

ELG 7.3: Use properties of operations to generate equivalent expressions.

Vertical Progression:

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| 5th Grade | <p>5.OA.A Write and interpret numerical expressions.</p> <ul style="list-style-type: none"> ○ 5.OA.A.1 Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols. ○ 5.OA.A.2 Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them. |
| 6th Grade | <p>ELG 6.5 Apply and extend previous understandings of arithmetic to algebraic expressions.</p> <ul style="list-style-type: none"> ○ 6.EE.A.3 Apply the properties of operations to generate equivalent expressions. ○ 6.EE.A.4 Identify when two expressions are equivalent (i.e., when the two expressions name the same number regardless of which value is substituted into them). |
| 7th Grade | <p>ELG 7.3 Use properties of operations to generate equivalent expressions.</p> <ul style="list-style-type: none"> ○ 7.EE.A.1: Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients. ○ 7.EE.A.2: Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related. <i>For example, $a + 0.05a = 1.05a$ means that "increase by 5%" is the same as "multiply by 1.05."</i> |
| 8th Grade | <p>ELG 8.4 Analyze and solve linear equations and pairs of simultaneous linear equations.</p> <ul style="list-style-type: none"> ○ 8.EE.C.7 Solve linear equations in one variable. ○ 8.EE.C.7.a Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form $x = a$, $a = a$, or $a = b$ results (where a and b are different numbers). ○ 8.EE.C.7.b Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms. |

Students will demonstrate command of the ELG by:

- Applying the properties of operations to solve problems involving linear expressions with rational coefficients.
- Expanding linear expressions with rational coefficients.
- Factoring linear expressions with rational coefficients.
- Adding and subtracting linear expressions with rational coefficients.
- Applying the properties of operations to write equivalent expressions.
- Determining how the context is related to an expression and how using an equivalent expression might better fit the context.

ELG 7.3: Use properties of operations to generate equivalent expressions.

Vocabulary:

- associative property
- coefficient
- commutative property
- distributive property
- equivalent expressions
- expanding expressions
- factor
- like terms
- linear expressions
- order of operations
- properties of operations
- variable

Sample Instructional/Assessment Tasks:

1) Standard(s): 7.EE.A.2

Source: Illustrative Mathematics www.illustrativemathematics.org

Item Prompt:

Malia is at an amusement park. She bought 14 tickets, and each ride requires 2 tickets.

a. Write an expression that gives the number of tickets Malia has left in terms of x , the number of rides she has already gone on. Find at least one other expression that is equivalent to it.

b. $14-2x$ represents the number of tickets Malia has left after she has gone on x rides. How can each of the following numbers and expressions be interpreted in terms of tickets and rides? 14, -2, $2x$

c. $2(7-x)$ also represents the number of tickets Malia has left after she has gone on x rides. How can each of the following numbers and expressions be interpreted in terms of tickets and rides? 7, $(7-x)$, 2

Correct Answer(s)

- Possible expressions: $14-2x$; $2(7-x)$; $14-x-x$; $10-2x+4$; $-2x+14$
- In the expression $14-2x$, the 14 represents the number of tickets Malia started with since the value of the expression is 14 when $x=0$. The -2 represents the number of tickets she spends per ride. $2x$ represents the number of tickets she has to subtract from her initial amount after riding x rides.
- In the expression $2(7-x)$, the 7 represents the total number of rides Malia can go on. $(7-x)$ represents the number of rides she has left and the 2 represents the number of tickets required for each ride Malia has left.

2) Standard(s): 7.EE.A.1

Source: Smarter Balanced

Item Prompt:

Find the value of n so that the expression $(-y + 5) + (7y - 9)$ is equivalent to $(ny - 4)$.

Find the value of n so that the expression $(-y + 5.3) + (7.2y - 9)$ is equivalent to $(6.2y + n)$.

Explain how you found the value of n for both expressions.

Solution:

The student finds the correct value for the variable (6; -3.7) and explains/justifies the solution.