M2C3 Project
Safe Water for School Task
Student Work

This file includes different solution paths for students in grades 3, 4, and 5. Students used whole number addition, multiplication, and division to determine the number of large jugs of water needed to supply their class with clean water for a set amount of time.

Factors that Students Considered

- How much water each student drinks per day

- If students bring water bottles (with water) from home

- How long a school day is and what activities (e.g. recess, P.E. class) and factors (e.g. the time of year, weather) influence water consumption

Connections to Students' Experiences

- Students drink water in school and some classrooms have water dispensers in them.

- Schools and cities test that water is safe to drink, and some students have experienced dealing with unsafe water in their city.

- Many students have learned about the water crisis in Flint, Michigan.

What do you Know, Need to Know, Assume?

Grade 4 students **made sense of the task** by brainstorming a chart of what they knew, what they needed to know or find out, and what they could assume about calculating the amount of drinking water needed for their class for one school day.

This class had 28 people (adults and students) and they knew the number of hours they spent at school each day. They needed to find out the amount of water in 1 large jug and how much each person drinks per day. They assumed some people bring water bottles to school.

If our water fountains were unsafe, how many large jugs of water would we need to make sure that everyone in our <u>class</u> has enough drinking water for 1 school day?

What do we KNOW that will help us?	What do we need to know or find out?	What do we need to decide? What assumptions do we need to make?
28 people total	how much water in 1 jug?	Some people bring Water bottles
the hours of each school day	how much water does 1 person drink on average	Adults are included

Grade 4 students knew their class size and that not everyone drinks water. They knew that they tend to drink more water when they are active, like during P.E., music class, and recess. They needed to find out how much water each person would drink and who would bring their own water bottle. They had to make some assumptions about how often students would be able to get water from the dispenser.

What do you Know, Need to Know, or Assume/Decide?

What do we KNOW that will help us?	What do we NEED TO KNOW or find out?	What DECISIONS/ASSUMPTIONS do we have to make?
• people in our class (26) • drink more water around P.E/recesses music • 5 gal in jug 1.87 litres • Not everyone drinks water	• How much water people drink? • How many people have waterbottles? • How much average person drink • do we all have cups? • How much water in the cups?	• How often people can get water? • how much is in a cup? • how many people have cups or waterbottles

Clear Water Task

This group divided the 22 students into two groups by age (8- and 9-year-olds) because they needed different amounts of water. In a repeated addition model, they decomposed 16 (cups in a gallon) to find the total number of cups needed for the class, which was 155. They stated that 2 large jugs are required, unless adults are also included; then they would need an additional jug.

What are your assumptions?

(How many people? How many adults and how many children? How much water does each person get? Do they drink all their water at school?)

Everyone in the javelina room in total needs 155 cups of water because there are 7 8 year olds and 8 9 year olds. So there are 16 cups in a gallon. And there 5 gallons in each Jug And there 80 cups. Jag And there 80÷2=160. And in Jag and 13 100 and 55, everyone in 13's cups of water.

In conclusion you only need 3 Jug's of water in a day

Show your math here:

16 cups of water in a gallon
A large jug of water has 5 gallons
16×5=80
16+16+16+16+16=80
20 20 10

40+10=50

6+6+6+6+6
12+12+6
24+6=30

a jug of water has 80 cups.
3×15=120
5×10=50
8×10=40+50

160−155=5 120=100
7×5=35 100+20=120
120+35=155

30+50=80
We only need 2b jugs of water.

7 people need five cups a day
16 people need 8 cups of water per day.

7+15

10+7=117 117 5=22

How many large jugs of water do we need?

Write your plan here:

The classroom will need 2 jugs of water but including the adults we would need 3 jugs because there are two adults and they drink 10 cups it would basically be 3 jugs.

Grade 4 Solution

These students decided that their class needs 3 large jugs of water for one day, based on assumptions that each student gets 64 ounces and there are 27 kids. They found the total number of ounces needed (1,728) and compared this to the total number of ounces in 3 jugs.

Important assumptions and decisions made
64 ounes per person.
27 kids in our class.
1,728 ownes for everyone in the class.

How many large jugs of water do we need? ____3____

Use pictures, numbers, and words to show that your plan will work.

64 ← ounces per person
×27 ← kids in class

4×7=28
60×20=1,200
60×7=420
4×20=80

$\begin{array}{r} 1200 \\ 420 \\ 80 \\ + 28 \\ \hline 1,728 \end{array}$ ones for the whole class

128
× 5
640 ← ounces in 1 jug.

