

Grade 6 Expressions & Equations Sample Unit Plan

This instructional unit guide was designed by a team of Delaware educators in order to provide a sample unit guide for teachers to use. This unit guide references some textbook resources used by schools represented on the team. This guide should serve as a complement to district curriculum resources.

Unit Overview

In this unit, students develop an understanding for the use of variables in mathematical expressions. They write expressions, one-step equations and inequalities that correspond to given real-world situations, evaluate expressions, and use expressions and formulas to solve problems. By understanding that expressions in different forms can be equivalent, students use the properties of operations to rewrite expressions in equivalent forms. Students know that the solutions of an equation are the values substituted for variables that make the equation true. Students use properties of operations and the concept of maintaining equality on both sides of an equation to solve. Students make connections between two variables by constructing and analyzing models, such as ratio tables or graphs, and relate these to equations. Students will also use equations (such as $3x = y$) to describe relationships between quantities.



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The Design Process

The writing team followed the principles of Understanding by Design (Wiggins & McTighe, 2005) to guide the unit development. As the team unpacked the content standards for the unit, they considered the following:

Stage 1: Desired Results

- What long-term transfer goals are targeted?
- What meanings should students make? What essential questions will students explore?
- What knowledge and skill will students acquire?

Stage 2: Assessment Evidence

- What evidence must be collected and assessed, given the desired results defined in stage one?
- What is evidence of understanding (as opposed to recall)?

Stage 3: The Learning Plan

- What activities, experiences, and lessons will lead to achievement of the desired results and success at the assessments?
- How will the learning plan help students of Acquisition, Meaning Making, and Transfer?
- How will the unit be sequenced and differentiated to optimize achievement for all learners?

The writing team also incorporated components of the Learning-Focused (LFS) model, including the learning map, and a modified version of the K-U-D.

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Content and Practice Standards

Transfer Goals (Standards for Mathematical Practice)

The Standards for Mathematical Practice describe varieties of expertise that mathematics educators at all levels should seek to develop in their students.

1. Make sense of problems and persevere in solving them
2. Reason abstractly and quantitatively
3. Construct viable arguments and critique the reasoning of others
4. Model with mathematics
5. Use appropriate tools strategically
6. Attend to precision
7. Look for and make use of structure
8. Look for and express regularity in repeated reasoning

Content 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.

1. Write expressions that record operations with numbers and with letters standing for numbers.
2. Identify parts of an expression, using mathematical terms (sum, term, product, factor, quotient, coefficient); view one or more parts of an expression as a product of two factors; as both a single entity and a sum of two terms.
3. 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).

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).

6.EE.B Reason about and solve one-variable equations and inequalities.

6.EE.B.5 Understand solving an equation or inequality as a process of answering a question: which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true.

6.EE.B.6 Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set.

6.EE.B.7 Solve real-world and mathematical problems by writing and solving equations of the form $ax + b = c$ and for cases in which p , q and x are all nonnegative rational numbers.

6.EE.B.8 Write an inequality of the form $ax + b > c$ or $ax + b < c$ to represent a constraint or condition in a real-world or mathematical problem. Recognize that inequalities of the form $x > c$ or $x < c$



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have infinitely many solutions; represent solutions of such inequalities on number line diagrams.

6.EE.C Represent and analyze quantitative relationships between dependent and independent variables.

6.EE.C.9 Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation.



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Enduring Understandings & Essential Questions

Enduring Understanding	Essential Question(s)
Understanding 1. Variables can be used to write and evaluate expressions with whole number exponents. (6.EE.A.1, 6.EE.A.2)	<p>EQ1. How can you apply and extend previous understandings of arithmetic to reading, writing, and evaluating algebraic expressions?</p> <p>LEQ1. How can you write and evaluate numerical expressions involving whole number exponents?</p> <p>LEQ2: Why are operations important in evaluating expressions?</p> <p>LEQ3: How can you interpret and translate expressions given algebraic or written forms, including real world contexts?</p>
Understanding 2. Properties can be used to generate equivalent expressions and identify equivalence. (6.EE.A.3, 6.EE.A.4)	<p>EQ2a. How can you apply properties of operations to generate equivalent expressions?</p> <p>EQ2b: How can expressions be represented in different ways to compare and find equivalence?</p> <p>LEQ4: How can you identify and justify the properties of operations to generate equivalent expressions using multiple representations?</p> <p>LEQ5: Why is equivalency important when solving problems?</p>
Understanding 3. Variables can be used to represent, write, and solve equations and inequalities for real world problems. (6.EE.B.5, 6.EE.B.6, 6.EE.B.7, 6.EE.B.8)	<p>EQ3. How can variables be used to represent and solve equations and inequalities in real world problems?</p> <p>LEQ6: How can an equation be used to represent and solve a real world/mathematical situation?</p> <p>LEQ7: How can you use substitution to solve equations?</p> <p>LEQ8: How can you use inverse operations in solving one-variable equations?</p> <p>LEQ9: How can an inequality be used to represent and solve a real world/mathematical situation?</p>
Understanding 4. Quantities can be represented in real world problems by	EQ4. How can variables represent quantities in real world relationships?



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variables that change in relationship to each other. (6.EE.C.9)	<p>LEQ10: How can you distinguish between an independent variable and a dependent variable?</p> <p>LEQ11: How does the change in one variable affect the change in the other?</p> <p>LEQ12: How can you relate tables and graphs to equations?</p>
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***Enduring understandings and essential questions adapted from NCTM Enduring Understandings**

Source: Lloyd, G., Eisenmann, B. & Star, J. (2011). *Developing essential understanding of expressions, equations, and functions for teaching mathematics in grades 6-8*. Reston, VA: National Council of Teachers of Mathematics, Inc.



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Acquisition

Conceptual Understandings (Know/Understand)	Procedural Fluency (Do)	Application (Apply)
<p>Use numbers and variables to represent mathematical and/or real world situations.</p> <p>Explain how to use inverse operations when solving one-variable equations.</p> <p>Understand that variables can represent an unknown number, or, depending on the purpose, any number in a specified set.</p> <p>Identify the constraint or condition in a real-world or mathematical problem.</p> <p>Understand that inequalities of the form $x > c$ or $x < c$ have infinitely many solutions.</p> <p>Understand the relationship between the independent and dependent variables.</p>	<p>Write numerical expressions involving whole number exponents.</p> <p>Solve order of operation problems that contain exponents.</p> <p>Translate between written phrases and algebraic expressions.</p> <p>Evaluate expressions at specific values for variables.</p> <p>Evaluate algebraic expressions including those that arise from real-world problems.</p> <p>Generate equivalent expressions using the properties of operations.</p> <p>Recognize when two expressions are equivalent.</p> <p>Identify parts of using mathematical terms (sum, term, product, factor, quotient, coefficient).</p> <p>Develop a rule for solving one-step equations using inverse operations with non-negative rational coefficients.</p> <p>Solve and write equations for real-world mathematical problems containing one</p>	<p>Apply order of operations when there are no parentheses for expressions that include whole number exponents.</p> <p>Apply the properties of operations to generate equivalent expressions.</p> <p>Verify that two equations are equivalent no matter what number is substituted.</p> <p>Apply rules of the form $x + p = q$ and $px = q$, for cases in which p, q, and x are all non-negative rational numbers, to solve real world and mathematical problems; with only one unknown quantity.</p> <p>Relate the data in a graph and table to the corresponding equation.</p> <p>Analyze the relationship between the dependent variable and independent variable using tables and graphs.</p>



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	<p>unknown.</p> <p>Represent solutions to inequalities or the form $x > c$ or $x < c$, with infinitely many solutions, on number line diagrams.</p> <p>Write an inequality of the form $x > c$ or $x < c$ to represent a constraint or condition in a real-world or mathematical problem.</p> <p>Identify the independent and dependent variables.</p> <p>Write an equation to express one quantity (dependent) in terms of the other quantity (independent).</p>	
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Reach Back/Reach Ahead Standards

How does this unit relate to the progression of learning? What prior learning do the standards in this build upon? How does this unit connect to essential understandings of later content in this course and in future courses? The table below outlines key standards from previous and future courses that connect with this instructional unit of study.

