

# Dirty Dishes

**Skill: Language Arts, Math**

## Objectives

Students will:

- Understand how they can conserve water by not pre-rinsing dishes
- Understand the environmental benefits of water conservation

## Background

Have you ever asked why you have to wash the dishes before you wash them in the dishwasher? This practice, known as pre-rinsing, doesn't seem to make a lot of sense. Pre-rinsing dishes began during the energy crises of the 1970's and 1980's. During this time consumers were advised to lower their hot water heater temperature as an energy saving measure. The lowered hot water heater temperature led to ineffective dish washing. So, the habit of prewashing dishes began.

Pre-rinsing dishes in the sink before loading the dishwasher is a common practice. In one study, one half of the participants pre-rinsed almost daily. It is estimated that consumers use up to 25 gallons of water per dishwasher load by pre-rinsing. In comparison, energy efficient dishwashers use 6 - 10 gallons of water per complete cycle, depending on the number of washes and rinses included in that particular cycle. The pre-rinsing practice represents a substantial use of water and energy.

Why do we pre-rinse? Many of us do it out of habit. Sometimes because we are going to delay running the dishwasher until it is full, while others expect poor dishwashing performance without pre-rinsing, in other words we don't think the dishwasher will get our dishes clean.

The solution: selecting the proper dishwasher cycle to match soil on the dishes is important for cleaning, energy and water use. The pre-rinse or rinse-only cycle, with or without detergent, improves cleaning for minimal water use. This cycle also prevents dried-on foods in the event of a delayed wash. In addition, choosing a heavy or "pot/pan" cycle may give more cleaning effectiveness and will use less water than pre-rinsing in the sink before loading the dishwasher.

These practices work because most dishwashers today have booster heaters to raise water temperature and increase cleaning efficiency. Although, consumers may not be aware of this option.

Finally, Consumers need to follow manufacturers recommendations for effective use of dishwashers, including fresh detergent; loading dishes properly so that water can reach all of the dishes; keep filters clean, if present; and use a rinse agent.

## Vocabulary

- conserve
- benefits
- ineffective
- substantial
- effectiveness
- consumer
- efficiency
- recommendations
- filter

## Materials Needed

- Student Worksheets

## P.A.S.S.

### 4th Grade

- Read 1.1, 3.1b,2b
- Write 1.2, 2.1d

### Math

- Process 1.1,2, 2.1, 4.4, 5.2
- Content 5.1b

### 5th Grade

- Read 1.1a, 3.1b,2b
- Write 1.2, 2.1

### Math

- Process 1.1,2, 2.1, 4.4, 5.2
- Content 5.1a

### 6th Grade

- Read 1.1a, 3.1b,2a
- Write 2.2b,7

### Math

- Process 1.3, 2.1, 4.1, 5.4
- Content 5.1



# Dirty Dishes

## Procedure

- Review background material with students
- Have Students complete worksheet to best of their knowledge regarding household dishwashing practices
- Follow-up with discussion questions and optional activities

Pre-Rinsing dishes uses about 25 gallons of water per dishwasher load. Following the manufacturers recommendations and simply scraping your dishes into the trash before loading them into the dishwasher conserves water. Use the following worksheet to determine how much water your household could save by scraping instead of pre-rinsing.

Do you pre-rinse? \_\_\_\_\_ yes \_\_\_\_\_ no

How many times a week do you or your household operate the dishwasher?  
(Circle your Answer)

1      2      3      4      5      6      7      8      9      10

### Let's do the math!

*Water Saved by not pre-rinsing dishes:*

Take the number of times your household runs the dishwasher times 25 gallons of water saved by not pre-rinsing.

<i>Example: Water saved by scraping</i>	<i>25</i>	<i>gallons</i>
<i># of times dishwashing</i>	<u><i>6</i></u>	
<i>Excess water used pre-rinsing</i>	<i>150</i>	<i>gallons</i>

<b>Water saved by scraping</b>	<b>25</b>	<b>gallons</b>
<b># of times dishwashing</b>	<u>                    </u>	
<b>Excess water used pre-rinsing</b>		<b>gallons</b>

If you handwash dishes, your household will use approximately 30 gallons (with water running) per load of dishes. This compares to 15 gallons of water usage in the dishwasher. Multiply 15 gallons of water times the number of times you household handwashes a dishwasher size load.

<i>Example: Extra water used by handwashing dishes</i>	<i>15</i>	<i>gallons</i>
<i># of time dishwashing (dishwasher size load)</i>	<u><i>6</i></u>	
<i>Excess water used handwashing dishes</i>	<i>90</i>	<i>gallons</i>

<b>Extra water used by handwashing dishes</b>	<b>15</b>	<b>gallons</b>
<b># of time dishwashing (dishwasher size load)</b>	<u>                    </u>	
<b>Excess water used handwashing dishes</b>		<b>gallons</b>



# Dirty Dishes

How many gallons of water could you save in one week? \_\_\_\_\_

Multiply that by the number of weeks (52) in a year.

*Example:* 150 gallons X 52 weeks = 7,800

\_\_\_\_\_ gallons X 52 weeks = \_\_\_\_\_

Is that alot of water?                      Yes                      No

The average American family of four uses about 88,000 gallons of water a year or 7,333 gallons a month. This amounts to an average of more than 240 gallons a day for the household or more than 60 gallons per person per day. In large homes, with several bathrooms and irrigated lawns, families can use more than 75 gallons of water per person per day.

