

# Arizona Copper Mines

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<b>Grade Level</b>	4
<b>Duration</b>	2 class periods

Arizona Social Studies Standards
<b>Strand 1: American History</b> <b>Concept 1: Research Skills for History</b> <b>PO 1.</b> Use the following to interpret historical data: <ol style="list-style-type: none"><li>timelines – B.C.E. and B.C.; C.E. and A.D.</li><li>graphs, tables, charts, and maps</li></ol>
<b>Concept 7: Emergence of the Modern United States</b> <b>PO 1.</b> Describe the economic development of Arizona: <ol style="list-style-type: none"><li>mining</li><li>ranching</li><li>farming and dams</li></ol>
<b>Strand 4: Geography</b> <b>Concept 1: The World in Spatial Terms</b> <b>PO 1.</b> Use different types of maps to solve problems (i.e., road maps – distance, resource maps-products, historical maps-boundaries, thematic map-climates). <b>PO 7.</b> Locate physical and human features in Arizona using maps, illustrations, or images: <ol style="list-style-type: none"><li>physical (e.g., Grand Canyon, Mogollon Rim, Colorado River, Gila River, Salt River)</li><li>human (e.g., Phoenix, Yuma, Flagstaff, Tucson, Prescott, Hoover Dam, Roosevelt Dam)</li></ol>

Other Arizona Standards
<b>Reading</b> <b>Strand 3: Comprehending Informational Text</b> <b>Concept 1: Expository Text</b> <b>PO 6.</b> Interpret information from graphic features (e.g., charts, maps, diagrams, illustrations, tables, timelines) in expository text. <b>Concept 2: Functional Text</b> <b>PO 2.</b> Interpret details from functional text for a specific purpose (e.g., to follow directions, to solve problems, to perform procedures, to answer questions).
<b>Writing</b> <b>Strand 3: Writing Applications</b> <b>Concept 2: Expository</b> <b>PO 2.</b> Write an expository paragraph that contains: <ol style="list-style-type: none"><li>a topic sentence</li><li>supporting details</li><li>relevant information</li></ol>

## Overview

Students will engage in a hands-on activity using GPS technology in the context of the Arizona copper industry.

## Purpose

Students will understand the history and importance of the copper industry in Arizona.

## Materials

- GPS units – 1 for each group of 4 students
- *eTrex Legend Quick Reference Guide* – 1 for each group of 4 students
- Arizona Mining Town Map - 1 per student
- General Information about Copper Mining - 1 per student

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- Arizona Copper Mines Waypoint Worksheet - 1 copy to be cut apart
- Clipboards, journals, pencils - 1 per student
- 4 plastic boxes
- A Checklist for My Work - 1 per student

## Objectives

Students will:

- Find waypoints using a GPS unit
- Identify locations on a map
- Transcribe information into a journal
- Write a paragraph about copper mining in Arizona

## Lesson Components

**Prerequisite skills:** Students will know how to use a GPS unit.

**Prior to the lesson:** The teacher will determine and program the location of the waypoints into the GPS units by degrees, minutes, and seconds. One copy of the Arizona Copper Waypoint Worksheet will be cut up so each waypoint is a separate slip of paper. A plastic case containing one slip of paper about a copper mine will be left at each waypoint.

1. Hand out, read, and discuss the General Information about the Copper Mining handout.
2. Distribute the Arizona Mining Town map. Ask the students to look for any pattern in where mines were located. (The pattern of mines is strongest from the northwest to the southeast across Arizona.)
3. Divide students into groups of four.
4. Distribute the *eTrex Legend Quick Reference Guide* and a GPS unit to each group.
5. Review the features of the GPS unit and how to navigate to the waypoints.
6. Instruct the students to take turns completing the tasks.  
The shared tasks are:
  - (1) using the GPS unit to find the correct location
  - (2) being responsible for opening and replacing the plastic box just as it was found
  - (3) reading the information on the slip of paper found in the plastic box
  - (4) locating the city on the Arizona Mining Town map

**All students will:**

  - (1) write the information found in the plastic box in their journal
  - (2) circle the city on their Arizona Mining Town map
7. Pass out a clipboard, journal and pencil to each student.
8. At each waypoint a student will read the slip of paper that they find in the plastic box. A student will locate the city on the Arizona Mining Town map. All students will circle the

location of the copper mine on their map and then write the fact in their journal. They should rotate group tasks until everyone has taken a turn.

9. After completing all of the waypoints the students will return to the class.
10. Students will write a summary of the information about the copper mines collected at the waypoints using the information from their maps and journal.
11. Hand out the student writing checklist to the students. The summary should include locations of the mines from the map, indicating the location of each mine within the state (i.e., middle of the state, east, west, north, south), a fact about each location, and some of the ways that copper is used. The summary should have a good introduction, accurate supporting details, and a conclusion.
12. Collect student summary for assessment.

## Assessment

The summary can be graded for Ideas and Organization using the Student Checklist. 18 points are possible. 16 points is mastery.

## Extensions

Go on a field trip to a mining museum in Arizona:

Arizona Mining and Mineral Museum in Phoenix: <http://www.mines.az.gov/General/museum.html>

Bisbee Mining and Historical Museum: <http://www.bisbeemuseum.org/>

Jerome Historic State Park: <http://www.pr.state.az.us/Parks/parkhtml/jerome.html>

ASARCO Mineral Discovery Center: <http://www.mineraleDiscovery.com/>

Research how GPS is used in the copper mining industry today.

