

Title: **Minerals and You**

Day/Time: **K-12**

[Academic Expectations](#)

[Core Content for Assessment:](#)

Objective:

The purpose of this exercise is to acquaint students with how mineral are used in everything around us-- from cereal to satellites.

Background Information:

You wake up in the morning and switch on the light. You wash your face, brush your teeth, and get dressed. You turn on the radio and eat breakfast--a bowl of cereal, a glass of juice, perhaps some toast and a cup of coffee or tea. You look out the window, then head for the door--ready to start the day.

And almost everything you've done so far--and everything you'll do for the rest of the day--would be impossible without minerals.

Water pipes and electric wiring; refrigerator, radio, toaster, lamp, and light bulb; sheets, towels, and clothing; soap and toothpaste; window, cereal bowl, juice glass, coffee cup; water faucet, spoon, doorknob--all were made from or with minerals. Even breakfast reached your table with the help of minerals.

Minerals and the Modern World

Minerals touch our lives in hundreds of ways each day. Life as we know it would not exist without them. Everything that cannot be grown--that's neither plant nor animal--is a mineral or made from minerals.

Agriculture, construction, manufacturing, transportation, electronics, art, science--almost every area of human activity depends in some way on minerals. The raw materials we take out of the ground are as critical to our way of life--and life itself--as food and water.

We consume minerals in amounts that range from billions of tons of sand and gravel a year to only thousands of pounds of rhenium--a metal used in producing lead-free gasoline. In the United States alone, it takes more than 2 billion tons of minerals each year to maintain our way of life. That's about 10 tons of minerals for every man, woman, and child. From those minerals we get the products we need to live and those that make life more comfortable.

Agriculture

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Our dependence on minerals begins with the most basic requirement for life--food. Minerals are essential to the many activities involved in putting food on our tables. Fertilizers made from potash, phosphate rock, sulfur, and nitrogen help plants grow. Farmers use metal tractors and combines to plant and harvest crops. They ship fruit, vegetables, grain, and livestock to market in trucks, railroad cars, and airplanes--all made of metal. Food processors use metal machines and equipment; they package food in metal cans and other containers made from or with minerals.

In addition, like all plants and animals, we need mineral nutrients to keep us alive and well. The foods we eat supply iron, calcium, phosphorus, magnesium, copper, zinc; we even take vitamins containing minerals to make sure we get enough.

Construction

Minerals provide the building blocks for the houses and apartment buildings we call home; for the towns and cities where we live, work, and play; and for the roads, highways, and bridges that connect them.

We find the products of pits, quarries, and mines from basement to attic, from parking garage to penthouse. Our houses, apartment buildings, offices, and factories have walls of brick, stone, concrete . . . roofs made from asphalt and gravel . . . concrete foundations and gypsum wallboard . . . metal air conditioners, furnaces, and ventilation ducts . . . and a network of copper pipes, wires, and cables that bring water, light, and power.

Other minerals and mineral-based materials used in construction include cement, sand, clay, tile, lime, glass, aluminum, iron and steel, lead, and zinc.

Manufacturing

Many of the goods and products we use each day are made from minerals. Stoves, TVs, refrigerators, microwave ovens, washing machines, radios, and dishwashers contain steel, aluminum, and other metals. Aluminum pots and stainless steel kitchen utensils . . . brass doorknobs and picture frames . . . plates and porcelain vases made from China clay . . . metal tools, bolts, screws, and nails . . . soaps and detergents made from boron, phosphates, soda ash . . . toothpaste, aspirin tablets, lipstick, eye shadow and other cosmetics containing clay--we find mineral products in every room, closet, and cabinet.

Many materials that are not in themselves minerals could not be made without them. We use sand, selenium, silicon, soda ash, and other minerals to manufacture glass. Making paper may require clay, lime, or sodium sulfate. Minerals like titanium, lead, and cadmium help give paints their color, white talc, mica, and clay help them last longer.

Minerals actually make possible the manufacture of almost every product bought and sold today. The machines used in factories, plants, mills, and refineries are made from steel and other metals. The processes involved in refining petroleum, making steel, and producing textiles, paper, glass, plastics, and fertilizers depend on chemicals made from minerals.

Transportation

In the modern world, minerals take us wherever we want to go--from the local shopping center to the moon. If we want to move people and materials, we need minerals. Cars, trucks, and buses; trains, subways, and the rails they run on; barges, ships, and the cranes that unload them--all are made from metal.

Cars, for example, contain iron and steel, manganese, chromium, lead, zinc, platinum, copper, and aluminum. We drive them on streets, highways, and bridges made from asphalt, sand, gravel, and concrete. Road crews use sand and salt to keep them from skidding on snow and ice. Even the gas in their tanks was prepared using mineral-based chemicals.

Minerals carry us into the air and beyond the atmosphere. Jets made of aluminum, chromium, cobalt, columbium, tantalum, and titanium take off by the thousands each day. Satellites, missiles, and space orbiters depend on the permanence, strength, reliability, and corrosion resistance of these metals. Gold used in the space suits of astronauts and as thin coatings on equipment protects both from the deadly radiation and heat of the sun.

Electronics

The advances in electronics and computer technology that made possible the exploration of space and hundreds of other technical achievements would be inconceivable without minerals.

Copper, for example, transformed the way we live. Its ability to conduct electricity not only gave us new ways to light and heat our homes, but opened the way to a world of machines that can do almost anything except think. And today's computer scientists are working on that.

Directly or indirectly, the electronics and computer industries use almost every mineral mined today. It takes 42 different minerals, for example, to make something as seemingly simple as a telephone handset. From aluminum and beryllium to yttrium and zinc--minerals put light, power, communication, information, and entertainment at our fingertips.

Art and Science

Minerals provide the materials for men and women to express themselves and explore the world. Painters and sculptors use mineral products--pigments, clay, marble. The photographer and movie maker would have no art without silver--the metal that makes it possible to record images on film. Symphony orchestras, brass bands, and rock superstars make music with instruments made from metal; listening to recorded music would be impossible without equipment made of a wide range of minerals.

The instruments of science--from microscopes and supercomputers to test tubes and beakers--also depend on minerals. With these instruments, scientists have explored the

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world from cell to solar system, discovering new treatments for disease, new sources of energy, even new galaxies.

Less positively, minerals have been a part of human warfare since the first caveman cast the first stone. Yet, today, that too is changing--minerals are being used in almost every aspect of our efforts to ensure world peace.

As long as civilization as we know it endures, minerals will be there, playing an essential part in our daily lives.

Discussion:

Discuss how we use minerals in almost everything we do. Are any minerals produced in your state? What products are they used for?

U.S. Bureau of Mines, Office of Public Information (1992)

Adapted from materials provided by Women In Mining