



GEMSTONE CARVINGS

THE MASTERWORKS OF HAROLD VAN PELT

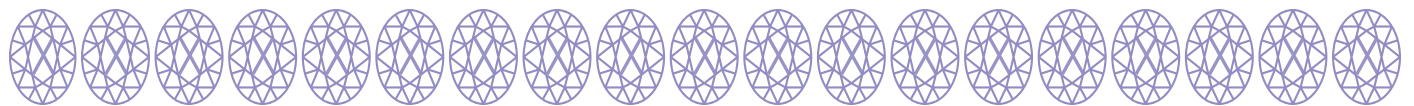
A Resource for Students and Educators

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ACKNOWLEDGEMENTS

It is with great pleasure that the Bowers Museum presents this Resource Guide for Students and Educators with our goal to provide worldwide virtual access to the themes and artifacts that are found in the museum's eight permanent exhibitions.

There are a number of people deserving of special thanks who contributed to this extraordinary project. First, and most importantly, I would like to thank Victoria Gerard, Bowers' Vice President of Programs and Collections, for her amazing leadership; and the entire education and collections team, particularly Laura Belani, Mark Bustamante and Sasha Deming, for their important collaboration. Thank you to Pamela M. Pease, Ph.D., the Content Editor and Designer, for her vision in creating this guide. I am also grateful to the Bowers Museum Board of Governors and Staff for their continued hard work and support of our mission to enrich lives through the world's finest arts and cultures.

I'd like to acknowledge Harold and Erica Van Pelt, without whom this resource would not be possible. Harold's incredible craft and the duo's dynamic photography make this resource come alive. I also want to thank Michael Scott for generously providing photographs taken by the Van Pelts of his own, unparalleled gem collection which illustrates the many varieties of quartz in such a spectacular manner.

Please enjoy this interesting and enriching compendium with our compliments.

Peter C. Keller, Ph.D.
President
Bowers Museum

Cover Art

Agate Rhyton

Carved by Harold Van Pelt

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MODULE ONE: INTRO / FOCUS QUESTIONS

PERIODIC TABLE OF ELEMENTS

LEGEND

halogens	noble gases
alkaline metals	metalloids
other metals	lanthanoids
transition metals	non-metals
	actinoids
	non-metals

Elements, Minerals, Rocks, Crystals, Gemstones and Their Varieties

Elements are the fundamental materials of which all matter is composed. Two examples of elements are Carbon (C) and Iron (Fe).

- **Carbon** (C) is a clear or black substance that combines easily with other elements. It forms the basis of all plant and animal life and provides most of the energy we use. Carbon is also a major element in many rock forms such as graphite and diamonds.
- **Iron** (Fe) is the chief "ingredient" in the Earth's core. It is found in many rocks, as well as in the Sun, the stars, and the human body, where it helps keep our bones strong.

There are more than 100 known elements. Each element is given a name represented by one or two letters, a number and a category such as "metals" or "gases." Scientists group all known elements on a chart called the **periodic table**.

Rocks are naturally occurring solids made up of one or more mineral species that comprise the Earth's surface. Rocks are generally classified in one of three categories depending on how they are formed:

- **Igneous rocks** such as granite, basalt and obsidian are formed when hot, molten rock crystallizes and solidifies. This process originates deep within the Earth. When magma cools slowly below the Earth's surface, it forms **intrusive** igneous rocks such as granite. When magma explodes through the Earth's crust, lava flows down the side of the volcano, then quickly cools and solidifies, forming **extrusive** igneous rocks such as obsidian and basalt.
- **Sedimentary rocks** are made up of pieces of pre-existing rocks. Weathering and wind erode rocks, loosening tiny pieces which are then carried downhill by wind and rivers to settle in basins, lakes, sand dunes or on the ocean floor. Over time, layers of sediment accumulate and are compacted when new layers are added. Sandstone, limestone and shale are examples of sedimentary rocks.
- **Metamorphic rocks** are formed when rocks are subjected to extreme heat, intense pressure or hot mineral-rich fluids or some combination of these factors. Conditions like these are found deep inside Earth or where tectonic plates meet. Marble, gneiss and slate are examples of metamorphic rocks.



Granite is an example of an intrusive igneous rock.

Photograph by James St. John

MODULE ONE: INTRO / FOCUS QUESTIONS



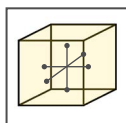
Quartz is an abundant and useful mineral with a hexagonal crystal structure.

Photograph by Albert Russ

CRYSTAL SHAPES

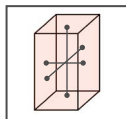
1. CUBIC

Example: *Diamonds*



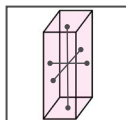
2. TETRAGONAL

Example: *Rutile*



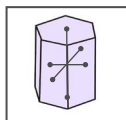
3. ORTHORHOMBIC

Example: *Topaz*



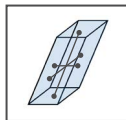
4. HEXAGONAL

Examples: *Emerald, Quartz*



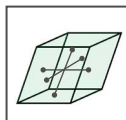
5. MONOCLINIC

Example: *Moonstone*



6. TRICLINIC

Example: *Turquoise*



Minerals are naturally occurring inorganic solids with a defined chemical composition and an internal crystal structure. They can be identified by observing how they break (cleavage), by their hardness (their ability to scratch another rock), and by their shape or crystal structure. Quartz is the most well-known mineral on Earth. Examples of other minerals include diamonds, copper and salt. Of more than 5,000 mineral species, less than 100 possess the unique qualities needed to be considered gemstones.

Quartz is a significant component of many igneous, metamorphic and sedimentary rocks. Quartz is found in a range of varieties and colors. If pure, it forms colorless hard crystals that are transparent. Trace amounts of impurities, or exposure to heat or radiation, change the color and form varieties of quartz such as rose quartz, citrine, amethyst and smoky quartz.

Crystals form orderly shapes that extend in all three spatial dimensions (length, width and depth). Crystal structures have flat surfaces and straight edges. They can be grouped into variations of one of six types based on their shape, structure and **symmetry**.

1. **Isometric (cubic) crystals** have six sides of equal dimensions.

With all three of their axes meeting at 90° , they are the most symmetrical crystal structure.

2. **Tetragonal crystals** look like a three-dimensional rectangular box with six sides. The top and bottom surfaces are square. The four vertical sides are longer than they are wide.

3. **Orthorhombic crystals** are similar to tetragonal crystals but the shape of the top and bottom surfaces are rectangular instead of square, and may have pointed ends.

4. **Hexagonal crystals** have six sides. The top and bottom hexagons have pointed ends. Quartz has a hexagonal structure. Snowflakes are crystals that also have a six-sided structure.

5. **Monoclinic crystals** form a rectangular prism with a parallelogram as its base.

6. **Triclinic crystals** have sides of any length, forming unique shapes. With none of their three axes meeting at 90° , they are the least symmetrical crystal structure.

Illustrations of crystal shapes inspired by digital renderings of Daniel Mayer_GNU Free Documentation License



Diamonds are among the most beautiful and valuable gemstones. Although pure diamonds are clear, slight impurities (other chemical elements) or structural defects can cause the stone to appear in a rainbow of colors. Nitrogen gives diamonds a yellow tone. The element boron gives diamonds a blue tone. Red diamonds are thought to be the result of a molecular change in the stone.

© Harold and Erica Van Pelt
Michael Scott Gem Collection

Gemstones

Of the more than 5000 known minerals, less than 100 have the qualities of beauty, rarity and durability to qualify as gemstones:

- **Beauty** is a mineral's color, optical qualities, and how perfectly formed it is
- **Rarity** is how uncommon or hard to find a mineral is
- **Durability** is how long a mineral lasts, and if it is strong enough to be worn as jewelry

Gemstones are measured in millimeters. A 6mm diamond, for example, would measure about 1/4 inch in diameter. Gemstones are weighed in **carats**. A 1-carat diamond would weigh 1/5 of a metric gram, or 200 milligrams. A handful of 2270 one-carat diamonds would weigh one pound.

When pure white light hits a gemstone, it breaks into different wavelengths of light that are refracted by its internal **facets**. This gives a gemstone its sparkle or **brilliance**.

Focus Questions:

ROCKS

- How are rocks formed?
- How do rocks change over time?

MINERALS

- How are minerals identified?
- Why do minerals have different shapes and colors?

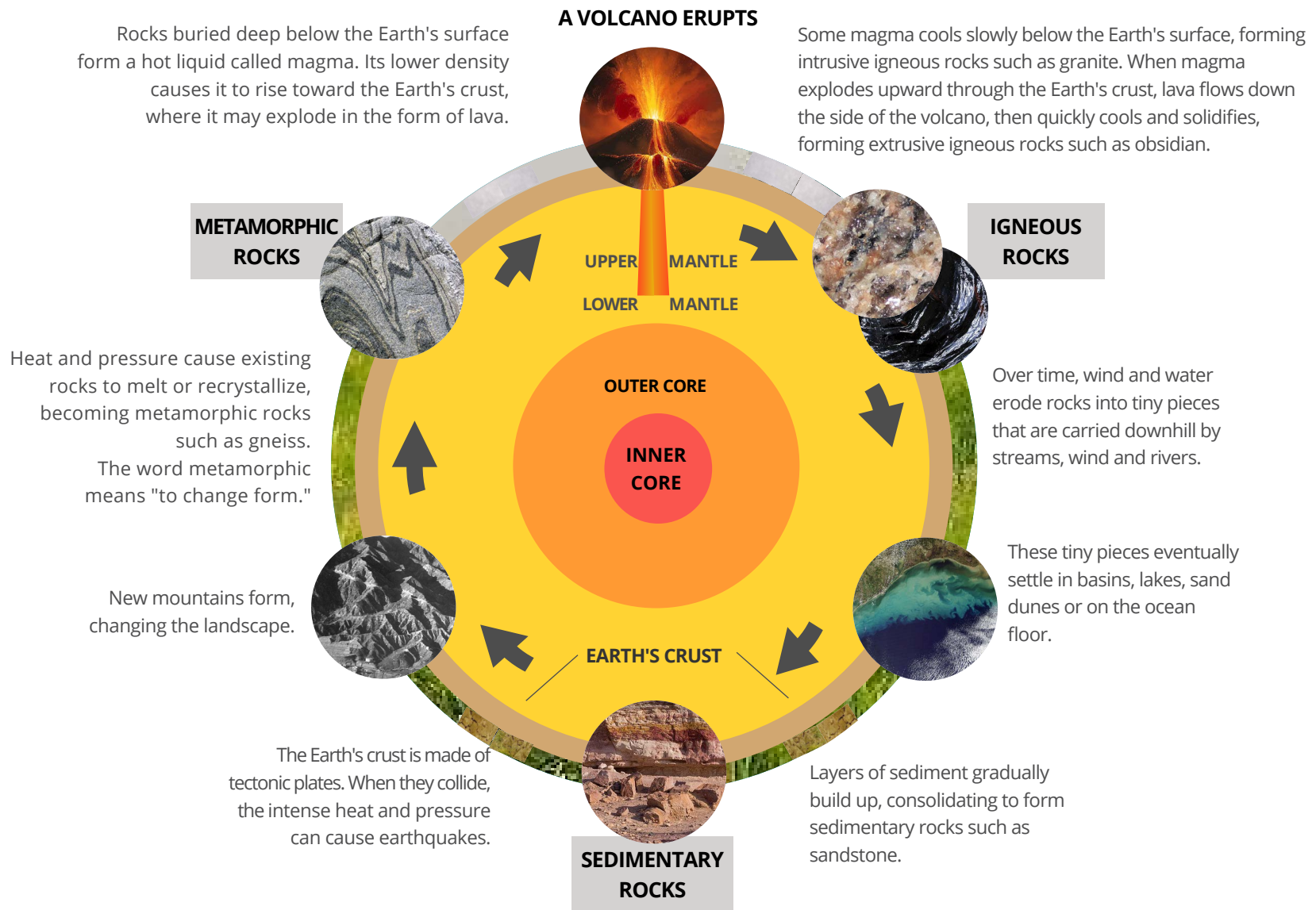
CRYSTALS

- Are snowflakes crystals?

