

Algebra 1 - Structure of Algebraic Expressions - Lesson

Common Core A-SSE.A.1a, A-SSE.A.1b · maths-pdf.fr/en/

An algebraic expression is built from terms, which are numbers, variables, or products of both. A coefficient is the number multiplying a variable, a constant has no variable, and factors are multiplied together. Reading each part in context, and treating a group in parentheses as one quantity, lets you interpret, simplify, and compare expressions correctly.

Algebra 1 · Common Core State Standards: **A-SSE.A.1a, A-SSE.A.1b**

Key facts

- Terms are separated by + and - signs, and each term keeps its own sign.
- A coefficient multiplies a variable; a constant has no variable.
- Like terms have the same variable part and can be combined by adding coefficients.
- A grouped expression such as $(x + 3)$ can be treated as one factor.
- In a model, a coefficient is often a rate and a constant is a starting amount.

What are the parts of an algebraic expression?

An algebraic expression joins numbers and variables with operations. Before you simplify anything, name its parts.

Parts of an expression

A **term** is a number, a variable, or a product of both. Terms are separated by + and - signs. A **coefficient** is the number multiplied by a variable. A **constant** is a term with no variable. A **factor** is any quantity that is multiplied in a product.

$3x^2$	$- 5x$	$+ 7$
term, coefficient 3	term, coefficient -5	constant term

The expression has three terms. Each term keeps the sign in front of it.

In $3x^2 - 5x + 7$ there are 3 terms. The coefficients are 3 and -5, and the constant is 7. The sign in front of a term belongs to that term.

How do you interpret an expression in context?

Each part of an expression tells a story. A gym charges a \$25 joining fee and \$18 per month. After m months, the cost in dollars is $18m + 25$. The coefficient 18 is the rate: dollars added per month. The constant 25 is the starting amount that is paid once.

Months m	Cost $18m + 25$
1	\$43
2	\$61
3	\$79
6	\$133

The cost grows by \$18 each month, starting from the \$25 fee.

When you read an expression, ask what each term measures and what its units are. A term with a variable changes as the variable changes. A constant stays the same.

How can you see part of an expression as a single quantity?

Parentheses group several terms into one factor. In $5(x+3)$, the group $(x+3)$ is one quantity that is multiplied by 5. If $(x+3)$ is 10, the whole expression is just $5 \times 10 = 50$.

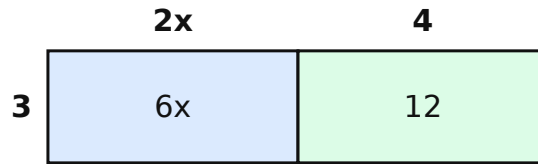
5	$\times$	$(x + 3)$
factor	multiply	factor (one group)

In $5(x + 3)$, the sum $x + 3$ is one factor that acts as a single quantity.

The same idea helps with formulas. In $P(1+r)^n$ the factor $(1+r)^n$ does not depend on P , so the expression is the starting amount P multiplied by a growth factor.

How do you simplify an expression?

Simplifying means writing an equivalent expression with fewer terms. Use the distributive property and combine like terms, which are terms with the same variable part.



Area model: $3(2x + 4) = 6x + 12$.

1. Distribute each factor over its group.
2. Circle like terms (same variable and exponent).
3. Add or subtract the coefficients of like terms.

Example: Simplify $4(x+2)+3x-5$. Distribute: $4x+8+3x-5$. Combine $4x+3x$: the result is $7x+3$.

Questions about structure of algebraic expressions

What is the difference between a term and a factor?

Terms are added or subtracted, while factors are multiplied. In $3x + 5$, the terms are $3x$ and 5 . In $3x$, the factors are 3 and x .

What is a coefficient?

A coefficient is the number that multiplies a variable. In $-7y$ the coefficient is -7 . If no number is written, as in x , the coefficient is 1 .

What are like terms?

Like terms have exactly the same variables with the same exponents. The terms $5x$ and $-2x$ are like terms, but $5x$ and $5x^2$ are not.

How do you interpret a term in a word problem?

Ask what the number and the variable stand for and what units go with the term. In $2.25b$, if b is the number of brownies sold at $\$2.25$ each, the term is the money earned from brownies.

Why can a group in parentheses be treated as one quantity?

The parentheses mean the terms inside are evaluated together first. So $(x + 3)$ acts like a single number whenever it is multiplied, divided, or raised to a power.