

Return To [Middle School Lesson Plans](#)

**Title:** Minerals and the Products of Mining

**Level:** Middle School

**Time:** 110 minutes

**KERA Goals:** 2.19; 2.2; 2.33; 2.5; 5.3

**Objective:**

1. By plotting where minerals come from, students will have an awareness of how mineral use makes the world interdependent.
2. Students learn to identify some of the mineral products they use each day.
3. Students test knowledge through puzzles and classroom activities.
4. The extension experiment further investigates the formation of mineral deposits.

Each activity is designed to be completed in 1 classroom period, unless noted otherwise.

**Background Information:**

1. We mine many different minerals from Earth, which provide us with almost any product or technology imaginable.
2. All of these products exist in limited supply on and under the Earth's surface, so it's important that we realize what they are and where they came from

Everything we use on Earth that is not made of plants or animals is made of minerals. These minerals are our natural resources. They are mined so that we can have all of the products we're used to using. Even though 99 percent of the Earth's surface has never been mined, it is important to remember that minerals exist in limited supply. We should be aware of what products they provide us with and use our mineral resources wisely.

Geologists classify mineral deposits into three main types. Igneous rocks were formed by fire, usually from volcanoes. Metamorphic deposits were formed because of great heat and pressure inside Earth. Sedimentary rocks were formed out of material which has been deposited by water. This experiment shows how sedimentary rocks are formed.

**Activity 1: Where Are the Minerals?**

**Materials:**

Where Are the Minerals? Student List  
World map  
Non-permanent dot stickers

1. Assign specific minerals from the list to pairs or groups of students. Ask them to identify

the countries where their minerals are produced.

2. The students should then put a dot sticker on the map on each of the countries that are major suppliers of their assigned minerals. If the country supplies more than one mineral, it will have more than one dot sticker.

3. Request that the students describe the resulting pattern of dot stickers. The important idea with this activity is that the mineral deposits are random, and countries are interdependent on each other for their mineral needs.

### Where Are The Minerals?

Aluminum (Bauxite)	Australia, Guinea
Andalusite	South Africa, India
Barite	China, India
Beryllium	U.S., Russia
Borates	Turkey, U.S.
Cadmium	Japan, Belgium
Chromite	South Africa, Russia
Clays	U.S.
Copper	Chile, U.S.
Diatomite	U.S., France, Romania
Feldspar	Italy, U.S.
Fluorspar	China, Mongolia
Graphite	Korea, India
Gravel	U.S.
Gypsum	U.S., Canada
Industrial Diamonds	Australia, Zaire
Iron	Russia, China
Kyanite	South Africa, India, France
Lead	Australia, U.S.
Lime	Russia, China
Limestone	U.S.
Micas	U.S., Russia
Nickel	Russia, Canada

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Perlite	U.S., Greece
Platinum	South Africa, Russia
Potash	Russia, Canada
Pumice	Italy, Greece
Selenium	Japan, Canada
Silica Sand	U.S., Netherlands
Sillimanite	South Africa
Sodium Sulfate	Mexico, Spain
Sulfur	U.S., Russia
Talc	Japan, U.S.
Tin	China, Brazil
Titanium	Russia, Japan
Trona (Soda Ash)	U.S., Kenya
Tungsten	China, Russia
Vermiculite.	South Africa, U.S
Wollastonite	Germany, Great Britain
Zeolites	U.S., Tanzania
Zinc	Canada, Australia
Zircon	Australia, South Africa

### Activity 2: Rocks In Your Head

#### Materials:

Rocks In Your Head Minerals Quiz and Teacher's Answer/Discussion Guide

1. In class, pass out and have students complete the Rocks In Your Head Minerals Quiz.
2. Go over the answers with the students in class, using the discussion points on your answer sheet.

### Activity 3: What's Mined Is Yours

#### Materials:

Whats Mined Is Yours Student Worksheet

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1. Talk about the mineral products in the classroom. Chalk is a mineral, also is the metal in desks and glass in windows. Pencil "lead" is actually graphite. What other mineral products are there in the classroom?
2. Hand out the student worksheet What's Mined Is Yours. Ask students to log their activities from the day before and try to come up with the mineral products that they used in each activity.
3. Use the end of this class, or the beginning of the next to choose one of the common activities, such as eating breakfast, and write a master list on the board of mineral products used by everyone during this activity.