GEMSTONES

- What gives gemstones their sparkle?
- How are gemstones cut?
- How are gemstones carved?
- What do you treasure?

MODULE ONE: INTRO / FOCUS QUESTIONS



A complete rock cycle can take billions of years!

THE ROCK CYCLE

MODULE ONE ACTIVITY: ROCKSTAR CHALLENGE

1. Draw a line to match the type of rock on the left with an explanation of how it is formed on the right.

IGNEOUS ROCKS

Formed by the erosion of existing rocks into tiny pieces carried downhill by wind and water where over time they build up in layers

SEDIMENTARY ROCKS

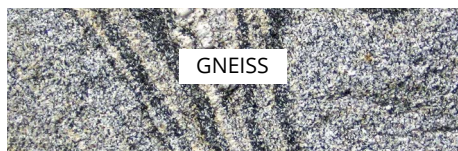
Created when intense heat and pressure that causes existing rocks to change form

METAMORPHIC ROCKS

Formed when magma erupts from below the Earth's surface through the crater of a volcano, then cools

2. Draw a line to match the type of rock on the left with the picture of an example of that type of rock on the right.

IGNEOUS ROCKS



SEDIMENTARY ROCKS



METAMORPHIC ROCKS



3. TRUE OR FALSE?

_____ Over time, a rock can change from one type to another.

_____ The entire rock cycle takes one hundred years.

_____ Elements are the basic material that make up all matter.

4. CHOOSE

A gemstone is a rock or mineral that has been cut and polished. From the list below, circle the three most important qualities on which a gemstone's value is based:

- **Size** (measured in millimeters)
- **Beauty** (color, optical qualities, and how perfectly formed it is)
- **Durability** (strength, how long it lasts, can it be worn as jewelry)
- **Weight** (measured in carats)
- **Rarity** (how uncommon or hard to find it is)

5. The first 5 stones below are all varieties of the mineral quartz.

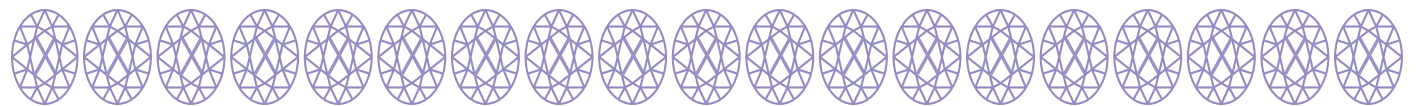
Agate is a variety of chalcedony which is a microcrystalline form of quartz. Which is your favorite and why? Look at the crystal structures on p.6, then choose one and draw its shape.



ROSE QUARTZ • ROCK CRYSTAL • AMETHYST • SMOKY QUARTZ • CITRINE • AGATE

MODULE TWO:

SEARCHING FOR TREASURE



MODULE TWO: SEARCHING FOR TREASURE

Gemstone Mining: Mapping Earth's Treasures

For thousands of years, people have searched to uncover Earth's treasures. From the simple act of digging in one's own backyard, to scaling mountains, venturing into rivers and caves, or diving beneath the surface of the ocean, extracting Earth's rocks and minerals happens on both a small and large scale. The map below shows where

certain rocks, minerals and gems featured in this guide have been found. It represents just a few of the thousands of underground, open pit and alluvial mining sites located throughout the world. For a more comprehensive view, follow the link in our References section to the [World Gemstone Map](#) compiled by a nonprofit organization dedicated to documenting gemstone knowledge from prehistory to the present.



MODULE TWO: SEARCHING FOR TREASURE



Alluvial mining for gold and diamond deposits in South African riverbeds



Muzo emerald mine in Colombia, South America

Mining Environments

Mining happens in many different environments. The equipment and methods used vary based on the type and location of the material miners are seeking to excavate.

Lode mining involves the labor of many miners working together in tunnels located inside a mountain or beneath the ground. In large, industrial mining operations, bulldozers move the earth, then drills and explosives help extract the rocks and minerals.

Alluvial (riverbed) mining is richer and more economical than lode mining. It requires much simpler tools and equipment.



Mining for garnets in Tanzania, Africa



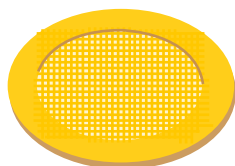
Alluvial mining for sapphires in Sri Lanka

MODULE TWO ACTIVITY: BECOME AN AMATEUR ROCKHOUND

Searching for Rocks and Minerals



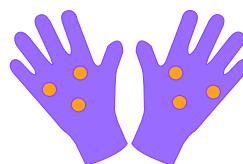
BUCKET AND SHOVEL



SIEVE



FIELD GUIDE



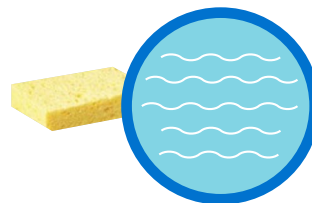
PROTECTIVE GEAR



TOOTHPICKS



TOOTHBRUSH



SPONGE AND SOAPY WATER



NOTEBOOK AND PENCIL



MAGNIFYING GLASS



PAPER TOWELS



EGG CARTON



BAG OR BACKPACK

Searching for treasures buried in your back yard, at the beach or in the wild can be fun. First, make sure you have permission before you dig!

Next, gather some tools you may need:

- Bucket and shovel to dig and store rocks
- A sieve to help separate rocks from the dirt, sand, or water
- Pictures of rocks to serve as a "Field Guide" to help you identify what you discover
- Rocks don't always look great when you first find them. A toothbrush, toothpicks, sponge and bowl of soapy water will help you clean off dirt, sand and other debris so that you can see what you have found
- A few paper towels to dry off your rocks
- A notebook to jot down where you found your treasures and other observations
- A magnifying glass
- An egg carton to protect rocks that are fragile or have sharp edges
- A bag or backpack to carry treasures you have discovered

Always make sure to wear the protective gear (gloves, shoes, hat, etc.) needed for the environment you've chosen to explore!

Identifying What You Find

Rocks and minerals look much rougher than the polished, cut and carved gemstones you see in fancy jewelry, rock shops or museums.

How can you tell what type of rock or mineral you have found and if it has the potential to be a "keeper?" There are several tests that even amateur rockhounds can perform to help identify rocks and minerals:

Hardness Test

The **Mohs scale** measures the hardness of a rock or mineral based on its ability to scratch another type of rock or mineral. On a scale of 1 to 10, the softest mineral is Talc (#1). The hardest mineral is a diamond (#10). Diamonds are so hard they will scratch all other surfaces. Quartz (#7) is considered to be of medium hardness. It can scratch a copper penny (between #3 and #4 on the Mohs scale) but cannot scratch a Ruby (#9).

Streak Test

Each mineral will leave its own distinct color mark when rubbed on an unglazed clay tile. Even if minerals appear to be different, this test can help you identify rock "families."

Light Reflection and Transparency Tests

If a mineral allows light to pass directly through its crystals, it is **transparent**. If only a small amount of light passes through, it is **translucent**. If light bounces back off a mineral it is said to be **opaque**.

Respecting People and the Earth

The mining industry plays a large role in many developing countries. While they produce materials needed for peoples' daily lives and are a source of economic growth, there are risks from the mining process that can impact both the environment and the health of local communities. Unless managed responsibly, mining can result in soil erosion, groundwater contamination, and a loss of biodiversity in local ecosystems. In wilderness areas, mining may destroy animal habitats, and in rural areas mining can disturb land needed for grazing and farming.

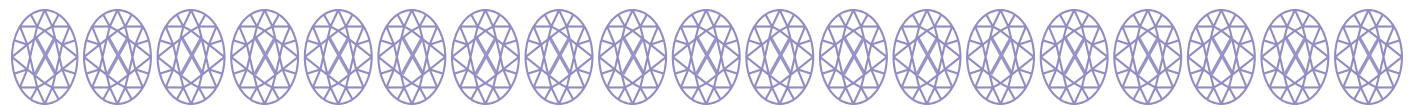
In addition to the physical danger of working in the mines, chemicals emitted during the mining process can negatively affect public health. These changes can displace populations and create local conflicts. Therefore, it is important that both large mining companies as well as small-scale miners be mindful of their responsibility to respect both people and the environment.

Natural vs. Lab-Created Gemstones

Natural gemstones are formed in nature with no interference from humans other than being mined, faceted and polished. They have not been treated, enhanced or altered.

Today not all gemstones are extracted from the Earth. Some are created in the lab. Many of these gemstones have the exact chemical composition of a natural stone. Others may look like a certain gemstone, but their chemical compositions are different.

