

Name _____

Grade _____

Title _____




*Writing
is a natural experience . . .*

*made possible by the people
who develop our natural resources.*


If you can see it, touch it, taste it, smell it, or hear it, It's from our Natural Resources.

It's only a pencil



Dig A Little Deeper

What's In A pen-cil Besides Wood?



Geography: Create raw materials origin map.

The cedar wood is from the forests in California and Oregon. The graphite (not lead) might come from Montana or Mexico, and is reinforced with clays from Kentucky and Georgia.

The eraser is made from soybean oil, latex from trees in South America, reinforced with pumice from California or New Mexico, and sulfur, calcium, and barium.

The metal band is aluminum or brass, made from copper and zinc, mined in no less than 13 states and nine Canadian provinces.

The paint to color the wood and the lacquer to make it shine are made from a variety of different minerals and metals, as is the glue that holds the wood together.

Social Studies: Research development of pencil.

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

Math/Science: Count measure, classify, graph classroom pencils.

Writing: Acrostic poem "pencil pal" biography.

How many countries does it take to make a pencil?

LANGUAGE ARTS

(see page 4 pencil pattern)

Story Starters: Day in the Life of a Pencil ... If I Were A Pencil ... If My Pencil Could Talk ... Autobiography of a Pencil ... Pencil Poetry. (Include factual information in the stories. This could be an assessment tool as well as a creative writing activity).

ART

Using the pencil pattern (page 4) create a decorated pencil, bookmark, puppet, etc. Make pencil rubbings, fingerprint people or animals.

READ MORE ABOUT IT

From Graphite to Pencil, A Start To Finish Book, by Ali Mitgutsch

Young World, *How Things Are Made, A Child's First Encyclopedia*

Mineral Resources A-Z, by Robert L. Bates, Environment Reference Series

SOCIAL STUDIES

Research the development of the pencil. Create a timeline on the development of the pencil or writing tools. Research the development and production of the pencil, from China to the modern age. (See Pencil Facts, page 2). Research written languages, such as Cuneiform, Hieroglyphics, Rune, and the cultures using these forms.

MATH

Count, classify, measure, and graph the pencils in the classroom. How many pencils are used by your students, the school, their families? Make a Venn diagram of the pencils in the classroom.



GEOGRAPHY/SCIENCE

See pages 2 and 3 for Map skills and Science tie-ins. For a good site, visit www.pencilpages.com

Dig A Little Deeper

Mini-research project

What is graphite? What physical characteristics of graphite cause it to be a good tool for making fingerprints (see page 2 Activity)? What other products can graphite be used to make? Are there different resources that could be used to make other parts of a pencil? Where are these materials found? Do they have other uses?

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

Pencil Parts Have Other Uses

Major copper producing countries: United States, Chile, Canada, Poland, Zaire, Zambia.

Major copper producing states in U.S.: Arizona, New Mexico, Utah, Michigan, and Montana.

Uses of Copper: 41% in building construction, 24% in electrical and electronic products, 13% in industrial machinery and equipment, 12% in transportation, and 10% in other general products.

Major zinc producing countries: Australia, Canada, China, Mexico, Peru, United States.

Major zinc producing states in U.S.: Tennessee, New York, Alaska, Missouri. Minor production in Colorado, Idaho, Illinois, Montana. The U.S. imports approx. 30% of the zinc it uses.

Uses of zinc: 46% in construction, 20% in transportation, 11% in machinery, 11% electrical uses, and 12% in other uses such as paints, batteries, rubber, medicines, lubricants.

Clays are produced in most states, except: Alaska, Delaware, Hawaii, Rhode Island, Vermont, and Wisconsin.

Main types of clay: kaolin, ball clay, fire clay, bentonite, fuller's earth, and common clay.

Uses of clays: paper making, glass, dinnerware, floor & wall tile, bathroom fixtures, kitty litter and other absorbents, medicines, and various foods.

