



# M2C3 Project

## Conserving Water While Brushing Teeth

### Student Work

This file provides three examples of student solution paths for the Conserving Water while Brushing Teeth task. Students used multiplication and division of whole and rational numbers and worked with time and volume measurements and conversions. The teacher asked the students to explain their work and label each number as part of their explanation, thus promoting student understanding.

# Factors that Students Considered

- How many people were in the family
- How many times a day they brushed their teeth
- How many minutes it takes to brush one's teeth
- How many days are in a month ( 30 or 31)

# Connections to Students' Experiences

- Students and their family members brush their teeth and may let the water run while doing so.
- Water conservation may be a high priority in their communities.

What do we know that could help us?

If we turn off the water while brushing we use less water

The stronger the water flow, the more water is wasted

The longer we brush with the water on the more water is wasted.

What would you need to know? How could you get this information?

• How much water is in one gallon?

• How much water is wasted if you leave the water running while brushing your teeth

• How much water is wasted per each minute

\* measure water running a minute using a measuring cup and a timer

What would we need to assume or decide?

• Each of us brush our teeth two times a day

• Everyone takes the same time brushing

• Every one takes two minutes for each brushing

• The water stop off until the toothpaste is on the brush

• The water flow is the same each time we brush our teeth.

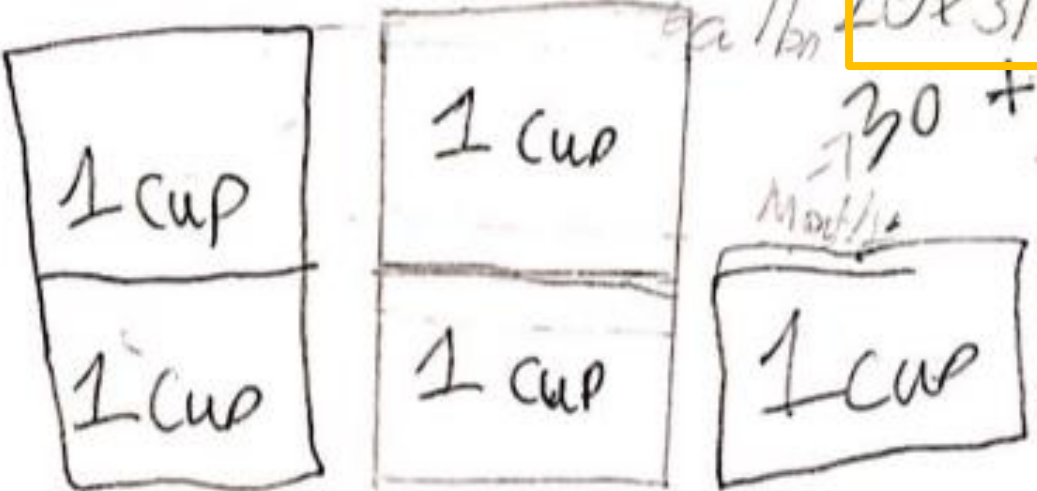
# Model

$$5 \times 2 = 10$$

$$10 \times 2 = 20$$

$$20 + 10 = 30$$

$$20 \times 31 = 606$$



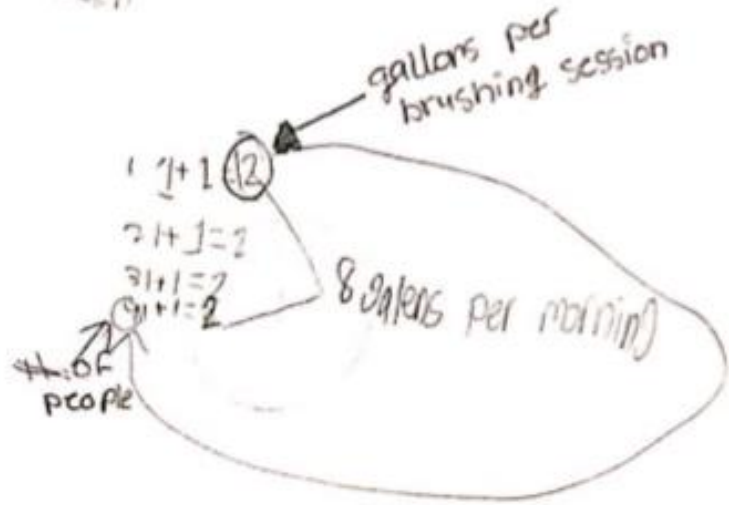
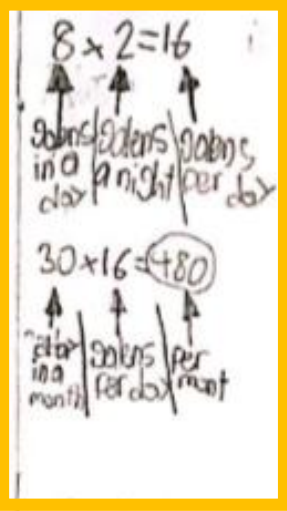
Paragraph:  
 Conserving water...  
 The news paper is resonable. The family conserve 596 gallons per month. The news paper said that they conserved 606 gallons.

This group of students assumed there were 5 members in the family with each brushing teeth twice a day for a total of 10 times a day. If family members leave the water running when they brush their teeth and use 2 gallons each time, they will waste 20 gallons of water a day. Multiplying 20 gallons per day x 31 days in a month they found 606 gallons per month used ( this should be 620 gallons). They have labeled this amount as wasted.

