Write Expressions

A situation can often be modeled mathematically by translating verbal statements into mathematical statements or writing a statement that represents the situation.

Translating from Words to Mathematical Expressions

Addition

The **sum** of a number and 4	$x + 4$
5 **more than** a number	$x + 5$
2 **plus** a number	$2 + x$
13 **added to** a number	$x + 13$
Seventy-five **increased by** a number	$75 + x$

Subtraction

3 **less than** a number	$x - 3$
25 **decreased by** a number	$25 - x$
a number **minus** 3	$x - 3$
4 **subtracted from** a number	$x - 4$
The **difference between** a number and 21	$x - 21$

Multiplication

8 **times** a number	$8x$
A number **multiplied by** 9	$9x$
Twice a number	$2x$
Three-fourths **of** a number	$\frac{3}{4}x$
The **product** of a number and 21	$21x$

Division

The **quotient** of 6 and a number	$6 \div x$
Twenty-four **divided by** a number	$24 \div x$
The **ratio** of a number and 13	$\frac{x}{13}$

Example:

Translate the following written expression into a mathematical expression.

The product of the square of the product of a and b and the sum of e and f.

Solution:

Break the expression into parts, and then translate each part.

"**Product**" means multiplication. The quantities that are being multiplied are "the square of the product of *a* and *b*" and "the sum of *e* and *f*."

"**The square of**" means a quantity is being squared. The quantity being squared is "the product of *a* and *b*," written "$a \times b$."

"**Sum**" means addition, so "the sum of *e* and *f*" is "$e + f$."

The entire mathematical expression is written below.

$$(a \times b)^2 \times (e + f)$$

Write Expressions

Translating written statements is an important step in building problem-solving skills. Follow the order of operations. When addition or subtraction occurs before multiplication or division, be sure to use parentheses.

Example:

Write the statement as an expression.

Add 7 and 2. Then, multiply by 3.

Solution:

Use parentheses to show addition occurs before multiplication. So, the statement can be written as **(7 + 2) × 3**.

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https://www.khanacademy.org/math/algebra/introduction-to-algebra/writing-expressions-tutorial/v/writing-expressions-1

http://www.ixl.com/math/grade-6/write-variable-expressions-to-represent-word-problems

https://www.khanacademy.org/math/algebra/introduction-to-algebra/writing-expressions-tutorial/e/writing_expressions_1

http://www.virtualnerd.com/tutorials/?id=Alg1_8_2_13

https://www.khanacademy.org/math/cc-sixth-grade-math/cc-6th-expressions-and-variables/cc-6th-equivalent-expressions/v/equivalent-forms-of-expressions-1

Equivalent Expressions

*An expression that is equivalent to a given expression can be found by using **properties of arithmetic**, such as the associative, commutative, and distributive properties.*

Example:

What is an algebraic expression that is equivalent to the expression below?

$$4(6x + 9) - x$$

Solution:

Use the properties of arithmetic to find an expression that is equivalent to $4(6x + 9) - x$

$4(6x + 9) - x$	=	$24x + 36 - x$	Distribute the 4.
	=	$24x - x + 36$	Commutative Property
	=	$23x + 36$	Combine like terms.

Therefore, the expression **$23x + 36$** is equivalent to $4(6x + 9) - x$.

http://www.mathsisfun.com/algebra/inequality-solving.html

Solve Equations & Inequalities - Substitution

To determine if a value is a solution to an equation or an inequality, use substitution to see if the value makes the equation or inequality true.

Example 1:

From the set {144, 168, 180}, use substitution to determine which value of x makes the equation true.

$$x \div 12 = 15$$

Solution:

To find the value of x that makes the equation true, substitute each number from the set into the equation for x.

$$x \div 12 = 15$$
$$144 \div 12 = 12$$
$$168 \div 12 = 14$$
$$180 \div 12 = 15$$

Therefore, the value of x that makes the equation true is **180**.

Example 2:

From the set {12, 14, 16}, use substitution to determine which value of *x* makes the equation true.

$$8x = 104$$

Solution:

To find the value of *x* that makes the equation true, substitute each number from the set into the equation for *x*.

$$8x = 104$$
$$8(12) = 96$$
$$8(14) = 112$$
$$8(16) = 128$$

Therefore, **none of these values** of *x* make the equation true.

Example 3:

From the set {3, 4, 5}, use substitution to determine which value of *x* makes the inequality true.

$$x + 6 > 10$$

Solution:

To find the value of *x* that makes the inequality true, substitute each number from the set into the inequality for *x*.

$$x + 6 > 10$$
$$3 + 6 = 9$$
$$4 + 6 = 10$$
$$5 + 6 = 11$$

Therefore, the value of *x* that makes the inequality true is **5**.

http://www.schooltube.com/video/2b34f37333c243129065/Symbolizing%20Problem%20Situations

http://www.studyzone.org/mtestprep/math8/e/numerica6l.cfm

http://www.studyzone.org/mtestprep/math8/e/numerical6p.cfm

Symbolize Expressions

Translating verbal descriptions into mathematical expressions can be helpful for problem solving.

Example 1:

Jeremy went to the Die-Cast Car collectors convention. He spent $34 on a model restoration kit, and m dollars on model cars. Find the expression which can be used to find the total amount of money he spent.

Solution:

Jeremy spent $34 on the kit and m dollars on model cars.

The total amount of money he spent is the sum of these two values.

$$\$34 + m$$

Example 2:

Samantha went to art camp for W weeks. During art camp, she painted a total of 48 pictures. She painted the same number of pictures each week of camp. Find the expression which can be used to find the number of pictures she painted each week.

Solution:

To find the number of pictures she painted each week, divide the total number of paintings by the number of weeks.

$$48 \div W$$