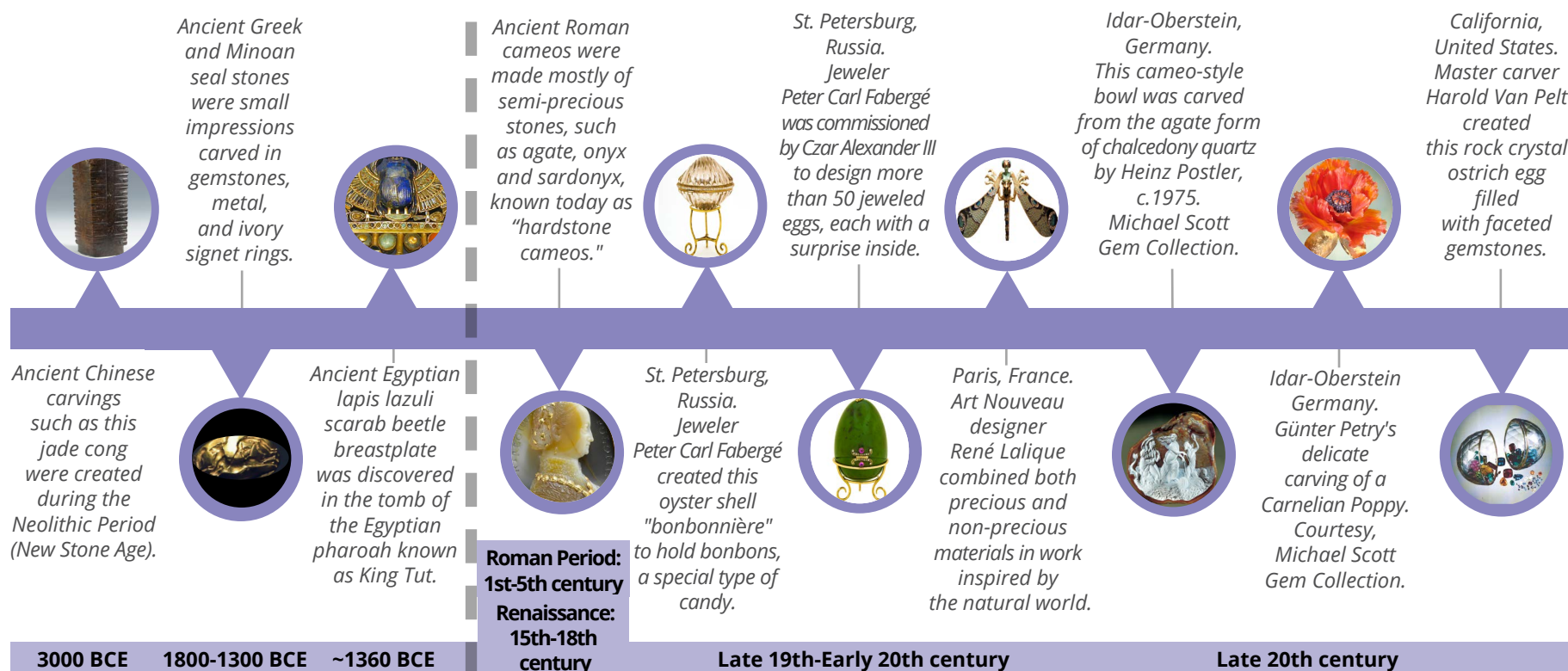
MODULE THREE:
HISTORY OF
GEMSTONE CARVING



MODULE THREE: TIMELINE OF GEMSTONE CARVING

Humans have been fashioning pretty pebbles into beads and **amulets** for thousands of years. About 5,000 years ago, Chinese, Greeks, Romans and certain pre-Columbian cultures of South America began grinding stones into distinct shapes to form utilitarian and art objects. Chinese craftsmen shaped jade into containers and mythical animals. Greeks and Romans carried on the tradition of precious stone carving, also known as **lapidary**, by engraving seals and cameos.

Especially interesting is Idar-Oberstein, a pair of small towns in western Germany built on cliffs that supplied agate stones to the Romans. Their 500-year tradition of lapidary art is legendary. In the late 19th century, Idar-Oberstein became a primary source of both material and carving skill for Peter Carl Fabergé, the Russian court jeweler to Czar Alexander III. Fabergé's intricate and finely-crafted work inspired many 20th century gemstone carvers.



Ancient China: Jade Carving



Jade Cong with Human Face Design
Liangzhu Culture
Neolithic Period (3100-2200 BCE)

Shanghai Museum

The gemstone jade has been treasured in China from ancient times to the present day. It is associated with immortality, heaven and Imperial power.

Jade items have been found in tombs as early as 3500 BCE. From about 2500 BCE, two types of jade artifacts were being buried in large numbers with the deceased. The first type is a jade disc, or *bi*, with a hole in the center. The second type is the *cong*, a cylinder with a square cross-section and a round hole or tube extending into the interior of the artifact. Although the purpose of these two artifacts is unclear, they are thought to have had a ceremonial or ritual function. One theory is that the *bi* and *cong* symbolize Heaven (the circle) and Earth (the square).

Jade exists in two forms, nephrite and jadeite. Nephrite has been mined in China since the Neolithic (New Stone Age) period. It is more common than jadeite. Jadeite is found in Myanmar. It is rarer and more valuable. These two minerals can appear to look alike. They have similar physical properties, but they differ in their mineral composition and crystal structure.

The color of jade ranges from light to dark with the most desired shade being a pale green that is caused by impurities within the gem. Jade objects and jewelry have always been symbols of rank and wealth.

Ancient Greece: Minoan Seal Stone



Ancient Greek Seal Stone Signet Ring, ~1700 BCE
Gold

Photograph by Andree Stephan

There are three methods of gem carving: **intaglio**, **reverse intaglio** and **relief**. This Minoan seal stone is an example of the intaglio method in which a design is engraved below the surface of a precious metal or stone. The image above shows both the positive and negative "impressions" made by the ring when used to stamp or "sign" documents or to identify ownership. The design of a signet ring was typically a symbol that was representative of its wearer.

Ancient Egypt: Scarab Beetle



Detail of Scarab Beetle, 1361-52 BCE
from Ancient Egyptian Scarab Pectoral (jeweled breastplate)

Photograph by Jean-Pierre Dalbéra

Lapis lazuli was used to carve this **scarab** beetle on a piece of jewelry from the tomb of Tutankhamun ("King Tut") at Thebes, a major ancient Egyptian city. In addition to lapis lazuli and turquoise, ancient Egyptians used "common" stones such as amethyst, chalcedony, obsidian and quartz both in jewelry and in powdered form as medicinal remedies. Scarab beetles were frequently portrayed on amulets because the insect was considered a symbol of the cycle of birth and rebirth.

Renaissance Cameo



Detail, Cameo Portrait of Bona Sforza
Sardonyx, gold; 2.8 x 1.7 in.
Giovanni Jacopo Caraglio, c. 1540

Public domain
Metropolitan Museum of Art

Cameos often depict portraits of famous people or religious, historic and mythological scenes. They first became popular in the first century CE, and again enjoyed renewed interest during the Renaissance and beyond.

This cameo was commissioned by the Queen of Poland, a surviving member of the powerful House of Sforza, which had ruled the Duchy of Milan, Italy since 1447.

Modern Cameo



Beautiful Galatea Cameo Bowl
10 x 9 x 3.5 in.; 2 lb.
Heinz Postler, c. 1975

Idar-Oberstein, Germany
Michael Scott Gem Collection

This cameo-style bowl shows the agate form of chalcedony quartz. Cameos are carvings in **relief** set against a background of contrasting color. This is the opposite of intaglio carving which consists of sunken rather than raised engraving.

Agate and sardonyx shell are especially suited for cameos because of their naturally occurring bands of color which allow the cameo to be carved from a single stone.

19th-20th Century House of Fabergé



Oyster Shell Bonbonnière
House of Fabergé

The McFerrin Collection
Courtesy of the Houston Museum of Natural Science

Fabergé was a Russian jeweler known for fine craftsmanship and creative designs. This carved oyster shell bonbonnière has a fluted texture. It is hinged on the shell's straight edge so that the two halves can open to insert a small treasure or piece of candy inside.

The edges of both the upper and lower half-shells have a gold rim set with tiny diamonds.



Jade Egg
House of Fabergé

The McFerrin Collection
Courtesy of the Houston Museum of Natural Science

Fabergé designed more than 50 jeweled eggs from 1885 to 1917. Ten Imperial Eggs were commissioned by Czar Alexander III of Russia as annual Easter gifts for his wife, Czarina Maria Feodorovna. Another 40 eggs were created during the reign of his son Nicholas II as gifts for his mother and his wife. Peter Carl Fabergé had total freedom to design the eggs, with only one requirement—that each contain a "surprise." The above egg was carved from nephrite jade.

Jewelry and Decorative Art



Dragonfly Ornament, c. 1897-1898
René Lalique, French (1860-1945)
Gold, enamel, chrysoprase, moonstones and diamonds

Photograph by Sprk1g

René Lalique was an innovative Art Nouveau artist who broke from tradition by combining both precious materials such as gold, opals and diamonds with non-precious mother of pearl, horn and enamel in his work. He chose materials based on how their properties of light and color would enhance his chosen subject. This delicate *broche* (pin) combines the carved head of a woman with the body and wings of a dragonfly.



Carnelian Poppy
Günter Petry, Idar-Oberstein, Germany

Photograph © Harold and Erica Van Pelt
Michael Scott Gemstone Collection

Günter Petry's works are made from precious gem materials (ruby, sapphire, emerald and diamonds) as well as gold, silver and enamel. His subjects range from delicate flowers to sculptures of people and horses.

Carnelian is a brownish-red mineral. It was used as a semi-precious gem material in amulets and jewelry in ancient Egypt. The stone is believed to symbolize warmth, energy, courage and good luck.

Late 20th Century

In the 1960s, Harold and Erica Van Pelt began traveling to a small town in western Germany that has a 500-year history as a center for gemstone carving. Because of the Van Pelt's work as professional gem and mineral photographers, they have been able to visit the studios of many of the great gem carvers there. This gave them an opportunity to admire many beautiful and intricate designs at close range.

The Van Pelt's also traveled to see major European museums—such as the Louvre in Paris, the Victoria and Albert Museum in London, the Hermitage in Saint Petersburg, Russia and the Museo del Prado in Madrid, Spain—where they were able to take thousands of photographs. Later, Harold observed that as a result of this exposure to European masterworks "our designs seem to have a more classical style." Another influence may have been the artistry of Russian jeweler Peter Carl Fabergé, creator of the famous Imperial Eggs for Czar Alexander III of Russia.

Like most artists, Harold Van Pelt has developed his own approach to his creative work. He is adept at seeing the imaginative possibilities in a piece of quartz or agate and works hard to make his vision a reality. But carving does not always go exactly as planned—once Van Pelt lost hundreds of hours of work when a piece he was working on shattered into tiny pieces.

Some sculptors know exactly what their work is going to look like and feel that they are taking a rough piece of rock and releasing that



Rock Crystal Ostrich Egg
Photographed with faceted gemstones

© Harold and Erica Van Pelt

sculpture from the stone. Van Pelt doesn't see it quite that way. As he points out, "You don't know what you have until you're done and the parts are assembled . . . hopefully most of the time you are amazed that it's good or better than you thought it would be."

The ostrich egg above represents one of Harold Van Pelt's most impressive accomplishments.

Gemstone Myths and Legends

Gemstone myths have been passed down throughout history in stories that assigned certain properties to specific gems. Some stones, called **birthstones**, have been associated with a certain birth month. The earliest known mention of birthstones dates back to the biblical book of Exodus which describes a breastplate containing 12 gems, thought to represent either the 12 tribes of Israel or the 12 months of the Roman calendar.

