

Richmond Public Schools

Curriculum Framework

7th Grade Math

Strand: Patterns, Functions, Algebra	
7.13 The student will solve one- and two-step linear inequalities in one variable, including practical problems, involving addition, subtraction, multiplication, and division, and graph the solution on a number line.	
Suggested Pacing	
Second Nine Weeks- 8 Instructional Days	
Spiraling Standards	
Spiraling Down: 6.14 The student will <ol style="list-style-type: none">represent a practical situation with a linear inequality in one variable; andsolve one-step linear inequalities in one variable, involving addition or subtraction, and graph the solution on a number line.	Spiraling Up: 8.18 The student will solve multistep linear inequalities in one variable with the variable on one or both sides of the inequality symbol, including practical problems, and graph the solution on a number line.
Essential Questions	Common Misconceptions
<ul style="list-style-type: none">How are the procedures for solving equations and inequalities the same? The procedures are the same except for the case when an inequality is multiplied or divided on both sides by a negative	<ul style="list-style-type: none">Solutions presented to inequalities are often seen as solutions of equations. Therefore, solutions which are true can be wrongfully identified as false because the number doesn't match that which is found using procedures to solve equations.

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<p>number. Then the inequality sign is changed from less than to greater than, or greater than to less than.</p> <ul style="list-style-type: none"> ● How is the solution to an inequality different from that of a linear equation? In an inequality, there can be more than one value for the variable that makes the inequality true. 	<ul style="list-style-type: none"> ● Inverse operations involving adding or subtracting negative numbers prompting students to inverse inequality symbols when it should only be done for multiplication or division of negative numbers
Understanding the Standard	Essential Knowledge and Skills
<ul style="list-style-type: none"> ● A one-step inequality may include, but not be limited to, inequalities such as the following: $2x > 5$; $y - \frac{2}{3} \leq -6$; $\frac{1}{5}x < -3$; $a - (-4) \geq \frac{11}{2}$. ● A two-step inequality may include, but not be limited to inequalities such as the following: $2x + 1 < -25$; $2x + \frac{1}{2} \geq -5$; $-25 > 7.2x + 1$; $\frac{x-7}{-3} \leq 4$; $\frac{3}{4}x - 2 \leq 10$. ● The solution set to an inequality is the set of all numbers that make the inequality true. ● The inverse operation for addition is subtraction, and the inverse operation for multiplication is division. ● The procedures for solving inequalities are the same as those to solve equations except for the case when an inequality is multiplied or divided on both sides by a negative number. Then the inequality sign is changed from less than to greater than, or greater than to less than. ● When both expressions of an inequality are multiplied or divided by a negative number, the inequality symbol reverses (e.g., $-3x < 15$ is equivalent to $x > -5$). 	<p>The student will use problem solving, mathematical communication, mathematical reasoning, connections, and representations to</p> <ul style="list-style-type: none"> ● Apply properties of real numbers and the multiplication and division properties of inequality to solve one-step inequalities in one variable, and the addition, subtraction, multiplication, and division properties of inequality to solve two-step inequalities in one variable. Coefficients and numeric terms will be rational. ● Represent solutions to inequalities algebraically and graphically using a number line. ● Write verbal expressions and sentences as algebraic expressions and inequalities. ● Write algebraic expressions and inequalities as verbal expressions and sentences. ● Solve practical problems that require the solution of a one- or two-step inequality. ● Identify a numerical value(s) that is part of the solution set of a given inequality.

