

# Thar's Gold in Them Hills!: Gold Panning

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**Grade Level** High School  
**Duration** 3 class periods

## National Standards

### GEOGRAPHY

#### Element 5:

#### Environment and Society

14. How human actions modify the physical environment  
16. The changes that occur in the meaning, use, distribution, and importance of resources

## AZ Standards

### SCIENCE

#### Chemistry

Plus HS+C.P1U1.5 Plan and carry out investigations to test predictions of the outcomes of various reactions, based on patterns of physical and chemical properties.

Essential HS.P1U3.4 Obtain, evaluate, and communicate information about how the use of chemistry related technologies have had positive and negative ethical, social, economic, and/or political implications.

#### Earth and Space

Plus HS+E.E1U3.9 Construct an explanation, based on evidence, for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.

#### Core Ideas for Using Science

U1: Scientists explain phenomena using evidence obtained from observations and or scientific investigations. Evidence may lead to developing models and or theories to make sense of phenomena. As new evidence is discovered, models and theories can be revised.

U2: The knowledge produced by science is used in engineering and technologies to solve problems and/or create products.

## Arizona Social Science Standards

### GEOGRAPHY

**Human-environment interactions are essential aspects of human life in all societies.**

HS.G2.1 Analyze interactions within and between human and physical systems.

HS.G2.2 Evaluate how political and economic decisions throughout time have influenced cultural and environmental characteristics of various places and regions.

HS.G2.4 Evaluate the use and sustainability of natural resources

## Overview

When people think of gold prospectors, they often conjure up an image of a '49er with his burro, gold pan, and pick and shovel. The truth is that there were many gold rushes in North America during its settlement by Europeans, and gold is even being mined today. In Arizona, gold has been found in all the counties except Apache, Navajo and Coconino. If you have ever wanted to try and find some gold, you might find that it is not as difficult as you might think--all you need is a little knowledge about the science behind prospecting.

## Purpose

In this lesson, students will learn about the physical properties of gold and how placer gold can be separated from a mixture of soil. They will also learn how the placer gold becomes concentrated in the soil which will educate students on how to find the best locations to dig for gold.

## Materials

- Fun Facts About Gold reading

- Gold pan, pick, shovel, whisk broom, empty vial, plastic bucket, hammer, liquid soap, panning tub, and gloves.
- Thar's Gold in them Hills!: Gold Panning assessment and Answer Key

## Objectives

The student will be able to:

1. describe the best places in a streambed to look for placer gold.
2. successfully use a gold pan to separate gold from soil.
3. describe several physical properties of gold.
4. describe how gold "rushes" have impacted settlement and the environment.

## Procedures

### SESSION ONE

1. Anticipatory Set: Hold up and show the class a bit of gold (it can be a necklace, pendant, earring, nugget, or vial containing flakes). Ask the students if anyone knows what this object is made of. After gold is determined, lead a discussion to find out what they know about gold.

*Note: This is a good time to fill in any gaps in their understanding regarding its cultural and economic importance. **You have a choice to orally present the information below to the students or you can use the Fun Facts About Gold reading as a handout.***

Important concepts could include: 1) the fact that it is an element and is one of about a hundred substances from which all other mixtures and compounds are made. 2) It has seventy-nine protons (nothing else has this number of protons) in each atom's nucleus and 3) an atomic symbol of Au from the Latin word "aur" which means gold. 4) Gold is 19.3 times heavier than water (so it has a specific gravity of 19.3) and 5) it is about six times heavier than ordinary rock. 6) It does not oxidize (rust) so it is always shiny, bright yellow, and 7) it is so malleable that it can be pounded into sheets so thin that it would require over 200,000 sheets to form a stack an inch high. 8) It is very heavy—a cubic foot of gold would weigh about 1,200 pounds. 9) In gold panning, we take advantage of the fact that gold is heaviest of all the particles in the soil—since gold is very heavy, it stays in the bottom of the gold pan. 2. Ask the class to find out how many students have ever panned for gold. Tell them that this lesson is about finding and panning for gold!