Some gemstone myths appear below, featuring many stones mentioned in this guide. Read these myths, then create a story or poem from your own imagination, starring your favorite gem.

Agate: This stone is typically banded in appearance. It consists of chalcedony and quartz and is believed to endow those who wear it with a bold heart. Ancient Persians believed agate could divert storms. Roman farmers once carried it hoping heaven would grant them bountiful harvests.

Amber: Though technically fossilized tree resin and not a stone, amber is still considered a gem. Amber is affiliated with electricity and light: We derive the word electricity from the Greek name for amber, *elektron*. Amber was once believed to be made of solidified sunlight.

Amethyst: Named after the maiden Amethyst from Greek mythology, amethyst was once considered the stone of royalty. As such, it was more valued than diamonds. Amethyst is believed to help calm the mind. It has been found in many Egyptian tombs that date as far back as 3000 BCE.

Aquamarine: This semi-precious stone was said to be found in the treasure chest of mermaids. Sailors wore it as a good luck charm to ensure a safe and prosperous passage across stormy seas.

Cat's Eye: In Hindu lore, placing a cat's eye on one's "third eye" was believed to increase psychic ability and drive away evil spirits.

Citrine: This variety of quartz was thought to improve creativity, attract wealth, and fight bad energy. It was often used to beautify homes and personal accessories and was popular in the 1920s and 1930s for its warmth and expressiveness.

Diamond: Ancient Roman texts note that Cupid's arrows were tipped with magical diamonds that held the power to reinforce love. April's birthstone is the most famous and desired of all precious stones. Diamonds are the only gemstones comprised of one pure element, carbon.

MODULE THREE: HISTORY OF GEMSTONE CARVING

Its molecules bond in perfect symmetry to make the hardest naturally occurring substance on the planet. Due to these physical properties, diamonds have long symbolized power, strength, innocence, incorruptibility, longevity, constancy, and good fortune. They are valued for their cutting abilities and have many industrial applications, such as cutting and polishing other gems.

Emerald: Romans believed that emeralds had the power to restore vision. Throughout the world, many believe that May's birthstone helps people reveal truth and predict the future.

Garnet: In mythology, garnets are associated with pomegranate seeds. Hades, king of the underworld in ancient Greek mythology, gave garnets to his wife Persephone as a token of safety. As a result, garnets are often given as gifts to travelers, to ensure their quick, safe return.

Jade: In ancient China, it was believed that jade conferred immortality and could ward off evil spirits. It was even thought that jade prevented the body from decaying after death. For this reason, it was used to make burial suits for the royal family of the Han dynasty. These suits used thousands of jade plaques, usually sewn together with gold thread.

Lapis Lazuli: This royal stone of ancient Egypt, lapis was used to make amulets and scarab ornaments. It was said to contain the soul of the gods. During the Renaissance, artists ground lapis to make ultramarine pigment for painting skies and seas.

Moonstone: The geological structure of moonstone causes it to scatter light in a way that resembles moonlight. In Hindu mythology, and in other cultures as well, moonstones are believed to be made of solidified moonbeams.

Opal: Long considered one of the luckiest and most magical of all gems, opals have the ability to show many colors. No two opals are alike. According to Arabian legend, opals fell from the heavens in flashes of lightning. A myth states that if one finds an opal that has a great amount of color (known as "fire"), its owner can expect to come into money.

Pearl: The ancient Japanese believed pearls were created out of the tears of mermaids, nymphs and other mythical beings. Ancient Chinese civilizations believed black pearls were formed inside a dragon's head. To collect the pearls, one had to slay the dragon.

Peridot: Folklore suggests that finding a peridot during the day was not easy. However, its dazzling hue could be spotted easily at night with the help of a lamp. It became a practice to mine peridots only after sunset. Romans christened this gem the "evening emerald."

MODULE THREE: HISTORY OF GEMSTONE CARVING

Quartz: Long ago, people believed rock crystal was a compact form of ice. The Greek word *krystallos* means "clear ice." Futures have been foretold by magicians from all over the world by gazing into a globe made of rock crystal.

Ruby: The symbolism of this gemstone has long been linked to fortune and healing. Because of the stone's likeness to the color of blood, numerous early cultures believed that rubies held the power of life. Nearly all rubies have inclusions (or imperfections), but most jewelry lovers believe they only add to a stone's personality.

Sapphire: Greek and Roman nobility believed that September's birthstone protected wearers from harm. Sapphire signet rings were popular in royal courts for their legendary ability to bestow wisdom and inner peace. Many ancient civilizations believed the world was set upon a gigantic sapphire which painted the sky blue with its reflection.

Spinel: According to legend, spinel can help bring energy to its owner. It is also believed to encourage new ways of thinking and facing life's challenges. It exists in a variety of colors and can also appear colorless. For hundreds of years, spinel gemstones were mistaken for rubies. Two gems on the English Crown jewels—including the Black Prince Ruby—actually turned out to be red spinels!

Tanzanite: This semi-precious stone is believed to stimulate intuition and perception.

Tourmaline: According to Egyptian legend, tourmaline acquired its array of colors when it left the Earth's center and passed through a rainbow. It commonly occurs in pink, blue, yellow, green, and red.

Topaz: Early gem cutters cited topaz as a stone capable of protecting against disease and untimely death. It has the reputation of strengthening the intellect, lessening anger and sadness, and eliminating cowardice.

MODULE THREE: HISTORY OF GEMSTONE CARVING



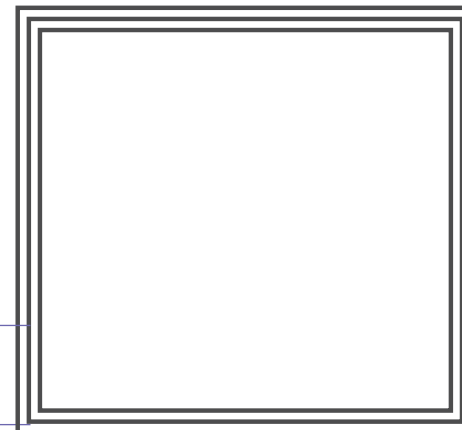
MODULE THREE ACTIVITY: MY GEMSTONE STORY

My Gemstone Story

Write your own story or poem featuring your favorite gemstone as the main character or theme, using inspiration from what you have learned in this introduction to gems and gemstone artworks. Give it a title and illustrate your writing with an image of your chosen gemstone in the frame at right.

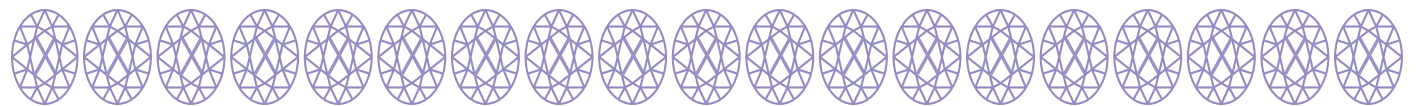
TITLE: _____

AUTHOR: _____



MODULE FOUR:

THE ART OF LAPIDARY





© Harold and Erica Van Pelt

INTRODUCING MASTER GEMSTONE CARVER **HAROLD VAN PELT**

Thousands of people have admired the work of Harold Van Pelt. Along with his wife Erica, the Van Pelt's are considered the finest gem and mineral photographers in the world.

Few people are aware of Van Pelt's extraordinary ability as a fine art gemstone carver. In 2010, Bowers Museum presented the first comprehensive exhibition of his extraordinary work.

For more than 35 years, Van Pelt has been perfecting the art of carving quartz and its many varieties. Hundreds of hours go into each multi-faceted, fluted and textured vase, hollow container, sculpture and vessel. Many are accented with gold and semi-precious stones.

Working stone down to paper-thin walls brings out the natural quality and gives quartz the transparency of glass. Transformed by one man's vision and skill from a solid stone to an incredibly delicate work of art, the gemstone carvings of Harold Van Pelt have to be seen to be believed.

“WHEN YOU START TO CARVE,
YOU HAVE AN **INSPIRATION** AND A
SKETCH OF WHAT YOU WANT TO MAKE . . .

**AFTER YOU FINISH A PROJECT,
YOU WANT TO DO SOMETHING MORE
COMPLICATED THE NEXT TIME
TO SEE IF YOU CAN DO IT.”**

—HAROLD VAN PELT, MASTER CARVER
IN AN INTERVIEW WITH
DR. PETER KELLER, BOWERS MUSEUM



Rock crystal

© Harold and Erica Van Pelt

Choice of Gem Materials

Quartz is a hard mineral composed of silicon and oxygen atoms. It is found in six-sided crystals that can weigh as much as several tons. Quartz is the second most prevalent mineral in Earth's crust, but finding quartz crystals with the size, form and clarity suitable for carving requires luck and stamina. Sources include the Alps, the polar Urals and Brazil. Quartz is the perfect medium for an artist equal to the technical challenges of producing one-of-a-kind works of art.

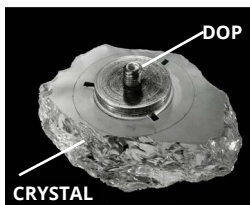
A stone's hardness is measured from 1 to 10 on the Mohs scale. Diamonds are the hardest stone, with a score of 10. Quartz—with a hardness rating of 7— defines the boundary between stones that are considered hard and those that are considered soft. Anything higher than a rating of 7 is a hard stone. Anything less than 7 is a soft stone.

On its own, quartz does not have any color. Clear quartz is known as **rock crystal**. As with other gemstones, quartz can be found in almost any color of the rainbow, with each variety producing a different type of gemstone. This is due to very small amounts of impurities it may contain. Gemstones that are part of the quartz crystal family include:

- **Amethyst** (purple)
- **Citrine** (yellow)
- **Rose Quartz** (pink)
- **Smoky Quartz** (black)
- **Chalcedony** (translucent or opaque white, gray, grayish-blue or brown)

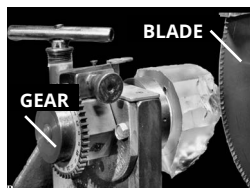
Because quartz is so common and so beautiful, it's easy to understand why it was the gem of choice for early lapidary workers. On the following pages, we will see the process used by master gem carver Harold Van Pelt to create a hollowed-out ostrich egg made of rock crystal and gold.

MODULE FOUR: THE ART OF LAPIDARY



A. A sawed block of rock crystal showing its **cross-section profile**.

The crystal will be attached to a **dop** stick using strong adhesive glue to hold it in place during the carving process.



B. The rock crystal block is mounted on a rotatable tool that will saw off strips to achieve a **cylindrical** profile. The gear allows rotation by an equal number of degrees for each cut made by the diamond blade on the wheel at right.