Reach Back Standards	Reach Ahead Standards
<p>4.NBT.A.2 Read and write multi-digit whole numbers using base-ten numerals, number names, and expanded form. Compare two multi-digit numbers based on meanings of the digits in each place, using $>$, $=$, and $<$ symbols to record the results of comparisons.</p> <p>5.OA.A.1 Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols.</p> <p>5.OA.A.2 Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them.</p> <p>Students in Grades 2-5 have been using properties of operations to write expressions in different ways.</p> <p>5.G.A.2 Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation.</p>	<p>7.EE.A.1 Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.</p> <p>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.</p> <p>7.EE.B.3 Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form using tools strategically.</p> <p>7.EE.B.4 Use variables to represent quantities in real world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.</p> <p>8.EE.A.1 Know and apply the properties of integer exponents to generate equivalent numerical expressions.</p> <p>8.EE.C.7 Solve linear equations in one variable.</p> <p>8.EE.C.8 Analyze and solve pairs of simultaneous linear equations.</p> <p>8.F.A.2 Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).</p>



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Common Misconceptions

- Students may confuse the independent and dependent variable in an equation, graph, or table.
- Students may misuse the commutative property by applying it to subtraction and/or division.
- Students may misunderstand that a fraction problem may also be viewed as a division problem.
- Students may lack a conceptual understanding of the order of operations and not understand why the order of operations works mathematically.
- Students may misunderstand that a single number can be an expression.
- Students may use an inverse operation only on one side of an equation.
- Students may distribute only to the first term inside the parentheses, instead of distributing to all terms inside the parentheses.
- Students may assume if there is no coefficient in front of the variable, then the variable does not have a value.
- Students may forget to include the operation when substituting a number for the variable when working with a coefficient and variable.
- Students may move the variable to the left side of the inequality without understanding the meaning of the quantities in the inequality.
- Students may not be able to state the name of the $<$ or $>$ sign unless it is an equation (such as $45 > 22$).
- Students may confuse the meaning of equation and expression.



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Grade 6 Smarter Balanced Blueprints



Mathematics Summative Assessment Blueprint
As of 02/09/15

Target Sampling Mathematics Grade 6						
Claim	Content Category	Assessment Targets	DOK	Items		Total Items
				CAT	PT	
1. Concepts and Procedures	Priority Cluster	E. Apply and extend previous understandings of arithmetic to algebraic expressions.	1	5-6	0	16-19
		F. Reason about and solve one-variable equations and inequalities.	1, 2			
		A. Understand ratio concepts and use ratio reasoning to solve problems.	1, 2	3-4		
		G. Represent and analyze quantitative relationships between dependent and independent variables.	2	2		
		B. Apply and extend previous understandings of multiplication and division to divide fractions by fractions.	1, 2			
		D. Apply and extend previous understandings of numbers to the system of rational numbers.	1, 2	2		
	Supporting Cluster	C. Compute fluently with multi-digit numbers and find common factors and multiples.	1, 2	4-5		
		H. Solve real-world and mathematical problems involving area, surface area, and volume.	1, 2			
		I. Develop understanding of statistical variability.	2			
		J. Summarize and describe distributions.	1, 2			

Target Sampling Mathematics Grade 6						
Claim	Content Category	Assessment Targets	DOK	Items		Total Items
				CAT	PT	
2. Problem Solving 4. Modeling and Data Analysis	Problem Solving (drawn across content domains)	A. Apply mathematics to solve well-posed problems arising in everyday life, society, and the workplace.	2, 3	2	1–2	8-10
		B. Select and use appropriate tools strategically.	1, 2, 3	1		
		C. Interpret results in the context of a situation.				
		D. Identify important quantities in a practical situation and map their relationships (e.g., using diagrams, two-way tables, graphs, flow charts, or formulas).				
	Modeling and Data Analysis (drawn across content domains)	A. Apply mathematics to solve problems arising in everyday life, society, and the workplace.	2, 3	1	1–3	
		D. Interpret results in the context of a situation.	2, 3, 4	1		
		B. Construct, autonomously, chains of reasoning to justify mathematical models used, interpretations made, and solutions proposed for a complex problem.				
		E. Analyze the adequacy of and make improvements to an existing model or develop a mathematical model of a real phenomenon.				
C. State logical assumptions being used.		1, 2, 3				1
F. Identify important quantities in a practical situation and map their relationships (e.g., using diagrams, two-way tables, graphs, flow charts, or formulas).	3, 4	0				
3. Communicating Reasoning	Communicating Reasoning (drawn across content domains)	A. Test propositions or conjectures with specific examples.	2, 3	3	0-2	8-10
		D. Use the technique of breaking an argument into cases.	2, 3, 4	3		
		B. Construct, autonomously, chains of reasoning that will justify or refute propositions or conjectures.				
		E. Distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in the argument—explain what it is.				
		C. State logical assumptions being used.	2, 3	2		
		F. Base arguments on concrete referents such as objects, drawings, diagrams, and actions.				
		G. At later grades, determine conditions under which an argument does and does not apply. (For example, area increases with perimeter for squares, but not for all plane figures.)				

Available at <https://portal.smarterbalanced.org/library/en/mathematics-summative-assessment-blueprint.pdf>



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Assessment Evidence

Target E

- The student evaluates numerical expressions involving whole-number exponents.
- The student writes numerical expressions involving whole-number exponents, algebraic expressions, and expressions from formulas in real-world problems.
- The student uses mathematical terms to describe expressions.
- The student evaluates algebraic expressions and expressions from formulas in real-world problems.
- The student creates equivalent expressions by applying properties of operations.
- The student identifies when expressions are equivalent by utilizing properties of operations.

Target F

- The student uses substitution in one-variable equations and inequalities.
- The student writes one-variable equations and inequalities and solves one-variable equations in real-world and mathematical problems.
- The student represents solutions of inequalities in real-world and mathematical problems on a number line.

Target G

- The student writes an equation to express one quantity versus another quantity using dependent and independent variables.
- The student identifies the relationship between dependent and independent variables from graphs and tables and relates them to equations.

What is evidence of understanding (as opposed to recall)?

Target E

- The student applies understanding of the properties of operations to create two expressions and justify why they are equivalent using mathematical terms.
- The student writes and evaluates algebraic expressions and expressions from formulas in real-world problems.

Target F

- The student explains inequalities as a set of an infinite number of solutions (some connecting the content of this target to 6.NS Target C).
- The student reasons about and solve equations and inequalities by writing and graphing their solutions on a number line.

Target G

- The student can explain and apply mathematical concepts and carry out mathematical procedures with precision and fluency.



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What important transfer tasks should anchor the assessment since transfer is the essence of understanding?

Target E

- Tasks for this target will ask students to write and evaluate expressions (numerical expressions with whole-number exponents; algebraic expressions; and expressions arising from formulas in real-world problems). Other tasks will ask students to identify or generate equivalent expressions using understanding of properties or operations.
 - Distance to School <https://www.illustrativemathematics.org/content-standards/6/EE/A/2/tasks/540>
 - Rectangle Perimeter 1 <https://www.illustrativemathematics.org/content-standards/6/EE/A/2/tasks/421>

Target F

- Tasks for this target will ask students to reason about and solve one variable equations and inequalities, students should be able to perform error analysis, specifically noting non-examples.
- Tasks for this target have students substitute a value for a variable can be true for multiple equations and/or inequalities.

