

1. Handling Complaints

Whenever a student complains:
 “What good is all this math we’re learning?”
 my standard response is:
 “Good question. Let me tell you my favorite word problem.”
 Invariably I hear “Never mind!”
 We are going to take a little sojourn into the world of word problems.

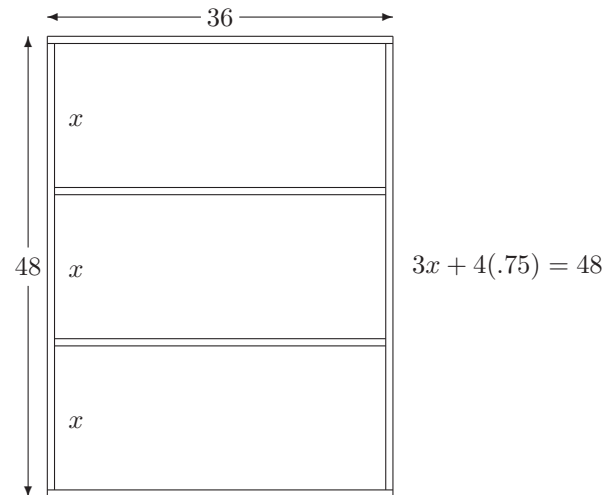
2. Solving Word Problems

- Create Variables
- Organize Data
- Draw a diagram
- Translate Words → Equation (English to Math)
- Solve the equation.

3. Building Bookcases

Bookcase Problem You wish to build a bookcase. You are using lumber which is $\frac{3}{4}$ inch thick. The dimensions are 36 inches wide, 48 inches high. You want to install 2 interior shelves so that the shelves are equally spaced. What is the spacing between the shelves?

4. Bookcase Picture



5. Bookcase Solution

$3x + 4(.75) = 48$
 $3x + 3 = 48$
 $3x = 45$
 $x = 15$
 Make the shelves 15 inches apart.

6. Professors and Students

Consider the sentence:
 For every professor at a small liberal arts college, there are two students.
 If P = the number of professors and
 S = the number of students,
 translate the above sentence as a mathematical equation:
 (a) $P = 2S$
 (b) $S = 2P$
 (c) Some other answer

7. Painting versus doing laundry

Are the following word problems solved in the same way:

Painting Problem. Bob can paint a room in one hour. His brother Bill can paint the room in 45 minutes. How long will it take them, working together, to paint the room?

Laundry Problem. Joan can wash a load of laundry in one hour. Her mother can do the laundry in 45 minutes. How long will it take them, working together, to do a load of laundry?

Explain your answer.

9. Mary Jane: Words $\rightarrow$ Math

Let x = Mary Jane's age.

How old was she on her last birthday? x

Half as old as she was on her last birthday is $x/2$

Lacking 5 years of being half as old as she was on her last birthday is $x/2 - 5$

Half again means 50% more, or $1\frac{1}{2}$ times, or $\frac{3}{2}$ times.

For example, if gas costs 2 dollars and next year it costs half again as much as this year, then next year a gallon of gas will cost $\frac{3}{2} \times 2 = 3$ dollars

11. Charise's Homework

Charise, with some help from her cousins, solved all but one story problem in her algebra worksheet by finding an equation to solve.

The single exception is our next word problem to think about.

13. Divisibility Requirements on x

When she was 1, her age divided the age of her Grandfather, who would then be $x + 1$.

No information here, since 1 divides all numbers.

When she was 2, her age divided the age of her Grandfather, who would then be $x + 2$.

This implies 2 divides x .

Using this reasoning for the next three birthdays, we see that 3, 4, and 5 all must divide x .

The first number divisible by 2, 3, 4, and 5 is 60.

8. Mary Jane

Lucy and Lottie Hill are 90 years old. Mary Jane, on the other hand, is half again as old as when she was half again as old as when she lacked 5 years of being half as old as was on her last birthday.

How old is Mary Jane?

This is why people hate math.

10. How old is Mary Jane?

Lucy and Lottie Hill are 90 years old. Mary Jane, on the other hand, is half again as old ($\frac{3}{2}$ times) as when she was half again as old (another $\frac{3}{2}$ times) as when she lacked 5 years of being half as old as was on her last birthday ($\frac{x}{2} - 5$).

Equation: $x = \frac{3}{2} \frac{3}{2} \left(\frac{x}{2} - 5 \right)$

Solve this equation for x .

Why does the problem begin with Lucy and Lottie Hill?

12. Charise's Problem

Charise's Problem For the first five consecutive birthdays after she was born, Mary's age exactly divided her grandfather's age. How old was her grandfather when Mary was born?

Let x = the age of Mary's grandfather when she was born?

Can you solve this problem by coming up with an equation to solve for x ?

14. Gramps was 60

Verification:

Mary's age	Gramps' age
1	61
2	62
3	63
4	64
5	65

Note that $60 = LCM[3, 4, 5]$, that is, the smallest number divisible by 3, 4, and 5.

Why don't we need to throw in another 2?