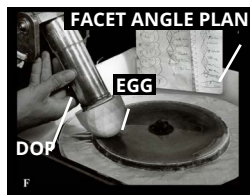
C. After sawing, the rough egg-shaped profile is ground by hand against the diamond-charged **turbine** wheel.



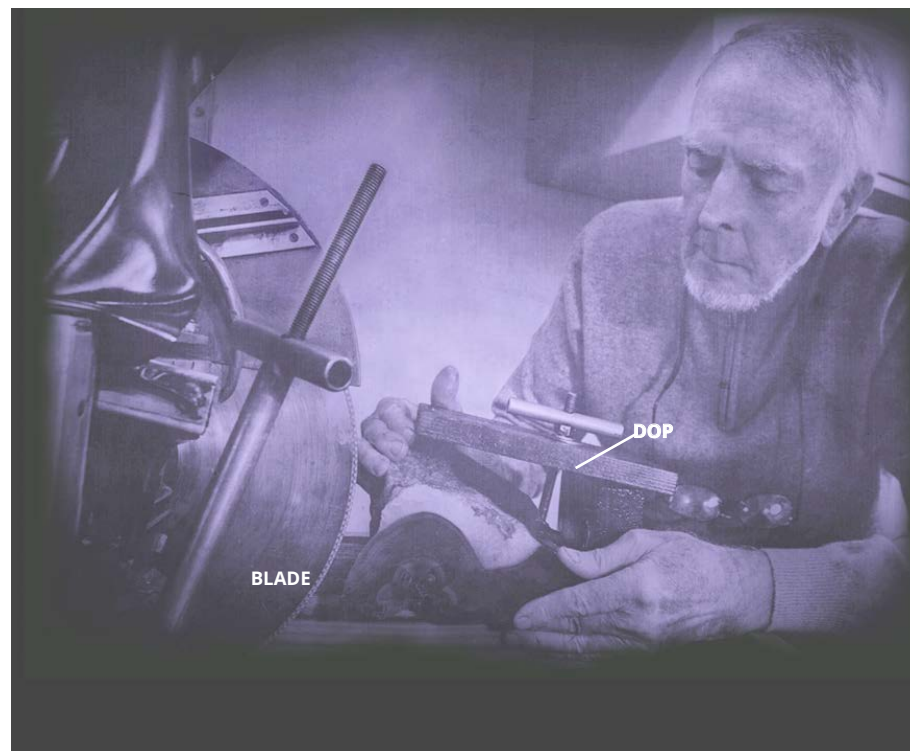
D. Accurate **profiling** is accomplished using a grinding wheel.



E. Marks left from profiling are made smooth by **grinding** using the diamond wheel. Great care must be taken not to overgrind. This step establishes the basic shape for **faceting**.



F. Facets are ground using a large, custom-designed machine with an 8 in. diamond disc.



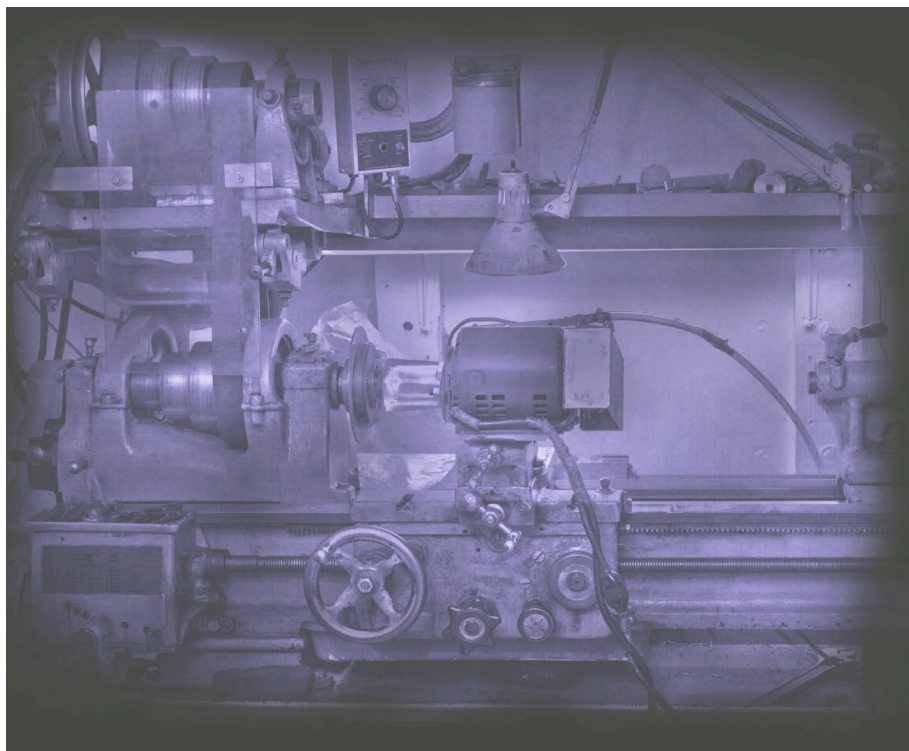
© Harold and Erica Van Pelt

Gemstone Carving Process: Cutting and Polishing

Gemstone faceting and carving can increase the value of gem materials. It can help transform rough or imperfect gem materials into clean, faceted or carved gems. The process takes patience, time, skill and special tools. These images show master carver Harold Van Pelt working in his studio with rock crystal to form a hollow egg-shaped work of art. Suitable tools did not exist at the time to accomplish this design, so Van Pelt made or repurposed his own tools and machinery.

Images © Harold and Erica Van Pelt

MODULE FOUR: THE ART OF LAPIDARY



© Harold and Erica Van Pelt

Harold Van Pelt enjoys a challenge. "The first egg I made had a couple hundred facets and it was satisfying, so I made a larger one" he stated in an interview with Dr. Peter Keller, President of Bowers Museum.

Van Pelt went many steps further and hollowed the egg shape out, with walls that were only three to four millimeters (approximately 1/8 in.) thick. The finished egg contains 416 triangular facets.

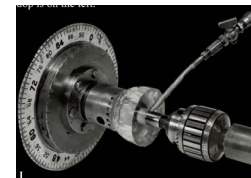
G. Facets are pre-polished on a wooden lapidary cutting and polishing wheel commonly known as a **lap**. (The surface of the lap is lubricated with oil. Polishing uses a diamond compound to provide **grit**.)



H. The stone is turned around using a **lathe** to help ensure alignment when **hollowing out** the inside of the egg. The dop originally inserted in the crystal is replaced with a new dop whose **diameter** is greater.



I. The narrow **core** is knocked out to leave a cylindrical recess, or open space in the center of the crystal. This step is followed by two other core **drillings**, each of greater diameter.



J. The rough interior is now cut by the use of a suitable diamond wheel attached to the post at right, while the egg itself is slowly rotated.



K. The inside of the egg is hollowed out before the egg is removed from the lathe. A series of felt wheels charged with fine cerium oxide powder provides the final polish.



The approximate thickness (1/8 in.) of the walls of Harold Van Pelt's faceted crystal egg.



Images © Harold and Erica Van Pelt

MODULE FOUR ACTIVITY: SOAP CARVING PROJECT

SUPPLIES

Bar of Ivory Soap



Potato Peeler



Plastic Knife



Cutting Surface



Scissors



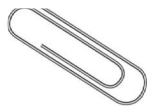
Pencil



Brush



Paper Clip



- 1 Use a potato peeler to scrape the logo off your bar of soap.
- 2 With a pencil, trace your design onto the bar of soap. Try to choose designs that are simple with no thin shapes that could easily break off during the carving process.
- 3 Use a plastic knife to trim off excess corners of your soap.
- 4 Brush away any soap shavings.
- 5 Continue to refine the shape and smooth the edges of your design using tools such as the potato peeler and plastic knife.
- 6 Carve details in the surface of the soap using a paper clip or other tools you have on hand.

1



2



3



4



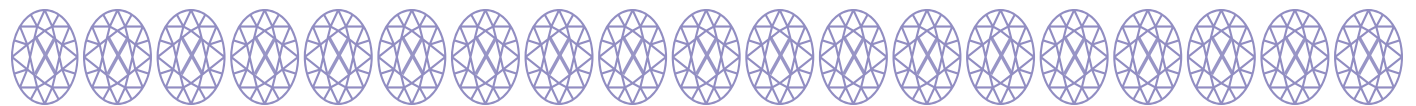
5



MODULE FIVE:

MASTERWORKS OF

HAROLD VAN PELT



Clear Rock Crystal



Rock Crystal Faceted Egg with Aquamarine Base
This hollow faceted quartz egg sits on a 363-carat aquamarine pedestal which in turn rests on four 5-carat aquamarine **cabochons**.

© Harold and Erica Van Pelt

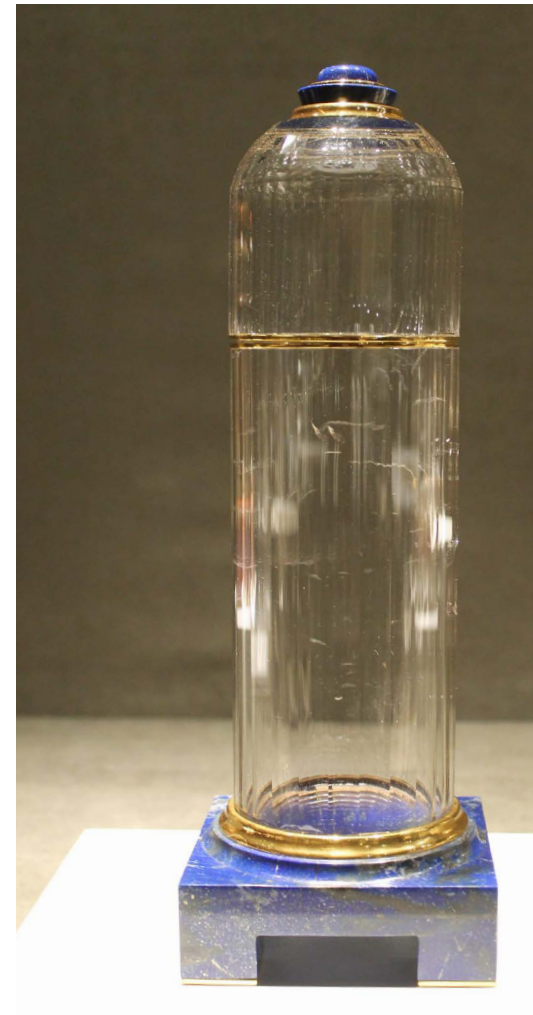


Petrified Wood and Quartz
Two parallel hollow quartz jars with a petrified wood base and handle.

© Harold and Erica Van Pelt

Pieces carved by Harold Van Pelt in clear quartz (rock crystal) often create textured transparent surfaces using triangular or vertically ribbed facets in combination with other semi-precious stones and gold.

