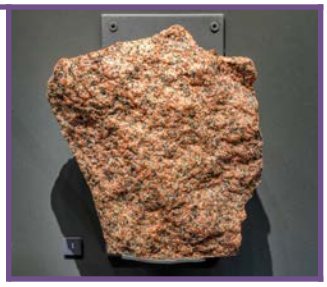
Rock, Mineral, and Crystal

WORKSHEET A

Answer Key & Notes to Educator

You will explore rocks, minerals, and crystals.

STOP 1 Find and observe a granite rock in "Mineral Basics" area of the hall



A **rock** is a solid that is made of one or more **mineral grains**.

This **granite rock** is made of several different kinds of mineral grains. You can tell the minerals in this rock apart by their different **colors**.

How many kinds of minerals do you see? *Answer: 4*

Look closely at the granite rock. Touch it. Describe what you **see** and **feel**:

Sample observations: The rock feels rough, bumpy, and cold. It feels solid and looks heavy.

The mineral grains in this rock are tiny. They are different sizes, shapes, and colors.

Next, look at the four objects below the granite rock.

Each is about the same size as the granite. But they're not rocks. They are **minerals**! In fact, these are the same four kinds of minerals as the tiny mineral grains make up the granite rock. Minerals come in different **sizes**. Some are really big and some are really small.

Can you match these four big minerals with the tiny mineral grains in the granite rock?

- ▢ Yes, I matched all four!
- ▢ Yes, I matched some
- ▢ No, I didn't match any

STOP 2 Explore the minerals to the right of the granite

Minerals come in many **colors**, **shapes**, and **sizes**.
Compare these minerals. What do they have in common?

Sample similarities: solid, cold

How are they different?

Sample differences: sizes (e.g. big, narrow)

shapes (e.g. pointy, bubbly, flaky, long,)

colors (e.g. brown, red, orange, teal, black, white, clear)

STOP 3 Observe a crystal to the left of the granite

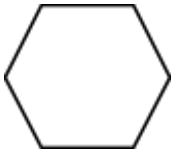
Minerals are found as mineral grains, like those in the granite rock.
Minerals are also found as well-formed **crystals**, like the one here.
One way you can tell it is a crystal is by its natural **flat surfaces**, or "**faces**."

Count the number of faces on this crystal: *Answer: more than 10*

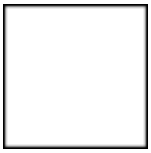
Look at the faces of this crystal.

Do you see a shape?

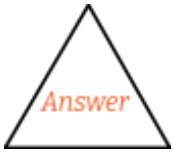
Which shape do you think it might be? Circle it:



hexagon



square



triangle

STOP 4 Explore crystals and 3-D models in the "Crystal Systems" area of the hall

Each kind of mineral forms in a repeating **three-dimensional (3-D) shape**. This 3-D shape depends on a mineral's **crystal structure**.

If a mineral is well formed as a crystal, sometimes it's easy to identify its crystal structure by observing:

- the number of faces (flat surfaces)
- any repeating 3-D shapes

Examine the minerals on the wall. For each section on the wall, the crystal structure of the minerals are shown as a touchable model at the bottom.

Can you identify the crystal structures of the minerals on the wall? (Hint: Look at the touchable models.)

- ☐ Yes, it was easy to identify them all
- ☐ Yes, but some were harder to identify than others
- ☐ No, I didn't identify any

EXPLORE MORE

Play the **"What is a Mineral?" interactive game** to explore the traits that make a mineral a mineral.

Mineral: Quartz

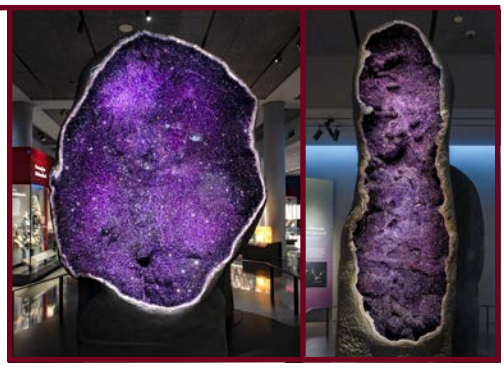
WORKSHEET B1

Answer Key & Notes to Educator

You will explore the colors, shapes, and sizes of a mineral called quartz.

STOP 1 Find and observe a giant geode near the hall entrance (pick one of the two)

A geode is a rounded rock that is hollow on the inside. This giant geode looks like a gray rock on the outside. But on the inside, it is lined with mineral crystals. One type of mineral in this geode is quartz. Quartz comes in many different colors. Purple quartz are called amethyst. There are thousands of amethyst crystals inside this geode!