*Calculate the percentage of water your household could save by no pre-rinsing dishes:*

*Example:* 88,000 gallons average use / 7800 gallons saved X 100 = 11% water savings

**88,000 gallons average use / \_\_\_\_\_ gallons saved X 100 = \_\_\_\_\_% water savings**

*Using our example we saved 7,800 gallons of water a year by properly using the dishwasher. That is over one month's water usage in the average household.*

*Now let's add up the gallons saved for everyone in class:*

*Example:* 150 gallons of water for 20 students would equal 3,000 gallons of water a week or 156,000 gallons of water a year.

\_\_\_\_\_gallons of water used X \_\_\_\_\_students = \_\_\_\_\_gallons (class total)

\_\_\_\_\_gallons (class total) X 52 weeks = \_\_\_\_\_gallons of water that  
could be saved by scraping  
instead of pre-rinsing

Decide for yourself, "To pre-rinse or not to pre-rinse" that is the question.

What is your final answer?                      Yes                      or                      No



# Dirty Dishes

## Optional Activity:

Have students take this information home and actually count how many times the dishwasher is run in their household. Also have them time how long it takes to pre-rinse the dishes. Calculate the gallons used. One minute of pre-rinsing uses 2 gallons of water. How much water was used pre-rinsing.

Then take the number of gallons used and calculate the actual cost of the water to the household. How much money could have been saved by scraping instead of pre-rinsing?

Have students wash a load of dishes without pre-rinsing and compare it to the cleanliness of a load of washed dishes that was pre-rinsed.

Have students come back to class with a report.

Add up the gallons actually used for the entire class and the cost savings.

Ask students if they should scrap or pre-rinse and why?

## Additional Water Saving Resources:

Heaton, L., Ilvento, T., Taraba, J. (Unknown) Conserving water at home, University of Kentucky Cooperative Extension Service Publication IP-2 Available: <http://www.ca.uky.edu/agc/pubs/ip/ip2/ip2.htm>

Oklahoma Department of Environmental Quality, Water, Water costs money, Don't waste it. Available: <http://www.deq.state.ok.us/factsheets/water/waterwst.pdf>

Texas A&M University (2006) Need water? Available: <http://water.tamu.edu/>

Texas A&M University (2006) Estimate the amount of water you and your family use a day. Available: <http://waterandme.tamu.edu/watercalc.html>

## References:

Emmel, J. M. (2003) Dishwashing and water conservation: An opportunity for environmental education, *Journal of Extension*, 41(1). Retrieved October 5, 2006, from: <http://www.joe.org/joe/2003february/rb3.shtml>

Klump, M., Ruby, S. (1993) Oklahoma aqua times teacher's guide: Oklahoma State University Publication No. 747

Soap and Detergent Association (2000). Automatic dishwashing. Retrieved October 17, 2007 from: [http://www.sdahq.org/dishwash/understanding\\_automatic\\_dishwashing.html](http://www.sdahq.org/dishwash/understanding_automatic_dishwashing.html)



# Dirty Dishes

## Additional Facts:

### Cycle Choice

Most dishwashers today provide a number of cycle choices so consumers can match a cycle to the type of load, increasing efficiency of both cleaning and resource use. Only 25% of the participants in a recent study used the water-efficient pre-rinse or rinse-only cycle on their dishwashers. If dishes are pre-rinsed using a dishwasher pre-rinse cycle, approximately one gallon of water is used

### Cleaning Satisfaction

Another concern of consumers is the overall satisfaction with how well a dishwasher cleans. If satisfactory results are not received, rewashing is needed, so, more water and energy are used. Experience with unsatisfactory washing results might encourage consumers to pre-rinse.

Most studies about dishwasher performance state that a majority of the dishwashers do an acceptable job of cleaning (Consumer Reports, 1993, 1995; Leipnitz, 1980; SDA, 2000). Approximately 60% of the respondents in the national survey stated they were very satisfied with the performance of their dishwasher, followed by 30% who were somewhat satisfied. However, these satisfied consumers are also consumers who frequently pre-rinse their dishes before placing them into the dishwasher.

### Water Temperature

Proper water temperature is critical for satisfactory cleaning results. The Soap and Detergent Association (2000) recommends a water temperature no lower than 130 degrees F, and other sources recommend temperatures of 140, 150 degrees F. To save energy as well as provide a safer water temperature for family use, many households have lowered their water heater temperature to 120 degrees F or lower. It is advised that consumers purchase dishwashers with an auxiliary or booster heater that increases the water temperature in the dishwasher to 140 to 160 degrees F. Such features may add to the cost of the dishwasher initially, but the energy savings from reducing the temperature on the home water heater will pay for the feature many times over.

### Health Concerns

Automatic dishwashing sanitizes dishes. A study by the University of Louisville School of Medicine pointed out that the average bacteria count for all machine-washed dishes in their study was less than 1 per plate, while the bacteria count on dishes washed by hand during the same test averaged 390 per plate, some of the hand-washed dishes in this study had a bacteria count as high as 16,000. All of the machine washed dishes easily met the public health standard of 100 bacteria or less per plate, a level recognized by health authorities as safe and attainable.

Oklahoma State University, in compliance with Title VI and VII of the Civil Rights Act of 1964, Executive Order 11246 as amended, Title IX of the Education Amendments of 1972, Americans with Disabilities Act of 1990, and other federal laws and regulations, does not discriminate on the basis of race, color, national origin, sex, age, religion, disability, or status as a veteran in any of its policies, practices or procedures. This includes but is not limited to admissions, employment, financial aid, and educational service.

Issued in furtherance of Cooperative Extension work, acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture, Robert Whitson, Vice President, Dean and Director of Cooperative Extension Service, Oklahoma State University, Stillwater, Oklahoma. This publication is issued by Oklahoma State University as authorized by the Dean of the Division of Agricultural Sciences and Natural Resources and has been prepared for both internal and external distributions through print and electronic media.