## Sources

Arizona Mining Towns	<a href="http://alliance.la.asu.edu/maps/AZ_Mining_Towns2.pdf">http://alliance.la.asu.edu/maps/AZ_Mining_Towns2.pdf</a>
Mining in Arizona	<a href="http://jeff.scott.tripod.com/miningaz.html">http://jeff.scott.tripod.com/miningaz.html</a>
Copper–The Ancient Mineral	<a href="http://www.mii.org/pdfs/copper.pdf">http://www.mii.org/pdfs/copper.pdf</a>
Copper Fact Sheet	<a href="http://www.azcu.org/teachersRedMetal1.php">http://www.azcu.org/teachersRedMetal1.php</a>
Mining & Production	<a href="http://www.azcu.org/teachersCommodity2.php">http://www.azcu.org/teachersCommodity2.php</a>
Minerals of Arizona	<a href="http://mineral.galleries.com/minerals/fablocal/arizona.htm">http://mineral.galleries.com/minerals/fablocal/arizona.htm</a>
Google Earth	<a href="http://earth.google.com/">http://earth.google.com/</a>

General Information about Copper Mining written by Patty Sepp based on information from the Arizona Mining Association. This material is found on the GeoLiteracy CD created by the Arizona Geographic Alliance. Go to <http://alliance.la.asu.edu/azga/> and click on GeoLiteracy.

# General Information about Copper Mining

By Patty Sepp

Arizona Geographic Alliance

## Introduction

Do you play CD's or cassette tapes? Use a computer? Play video games? Watch TV? Use a VCR? Use batteries? Talk on a phone? Turn on lights? Use a microwave? Take a shower? Ride in a car? Use coins? Then you use copper! All of these items need copper!

Arizona is known for its copper deposits. Of all the 50 states, Arizona produces the most copper. This is the reason this state is called the "Copper State." Arizona has been the leading producer in the nation of this metal since 1910. The copper industry is important to Arizona's economy, employing thousands of people and bringing in billions of dollars.

## How was copper formed in Arizona?

"**Volcanoes** gave birth to copper. The volcanic age left copper deposits, hidden deep beneath the earth's surface, in a diagonal line from one end of Arizona to the other." [Arizona Mining Association (AMA) website]

**Copper** is a mineral that we find in the **crust** of the earth. Arizona has a lot of **igneous rocks**. These are rocks were once molten **magma**. The tremendous heat and pressure within the earth produced this magma. The magma cooled and hardened into igneous rocks. Igneous rocks may also have other precious metals besides copper inside them.

## Where is the copper?

Prospectors came to Arizona in the 1800s to search for such minerals as copper, gold, and silver. They came with their burros and picks, shovels, and pans. They could find copper sometimes by just looking at rocks located on the surface of the earth. As time went on, however, the copper was harder to find. Picks, shovels, and pans were replaced by more complicated mining equipment. Miners had to search deeper in the earth for the copper ore.

According to the AMA, copper is buried deep within the earth and the average mine produces only 10 pounds of copper per ton of ore. To obtain that amount, the average mine must move an additional two tons of rock. Remember, one ton equals 2,000 pounds.

One Ton = 2,000 pounds 10 pounds of copper somewhere  
in there

One Ton = 2,000 pounds rock - no copper

One Ton = 2,000 pounds rock - no copper

Totals: **Three Tons = 6,000 pounds to obtain 10 pounds of copper**

### **What are the 2 types of copper mines in Arizona?**

There are 2 types of copper mines. The first type of mine is an **open pit mine** or a surface mine. It is a copper mine that is located at the top of the ground. The ore is removed layer by layer and the land has a terraced appearance. These **terraces** are sometimes called benches.

The second type of mine is an **underground mine**. The copper is under the earth. This type of mine has a vertical opening. This opening is called a **shaft**.

### **Where are some of the Copper Mines located in Arizona?**

There are several locations where copper has been found and mined in Arizona. Use the Arizona Mining Town map to see where mines were located. However, not all of these were copper mines.

### **Summary**

Copper is an important natural resource, and Arizona is the leading producer of copper in our nation. Throughout volcanic rocks we locate this ore to produce much of the copper that goes into many of our products used everyday.

# AZ Copper Mines Waypoint Worksheet

## WAYPOINT 1: Morenci

There are two primary methods of mining copper in Arizona: underground or open pit mining. Morenci used open pit mining.

## WAYPOINT 2: Bisbee

Bisbee used both open pit and underground mining. A mineral that is found here is Azurite, which is very popular because of its deep blue color created by the presence of copper.

## WAYPOINT 3: Jerome

In the 1800's, Jerome was a huge copper mining town. When the price of copper dropped, the mines closed down. Today it is a good place for tourists to visit.

## WAYPOINT 4: Ajo

This mining town recently opened up its copper mines again. Ajo can make money on its copper now because the price of copper is so high and because of new technology.

## A Checklist for My Work

Name \_\_\_\_\_

My summary includes:

Ideas – these are your supporting details

\_\_\_\_\_ I have a the names of the 4 mines – 4 points

\_\_\_\_\_ I have the location of the 4 mines in terms of its location (in the middle, southern, eastern, western, or northern part of the state) – 4 points

\_\_\_\_\_ I have 1 fact about each of the 4 mines – 4 points

\_\_\_\_\_ I have 2 ways that copper is used today – 2 points

Organization

\_\_\_\_\_ I have a good introduction. – 2 points

\_\_\_\_\_ I have good supporting details. – 14 points

\_\_\_\_\_ I have a good conclusion. – 2 points

Total points possible – 18 points

Total points - \_\_\_\_\_