What directions would you give a student who wanted to make a plan for safe water for their class?
1. 64 ounecs per person
2. 640 ounces = 1 jug
5. 27 kids in our class

3. 128 ounces in 1 gallon
4. 5 gallons in 1 jug

Grade 4 Solution

This group attempted to write out generalized steps and necessary information for others who wanted to solve this task. Generalizing was typically a challenging step for students.

This group decided that 2 jugs of water was sufficient since they assumed 7 kids in their class would bring water bottles from home. The total number of ounces required for the remaining 20 students was 1,120 or 8 gallons and 96 ounces. So the 2 jugs (which is 10 gallons) is enough.

Important assumptions and decisions made	How many large jugs of water do we need? _2 Jugs_
We assume that Seven kids would bring water bottles. we assume that 20 woluded not bring Water bottles.	Use pictures, numbers, and words to show that your plan will work. 128 ounes = 1 gallon 5 gallon = 1 Jug 20 kids Shall drink 1,120 ounes. 1,120 ounes = (8 gallon 96 ounes) 2 Jugs

What directions would you give a student who wanted to make a plan for safe water for their class? Find out how many ounes kids are drink.
Find Out how many gallon are in the ounes.
Find out how many Jugs.

These students calculated the number of jugs needed for 1 day and 1 week. They assumed that students only need 5 cups of water since they are not at school all day, but teachers need more water. In all, they needed 118 cups, which is 7 gallons and 6 cups. This can be covered by 2 large jugs, with 2 gallons and 10 cups left over.

Grade 5 Solution

For the week total, they did not simply multiply the one-day amount by 5, since that would not account for the leftovers from each day. Instead, they recalculated the total number of cups needed and found that only 8 large jugs are required for the week.

Handwritten student work:

Plan

I day

Each student will get 5 cups because we are not here all day.
The teachers will get 9 cups because they come before school and after school.

I week

In one week each student will get 25 cups.

The leftover water will be for the plants and trees outside.

How many large jugs of water do we need __2__.
1 week : 8 Jugs

cups   students
$5 \times 20 = 100$ cups = 6 gallons 4 cups

$+ 3/16$ cups = 1 gallon
$\times$ 6 gallons
96

cups   teachers
$9 \times 2 = 18$ cups = 1 gallon 2 cups

6 gallons 4 cups
+ 1 gallon 2 cups

total 7 gallons 6 cups

1 week
cups
$25 \times 20 = 500$ cups = 31 gallons 4 cup
$45 \times 2 = 90$ cups = 5 gallons 10 cups

16 cups
$\times$ 31 gallons + 16 cups + 5 gallons 10 cups
4·16 $\times$ 5 gallons
+ 480   80
496

31 gallons 4 cups
+ 5 gallons 10 cups

total 36 gallons 14 cups

40   8 gallon 16 cups
- 36 - 14
4   2 gallons 2 cups

10 gallons
- 7 gallons
3 gallons
- 6 cups

2 gallons 10 cups

2 gallons 10 cups left over

Grade 5 Solution

This class found the amount of water required for a one month at school. They chose May as their month, which included 21 school days. They assumed only 3 cups of water per person. They wrote out equations to model: 75 cups per day multiplied by 21 days meant 1,575 cups, which they divided by 16 to get 98 gallons and 7 cups. They rounded this up to 99 gallons. Then they divided 99 by 5 (gallons in a jug) to find the total number of jugs. They rounded this to 20 large jugs, since 19 jugs would not have been enough.

ASSUMPTIONS AND DECISIONS

LARGE JUGS NEEDED _20_

May is the month (21 days at school)
25 people in class
Measured in gallons
Everyone drinks 3 cups a day at school

WORK THAT PROVES YOUR SOLUTION:

C caps
P people
D Days
m = month
J = Jugs
G = Gallon

$$3 \times 25 = 75$$

$$75 \cdot 21 = 1575 \text{ cups per } m$$

$$1575 \div 16 = 98 r 7 = 99$$

$$99 \div 5 = 19 r 4 = 20$$

EQUATION or FORMULA:

25 people x 3 cups = 75 cups per day

75 cpd x 21 days of may at school = 1575 CUPS per month

1575 ÷ 16 = 98·7   round 99

99 ÷ 5 = 19·4   round 20

Analyzing and Comparing Solutions

This **fourth-grade** class made a chart to compare and analyze plans after all groups completed the task. The chart showed assumptions about people included and the daily water allowance. Nearly every group proposed a different total number of large jugs needed for the class. There was also variation in the amount of water left over.

Number of People	Water per Person per School Day	Total number of 5 gallon jugs needed	Leftover water?
29	8 cups	3	1 cup ?
27	10 cups	4	
27	8 cups	2 jugs, 3 gallons and 8 cups about 3 jugs	1 gallon and 8 cups
27	8 cups	3 jugs 14 gallons	
27	7 cups	About 3	12 cups