

Grade 7 Target C

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Content Domain: Expressions and Equations

Target C [m]: 7.EE.A Use properties of operations to generate equivalent expressions.

Standards included in Target C: 7.EE.A, 7.EE.A.1, 7.EE.A.2

7.EE.A Use properties of operations to generate equivalent expressions.

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. For example, $a + 0.05a = 1.05a$ means that “increase by 5%” is the same as “multiply by 1.05.”

Vertical Alignment

Related Grade 6 standards

6.EE.A Apply and extend previous understandings of arithmetic to algebraic expressions.

6.EE.A.1 Write and evaluate numerical expressions involving whole-number exponents.

6.EE.A.2 Write, read, and evaluate expressions in which letters stand for numbers.

a. Write expressions that record operations with numbers and with letters standing for

numbers. For example, express the calculation “Subtract y from 5” as $5 - y$.

b. Identify parts of an expression using mathematical terms (sum, term, product, factor, quotient, and coefficient); view one or more parts of an expression as a single entity. For example, describe the expression $2(8 + 7)$ as a product of two factors; view $(8 + 7)$ as both a single entity and a sum of two terms.

c. Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. Perform arithmetic operations, including those involving whole-number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations). For example, use the formulas $V = s^3$ and $A = 6s^2$ to find the volume and surface area of a cube with sides of length $s = \frac{1}{2}$.

6.EE.A.3 Apply the properties of operations to generate equivalent expressions. For example, apply the distributive property to the expression $3(2 + x)$ to produce the equivalent expression $6 + 3x$; apply the distributive property to the expression $24x + 18y$ to produce the equivalent expression $6(4x + 3y)$; and apply properties of operations to $y + y + y$ to produce the equivalent expression $3y$.

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). For example, the expressions $y + y + y$ and $3y$ are equivalent because they name the same number regardless of which number y stands for.

Related Grade 8 Standards

8.EE.C Analyze and solve linear equations and pairs of simultaneous linear equations.

8.EE.C.7 Solve linear equations in one variable.

a. Write 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).

b. Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.

Achievement Level Descriptors

Level 1 Students should be able to apply properties of operations as strategies to add and subtract linear expressions with integer coefficients.

Level 2 Students should be able to apply properties of operations as strategies to factor and expand linear expressions with integer coefficients. They should also be able to add and subtract linear expressions with rational coefficients.

Level 3 Students should be able to apply properties of operations as strategies to factor and expand linear expressions with rational coefficients. They should understand that rewriting an

expression can shed light on how quantities are related in a familiar problem-solving context with minimal scaffolding.

Level 4 Students should understand that rewriting an expression can shed light on how quantities are related in an unfamiliar problem-solving context with no scaffolding.

Evidence Required

1. The student adds and subtracts linear expressions with rational coefficients.
2. The student factors linear expressions with rational coefficients.
3. The student expands linear expressions with rational coefficients.
4. The student generates equivalent linear expressions using a combination of addition and subtraction, factoring, and expansion.

Vocabulary

sum, difference, factor, rational coefficient, linear expression, distributive property of multiplication, associative property of addition/multiplication, commutative property of addition/multiplication

Response Types

Multiple Choice, single correct response; Multiple Choice, multiple correct response; Equation/Numeric

Materials

linear expressions in one or two variable

Attributes

None

Claim 1: Concepts and Procedures (DOK 1, 2) Question Banks

Students can explain and apply mathematical concepts and carry out mathematical procedures with precision and fluency.

Claim 1 7.EE.A.1 DOK Level 1

Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.

Evidence Required

The student adds and subtracts linear expressions with rational coefficients

Question Type 1: The student is presented with two or more linear expressions.

- Item difficulty can be adjusted via these methods:
 - o Expressions have integer coefficients.

These pages were adapted from open source documents available on the Smarter Balanced Website: <http://www.smarterbalanced.org/assessments/development/> August 2016

- o Expressions include decimal coefficients.
- o Expressions include coefficients which are fractions or mixed numbers.
- o Expressions include exactly one variable.
- o Expressions include more than one variable.

1. Select the expression equivalent to $(3x + 2) + (-6x + 3)$.
 - A. $-3x + 5$
 - B. $3x + 5$
 - C. $9x + 5$
 - D. $-9x + 5$

2. Select the expression equivalent to $(2.1x + 4.3) - (-3x - 7)$.
 - A. $-0.9x - 2.7$
 - B. $-0.9x + 11.3$
 - C. $5.1x - 2.7$
 - D. $5.1x + 11.3$

Answer Choices: Each answer choice should be expressions in the form $px + q$, where p and q are integers or rational numbers, depending on the level of difficulty. Distractors will include incorrect calculations based on negative sign(s) and incorrectly combining terms.

Rubric: (1 point) The student identifies the equivalent expression (e.g., A; D).

Response Type: Multiple Choice, single correct response

Claim 1 7.EE.A.1 DOK Level 1

Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.

Evidence Required

The student adds and subtracts linear expressions with rational coefficients

Question Type 2: The student is presented with two or more linear expressions.

