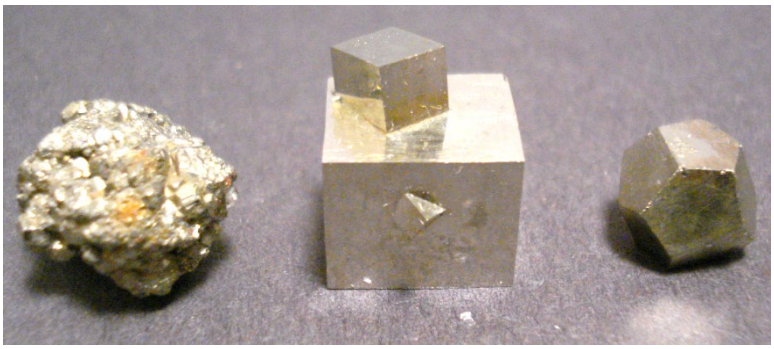
12. Pyrite (iron sulfide or FeS_2)



The mineral pyrite is common in all environments—sedimentary, igneous, and metamorphic—and is a common constituent of ore deposits. Deep-sea oceanic vents have been found to eject fine particles of pyrite-generated iron that provide trace nutrients to bacteria, plankton, and other sea life. When it is shiny and brass-yellow it can be mistaken for gold and hence is called fool's gold. However, pyrite does not have a gold streak but a black one of an unglazed ceramic streak plate. It is rarely mined for its iron content because the sulfur in the mineral is a contaminant that makes the resulting iron weak and brittle. It is mainly used today to produce sulfur dioxide (SiO_2), which is used in the paper industry as a whitener and for the production of sulfuric acid, which has a great many uses in the chemical industry.

Activities:

K-3: Pyrite can be identified by its metallic luster. That means that it is very shiny, usually silver or gold colored and reflects light. Non-metallic luster is usually not as reflective and can be dull or waxy or even vitreous, like glass. Find some things around the house that have a metallic and non-metallic luster.

Metallic: _____. Non-metallic: _____.

K+: Pyrite is also known as "fool's gold" because it has a yellowish color like gold, but it is not quite the same. If you have the Economic Rock and Mineral set, compare the color of pyrite against a piece of gold jewelry. Do you see a difference in the color? Circle your answer: Yes No

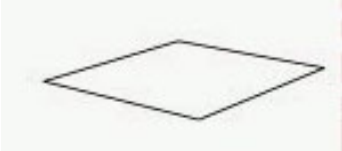
K-5: Pyrite is very hard, about the same hardness as steel. Try to scratch the copper surface of a US penny coin with a steel nail. Then try to scratch the nail with the penny. This is done to determine the relative hardness of one material to another. If the nail cannot scratch the penny, then the penny is harder. If the nail can scratch the penny, then the nail is harder. Circle which is harder:

Penny

Steel nail

12. Pyrite continued

K-5: When pyrite breaks, it breaks along curved surfaces, which is called a conchoidal fracture. This behavior is very different from that of some other metallic minerals, such as galena, that break along flat surfaces. To show the difference between a conchoidal fracture breaking along cleavage surfaces, stack some same-size cubic objects such as dice or wooden blocks into a larger 3D block structure. When you gently nudge the block structure, it separates into smaller pieces along smooth, parallel surfaces. To demonstrate conchoidal fracture, put on safety glasses and put an ice cube on the driveway or sidewalk outside and gently tap it with a hammer until it breaks. Are the broken surfaces flat and smooth (like breaking along cleave surfaces) or curved and jagged? Circle your answer:



Smooth cleavage face

Conchoidal fracture

1-3: Pyrite crystallizes in the isometric crystal system. Some of the best-formed crystals of pyrite in the world come from Spain and form perfect cubes. Find some things around your home that are also cubes. Write or draw your answers:

4-5: Look at the driveway or sidewalk for some concrete with pebbles embedded in it. Use a steel nail to try to scratch a pebble. The pebbles are usually made up of quartz, which is rated 7 out of 1–10 on the Mohs relative hardness scale. Pyrite is about the same hardness as a steel nail. Is the pebble harder than the nail? Circle your answer: Yes No On the basis of your result, which is relatively harder, pyrite represented by steel or quartz represented by the pebble? _____

6-8: Pyrite is made from iron and sulfur. Find iron on the periodic table of the elements. What is its atomic number? _____. What is the atomic number of sulfur? _____. How many atoms of sulfur are there per atom of iron in pyrite? _____.

9+: Research the physical properties of pyrite and gold before you go mining to avoid being fooled by fool's gold. Summarize how to distinguish them: _____

_____

_____.