

Symbolic Expression 1

(K-4) Elementary School Learning Targets

SE-1 Use equations and expressions involving basic operations to represent a given context.

- Represent numerical relationships using combinations of symbols ($=$, $>$, $<$) and numbers to form expressions and equations;
- Solve for unknown in simple number binary number sentences (e.g., $____ + 4 = 7$);
- Write equations showing inverse operations and related operations (e.g., addition-multiplication).

(5-8) Middle School Learning Targets

SE-1 Represent relationships and interpret expressions and equations in terms of a given context for determining an unknown value.

- Represent mathematical relationships symbolically and solve for any variable (for 1st degree equations and for common formula (literal equation));
- Explain how to manipulate an algebraic expression to create equivalent expressions and provide step-by-step explanations and justifications.

(9-12) High School Learning Targets

SE-1 Represent relationships and interpret expressions and equations in terms of a given context (including complex and families of functions) for determining unknown values (including two or more variables).

- Represent and interpret multi-step problems;
- Represent complex numbers and vectors;
- Demonstrate the relationship between systems of equations and matrix representations;
- Represent the relationship between functions and modeling.

Grade Differentiation

Elementary School Progress Indicators

Progress Indicator: E.SE.1c using symbols ($=$, $>$, $<$) to compare whole number quantities, write equations, and determine if equations are true

2.SE.1c1 Compare sets and use appropriate symbols to label the first as $=$, $<$, or $>$ the second set

Counting and Cardinality

K CC Compare numbers.

K.CC.C.6 Identify whether the number of objects in one group is greater than, less than, or equal to the number of objects in another group, e.g., by using matching and counting strategies.

2.SE.1c2 Label simple equations as $=$ or with the phrase not equal

Operations and Algebraic Thinking

1 OA Work with addition and subtraction equations.

1.OA.D.7 Understand the meaning of the equal sign and determine if equations involving addition and subtraction are true or false. For example, which of the following equations are true and which are false? $6 = 6$, $7 = 8 - 1$, $5 + 2 = 2 + 5$, $4 + 1 = 5 + 2$.

Progress Indicator: E.SE.1d representing addition and subtraction in multiple formats, including expressions

2.SE.1d1 Represent addition of 2 sets when shown the $+$ symbol

Operations and Algebraic Thinking

2 OA Represent and solve problems involving addition and subtraction.

2.OA.A.1 Use addition and subtraction within 100 to solve one-and two-step word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.

2.SE.1d2 Represent a "taking away" situation with the $-$ symbol

Operations and Algebraic Thinking

1 OA Work with addition and subtraction equations.

1.OA.D.8 Determine the unknown whole number in an addition or subtraction equation relating to three whole numbers. For example, determine the unknown number that makes the equation true in each of the equations $8 + ? = 11$, $5 = _ - 3$, $6 + 6 = _$.

Progress Indicator: E.SE.1g using symbols ($=$, $>$, $<$) to compare whole numbers, fractions, or decimals; write equations; and express inverse or related operations

3.SE.1g1 Use $=$, $<$, or $>$ to compare 2 fractions with the same numerator or denominator
Number and Operations – Fractions

3 NF Develop understanding of fractions as numbers.

3.NF.A.3 Explain equivalence of fractions in special cases, and compare fractions by reasoning about their size

d) Compare two fractions with the same numerator or the same denominator by reasoning about their size. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with the symbols $>$, $=$, or $<$, and justify the conclusions, e.g., by using a visual fraction model.

Progress Indicator: E.SE.1g using symbols ($=$, $>$, $<$) to compare whole numbers, fractions, or decimals; write equations; and express inverse or related operations

**4.SE.1g2 Use $=$, $<$, or $>$ to compare 2 fractions (fractions with a denominator of 10 or less)
Number and Operations – Fractions**

4 NF Extend understanding of fraction equivalence and ordering.

4.NF.A.2 Compare two fractions with different numerators and different denominators, e.g., by creating common denominators or numerators, or by comparing them to a benchmark fraction such as $\frac{1}{2}$. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with symbols $>$, $=$, or $<$, and justify the conclusions, e.g., by using a visual fraction model.

