

Everything Is Made Of Something
If you can see it, touch it,
taste it, smell it, or hear it,
It's from our Natural Resources.



Dig A Little Deeper
Find Out That



The History of Gold is The History of the World

The ancient western world learned from Egypt how to mine and refine gold. Egypt's incredible gold wealth came from granite hills on both sides of the Red Sea.

One of the greatest gold hunters of all time was Alexander the Great. When he died at the age of 33, he had conquered more lands than any general before him.

The famed Roman Empire was gold poor, and the lure of Spain's gold mines was a major cause of the Punic Wars.



American Indians mined gold as early as 1565, to trade with Spanish explorers in Florida. Without the Gold Rush of 1849, California, Nevada, and Utah might be part of Mexico.

The first documented discovery of gold in America was made by a 12-year-old boy in 1799, in North Carolina.

Nearly 50 pounds of gold is used every day by dentists, requiring the mining of 18,500 tons of ore each day.

For information about minerals in society, contact:
Mineral Information Institute at www.mii.org

Science: How & why is gold mined. Create list of uses.

Music/Drama

Develop and/or perform skits based on gold. Ideas for the skits could come from the reading activities. Sing mining songs such as Clementine or The Fools of Forty-Nine. Have students interpret the meaning of these songs.

Art

Create posters advertising the "Gold Rush". Make a collage of items that use gold. Create a visual dictionary.

Careers

Investigate mining-related careers—metallurgist, geologist, mining engineer, chemical engineer, surveyor, driller, blaster, environmental scientist, cartographer. Invite these professionals to speak to your class. Invite a jeweler with goldsmithing experience to demonstrate the craft.

Science

See page 4 for science activities.

Contains some materials previously provided by BLM, A Golden Opportunity for Science, and The Gold & Silver Institute.

Teachers always have permission to reproduce MII materials for use in their classrooms.

Math: Different measurements. An ounce (Troy) of gold is heavier than an ounce of feathers. Graph price over time. Find out about "Karats."

**Experience the
Gold Rush**

Social Studies

See pages 2 and 6 for timeline and map activities. Research how immigrants affected the Gold Rush in this country. What is the meaning of "Pikes Peak or Bust"? Research gold and the westward expansion. Discuss the uses of gold as a monetary standard.

Math

Explore various measurements for gold such as Troy ounces, and Karats. Check the newspaper for current gold prices and make bar graphs to show how prices fluctuate over time. Discuss the factors that affect prices and the implications of price fluctuations for jewelers and other gold buyers.

Discuss the difference between 18K and 24K gold. Have students clip jewelry advertisements from the newspaper, noting the different karat values and prices. (*A karat is a unit of fineness for gold equal to 1/24 part of pure gold in an alloy. Thus, 24K denotes pure gold, whereas 18K indicates a mixture of 18 parts gold with 6 parts other metals.*)

Reading

Read legends, fairy tales, folk tales, or myths about gold— Midas Touch, Rumpelstiltskin, the search for the seven cities of gold, Jason, Blackbeard's Treasure, Treasure Island, Snow Treasure, stories about Leprechauns.

Language Arts

See page 3 for activities on expressions linked to gold, writing newspaper articles, vocabulary.

**Recreate the Thrill of the
Gold Rush in Your Classroom**
Pan for gold to demonstrate density for science
Experience Gold Rush fever in American History

Timeline

Gold through recorded history

4000 B.C.

A culture, centered in what is today Eastern Europe, begins to use gold to fashion decorative objects. The gold was probably mined in the Transylvanian Alps or the Mount Pangaion area in Thrace.

2500 B.C.

Gold jewelry is buried in the Tomb of Djer, king of the First Egyptian Dynasty, at Abydos, Egypt.

1500 B.C.

The immense gold-bearing regions of Nubia make Egypt a wealthy nation, as gold becomes the recognized standard medium of exchange for international trade.

1350 B.C.

The Babylonians begin to use fire assay to test the purity of gold.

1200 B.C.

Sheepskin is used to recover gold dust from river sands on the eastern shores of the Black Sea. The practice is most likely the inspiration for the "Golden Fleece."

560 B.C.

The first gold coins made purely from gold are minted in Lydia, a kingdom of Asia Minor.