Pick one or more of the purple quartz crystals. Look at them closely.

Draw one or more crystals:

Describe its **color**:

Sample answers: purple, violet

What do you think it would **feel** like?

Sample answers: smooth, rough, sharp, bumpy, cold

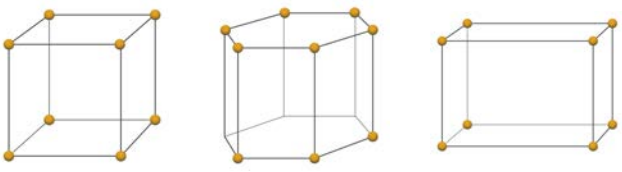
The **size** of this crystal is:

- ☐ Smaller than my head
- ☐ Same size as my head
- ☐ Bigger than my head

Compare a few of the purple quartz crystals. Do you see a **repeating 3-D shape**?

Which shape do you think it might be? Circle it:

Answer: hexagonal



cubic hexagonal orthorhombic

STOP 2 Find and observe other quartz specimens

HINT: Look in these cases!
- A Quartz by Any Other Name (#1–14)
- Light and Dark (#20, 22, 27, 29)
- Beautiful and Classic

The mineral quartz comes in many different colors and sizes. To see the variety, look for quartzes in nearby cases.

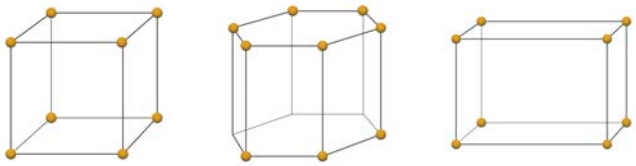
Pick your favorite quartz. Draw and describe it below.

Draw it:

Describe its **color** and **size**:

Observations will vary

Do you see a **repeating 3-D shape**? Which shape do you think it might be? Circle it: *Answer: hexagonal*



cubic hexagonal orthorhombic

STOP 3 Find and observe gems made from quartz

HINT: Go to the **Hall of Gems** Look for a case titled **Quartz**

People use tools to turn rough crystals into cut and polished crystals we call gems. Look at the gems made from the mineral quartz. List the **colors** you see:

Observations may include: purple, yellow, pink, white, clear, light brown, dark brown

Compare the rough quartz specimens and the quartz gems. What **differences** do you see?

Observations may include: minerals are rough and bumpy; gems have more shiny and smooth surfaces

Pick your favorite quartz gem. Draw it:

EXPLORE MORE

1. Watch the **"Igneous Environment" video** to learn how minerals like quartz form.
2. Visit the **interactive periodic table** to make your own minerals.

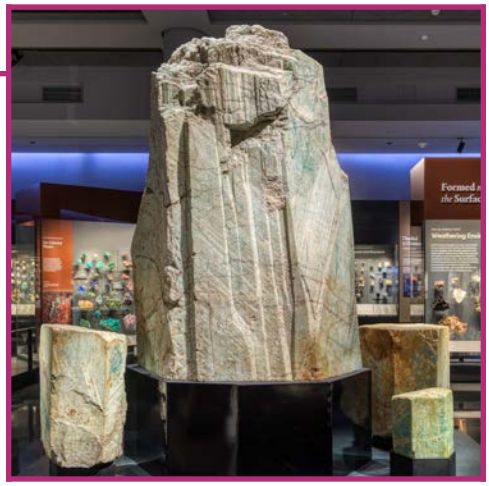
Mineral: Beryl

WORKSHEET B2

Answer Key & Notes to Educator

You will explore the colors, shapes, and sizes of a mineral called beryl.

STOP 1 Find and observe large beryl crystals



Each of these beryls is one single crystal. The biggest one in the middle is 5 feet (1.5 meters) tall. This crystal might look really big. But it is just a small piece of an enormous beryl crystal found in Maine. That crystal was 19 feet (5.8 meters) long. It looked like a tree log! Other pieces of that enormous crystal are in other museums.

Pick one of the four beryl crystals to observe. Look at it closely. Touch it.

Draw one of the beryl crystals:

Describe its **color**:

Sample answers: light green, cream

Describe what it **feels** like:

Sample answers: smooth, cold

The **size** of this crystal is:

- ☐ Smaller than my head
- ☐ Same size as my head
- ☐ Bigger than my head

Compare the three smaller beryl crystals.
Do you see a **repeating 3-D shape**?