Target G

- Tasks for this target will ask students to select or write an equation that expresses one quantity in terms of another. Some tasks will target the relationship between the variables in an equation and their representation in a table or graph.

What criteria should be used to assess work related to the Desired Results, not just the particulars of the task?

Target E

- Students can apply the understanding of the properties of operations to create two expressions and justify why they are equivalent using mathematical terms.
- Students can write and evaluate algebraic expressions and expressions from formulas in real-world problems.

Target F

- Students can identify and properly use key vocabulary in creating equations from real world scenarios
- Students can determine possible outcomes and non-examples using substitution of values for variables.

Target G

- Students can write an equation to express one quantity versus another quantity using dependent and independent variables.
- Students can identify relationships between dependent and independent variables from graphs and tables and relate them to equations.



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EQ#1 - How can you use variables and numbers to write and evaluate expressions?

- Apply the understanding of the properties of operations to create two expressions and justify why they are equivalent using mathematical terms.
- Write and evaluate algebraic expressions and expressions from formulas in real-world problems.

EQ#2 - How can you use properties to generate equivalent expressions?**EQ#3 - How can variables be used to represent equations and inequalities in real world problems?****EQ#4 - How can variables represent quantities in real world relationships?****Smarter Samples:**

[2014 SBAC Math Scoring Guide](#): Question 22, 10, 5, 7, 15, 25, 16

6.EE.A.2.A & 6.EE.A.2.C

Rectangle Perimeter 1 <https://www.illustrativemathematics.org/content-standards/6/EE/A/2/tasks/421>

Distance to School <https://www.illustrativemathematics.org/content-standards/6/EE/A/2/tasks/540>

PARCC 2016 Sample Released Item #13

https://parcc.pearson.com/resources/Practice-Tests/TBAD/Gr6Math/PC1105801_Gr6MTB_PT.pdf

6.NS.B.4 & 6.EE.A.2.B

Rectangle Perimeter 1 <https://www.illustrativemathematics.org/content-standards/6/EE/A/2/tasks/421>

6.EE.A.3 & 6.EE.A.4

Anna in D.C.

<https://www.illustrativemathematics.org/content-standards/6/EE/A/3/tasks/997>

Rectangle Perimeter 2 <https://www.illustrativemathematics.org/content-standards/6/EE/A/4/tasks/461>

Equivalent Expressions

<https://www.illustrativemathematics.org/content-standards/6/EE/A/4/tasks/542>

6.EE.A.5 & 6.EE.A.6

Log Ride

<https://www.illustrativemathematics.org/content-standards/6/EE/B/5/tasks/673>

6.EE.B.7

Firefighter Allocation <https://www.illustrativemathematics.org/content-standards/6/EE/B/7/tasks/425>



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Anna in D.C.

<https://www.illustrativemathematics.org/content-standards/6/EE/B/7/tasks/997>

Fruit Salad

<https://www.illustrativemathematics.org/content-standards/6/EE/B/7/tasks/1032>

Morning Walk

<https://www.illustrativemathematics.org/content-standards/6/EE/B/7/tasks/1107>

6.EE.B.8

Fishing Adventures 1

<https://www.illustrativemathematics.org/content-standards/6/EE/B/8/tasks/642>

Height Requirements

<https://www.illustrativemathematics.org/content-standards/6/EE/B/8/tasks/2010>

6.EE.C.9

Chocolate Bar Sales

<https://www.illustrativemathematics.org/content-standards/6/EE/C/9/tasks/806>



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The Learning Plan: LFS Student Learning Maps

Key Learning:

Understanding 1. Variables can be used to write and evaluate expressions with whole number exponents. (6.EE.A.1, 6.EE.A.2)

Unit Essential Question:

EQ1. How can you use variables and numbers to write and evaluate expressions?



Concept: Evaluating Expressions	Concept: Representing Expressions
LEQ: LEQ1. How can you write and evaluate numerical expressions involving how number exponents? LEQ2. Why are operations important in evaluating expressions?	LEQ: LEQ3. How can you interpret and translate expressions given algebraic or written forms, including real world contexts?
Vocabulary: <ul style="list-style-type: none"> • Exponents • Base • Power • Numerical expression • Factor • Evaluate • Order of operations • Value • Like terms • Substitution • Solution • Quantity 	Vocabulary: <ul style="list-style-type: none"> • sum • term • difference • algebraic expression • numerical expression • coefficient • constant



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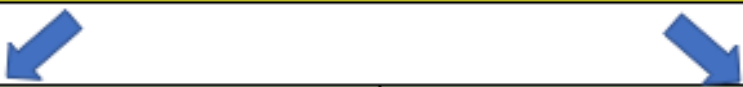
Key Learning:

Understanding 2. Properties can be used to generate equivalent expressions and identify equivalence. (6.EE.A.3, 6.EE.A.4)

Unit Essential Questions:

EQ2a. How can you apply properties of operations to generate equivalent expressions?

EQ2b. How can expressions be represented in different ways to compare and find equivalence?



Concept: Properties of Operations	Concept: Generating Equivalent Expressions
LEQ: LEQ4: How can you identify and justify the properties of operations to generate equivalent expressions using multiple representations?	LEQ: LEQ5: Why is equivalency important when solving problems?
Vocabulary: <ul style="list-style-type: none">• Equivalent• Like terms• Coefficient• Associative property• Commutative property• Distributive Property	Vocabulary: <ul style="list-style-type: none">• Equivalent• Equation



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Key Learning:

Understanding 3. Variables can be used to represent and write equations and inequalities for real-world problems. (6.EE.B.5, 6.EE.B.6, 6.EE.B.7, 6.EE.B.8)

Unit Essential Questions:

EQ3. How can variables be used to represent equations and inequalities in real-world problems?



Concept: Representing Real-World Situations with Equations and Inequalities	Concept: Writing and Solving Equations	Concept: Writing and Solving Inequalities
LEQ: LEQ6. How can an equation be used to represent and solve a real-world/mathematical situation? LEQ9: How can an inequality be used to represent and solve a real-world/mathematical situation?	LEQ: LEQ6. How can an equation be used to represent and solve a real-world/mathematical situation? LEQ7. How can you use substitution to solve equations? LEQ8: How can you use inverse operations to solve one-variable equations?	LEQ: LEQ9: How can an inequality be used to represent and solve a real-world/mathematical situation?
Vocabulary: <ul style="list-style-type: none">EquationInequalityVariable/unknown	Vocabulary: <ul style="list-style-type: none">EquationVariable/unknownSubstitutionInverse operationSolution	Vocabulary: <ul style="list-style-type: none">InequalityVariable/unknownInverse operationSolution set



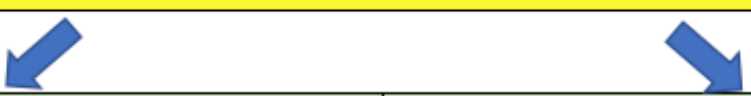
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Key Learning:

Understanding 4. Quantities can be represented in real world problems by variables that change in relationship to each other. (6.EE.C.9)

Unit Essential Question:

EQ4. How can variables represent quantities in real-world relationships?



Concept: Representing Equations Graphically	Concept: Representing Relationships in Different Ways
LEQ: LEQ10: How can you distinguish between an independent variable and a dependent variable? LEQ11: How does the change in one variable affect the change in the other?	LEQ: LEQ12: How can you relate tables and graphs to equations?
Vocabulary: <ul style="list-style-type: none">• Independent Variable• Dependent Variable• x-axis• y-axis	Vocabulary: <ul style="list-style-type: none">• Table of values• Graph• Equation



Expressions and Equations Unit at a Glance

Part I: Expressions

Understanding 1. Variables can be used to write and evaluate expressions with whole number exponents.