300 B.C.

Greeks and Jews of ancient Alexandria begin to practice alchemy, the quest of turning common metals into gold. The search reaches its pinnacle from the late Dark Ages through the Renaissance.

58 B.C.

After a victorious campaign in Gaul, Julius Caesar brings back enough gold to give 200 coins to each of his soldiers and repay all of Rome's debts.

742-814 A.D.

Charlemagne overruns the Avars and plunders their vast quantities of gold, making it possible for him to take control over much of Western Europe.

1250-1299 A.D.

Marco Polo writes of his travels to the Far East, where the "gold wealth was almost unlimited."

1511 A.D.

King Ferdinand of Spain says to explorers, "Get gold, humanely if you can, but all hazards, get gold," launching massive expeditions to the newly discovered lands of the Western Hemisphere.

1981 A.D.

The first space shuttle is launched, using gold-coated impellers in its liquid hydrogen fuel pump.

1990 A.D.

United States becomes the world's second largest gold producing nation.



1565 A.D.

American Indians mined gold to trade with Spanish Conquistadors in Florida.

True or False

Test Your Gold IQ

1. One ounce of gold is heavier than one ounce of almost anything else.
 2. Pure 24K gold is more durable than 18K gold.
 3. The main reason gold is so valuable is because it is very rare.
 4. In the USA, any gold described as real gold must be at least 14K.
 5. Most white gold is made by mixing pure gold with silver.
 6. If a jewelry piece has scratches, it's of poor quality.
 7. A good way to clean gold jewelry is to spread toothpaste on it and rub it clean with a brush.
1. **T:** Gold is measured in troy weight while almost everything else is in avoirdupois. Troy ounces are heavier than avoirdupois ounces.
 2. **F:** When pure gold is alloyed (mixed) with other metals to form 18K gold, it becomes stronger and harder.
 3. **F:** There are metals more rare than gold that sell for less because the demand is lower.
 4. **F:** It must be at least 10K (10/24ths gold).
 5. **F:** Most white gold is made by alloying pure gold with copper, nickel, and zinc.
 6. **F:** Because gold scratches easily, well-made pieces get scratched.
 7. **F:** Toothpaste is an abrasive, and the brush could scratch the metal.

1700 A.D.

Gold is discovered in Brazil, which becomes the largest producer of gold by 1720, with nearly two-thirds of the world's output.

1799 A.D.

A 17-pound gold nugget is found in Cabarrus County, North Carolina, the first documented gold discovery in the United States.

1970 A.D.

The charge-coupled device is invented; it was first used to record the faint light from stars. The device (which used gold to collect the electrons generated by light) is the basis for video cameras.

1960 A.D.

The first patent is granted for the invention of the laser. It uses carefully positioned gold-coated mirrors.

1947 A.D.

The first transistor is assembled. The device uses gold contacts pressed into a germanium surface.

1942 A.D.

President Franklin D. Roosevelt closes all U.S. gold mines, so that all mining activity would go toward producing the raw materials necessary to win World War II.

1935 A.D.

Western Electric Alloy #1 (69% gold, 25% silver, 6% platinum) finds universal use in all switching contacts for AT&T telecommunications equipment.

1927 A.D.

An extensive medical study conducted in France proves gold to be valuable in the treatment of rheumatoid arthritis.

1903 A.D.

The Engelhard Corporation introduces an organic medium to print gold on surfaces, this becomes the foundation for microcircuit printing technology.

1898 A.D.

Two prospectors discover gold in Klondike, Canada's Yukon Territory, spawning the last gold rush of the century.

1868 A.D.

George Harrison, while digging up stones to build a house, discovers gold in South Africa—the source of nearly 40% of all gold mined since then.

1859 A.D.

Comstock lode of gold and silver is struck in Nevada.

1848 A.D.

Flakes of gold are found while building a sawmill for John Sutter near Sacramento, California, triggering the California Gold Rush and hastening the settlement of the American West.

1803 A.D.

Gold is discovered at Little Meadow Creek, North Carolina, sparking the first U.S. gold rush.

