



## 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:

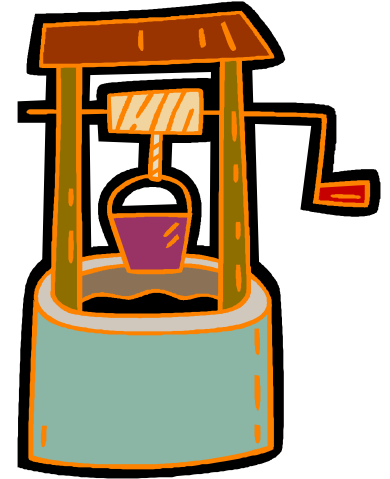
- Learn about water access and use during the Gold Rush.
- Re-enact 1849 when modern plumbing didn't exist.
- Have a 2-gallon ration of water to use for one day.
- Understand value of water when available in limited supply.
- Compare water use in 1849 to today.
- Take notes, discuss and analyze findings.

## 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!

Up 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 the advent of modern household plumbing brings San Francisco residents seemingly unlimited amounts of water from huge reservoirs like Hetch Hetchy in Yosemite Valley, 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

Two 60-minute class periods +  
1 weekend day of homework

## Materials

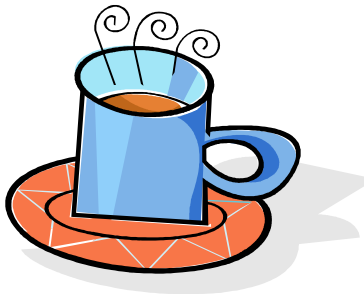
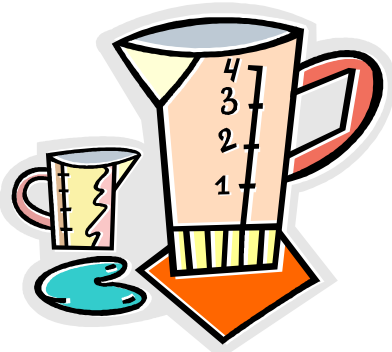
- 2-6 One-Gallon plastic jugs for classroom activity
- 1 One-Gallon plastic jug per student. Ask students to save empty juice containers from home. (While milk jugs will work, they must be thoroughly cleaned so no milk residue spoils inside.)
- One 8 oz. measuring cup per student. Can be a cleaned yogurt container. Can also use measuring cups from home.
- Student Worksheet and Survey
- Parent Letter
- *Hetch Hetchy* Fact Sheet & Comprehension Questions (optional)

### Preparation for Teaching

1. Gather items from the materials list. *Note: You may need to start a week in advance to ensure each student has one empty jug to use.*
2. Fill your gallon jugs with water.
3. Make student copies of Student Worksheet, Survey, and Parent Letter.
4. Organize students into groups of 4.
5. (optional) Make copies and give each group a copy of the *Hetch Hetchy* Fact Sheet and Comprehension Questions.
6. (optional) Have students take turns reading the fact sheet 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 2 gallons per person.*)



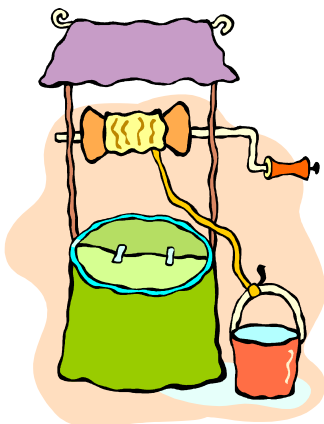
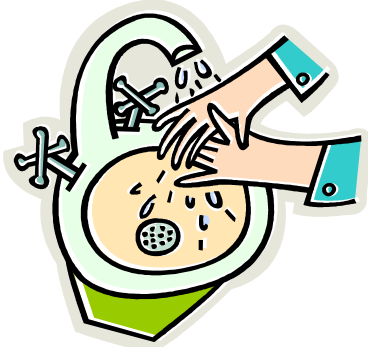
13. Hold up the jug and tell students this is one gallon of water. Hold up 8 oz. measuring cup and say that each gallon contains 16 cups of water. Since 1 cup = 8 ounces, how many ounces are in a gallon? (*Have students do math at desk, or do on the board:  $16 \text{ c.} \times 8 \text{ oz.} = 128 \text{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

