

Headley-Whitney Museum
Lesson Plan
Diamonds and Gemstones
Recommended for Grades 3-5

Core Content Areas Covered: Arts and Humanities, Reading, Science, Writing, Social Studies

Background Information for Teachers

- ✓ Everyone is familiar with the diamond, commonly used as an engagement ring in Western culture. Its hardness and durability symbolize permanence, important in a promise of marriage.
- ✓ Diamonds are the hardest substance known in nature at 10 on the Mohs' scale.
- ✓ Usually colorless, but can be yellow, green, blue, purple, pink, or even black. These colors are the result of impurities in the stone, but they are highly desired for their rarity. Diamonds are known for their ability to make reflective color from light and their surroundings.
- ✓ Made of pure Carbon. Graphite (pencil lead) is also made of pure Carbon. The difference between the two is the way that nature has compressed the Carbon.
- ✓ The only way to cut or polish a diamond is to use another diamond.
- ✓ 80% of the world's diamonds are unfit to be used as gemstones. They are used in commercial and industrial objects, such as drills, knives, and heavy machinery.
- ✓ Most diamonds today are mined in Africa, about 95% of the world's supply. Africa has also produced most of the world's largest diamond specimens. The old mines in India and Brazil continue to produce a few diamonds, but are much less common.
- ✓ First diamonds came from India. They first came to Europe about 1,000 AD (CE) where they were exclusively owned by kings. They were used in crowns, scepters, and pendants to emphasize the wealth and prestige of their kingdom. It was illegal for women to wear diamonds by order of Saint Louis (King Louis IX of France, ruled 1226-1270). No women wore diamonds until the mid-15th century.
- ✓ The first woman to wear a diamond was Agnes Sorel, the mistress of King Charles VII of France. She popularized the use of diamonds in jewelry and they quickly became a favorite of women for their ostentatious sparkle.
- ✓ The largest known cut diamond, the Cullinan I or the Star of Africa, originally weighed 3,106 carats in its rough form. It was cut into smaller pieces, the largest weighing 530.2 carats.
- ✓ Because of their small size and high value, gemstones can be used as currency. In Nazi Germany, many Jewish families swallowed gemstones in order to keep them in their possession. Later, they could trade or sell them after their escape. The gemstones were the only thing of value that many Jewish families were able to carry with them when they were forced from their homes.

Diamond Formation

- ✓ Diamonds form from Carbon only under very high temperatures and pressures. They form about 120 miles below the Earth's surface.
- ✓ They came to the Earth's surface by ancient volcanoes forming diamond crystals in the volcanic rock, **kimberlite**.
- ✓ Diamonds can easily break off of kimberlite as the result of erosion, water currents, or glaciers, eventually carrying diamonds to the ocean.
- ✓ Raw diamonds are not refractive. The raw stone must be cut to achieve the "brilliance" we associate with diamonds.
- ✓ Today, diamonds are mostly mined in kimberlite fields, but are occasionally found in stream beds, lake shores, or ocean coasts (known as **alluvial sources**).
- ✓ Carbon atoms are structured in a regular lattice formation.

Finishing and Cutting a Gemstone

- ✓ Gemstones are easily cut along the lines of the lattice (**planes of cleavage**). To cut in any other way, a special tool, a diamond saw, must be used.
- ✓ Other effects can be achieved by **rubbing**—which involves grinding two stones against each other in order to make a round or textured surface. **Grinding** is a process where a stone is held against a grinding wheel covered with diamond dust, resulting only with a flat surface. Rubbing achieves greater results, but is much less precise.
- ✓ To **polish** a gemstone, jewelers use the grinding wheel, with a finer grain of diamond dust. This makes the stone more refractive and brilliant.
- ✓ A **facet** on a cut stone is a smooth surface where light can enter the rock. The light is then refracted within the stone and ideally is reflected out the top of the gem, maximizing its brilliance. Facet placement is very important to the overall integrity of the stone.
- ✓ Gemstone size is measured by the **carat**, which equals 200 milligrams. The more carats a stone weighs, the higher its value.
- ✓ Gemstone **clarity** refers to the presence or absence of flaws. There are both internal flaws, **inclusions**, and external flaws, **blemishes**. It is very rare to find a stone with perfect clarity, although most flaws are not visible to the unaided eye.

Recommended Classroom Books and Reading Assignments:

- The Day I Was Rich, by Bill Cosby, ages 5-8
- The Magic School Bus Chapter Book #20: Rocky Road Trip, by Judith B. Stamper. Ages 7-10
- Scholastic Atlas of the Earth, ages 7-10
- Cam Jansen's Mystery of the Stolen Diamonds, by David A. Adler

Classroom Preparation

Materials:

Large Plastic Bin with low sides

Sand

Large Rhinestones (1 per student)

Water

In the plastic bin, place the rhinestones at regular intervals. Then fill the bin with a layer of sand about an inch deep. Place the bin on a table where all of the students will be able to view the display and prop one end of the bin up so that it is slightly tilted. Put the water in a pitcher to the side of the bin.

Lesson Plan

1. Have your students imagine that they are poor servant children in the 17th century in India. Explain that these children have never been to school or slept in a bed and work with their parents every day in difficult field labor. One day, their parents send the children to wash their clothes in a nearby river. At this point, have the children come to the table where you have placed the plastic bin.
2. Slowly pour the water into the bin to make a “river.” As the water moves the sand, the rhinestones will begin to appear. Explain that this is how diamonds were first discovered in India, carried by the water to a new place, or an **alluvial source** of diamonds. Have the students take turns “mining” a diamond so that each student has one rhinestone. Then have them return to their seats.
3. Lead a class discussion about how the servant children’s lives would have changed now that they have discovered a large diamond. How would it impact their families? How would other people perceive the diamond? Remind them that no commoners owned diamonds at the time (they were for kings only). People believed in fate as the will of their god, so what would they perceive of the children? Would they be adored or scorned?
4. Next, discuss the physical properties of the stone. Have them examine their rhinestones. Is it dull or shiny? What shape is it? What color? Is it hard or soft? As they observe the stones, record the properties they observe on the chalkboard.
5. Reviewing your list of characteristics (durability, permanence, light refraction, etc), ask children about what these characteristics might mean. What could these traits **symbolize**? Where have they seen diamonds used in today’s world? Why would a diamond be used in an engagement ring? Why did kings use diamonds instead of queens? Why were commoners forbidden from wearing or owning gemstones?
6. Ask your students to write a short diary entry about how they would feel if they were given a *real* diamond. What would they do with it?
7. As they write, distribute art supplies to your students. Using their rhinestone diamond, have them create an image of how they would use their diamond in today’s world.