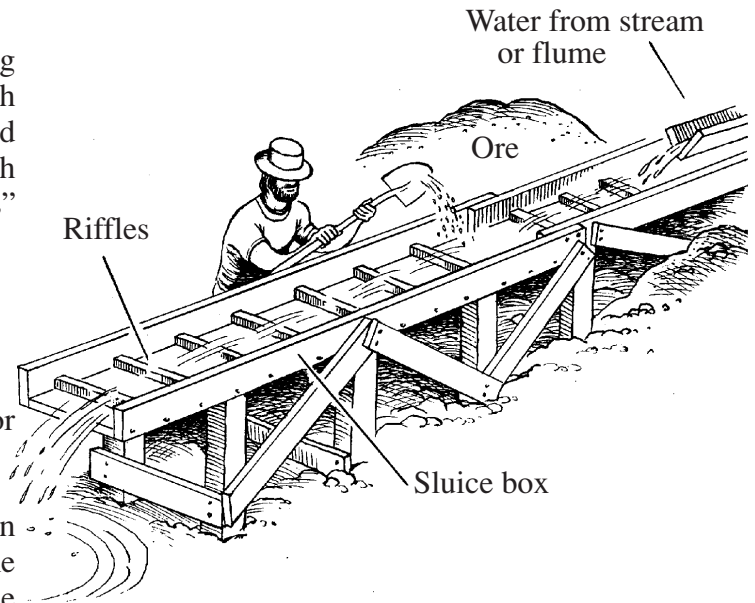
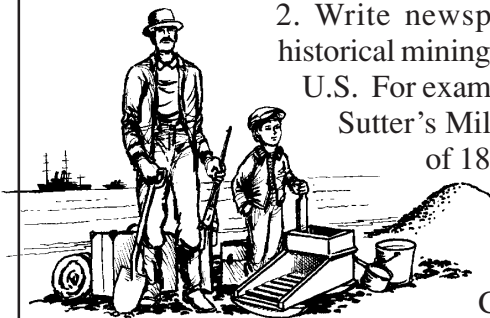
Language Arts Activities

1. Create an illustrated dictionary of the following gold mining terms. Students may work alone, with partners, or in small groups. The dictionary should be colorful and imaginative, but show what each term means. Students may bind their "dictionaries" and share with the class.

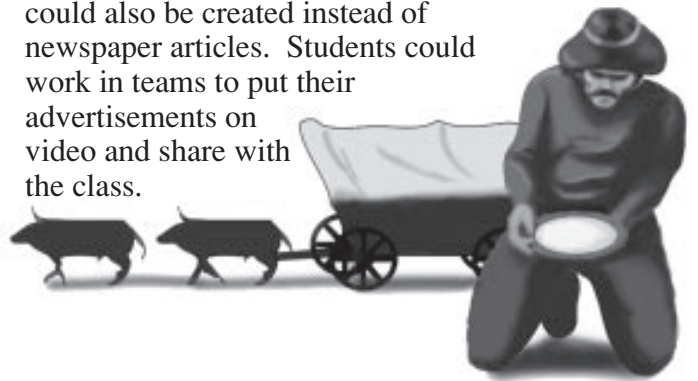
- | | | |
|------------|--------------|-------------|
| prospector | sluice box | mother lode |
| placer | panning | orebody |
| rocker | Forty-niners | Klondike |
| Eureka | vein | arrastra |

These are only suggestions. Any mining or gold terms could be used for the dictionary.

2. Write newspaper articles on historical mining discoveries in the U.S. For example, announce the Sutter's Mill, California, find of 1848; the Comstock Lode in Nevada in the 1860's; the Cripple Creek, Colorado, discovery in 1892; or the Anvil Creek, Alaska, lode found in 1898. Other major gold strikes could be used also, including the major new gold discoveries occurring today.



Posters, "TV" or "radio" advertisements could also be created instead of newspaper articles. Students could work in teams to put their advertisements on video and share with the class.