### Classroom Activity

1. Divide students into pairs.
2. Tell them they will take turns pretending they live back in 1849. They are siblings who are sent to the local well to bring home two gallons of water (*the amount needed for one person per day*).
3. Have students either get up from their seats two at a time, or line up in pairs and give each a gallon of water to carry down the hall and back, or once around the room. *Note: If you have more jugs and can fill them, it will make this part of the activity go faster. You can also have students walk to a location outside. The point of this activity is for students to understand the weight of water. They must walk far enough for them to understand that carrying water is difficult. Let students experiment with actually carrying two jugs at once. And, when you're done with this activity, empty the jugs by watering the school garden, street trees, or classroom plants!*
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? What was it like carrying two gallons at once?
5. Tell students they will soon experience life like San Franciscans did 160+ years ago.
6. Explain that for one day over the weekend they will only be able to use two gallons of water for all their needs. They will measure out the amount of water they use each time and will record this in an activity sheet. *Note: They can choose which day of the weekend to do this. If doing this activity on a weekend day is too challenging for students, it can be done during the week.*
7. Explain *The Laws of the Land* and distribute *Student Worksheet*. Answer questions about *The Laws of the Land* and make sure students understand that they will only have two gallons of water to use for their daily needs including cooking, drinking, bathing and brushing teeth. Though it will be easy for them to find ways around this ration (say, by using a hand sanitizer instead of washing hands, or disposable plates so they don't have to wash the dish) they should not do this! The point is to pretend they are back in the Gold Rush days when modern access to water and other inventions did not exist. *Note: Students can use the toilet to flush, but do not need to account for this water use.*
8. Spend a few minutes as a class (or in small groups) discussing what

### LAWS OF THE LAND

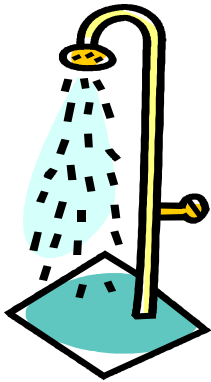
1. You cannot use modern plumbing except the toilet. All other water used must come from your 2 gallon jugs.
2. You must use your water to wash any plates, cups and forks you use.
3. Disposables like paper towels, plates, utensils, wipes, etc. cannot be used. These did not exist in 1849.
4. When you eat or drink, you must measure out the amount of water you think was needed for preparing that food or beverage.



- lifestyle habits or activities might be put on hold for the day. Are there any alternative behaviors or methods they can think of to conserve water? Ex: using a washcloth to bathe; using a basin or bowl to hold water when washing hands or face; reusing cup or spoon instead of washing every time; appropriate reuse of water (i.e. multiple use of cooking water, or watering plants with relatively clean leftover water.)
9. Answer questions and distribute *Parent Letter*. *Note: If students have scheduled activities such as a birthday party that might include swimming, they can participate as they normally would—and ignore the water used for the pool, but they still need to account for the water use in their beverages and food preparation at that event. Again, the point of this activity is to simulate life 160+ years ago (to the best of their ability!) when water was not as readily available as it is today.*

