

Writing, Evaluating and Simplifying Algebraic Expressions

Grade 6 math · Lesson · Standards: 6.EE.A.2, 6.EE.A.3, 6.EE.A.4

Quick answer: An algebraic expression combines numbers, variables and operations, like $3n + 5$. A variable is a letter standing for a number, and a coefficient is the number multiplying it. To evaluate, substitute a value for each variable and follow the order of operations. Equivalent expressions, made with the distributive property or by combining like terms, always have equal values.

Standards: 6.EE.A.2, 6.EE.A.3, 6.EE.A.4 · **Level:** Grade 6

What are variables, terms and coefficients?

Vocabulary

- A **variable** is a letter that stands for a number that can change or is unknown.
- An **algebraic expression** combines numbers, variables and operation symbols, such as $5n + 3$.
- A **term** is a part of an expression separated by $+$ or $-$. A **coefficient** is the number multiplying a variable, and a **constant** is a term with no variable.

$$\begin{array}{ccc}
 \text{5n} & + & \text{3} \\
 | \quad | & & | \\
 \text{coefficient 5} & & \text{constant term 3} \\
 \text{variable n} & &
 \end{array}$$

2 terms:
5n and 3

Parts of the expression $5n + 3$.

Writing a number next to a letter means multiplication, so $5n$ means $5 \times n$. The expression $n \div 4$ can also be written as a fraction with n on top and 4 on the bottom.

How do you write an expression from words?

Words	Expression
9 more than a number n	$n + 9$
9 less than a number n	$n - 9$
twice a number n	$2n$

Words	Expression
a number n divided by 4	$\frac{n}{4}$
5 times the sum of n and 2	$5(n + 2)$

Common mistake

Reversing “less than.” “9 less than n ” is $n - 9$, not $9 - n$.

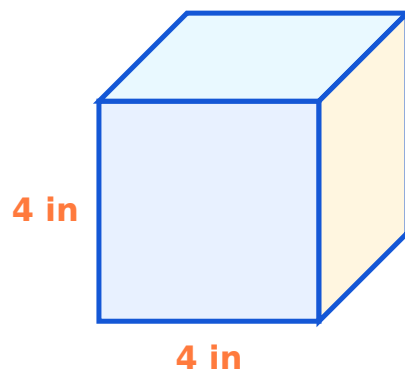
How do you evaluate an expression or a formula?

Method: evaluate

1. Replace every variable with its given value, using parentheses if helpful.
2. Evaluate powers, then multiply and divide, then add and subtract, left to right.

Worked example

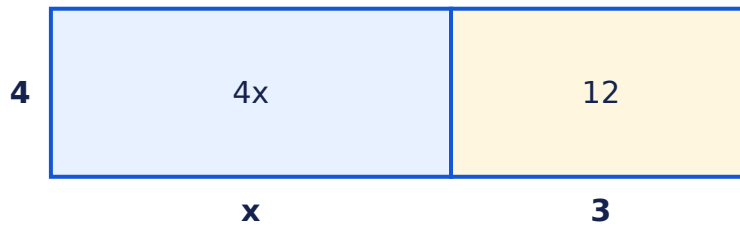
The volume of a cube is $V = s^3$ and its surface area is $A = 6s^2$. For $s = 4$ inches: $V = 4 \times 4 \times 4 =$ **64 cubic inches**, and $A = 6 \times 16 =$ **96 square inches**.



A cube with edge $s = 4$ in.

What are equivalent expressions?

Two expressions are **equivalent** when they have the same value for every number. The distributive property gives one pair: $4(x + 3) = 4x + 12$. Combining like terms gives another: $3y + 4 + 2y + 1 = 5y + 5$, because terms with the same variable part can be added.



The total area is $4(x + 3) = 4x + 12$.

Mathbot's tip

Test your simplified answer: pick a number, such as 2, and check that both expressions give the same result.

Key points to remember

- A term is a part of an expression separated by $+$ or $-$.
- A coefficient multiplies a variable: in $7y$, the coefficient is 7.
- To evaluate, substitute the value and use the order of operations.
- $a(b + c) = ab + ac$ is the distributive property.
- Like terms have the same variable part and can be combined: $6x + 2x = 8x$.

Writing, Evaluating and Simplifying Algebraic Expressions: frequently asked questions

What is the difference between an expression and an equation?

An expression, like $3n + 5$, has no equal sign and cannot be solved. An equation, like $3n + 5 = 20$, states that two expressions are equal and can be solved.

How do you tell the coefficient of a term?

The coefficient is the number multiplied by the variable. In $9m$ it is 9. If a variable has no number in front, such as x , its coefficient is 1.

What are like terms?

Like terms have exactly the same variable part, such as $4x$ and $7x$. You can add or subtract their coefficients to combine them. The terms $4x$ and 7 are not like terms.

How can you check that two expressions are equivalent?

Substitute the same number into both and compare. If one value works but another does not, they are not equivalent. For a proof, use the distributive property or combine like terms.

Why does the formula $V = s^3$ use an exponent?

A cube has three equal edge lengths, length, width and height, all equal to s . The volume multiplies them, $s \times s \times s$, which is written s^3 .