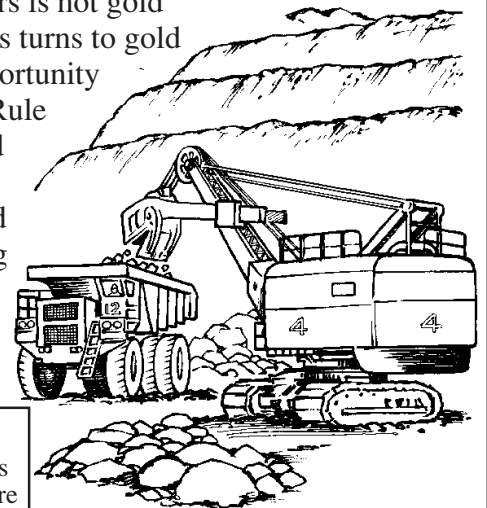
3. Have students prepare and present reports (including maps) on gold rushes in the U.S., Canada, Australia, South Africa, West Africa, Malaya, Mexico, and Siberia. The report should include how the discovery of gold changed the history of these areas.

Again, students could work in small groups to prepare and present these reports.

4. Expressions linked to gold. Have students brainstorm and research metaphors or expressions linked to gold. Students could illustrate and then explain what each phrase means.

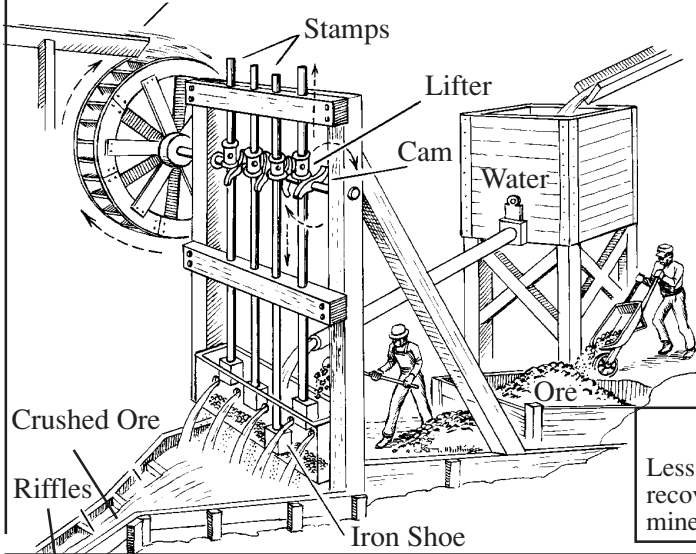
Examples:

- Worth your weight in gold
- All that glitters is not gold
- All he touches turns to gold
- A golden opportunity
- The Golden Rule
- Heart of Gold
- Good as gold
- Gold standard
- Gold-bricking
- Fools Gold



Stamp Mill

Power by water, steam, or animals



Rule of Thumb

Less than 1/2 ounce of gold is recovered from each ton of ore mined in today's gold mines.

Social Studies Activities

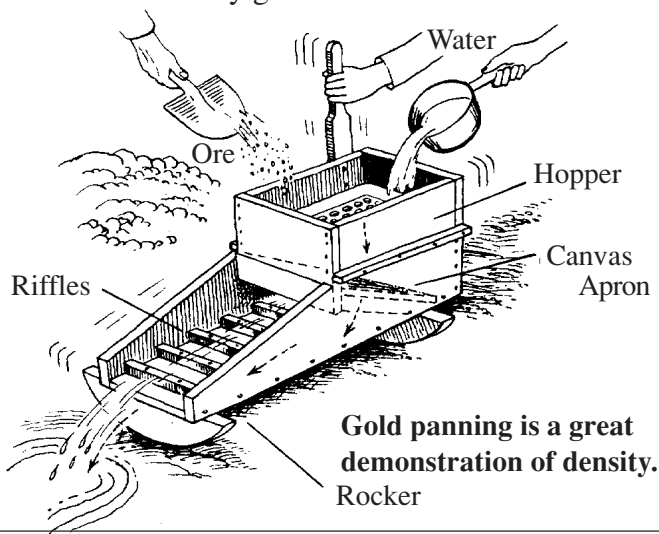
- Using a world map locate and label the major gold producing countries.
- Using the timeline information in the packet, reproduce and enlarge the information for each student (or group of students). Cut the events apart and mix them up. Using cash register tape, the students create a timeline for the history of gold, then locate and label each event on a world map.
- Chart the routes of the following explorers: Columbus, Coronado, deSoto. How did gold influence their explorations?
- Pick one event from the timeline (page 2) then research and report on how this "golden" event influenced world history. The report should include people and places for each event. Students can create visual aids and give an oral presentation.