### Follow-Up Writing Activity and Discussion

- When students return to class, they will want to share their stories. Tell them they will have a chance to discuss their experiences soon.
- Pass out the *Water from the Well Survey* and give them 20 minutes to fill it out, using complete sentences and proper grammar. (*This can also be homework they do with the activity at home.*)
- Put them into groups of 4 to discuss what their experiences were like. Make sure everyone in the group has a chance to share.
- Collect all surveys for grading later and reconvene as a class. Read off each question in the survey and ask students to share their answers.
- Tell students that they will now leave the days of the Gold Rush. They will time travel back to San Francisco. Have them think about how they use water at home today versus how they used water back in 1849.
- Ask the following:
  - What are the benefits of modern plumbing and a seemingly plentiful water supply such as Hetch Hetchy Reservoir? (*easy on-demand access, can use as much as you like for a variety of uses, plentiful supply, sanitary standards, hot running water*)
  - 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 an endless amount of water available, and conservation isn't needed; allows for easy waste.*)
  - 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 washing hands, face, teeth or doing dishes; showers increase likelihood of taking long showers; flushing toilets increases likelihood of flushing when it isn't necessary, etc. Also, modern plumbing allows us to use water for things we wouldn't have in 1849 like car washing, swimming pools, golf courses, ice skating rinks, fake snow for skiing, 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 conclusions do you draw from this lesson and what, if any, new actions will you take when it comes to using water?



### Extensions

1. Graph water use during activity.
2. Have students add up regular amount of water they use the day after this activity is over. Compare.
3. Compare and contrast water access in San Francisco and the US with countries like Sudan and Ethiopia. Have students write a report.
4. Have students do collage that compiles images of different water uses.
5. Research situations in which water rationing existed such as: drought, wartime, or seafaring journeys like those made to San Francisco in the 1850s.
6. What laws or policies would students pass to help protect our water supply?

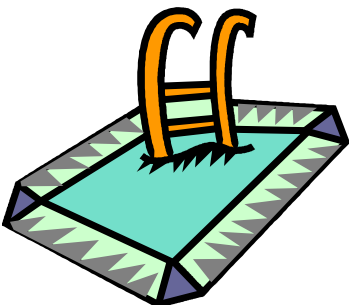


### CA State Standards

**Grade 4** English Reading 1.1 • Writing 1.4 • 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 • Mathematical Reasoning 3.3

**Grade 5** Reading 1.1, 2.3, 2.4 • Written and Oral English Language Conventions 1.4 • History – Social Science 5.84  
Science Earth Sciences 3e, 6g • Mathematical Reasoning 3.3

**Grade 6** Reading Comprehension 2.2 • Writing 1.3  
Written Conventions 1.1 • Mathematical Reasoning 2.1, 3.3  
Scientific Investigation and Experimentation 7d





# Water from the Well - Worksheet



## Student Worksheet

Pretend it is the 1849. You are living in San Francisco during the days of the Gold Rush. Water is hard to come by, so you can only use two gallons of water a day for everything, including drinking, cooking, and washing. Each time you use water, pour it into an 8 oz. cup to measure the amount you use. Write down how much water you used, and what you used it for, *each time you use it*.

### THE LAWS OF THE LAND

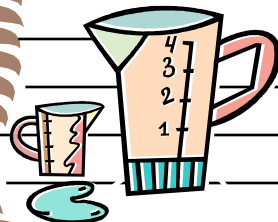
1. You cannot use any modern plumbing except the toilet. All other water use must come from your 2 gallons.
2. When you eat or drink, measure out amount of water you think was needed for preparing that food or drink.
3. You must use your own water to wash any plates, cups and utensils you use.
4. You may not use disposable items like paper towels, plates, wipes or utensils. These things didn't exist in 1849!



What did you use your water for ?

How many cups were used?

What did you use your water for ?	How many cups were used?



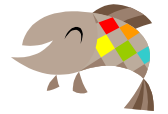
Total Cups Used: \_\_\_\_\_

Name \_\_\_\_\_

Date \_\_\_\_\_



# Water from the Well - Survey



Student Worksheet

Answer the following questions. Use other side if more space is needed.



1. What water-uses did you prioritize or put first? Why were these your priorities?

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2. What water-use activities, if any, did you eliminate from your day?

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3. Did you use anything to help save water? (Ex: washcloth or a wash-bowl)

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4. Did you have water left over at the end of the day? If so, what did you use it for?

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5. What water-saving techniques from 1949 could you do at home on a regular basis? Will you?

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6. What were some of the reactions from your family when you did this activity?

