



Unit 3 Expressions, Equations and Inequalities Math 7 Reg

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Archdiocesan Curriculum > Grade > Math > Days 20 to 24

Stage 1: Desired Results						
General Information In this unit, students will learn to use linear expressions to represent a quantity in different ways and to add, subtract, factor, and expand expressions with rational coefficients. They will write and solve equations that model real-world situations, including two-step equations involving unknown angle measurements. Students will also apply properties to solve one-step inequalities and extend their understanding by writing and solving two-step inequalities to represent and solve problems. Throughout the unit, students will make connections between algebraic representations and real-life applications, building fluency and confidence with foundational algebra concepts. Mathematical Practices: - Make sense of problems and persevere in solving them - Reason abstractly and quantitatively - Model with mathematics - Attend to precision - Look for and make use of structure	Essential Question(s) - How can you represent the same quantity using different but equivalent linear expressions? - What strategies help when adding, subtracting, factoring, or expanding expressions with rational coefficients? - How can equations and inequalities be used to model and solve real-world problems? - What do unknown angle relationships teach us about using equations to solve geometric problems? - How do properties of equality and inequality guide your steps when solving equations and inequalities?					
	Enduring Understanding/Knowledge Students will: - Use linear expressions to represent a quantity in different ways. - Add, subtract, factor, and expand linear expressions with rational coefficients. - Represent a real-world situation with an equation. - Solve real-world situations using an equation. - Write and solve two-step equations involving unknown angle measurements. Review/Assess - Apply properties to solve one-step inequalities. - Write two-step inequalities to represent situations. - Write and solve two-step inequalities to solve problems. Review/Assess	Vocabulary <table><thead><tr><th>New</th><th>Review</th></tr></thead><tbody><tr><td> - adjacent angles - complementary angles - supplementary angles - vertical angles </td><td> - Associative Property of Addition - Commutative Property of Addition - equilateral triangle - greatest common factor - like terms - term - isosceles triangle - perimeter - Division Property of Equality - solution of an equation - right angle - equivalent - inequality - solution of an inequality </td></tr></tbody></table>		New	Review	- adjacent angles - complementary angles - supplementary angles - vertical angles
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- adjacent angles - complementary angles - supplementary angles - vertical angles	- Associative Property of Addition - Commutative Property of Addition - equilateral triangle - greatest common factor - like terms - term - isosceles triangle - perimeter - Division Property of Equality - solution of an equation - right angle - equivalent - inequality - solution of an inequality					
Connections to Catholic Identity / Other Subjects Religion/Catholic Identity: The ephah and the bath shall be the same quantity, so that the bath will contain a tenth of a homer and the ephah a tenth of a homer; their standard shall be according to the homer. The shekel shall be twenty gerahs; twenty shekels, twenty-five shekels, and fifteen shekels shall be your maneh. (Ez 45:11-12)	Differentiation Enrichment Explore Real-World Applications of Linear Expressions Have students identify and create real-world problems that involve linear expressions. For example, students can explore how to calculate the cost of a subscription service over time or represent the relationship between the distance traveled and time for different vehicles					

- Or what woman, if she has ten silver coins and loses one coin, does not light a lamp and sweep the house and search carefully until she finds it? (Luke 15:8)

Other Subject Here:

- **STEM:** In order to make action look real in computer games, mathematicians and software developers came up with complicated equations of how human motion works. The software for computer games has more equations in it than one could possibly imagine.

using linear expressions. Encourage them to write and solve the corresponding equations to find unknown quantities.

- **Investigate Factoring and Expanding Linear Expressions**

Challenge students to factor and expand linear expressions with rational coefficients in multiple ways. Provide problems where they need to factor expressions that represent real-world scenarios, such as discounts on products or savings over time. Have them present their methods and solutions, explaining how factoring or expanding simplifies problem-solving.

- **Advanced Application of Two-Step Equations**

Ask students to create and solve two-step equations based on more complex real-world situations, such as calculating the speed of an object when given the total distance traveled and time taken, or solving angle problems involving multiple geometric figures.

- **Explore Multi-Step Inequality Problems**

Have students write and solve two-step inequalities to model real-world situations involving costs, discounts, or savings. Ask them to analyze and explain the solutions in terms of the context of the problem, such as determining how long it will take to save for an item on a budget or finding the range of possible values for a quantity.