Annual Production of Gold Before 1848 in Thousands of Ounces

	Production	Source
Egyptians from 2000 BC	32	Egypt/Sudan/Saudi Arabia
Roman Empire	193 - 289	Mainly from Spain and Portugal
500 - 1100	96 - 161	Germany/Austria/South America (local use)
1100 - 1400	161 - 193	Germany/Austria/West Africa/South America (local use)
1400 - 1500	161 - 257	West Africa/South America
1500 - 1600	161 - 322	West Africa/South America
1600 - 1700	322 - 386	West Africa/South America
1700 - 1800	482 - 804	West Africa/Brazil and other South American countries/Russia
1800 - 1840	804 - 1,608	West Africa/Brazil and other South American countries/Russia
1847	2,476	Russia over 1 million oz. plus Africa/South America

Science Activities

- Make a list of the unique physical properties of gold.
Gold is highly reflective, an excellent conductor, and is highly malleable (it can be hammered into a new shape). It is also ductile (it can be drawn or molded into wire or threads). Gold does not rust, tarnish or corrode, nor does it dissolve in water or most acids.
- Illustrate the properties of malleability and ductility. Collect such items as clay, putty, pastry dough, cheese, kneaded erasers, marshmallows, aluminum foil, or taffy, and ask students to manipulate them, then to order them from most to least malleable, and from most to least ductile. Relate these properties to the properties of gold.
- Discover density. Density = weight \div by size. Gold has the greatest density of any mineral—it's heavy for its size. That's why gold accumulates in streams.



Questions & Answers:

Gold is a mineral. What does that mean? *A mineral is something found in nature that is neither a plant nor an animal. Most rocks contain two or more minerals.*

Gold is also a metal. Are all minerals also metals? *All metals are not minerals. For example, the metal zinc is not a mineral—it is not found as a pure metal in nature. Most minerals are nonmetallic. Graphite, gypsum, and halite are all nonmetallic minerals.* What properties does gold share with other metals? *Like all metals, gold is shiny, a conductor of heat and electricity, and can be hammered without breaking.*

Silver conducts electricity better than gold and costs less. Why, then, is gold used to plate electrical contacts in high-quality switches and in computers? *Silver tarnishes when it combines with impurities in the air and loses its conductivity.*

Speculate why jewelers would prefer to work with an alloy of copper and gold rather than either gold or copper alone. *Pure gold is a soft metal that scratches, bends, and breaks easily. Jewelry made from it would not last very long. Copper, on the other hand, is an inexpensive, harder metal that dulls rapidly and turns green when exposed to air. When copper and gold are melted together, the alloy formed is sturdier than the pure metals and has most of the brilliance of gold.*

Don't just read about the greatest migration in American history or watch a video about density.

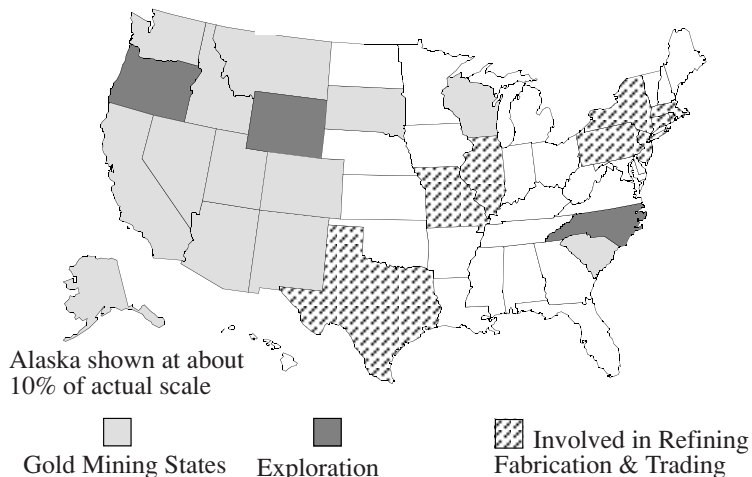
Experience *Gold Fever*

Pan for Gold in Your Classroom

For a classroom panning experience, obtain some fine copper beebee pellets or iron filings from a hardware store. Mix one-quarter cup of the "gold" with about 10 liters of sand. Put the mixture in a bucket and add water to make a slurry. Have students use small shallow bowls or old pie pans to scoop up a bowl of slurry and swirl it over another bucket or large tub. Tell them not to tip the pan too far and to continue adding plain water while swirling until only the pellets or filings remain in the bowl. Discuss how this activity relates to what the Prospectors experienced during the Gold Rush.

