



## Lesson Summary

Students re-enact San Francisco's Gold Rush days, compare access to fresh water then and today, and analyze their findings.

## Overview

In this lesson, students will:

- Learn about water access and use during the Gold Rush.
- Understand the value of water when availability is limited.
- Re-enact 1849 when modern plumbing didn't exist.
- Compare water use in 1849 to today.
- Take notes, discuss and analyze findings.

## Background

Water is life. While we can go weeks without food, we can only survive days without water. Although three-quarters of the planet is covered with water, 97% is saltwater and only 3% is fresh water. Since most of the planet's freshwater is locked in glaciers and deep underground in out-of-reach places, we only have access to 0.34% of all water on Earth. That's like having 100 dollars in the bank, but only being able to use 34 cents!

Until the mid-1800s, residents of San Francisco depended on local streams, springs and wells for their freshwater supply. With the discovery of gold in 1848, and the ensuing population boom in San Francisco, water became a scarce resource. In order to supply enough water, people peddled water in barrels that were carried in carts or on the backs of donkeys. In 1857, the San Francisco City Water Works dammed Lobos Creek in the Presidio as a means to secure more water for local residents.

With water at a premium, people during the Gold Rush days prioritized their uses of water by first meeting their needs for drinking and cooking. Water was needed for coffee and tea, boiling potatoes and beans, making soups and stews and baking bread and pies. Water would then be used for bathing, shaving, washing clothes and linens, and cleaning homes. Unlike today, when modern household plumbing is connected to huge reservoirs like Hetch Hetchy in Yosemite Valley that provide easier access to water, most people living in San Francisco during the Gold Rush days used a bucket and dipper, and did not bathe everyday or use water for recreation, washing vehicles, or flushing toilets.



## Time Needed for Lesson

60-75 minutes

## Materials

- 5 one-gallon plastic jugs
- 5 8 oz. measuring cups. (can be cleaned yogurt containers)
- 1 new toothbrush
- 1 tube toothpaste
- 1 bar of soap
- 1 washcloth
- 1 old tee shirt
- laundry soap
- 1 basin, tub or big bowl
- 1 coffee mug or plate
- 1 sponge
- dishsoap
- 5-10 paper towels
- sink or outdoor space that can get wet
- *Hetch Hetchy & Let's Save Water* Fact Sheets & Comprehension Questions (optional)

### Preparation for Teaching

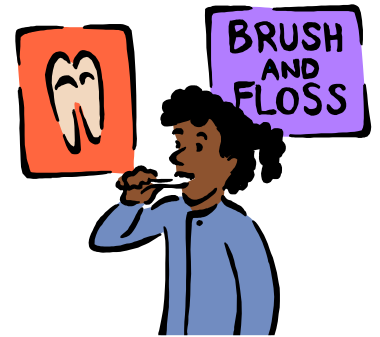
1. Gather items from materials list.
2. Fill all gallon jugs with water.
3. Organize students into five groups.
4. (Optional) Make copies and give each group a copy of the *Hetch Hetchy* and *Let's Save Water* Fact Sheets and Comprehension Questions.
5. (Optional) Have students take turns reading the fact sheets aloud in groups and then answering the comprehension questions. Alternately, this can be an individual class or homework assignment.

### Pre-Activity Questions & Discussion

1. Gather students together as a class.
2. Tell students they are going to jump into an imaginary Time Machine so they can travel from today, back 160+ years to the days of the Gold Rush.
3. Say: It's time to travel back to 1849. Gold has been discovered and many people have come to San Francisco to strike it rich.
4. (Optional: To match a standard) Ask student to read aloud the paragraph "Once Upon a Time..." from the *Hetchy Hetchy* Fact Sheet.
5. Ask: In 1849, did San Francisco residents have indoor plumbing like today, where they could just turn on a kitchen faucet to get water? (*no*)
6. Where did San Francisco residents get their water? (*from wells and streams, and from peddlers who sold water in barrels*)
7. How do you think they got their water home? (*They used buckets and pails filled at the water source and then carried or transported this water home.*)
8. How big a bucket do you think they could each carry? (*Take guesses from students. Let them use their hands to describe size of the bucket. If needed, remind students that water is heavy, so the bucket can't be too big or else it can't be carried by hand.*)
9. When they finally got water home, what do you think they used it for? Write answers on board. (*Drinking beverages like coffee and tea; baking and cooking food like soups, stews, meats, boiled potatoes, rice, vegetables, pies and breads; washing dishes; bathing, shaving; washing clothes and linens; cleaning the house*)
10. Of all these uses, which ones are the most important? Why? (*drinking and cooking because those two things are needed for survival*)
11. If there was a water shortage, which uses could the people forgo or do without? (*Take answers and then point to all answers on board except for drinking and cooking.*)
12. How many gallons a day do you think each person would really need back then for all their uses? (*Take guesses. Generally speaking, water use at home averaged 1-2 gallons per person.*)



