

Grade 7 - Equivalent Linear Expressions - Lesson

Common Core 7.EE.A.1, 7.EE.A.2 · maths-pdf.fr/en/

Equivalent expressions have the same value for every value of the variable. You can rewrite a linear expression by combining like terms, by expanding with the distributive property, or by factoring out the greatest common factor. Rewriting an expression can show how the quantities in a problem are related.

Grade 7 · Common Core State Standards: **7.EE.A.1, 7.EE.A.2**

Key facts

- Like terms have the same variable part and can be combined by adding coefficients.
- Distributive property: $a(b+c) = ab+ac$.
- Factor by pulling out the greatest common factor: $6x+12 = 6(x+2)$.
- Subtracting an expression means adding its opposite.
- Adding 5% tax to a price p gives $p+0.05p = 1.05p$.

What are equivalent expressions?

Two expressions are **equivalent** if they have the same value for every number you substitute for the variable.

x	$3(x+4)$	$3x+12$
0	12	12
1	15	15
2	18	18
5	27	27

Equivalent expressions give the same value for every x .

The properties of operations, such as the commutative, associative, and distributive properties, are the rules that let you rewrite an expression without changing its value.

How do you combine like terms?

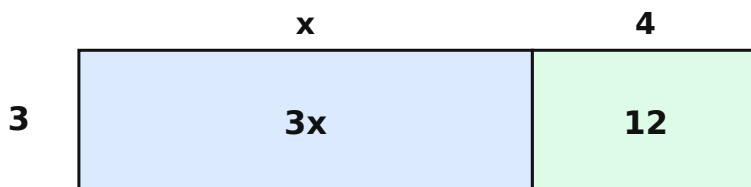
Like terms

Like terms have the same variable part, such as $5x$ and $-2x$. Combine them by adding the coefficients: $5x + (-2x) = 3x$. Constants such as 7 and -4 are also like terms.

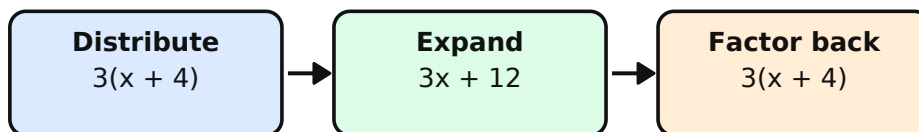
For example, $4a + 3 + 2a - 7 = (4a + 2a) + (3 - 7) = 6a - 4$. Subtracting an expression means adding its opposite: $(7x + 3) - (2x - 4) = 7x + 3 - 2x + 4 = 5x + 7$.

How do you expand and factor?

The distributive property says $a(b+c) = ab+ac$. Use it to **expand**. Work backward with the greatest common factor to **factor**.



The area model shows $3(x + 4) = 3x + 12$.

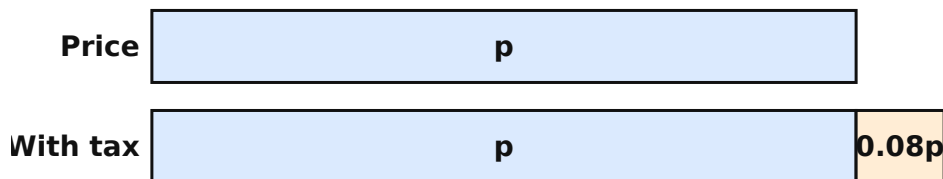


Expanding and factoring undo each other.

1. To expand, multiply the outside number by every term inside, and watch the signs:
 $-2(y-5) = -2y + 10$.
2. To factor, find the greatest common factor (GCF) of the terms: the GCF of $6x$ and 12 is 6.
3. Write the GCF outside and the leftover terms inside: $6x + 12 = 6(x + 2)$.

Why rewrite an expression in a different form?

Different forms show different information. If a \$20 jacket gets 8% sales tax, the cost can be written $p + 0.08p$ or $1.08p$. The second form says the total is 108% of the price in one step.



Adding 8% tax to p gives $p + 0.08p = 1.08p$.

With rational coefficients, treat fractions and decimals like any other number: $\frac{1}{2}x + \frac{3}{4}x = \frac{5}{4}x$ and $0.4(5x-10) = 2x-4$.

Questions about equivalent linear expressions

What does it mean for expressions to be equivalent?

Two expressions are equivalent when they give the same value for every number substituted for the variable. For example, $3(x+4)$ and $3x+12$ are equivalent.

What are like terms?

Like terms have the same variable raised to the same power. In $5x+3-2x$, the terms $5x$ and $-2x$ are like terms, and so are any constants.

How do you distribute a negative number?

Multiply the negative number by every term inside the parentheses and change signs accordingly. $-2(y-5) = -2y+10$.

How do you factor an expression?

Find the greatest common factor of all terms, write it in front of parentheses, and divide each term by it. $15a-10 = 5(3a-2)$.

How can I check that two expressions are equivalent?

Substitute several values for the variable into both expressions. If any value gives different results, they are not equivalent.