Order a *Gold Panning Kit* from MII and experience the *Real Thing*. And your students can keep the Gold!

America's Gold States



Alaska is one-sixth of the U.S.
It's as big as:
540 Rhode Islands
289 Delawares
117 Connecticuts
89 Hawaiiis
2 Texas

MI
501 Violet Street
Golden, CO 80401 USA
303/277-9190 Fax 303/277-9198 On-line at www.mii.org

Gold is used in a lot more than jewelry

Automobile

Gold is used in the trigger deployment system of automobile airbags, now in more than 10 million cars. It is also used in other electronic parts.

Gold is the best reflector of infrared energy which is used by auto manufacturers to dry the paints on their cars, saving time and lowering the energy use and cost.

Gold-plated connectors and contacts that operate in a car's engine require materials that can withstand the high-temperature and corrosive environment under a car's engine hood.

Aircraft Engines

The majority of jet engines on the new Boeing 777 are made by Pratt & Whitney. P&W uses nearly two pounds of gold as a brazing alloy in each engine and there are two engines on each plane.

Many aircraft use gold-coated acrylic windows in the cockpit to help windows stay clear of frost and fogging. Gold's reflectivity helps keep the cockpit cool on hot runways and gold's thermal conductivity helps maintain the heat of the cabin while in flight at high, cold altitudes.

Gold reflectors are used on Air Force One for defense, to confuse an incoming missile's heat-seeking signal, making it difficult for the missile's guidance system to focus on its target.

Computers

40 million personal computers are manufactured worldwide each year and gold is an integral part of the semiconductor circuits. Each key on the keyboard strikes gold circuits that relay the data.

Telephones

Inside the mouthpiece is a miniature transmitter that contains gold in one of its central components, the diaphragm. Telephone wall jacks and connecting cords also use gold for the contacts.

Electronics

Gold is the best material to use in almost all microcircuits in electronic equipment.

Dentistry

More than 26,000 pounds are used by dentists every year.

Food

Gold is a critical part of the equipment that assures packaged fruits and vegetables will resist spoiling.

Healthcare

Gold is extensively used in medical diagnosis and monitoring equipment, as well as medicines and implants.