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Dear Parent or Guardian,

In class, your child is learning about water resources and conservation. They are participating in a lesson called *Water from the Well* in which they pretend to be back in the Gold Rush days (1850s), when water was limited and very expensive.

For one day this weekend, students will pretend they are living during Gold Rush times, and will use only two gallons of water for ALL uses including cooking, drinking, bathing, etc. Students will measure out all the water they use, and record what they used it for. For example, if pasta or soups are prepared for dinner, they will estimate how much water was needed for their portion. While they won't actually add that water to the pot from their gallon of water, they will write down "1 cup for soup" on their activity sheet, and pour out the water (to water a houseplant perhaps?). With regards to bathing: instead of showering or running a bath, students can use water-saving methods such as using a washbasin or washcloth. [The one exception to this rule is using the toilet. That is the only time they can use "modern plumbing" and don't need to account for the amount of water used.] This lesson will help them better understand the value of water and encourage them to identify their own priorities for water use.

Thank you for supporting your child in this activity. We think it will be a very fun, unique and interesting way to learn about the value of water!

Sincerely,

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Teacher Signature

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Estimado Padre, Madre o Tutor,

En clase, su hijo/a está aprendiendo sobre los recursos y conservación de agua. Están participando en una lección que se llama “Water from the Well” (“Agua del Pozo”) en la cual ellos pretenden volver a los días de la Fiebre de Oro (Gold Rush) (1850s), cuando el agua era limitada y muy cara.

Por un día durante esta fin de semana, los estudiantes pretenderán que están viviendo durante los tiempos de la Fiebre de Oro, y usarán solamente dos galones de agua para TODOS los usos, incluyendo cocinar, beber, bañarse, etc. Los estudiantes medirán toda el agua que ellos usen, y registrarán en qué se usó. Por ejemplo, si se prepara pasta o sopa para la cena, ellos deberán estimar qué tanta agua se utilizó para su porción. Ellos en realidad no añadirán a la olla del galón de agua, ellos van a escribir “1 taza por sopa” en su hoja de actividades, y van a botar el agua (¿tal vez en el macetero?). Con relación al baño: en lugar de ducharse o tomar una ducha, los estudiantes pueden utilizar métodos para ahorrar agua tales como utilizar una lavacara o un trapo para limpiarse. [La excepción a esta regla es utilizar el inodoro. Ese es el único momento en el que podrán utilizar “alcantarillado moderno” y no necesitan contarlo en la cantidad de agua que se utilizó.] Esta lección les ayudará a entender mejor el valor del agua y los alentará a identificar sus propias prioridades para el uso del agua.

Gracias por apoyar a su hijo/a en esta actividad. ¡Pensamos que va a ser una forma divertida, única e interesante de aprender sobre el valor del agua!

Atentamente,

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Firma del/la profesor/a

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親愛的家長或監護人，

在課堂上，你的孩子將會學習瞭解有關水資源以及節約用水的知識。他們上的這堂課程名為“來自井中的水”，他們假設回到淘金時期(1850年代)，當時的水不但資源有限的而且非常昂貴。

本星期會有一天是讓學生裝作他們生活在淘金時期，並且只使用兩加侖的水供應所有的生活所需，包括烹煮、飲用、沐浴等。學生將會計量他們的用水量，並且記錄用水目的。例如，如果要為晚餐準備意大利麵或湯，他們就要根據所需份量而估計用水量。雖然他們不會將他們的水真正盛入鍋子中，但他們會在他們的活動表上寫下“湯需一杯水”，並且將水倒出(可能用來灌溉室內植物?)。沐浴的安排: 與其進行淋浴或洗澡，學生可以採用省水措施，例如使用洗臉盆或毛巾。[使用抽水馬桶是此規定的一個例外事項。這是他們唯一可以使用“現代化抽水馬桶”，並且不需要計算用水量。] 這堂課程會幫助他們更進一步明白水的價值，以及鼓勵他們確立他們自己的優先用水事項。

感謝你支持你的孩子參加此次活動。我們認為這是一次非常歡樂、獨特以及有趣的方式學習瞭解有關水的價值!

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