



Water Use

Summary

Students monitor their personal daily water usage, compare their water usage with Animal Ark's, and discuss water conservation.

Objectives

- Nevada Science Standards
 - Content Standard N.5.A: Students understand that science involves asking and answering questions and comparing the answers to what scientists know about the world.
 - N.5.A.1: Students know scientific progress is made by conducting careful investigations, recording data, and communicating the results in an accurate method.
 - Content Standard N.5.B: Students understand that many people, from all cultures and levels of ability, contribute to the fields of science and technology
 - N.5.B.3: Students know the benefits of working with a team and sharing findings.
- Nevada Mathematics Standards
 - Content Standard 1.0: Students will accurately calculate and use estimation techniques, number relationships, operation rules, and algorithms; they will determine the reasonableness of answers and the accuracy of solutions to solve problems, communicate, reason, and make connections within and beyond the field of mathematics.
 - 1.5.7: Multiply and divide decimals by whole numbers in problems representing practical situations.
 - 1.5.8: Generate and solve addition, subtraction, multiplication, and division problems using whole numbers and decimals in practical situations.
 - Content Standard 3.0: Students will use appropriate tools and techniques of measurement to determine, estimate, record, and verify direct and indirect measurements to solve problems, communicate, reason, and make connections within and beyond the field of mathematics.
 - 3.5.1: Estimate and convert units of measure for volume.
 - 3.5.4: Determine totals, differences, and change due for monetary amounts in practical situations.
 - 3.5.6: Determine equivalent periods of time, including relationships between and among seconds, minutes, hours, days, months, and years.
- Nevada Social Studies Standards
 - Content Standard H3.0: Students understand how social ideas and individual action lead to social, political, economic, and technological change.
 - H3.5.3: Describe ways individuals display social responsibility.
 - Content Standard G6.0: Students understand the physical and human features of places and use this information to define and study regions and their patterns of change.

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- G6.5.1: Provide examples of human-environment interactions in the United States.
- Content Standard G8.0: Students understand effects of interactions between human and physical systems and the changes in use, distribution, and importance of resources.
 - G8.5.1: Describe ways physical environments affect human activity in the United States using historical and contemporary examples.
- Content Standard E9.0: Students will understand how scarcity and incentives affect choices, how markets work, why markets form, how supply and demand interact to determine the market price, and how changes in prices act as economic signals to coordinate trade.
 - E9.5.1: Describe how scarcity requires a person to make a choice and identify costs associated with that choice.

Materials

- Personal Water Audit (Attached)
- Animal Ark Water Usage Worksheet (Attached)
- Chalkboard or Whiteboard

Introduction

Residents in the United States generally have easy access to water. Simply turn on the faucet. In many parts of the world, this is not the case. Often, people have to carry gallons of water for several miles. In addition to the time and energy spent hauling water, unsafe or unsanitary conditions may spread disease or cause other problems. Even in the United States, problems associated with population growth, pollution, droughts, and uneven natural resource distribution can affect us.

At Animal Ark, water comes from a well that is 950 feet in the ground. It costs a great deal of time and money to pump the water from the well into holding tanks for use.

Lesson Plan

1. Reproduce the Personal Water Audit so that each student has one to take home. Have each student complete the Personal Water Audit prior to the lesson.
2. List the students' totals from the Personal Water Audit on the whiteboard. As a class, calculate the class' average water usage.
3. Discuss Daily Water Usage. You may use the following questions:
 - a. Were you surprised by the amount of water you used in a single day?
 - b. Did you imagine you used more or less water each day?
 - c. Did you use more or less water than the class average?
 - d. How much of your total water was actually used and how much went down the drain?
 - e. How would your audit look on a different day (i.e. summer vs. winter, weekends vs. weekdays, laundry day, etc.)?



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- f. Do you think your estimates on the Personal Water Audit were more or less than you actually use?
 - g. How do you think your usage compares with students living around Lake Tahoe (or in Reno if your school is around Lake Tahoe)?
 - h. How do you think your usage compares with people in other countries?
 - i. Conditions such as population growth, pollution, droughts, and uneven natural resource distribution can threaten water supplies, even in the United States. What do you think might happen if we were faced with extreme water shortages?
4. Assign the Animal Ark Water Usage Worksheet
 5. Discuss water usage at Animal Ark based upon answers to the Animal Ark Water Usage Worksheet.
 - a. What did you learn from the Animal Ark Water Usage Worksheet? Do you have a better idea of the issues associated with lack of access to water?
 - b. Imagine that you and your family must live off of less than 10 gallons of water per day. How would life be different? Consider cooking, cleaning, toilet use, bathing, drinking, appliances, etc.
 - c. What could you do to reduce your daily water usage? For example, do not let water run when brushing teeth or washing dishes, take shorter showers, do full loads of laundry or dishes, use rainwater to water lawns, etc.