Pollution Abatement

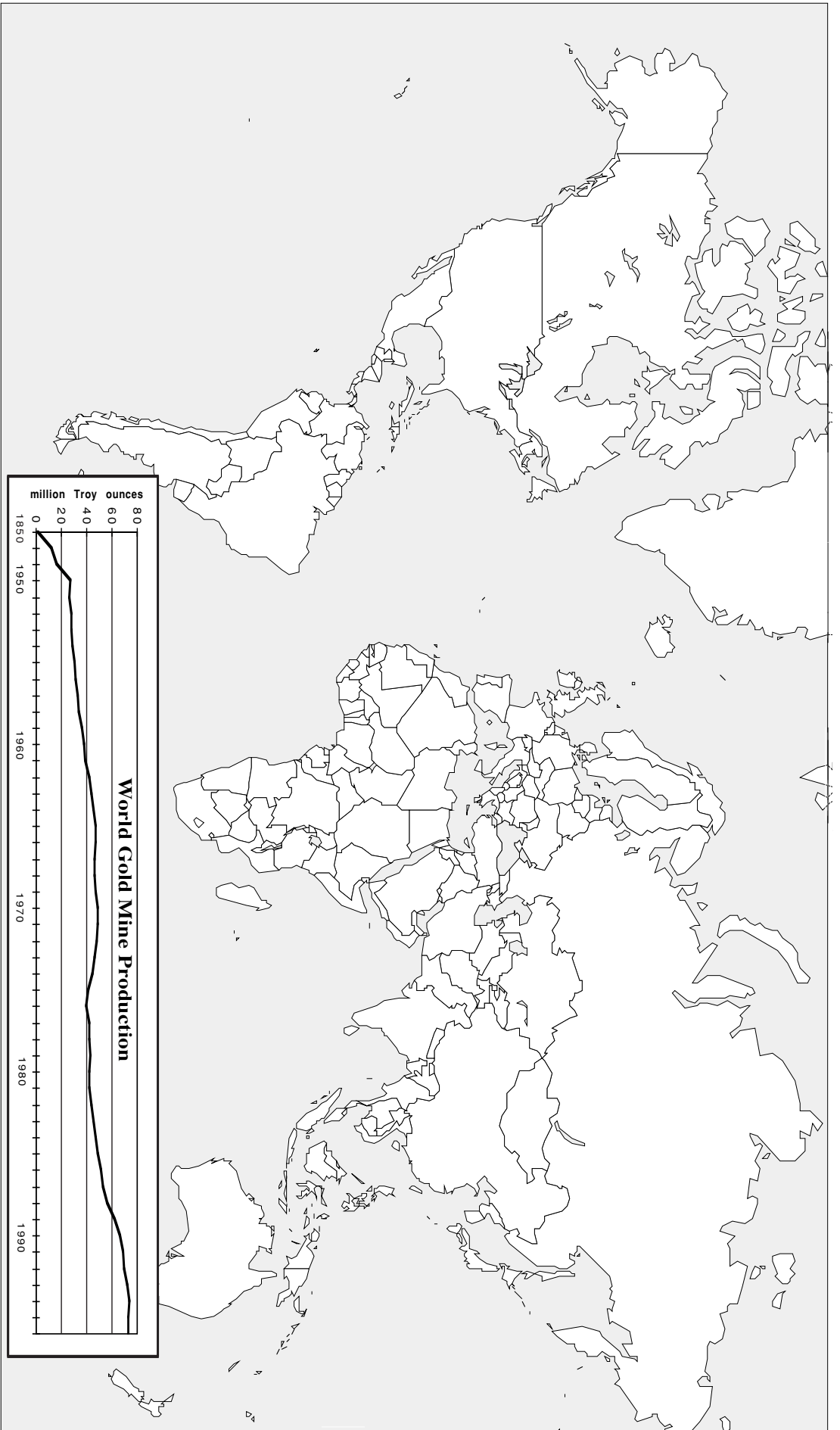
As a catalyst, gold helps convert CO to CO₂ and nitric oxide to harmless nitrogen.

Astronomy

The world's largest telescopes, located at the Keck Observatory, use pure gold to coat the 21-inch secondary mirrors on both of its twin telescopes.

Space

Gold protects the onboard computers in the Galileo space probe. It is used throughout the electronic circuitry in satellites and the Space Shuttle, and in the visors in space suits worn by astronauts.

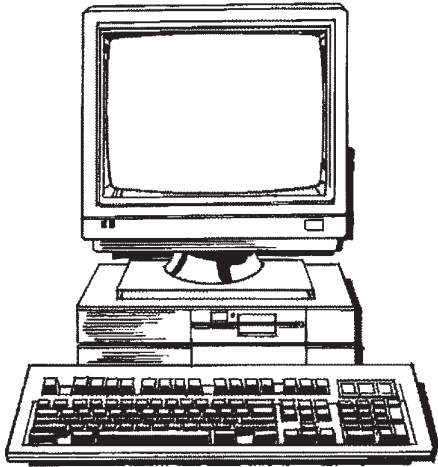


World Gold Mine Production in tonnes (major countries only)

multiply tonnes by .032151 to convert to million Troy ounces

PRIMARY MINE PRODUCTION (metric tonnes)																					
	<u>RSA</u>	<u>USA</u>	<u>AUS</u>	<u>CAN</u>	<u>China</u>	<u>Russia</u>	<u>Peru</u>	<u>Uzbek</u>	<u>Indo</u>	<u>Braz</u>	<u>Ghana</u>	<u>Chile</u>	<u>PNG</u>	<u>Phil</u>	<u>Mex</u>	<u>Zimb</u>	<u>Venz</u>	<u>Columb</u>	<u>Other</u>	<u>WORLD</u>	
1995	523.8	317.0	253.5	152.0	140.0	132.2	57.7	70.0	62.9	64.4	53.1	44.6	53.4	27.1	20.3	24.0	7.1	21.2	225.6	2,250.0	1995
1996	497.6	326.0	289.5	166.4	145.0	123.0	64.8	72.0	65.0	60.0	49.2	53.2	51.1	31.8	24.5	24.8	11.7	22.1	250.4	2,328.0	1996
1997	483.4	362.0	311.4	169.1	175.0	115.0	76.8	75.0	68.0	59.0	52.0	49.5	47.5	33.8	26.0	25.0	19.7	18.8	305.1	2,472.0	1997
1998	465.0	366.0	320.0	155.0	150.0	105.0	89.2	100.0	145.8	60.0	73.3	45.0	63.2	34.9	26.1	27.1	---	---	329.5	2,555.0	1998
1999	449.5	341.0	301.3	155.0	150.0	126.0	128.0	80.0	155.0	50.0	---	---	---	---	---	---	---	---	633.2	2,569.0	1999

