Grade 6 Target E

Domain, Target, Standards, DOK, Vertical Alignments, Achievement Levels, Evidence Required, Vocabulary, Response Types, Materials, Attributes, Question Types, and Question Banks (Examples)

Content Domain: Expressions and Equations

Target E [m]: 6.EE.A Apply and extend previous understandings of arithmetic to algebraic expressions.

Standards included in Target E: 6.EE.A, 6.EE.A.1, 6.EE.A.2, 6.EE.A.3, 6.EE.A.4

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, 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 = s3 and A = 6 s2 to find the volume and surface area of a cube with sides of length s = ½.

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); 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.

Vertical Alignment

Related Grade 5 standards

5.OA.A Write and interpret numerical expressions.

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. For example, express the calculation “add 8 and 7, then multiply by 2” as 2 x (8 + 7). Recognize that 3 x (18932 + 921) is three times as large as 18932 + 921, without having to calculate the indicated sum or product.

Related Grade 7 Standards

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.”

Achievement Level Descriptors

Level 1 Students should be able to evaluate numerical expressions without exponents; write one- or two-step numerical expressions; and identify parts of an expression, using terms (e.g., coefficient, term, sum, product, difference, quotient, factor).

Level 2 Students should be able to evaluate numerical expressions with nonnegative integer exponents that do not need to be distributed across a set of parentheses. They should be able to apply and extend previous understandings of arithmetic to evaluate expressions with variables that do not contain exponents. They should also be able to write one- and two-step algebraic expressions that introduce a variable and identify equivalent expressions.

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Level 3 Students should be able to write and evaluate numerical expressions with nonnegative integer exponents and expressions from formulas in real-world problems, and they should be able to apply and extend previous understandings of arithmetic to evaluate expressions with variables that include nonnegative integer exponents. They should be able to apply properties of operations to generate equivalent expressions.

Level 4 Students should be able to apply the understanding of the properties of operations and use the properties to show why two expressions are equivalent.

Evidence Required

1. The student evaluates numerical expressions involving whole-number exponents.

2. The student writes numerical expressions involving whole-number exponents, algebraic expressions, and expressions from formulas in real-world problems.

3. The student uses mathematical terms to describe expressions.

4. The student evaluates algebraic expressions and expressions from formulas in real-world problems.

5. The student creates equivalent expressions by applying properties of operations.

6. The student identifies when expressions are equivalent by utilizing properties of operations.

Vocabulary

sum, product, quotient, difference, negative, term, factor, coefficient, expression, algebraic expression, numerical expression, order of operations, distributive property, associative property, commutative property

Response Types

Multiple Choice, multiple correct response; Equation/Numeric; Drag and Drop

Materials

none

Attributes

Only whole-number exponents can be used in items that involve the use of exponents.

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 6.EE.A.1 DOK Level 1

Write and evaluate numerical expressions involving whole-number exponents.

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Evidence Required

The student evaluates numerical expressions involving whole-number exponents.

Question Type 1: The student is presented with a numerical expression with exponents.
Example Stem: Enter the value of $3^3 \bullet 7^3 - 8 \div 4$.

Rubric: (1 point) Student enters the correct value for the expression (e.g., 1321).

Response Type: Equation/Numeric

Claim 1 6.EE.A.1 & 6.EE.A.2 DOK Level 1

Write and evaluate numerical expressions involving whole-number exponents.

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

Evidence Required

The student writes numerical expressions involving whole-number exponents, algebraic expressions, and expressions from formulas in real-world problems.

Question Type 1: The student is presented with a verbal numerical expression with exponents or verbal algebraic expression with or without exponents.

1. Enter a numerical expression that represents the sum of eight squared and thirty-two.

2. Enter an algebraic expression that represents eight times the sum of y squared and twenty-eight.

Rubric: (1 point) Student enters a correct numerical/algebraic expression for the given verbal expression (e.g., 8^2+32; $8(y^2+28)$).

Response Type: Equation/Numeric

Claim 1 6.EE.A.1 & 6.EE.A.2b DOK Level 1

Write and evaluate numerical expressions involving whole-number exponents.

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

Evidence Required

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The student uses mathematical terms to describe expressions.