EQ1: How can you apply and extend previous understandings of arithmetic to reading, writing, and evaluating algebraic expressions?

Days	Topic	Standard(s)
2	<u>Writing and Simplifying Numerical Expressions with Exponents</u>	6.EE.A.1 6.EE.A.2a 6.EE.A.2b
2	<u>Simplifying Numerical Expressions</u>	6.EE.A.1 6.EE.A.2a 6.EE.A.2b
4	<u>Writing and Evaluating Algebraic Expressions</u>	6.EE.A.2c
1	<u>Assessment - Exponents and Expressions</u>	6.EE.A.1 6.EE.A.2a 6.EE.A.2b 6.EE.A.2c

<p>Part I: Days 1-2 I can evaluate numerical expressions involving whole-number exponents. I can interpret and translate expressions in algebraic forms.</p> <p><u>Standards:</u> 6.EE.A.1</p>	<p>Part I: Days 3-4 I can use order of operations to evaluate expressions.</p> <p><u>Standards:</u> 6.EE.A.1</p>	<p>Part I: Days 5-8 I can translate and evaluate expressions in which letters stand for numbers. I can translate and evaluate expressions given algebraic or written forms, including real world context. I can evaluate expressions that arise from formulas used in real world problems.</p>	<p>Part I: Day 9 I can apply and extend previous understandings of arithmetic to reading, writing and evaluating algebraic expressions.</p> <p><u>Standards:</u> 6.EE.A.1</p>
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6.EE.A.2.A 6.EE.A.2.B	6.EE.A.2.A 6.EE.A.2.B	Standards: 6.EE.A.2.C	6.EE.A.2.A 6.EE.A.2.B 6.EE.A.2.C
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Part II: Equations and Inequalities

Understanding 2. Properties can be used to generate equivalent expressions and identify equivalence.

Understanding 3. Variables can be used to represent and write equations and inequalities for real world problems.

Understanding 4. Quantities can be represented in real world problems by variables that change in relationship to each other.

EQ2a: How can you apply properties of operations to generate equivalent expressions?

EQ2b: How can expressions be represented in different ways to compare and find equivalence?

EQ3: How can variables be used to represent and solve equations and inequalities in real-world problems?

EQ4: How can variables represent quantities in real-world relationships?

Days	Topic	Standard(s)
2	<u>Generate Equivalent Expressions using Mathematical Properties</u>	6.EE.A.3
2	<u>Identify and Justify Equivalent Expressions</u>	6.EE.A.4
2	<u>Writing and Evaluating Equations</u>	6.EE.B.5 6.EE.B.6
5	<u>Writing and Solving Equations</u>	6.EE.B.7
5	<u>Representing and Analyzing Relationships Between Two Variables</u>	6.EE.C.9
3	<u>Writing and Solving One-Step Inequalities</u>	6.EE.B.8
1	<u>Assessment</u>	6.EE.A.3 6.EE.A.4 6.EE.B.5 6.EE.B.6 6.EE.B.7 6.EE.B.8 6.EE.C.9



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<p>Part II: Days 10-11 I can apply the properties of operations to generate equivalent expressions.</p> <p><u>Standards:</u> 6.EE.A.3</p>	<p>Part II: Days 12-13 I can identify and justify the properties of operations to generate equivalent expressions using multiple representations.</p> <p><u>Standards:</u> 6.EE.A.4</p>	<p>Part II: Day 14-15 I can write an equation to represent a real-world or mathematical situation. I can evaluate whether a value is a solution to a given equation</p> <p><u>Standards:</u> 6.EE.B.5 6.EE.B.6</p>	<p>Part II: Days 16-20 I can write and solve single-step equation where variables are used to represent numbers in real-world or mathematical problems. I can use inverse operations in solving one-variable equations.</p> <p><u>Standards:</u> 6.EE.B.7</p>
<p>Part II: Days 21-25 I can analyze the relationship between the dependent and independent variables using tables and graphs. I can use variables to represent quantities in a real-world problem that change in relation to each other. I can analyze the relationship between variables using graphs and tables and can relate these to the equation.</p> <p><u>Standards:</u> 6.EE.C.9</p>	<p>Part II: Days 26-29 I can write and solve inequality of the form $x > c$ or $x < c$ to represent a constraint or condition in a problem. I can recognize that an inequality of the form $x > c$ or $x < c$ can have infinitely many solutions. I can represents solutions of inequalities on number lines.</p> <p><u>Standards:</u> 6.EE.B.8</p>	<p>Part II: Day 30 I can apply my understanding of equations and inequalities to solve real-world and mathematical problems.</p> <p><u>Standards:</u> 6.EE.A.3 6.EE.A.4 6.EE.B.5 6.EE.B.6 6.EE.B.7 6.EE.B.8 6.EE.C.9</p>	



Part I: Expressions

Days 1-2: Writing and Simplifying Numerical Expressions with Exponents

Learning Targets:

I can evaluate numerical expressions involving whole-number exponents.

I can interpret and translate expressions in algebraic forms.

Linked Content Standard:

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.

Instructional Notes:

- Introduce real-world problems that require writing and simplifying numerical expressions with exponents.
- Introduce the concept of order of operations.

Linked Essential Understanding(s):	Linked Unit EQ(s):
Understanding 1: Variables can be used to write and evaluate expressions with whole number exponents.	EQ1: How can you apply and extend previous understandings of arithmetic to reading, writing, and evaluating algebraic expressions?

Reach Back Standards	Reach Ahead Standards
5.OA.1 Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols. 5.OA.2 Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them.	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. 8.EE.A.1 Know and apply the properties of integer exponents to generate equivalent numerical expressions.

LEQ1: How can you write and evaluate numerical expressions involving whole number exponents?



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Text Alignment:

Text	Big Ideas Mathematics (2014)	Eureka Math (2015)	LearnZillion (2013)	Connected Mathematics (CMP2, 2006)	Connected Mathematics (CMP3, 2014)
Section(s)	1.2 3.1 (Activity 1-2, Examples 1-2)	Module 4, Lesson 22	5.1 5.2	Prime Time - Investigations 3,4	Variables and Patterns Investigation 3 Prime Time Investigation 3 and 4
Strength of Alignment	Aligned	Aligned	Somewhat Aligned	Aligned	Weak Alignment

Sample Lesson Activities/Resources:

This lesson helps to build fluency with evaluating and simplifying expressions containing exponents. This work develops students' understanding that the expression represents a "recipe" which can also be evaluated using Order of Operations to produce a known value.

https://delawaredreamteam.learnzillion.com/lesson_plans/3504-3-write-and-evaluate-algebraic-expressions-containing-exponents-fp

In this lesson, students extend prior knowledge of ratios from 6.RPA.3 to expressions as they use the ratio to write a multiplicative expression. Students work with a table, which helps them realize the relationship between a variable and an expression is the same relationship within the table of numerical values.

https://delawaredreamteam.learnzillion.com/lesson_plans/3324-1-understand-that-mathematical-relationships-can-be-represented-as-expressions-c



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Days 3-4: Simplifying Numerical Expressions

Learning Target: I can use order of operations to evaluate expressions.

Linked Content Standards:

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

6.EE.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.

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 product of two factors; as both a single entity and a sum of two terms.

Instructional Notes:

- Include real-world problems that require writing and/or evaluating numerical expressions and expressions with variables.

Linked Essential Understanding(s):	Linked Unit EQ(s):
Understanding 1: Variables can be used to write and evaluate expressions with whole number exponents.	EQ1: How can you apply and extend previous understandings of arithmetic to reading, writing, and evaluating algebraic expressions?