Assessment

Students are assessed through the following:

- Completion of the Personal Water Audit
- Completion of the Animal Ark Water Usage
- Participation and contribution to class discussions



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Personal Water Audit

Name: _____ Date: _____

Answer the following questions about your water usage today. If you do not know the exact numbers, please estimate as well as you can. Ask your parents for help if you need.

BEFORE completing the chart below, guess how many gallons of water you use in 1 day: _____

Question	Answer	Calculation	Answer
1. How many times have you flushed a toilet today?		Multiply this number by 3: The average toilet uses 3 gal. of water per flush	Gal
2. Did you take a bath?		Write down 40 gal if you took a bath.	Gal
3. If you took a shower, how many minutes were you in the shower?		Multiply this number by 7	Gal
4. How many times did your family run the dishwasher today?		Multiply this number by 10	Gal
5. How many loads of laundry did your family do today?		If your washer's door is on the top, multiply this number by 40 If your washer's door is on the front, multiply this number by 25	Gal
6. How many minutes today did you run sink faucets? Think about brushing teeth, washing hands and face, washing dishes, etc.		Multiply this number by 4	Gal
7. Do you have any leaky faucets? For each leaky faucet, count the number of drips in a minute.		First, divide the number of drips by 10. Then, multiply your answer by 1.4	Gal
8. How many glasses of water did you drink today?		Multiply this number by 0.0625	Gal
9. How many minutes did you use a hose today? Think about watering a garden, washing a car, or bathing a pet.		Multiply this number by 10	Gal
Daily Total		Add all the numbers in the right-hand column.	



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Animal Ark Water Usage Worksheet

Name: _____ Date: _____

1. On average, Animal Ark uses 1,500 gallons of water per day to clean after the animals, provide pools for animals in summer, clean dishes, flush toilets, and watering trees in summer. How many gallons does Animal Ark use annually?
2. Animal Ark's well can only hold 720 gallons. Animal Ark's pump can move 4 gallons per minute from the well into holding tanks. How long can Animal Ark run the pump before there is no more water in the well (assuming the well does not refill until after the pump is turned off)?
3. If Animal Ark can only pump water 720 gallons twice each day, how much water could Animal Ark pump each year? Is this more or less than the amount of water used each year (Question 1)?
4. It costs Animal Ark \$8.00 every time it runs the well pump for 3 hours. If Animal Ark pumps twice per day, as in Question 3, every day of the year, how much does Animal Ark spend to pump water?
5. How can Animal Ark use less water?



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Animal Ark Water Usage Worksheet Answer Key

Name: _____ Date: _____

1. On average, Animal Ark uses 1,500 gallons of water per day to clean after the animals, provide pools for animals in summer, clean dishes, flush toilets, and watering trees in summer. How many gallons does Animal Ark use annually?

1,500 gallons of water per day X 365 days per year = 547,500 gallons of water per year

2. Animal Ark's well can only hold 720 gallons. Animal Ark's pump can move 4 gallons per minute from the well into holding tanks. How long can Animal Ark run the pump before there is no more water in the well (assuming water is not coming into the well while the pump is running)?

720 gallons / 4 gallons per minute = 180 minutes

180 minutes / 60 minutes per hour = 3 hours

3. If Animal Ark can only pump water 720 gallons twice each day, how much water could Animal Ark pump each year? Is this more or less than the amount of water used each year (Question 1)?

720 gallons per pump cycle X 2 pump cycles per day = 1,440 gallons per day

1,440 gallons per day X 365 days per year = 525,600 gallons per year which is less than the 547,500 gallons used per year in Question 1

4. It costs Animal Ark \$8.00 every time pumps water. If Animal Ark pumps twice per day, as in Question 3, every day of the year, how much does Animal Ark spend to pump water?

\$8.00 per pump cycle X 2 pump cycles per day = \$16.00 per day

\$16.00 per day X 365 days per year = \$5,840.00 per year

5. How can Animal Ark use less water?