13. Hold up the jug and tell students this is one gallon of water. Hold up 8 oz. measuring cup and say that each gallon contains 16 cups of water. Since 1 cup = 8 ounces, how many ounces are in a gallon? (*Have students do math at desk, or do on the board:  $16 \text{ c.} \times 8 \text{ oz.} = 128 \text{ oz.}$* )



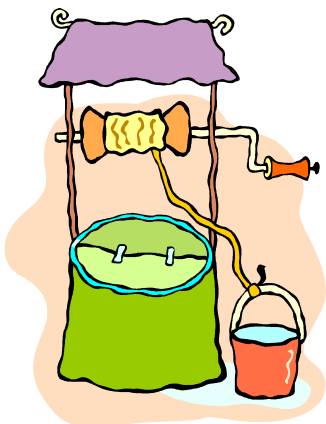
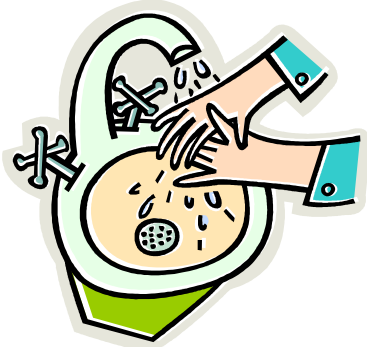
### Classroom Activity

1. Divide students into five groups. Give each group 1 gallon of water.
2. Remind them it is San Francisco in 1849. They are siblings who must bring home one gallon of water from the well.
3. Have students get up from their groups two at a time, or line up in pairs. Each pair should hold a gallon of water. They should take turns carrying this jug of water down the hall, or once around the room.  
*Note: The point is for students to experience the weight of water. They must walk far enough to understand that carrying water is difficult.*
4. Ask students to describe their experience carrying the water. Was it hard? How far do they think they could carry a gallon of water before it became too difficult?
5. Tell students they will now further experience life like San Franciscans did 160+ years ago.
6. Explain that each group will be given an activity like brushing teeth, washing faces, doing the dishes, or washing clothes. They will measure out the amount of water needed for this activity, while doing the action, and record it. *Note: Students should do this outside or over a sink.*
7. Each group should match one student with one of the following roles:
  - The Doer (of the activity)
  - The Pourer (of the water)
  - The Cup Holder (as the water is being poured)
  - The Note-Taker (of how much water is used)

*Note: If you have more than four students in a group, you may do this activity twice to allow every student to have a participatory role. If not, then ask the extra students to be observers who pay close attention. They will later be asked to report what happened to the class.*

8. Assign each group an activity and distribute measuring cups, paper towels, and the following supplies:
  - Tooth Brushing Group: toothbrush + toothpaste
  - Face Washing Group: bar of soap + washcloth
  - Clothes Washing Group: tee shirt + laundry soap + tub or basin
  - Dish Washing Group: mug or plate + dish soap + sponge
9. Remind them they are still in the Gold Rush days with only a gallon of water to use for their daily needs, and they must try to accomplish their assigned activity using as little water as possible.
10. Before they begin, let them discuss as a group how much water they predict will be needed for their activity. Guesses should be in ounces, and written down by the note-taker. Remind them that a gallon is 128 oz.

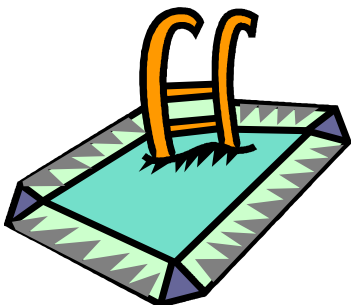
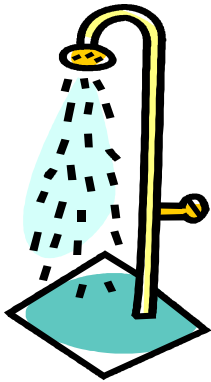




10. If it's unclear how to proceed, explain to each group what they must do to accomplish their activity. (i.e. make sure the plate is clean, etc.)
11. As the activity commences, they should measure all the water they use, and this must be recorded by the note-taker.

