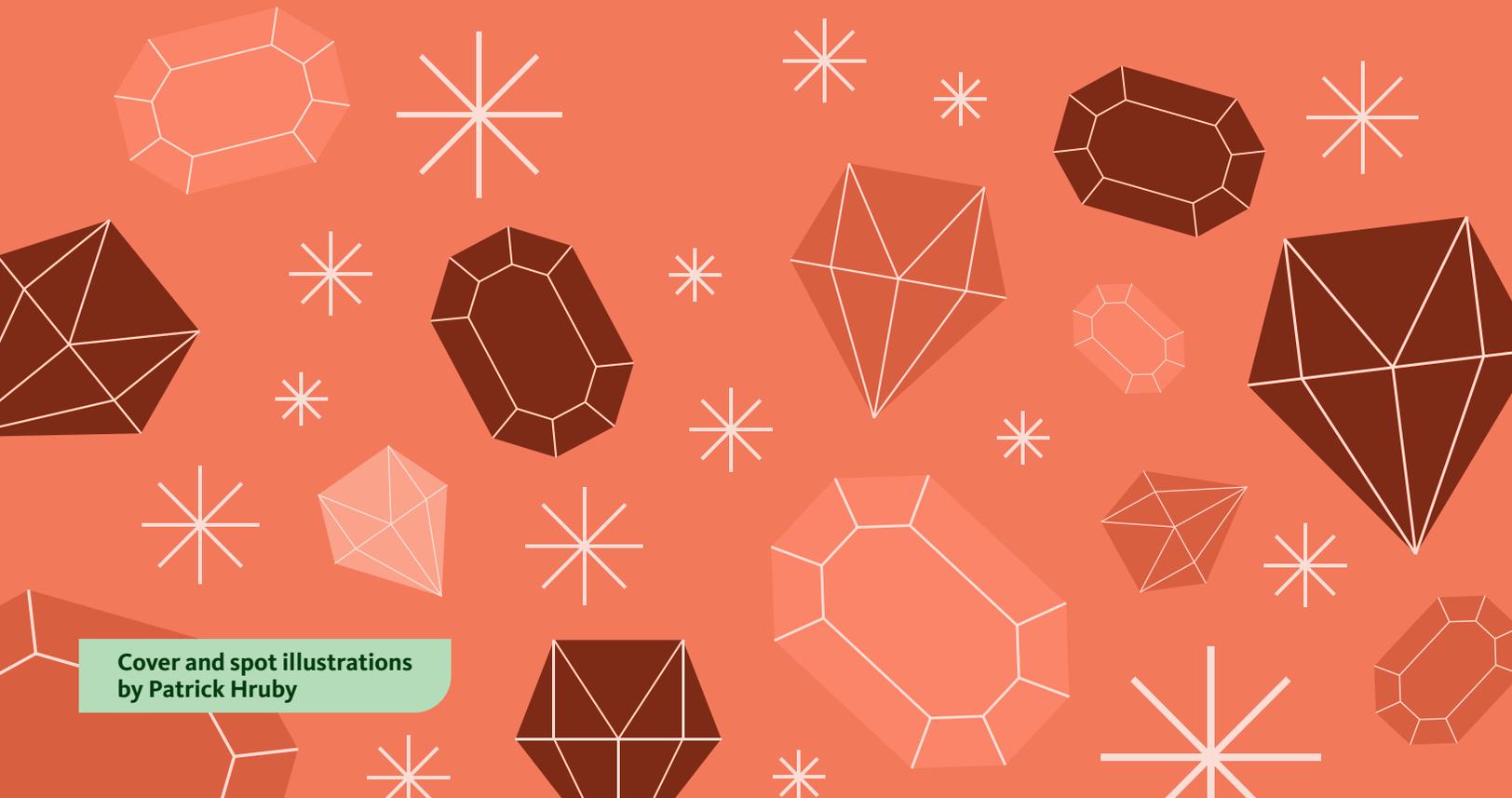
GRADES 3 - 5

NATURAL
HISTORY
MUSEUM
LOS ANGELES COUNTY

LA BREA
TAR
PITS
& MUSEUM



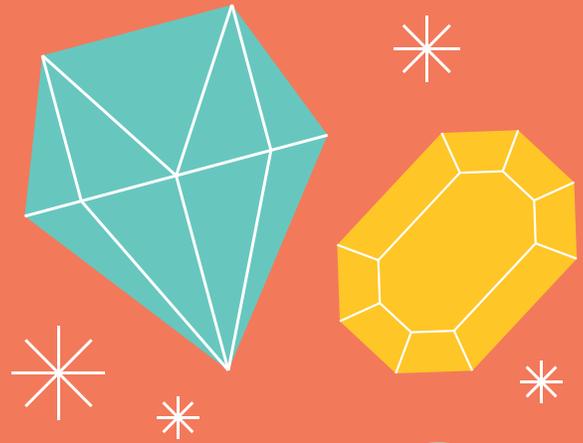
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**Cover and spot illustrations
by Patrick Hruby**

ROCKS & MINERALS

An Exploratory Guide



GRADES
3-5

INTRODUCTION

Welcome to the wondrous world of rocks and minerals! In this guide, we'll learn that rocks and minerals are formed and changed through some really fascinating processes on Earth. We'll also figure out how to differentiate between igneous, sedimentary, and metamorphic rocks – three major groups of rocks – by referring to their properties and methods of formation, also known as the rock cycle! By the time you get to the end of this guide, you'll also know how to identify some common rocks & minerals. Pretty cool, huh?

MATERIALS

- Writing utensil
- Specific materials for follow-up activity on pg. 13

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WHAT DO YOU ALREADY KNOW ABOUT ROCKS & MINERALS?

Before we get started, let's think about what we might already know about rocks & minerals and what we want to know about rocks & minerals using this KWL chart. Later, come back and fill in the final column: what you learned about rocks & minerals!

K. What I know	W. What I want to know	L. What I learned

VOCABULARY

As you work on this scavenger hunt, add definitions to the vocabulary words below!
You might find them in this guide or on museum labels:

WORD	DEFINITION
Mineral	
Rock	
Properties	