**4.SE.1g3 Use $=$, $<$, or $>$ to compare 2 decimals (decimals in multiples of .10)
Number and Operations – Fractions**

4 NF Understanding decimal notation for fractions and compare decimal fractions.

4.NF.C.7 Compare two decimals to hundredths by reasoning about their size. Recognize that comparisons are valid only when the two decimals refer to the same whole. Record the results of comparisons with the symbols $>$, $=$, or $<$, and justify the conclusions, e.g., by using a visual model.

Progress Indicator: E.SE.1h expressing whole numbers as fractions, and fractions as equivalent decimals; recognizing that a fraction is one number, not two

**4.SE.1h1 Express whole numbers as fractions
Number and Operations – Fractions**

3 NF Develop understanding of fractions as numbers.

3.NF.A.3 Explain equivalence of fractions in special cases, and compare fractions by reasoning about their size

c) Express whole numbers as fractions and recognize fractions that are equivalent to whole numbers. Examples: Express 3 in the form $3 = \frac{3}{1}$; recognize that $\frac{6}{1} = 6$; locate $\frac{4}{4}$ and 1 at the same point of a number line diagram.

**4.SE.1h2 Identify the equivalent decimal for a fraction
Number and Operations – Fractions**

4 NF Develop understanding of fractions as numbers.

4.NF.C.6 Use decimal notation for fractions with 10 or 100 denominators. For example, rewrite 0.62 as $\frac{62}{100}$; describe a length as 0.62 meters; locate 0.62 on a number line diagram.

Progress Indicator: M.SE.1a using symbols ($=$, $>$, $<$) to compare whole numbers, fractions, or decimals; write equations; and express inverse or related operations

**5.SE.1a1 Given a real-world problem, write an expression using 1 set of parentheses
Operations and Algebraic Thinking**

5 OA Write and interpret numerical expressions.

5.OA.A.1 Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols.

Middle School Progress Indicators

Progress Indicator: M.SE.1a using symbols ($=$, $>$, $<$) to compare whole numbers, fractions, or decimals; write equations; and express inverse or related operations

6.SE.1a2 Given a real-world problem, write an equation using 1 set of parentheses Expressions and Equations

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

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

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 $s = 1/2$.

6.SE.1a3 Write expressions for real-world problems involving one unknown number

No CCSS linked

6.SE.1a4 Given a real-world problem, write an inequality.

Expressions and Equations

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

6.EE.B.8 Write an inequality of the form $x > c$ or $x < c$ to represent a constraint or condition in a real-world or mathematical problem. Recognize that inequalities of the form $x > c$ or $x < c$ have infinitely many solutions; represent solutions of such inequalities on number line diagrams.

Progress Indicator: M.SE.1b writing, interpreting, and using expressions, equations, and inequalities (including using brackets, parentheses, or braces)

6.SE.1b1 Evaluate whether both sides of an equation are equal

Expressions and Equations

6 EE Apply and extend previous understandings of arithmetic to algebraic 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). For example, the expressions $y + y + y$ and $3y$ are equivalent because they name the same number regardless of which number y stands for.

6.SE.1b2 Use properties to produce equivalent expressions

Expressions and Equations

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

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 $3y$.

Progress Indicator: M.SE.1f writing and interpreting mathematical expressions, equations, and inequalities that correspond to given situations

7.SE.1f1 Set up equations with 1 variable based on real world problems

Expressions and Equations

7 EE Solve real-life and mathematical problems using numerical and algebraic expressions and equations.

7.EE.B.4 Use variables to represent quantities in a real-world or mathematical problem and construct simple equations and inequalities to solve problems by reasoning about the quantities.

7.SE.1f2 Solve equations with 1 variable based on real world problems

Expressions and Equations

7 EE Solve real-life and mathematical problems using numerical and algebraic expressions and equations.

7.EE.B.4 Use variables to represent quantities in a real-world or mathematical problem and construct simple equations and inequalities to solve problems by reasoning about the quantities.

7.SE.1f3 Add and subtract linear expressions.

Expressions and Equations

7 EE 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.SE.1f4 Factor and expand linear expressions.

Expressions and Equations

7 EE 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.

Progress Indicator: M.SE.1f writing and interpreting mathematical expressions, equations, and inequalities that correspond to given situations

8.SE.1f5 Use properties of integer exponents to produce equivalent expressions

Expressions and Equations

8 EE Work with radicals and integer exponents

8.EE.A.1 Know and apply the properties of integer exponents to generate equivalent numerical expressions.