### Follow-Up Activity and Discussion

1. When activities are completed, come together as a class and ask the observers from each group to report what happened and note how many ounces of water were used for their activity.
2. Did the amount of water used match their predictions?
3. Were students surprised by what they discovered during their activities?
4. Did the amount of water available seem realistic for the task at hand?
5. Do they think they could use less water if they did the activity a second time? *Note: If time allows, test this hypothesis by letting them do the activity a second time.*
6. Tell students it's time to leave the Gold Rush era and return to modern day San Francisco. Have them take a minute to picture how they use water at home today versus how they used water back in 1849. Are there any thoughts students would like to share?
7. Write the following numbers on the board: 3, 3, 30, 30
8. Point to each number and tell students it is the number of gallons we normally use today to do those same activities - especially when leaving the faucet on and the tap running. *Note: These values are based on a 3 gallon per minute (gpm) faucet flow-rate, which is a reasonable assumption for an inefficient fixture.*
  - Brushing Teeth = 3 gallons
  - Washing Face = 3 gallons
  - Hand Washing Clothes = 30 gallons
  - Hand Washing Dishes = 30 gallons
9. Do the math on the board for the ounces needed, so it's comparative to their data. (3 gallons = 384 ounces; 30 gallons = 3840 ounces)
10. Ask each group for the ounces they used for their activity. List their number next to the modern day number.
11. What do students think about these comparisons? What does it tell them?
12. Ask the following:
  - a. What are the benefits of modern plumbing and a seemingly plentiful water supply such as Hetch Hetchy Reservoir? (*easy on-demand access straight into home, available for a variety of uses, plentiful supply, sanitary standards, hot running water*)
  - b. What are the drawbacks of modern plumbing? (*creates disconnect from our water source; plentiful and ready supply when turning on faucet gives impression there is endless amount of water available, and conservation isn't needed; allows for easy waste.*)



- c. How does modern plumbing give the impression that there's "plenty of water?" (*No outward sign that there **isn't** plenty of water; when you turn on tap, the water's always there. Conclusion is that there must be plenty of water since it flows so readily all the time.*)
- d. How does modern plumbing increase our daily water use? (*Because we no longer deal with the difficulty of gathering water from the well, we readily waste water. Faucets increase likelihood of running water when brushing teeth, doing dishes, etc.; showers increase likelihood of taking long showers; flushing toilets increase likelihood of flushing when it isn't necessary, etc. Modern plumbing also allows us to use water for things we wouldn't have in 1849 like car washing, swimming pools, golf courses, indoor ice skating rinks, machine made snow, etc.*)
- e. Do you think that all of our water use is necessary, or do we use a lot of our water just because it is so readily available?
- f. What alternative methods or behaviors can we learn from the Gold Rush days that can help conserve water? (*use a washcloth to bathe; use a basin to hold water when washing hands or face; reuse cup or plate instead of washing every time; wash clothes only when they need to be washed*)
- f. What, if any, new actions will you take when it comes to using water? (*turn off the faucet; take a shorter shower; wash full loads; fix leaky plumbing; sweep sidewalk instead of hosing; etc.*)
- g. (Optional: To match a standard) Ask students to write 2 things they learned from this lesson and 2 choices they will make to save water.

### Extensions

1. Graph water use of the various activities.
2. Have students do collage that shows images of different water uses.
3. Research situations in which water rationing existed such as: drought, wartime, or ocean travel to San Francisco in the 1850s.

### CA State Standards

**Grade 4** English Reading 1.1 • Written and Oral English Language Convention 1.1 • Listening and Speaking 1.1, 1.2, 1.8  
Investigation and Experimentation 6b • History - Social Science 4.33, 4.42, 4.46, 4.47

**Grade 5** Reading 1.1, 2.3, 2.4 • History – Social Science 5.84  
Science Earth Sciences 3e, 6g

**Grade 6** Reading Comprehension 2.2 • Written Conventions 1.1  
Mathematical Reasoning 2.1, 3.3 • Scientific Investigation and Experimentation 7d