3. Begin by discussing the legal aspect of prospecting.

- You can't just dig for gold anywhere you want. It is forbidden to prospect on Indian and military reservations, parks, monuments, wilderness areas, private land without permission, or someone else's gold claim.
  - Filing a gold claim is not that difficult, but it is beyond the scope of this lesson. Luckily in Arizona, the Gold Prospector's Association of America has many claims and a phone call to 1-800-551-9707 ext. 109 will let you find out which local chapter is closest to you. The chapter might help you with a field trip or come to your school with some paydirt to pan.
4. Then build some background knowledge.
- Gold is usually associated with ancient volcanic activity, but just because you have volcanic rocks in your area does not mean there will be gold in them.
  - The best way to find gold is to go to a place where it has been found before. There are many books, maps and websites which can provide information on historic gold finds in Arizona.
  - If you find a site and gain permission to explore for gold, you have to know a little about how to look for it. If the gold is within rock, it is called lode gold. In this form, it is very expensive to extract.
  - We are interested in placer gold, where many years of erosion has released some of the gold from the rock. This placer gold is the gold we can more easily dig and pan for. In times of heavy rains and flooding of washes, gold can be transported downhill by water.
  - Since gold is so heavy, it tends to drop to the bottom of the streambed when the floodwaters slow down. These are the places where you look for gold—where the stream channel widens, or the slope of the stream decreases. Water flows slower on the inside bend of a stream or where the water encounters large rocks or logs. These are all good places to look.
  - The gold will not be on the top of the soil, but near the bottom. You have to dig down past the loose sand until you encounter clay, caliche, or bedrock. When you dig into the clay, save it for your gold pan. If you find caliche or bedrock, use a whisk broom to carefully sweep the soil on top of the caliche or bedrock into a shovel and save this material for your gold pan.

- Where a stream is located now may not be where it was hundreds or thousands of years ago. Stand back and take a look at the whole area near the streambed. Use your imagination and try to picture where an inside bend was thousands of years ago, and try your luck digging there. One sign that you are on the right track is finding rounded rocks where the rough edges of the rock were knocked off as it flowed down an ancient flooding streambed.
- Another sign is finding black sand as you pan for your gold. Black sand is mostly hematite and magnetite which, like gold, are very heavy, indicating that you are finding where the heavy materials in the soil are settling.
- If you have never panned for gold before, it is best to have an experienced prospector show you how to accomplish the method. It is not too difficult, but it does require technique and a little practice. You can find videos of gold panning technique at online sites such as Youtube. Good Luck, and may the bottom of your pan always be yellow.

4. Closure for this day: Have the students take out a sheet of paper and write down three locations within a streambed where they might look for gold.

## SESSION TWO

5. You have three options here. First, you can get permission and go on a field trip to a known gold producing area where students can get into groups and search for gold (maybe even with a prospector from a local club). Second, you can have local prospectors come to your school with some paydirt and have them help teach students how to pan for

gold. Lastly, you can buy some placer gold (gold flakes and gold specks) and mix it into some soil that you have placed into buckets for the students to use to fill their gold pans.

## SESSION THREE

6. Have students complete the Thar's Gold in Them Hills! Gold Panning worksheet. You will need to establish a gold panning area in the classroom so you can evaluate their technique for Question 4 on the worksheet.

## Assessment

### Science and Geography

Thar's Gold in them Hills!: Gold Panning assessment can be graded. Mastery will be considered 28 points or higher on the assessment.

## Extensions

Give each student this Arizona Mining Towns map. [http://geoalliance.asu.edu/sites/default/files/maps/AZ\\_Mining\\_Towns2.pdf](http://geoalliance.asu.edu/sites/default/files/maps/AZ_Mining_Towns2.pdf) Have the students pick a town on the map and research it. They should report on what minerals were found there and for how long did the mine operate.

## Sources

Gold Prospector's Association of America  
<https://www.goldprospectors.org/>

Arizona Mining Towns map  
[http://geoalliance.asu.edu/sites/default/files/maps/AZ\\_Mining\\_Towns2.pdf](http://geoalliance.asu.edu/sites/default/files/maps/AZ_Mining_Towns2.pdf)