### **Evaluation:**

Copy and distribute Treasures of the Earth word search puzzle, and have the students complete it as an assignment.

### **Treasures of the Earth**

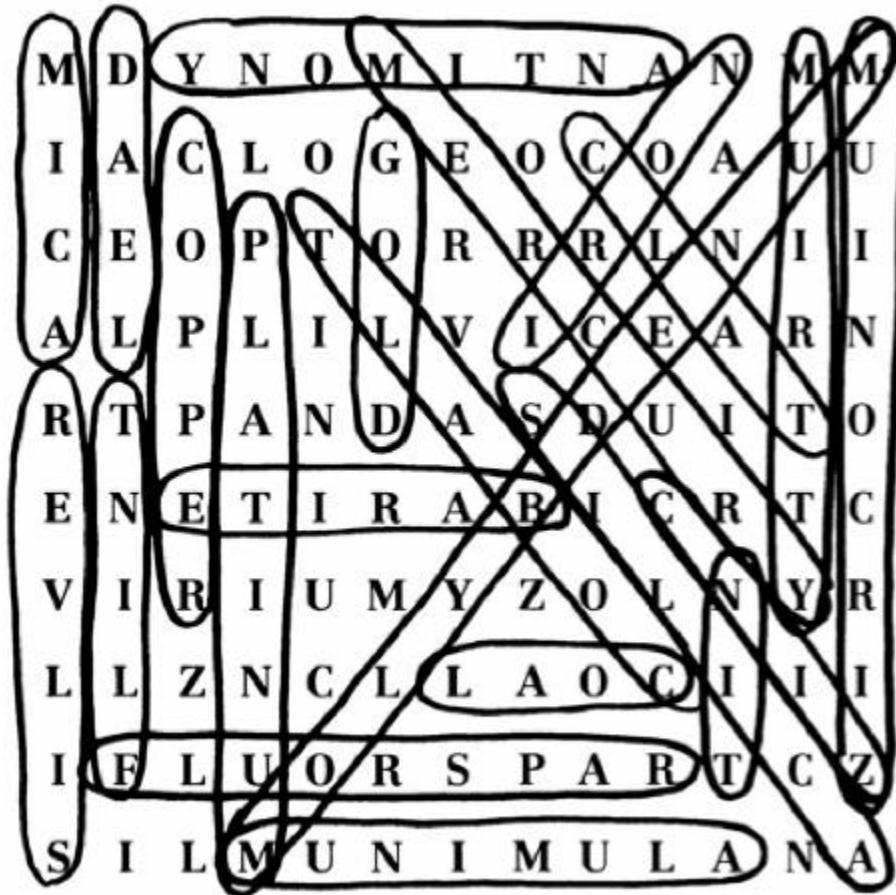
This puzzle is filled with minerals. Some are spelled backwards. You can search both horizontally and diagonally. See if you can locate and "mine" these:

Aluminum  
Antimony  
Barite  
Coal  
Cobalt  
Copper  
Flint  
Fluorspar  
Gold  
Iron  
Lead  
Mercury  
Mica  
Molybdenum  
Platinum  
Silica  
Silver  
Talc  
Tin  
Yttrium  
Zinc  
Zirconium

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M D Y N O M I T N A N M M  
I A C L O G E O C O A U U  
C E O P T O R R R L N I I  
A L P L I L V I C E A R N  
R T P A N D A S D U I T O  
E N E T I R A B I C R T C  
V I R I U M Y Z O L N Y R  
L L Z N C L L A O C I I I  
I F L U O R S P A R T C Z  
S I L M U N I M U L A N A

Answers:



Activity 4: Sedimentary Rock Formation

**Materials:**

Quart jar with cover  
4 tablespoons sand  
4 tablespoons fine sand  
4 tablespoons fine pebbles  
water

1. Put the sand, fine soil, and fine pebbles into the quart jar.
2. Fill the jar with water, put the top on, and shake it up.
3. Set the jar down and watch what happens. The pebbles go to the bottom immediately. The sand falls to form a layer, then sand and larger pieces of soil on top of that. Deposited at the top is a layer of the finer soil.
4. If you can leave the jar for several days, most of the materials will settle and the water will become almost clear.

