

Grade 6 - Equivalent Expressions and the Distributive Property - Lesson

Common Core 6.EE.A.3, 6.EE.A.4 · maths-pdf.fr/en/

Equivalent expressions have the same value for every value of the variable. The distributive property, $a(b + c) = ab + ac$, rewrites $3(x + 2)$ as $3x + 6$, and combining like terms rewrites $2x + 3x$ as $5x$. To check whether two expressions are equivalent, substitute several numbers and compare the results.

Grade 6 · Common Core State Standards: **6.EE.A.3, 6.EE.A.4**

Key facts

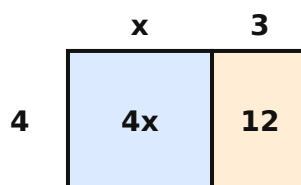
- Equivalent expressions have the same value for every value of the variable.
- Distributive property: $a(b + c) = ab + ac$.
- Like terms have the same variable part and can be combined.
- Factor out the GCF to reverse the distributive property.
- Substitute values to test whether two expressions are equivalent.

What are equivalent expressions?

Two expressions are **equivalent** if they have the same value for every value of the variable. For example, $3(x+2)$ and $3x+6$ are equivalent. When $x=1$, both are 9. When $x=2$, both are 12.

Properties of operations

The **distributive property** says $a(b+c) = ab+ac$. The commutative property lets you change order, $a+b = b+a$, and the associative property lets you regroup.



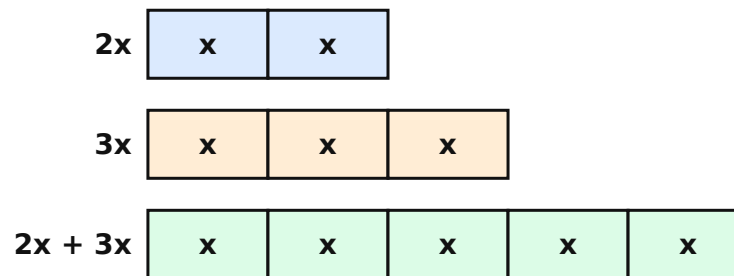
The distributive property: $4(x + 3) = 4x + 12$.

How do you use the distributive property?

Multiply the outside factor by every term inside the parentheses. For $5(2y+7)$, compute $5 \cdot 2y = 10y$ and $5 \cdot 7 = 35$, so the result is $10y+35$. You can also work backward and *factor out* the greatest common factor: $8x+12=4(2x+3)$.

How do you combine like terms?

Like terms have the same variable part. Add or subtract their coefficients. $2x+3x=5x$, but $2x+3$ cannot be combined because one term has a variable and the other does not.



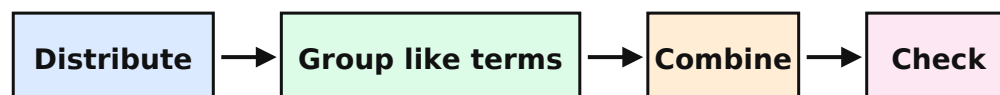
Like terms combine: $2x + 3x = 5x$.

How can you test whether two expressions are equivalent?

Substitute several values for the variable. If the results ever differ, the expressions are not equivalent. For $2(x+5)$ and $2x+5$ with $x=4$, the values are 18 and 13, so they are not equivalent.

x	1	2	3
$3(x + 2)$	9	12	15
$3x + 6$	9	12	15

Equivalent expressions give the same value for every x.



A four-step plan for simplifying.

1. Distribute any factors outside parentheses.
2. Group the like terms together.
3. Add or subtract the coefficients.
4. Check with a number for the variable.

Example: $3(2x+5)-4x+1=6x+15-4x+1=2x+16$. Check with $x=2$: both forms equal 20.

Questions about equivalent expressions and the distributive property

What does equivalent expressions mean?

Equivalent expressions have the same value no matter what number replaces the variable. For example, $2(x + 3)$ and $2x + 6$ are equivalent.

What is the distributive property?

It says $a(b + c) = ab + ac$. Multiply the outside number by each term in the parentheses.

What are like terms?

Like terms have the same variable part, such as $3x$ and $5x$. You add or subtract their coefficients to combine them.

How do you factor out a common factor?

Find the GCF of the terms, divide each term by it, and write the GCF times the new sum. For $8x + 12$, the GCF is 4, so the result is $4(2x + 3)$.

How can you check that two expressions are equivalent?

Substitute a few values for the variable. If the values are always equal, they are equivalent. If any pair differs, they are not.