Reach Back Standards	Reach Ahead Standards
5.OA.1 Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols. 5.OA.2 Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them.	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. 7.EE.B.3 Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form using tools strategically. 8.EE.A.1 Know and apply the properties of integer exponents to generate equivalent numerical expressions.



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LEQ2: Why are operations important in evaluating expressions?

Text Alignment:

Text	Big Ideas Mathematics (2014)	Eureka Math (2015)	LearnZillion (2013)	Connected Mathematics (CMP2, 2006)	Connected Mathematics (CMP3, 2014)
Section(s)	1.3 3.1 (Examples 3-4)	Module 4, Lessons 5, 6, 7, and 8	5.3 5.4	Variables and Patterns - Investigations 3 and 4	Variables and Patterns Investigation 3 and 4
Strength of Alignment	Aligned	Aligned	Aligned	Aligned	Weak Alignment

Sample Lesson Activities/Resources:

This lesson helps to build fluency with writing algebraic expressions. This work develops students' understanding that mathematical relationships can be represented with expressions, and we can use those expressions as we use numbers.

https://delawaredreamteam.learnzillion.com/lesson_plans/3328-3-use-substitution-to-find-the-value-of-variables-in-an-expression-fp

This lesson provides an opportunity for students to apply their knowledge and understanding of writing expressions to a real-life situation. Students are asked to convert a bulk recipe to a manageable amount to make lemonade.

https://delawaredreamteam.learnzillion.com/lesson_plans/3331-4-mathematical-relationships-can-be-represented-as-expressions-a



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Days 5-8: Writing and Evaluating Algebraic Expressions

Learning Targets:

I can translate and evaluate expressions in which letters stand for numbers.

I can translate and evaluate expressions given algebraic or written forms, including real world context.

I can evaluate expressions that arise from formulas used in real world problems.

Linked Content Standards:

6.EE.A 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.

6.EE.2.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 product of two factors; as both a single entity and a sum of two terms.

6.EE.2.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).

Instructional Notes:

- Include real-world problems that require writing and/or evaluating algebraic expressions.

Linked Essential Understanding(s):	Linked Unit EQ(s):
Understanding 1: Variables can be used to write and evaluate expressions with whole number exponents.	EQ1. How can you apply and extend previous understandings of arithmetic to reading, writing, and evaluating algebraic expressions?

Reach Back Standards	Reach Ahead Standards
5.OA.1 Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols. 5.OA.2 Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them.	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. 7.EE.B.3 Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form



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	<p>using tools strategically.</p> <p>7.EE.B.4 Use variables to represent quantities in real world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.</p>
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LEQ2: Why are operations important in evaluating expressions?

LEQ3: How can we interpret and translate expressions given algebraic or written forms, including real world context?

Text Alignment:

Text	Big Ideas Mathematics (2014)	Eureka Math (2015)	LearnZillion (2013)	Connected Mathematics (CMP2, 2006)	Connected Mathematics (CMP3, 2014)
Section(s)	1.3 4.1 (Examples 1-3) 4.2 (Examples 1-3) 4.3 (Examples 1-3, ext)	Module 4, Lesson 15, 18, 19, 20, 21	8.1 8.2 8.3 8.4 10.5	Prime Time - All Investigations (Remediation) Variables and Patterns Investigation 2 & 3	Variables and Patterns Investigation 3 and 4
Strength of Alignment	Aligned	Aligned	Aligned	Aligned	Weak Alignment

Sample Lesson Activities/Resources:

This lesson helps to build fluency with writing expressions. This work develops students' understanding that mathematical relationships can be represented with expressions, and we can use those expressions as we use numbers.

https://delawaredreamteam.learnzillion.com/lesson_plans/3327-2-represent-mathematical-relationships-as-expressions-fp

Students extend prior knowledge of properties of operations on numerical expressions from 5.OA to algebraic expressions as students write algebraic expressions which describe the perimeter of picture frames.

https://delawaredreamteam.learnzillion.com/lesson_plans/1975-1-understand-that-algebraic-expressions-represent-both-instructions-and-a-quantity-c



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This lesson helps to build fluency with writing, evaluating, and naming the parts of algebraic expressions. This work develops students' understanding that algebraic expressions can represent both a “recipe” and a quantity (that we may or may not be able to name with a number).

https://delawaredreamteam.learnzillion.com/lesson_plans/3503-2-write-algebraic-expressions-and-identify-their-parts-using-mathematical-terminology-fp

Smarter Digital Library: [Toothpick Problems From The Smarter Digital Library](#) (Log in with your Smarter Digital Library Account before selecting this link.)

Mini Assessment Items #7-10 from Achieve the Core

<http://achievethecore.org/page/910/extending-previous-understandings-of-properties-mini-assessment>

Rectangle Perimeter 1

<https://www.illustrativemathematics.org/content-standards/6/EE/A/2/tasks/421>

Modeling Equivalent Expressions Lesson from Achieve the Core

<http://achievethecore.org/page/2851/modeling-equivalent-expressions>

Distance to School

<https://www.illustrativemathematics.org/content-standards/6/EE/A/2/tasks/540>

PARCC 2016 Sample Released Item #13

https://parcc.pearson.com/resources/Practice-Tests/TBAD/Gr6Math/PC1105801_Gr6MTB_PT.pdf



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Day 9: Assessment - Exponents and Expressions

Learning Target: I can apply and extend previous understandings of arithmetic to reading, writing and evaluating algebraic expressions.

Linked Content 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.

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 product of two factors; 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).

Instructional Notes:

- Ensure that the assessment includes a balance of questions that assess conceptual understanding, procedural fluency, and application.

Linked Essential Understanding(s):	Linked Unit EQ(s):
Understanding 1: Variables can be used to write and evaluate expressions with whole number exponents.	EQ1. How can you apply and extend previous understandings of arithmetic to reading, writing, and evaluating algebraic expressions?

Reach Back Standards	Reach Ahead Standards
5.OA.1 Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols. 5.OA.2 Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them.	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. 7.EE.B.3 Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form



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	<p>using tools strategically.</p> <p>7.EE.B.4 Use variables to represent quantities in real world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities</p> <p>8.EE.A.1 Know and apply the properties of integer exponents to generate equivalent numerical expressions.</p>
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LEQ1: How can you write and evaluate numerical expressions involving whole number exponents?

LEQ2: Why are operations important in evaluating expressions?

LEQ3: How can you interpret and translate expressions given algebraic or written forms, including real-world contexts?

Text Alignment:

Text	Big Ideas Mathematics (2014)	Eureka Math (2015)	LearnZillion (2013)	Connected Mathematics (CMP2, 2006)	Connected Mathematics (CMP3, 2014)
Assessment					
Strength of Alignment	Somewhat Aligned	Aligned	Aligned	Somewhat Aligned	Weak Alignment

Sample Lesson Activities/Resources:

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

$$8(y^2 + 28)$$

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.



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E. B and C

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). ____45

Enter the value of $2 \bullet y - 8 \div 4$ when $y = 7$. ____ 12

Enter the value of $3^3 \bullet y^2 - 8 \div 4$ when $y = 7$. ____1321

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?

\$334.65



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Part II: Equations and Inequalities

Days 10-11: Generating Equivalent Expressions using Mathematical Properties

Learning Target: I can apply the properties of operations to generate equivalent expressions.

Linked Content Standard:

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

6.EE.A.3 Apply the properties of operations to generate equivalent expressions.

Instructional Notes:

- Emphasize using different strategies for generating equivalent expressions.
- Have students verify that expressions are equivalent by generating models and evaluating for different values.