**Discussion:**

This is what happens when mineral particles are carried by water to lakes or oceans. As the water slows down, the material settles, with heavier pieces being deposited first. Lighter pieces stay on top and layers are formed. Limestone, shale, sand and clay are minerals that typically form this way. This is why miners often temporarily remove topsoil to get to a mineral deposit. Sometimes you will see layers of sedimentary rock when a road cuts through hilly country.

**Minerals Quiz: Rocks In Your Head**

Actually you do have rocks in your head, and in the rest of your body. Our bodies need the minerals calcium, potassium and phosphorus to name a few. If you think about it, there's not much we do that doesn't include minerals. Try this quiz to find out what you know about rocks.

1. One of the largest mining trucks is as tall as a two-story house and weighs as much as:  
A. William "Refrigerator" Perry  
B. 6 jumbo jets  
C. The Empire State Building
2. How many minerals were used to make your television set?  
A. 2  
B. 19  
C. 35

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3. Percentage of Earth's surface that has once been or is being mined:
  - A. 50%
  - B. 25%
  - C. 1%
  
4. Most modern mines were first discovered by:
  - A. A large corporation
  - B. An individual geologist
  - C. Bart Simpson
  
5. A mineral important for film and photo processing is:
  - A. Silver
  - B. Copper
  - C. Clay
  
6. What is it called when a modern miner returns land to a useful condition?
  - A. Renovation
  - B. Reclamation
  - C. Restoration
  
7. What is the most common metal in Earth's crust?
  - A. Aluminum
  - B. Gold
  - C. Silver
  
8. When two minerals are mixed together, the resulting compound is called:
  - A. A solution
  - B. A twosome
  - C. An alloy
  
9. Most metals were formed by molten rocks that cooled, called:
  - A. Sedimentary rocks
  - B. Igneous rocks
  - C. Metamorphic rocks
  
10. A liquid metal, also called quicksilver:
  - A. Limestone
  - B. Diamond
  - C. Mercury
  
11. Farmers use this mineral-based product to replace nutrients in the soil.
  - A. Insecticide
  - B. Fertilizer
  - C. Compost
  
12. This mixture of sand, cement, and stone hardens when it dries:
  - A. Concrete

- B. Steel
- C. Bronze

13. How can everyone help conserve our mineral resources?

- A. Recycling
- B. Buying many products we don't need
- C. Panning for our own gold

### **Minerals Quiz: Rocks In Your Head (Answer Key)**

Actually you do have rocks in your head, and in the rest of your body. Our bodies need the minerals calcium, potassium and phosphorus to name a few. If you think about it, there's not much we do that doesn't include minerals. Try this quiz to find out what you know about rocks. (Answers are in bold type.)

1. One of the largest mining trucks is as tall as a two-story house and weighs as much as:

- A. William "Refrigerator" Perry
- B. 6 jumbo jets**
- C. The Empire State Building

Discussion Points: Some mineral deposits, such as copper, are not highly concentrated, and large amounts must be processed to extract the mineral from the ore. The giant trucks are used to haul as much as 120 tons per load of ore out of the deep pits. In a surface mine, the big trucks are needed to take the loads of minerals like coal, often dug up by a large crane or dragline.

2. How many minerals were used to make your television set?

- A. 2
- B. 19
- C. 35**

Discussion Points: Your television set contains at least 35 minerals. See how many the class can guess. (Aluminum, Antimony, Barite, Beryllium, Cobalt, Columbium, Copper, Europium, Gallium, Germanium, Gold, Indium, Iron, Kaolin, Lanthanides, Limestone, Lithium, Manganese, Mercury, Mica, Molybdenum, Platinum, Rhenium, Selenium, Silica, Strontium, Tantalum, Tellurium, Terbium, Tin, Titanium, Vanadium, Yttrium, Zinc, Zirconium.)

3. Percentage of Earth's surface that has once been or is being mined:

- A. 50%
- B. 25%
- C. 1%**

Discussion Points: It's amazing that 99% of Earth's surface has never been touched by mining, especially when we consider all of the different minerals and mineral products we



use every day.