Which shape do you think it might be? Circle it:

Answer: hexagonal

cubic dodecahedron hexagonal

STOP 2 Find and observe other beryl specimens

HINT: You can find beryl in these cases!
- What Big Crystals You Have (# 3, 5, 7)
- Complex Pegmatites (# 22, 35, 41, 42)
- Beautiful and Classic

The mineral beryl comes in many different colors and sizes. To see the variety, look for beryl in nearby cases in the hall.

Pick your favorite beryl. Draw and describe it below.

Draw it:

Describe its **color** and **size**:

Observations will vary

Do you see a **repeating 3-D shape**? Which shape do you think it might be? Circle it: *Answer: hexagonal*

cubic dodecahedron hexagonal

STOP 3 Find and observe gems made from beryl

HINT: Go to the **Hall of Gems** Look for a case titled **Beryl**

People use tools to turn rough crystals into cut and polished crystals we call gems. Look at the gems made from the mineral beryl. List the **colors** you see:

Observations may include:

pink, orange, blue, green, yellow, white

Compare the rough beryl specimens and the beryl gems. What **differences** do you see?

Observations may include: minerals are rough and

bumpy; gems have more shiny and smooth surfaces

Pick your favorite beryl gem. Draw it:

EXPLORE MORE

1. Watch the **"Pegmatitic Environment" video** to learn how minerals like beryl form.
2. Visit the **interactive periodic table** to make your own minerals.

Mineral: Garnet

WORKSHEET B3

Answer Key & Notes to Educator

You will explore the colors, shapes, and sizes of a mineral called garnet.

STOP 1 Find and observe this giant rock slab

This giant rock slab was found in upstate New York. This rock contains many kinds of minerals. One of these minerals is garnet. It is easy to spot the garnets in this rock. Just look for the dark red minerals!

Pick one of the smallest garnets and one of the biggest garnets to observe. Look at them closely. Touch them.

Draw the small garnet you chose. Try to draw it at the same size as the actual garnet!

Describe their **color**:

Sample answers: red, dark red

Describe what they **feel** like:

Sample answers: rough, scratchy

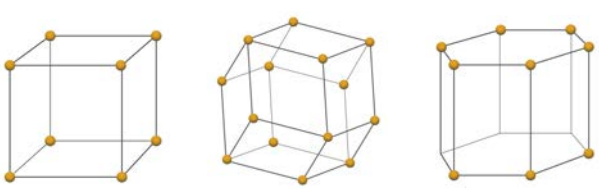
The **size** of the big garnet I chose is:

- ☐ Smaller than my head
- ☐ Same size as my head
- ☐ Bigger than my head

Compare a few of the garnets.
Do you see a **repeating 3-D shape**?

Which shape do you think it might be? Circle it:

Answer: dodecahedron



cubic dodecahedron hexagonal

STOP 2 Find and observe other garnet specimens

HINT: Go to a case titled **Garnets: Beautiful, Durable, Useful**

The word "garnet" is a name of a group of minerals that includes different kinds of minerals. And these minerals come in many different colors and sizes. To see the variety, look at the ones in this case. They're all garnets!

Pick your favorite garnet. Draw and describe it below.

Draw it:

Describe its **color** and **size**:

Observations will vary

Do you see a **repeating 3-D shape**? Which shape do you think it might be? Circle it: *Answer: dodecahedron*

cubic dodecahedron hexagonal

STOP 3 Find and observe gems made from garnet

HINT: Go to the **Hall of Gems** Look for a case titled **Garnet**

People use tools to turn rough crystals into cut and polished crystals we call gems. Look at the gems made from the mineral garnet. List the **colors** you see:

Observations may include:

red, orange, purple, pink, brown, yellow, green

Compare the rough garnet specimens and the garnet gems. What **differences** do you see?

Observations may include: minerals are rough and bumpy; gems have more shiny and smooth surfaces

Pick your favorite garnet gem. Draw it:

EXPLORE MORE

1. Watch the **"Metamorphic Environment" video** to learn how minerals like garnet form.
2. Visit the **interactive periodic table** to make your own minerals.

Mineral: Fluorite

WORKSHEET B4

Answer Key & Notes to Educator

You will explore the colors, shapes, and sizes of a mineral called fluorite.

STOP 1 Find and observe a fluorite

This fluorite is made of many small crystals. Each fluorite crystal looks like a tiny yellow box.

And there's another mineral here. On top of the fluorite crystals are golden grains of a mineral called pyrite.

Pick one or more of the fluorite crystals. Look at it closely.