Luster	
Color	
Streak	
Hardness	
Glassy	
Dull	
Shiny	
Metallic	
Fossil	

FIRST OF ALL...WHAT IS A ROCK? WHAT IS A MINERAL?



Minerals are non-living crystals that form in nature. Though minerals are part of nature, they do not come from animals or plants. One key defining factor of minerals is that they are not made by people!

Rocks are also non-living substances found in nature, but they're made up of grains of one or more minerals. So what are rocks made out of? Minerals! Minerals can be found in caves, underground, or even in the air. There are over 5,700 different types of minerals on our planet – and about 100 new minerals are discovered each year!

Using the notes above that tell us what minerals are, circle the items below that you think are NOT minerals (hint: think of the substances that might be “man-made”):

COPPER

BRICK

PLASTIC

DIAMOND

GOLD

ACTIVITY

1

MINERAL DETECTIVES

The four **properties** (or clues) that scientists use to identify minerals are:

1 COLOR

The hue of a mineral. Some minerals can even change colors if exposed to heat, radiation, or light!

2 LUSTER

How the light bounces off a mineral.

3 STREAK

A mineral's "streak" is the mark the mineral makes when rubbed against something.

4 HARDNESS

A mineral's ability to resist scratching. Three testers that can be used to determine a mineral's hardness: your fingernail, a penny, or a nail!

SHINE BRIGHT LIKE A DIAMOND

Luster is how the light bounces off the mineral. Some words that people who study minerals use to describe a mineral's luster are:

**GLASSY**

Quartz

**SHINY**

Cassiterite

**DULL**

Kaolinite

**METALLIC**

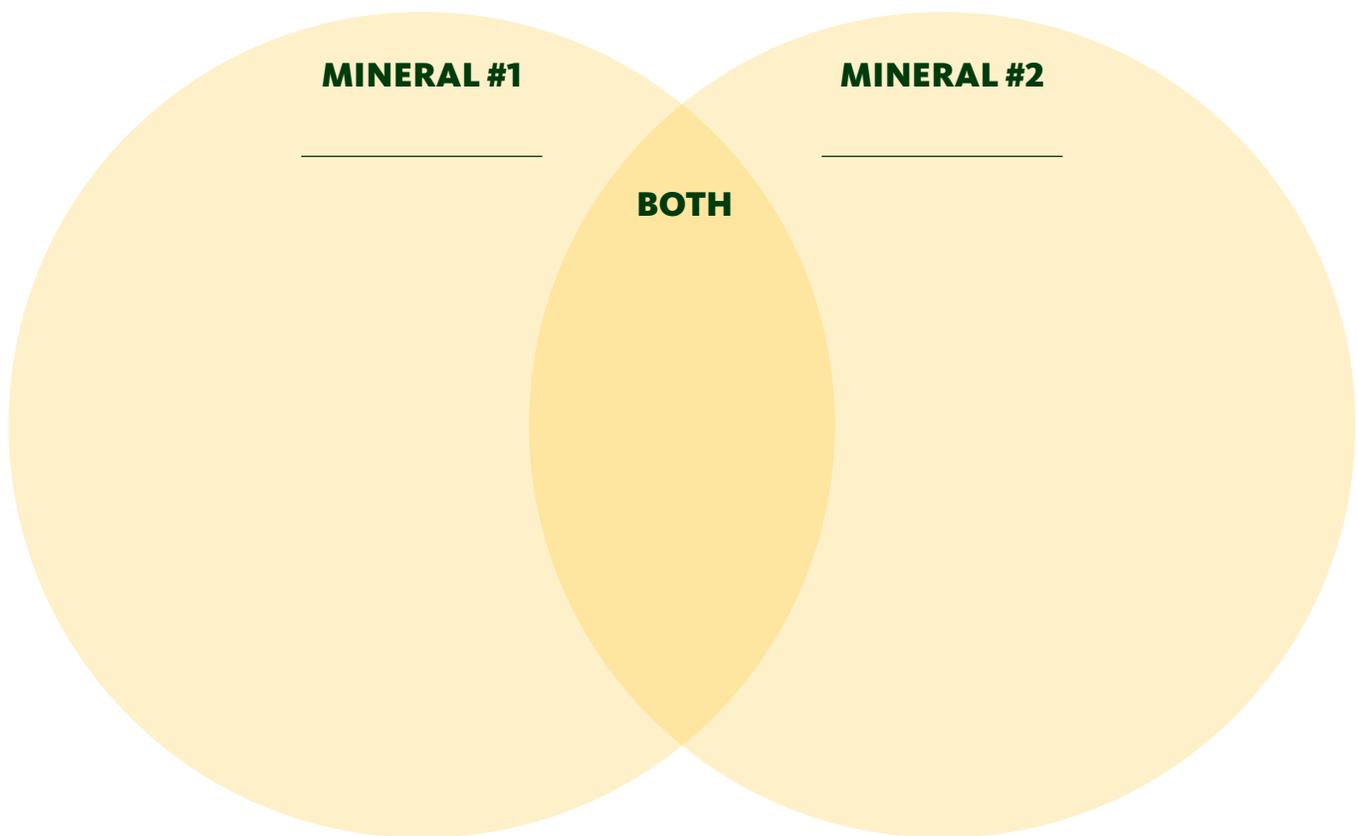
Gold

6 MINERAL DETECTIVES

Pick two of the four minerals and compare & contrast them using the Venn diagram below.

Write the name and characteristics, or what you notice about each mineral, on each side of the circle.

Then, write characteristics that both minerals share where the circles overlap!



COLORS AS CLUES

Color is not as useful in identifying a mineral as the other properties, like **luster, streak, and hardness**. Why do we think that is? Take a look at these two examples:



What do you notice about these objects? Write one sentence about what you see below:

The two examples are calcite on the left (which is a mineral) and limestone on the right (which is a rock)! Many minerals and rocks are the same color, which can make it challenging to identify which is which just by color alone.

CONDUCT YOUR OWN INVESTIGATION: FIND A MINERAL

Go into the Gem & Mineral Hall at the Natural History Museum on Level 1 and pick one mineral that catches your eye (or flip to the back of this guide to see a list of common minerals). Conduct a scientific observation of your mineral below:

Name of mineral: _____

Where it was found: _____

What type of luster does your mineral have?