Linked Essential Understanding(s):	Linked Unit EQ(s):
Understanding 2: Properties can be used to generate equivalent expressions and identify equivalence	EQ2a: How can you use properties to generate equivalent expressions? EQ2b: How can expressions be represented in different ways to compare and find equivalence?

Reach Back Standards	Reach Ahead Standards
4.NBT.A.2 Read and write multi-digit whole numbers using base-ten numerals, number names, and expanded form. Compare two multi-digit numbers based on meanings of the digits in each place, using $>$, $=$, and $<$ symbols to record the results of comparisons. 5.OA.1 Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols. 5.OA.2 Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them.	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. 7.EE.B.4 Use variables to represent quantities in real world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities 8.EE.A.1 Know and apply the properties of integer exponents to generate equivalent



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	numerical expressions.
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LEQ4: How can you identify and justify the properties of operations to generate equivalent expressions using multiple representations?

LEQ5: Why is equivalency important when solving problems?

Text Alignment:

Text	Big Ideas Mathematics (2014)	Eureka Math (2015)	LearnZillion (2013)	Connected Mathematics (CMP2, 2006)	Connected Mathematics (CMP3, 2014)
Section(s)	3.3; 3.4	Module 4, Lessons 15, 16, and 17	8.5 8.6 8.7 8.8 8.9 8.10	Variables and Patterns - Investigation 3	Variables and Patterns Investigation 3 and 4
Strength of Alignment	Somewhat Aligned	Aligned	Strongly Aligned	Weak Alignment	Weak Alignment

Sample Lesson Activities/Resources:

Students extend prior knowledge of algebraic expression from 6.EE.B.6 to the concept of equivalence as students evaluate the expressions for multiple values of the variable. The concept is developed through work with area models and substitution, which aid students in extending knowledge of equal value and equal area to the abstract concept of equivalent expressions.

https://delawaredreamteam.learnzillion.com/lesson_plans/3128-11-understand-that-equivalent-expressions-have-the-same-value-c



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Days 12-13: Identifying and Justifying Equivalent Expressions

Learning Target: I can identify and justify the properties of operations to generate equivalent expressions using multiple representations. (6.EE.4)

Linked Content Standard:

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

6.EE.A.4 Apply the properties of operations to generate equivalent expressions.

Instructional Notes:

- Emphasize using different strategies for generating equivalent expressions.
- Have students verify that expressions are equivalent by generating models and evaluating expressions at different values.

Linked Essential Understanding(s):	Linked Unit EQ(s):
Understanding 2: Properties can be used to generate equivalent expressions and identify equivalence.	EQ2b: How can expressions be represented in different ways to compare and find equivalence?

Reach Back Standards	Reach Ahead Standards
<p>4.NBT.A.2 Read and write multi-digit whole numbers using base-ten numerals, number names, and expanded form. Compare two multi-digit numbers based on meanings of the digits in each place, using $>$, $=$, and $<$ symbols to record the results of comparisons.</p> <p>5.OA.1 Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols.</p> <p>5.OA.2 Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them.</p>	<p>7.EE.A.1 Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.</p> <p>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.</p> <p>7.EE.B.4 Use variables to represent quantities in real world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.</p> <p>8.EE.A.1 Know and apply the properties of integer exponents to generate equivalent numerical expressions.</p> <p>8.EE.C.7 Solve linear equations in one variable.</p>



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	8.F.A.2 Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).
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LEQ4: How can you identify and justify the properties of operations to generate equivalent expressions using multiple representations?

Text Alignment:

Text	Big Ideas Mathematics (2014)	Eureka Math (2015)	LearnZillion (2013)	Connected Mathematics (CMP2, 2006)	Connected Mathematics (CMP3, 2014)
Section(s)	3.3 3.4	Module 4, Lessons 5, 6, 7, 8, 15, 16, 17, 18, 19, 20, 21, 22	8.11 8.12 8.13 8.14 8.15	Variables and Patterns Investigation 3	Variables and Patterns Investigation 3 and 4
Strength of Alignment	Somewhat Aligned	Weak Alignment	Strongly Aligned	Weak Alignment	Weak Alignment

Sample Lesson Activities/Resources:

This lesson helps to build procedural skill with equivalency of expressions. Area models are used here because it supports a visual/tactile understanding of an abstract topic. This work develops students' understanding that equivalent expressions have the same value.

https://delawaredreamteam.learnzillion.com/lesson_plans/3511-12-use-models-to-identify-equivalent-expressions-fp

This lesson helps to build procedural skill with evaluating expressions for a given value. Substitution is used here because it highlights that different expressions can have the same value for one value of the variable but that doesn't make the expressions equivalent. This work develops students' understanding that equivalent expressions have the same value regardless of what value is used in place of the variable.

https://delawaredreamteam.learnzillion.com/lesson_plans/3512-13-use-substitution-to-identify-equivalent-expressions-fp

This lesson helps to build procedural skill with rewriting expressions into equivalent expressions. The properties of operations are used here because it supports the work from earlier in the unit. This work develops students' understanding that equivalent expressions have the same value.

https://delawaredreamteam.learnzillion.com/lesson_plans/3515-15-use-properties-of-operations-to-identify-equivalent-expressions-fp



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Days 14-15: Writing and Evaluating Equations

Learning Targets:

I can write an equation to represent a real-world or mathematical situation. (6.EE.6)

I can evaluate whether a value is a solution to a given equation (6.EE.5)

Linked Content Standard:

6.EE.B Reason about and solve one-variable equations and inequalities.

6.EE.B.5 Understand solving an equation or inequality as a process of answering a question: which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true.

6.EE.B.6 Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set.

Instructional Notes:

- Emphasize using different representations to model a real-world situation and how each representation connects with the equation.

Linked Essential Understanding(s):	Linked Unit EQ(s):
Understanding 3: Variable can be used to represent and write equations and inequalities for real world problems.	EQ3: How can variables be used to represent and solve equations and inequalities in real world problems?

Reach Back Standards	Reach Ahead Standards
5.OA.1 Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols. 5.OA.2 Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them.	7.EE.B.4 Use variables to represent quantities in real world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities 8.EE.C.7 Solve linear equations in one variable. 8.EE.C.8 Analyze and solve pairs of simultaneous linear equations. 8.F.A.2 Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).



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LEQ6: How can an equation be used to represent and solve a real-world/mathematical situation?

LEQ7: How can you use substitution to solve an equation?

Text Alignment:

Text	Big Ideas Mathematics (2014)	Eureka Math (2015)	LearnZillion (2013)	Connected Mathematics (CMP2, 2006)	Connected Mathematics (CMP3, 2014)
Section(s)	3.2 7.1 7.2 7.3	Module 4, Lessons 25, 30, 31, and 32	5.5 5.6 5.7 9.1 9.2 9.3	Variables and Patterns Investigation s 3 & 4	Variables and Patterns Investigation 2.1 2.2 2.3 2.4 4.2 (Weak)
Strength of Alignment	Aligned	Aligned	Somewhat Aligned	Strongly Aligned	Strongly Aligned

Sample Lesson Activities/Resources:

Students extend their prior knowledge of algebraic relationships from 5.OA.A to equations as students substitute a given value for a variable and evaluate an equation to determine if it makes the equation true. The concept is developed through work with tape diagrams, which explain how variables follow the same arithmetic properties as numbers. This work helps students deepen their understanding of equivalence because the value of the variable makes the equation true if the expressions on each side of the equal sign are equivalent.

https://delawaredreamteam.learnzillion.com/lesson_plans/2602-1-understanding-substitution-and-evaluating-equations-c

This lesson helps to build fluency with substituting numbers in for variables in an equation and evaluating the equation to determine if the number makes the equation true. Tape diagrams and number lines can be used here because they support how to evaluate equations. This work develops students' understanding that the solution of an equation is the set of values that make the equation true.

https://delawaredreamteam.learnzillion.com/lesson_plans/2605-2-practicing-substituting-and-evaluating-fp

This lesson provides an opportunity for students to apply their knowledge and understanding of substituting values for variables and evaluating an inequality to a real-life situation. Students are asked to help Mr. Lee decide how much pizza, juice, and cookies he should get for a class party and stay within a budget.