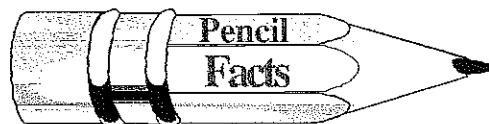
Activity: Fingerprints from graphite

- Materials**
- one sheet of scratch paper
 - a soft graphite pencil (No. 2)
 - five pieces of cellophane tape (2" long)
 - damp, soapy paper towel and dry paper towel
 - trace each student's hand for recording sheet

Experiment:

1. Use the side of a soft graphite pencil to apply a thick coating of graphite to a small section of the scratch paper. Rub the fingertip to be printed over the graphite. Make sure that the graphite covers the entire first joint of the finger—from the tip to the joint line.
2. Firmly press the graphite-coated fingertip on a piece of cellophane tape that has been placed adhesive side up on a desk or table. Slowly peel the tape from the finger. Place the tape in the correct space on the recording sheet.
3. Before printing each fingertip, apply more graphite.
4. After printing, each fingertip should be wiped clean with a soapy paper towel and dried to prevent graphite residue from smearing the next fingerprint.

You will also learn that graphite is a lubricant. Why is that?



Lead pencils contain no lead.

Graphite is extremely soft and smudges anything with which it comes in contact. Graphite feels greasy or slippery to the touch.

The less clay mixed with graphite, the softer and blacker the *lead* will be.

Wood cases for most pencils are made of incense cedar, a North American tree of the cypress family.

The word pencil comes from the Latin *penicillus*, which means little brush.

The English made the first graphite pencils in the mid-1500's.

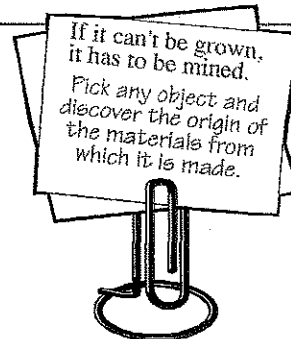
The Germans were the first to enclose the graphite in a wood case, about 1650.

In 1795, Nicolas Jacques Conte of France developed a pencil-making process that manufacturers still use today.

In 1812, William Monroe of Concord, Mass., sold the first American-made pencils to a Boston hardware dealer.

Eberhard Faber, an American businessman, built the first mass-production pencil factory in the United States in 1861.

More than 2 1/2 billion pencils are sold each year in the United States alone—about 11 pencils for each person in the country.