Support

- **Visualize Linear Expressions Using Models**

Use visual aids, like algebra tiles or graphs, to help students represent linear expressions in different ways. Start with simple problems where students add, subtract, and factor linear expressions using these models to support conceptual understanding before moving on to more abstract equations.

- **Step-by-Step Practice for Writing and Solving Equations**

Provide students with step-by-step guidance for writing and solving two-step equations. Start with problems that represent simple real-world situations (e.g., finding the total cost of a product with tax), and gradually increase the difficulty. Support students by modeling how to set up the equation, isolate the variable, and check their solution.

- **Use Word Problems to Introduce Two-Step Inequalities**

Start by providing students with word problems where they need to set up and solve two-step inequalities. For example, given a problem about spending within a budget or calculating the maximum amount of hours worked under certain conditions, walk them through the steps of translating the situation into an inequality and solving for the unknown.

- **Interactive Factoring and Expanding Exercises**

Provide students with interactive worksheets or online activities that allow them to practice factoring and expanding linear expressions. As they work through problems, provide instant feedback and explanations to ensure they understand the steps involved in each operation.

- **Use Real-Life Scenarios to Practice Writing Inequalities**

Engage students by having them write two-step

inequalities to model real-life scenarios, such as comparing the costs of different subscriptions or determining whether a savings goal is achievable within a certain time frame. This will help them see the practical applications of inequalities in everyday life.

- **Collaborative Problem-Solving with Peer Support**
Pair students together to solve problems involving two-step equations and inequalities. One student can focus on setting up the equation or inequality, while the other solves it. Afterward, they can compare answers and discuss their reasoning to support peer learning and reinforce the concepts.

Standards & Benchmarks

Solve Problems Using Expressions and Equations:

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

Rewrite and connect equivalent expressions in different forms in a contextual problem to provide multiple ways of interpreting the problem and investigating how the quantities in it are related.

7.EE.A.2

Describe how rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related. For example, $a + 0.05a = 1.05a$ means that "increase by 5%" is the same as "multiply by 1.05."

7.EE.B.3

Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. For example: If a woman making \$25 an hour gets a 10% raise, she will make an additional $\frac{1}{10}$ of her salary an hour, or \$2.50, for a new salary of \$27.50. If you want to place a towel bar $9\frac{3}{4}$ inches long in the center of a door that is $27\frac{1}{2}$ inches wide, you will need to place the bar about 9 inches from each edge; this estimate can be used as a check on the exact computation.

7.EE.B.4

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

7.EE.B.4.a

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. For example, the perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width?

7.G.B.4

Know and use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure.

Solve Problems Using Inequalities:

7.EE.B.3

Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. For example: If a woman making \$25 an hour gets a 10% raise, she will make an additional $\frac{1}{10}$ of her salary an hour, or \$2.50, for a new salary of \$27.50. If you want to place a towel bar $9\frac{3}{4}$ inches long in the center of a door that is $27\frac{1}{2}$ inches wide, you will need to place the bar about 9 inches from each edge; this estimate can be used as a check on the exact computation.

7.EE.B.4

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

7.EE.B.4b

Solve real-world and mathematical problems leading to inequalities of the form $px + q > r$, $px + q < r$, $px + q \geq r$, and $px + q \leq r$, where p , q , and r are specific rational numbers. Graph the solution set of the inequality on a number line and interpret it in the context of the problem.

Graph the solution set of the inequality and interpret it in the context of the problem. For example, as a salesperson,

you are paid \$50 per week plus \$3 per sale. This week you want your pay to be at least \$100. Write an inequality for the number of sales you need to make and describe the solutions. $px + q > r$

7.AF.4

Solve inequalities of the form $px + q (> \text{ or } \geq) r$ or $px + q (< \text{ or } \leq) r$, where p , q , and r are specific rational numbers.

Represent real-world problems using inequalities of these forms and solve such problems. Graph the solution set of the inequality and interpret it in the context of the problem.

Teaching Ideas/Resources

Websites/Resources:

- [Graspable Math-Solving One-Step Equations](#) – Use this interactive to guide students in solving one-step equations correctly.
- Expressions and Equations: [Algebra Equations](#)
- Equations and inequalities [Equations and Inequalities](#).
- [Gimkit - live learning game show](#)-there is a free part and a paid part; the free part provides games that are just as engaging as the paid section
- [Mash Up Math](#) provides games, worksheets, etc...