• Item difficulty can be adjusted via these methods:

- o Expressions have integer coefficients.
- o Expressions include decimal coefficients.
- o Expressions include coefficients which are fractions or mixed numbers.
- o Expressions include exactly one variable.
- o Expressions include more than one variable.

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

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

Rubric: (1 point) The student enters the correct value for the variable (e.g., 6; -3.7).

Response Type: Equation/Numeric

Claim 1 7.EE.A.1 DOK Level 1

Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.

Evidence Required

The student adds and subtracts linear expressions with rational coefficients

Question Type 1: The student factors linear expressions with rational coefficients.

1. Select all expressions equivalent to $-72x + 60$.

- A. $-12(6x - 5)$
- B. $-12(-6x - 5)$
- C. $6(-12x + 10)$
- D. $-6(-12x - 10)$

Answer Choices: Answer choices will be expressions in the form $p(qx + r)$ or $p(r + qx)$, where p , q , and r are rational numbers. Distractors will include misuse of the distributive property, incorrect calculations based on negative sign(s), and incorrectly combining terms.

Rubric: (1 point) The student selects all of the equivalent expressions (e.g., A and C).

Response Type: Multiple Choice, multiple correct response

Question Type 2: The student is presented with two linear expressions.

- Item difficulty can be adjusted via these methods:
 - o Expressions have only positive rational coefficients.
 - o Expressions include negative rational coefficients.
 - o Should contain one or more rational coefficient(s).
 - o Coefficients are rational numbers sharing a common factor with other terms.

1. Enter the value of p so that the expression $3(n + 5)$ is equivalent to $(n + p)3$.

2. Enter the value of p so that the expression $\frac{5}{6} - \frac{1}{3}n$ is equivalent to $p(5 - 2n)$.

Rubric: (1 point) The student enters the correct value for p (e.g., 5; $\frac{1}{6}$).

Response Type: Equation/Numeric

Claim 1 7.EE.A.1 DOK Level 1

Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.

Evidence Required

The student expands linear expressions with rational coefficients.

Question Type 1: The student is presented with a linear expression.

- Item difficulty can be adjusted via these methods:
 - o Expressions have positive or negative integer coefficients.
 - o Expressions include rational coefficients.

1. Which expression is equivalent to $-15x + 6$?

- A. $-3(5x - 2)$
- B. $-3(5x + 6)$
- C. $3(-5x - 2)$
- D. $3(5x + 6)$

2. Which expression is equivalent to $-0.8(10.8x - 20 + 3.2x)$?

- A. $-11.2x + 16$
- B. $-11.2x - 16$
- C. $-8.64x - 16.8$
- D. $-8.64x + 16.8$

Answer Choices: Distractors will include misuse of the distributive property; incorrect calculations are based on negative sign(s), and incorrectly combining terms.

Rubric: (1 point) The student selects the equivalent expression (e.g., A; A).

Response Type: Multiple Choice, single correct response

Question Type 2: The student is presented with two equivalent linear expressions.

- Item difficulty can be adjusted via these methods:
 - o Expressions have positive or negative integer coefficients.
 - o Expressions include rational coefficients.
 - o One expression has two variables.

1. Enter the value of b when the expression $14.1x + b$ is equivalent to $4.7(3x - 3.5)$.

Rubric: (1 point) The student enters the value for b (e.g., -16.45).

Response Type: Equation/Numeric

Claim 1 7.EE.A.1 DOK Level 2

Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.

Evidence Required

The student generates equivalent linear expressions using a combination of addition and subtraction, factoring, and expansion.

Question Type 1: The student is presented with a linear expression.

- Item difficulty can be adjusted via these methods:
 - o Expressions have only positive rational coefficients.
 - o Expressions include negative rational coefficients.
 - o Only addition/subtraction of expressions is required.
 - o Factoring/expansion of expressions is required.

1. Select all expressions that are equivalent to $3x + 5(-4x + 12) - (x - 3)$.

- A. $-18x + 63$
- B. $18x - 63$
- C. $3x - 20x + 60 - x + 3$
- D. $3x + 20x + 60 - x - 3$

2. Select all expressions that are equivalent to $0.75x + 0.25(x + 12.4) + (x - 2.1)$.

- A. $2x + 1$
- B. $x + 1$
- C. $x + 3.1 + x + 2.1$
- D. $x + 3.1 + x - 2.1$

Answer Choices: Distractors will include misuse of the distributive property, incorrect calculations based on negative sign(s), and incorrectly combining terms.

Rubric: (1 point) The student selects all the appropriate expressions (e.g., A and C; A and D).

Response Type: Multiple Choice, multiple correct response

Claim 4 Modeling and Data Analysis Question Banks

Claim Descriptors and Targets

Students can analyze complex, real-world scenarios and can construct and use mathematical models to interpret and solve problems.

Example 1

Megan has \$2500. She spends money on the following:

- \$800 on rent
- \$400 on food
- \$200 on utility services
- \$250 on loan payments
- \$x on other expenses

Let y represent the amount of money in dollars Megan has left. Write an equation that represents the relationship between the amount of money Megan spends on other expenses and the amount of money Megan has left.

Rubric: (1 point) The student computes Megan's spending and represents the remaining money with an equation

($y = 850 - x$, or equivalent).

Response Type: Equation/Numeric