Circle the word(s) that best describes your mineral:

GLASSY

SHINY

DULL

METALLIC

What do you notice about your mineral?

Draw a detailed illustration and write a description of your mineral. Include what you noticed about its shape and texture:

What did you notice

ACTIVITY

2

LET'S ROCK

There are three different types of rocks: igneous, sedimentary, and metamorphic. Each type of rock has a different way it was formed, but all rocks begin their lives deep underground. There, in the heat underneath the Earth's crust, minerals mix together to form rocks that then come up to the surface over millions and millions of years! This process is known as the *rock cycle*.



Head on over to the section of the museum's Gem & Mineral Hall that talks alllll about these three different types of rocks. Read the exhibit labels and fill in the blanks below:

What type of rock is formed when magma (or melted rock below the Earth's surface, such as lava) cools and hardens?

What type of rock is formed when weathering and erosion cause sediments (or small bits and pieces of rocks) to press together in layers?

What type of rock is formed when change occurs from heat and pressure below the Earth's crust?

Some other important processes that happen with rocks are:

- Weathering: The breaking down and wearing away of rocks
- Erosion: The movement of sediments from one place to another

ROLL BACK THE CLOCK

Any evidence – trace, mark, or remains – of an organism that is at least 10,000 years old is called a *fossil*.

What type of rock do you think fossils are usually found in? Circle your guess below:

IGNEOUS

SEDIMENTARY

METAMORPHIC

Why do you think fossils are generally preserved in that type of rock?

Scientists study fossils to learn more about extinct plants and animals. Extinct means they have no living members in existence. It's pretty neat that rocks can help preserve the bones of animals that lived MILLIONS of years ago! To see some of the fossils our scientists & researchers have found, walk on over to the Dinosaur Hall on Level 1. See if you can find the plesiosaur fossil (on the wall in the first section). Look closely at the rock it is embedded in.

What do you notice?

ACTIVITY

3

LET'S RECAP

We've learned a bit about rocks & minerals, but can you answer the below questions? Try your hand at this pop quiz!

1 What are minerals?

A mineral is _____

2 Name two places minerals can be found:

1. _____

2. _____

3 About how many different types of minerals have been found on Earth?

4 What are the four properties you can use to identify a mineral?

1. _____

2. _____

3. _____

4. _____

5 What are two words you can use to describe a mineral's luster?

1. _____

2. _____

6 What is one way you can test the hardness of a mineral?

7 What are the three different rock families?

1. _____

2. _____

3. _____

8 How is a metamorphic rock formed?

9 What was your favorite fact that you learned about rocks & minerals?

ACTIVITY

4

**FOLLOW-UP ACTIVITY:
MOCK ROCK EXPERIMENT**

Once you're done exploring the museum and you're back in your classroom or at home, you can ask an adult to help you create a simulated sedimentary rock to understand some of the basic elements of rocks & minerals.

As we learned earlier in the guide, minerals are the ingredients from which rocks are made! Rocks are nearly always made of different minerals mixed together. Geologists are people who study rocks. They make detailed observations of the rocks they discover. To do this, they use different techniques to try and identify all the minerals that might be present in a rock, such as **texture, appearance, shape, color, smell, and (even taste!)** to identify them. In this activity, we'll be making our own "mock" (or replica) rock and use some of the same observation techniques and skills that geologists use!

MATERIALS

For this activity, you'll need:

- 1 cup of white flour
- 1/2 cup of salt
- 1/2 cup of water
- Food coloring
- 1 cup of course sand
- Bowls
- 1/2 cup of aquarium or multicolored gravel
- Hammer
- Plastic bag
- Ruler or measuring tape

PLEASE NOTE:

- Do not put mock rocks in microwave or oven
- If necessary, use a paper towel to wipe the sand or gravel materials from any utensils used before washing so solid materials do not go down the drain

INSTRUCTIONS

- 1** Mix flour and salt together in a mixing bowl.
- 2** In a separate bowl, add 5 drops of each type of food coloring to the 1/2 cup of water.
- 3** Next, add the water mixture to the flour mixture.
If the mixture is crumbly, add a few spoonfuls of water until the mixture comes together smoothly.
- 4** Then, add the sand and gravel to the mixture. Knead until well-mixed, ensuring that you scrape the mixture off the bottom of the bowl.
- 5** Divide mixture into 24 equal pieces about the size of a ping pong ball. Grab a small amount of mixture and shape it in your hands.
- 6** Place your mock rocks on a napkin or plate to harden over 24 hours and clean up mixing supplies.
- 7** Congratulations! You've made your own mock rock! Answer the observation questions to complete your study.