The examples on this page use aquamarine and lapis lazuli gemstones as well as **petrified wood** for their pedestals and accents. Petrified wood is the name given to fossilized remains of trees or tree-like plants that have been replaced by silica during the process of mineralization.



Quartz Container with Lapis Lazuli Base
Slender quartz container with parallel facets on lapis lazuli base with a lapis cabochon on top.

© Harold and Erica Van Pelt

Amethyst



Amethyst Crystal
© Harold and Erica Van Pelt

Amethyst Cup
with Amethyst Crystals
Carved amethyst cup has 24
flutes on the body
and the base.
© Harold and Erica Van Pelt



Amethyst is a variety of quartz that ranges from light lilac to rich purple. Iron impurities are what give these crystals their beautiful color. This gemstone is named after Amethyst, a figure from Greek mythology.

Amethyst and other forms of crystalline quartz often form as geodes, hollow rocks that look plain from the outside but contain beautiful purple quartz crystals hidden inside. Geodes form when a cavity (empty space) allows the elements carbon dioxide and water to become trapped in streams of lava, creating "bubbles" inside the rock. The cavity fills up with mineral-rich water containing trace amounts of iron. Over time, this process generates six-sided (hexagonal) crystals.

Quartz with Inclusions



Harold Van Pelt spotted this rare, naturally occurring inclusion in the shape of a hummingbird. This quartz container has a silver lid with a chalcedony flower.

© Harold and Erica Van Pelt

Inclusions are impurities trapped inside another mineral during its formation. **Izoklakeite** is a metallic grey microcrystal. **Rutile** is a gold or reddish-brown mineral consisting of titanium dioxide. Naturally occurring "needles" in quartz crystals add to their value and interest.



Izok Hollow Quartz Skull

A life-size skull that contains rare *izoklakeite* inclusions. The original quartz crystal weighed over 250 pounds. The finished two piece skull with a jaw hinge that opens and closes weighs 6.5 pounds.

© Harold and Erica Van Pelt



Rutile Hand

This carving is a life-size replica of Erica Van Pelt's hand in rutilated quartz. These beautiful golden needles trapped during the crystallization process are often called "angel hair."

© Harold and Erica Van Pelt



Agate



Agate Rhyton

This wine cup or **rhyton** is carved from agate, a microcrystalline variety of quartz found most commonly in volcanic areas. Microcrystalline means that its crystals are microscopic. This drinking vessel has a gold capped nose over a hole to restrict the flow of wine.

© Harold and Erica Van Pelt

Oval Agate Box with Cover

Oval lidded box carved from a single piece of un-dyed agate. The agate displays subtle fine banding, typical in Brazilian agate.

© Harold and Erica Van Pelt

Free-form Agate Dish with Lid

When sliced, agate gives a banded appearance with a variety of colors. This design follows the natural contours of a Brazilian agate nodule,

© Harold and Erica Van Pelt



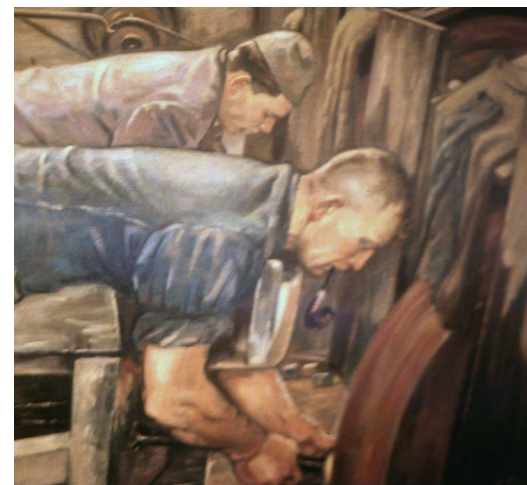
Past, Present and Future

As seen in this detail from a 19th century mural, stone cutters in the towns of Idar and Oberstein in western Germany had to lay face down and summon the strength of their entire body to grind the large stones extracted from nearby quarries. Although today's methods are less physically demanding, great dedication to **craft** is characteristic of the artists of the region whose work inspires gem carvers from around the world.

Creative artists are often inspired by the work of other artists. They study techniques from the past to understand how they were made, then often try to improve upon what has gone before by adding their own artistic vision.

An example of this can be seen in the story of the agate rhyton, or wine cup, shown on the cover of this guide. A similar piece was discovered about 1500 years ago inside a tomb from the Tang Dynasty (618-907 CE). With its characteristic animal-head shape, this drinking vessel was similar to others found in Greece, Rome and Persia. This unique design may have made its way east to China through the Silk Road, an ancient network of trade routes linking Europe and the Far East.

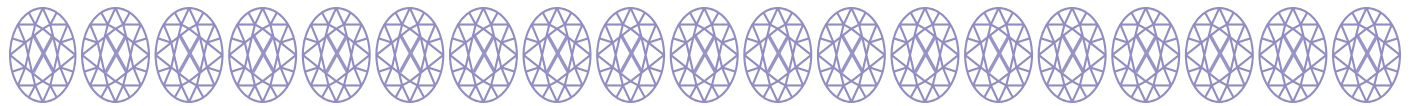
When present-day gem enthusiasts from California saw the rhyton in China, they commissioned a similar piece to be made by a gemstone carver in Idar-Oberstein. Around the same time, master gem carver Harold Van Pelt—who had also seen the unusual piece in a museum—was inspired to carve his own agate wine cup, adding innovations that would distinguish it from the others by refining the animal's facial features, introducing gold trim and hollowing out the vessel—as he believed the original would have been. Artists who create ground-breaking work do not just learn from the past, but use it as a springboard to experiment with new ideas, materials and techniques that will forge a path to the future.



19th century mural of early stone grinders
Edelstein Museum, Idar-Oberstein, Germany

MODULE SIX:

REFLECTION





Portrait of Erica and Harold Van Pelt

© Harold and Erica Van Pelt

Reflection

One of the traits of successful artists is their ability to **improvise**. When Harold Van Pelt was asked why he chose rock crystal and varieties of quartz as the primary material for his gemstone carvings, he simply answered: "It was available."

Living in California, the Van Pelts searched for large crystals from old collections. They went to quartz mines in Arkansas where they were able to buy and collect pieces at reasonable prices. When they needed to travel to Brazil for their work as professional gem photographers, they discovered there was a lot of agate they could acquire there.

When special equipment was required to realize their vision for a gemstone carving project, the tools they needed did not exist. Harold felt he had no other option than to build his own tools and or adapt equipment designed for other uses to accomplish his designs. When he required a very slow lathe and a large grinder to extract minerals from the stone that surrounded them, he bought a wood lathe built in 1925 and converted it to accomplish his goal. With an artist's eye and a keenly developed sense of form, structure, design and color, he brought his creative ideas to life.

Many people may have waited until they could obtain the perfect materials and equipment to begin working on their art. But Van Pelt did not wait. Resourcefulness—making use of what you have or can find—is a sign of creativity. In fact, many artists credit having "constraints" (things that limit one's possibilities) as one of the greatest boosts to innovation. Having to imagine new ways to solve a problem often turns out to be a great thing. A chef who runs out of a key ingredient has to improvise. Actors who suddenly forget their lines must think on their feet. They improvise, and often the results turn out even better than the original plan.

So, the next time you encounter a roadblock, don't wait for the perfect conditions in order to move forward. Look around you and fire up your creative problem-solving skills to improvise.

Collecting and Curating

Artifacts of artistic, cultural, historical or scientific interest are often collected by museums who share them with the public by planning and organizing permanent or temporary **exhibits**. An exhibit can be a large or small **collection** of objects displayed in a gallery, on a single surface, or online.

This guide to gemstone carving was based on an exhibit of the work of master gemstone carver Harold Van Pelt. It brings together a collection of his finest work that has been **curated** to tell a story that will enrich and enliven the experience of seeing and learning something new.

We all know what it means to "collect" things. But what does it mean to curate a collection? What makes a group of objects more than just a bunch of stuff? Museums curate collections by taking a perspective based on an artistic, cultural or scientific theme. Items are selected to develop the theme in an interesting way that has the potential to engage a specific audience and increase their understanding and appreciation of items chosen for display. The point of view of an exhibit of gemstones, for instance, could be organized by the work of a specific artist or group of artists, time periods, countries of origin, materials or techniques used, or categories of objects such as jewelry, vases, or sculptures.

In the capstone project for our study of gemstone carving, students will design their own mini-museum in order to share something that is interesting and meaningful to them with their classmates.

Photographing Objects and Works of Art

Erica and Harold Van Pelt are among the finest gem and mineral photographers in the world. They have developed an "artist's eye" and have perfected the arts of lighting and composition. Professional photographers use special lenses and equipment, but even amateur photographers can benefit from a few tips and a willingness to experiment.

Photography Tips

- Choose items that you feel will make an interesting image.
- Arrange your subject on a flat surface. Try hanging a large piece of seamless white paper or cloth behind and underneath your product.
- Position yourself as close as you can while still keeping your subject in focus. If you are too far away, you will lose detail. If you are too close, your picture may look fuzzy rather than sharp.
- In planning your composition, remember the **rule of thirds**. Items arranged **asymmetrically** look more interesting.
- If you are taking photos outside using natural light, the best times to do so are around 10am in the morning or 3 to 4 in the afternoon when the light is softer. This is preferable to shooting when the sun is directly overhead as that can create harsh shadows.
- If you are taking photos inside, position a lamp on either side of your subject (hidden outside the photo frame). Do not use your camera's flash.
- Experiment taking photos of your subject from several points of view to see what results in the best image. Avoid distracting backgrounds by paying close attention to what you see through the camera lens.
- Have fun!

MODULE SIX: REFLECTION



Natural Movement III
Smoky quartz with rutile
on obsidian base
Bernd Munsteiner, 1987
Idar-Oberstein, Germany
© Harold and Erica Van Pelt
Michael Scott Gem Collection



Rhythmus II
Amethyst quartz from Brazil
on marble base
Bernd Munsteiner, 1989
Idar-Oberstein, Germany
© Harold and Erica Van Pelt
Michael Scott Gem Collection



Impressions
Smoky quartz
on frosted quartz base
Bernd Munsteiner, 1988
Idar-Oberstein, Germany
© Harold and Erica Van Pelt
Michael Scott Gem Collection



Meditation
Citrine quartz and gold cone on a
silver and smoky quartz base
Bernd Munsteiner, 1987
Idar-Oberstein, Germany
© Harold and Erica Van Pelt
Michael Scott Gem Collection

Pretend for a moment that you have been asked to create an exhibit featuring the gemstone carvings shown above. The designs were created by gem carver Bernd Munsteiner of Idar-Oberstein, Germany as part of a series of "fantasy cuts" (carvings made on the back of gemstones). The images were artfully photographed by Harold and Erica Van Pelt, and are part of the Michael Scott Gem Collection, one of the world's largest gem collections outside of those of royalty. Below are some questions you might ask yourself as you plan your exhibit. What else do you see?