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- Solutions to inequalities can be represented using a number line.
- In an inequality, there can be more than one value for the variable that makes the inequality true. There can be many solutions. (i.e., $x + 4 > -3$ then the solution is $x > -7$. This means that x can be any number greater than -7 . A few solutions might be $-6.5, -3, 0, 4, 25$, etc.)
- Properties of real numbers and properties of inequality can be used to solve inequalities, justify solutions, and express simplification. Students should use the following properties, where appropriate, to further develop flexibility and fluency in problem solving (limitations may exist for the values of a, b , or c in this standard).
 - Commutative property of addition: $a + b = b + a$.
 - Commutative property of multiplication: $a \cdot b = b \cdot a$.
 - Subtraction and division are not commutative.
 - The additive identity is zero (0) because any number added to zero is the number. The multiplicative identity is one (1) because any number multiplied by one is the number. There are no identity elements for subtraction and division.
 - Identity property of addition (additive identity property):
 $a + 0 = a$ and $0 + a = a$.
 - Identity property of multiplication (multiplicative identity property): $a \cdot 1 = a$ and $1 \cdot a = a$.
 - Inverses are numbers that combine with other numbers and result in identity elements
 $\frac{1}{1}$
(e.g., $5 + (-5) = 0$; $5 \cdot \frac{1}{5} = 1$).

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- Inverse property of addition (additive inverse property):
 $a + (-a) = 0$ and $(-a) + a = 0$.
- Inverse property of multiplication (multiplicative inverse property): $a \cdot \frac{1}{a} = 1$ and $\frac{1}{a} \cdot a = 1$.
- Zero has no multiplicative inverse.
- Multiplicative property of zero: $a \cdot 0 = 0$ and $0 \cdot a = 0$.
- Division by zero is not a possible mathematical operation. It is undefined.
- Substitution property: If $a = b$, then b can be substituted for a in any expression, equation, or inequality.
- Addition property of inequality: If $a < b$, then $a + c < b + c$; if $a > b$, then $a + c > b + c$.
- Subtraction property of inequality: If $a < b$, then $a - c < b - c$; if $a > b$, then $a - c > b - c$.
- Multiplication property of inequality: If $a < b$ and $c > 0$, then $a \cdot c < b \cdot c$; if $a > b$ and $c > 0$, then $a \cdot c > b \cdot c$.
- Multiplication property of inequality (multiplication by a negative number): If $a < b$ and $c < 0$, then $a \cdot c > b \cdot c$; if $a > b$ and $c < 0$, then $a \cdot c < b \cdot c$.
- Division property of inequality: If $a < b$ and $c > 0$, then $\frac{a}{c} < \frac{b}{c}$; if $a > b$ and $c > 0$, then $\frac{a}{c} > \frac{b}{c}$.
- Division property of inequality (division by a negative number): If $a < b$ and $c < 0$, then $\frac{a}{c} > \frac{b}{c}$; if $a > b$ and $c < 0$, then $\frac{a}{c} < \frac{b}{c}$.

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Vocabulary	Instructional Activities Organized by Learning Objective
Coefficient Equation equivalent equation inequality inverse multiplicative inverse reciprocal variable	Virginia Department of Education <ul style="list-style-type: none">• <u>Inequalities</u> Textbook <p>Virginia Math Connects, Course 2, ©2012, Glencoe/McGraw-Hill page(s) 242-253; 787-790;</p> Notes <p><u>Solving Inequalities Teacher Notes</u></p>
Assessment	Resources <ul style="list-style-type: none">• Print<p>Virginia Coach New SOL Edition Mathematics Grade 7; page(s) 194 - 201</p>• Technology-based<ul style="list-style-type: none">○ BrainPop<ul style="list-style-type: none">▪ <u>Solve and Graph Inequalities</u> Station Activities <p><u>Matching Mania- Inequalities</u> <u>Inequalities Brain Game</u></p>

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Cross-Curricular Connections	Tiered Differentiations
<p>Health - Using art, symbols and color for safety awareness in reference to maximums and minimums. For example, height restrictions on amusement park rides, bridges, drive thrus, etc.</p>	<p>(Tier 1) Students can check their solutions by being given integers that may or may not be a part of the inequalities solution. (Tier 3) Students can solve compound inequalities and graph multiple solutions.</p>