OBSERVATIONS

Draw a detailed illustration and write a description of your mock rock. Include what you noticed about its texture, appearance, shape, color, and smell and measure its length, width, and height:

What do you notice?

TEXTURE: _____

APPEARANCE: _____

SHAPE: _____

COLOR: _____

SMELL: _____

What do you notice?

LENGTH: _____

WIDTH: _____

HEIGHT: _____

Place your mock rock in a plastic bag and use a hammer to gently break open your mock rock. What do you notice about the inside of your mock rock? Jot down what different types of material you see inside your rock:

ANSWER KEY

- Circle the items below that you think are **NOT** minerals:
Copper Brick Plastic Diamond Gold
- What type of rock is formed when magma (or melted rock below the Earth's surface, such as lava) cools and hardens? *Igneous*
- What type of rock is formed when weathering and erosion cause sediments (or small bits and pieces of rocks) to press together in layers? *Sedimentary*
- What type of rock is formed when change occurs from heat and pressure below the Earth's crust? *Metamorphic*
- What type of rock do you think fossils are usually found in?
Igneous Sedimentary Metamorphic
- What are minerals? *Minerals are non-living crystals formed in nature.*
- Name two places minerals can be found:
 1. *Caves OR underground*
 2. *In the air*
- About how many different types of minerals have been found on Earth? *5,700*
- What are the four properties you can use to identify a mineral?
 1. *Color*
 2. *Luster*
 3. *Streak*
 4. *Hardness*
- What are two words you can use to describe a mineral's luster? *Four options:*
 1. *Glossy*
 2. *Shiny*
 3. *Dull*
 4. *Metallic*
- What is one way you can test the hardness of a mineral?
Three options: Your fingernail, a penny, or a nail.
- What are the three different rock families?
 1. *Igneous*
 2. *Sedimentary*
 3. *Metamorphic*
- How is a metamorphic rock formed?
Metamorphic rock is formed from changes in heat and pressure below the Earth's crust.



Written by Steven Saunders

2019–2021 NHMLAC Teacher
Advisory Council

Steve Saunders (Mr. Steve) is an educator committed to student success both in and outside the classroom, providing an inspiring environment that promotes excitement, enthusiasm, and engagement for learning. Mr. Steve currently serves as the TK–12th Programs & Grants Coordinator at Lifeline Education Charter School in Compton. He has been an educator for 24 years, during which he has been honored with numerous awards including the L.A. Clippers Teacher Appreciation award, B.P. Most Innovative Teacher Award, ING Unsung Heroes Award, City of Inglewood Volunteer of the Year Award, and UCLA Project X Robotics Grant Winner.

Mr. Steve is a big fan of the Gem & Mineral Hall at the Natural History Museum and the paleontological sites located at La Brea Tar Pits (of which he conducts a classroom simulation with his students each year!). He also loves the museum’s Community Science program and regularly uses iNaturalist with his students, whose photos of plants and insects – found right in their own backyards – are submitted to scientists for active and ongoing research. Mr. Steve is very honored to be a member of the museum’s first Teacher Advisory Council.

STANDARDS

- CCSS 5.3 EARTH SCIENCE

“ I truly enjoyed working with Molly, Rachel, and their entire Education Teams at both the Natural History Museum and La Brea Tar Pits. I would also like to thank Dr. Aaron Celestian, Curator of Mineral Sciences, for sharing his expertise in helping me develop a cool activity for students to understand more about the world of rocks and minerals. ”

RESOURCES



Learn more about our Gem & Mineral Hall through the museum's Mineral Sciences collection.



Want to see what rocks & minerals we have at the museum? Search our digitized collection.



Looking to identify a mineral? Use this handy mineral identification guide from the Mineralogical Society of America



For an up-to-date list of current approved mineral species, visit the Mindat.org database.

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