The 2nd model allows each family member 1 cup of water a day or 5 cups per day. The written work states that" the family conserved 596 gallons [of water] per month" and that this was close to the 600 in the claim, thus the claim was reasonable. Although it is not found in the student work, one possible justification for the 596 gallons saved would be the following:

If the family used 5 cups of water a day, they would use 155 cups per month. One gallon is equivalent to 16 cups. Thus 10 gallons equals 160 cups which is close to 155. If approximately 10 gallons of water is used per month. 606 gallons – 10 gallons equals 596 gallons saved

## 2. Wasting water:

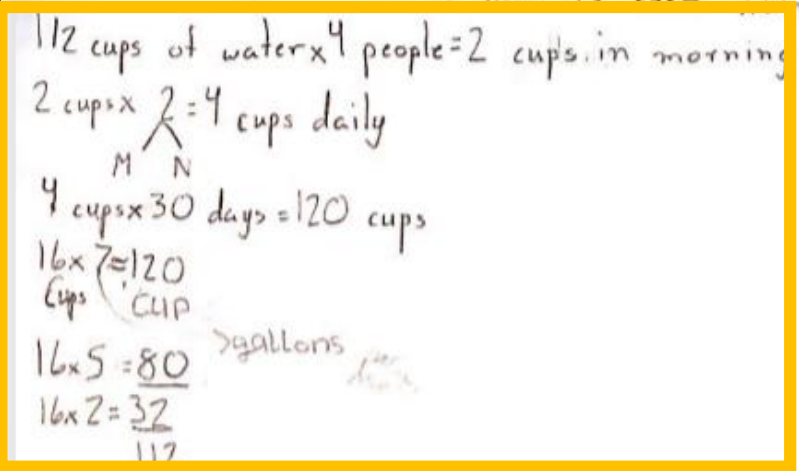


This group of students assumed there were 4 members of the family and that if they ran the water while brushing, they would use 2 gallons of water each time a family member brushed his/her teeth; resulting in 480 gallons used per month. If each family member used only 1/2 cup of water when brushing his/her teeth, they would use 120 cups per month. To determine how many gallons were used, instead of dividing 120/16 they multiplied 16 x 5 = 80 and 16 x 2 = 32. Adding the 80 and 32 they got 112, a sum close to 120. Thus they use 2+5 = 7 gallons as the number of gallons used each month. Subtracting 7 gallons from 480 gallons they found 473 gallons were conserved. Thus they found the claim of 600 gallons of water conserved to be reasonable.

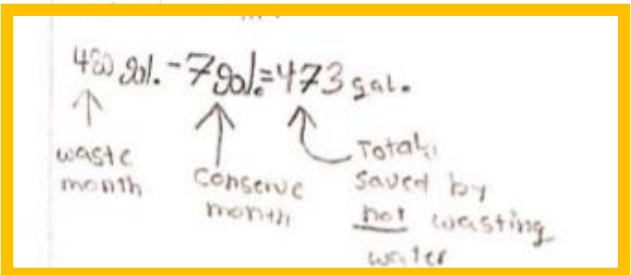
3<sup>rd</sup>  
grade

## 3. Brushing teeth w/o waisting water:

I think N... Family should use 1/2 of cup of water because if you split 4 in a half everyone will get the same amount of water and 4 parts and a half is even numbers.



4. We figer out that the family conserved 473 gallons without waisting water. I think it is kind of resonable to conserve 600 gallons of water because 473 is kind of close to 600 and it is not that high and not that low. So the family could conserve 600 gallons of water.



$$24 \times 30 = 720$$

↑  
gallons  
used  
in a  
month

$$3 \times 4 \times 2 = 24 = \text{gallons}$$

↑ ↑  
The gallons  
size used  
of in  
family everyday

$$3 \times 1 \times 2 = 6$$

↑ ↑ ↑  
people cup times  
in family, brush  
per day  
cups in  
day

$$6 \times 30 = 180$$

↑  
cups  
used  
a day

↑  
days  
in month  
used  
in month

$$180 \div 16 = 11$$

↑  
cups  
used  
in month

↑  
cups  
in  
gallon

This claim is not reasonable. This claim is not reasonable because the family saves 11 gallons. This how we got 11 gallons.  $6 \times 30 = 180$   
 $180 \div 16 = 11$ . This is how we got 11 gallons. The family uses 6 cups in a day. The family uses 4 gallons every day. The family uses 16 cups in a month. The family uses 16 cups in a month. This how we got 11 gallons.  
 720 is the wasteful month because the table Soap and Show  
 $24 \times 30 = 720$  gallons used in a month.

These students assumed there were 3 members in the family, 30 days in a month, and normally each member of the family would use 4 gallons of water each time someone brushed his/her teeth. Brushing their teeth twice a day would result in the use of 24 gallons of water a day and 720 gallons a month.

If the family members use one cup of water each time they brushed their teeth they would use 6 cups per day or 180 cups per month. With 16 cups in a gallon, they would use 180 cups / 16 cups per gallon resulting in 11 gallons of water use each month.

The students stated that the claim was not reasonable. In their explanation they state that "the family saved 11 gallons". They seem to have forgotten that they originally found that the family used 720 gallons per month. They restate amounts such as "The family uses 6 cups in a day.", "The family uses 4 gallons every day", and "The family used 180 cups in a month." but do not appear to fully understand what those amounts mean or how they relate to the claim.