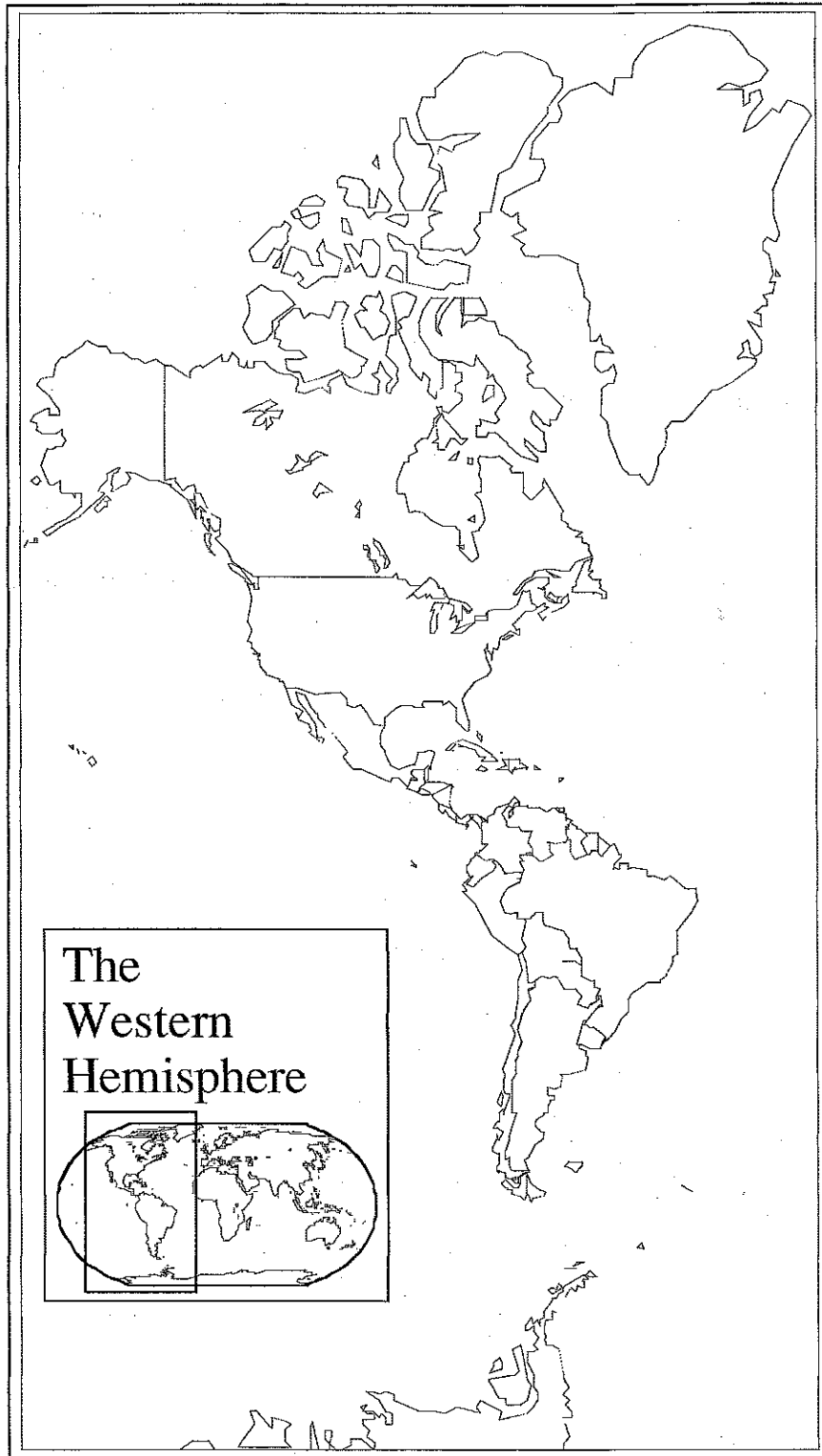
Pieces Parts of a Pencil

What's important when making a pencil?

- Parts Are Cheap — Parts Are Expensive
- Parts Are Easy to Find — Parts Are Hard to Find
- Materials Are Soft — Materials Are Hard
- Parts Easy to Make — Parts Hard to Make
- Materials Are Smooth — Materials Are Rough
- Materials Found Near You — Materials Far Away

What machine would you design to make a pencil?
What tools can you use instead of a pencil?

Does any country have all the natural resources necessary to make a pencil?



Activity 1

Using the information from page 1, determine which raw materials used to make a pencil are mined and which are grown. This can be a cooperative group activity.



Activity 2

Each student will need a sharp pencil. Identify the following parts of the pencil

*wood metal graphite
paint eraser glue*

Explain to your students that each part of the pencil comes from a different state or country. Use the support material (descriptions and map). Count the different locations and raw materials.

Activity 3

Create a Key for the pencil parts. Indicate the origin of the resources on the map.

*sulfur calcium aluminum
clay latex pumice
zinc copper graphite
barium wood soybean oil*

Research specific parts of the pencil. How is the natural resource obtained? Where this resource is found? Other uses for this resource. This could be a cooperative group or partner activity. Find out that aluminum (from the mineral *bauxite*) is not mined in the U.S. or Canada.



Wood for pencils must be straight-grained and of a texture that can be cut against the grain with a pencil sharpener. A cedar forest in northern California provides the wood for pencils made in the U.S.