

2-1 Study Guide and Intervention

Writing Equations

Write Equations Writing equations is one strategy for solving problems. You can use a variable to represent an unspecified number or measure referred to in a problem. Then you can write a verbal expression as an algebraic expression.

Example 1: Translate each sentence into an equation or a formula.

a. Ten times a number x is equal to 2.8 times the difference y minus z .

$$10 \times x = 2.8 \times (y - z)$$

The equation is $10x = 2.8(y - z)$.

b. A number m minus 8 is the same as a number n divided by 2.

$$m - 8 = n \div 2$$

The equation is $m - 8 = \frac{n}{2}$.

c. The area of a rectangle equals the length times the width. Translate this sentence into a formula.

Let A = area, ℓ = length, and w = width.

Formula: *Area equals length times width.*

$$A = \ell \times w$$

The formula for the area of a rectangle is $A = \ell w$.

Example 2: Use the Four-Step Problem-Solving Plan.

POPULATION The population of the United States in July 2007 was about 301,000,000, and the land area of the United States is about 3,500,000 square miles. Find the average number of people per square mile in the United States.

Step 1 Read You know that there are 301,000,000 people. You want to know the number of people per square mile.

Step 2 Plan Write an equation to represent the situation. Let p represent the number of people per square mile.

$$3,500,000 \times p = 301,000,000$$

Step 3 Solve $3,500,000 \times p = 301,000,000$

$$3,500,000p = 301,000,000 \quad \text{Divide each side by } 3,500,000$$
$$p = 86$$

There are 86 people per square mile.

Step 4 Check If there are 86 people per square mile and there are 3,500,000 square miles, $86 \times 3,500,000 = 301,000,000$. The answer makes sense.

Exercises

Translate each sentence into an equation or formula.

1. Three times a number t minus twelve equals forty.

2. One-half of the difference of a and b is 54.

3. Three times the sum of d and 4 is 32.

4. The area A of a circle is the product of π and the radius r squared.

5. **WEIGHT LOSS** Lou wants to lose weight to audition for a part in a play. He weighs 160 pounds now. He wants to weigh 150 pounds.

a. If p represents the number of pounds he wants to lose, write an equation to represent this situation.

b. How many pounds does he need to lose to reach his goal?

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The equation is $10x = 2.8(y - z)$.

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The equation is $m - 8 = \frac{n}{2}$.

c. The area of a rectangle equals the length times the width. Translate this sentence into a formula.
Let A = area, ℓ = length, and
 w = width.
Formula: Area equals length times width.
 $A = \ell \times w$
The formula for the area of a rectangle is $A = \ell w$.

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 $3,500,000 \times p = 301,000,000$

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 $3,500,000p = 301,000,000$ Divide each side by
 $p = 86$ 3,500,000.

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- WEIGHT LOSS** Lou wants to lose weight to audition for a part in a play. He weighs 160 pounds now. He wants to weigh 150 pounds.
 - If p represents the number of pounds he wants to lose, write an equation to represent this situation.
 - How many pounds does he need to lose to reach his goal?

2-1 Skills Practice

Writing Equations

Translate each sentence into an equation.

1. Two added to three times a number m is the same as 18.
2. Twice a increased by the cube of a equals b .
3. Seven less than the sum of p and t is as much as 6.
4. The sum of x and its square is equal to y times z .
5. Four times the sum of f and g is identical to six times g .

Translate each sentence into a formula.

6. The perimeter P of a square equals four times the length of a side ℓ .
7. The area A of a square is the length of a side ℓ squared.
8. The perimeter P of a triangle is equal to the sum of the lengths of sides a , b , and c .
9. The area A of a circle is pi times the radius r squared.
10. The volume V of a rectangular prism equals the product of the length ℓ , the width w , and the height h .

Translate each equation into a sentence.

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|----------------------------------|-----------------------|
| 11. $g + 10 = 3g$ | 12. $2p + 4t = 20$ |
| 13. $4(a + b) = 9a$ | 14. $8 - 6x = 4 + 2x$ |
| 15. $\frac{1}{2}(f + y) = f - 5$ | 16. $k^2 - n^2 = 2b$ |

Write a problem based on the given information.

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| <p>17. c = cost per pound of plain coffee beans
 $c + 3$ = cost per pound of flavored coffee beans
 $2c + (c + 3) = 21$</p> | <p>18. p = cost of dinner
 $0.15p$ = cost of a 15% tip.
 $p + 0.15p = 23$</p> |
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