- What is special about these pieces?** • They are all modern rather than traditional designs. They feature simple geometric shapes.
- What connects them to each other?** • They are all carved by the same artist as part of his "fantasy cut" series featuring a reverse intaglio technique that enhances the quality of light reflection.
- What sets each one apart?** • Each is cut from a different variety of quartz crystal whose mineral inclusions determine its color.
• Each of the pedestals is unique, using materials that echo the simple lines of the sculptures they display. Each is photographed with a dramatic contrasting background that enhances its design.

What do you treasure?

Now it's your turn! What is special to you that you would like to share with others?

Do you have art projects that you are proud of? Do you collect rocks, coins, shells, key chains, stickers or candy wrappers? What are your all-time favorite toys, books or video games? What things have you built with clay or Legos that you think are pretty cool? Any science experiments to share? Or have you planted a cactus garden? Anything that is meaningful to you is probably something others might enjoy as well.

Each is a potential idea you can use to **design your own museum**. Our Capstone Project for this guide will show you how and challenge you to present your unique perspective to your friends, family or classmates. Worksheets are provided to help walk you through the process. You can work on this project by yourself or choose to collaborate with others. Your exhibit can be "in-person" or virtual; inside or outside. *Let's get started!*

First, here is a list of 6 steps we will take. These will serve as a guide, but there are no "right" or "wrong" ways to approach this project.

- Step 1. Brainstorm:** Think of at least 3-5 different ideas for the "Museum of You." Jot them down.
- Step 2. Choose your best idea:** Evaluate options. Select one idea and give your museum a name.
- Step 3. Decide what "artifacts" to include:** You should plan on having six or eight objects in your gallery. If you can, take a photo (remember the tips you learned on page 43). Or make a quick sketch of each item. Write a short description of each artifact. How do these objects relate to each other? How are they different?
- Step 4. Design and prototype your gallery space:** Where will you exhibit your collection? Create a 2-D drawing or 3-D cardboard prototype. Think about how you will sequence sharing these items. What do you want people to see first? Last? An exhibit in some ways is like a story—it has a beginning, middle and end.
- Step 5. What will people learn?** What can your audience learn from the objects and ideas you share? What questions might they have? How might your audience engage or interact with your exhibit or connect it to something in their own experience?
- Step 6. Create a poster or 1-minute video to announce the opening of your exhibit!**

MODULE SIX CAPSTONE PROJECT: DESIGN YOUR OWN MUSEUM

Step 1. Brainstorm ideas for your museum

- Things I collect

- My favorite hobbies

- My favorite sports / games

- Things I make

- My favorite music

- My favorite animals

- Things I do for fun

- My favorite books / movies

- My favorite characters

MODULE SIX CAPSTONE PROJECT: DESIGN YOUR OWN MUSEUM

Step 2. Evaluate options and choose your best idea

Ask yourself the following questions about the things you listed in Step 1 to try to narrow your ideas down:

1. What are my top 3 categories of favorite things listed in Step 1 that mean the most to me?

A. _____ B. _____ C. _____

2. How might I share those favorite things with others?

Category A. _____

Category B. _____

Category C. _____

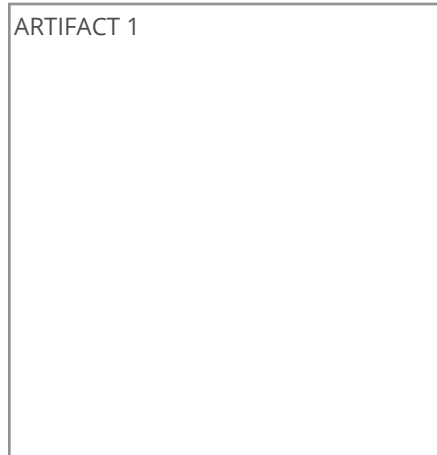
3. Picture how your exhibit might look like in each of those categories. Which would be the most interesting and original exhibit and why?

4. What I will name my museum:

MODULE SIX CAPSTONE PROJECT: DESIGN YOUR OWN MUSEUM

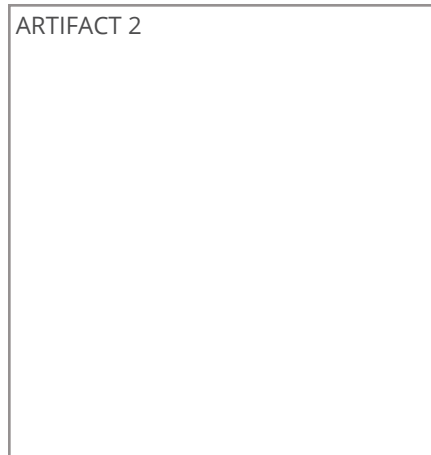
Step 3: Decide what 6-8 things (artifacts) to include

ARTIFACT 1



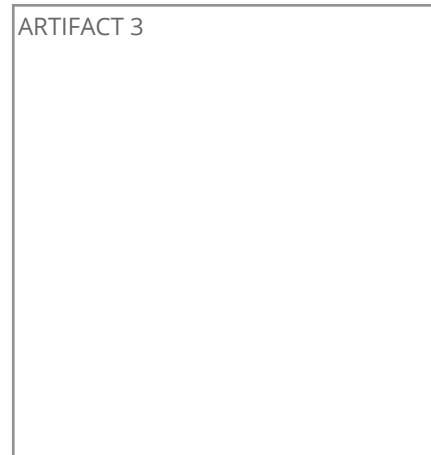
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ARTIFACT 2



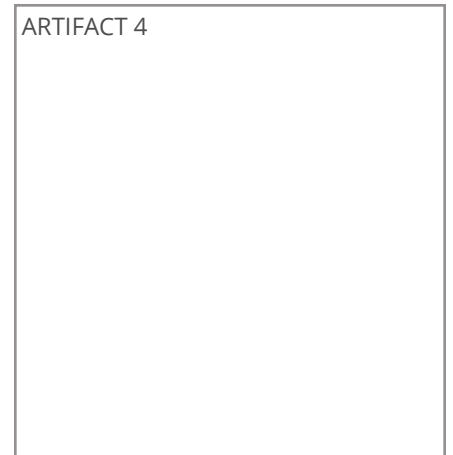
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ARTIFACT 3



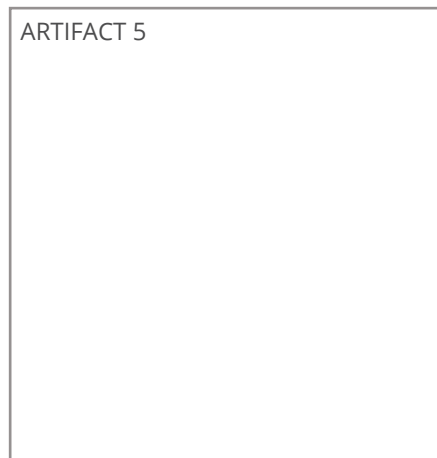
DESCRIPTION

ARTIFACT 4



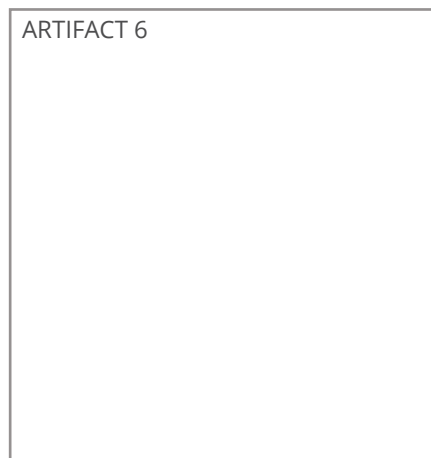
DESCRIPTION

ARTIFACT 5



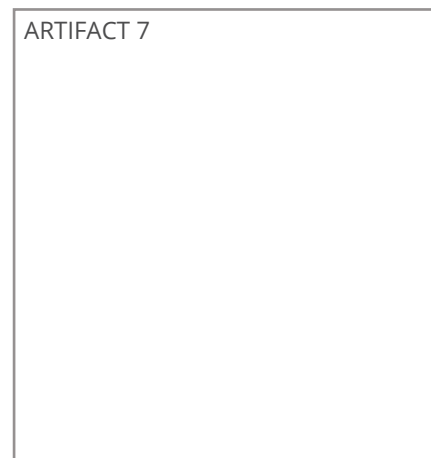
DESCRIPTION

ARTIFACT 6



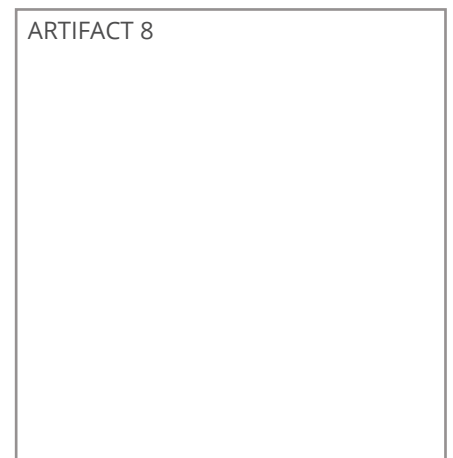
DESCRIPTION

ARTIFACT 7



DESCRIPTION

ARTIFACT 8



DESCRIPTION

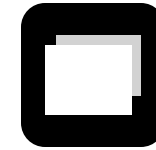
MODULE SIX CAPSTONE PROJECT: DESIGN YOUR OWN MUSEUM

Step 4: Design your gallery space

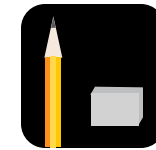
Include a diagram of how your artifacts will be displayed. Add arrows showing how your audience will move through the space. Will your objects be displayed on walls, floor or tabletop surfaces?



You will need:



Paper
or cardboard



Pencil and
eraser



Colored pencils
or markers

MODULE SIX CAPSTONE PROJECT: DESIGN YOUR OWN MUSEUM

Step 5: What will my audience learn or experience from seeing my museum/exhibit?

NAME OF STUDENT: _____

MY MUSEUM: _____

WHAT DO I HOPE THE AUDIENCE WILL LEARN FROM SEEING MY MUSEUM / EXHIBIT?

WHAT QUESTIONS MIGHT THEY HAVE?

HOW DO I HOPE IT WILL MAKE THEM FEEL?

IN WHAT WAYS CAN MY AUDIENCE ENGAGE WITH THIS EXHIBIT OR CONNECT IT TO SOMETHING IN THEIR OWN LIFE?

HOW DID I FEEL SHARING SOMETHING MEANINGFUL TO ME WITH MY FAMILY / FRIENDS / CLASSMATES?