Question Type 1: The student is presented with a numerical or algebraic expression.

1. Select all the statements that correctly describe the expression $4^3 \bullet (8w - 7)$.

A. 3 is a factor of the expression.
B. The difference of 8w and 7 is a factor of the expression.
C. The expression represents the product of 4^3 and 8w – 7.
D. The expression represents the difference of $4^3 \bullet$ 8w and 7.

Answer Choices: Answer choices should be statements that include the following vocabulary: sum, term, product, factor, quotient, and coefficient. Distractors will include confusing the meaning of sum, term, product, factor, quotient, and coefficient. At least two statements must be correct.

Rubric: (1 point) Student selects all the correct statements (e.g., B and C).

Response Type: Multiple Choice, multiple correct response

Claim 1 6.EE.A.2c DOK Level 1

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).

Evidence Required

The student evaluates algebraic expressions and expressions from formulas in real-world problems.

Question Type 1: The student is presented with an algebraic expression and specific values for variables in the expression.

1. The formula $C = \frac{5}{9}(F - 32)$ is used to convert degrees Fahrenheit (F) to degrees Celsius (C). Enter the temperature, in degrees Celsius (C), equal to 113 degrees Fahrenheit (F).

2. Enter the value of $2 \bullet y - 8 \div 4$ when y = 7.

3. Enter the value of $3 \bullet - 8 \div 4$ when y = 7.

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4. A baker uses the expression 5.75c + 3.45p to calculate his profit when he sells c cakes and p pies.

What is the baker's profit, in dollars, when he sells 33 cakes and 42 pies?

Rubric: (1 point) Student enters the correct value for the expression or formula (e.g., 45; 12; 1321; 334.65). Units should be assumed from the problem.

Response Type: Equation/Numeric

Claim 1 6.EE.A.3 DOK Level 2

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); apply properties of operations to y + y + y to produce the equivalent expression 3y.

Evidence Required

The student creates equivalent expressions by applying properties of operations.

Question Type 1: The student is presented with an algebraic expression or an incomplete algebraic expression.

1. Consider this expression: 3(2x + 5y).

Enter an expression that shows the **sum of exactly two terms** that is equivalent to 3(2x + 5y).

2. An equivalent expression to 6x + 15y can be written as the product of two factors. One of the factors is 3.

Enter the **second factor** that will result in 6x + 15y when the two factors are multiplied.

Rubric: (1 point) Student enters the correct algebraic expression (e.g., 6x + 15y; 2x + 5y).

Response Type: Equation/Numeric

Question Type 2: The student is presented with an expression and the parameters to create an equivalent expression.

1. Consider this equation.

3(2x + 5y) = ☐ + ☐

Drag an expression into each box to create an expression equivalent to 3(2x + 5y).

Example Stem 2: Consider this equation.

6x + ☐ = 3(☐ + 5)

Drag an expression into each box to create a true equation.

Interaction: Students will use the drag-and-drop feature to place expressions in the boxes. A palette will be given on the left-hand side with 8–12 terms. Snap-to feature should be used and Delete tool needs to be provided.

Rubric: (1 point) Student correctly creates an equivalent expression (e.g., 6x and 15y; 15 and 2x).

Response Type: Drag and Drop

Claim 1 6.EE.A.4 DOK Level 2

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.

Evidence Required

The student identifies when expressions are equivalent by utilizing properties of operations.

Question Type 1: The student is presented with an algebraic expression.

1. Select all expressions that are equivalent to 4(3x + 6y).

A. 12x + 6y
B. 12x + 24y
C. 2(6x + 12y)
D. 4(12x+24y)

2. Select all expressions that are equivalent to 3 + w + w + w.

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A. 3(1 + w)
B. 3 + 3w
C. 3+*ww*3
D. 3*ww*3

Answer Choices: Answer choices will be algebraic expressions. Distractors will include confusing the meaning of sum, term, product, factor, quotient, and coefficient and/or the properties of operations. At least two expressions must be correct.

Rubric: (1 point) Student selects all of the correct expressions (e.g., B and C; A and B).

Response Type: Multiple Choice, multiple correct response