4. Most modern mines were first discovered by:

A. A large corporation

**B. An individual geologist**

C. Bart Simpson

Discussion Points: Geologists use several methods to search for clues in discovering mineral deposits. They research the general geologic makeup of the land, and test soil and water for mineral concentration. If an area is promising, they will take aerial photographs and satellite images to help identify various rock forms. Then they examine the land more closely by taking samples and analyzing them further.

5. A mineral important for film and photo processing is:

**A. Silver**

B. Copper

C. Clay

Discussion Points: Silver is essential to photography. When combined with other elements, it becomes a compound that is very sensitive to light. A silver compound on film or paper turns dark when exposed to light.

6. What is it called when a modern miner returns land to a useful condition?

A. Renovation

**B. Reclamation**

C. Restoration

Discussion Points: After a mineral is extracted, modern miners reclaim the land, and return it to a useful, or better condition. They are transformed into parks, wildlife habitats, developments, and other cultural resources. When you look at a reclaimed mine site, it's difficult to tell a mine ever existed.

7. What is the most common metal in Earth's crust?

**A. Aluminum**

B. Gold

C. Silver

Discussion Points: The metals in Earth's crust are Aluminum (8.07%), Iron (5.06%), Calcium (3.64%), Sodium (2.84%), Potassium (2.58%), Magnesium (2.07%), and Titanium (.67%)

8. When two minerals are mixed together, the resulting compound is called:

A. A solution

B. A twosome

### **C. An alloy**

Discussion Points: Copper blends well with other metals to form alloys that are stronger than pure copper. Copper + Zinc = Brass. Copper + Tin = Bronze.

9. Most metals were formed by molten rocks that cooled, called:

A. Sedimentary rocks

**B. Igneous rocks**

C. Metamorphic rocks

Discussion Points: Sedimentary Rocks were created in layers and deposited by wind, water, and the buildup of plant and animal skeletons. Metamorphic Rocks are buried deep down and were changed by pressure and heat.

10 A liquid metal, also called quicksilver:

A. Limestone

B. Diamond

**C. Mercury**

Discussion Points: Mercury is the only metal that is liquid at normal temperatures. It expands in heat and contracts when cold and is used in thermometers and barometers.

11. Farmers use this mineral-based product to replace nutrients in the soil.

A. Insecticide

**B. Fertilizer**

C. Compost

Discussion Points: Since farmers use the same land over and over again, they need to fertilize it with minerals like Phosphate and Potassium, to keep crops and harvest healthy.

12. This mixture of sand, cement, and stone hardens when it dries:

**A. Concrete**

B. Steel

C. Bronze

Discussion Points: Imagine what the world would be like without concrete and no buildings or sidewalks.

13. How can everyone help conserve our mineral resources?

**A. Recycling**

B. Buying many products we don't need

C. Panning for our own gold

Discussion Points: Recycling not only reduces the amount of solid waste we send to landfills, it also reduces the amount of new minerals that we have to mine and helps reserve our mineral resources.

**Mineral Products: What's Mined Is Yours**

Earth bears many minerals which play a major role in our daily lives. Look around the room and you'll see many objects that are metal. We mine Earth's ore deposits to make iron, copper, aluminum and other metals. Mineral fuels, such as coal, give us energy to heat, air condition, light up and electrify our homes, offices and factories. Minerals are also mined for stone products to make concrete, brick and glass for our buildings, roads and playgrounds. And a broad assortment of Earth's minerals go into paper, paint, plastics, chemicals, filters, films, fertilizers, and many other products.

Make a log of what you did yesterday and how many mineral products you actually used.

Activity	Mineral Products Used (Metal, Energy, Stone, Industrial Minerals)		

**Example:**

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Activity	<b>Mineral Products Used</b> (Metal, Energy, Stone, Industrial Minerals)		
Woke up	alarm clock	room-walls	
	light	carpet	
Ate Breakfast	refrigerator	spoon, knife	microwave
	toaster	plate, bowl	
Got ready for school	toothpaste	pipes, sink	hair dryer
	soap	clothes	deodorant
Went to school	sidewalk	road	
	bus	gasoline	
Class	desk	paper	chalkboard
	books	pencil	chalk

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