

Richmond Public Schools
Curriculum Framework
Algebra 1

Strand: Equations and Inequalities

A.5 The student will

- a. solve multistep linear inequalities in one variable algebraically and represent the solution graphically;**
- b. represent the solution of linear inequalities in two variables graphically;**
- c. solve practical problems involving inequalities; and**
- d. represent the solution to a system of inequalities graphically.**



EOC Algebra I assessments will include a [Desmos Calculator](#)

Suggested Pacing

Second Nine Weeks -Equations/Inequalities Unit

A.5ac 2 blocks

Third Nine Weeks Equations/Inequalities

A.5bcd 5 blocks

Related Standards

Spiral Down

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.

8.18 The student will solve multi step 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.

Spiral Up

AII.3 The student will solve

- a) absolute value linear equations and inequalities.**

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Essential Questions	Common Misconceptions
<p>Essential Questions:</p> <p>A.5a</p> <ul style="list-style-type: none"> How is solving a multi step linear inequality the same as solving a multi step linear equation? <p><i>Solving for multi step linear inequality or linear equation are the same by distributing the term outside of the parenthesis to all the terms inside the parentheses. Combining like terms on each side of the equations. Lastly, isolating the variable first adding or subtracting followed by multiplying or dividing.</i></p> <p>How is it different?</p> <p><i>The difference between the multistep linear inequalities and linear equations is multiplying or dividing by a negative number when isolating the variable. The inequality symbol changes direction when multiplied or divided by a negative number, where linear equation solution has no sign change.</i></p> <ul style="list-style-type: none"> Why is it important to represent the solutions to a multi step linear inequality on a number line? <p><i>Representing the solution of a multistep linear inequality on number provides a visual of all valid solutions.</i></p> <ul style="list-style-type: none"> How can understanding the properties of real numbers and properties of inequality help when solving a multi step linear inequality? <p><i>The understanding the properties of real number and the properties of inequality help when solving multi step linear inequalities by providing justification/reasoning behind every step used when finding a solution.</i></p> <p>A.5b</p> <ul style="list-style-type: none"> How is the graph of a linear inequality with two variables similar to the graph of a linear equation with two variables? <p><i>Graphing linear inequality with two variables similar to the graph of a linear equations with two variables by identifying slope, x and y intercepts.</i></p> <p>How are they different?</p>	<ul style="list-style-type: none"> Flip the inequality when you divide or multiply by a negative number Treating inequalities the same as equations. Thinking that the solution set to an inequality must be an inequality. Lack of understanding of the symbolic meaning of inequalities. When introducing inequalities, students will try to connect what they already know about how to solve equations or inequalities; however, they do not connect the correct previous material to the new material. Students tend to apply strategies for solving equations when solving inequalities. They use their intuitive techniques here and this causes errors. It is important to explicitly draw their attention to the differences between an equation and an inequality.

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<p><i>Graphing linear inequality with two variables, the line maybe solid (greater than or equal to, or less than or equal to) or dashed (greater than, or less than), and the shading is either above (greater than, or greater than or equal to) or below (less than, or less than or equal to). Graphing linear equation with two variables is just a solid line.</i></p> <p>A.5c</p> <ul style="list-style-type: none"> • What does the solution of a linear inequality represent? <i>The solution of a linear inequality represents all the different possible values that make the inequality true.</i> <p>A.5d</p> <ul style="list-style-type: none"> • What does the solution of a system of linear inequalities represent? <i>The solution of a system of linear inequalities are the coordinates that each linear inequality share that make the each inequality true.</i> 			
Understanding the Standard	Essential Knowledge and Skills		
<ul style="list-style-type: none"> • A solution to an inequality is the value or set of values that can be substituted to make the inequality true. • The graph of the solutions of a linear inequality is a half-plane bounded by the graph of its related linear equation. Points on the boundary are included unless the inequality contains only $<$ or $>$ (no equality condition). • Practical problems may be modeled and solved using linear inequalities. • Solutions and intervals may be expressed in different formats, including set notation or using equations and inequalities. • Examples may include: <table border="1" style="margin-left: 20px; width: 100%; border-collapse: collapse;"> <tr> <td style="padding: 5px; text-align: center;">• Equation/ Inequality</td> <td style="padding: 5px; text-align: center;">• Set Notation</td> </tr> </table> 	• Equation/ Inequality	• Set Notation	<p>The student will use problem solving, mathematical communication, mathematical reasoning, connections, and representations to</p> <ul style="list-style-type: none"> • Solve multistep linear inequalities in one variable algebraically and represent the solution graphically. (a) • Apply the properties of real numbers and properties of inequality to solve multi step linear inequalities in one variable algebraically. (a) • Represent the solution of a linear inequality in two variables graphically. (b) • Solve practical problems involving linear inequalities. (c) • Determine whether a coordinate pair is a solution of a linear inequality or a system of linear inequalities. (c)
• Equation/ Inequality	• Set Notation		

