

Core Content

Cluster Title: Solve real-life and mathematical problems using numerical and algebraic expressions and equations.

Standard 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.

Concepts and Skills to Master

- Solve multi-step mathematical problems involving calculations with positive and negative rational numbers in a variety of forms.
- Solve multi-step real-life problems involving calculations with positive and negative rational numbers in a variety of forms.
- Convert between forms of a rational number to simplify calculations or communicate solutions meaningfully.
- Assess the reasonableness of answers using mental computation and estimation.

Supports for Teachers

Critical Background Knowledge

- Solve one-step linear equations involving non-negative rational numbers. (6.EE.7)
- Convert between fractions, decimals, and percent.

Academic Vocabulary

Estimate, rational number, reasonableness, solution

Suggested Instructional Strategies

- Choose real life problems to highlight the advantages of using different numerical representations (fractions, decimals, percent) or models (bar, equation, drawing).
- Assign student partners to solve problems, present solutions, and compare solution strategies.

Resources

- MSSM Chocolate Milk Problem
- “Problem Solving Strategies Crossing the River with Dogs” Johnson and Herr

Sample Formative Assessment Tasks

Skill-based Task

Malie and her sister won a \$45 iTunes gift card. They agree to split the money so that Malie gets $\frac{2}{3}$ of the value and her sister gets the rest. If songs on iTunes cost \$1.29, how many songs will each sister be able to buy?

Problem Task

Braxton wants to spend his \$60 savings on new longboard parts online. He has a promotional code that he can use for $\frac{1}{5}$ off his cost before shipping or for free shipping. If shipping costs are \$1.75 for each \$10 spent, how should he use his promotional code? Justify your answer.

Core Content

Cluster Title: Solve real-life and mathematical problems using numerical and algebraic expressions and equations.
<p>Standard 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.</p> <p>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. <i>For example, the perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width?</i></p> <p>b) Solve word problems leading to inequalities 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. <i>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.</i></p>
Concepts and Skills to Master
<ul style="list-style-type: none"> • Use variables to create equations and inequalities that model word problems. • Solve word problems leading to linear equations and inequalities. • Connect arithmetic solution processes that do not use variables to algebraic solution processes that use equations. • Use symbols of inequality to express phrases such as “at most”, “at least as much as”, or “no more than”.

Supports for Teachers

Critical Background Knowledge	
<ul style="list-style-type: none"> • Represent solutions of inequalities such as $x < c$ or $x > c$ on a number line. (6.EE.8) • Solve 1-step equations and inequalities. 	
Academic Vocabulary	
Algebraic, inequality, equation, inverse operations, solution set, at most, at least, less than, greater than, $<$, \leq , $>$, \geq	
Suggested Instructional Strategies	Resources
<ul style="list-style-type: none"> • Solve simple problems arithmetically and compare the process to that of finding solutions algebraically. • Partner problems: One student solves, the other writes reasons why steps work. • Find and analyze mistakes in student work samples. • Have students solve problems based on a verbal or written description • Use arithmetic and algebraic approaches to problems to examine the structure of the mathematics. 	NLVM-Balance scales
Sample Formative Assessment Tasks	
<p>Skill-based Task John and his friend have \$20 to go to the movies. Tickets are \$6.50 each. How much will they have left for candy? Connect the arithmetic and algebraic methods.</p>	<p>Problem Task When Zuri picks any number between -10 and 10, triples it, adds 9, divides by 3, and subtracts 3, what number does she get? Why? Evaluate and use algebraic evidence to support your conclusion.</p>