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https://delawaredreamteam.learnzillion.com/lesson_plans/2608-3-using-substituting-and-evaluating-in-real-world-problems-a

Parts of an Expression/Equation Poster

<https://drive.google.com/file/d/0B0GmxJw4hklPbG5PbFVBa1M3Tms/view?usp=sharing>



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Days 16-20: Writing and Solving Equations

Learning Targets:

I can write and solve single-step equation where variables are used to represent numbers in real-world or mathematical problems.

I can use inverse operations in solving one-variable equations.

Linked Content Standard:

6.EE.B Reason about and solve one-variable equations and inequalities.

6.EE.B.7 Solve real-world and mathematical problems by writing and solving equations of the form and for cases in which p , q and x are all nonnegative rational numbers.

Instructional Notes:

- Emphasize using different strategies for solving equations, including visual models.
- Have students make connections between visual models and algebraic procedures.

Linked Essential Understanding(s):	Linked Unit EQ(s):
Understanding 3: Variable can be used to represent and write equations and inequalities for real world problems.	EQ3: How can variables be used to represent equations and inequalities in real world problems?

Reach Back Standards	Reach Ahead Standards
5.OA.1 Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols. 5.OA.2 Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them.	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. 7.EE.B.4 Use variables to represent quantities in real world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities 8.EE.C.7 Solve linear equations in one variable. 8.EE.C.8 Analyze and solve pairs of simultaneous linear equations. 8.F.A.2 Compare properties of two functions each represented in a different way



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	(algebraically, graphically, numerically in tables, or by verbal descriptions).
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LEQ6: How can an equation be used to represent and solve a real-world/mathematical situation?

LEQ8: How do you use inverse operations in solving one variable equations?

Text Alignment:

Text	Big Ideas Mathematics (2014)	Eureka Math (2015)	LearnZillion (2013)	Connected Mathematics (CMP2, 2006)	Connected Mathematics (CMP3, 2014)
Section(s)	7.1, 7.2, 7.3	Module 4, Lesson 18-21, 26, 27, 30	9.7 9.8 9.9 9.10	Variables and Patterns - Investigation 3.1, 3.2, 3.3	Variables and Patterns Investigation 2.1.2.2
Strength of Alignment	Aligned/somewhat aligned	Aligned	Aligned	Aligned	Aligned

Sample Lesson Activities/Resources:

This lesson helps to build fluency with identifying equivalent equations. Tape diagrams and number lines are used here because they support students' understanding of how to informally solve equations. This work develops students' understanding that equivalent equations have the same solution.

https://delawaredreamteam.learnzillion.com/lesson_plans/2606-5-identifying-equivalent-equations-fp

This lesson provides an opportunity for students to apply their knowledge and understanding of equivalent equations to a mathematical situation. Students are asked to order of a set of equations from least to greatest based on the value of the solutions.

https://delawaredreamteam.learnzillion.com/lesson_plans/2609-6-comparing-equation-solutions-a

Students extend prior knowledge that mathematical relationships can be represented with expressions and that they can use those expressions as they use numbers from 6.EE.B.6c to use equations to solve problems as students calculate perimeter using equations. This work helps students deepen their understanding of equivalence because equations show a relationship between expressions. We can use the relational meaning of the equal sign to find a missing value in an equation.



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https://delawaredreamteam.learnzillion.com/lesson_plans/2604-7-using-equations-to-solve-problems-c

This lesson helps to build procedural skills with using inverse operations to solve equations. Tape diagrams are used because it shows how students can determine the appropriate inverse operation to use in order to solve the equation. This work develops students' understanding that because equations show a relationship between expressions, we can use the relational meaning of the equal sign to find a missing value in an equation.

https://delawaredreamteam.learnzillion.com/lesson_plans/2607-8-solving-equations-with-inverse-operations-fp

This lesson helps to build procedural skill with using inverse operations to solve equations. Students apply their previous understanding of how to determine the appropriate inverse operation to use in order to solve the equation. This lesson builds upon work with rational numbers. This work develops students' understanding that because equations show a relationship between expressions, we can use the relational meaning of the equal sign to find a missing value in an equation.

https://delawaredreamteam.learnzillion.com/lesson_plans/2882-9-solving-equations-with-inverse-operations-fp

This lesson provides an opportunity for students to apply their knowledge and understanding of solving equations to a real-life situation. Students are asked to determine how many laps Diego, Ashley and Paige must walk in order to each raise \$30 for their school's walk-a-thon.

https://delawaredreamteam.learnzillion.com/lesson_plans/2610-10-using-equations-to-solve-problems-a

CMP 2 (2009) Variables and Patterns (ACE Student Copy page 55-56, Ex 1-4, 9-12)

CMP 2 (2009) Variables and Patterns (Investigation 3, Problem 3.1, pgs 50-51)

CMP 2 (2009) Variables and Patterns (Investigation 3, Problem 3.2, page 52-53)



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Days 21-25: Representing and Analyzing Relationships Between Two Variables

Learning Targets:

I can analyze the relationship between the dependent and independent variables using tables and graphs.

I can use variables to represent quantities in a real-world problem that change in relation to each other.

I can analyze the relationship between variables using graphs and tables and can relate these to the equation.

Instructional Notes:

- Emphasize connections between different representations for the same relationship between two variables.
- Connect representations to real-world situations.

Linked Essential Understanding(s):	Linked Unit EQ(s):
Understanding 4: Quantities can be represented in real world problems by variables that change in relationship to each other.	EQ4: How can variables represent quantities in real world relationships?

Reach Back Standards	Reach Ahead Standards
<p>5.OA.1 Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols.</p> <p>5.OA.2 Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them.</p> <p>Students in Grades 2-5 have been using properties of operations to write expressions in different ways.</p> <p>5.G.A.2 Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation.</p>	<p>7.EE.B.4 Use variables to represent quantities in real world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities</p> <p>8.F.A.2 Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).</p>



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LEQ 10: How can you distinguish between an independent variable and a dependent variable?
LEQ 11: How does the change in one variable affect the change in the other?
LEQ 12: How can you relate tables and graphs to equations?

Text Alignment:

Text	Big Ideas Mathematics (2014)	Eureka Math (2015)	LearnZillion (2013)	Connected Mathematics (CMP2, 2006)	Connected Mathematics (CMP3, 2014)
Section(s)	7.4	Module 4, Lesson 31	5.6 5.7 5.8 5.9 5.10 5.11 5.12 5.13 5.14 5.15	Variables and Patterns Investigations 1-4	Variables and Patterns Investigation 2 3.1 3.2
Strength of Alignment	Weak Alignment	Aligned	Strongly Aligned	Strongly Aligned	Strongly Aligned

Sample Lesson Activities/Resources:

Students extend their understanding of proportional relationships and unit rates to write expressions and equations that model the relationship between proportional quantities. Students identify the independent and dependent quantities, model the relationship in multiple ways, and find missing values in the relationship.

<https://delawaredreamteam.learnzillion.com/resources/64217-representing-relationships>

This is a sample problem that practices analyzing relationships between two variables.

<https://www.opened.com/question/raul-a-pig-grows-3-cm-for-every-cm-that-paulo/1073010>

Firefighter Allocation task from Illustrative Mathematics

<https://www.illustrativemathematics.org/content-standards/6/EE/B/6/tasks/425>

Practice identifying independent and dependent variables with Khan Academy.