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<table border="1" style="width: 100%; border-collapse: collapse; margin-bottom: 10px;"> <tr> <td style="width: 50%; padding: 2px;">• $x = 3$</td> <td style="width: 50%; padding: 2px;">• $\{3\}$</td> </tr> <tr> <td style="padding: 2px;">• $x = 3$ or $x = 5$</td> <td style="padding: 2px;">• $\{3, 5\}$</td> </tr> <tr> <td style="padding: 2px;">• $y \geq 3$</td> <td style="padding: 2px;">• $\{y: y \geq 3\}$</td> </tr> <tr> <td style="padding: 2px;">• Empty (null) set \emptyset</td> <td style="padding: 2px;">• $\{\}$</td> </tr> </table> <ul style="list-style-type: none"> • Properties of Real Numbers and Properties of Inequality are applied to solve inequalities. • Properties of Real Numbers: <ul style="list-style-type: none"> Associative Property of Addition Associative Property of Multiplication Commutative Property of Addition Commutative Property of Multiplication 	• $x = 3$	• $\{3\}$	• $x = 3$ or $x = 5$	• $\{3, 5\}$	• $y \geq 3$	• $\{y: y \geq 3\}$	• Empty (null) set \emptyset	• $\{\}$	<ul style="list-style-type: none"> • Represent the solution of a system of two linear inequalities graphically. (d) <p>Determine and verify algebraic solutions using a graphing utility. (a, b, c, d)</p>				
• $x = 3$	• $\{3\}$												
• $x = 3$ or $x = 5$	• $\{3, 5\}$												
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• Empty (null) set \emptyset	• $\{\}$												
<u>Vocabulary</u>	Instructional Activities Organized by Learning Objective												
Inequality Greater than greater than or equal to less than less than or equal to Properties of Inequality Properties of Real Numbers Solve Justify	<ul style="list-style-type: none"> • Eureka <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr> <th colspan="4" style="text-align: center; padding: 5px;">Eureka - (Insert Lesson Title)</th> </tr> <tr> <th style="width: 15%; padding: 5px;">Eureka Grade</th> <th style="width: 15%; padding: 5px;">Module</th> <th style="width: 15%; padding: 5px;">Topic</th> <th style="width: 15%; padding: 5px;">Lesson(s)</th> </tr> </thead> <tbody> <tr> <td style="height: 30px;"></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> 	Eureka - (Insert Lesson Title)				Eureka Grade	Module	Topic	Lesson(s)				
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Eureka Grade	Module	Topic	Lesson(s)										
Assessment													
Mastery Checks Linear Inequalities A Linear Inequalities B Linear Inequalities C Linear Inequalities D	<ul style="list-style-type: none"> • Print Textbook Virginia Glencoe, Algebra I, ©2012, Carter, et al, McGraw-Hill School Education Group, page(s) 290 - 324 Coach book, Virginia edition, page(s) 112 - 127 • Notes Cool Math - Solving System by Graphing 												

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<p>System of Inequalities Student Performance Analysis</p>	<p>PowerPoints Graph linear inequalities Solve inequalities with multiplication and division Simplify inequalities Technology-based</p> <p>Quia - Solving multi-step Inequalities</p> <p>IXL - Solve System of Linear Inequalities</p> <p>Stations</p> <p>Station 1 Students will solve the multi- step inequalities to complete a Google Form - Solving Multi - Step Inequalities</p> <p>Station 2 Teacher will display the powerpoint for students to solve and graph Smartboard - Solving and Graphing Inequalities PPT</p> <p>Station 3 Teacher will provide materials for student to create a foldable explaining how to solve a system of inequalities. Solving Systems of Inequalities Foldable</p>
<p>Cross-Curricular Connections</p>	<p>Tiered Differentiations</p>

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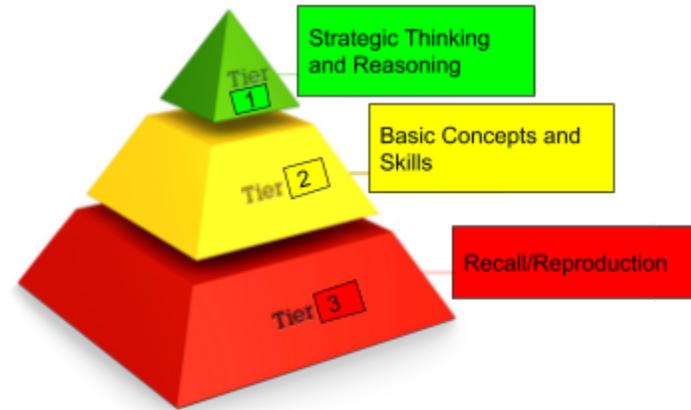
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History - An inequality can be written and solved to help make decisions in many parts of the history curriculum (example: write and solve an inequality to determine how much can be budgeted for each department and how much revenue can be collected).

Science – Students can research and write an inequality that represents their carbon footprint as it relates to the average suggested carbon footprint per person.

English – Students can write a paragraph explaining the steps to solve the inequality and use the properties of inequality to justify their steps.



Tier 3 Students sort the steps to solving multistep inequalities and match corresponding graphs.

Students identify if the lines should be solid or dotted.
If they express the equation in slope intercept form ($y=mx+b$) they can tell if the shading should be above or below the line. *Remember that if you multiply or divide by a negative ****WARNING**** you must flip the inequality*

Game: [Quia - Identify lines \(solid or dotted\)](#)

Tier 2

Students can determine and verify algebraic solutions using a graphing utility.

Students can represent the solution to a linear inequality with two variables graphically and algebraically

Tier 1

Students use properties to justify steps while solving an inequality, then

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	<p>analyze other students' work for errors.</p> <p>Students will share their solutions and compare and contrast the various inequalities that satisfy the conditions to linear or systems of inequalities</p>
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