MODULE SIX CAPSTONE PROJECT: DESIGN YOUR OWN MUSEUM

Step 6: Create a poster or video to announce the opening of your exhibit

NAME OF STUDENT: _____

MY MUSEUM: _____

HOW I WILL LET PEOPLE KNOW ABOUT MY MUSEUM:

POSTER VIDEO OTHER

WHAT WILL THEY NEED TO KNOW?

- TITLE OF EXHIBIT: _____
- DATE / TIME IT WILL BE AVAILABLE TO SEE: _____
- WHERE IT WILL BE? (CLASSROOM? / ONLINE?) _____
- WHO IS THE AUDIENCE? (KIDS, ADULTS, EVERYONE?) _____
- WHY THEY SHOULD SEE IT: _____

OTHER IDEAS:

GLOSSARY

Agate: A mineral formation typically with colored bands. Agate consists of chalcedony and quartz as its primary components.

Alluvial mining: An old-style but still-used method of mining riverbeds for mineral deposits. Rocks are broken down by weathering and the component minerals are free to be reconcentrated in streams and valleys.

Amulet: An ornament or small piece of jewelry thought to protect against evil, danger or disease.

Assymetry: When two halves of a composition or an object are not identical on both sides of a central axis.

Birthstones: Gemstones popularly associated with the month or astrological sign of one's birth.

Cabochon: A pillow-shaped gem that is polished but not faceted.

Carat: The standard measure of weight for precious stones. The weight of a 1-carat diamond would be equivalent to 1/5 gram.

Collection: A group of things that are related in some way.

Core: The innermost section of the Earth, beneath the Earth's crust. It consists of a solid inner layer of metal, and an outer layer of hot magma is known as the mantle.

Craft: The act of making something with skill and experience.

Curate: To select what one thinks is the best from a group of items.

Crust: The hard, outer layer of the Earth, where all known life exists.

Crystal: A mineral with a distinctive shape, such as a cube.

Element: One of 118 known substances that make up all known materials, including minerals.

Erosion: Breakup and movement of pieces of rock called sediments by water, wind or weather.

Exhibit: A public display of art or objects.

Extrusive: An igneous rock that has formed from lava that flows down the side of an erupted volcano, then quickly cools and solidifies.

Facet: The cut face of a gemstone.

Gems are beautiful, rare and durable. They originate from nature: rocks, plants and animals.

Gemstones: Rocks or minerals that have value when cut and polished. Includes precious (highly valuable) and semiprecious (less valuable) stones.

Gemology: The study of natural gems—such as diamonds, colored stones and pearls—as well as their synthetic counterparts.

Gem materials: A gem, or gemstone, is a type of material that is capable of being cut and polished for use in jewelry or other ornamental applications.

Geode: A rock with an open cavity filled with mineral crystals.

Geometry: A branch of math that focuses on the measurement and relationship of lines, angles, surfaces, solids and points.

Hardstone: Stones that rank #7 or higher on the Mohs scale of hardness, which ranges from #1 (talc) to #10 (diamond)

Hollow out: To remove the inside of something.

GLOSSARY

Igneous: A type of rock that is formed by the cooling of magma or lava, either deep inside the Earth or from eruption of a volcano.

Improvise: The activity of making or doing something spontaneously that was not planned beforehand, using whatever can be found.

Inclusions: In geology, any material trapped inside a mineral during its formation.

Influence: to have an effect on someone's thinking or behavior.

Intaglio: A method in which a design is engraved on the surface of a stone or metal. Reverse intaglio is a method in which the design is engraved on the back of a translucent or transparent surface so that it can be seen from the front.

Intrusive: An igneous rock formed when magma cools slowly below the Earth's surface.

Lapidary: The art of cutting, polishing and carving rough stones into gems for jewelry or decorative art. From the Latin "lapis" or "stone".

Lap: Cutting and polishing wheels used in lapidary.

Lava: Magma that has erupted at the Earth's surface.

Lathe: A machine tool that rotates a workpiece about an axis to perform various operations such as cutting, sanding, drilling and turning, with tools that are applied to the piece to create an object with symmetry.

Lode mining: Extracting minerals that are embedded or deposited between layers of rock.

Luster: The way light reflects off the surface of a mineral.

Magma: Molten rock created in the upper mantle, deep below the surface of the Earth.

Mantle: The middle layer of the Earth. The inner mantle is made of liquid rock. The outer mantle is made of rock that has the consistency of toothpaste.

Metamorphic: Type of rock formed when heat and pressure change the structure of rock that already exists.

Minerals: The basic building blocks of rocks. Minerals are naturally occurring crystals, made up of specific combinations of elements.

Mohs scale: Scale showing the relative hardness of one mineral to another. Talc is the softest mineral with a value of 1, and diamond is the hardest with a value of 10.

Museum: A site where objects of artistic, cultural, historical or scientific significance are stored and exhibited.

Opaque: Not transparent.

Ore: Rock or mineral from which a metal can be obtained.

Quartz: A colorless, transparent mineral commonly found in Earth's continental crust.

Relief: A technique used in sculpting and carving where sculpted elements stand out from a background of the same material.

Rock: Solid mixture of minerals and other solids. Rocks form in three types: igneous, sedimentary and metamorphic.

Rock cycle: The process by which the Earth transforms igneous, sedimentary and metamorphic rocks into other types of rock.

GLOSSARY

Rockhound: A person who loves to hunt for and collect rocks, gems, minerals and fossils.

Rule of thirds: A structure in which a composition is divided into thirds, both vertically and horizontally. Placing key elements on or at the intersection of two of these imaginary gridlines produces a more interesting design.

Rutile: A titanium mineral that occurs as irregular reddish-brown or gold needle-like inclusions in quartz crystal.

Sedimentary: A type of rock formed by weathering and erosion of existing rocks into small pieces. These sediments are carried downhill and deposited in a basin or body of water where over time they will form compact layers that eventually solidify into sedimentary rocks.

Symmetry: Occurs when two sides of a design are identical mirror images.

Translucent: Semi-transparent; allowing some light to pass through an object.

Transparent: Allowing light to pass through an object so that what is behind it can be clearly seen.

Tumbler: A machine used to smooth and polish rough-cut minerals and rocks into semi-precious gemstones.

Volcano: An eruption of lava and hot gases from within the Earth.

Weathering: When wind, water and air physically break down a rock into smaller pieces or sediments; or when rocks chemically dissolve in water.

REFERENCES AND RESOURCES

LINK TO CONTENT STANDARDS ON BOWERS MUSEUM WEBSITE

CONTENT STANDARDS

The projects and activities in this teacher and student resource guide address California Content Standards for the Arts, English Language Arts, History/Social Studies, Science and Technology.

www.curriculum-standards-gemstone-carvings.com

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8GC_ToC3_Cameo Bowl_Beautiful Galatea_Heinz Postler_Idar-Oberstein, c. 1975. Michael Scott Gem Collection
8GC_ToC4_Portrait of Harold Van Pelt_Duotone_©Harold and Erica Van Pelt
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8GC_ToC6_Ostrich Egg with gemstones ©Harold and Erica Van Pelt
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- Page 12 8GC_Alluvial Mining for Gold and Diamonds in South Africa_PK
8GC_Muzo Emerald Mine in Colombia, South America_PK
8GC_Gem Miner_Mining for Garnets in Tanzania, Africa_PK
8GC_Alluvial Mining for Sapphires in Sri Lanka_PK
- Page 13 8GC_Art Supply Icons_Courtesy, Pam Pease
- Page 16 8GC_Timeline 1_Thumbnail_Ancient Chinese Jade Cong with Human Face Design_Courtesy, Shanghai Museum
8GC_Timeline 2_Thumbnail_Ancient Greek_Minoan Seal Stone_Photo by Andree Stephan_Wikimedia Commons_CC BY-3.0
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8GC_Timeline 4_Thumbnail_Giovanni Jacobo Caraglio_c. 1540 Detail, Portrait Cameo of Bona Sforza_Wikimedia Commons_Metropolitan Museum_Public Domain
8GC_Timeline 5_Thumbnail_Fabergé_Oyster Shell Bonbonnière_

REFERENCES AND RESOURCES

- The McFerrin Collection_Courtesy of the Houston Museum of Natural Science
- 8GC_Timeline 6_Thumbnail_Fabergé Jade Egg_The McFerrin Collection_Courtesy of the Houston Museum of Natural Science
- 8GC_Timeline 7_Thumbnail_René Lalique_Dragonfly *Broche*_Photo by Sparklg_Flickr_Wikimedia Commons_CC BY-SA-2.0
- 8GC_Timeline 8_Thumbnail_Cameo Bowl_Beautiful Galatea_Heinz Postler_Idar-Oberstein, c. 1975. Michael Scott Gem Collection
- 8GC_Timeline 9_Thumbnail_Carnelian Poppy_Günter Petry_Idar-Oberstein, Germany
- 8GC_Timeline 10_Thumbnail_Ostrich Egg with Gemstones_© Harold and Erica Van Pelt
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- Page 18 8GC_Minoan Seal Stone_Photo by Andree Stephan_Wikimedia Commons_CC BY-3.0
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- 8GC_Beautiful Galatea_Cameo Bowl_Heinz Postler, c. 1975_Idar-Oberstein, Germany. Courtesy, Michael Scott Gem Collection.
- Page 20 8GC_Fabergé_Oyster Shell Bonbonnière_The McFerrin Collection_Courtesy of the Houston Museum of Natural Science
- 8GC_Fabergé_Jade Egg_The McFerrin Collection_Courtesy of the Houston Museum of Natural Science
- Page 21 8GC_René Lalique_Dragonfly *Broche*_Photo by Sparklg_Wikimedia Commons_CC BY-SA-2.0 Generic
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- Page 26 8GC_Birthstone_January_Garnet_PK
- 8GC_Birthstone_February_Amethyst_Sudjai Banthaothuk_Shutterstock_760013722
- 8GC_Birthstone_March_Aquamarine_PK
- 8GC_Birthstone_April_Diamond_PK
- 8GC_Birthstone_May_Emerald_PK
- 8GC_Birthstone_June_Pearl_PK
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- 8GC_Birthstone_August_Peridot_Aukita_Shutterstock_1722320869
- 8GC_Birthstone_September_Sapphire_Aukita_Shutterstock_1722320869
- 8GC_Birthstone_October_Opal_PK
- 8GC_Birthstone_November_Aukita_Shutterstock_1722320869
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- Page 32 8GC_Harold Van Pelt using various gem carving tools_© Harold and Erica Van Pelt
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- 8GC_Quartz Container with Lapis Lazuli Base_© Harold and Erica Van Pelt
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REFERENCES AND RESOURCES

RESOURCES

Books and Articles

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WORLD GEMSTONE MAP

<https://www.jewelinfo4u.com/world-gemstone-map>