Draw one or more fluorite crystals:

Describe its **color**:

Sample answers: light yellow

What do you think it would **feel** like?

Sample answers: smooth, cold

The **size** of this crystal is:

- ☐ Smaller than my head
- ☐ Same size as my head
- ☐ Bigger than my head

Compare a few of the fluorite crystals.
Do you see a **repeating 3-D shape**?

Which shape do you think it might be? Circle it:

Answer: cubic

cubic dodecahedron hexagonal

STOP 2 Find and observe other fluorite specimens

HINT: Go to a case titled **The Many Colors of Fluorite**

The mineral fluorite comes in many different colors and sizes.
To see the variety, look at the ones in this case. They're all fluorites!

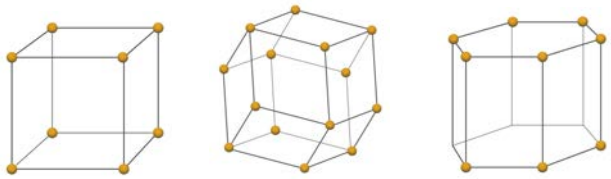
Pick your favorite fluorite. Draw and describe it below.

Draw it:

Describe its **color** and **size**:

Observations will vary

Do you see a **repeating 3-D shape**? Which shape do you think it might be? Circle it: *Answer: cubic*



cubic dodecahedron hexagonal

STOP 3 Find and observe gems made from fluorite

HINT: Go to the **Hall of Gems**
Look for a case titled **Fluorite**

People use tools to turn rough crystals into cut and polished crystals we call gems. Look at the gems made from the mineral fluorite. List the **colors** you see:

Observations may include: purple, pink, orange, blue, green, yellow, clear, white

Compare the rough fluorite specimens and the fluorite gems. What **differences** do you see?

Observations may include: minerals are rough and bumpy; gems have more shiny and smooth surfaces

Pick your favorite fluorite gem. Draw it:

EXPLORE MORE

1. Watch the **"Hydrothermal Environment" video** to learn how minerals like fluorite form.
2. Visit the **interactive periodic table** to make your own minerals.

Mineral: Azurite

WORKSHEET B5

Answer Key & Notes to Educator

You will explore the colors, shapes, and sizes of a mineral called azurite.

STOP 1 Find and observe this rock

This huge rock is called the Singing Stone. It used to "sing" high-pitched sounds when the humidity changed. But now that it is in a temperature-controlled room, it is quiet.

This rock contains many kinds of minerals. Three of these minerals are azurite, copper, and malachite. It is easy to spot these minerals by their color. Azurite is blue, copper is brown, and malachite is green.

The name of the mineral "azurite" is very similar to the name of the color "azure." That's because both words come from the same root word that means "blue." And the mineral azurite is known for its rich blue color.

Pick a part of the rock that has azurite. Look at it closely.

Draw a part of the rock that contains azurite:

Describe the azurite's **color**:

Sample answers: blue, dark blue

What do you think the azurite would **feel** like?

Sample answers: rough, bumpy, smooth

The **size** of this rock is:

- ☐ Smaller than my head
- ☐ Same size as my head
- ☐ Bigger than my head

STOP 2 Find and observe other azurite specimens

HINT: Look for azurite in these cases!
- An Enriching Process (# 16, 18)
- Copper Hills of Arizona (# 17, 23)
- Beautiful and Classic

The mineral azurite comes in different shades of blue.
Look for them in nearby cases in the hall.

Pick your favorite azurite. Draw and describe it below.

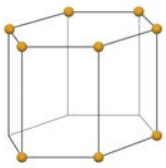
Draw it:

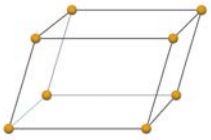
Describe its **color** and **size**:

Observations will vary

Do you see a **repeating 3-D shape**? Which shape do you think it might be? Circle it: *Answer: monoclinic*


dodecahedron


hexagonal


monoclinic

STOP 3 Explore how gems are made

HINT: Go to the **Hall of Gems**
Look for a case titled **Rough and Cut**

People use tools to turn rough crystals into cut and polished crystals we call gems.
Pick your favorite pair of a rough specimen and a gem in this case. Draw and compare them below.

Draw the rough specimen:	Draw the gem:

Describe how they are **similar**:

Observations may include: colors

Describe how they are **different**:

Observations may include: minerals are rough and bumpy; gems have more shiny and smooth surfaces

EXPLORE MORE

1. Watch the **"Weathering Environment" video** to learn how minerals like azurite form.
2. Visit the **interactive periodic table** to make your own minerals.