**Unit Abstract:**

This unit challenges students to use variables to create expressions and ultimately build equations for use in problem solving.  Students will use mathematical strategies to expand linear equations, write expressions in alternate forms, write equations and inequalities, and use the later to solve real-world problems. Students will be asked to explain their mathematical thinking.

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| **Overarching Question:**  How can we use variables to create expressions to solve real-world problems? | | | | | | |
|  | | **This Unit:** Use properties of operations to generate equivalent expressions. Solve real-life mathematical problems using numerical and algebraic expressions and equations. | | | |  |
| **Questions to Focus Assessment and Instruction:**  How can mathematical strategies can be used to expand linear expressions consistently?  How can rewriting an expression in an alternate form help to deepen understanding of a problem?  How can we create equations and inqualities to solve real-world problems? | | | | **Standards for Mathematical Practice**  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. | | |
| **Academic Vocabulary**  *(5-8 most important content specific vocabulary words)*  *Variable*  *Equation*  *Solution*  *Inequalitity*  *factor* |  | |  | |  | |

| **Standards** | **Learning Targets** *(including relevant practice standards)* | **Explanations and Examples\*** | **Assured Experiences**  *(common assessments and learning activities)* |
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| * 7.EE.1 Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.   7.EE.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.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.**  1. **Solve word problems leading to equations of the form *px + q = r* and *p(x + q) = r,* where *p, q, and r* are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach.** 2. **Solve word problems leading to equations of the form *px + q > r or px + q < r,* where *p, q, and r* are specific rational numbers. Graph the solution set of the inequality and interpret it in the context of the problem.** | Students will….  Accurately distribute expressions.  Accuratley simplify by combining like terms.  Accuratley factor expressions into simpliest form.  Accuratley expand expressions into other alternate forms.  Create multiple expressions for a given scenario.  Describe the value of using alternate forms of expressions to deepen understanding of problems.  Create equations and inequalities to solve real-world problems. | 7.EE.1. Examples:  • Write an equivalent expression for 3(*x* + 5) – 2  • Suzanne thinks the two expressions 2(3*a* – 2) and 10*a* – 2 are equivalent? Is she correct? Explain why or why not?  • Write equivalent expressions for 3*a* + 12.  Possible solutions might include factoring as in 3(*a* + 4), or other expressions such as *a* + 2*a* + 7 + 5.  • A rectangle is twice as long as wide. One way to write an expression to find the perimeter would be  *w* + *w* + 2*w*. Write the expression in two other ways.  Solution: 6w OR 2(*w*) + 2 (2*w*)    • An equilateral triangle has a perimeter of 6*x* + 15. What is the length of each of the sides of the triangle?  Solution: 2(2*x* + 5), therefore each side is 2*x* +5 units long.  7.EE.2. Examples:  • Jamie and Ted both get paid an equal hourly wage of $9 per hour. This week, Ted made an additional $27 dollars in overtime. Write an expression that represents the weekly wages of both if J = the number of hours that Jamie worked this week and T = the number of hours Ted worked this week? Can you write the expression in another way?  Students may create several different expressions depending upon how they group the quantities in the problem.  One student might say: To find the total wage, I would first multiply the number of hours Jamie worked by 9. Then I would multiply the number of hours Ted worked by 9. I would add these two values with the $27 overtime to find the total wages for the week. The student would write the expression 9*J* + 9*T* +27.  Another student might say: To find the total wages, I would add the number of hours that Ted and Jamie worked. I would multiply the total number of hours worked by 9. I would then add the overtime to that value to get the total wages for the week. The student would write the expression 9(*J* + *T*) + 27  A third student might say: To find the total wages, I would need to figure out how much Jamie made and add that to how much Ted made for the week. To figure out Jamie’s wages, I would multiply the number of hours she worked by 9. To figure out Ted’s wages, I would multiply the number of hours he worked by 9 and then add the $27 he earned in overtime. My final step would be to add Jamie and Ted wages for the week to find their combined total wages. The student would write the expression (9*J*) + (9*T* + 27).  • Given a square pool as shown in the picture, write four different expressions to find the total number of tiles in the border. Explain how each of the expressions relates to the diagram and demonstrate that the expressions are equivalent. Which expression do you think is most useful? Explain your thinking.    **7.EE.4** Examples:  • Amie had $26 dollars to spend on school supplies. After buying 10 pens, she had $14.30 left. How much did each pen cost?  • The sum of three consecutive even numbers is 48. What is the smallest of these numbers?  • Solve: *n* + 5 = 20  • Florencia has at most $60 to spend on clothes. She wants to buy a pair of jeans for $22 dollars and spend the rest on t-shirts. Each t-shirt costs $8. Write an inequality for the number of t-shirts she can purchase.  • Steven has $25 dollars. He spent $10.81, including tax, to buy a new DVD. He needs to set aside $10.00 to pay for his lunch next week. If peanuts cost $0.38 per package including tax, what is the maximum number of packages that Steven can buy?  Write an equation or inequality to model the situation. Explain how you determined whether to write an equation or inequality and the properties of the real number system that you used to find a solution.  • Solve *x* + 3 > 2 and graph your solution on a number line. | * Unit #3 common summative assessment * Learning activity:   Creating alternate forms to solve problems  <http://www.mathworksheetsland.com/7/17rewriteexp/lesson.pdf>  <http://www.mathworksheetsland.com/7/17rewriteexp/guided.pdf>  <http://www.mathworksheetsland.com/7/17rewriteexp/ip.pdf>  <http://www.mathworksheetsland.com/7/17rewriteexp/matching.pdf>  <http://www.mathworksheetsland.com/7/19eqword.html>  Area and Perimeter of shapes in different forms  <http://www.insidemathematics.org/assets/common-core-math-tasks/expressions.pdf>  engageny  <file:///C:/Users/jderose/Downloads/math-g7-m3-teacher-materials.pdf>  Glencoe math common core practice masters course 2 book: p77-91 |

**Instructional resources** (including manipulatives, literature connections, professional resources)

Standard #1

Standard #2

Standard #3

Standard #4

Standard #5

http://www.mathworksheetsland.com/7/17expre.html