

Translating Words into Algebraic Expressions

In a sentence, we translate "a number" into a variable, usually x .

The key to translate words into Algebraic expressions is to find key words. Here is a list of key words.

	Key Words	Example	Expression
Addition	increased by	a number increased by 2	$x+2$
	more than	2 more than a number	$x+2$
	sum	the sum of 2 and a number	$2+x$
	together	a number and 2 together	$x+2$
Subtraction	decreased by	2 decreased by a number	$2-x$
	decreased by	a number decreased by 2	$x-2$
	less than	2 less than a number	$x-2$
	fewer than	2 fewer than a number	$x-2$
	difference	the difference between a number and 2	$x-2$
	difference	the difference between 2 and a number	$2-x$
Multiplication	of	50% of a number	$0.5x$
	multiplied by	a number multiplied by 2	$2x$
	product	the product of 2 and a number	$2x$
	times	2 times a number	$2x$
Division	quotient	the quotient of a number and 2	$\frac{x}{2}$
	quotient	the quotient of 2 and a number	$\frac{2}{x}$
	ratio	the ratio of a number and 2	$\frac{x}{2}$
	ratio	the ratio of 2 and a number	$\frac{2}{x}$
Equals	is/are	The sum of a number and 2 is 10.	$x+2=10$
	the same as	The sum of a number and 2 is the same as 10.	$x+2=10$

In this table, the most common mistake is about "less than" and "fewer than".

Think about this question: What is 2 less than 5? It's obvious that the answer is $5-2=3$. Note that it's wrong to do $2-5=-3$. This is why "2 less than a number" must be translated into $x-2$, not the other way around.

When we put together multiple words in the table, it could be confusing and you will need practice.

[Example 1] one more than twice a number

[Solution] $2x+1$ or $1+2x$

[Example 2] one less than twice a number

[Solution] $2x-1$

Note that $1-2x$ is incorrect! This is different from addition in Example 1.

[Example 3] the product of 2 and 3 less than a number

[Solution] $2(x-3)$

The moment you see "product of", you should look for the key word "and", which connects those two parts in the multiplication. In this problem, those two parts are "2" and "3 less than a number."

Looking for the key word "and" is an important strategy. It's often useful to underline those two parts before and after "and."

[Example 4] the quotient of 3 and twice a number

[Solution] $\frac{3}{2x}$

[Example 5] 2 more than two thirds of a number is the same as a fourth of that number.

[Solution] The phrase "is the same as" should be translated into the equal sign. The solution is

$$\frac{2}{3}x + 2 = \frac{1}{4}x$$

There are equivalent solutions like this one:

$$\frac{x}{4} = 2 + \frac{2}{3}x$$

Note that "one fourth of a number" is the same as "the number divided by 4". For example, one fourth of 12 is 3, while 12 divided by 4 is still 3.