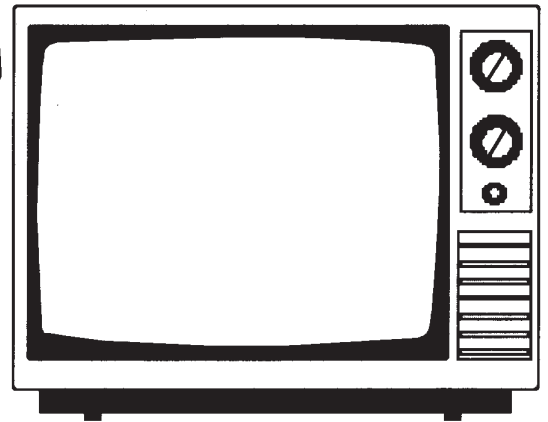
Gold is in Computers



Gold is in Airplanes



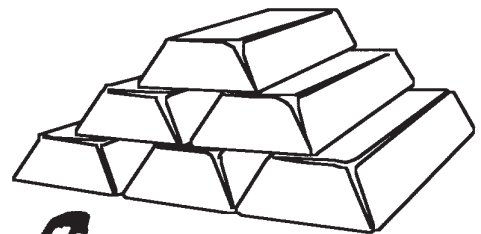
Gold is in Televisions and Telephones



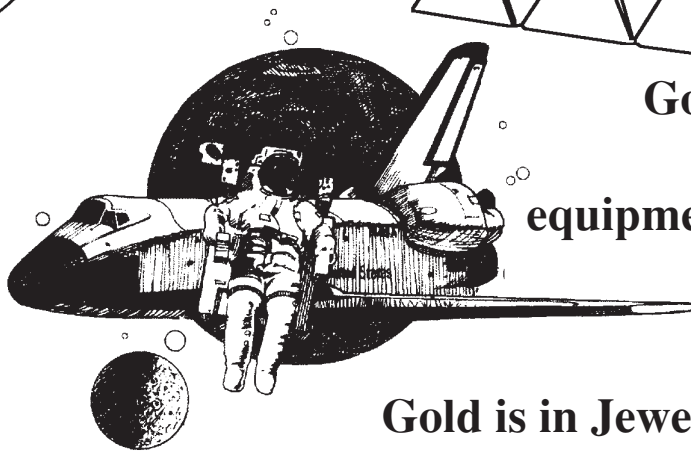
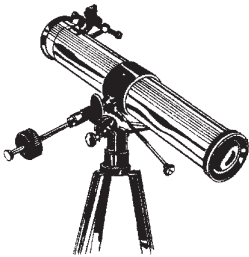
Gold is in Medicine



Gold represents wealth

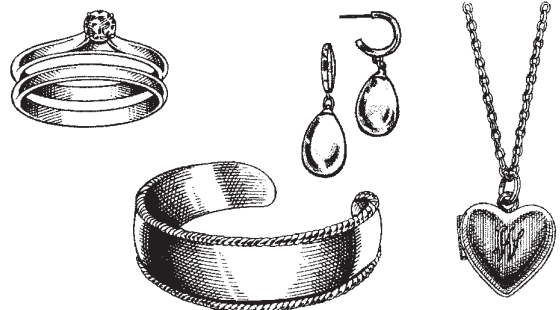


Gold is in Telescopes



Gold protects people and equipment in space

Gold is in Jewelry



Gold is in Cars and Trucks





The prospector and his faithful burro helped to settle much of the western half of North America.