

4.1.1 How can I use variables to solve problems?

Solving Word Problems by Writing Equations



Today you will learn to translate written information into algebraic symbols and then solve the equations that represent the relationships.

WARMUP: Solve single variable and multi-variable equations

a. $12 = -4(-6x - 3)$

b. Solve for y : $6x - 2y = 4$

c. $20 = -4x - 6x$

d. $5p - 14 = 8p + 4$

e. $-(7 - 4x) = 9$

f. Solve for y : $3x + 4y = 12$

4-1. Match each mathematical sentence on the right with its translation on the left.

- | | |
|----------------------------------|--|
| a. $2z + 12 = 30$ | 1. A zoo has two fewer elephants than zebras and five times more monkeys than elephants. The total number of elephants, monkeys, and zebras is 30. |
| b. $12z + 5(z + 2) = 30$ | |
| c. $z + (z - 2) + 5(z - 2) = 30$ | 2. Zola earned \$30 by working two hours and receiving a \$12 bonus. |
| d. $z + 12z = 30$ | 3. Thirty ounces of metal is created by mixing zinc with silver. The number of ounces of silver needed is twelve times the number of ounces of zinc. |
| | 4. Eddie, who earns \$5 per hour, worked two hours longer than Zach, who earns \$12 per hour. Together they earned \$30. |

4-2. Mathematical sentences, like those in the left column of problem 4-1, are easier to understand when everyone knows what the variables represent. A statement that describes what the variable represents is called a **“let” statement**. For example, for mathematical sentence” Note that a “let” statement always indicates the units of measurement.

Write a “let” statement for each of the mathematical sentences in parts (b) through (d) above. Part (a) is done for you.

(a) “Let z = Zola's rate of pay (in dollars/hour).

(b)

(c)

(d)

4-3 Together. The perimeter of a triangle is 31 cm. Sides #1 and #2 have equal length, while Side #3 is one centimeter shorter than twice the length of Side #1. Let's determine how long each side is:

- Solve using a guess and check table
- Solve by declaring variables, writing and solving an equation.

4-6. For the following word problems, write one or two equations. Be sure to define your variable(s) and units of measurement with appropriate “let” statements and label your answers. You do not need to solve the equations yet.

- a. After the math contest, Alicia noticed that there were four extra-large pizzas that were left untouched. In addition, another three slices of pizza were uneaten. If there were a total of 51 slices of pizza left, how many slices does an extra-large pizza have?

- b. Bowen and Myel are each saving money to pay for college. Bowen currently has \$15,000 and is working hard to save \$1000 per month. Myel only has \$12,000 but is saving \$1300 per month. In how many months will they have the same amount of savings?

- c. Jordan bought some CDs at her local store. She paid \$15.95 for each CD. Fortune bought the same number of CDs from a store online. She paid \$13.95 for each CD, but had to pay \$8 for shipping. In the end, both Jordan and Fortune spent the exact same amount of money buying their CDs! How many CDs did Fortune buy?

CHALLENGE: 4-7. Solve part (b) of problem 4-6 above. In how many months would they have the same amount of savings? How much savings would they have at that time?