<https://www.khanacademy.org/math/algebra/introduction-to-algebra/alg1-dependent-independent/e/dependent-and-independent-variables>

Days 26-29: Writing and Solving One-Step Inequalities



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Learning Targets:

I can write and solve inequality of the form $x > c$ or $x < c$ to represent a constraint or condition in a problem.(6.EE.8)

I can recognize that an inequality of the form $x > c$ or $x < c$ can have infinitely many solutions.(6.EE.8)

I can represents solutions of inequalities on number lines.(6.EE.8)

Instructional Notes:

- Emphasize the similarities and differences between equations and inequalities.
- Have students distinguish between real-world situations that can be represented with an equation or inequality.

Linked Essential Understanding(s):	Linked Unit EQ(s):
Understanding 3: Variables can be used to represent and write equations and inequalities for real world problems.	EQ3: How can variables be used to represent equations and inequalities in real world problems?
Understanding 4: Quantities can be represented in real world problems by variables that change in relationship to each other.	EQ4: How can variables represent quantities in real world relationships?

Reach Back Standards	Reach Ahead Standards
<p>4.NBT.A.2 Read and write multi-digit whole numbers using base-ten numerals, number names, and expanded form. Compare two multi-digit numbers based on meanings of the digits in each place, using $>$, $=$, and $<$ symbols to record the results of comparisons.</p> <p>5.OA.1 Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols.</p> <p>5.OA.2 Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them.</p> <p>5.G.A.2 Represent real world and</p>	<p>7.EE.A.1 Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.</p> <p>7.EE.B.3 Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form using tools strategically.</p> <p>7.EE.B.4 Use variables to represent quantities in real world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities</p> <p>8.F.A.2 Compare properties of two functions each represented in a different way</p>



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mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation.	(algebraically, graphically, numerically in tables, or by verbal descriptions).
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LEQ 9: How can an inequality be used to represent and solve a real-world/mathematical situation?

LEQ 11: How can the change in one variable affect the change in the other?

Text Alignment:

Text	Big Ideas Mathematics (2014)	Eureka Math (2015)	LearnZillion (2013)	Connected Mathematics (CMP2, 2006)	Connected Mathematics (CMP3, 2014)
Section(s)	7.5 7.6 7.7	Module 4, Lessons 23, 24, 33, 34	9.11 9.12 9.13 9.14 9.15 9.16	Variables and Patterns - Investigation 4	Variables and Patterns Investigation 4.5
Strength of Alignment	Aligned	Aligned	Aligned	Somewhat Aligned	Weak Alignment

Sample Lesson Activities/Resources:

Students extend prior knowledge of writing and solving equations to model equivalent relationships to modeling relationships with inequalities as students use the inequality symbols to write mathematical representations of unequal situations and identify possible solutions to each inequality. The concept develops through work with balance scales, which model that one quantity is larger or smaller than another quantity. Since balance scales are used to model solving equations, they provide a good visual for students to understand unequal relationships.

https://delawaredreamteam.learnzillion.com/lesson_plans/2003-11-understanding-that-inequalities-show-a-relationship-between-expressions-c

This lesson helps to build procedural skill using inequalities. Inequality symbols are used here because they model situations that have more than one solution. This work develops students' understanding that an inequality represents a relationship between items that can have many solutions.

https://delawaredreamteam.learnzillion.com/lesson_plans/2797-12-practice-writing-inequalities-fp

This lesson helps to build procedural skill with solving inequalities. The structure of doing the same operation (addition, subtraction, multiplication, or division with positive numbers) to each



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side of an equation is used here because it is also used to solve inequalities. Multiplication and division with negative numbers to solve inequalities is not discussed in this lesson. This work develops students' understanding that solving inequalities is similar to solving equations and uses some of the same properties.

https://delawaredreamteam.learnzillion.com/lesson_plans/3107-13-solve-one-step-inequalities-using-properties-of-equality-fp

Students extend prior knowledge of using points to using rays to show the infinite number of solutions that may be possible for an inequality. The concept develops through work with rays on number lines, which presents another visual model for any inequality. This work helps students deepen their understanding of equivalence because the ray represents a situation where the quantities are not equal and the solution can be many possible items.

https://delawaredreamteam.learnzillion.com/lesson_plans/2801-14-understand-how-number-lines-represent-inequalities-c

This lesson helps to build the procedural skill of identifying inequality words with their corresponding number line graphs. A number line is used here because it provides an excellent visual representation of the solutions to an inequality. This work develops students' understanding that, just like equations, the solutions to inequalities can be represented on number lines.

https://delawaredreamteam.learnzillion.com/lesson_plans/2798-15-graph-inequalities-on-number-lines-fp

This lesson provides an opportunity for students to apply their knowledge and understanding of inequalities to a real-life situation. Students are asked to write a recommendation to the Principal about whether two second grade classes or two sixth grade classes should move to new portable classrooms. The recommendation is based on the square footage required for each student in the two grade levels and other factors the student thinks should be considered.

https://delawaredreamteam.learnzillion.com/lesson_plans/2799-16-write-and-graph-inequalities-using-word-problems-a

This lesson focuses on writing and graphing inequalities from real-world problems.

<https://www.engageny.org/resource/grade-6-mathematics-module-4-topic-h-lesson-34>



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Day 30: Equations and Inequalities Assessment

Learning Target:

I can apply my understanding of equations and inequalities to solve real-world and mathematical problems.

Instructional Notes:

- Ensure that the assessment includes a balance of questions that assess conceptual understanding, procedural fluency, and application.

Linked Essential Understanding(s):	Linked Unit EQ(s):
Understanding 2: Properties can be used to generate equivalent expressions and identify equivalence	EQ2a: How can you use properties to generate equivalent expressions? EQ2b: How can expressions be represented in different ways to compare and find equivalence?
Understanding 3: Variables can be used to represent and write equations and inequalities for real world problems.	EQ3: How can variables be used to represent equations and inequalities in real world problems?
Understanding 4: Quantities can be represented in real world problems by variables that change in relationship to each other.	EQ4: How can variables represent quantities in real world relationships?

Reach Back Standards	Reach Ahead Standards
<p>4.NBT.A.2 Read and write multi-digit whole numbers using base-ten numerals, number names, and expanded form. Compare two multi-digit numbers based on meanings of the digits in each place, using $>$, $=$, and $<$ symbols to record the results of comparisons.</p> <p>5.OA.1 Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols.</p> <p>5.OA.2 Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating</p>	<p>7.EE.A.1 Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.</p> <p>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.</p> <p>7.EE.B.3 Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form using tools strategically.</p>



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<p>them.</p> <p>Students in Grades 2-5 have been using properties of operations to write expressions in different ways.</p>	<p>7.EE.B.4 Use variables to represent quantities in real world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities</p> <p>8.EE.A.1 Know and apply the properties of integer exponents to generate equivalent numerical expressions.</p> <p>8.EE.C.7 Solve linear equations in one variable.</p> <p>8.EE.C.8 Analyze and solve pairs of simultaneous linear equations.</p> <p>8.F.A.2 Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).</p>
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LEQ4: How can you identify and justify the properties of operations to generate equivalent expressions using multiple representations?

LEQ5: Why is equivalency important when solving problems?

LEQ6: How can an equation be used to represent and solve a real-world/mathematical situation?

LEQ7: How can you use substitution to solve an equation?

LEQ8: How do you use inverse operations in solving one variable equations?

LEQ 9: How can an inequality be used to represent and solve a real world/mathematical situation?

LEQ 10: How can you distinguish between an independent variable and a dependent variable?

LEQ 11: How does the change in one variable affect the change in the other?

LEQ 12: How can you relate tables and graphs to equations?



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