

F – Inequalities, Lesson 1, Solving Linear Inequalities (r. 2018)

INEQUALITIES

Solving Linear Inequalities

<p>Common Core Standard</p> <p>A-REI.B.3 Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.</p>	<p>Next Generation Standard</p> <p>AI-A.REI.3 Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.</p> <p>Note: Algebra I tasks do not involve solving compound inequalities.</p>
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NOTE: This lesson is closely related to, and builds upon, [Expressions and Equations, Lesson 3, Solving Linear Equations](#).

LEARNING OBJECTIVES

Students will be able to:

- 1) Solve one step and multiple step inequalities.
- 2) Explain each step involved in solving one step and multiple step inequalities.
- 3) Do a check to see if the solution is correct.

Overview of Lesson

Teacher Centered Introduction	Student Centered Activities
<p>Overview of Lesson</p> <ul style="list-style-type: none"> - activate students' prior knowledge - vocabulary - learning objective(s) - big ideas: direct instruction - modeling 	<p>guided practice ←Teacher: anticipates, monitors, selects, sequences, and connects student work</p> <ul style="list-style-type: none"> - developing essential skills - Regents exam questions - formative assessment assignment (exit slip, explain the math, or journal entry)

VOCABULARY

big rule of inequalities
equality
four column strategy
four general rules

greater than
greater than or equal to
inequality
inequality sign

less than
less than or equal to
not equal to
solution set

BIG IDEAS

The Big Rule for Solving Inequalities:

All the rules for solving equations apply to inequalities – plus one:

When an inequality is multiplied or divided by any negative number, the direction of the inequality sign changes.

Inequality Symbols:

< less than > greater than
≤ less than or equal to ≥ greater than or equal to
≠ not equal to

The **solution of an inequality** includes any values that make the inequality true. Solutions to inequalities can be graphed on a number line using open and closed dots.

Checking Solutions to Inequalities

To check the **solution** to an **inequality**, replace the **variable** in the inequality with a value in the solution set. If the value selected is a correct solution, the simplified inequality will produce a true statement.

NOTE: The value selected *must* be in the solution set.

DEVELOPING ESSENTIAL SKILLS

Solve for x: $4 + \frac{2}{5}x > 3 + x$

Notes	Left Hand Expression	Sign	Right Hand Expression
Given	$4 + \frac{2}{5}x$	>	$3 + x$
Multiply by 5	$20 + 2x$	>	$15 + 5x$
Subtract 2x	20	>	$15 + 3x$
Subtract 15	5	>	3x
Divide by 3	$\frac{5}{3}$	>	x
Check	Select $\frac{4}{3}$, which is less than $\frac{5}{3}$, to test the solution. $4 + \frac{2}{5}x > 3 + x$ $4 + \frac{2}{5}\left(\frac{4}{3}\right) > 3 + \left(\frac{4}{3}\right)$ $4 + \frac{8}{15} > 3 + \frac{20}{15}$ $\frac{60}{15} + \frac{8}{15} > \frac{45}{15} + \frac{20}{15}$ $\frac{68}{15} > \frac{65}{15} \text{ true}$		

REGENTS EXAM QUESTIONS (through June 2018)

A.REI.B.3: Solving Linear Inequalities

Divide both expressions by $\frac{5}{3}$ (Division property of equality)	$\frac{15}{1} \cdot \frac{3}{5}$	<	$\frac{5}{3}x \cdot \frac{3}{5}$
Simplify	9	<	x
Rewrite	x	>	9

PTS: 2 NAT: A.REI.B.3 TOP: Solving Linear Inequalities

139) ANS:

$$x \leq \frac{10b}{b-a}$$

Strategy: Use the four column method. Remember that $a > b$.

Notes	Left Expression	Sign	Right Expression
Given	$b(x-3)$	\geq	$ax+7b$
Distributive Property	$bx-3b$	\geq	$ax+7b$
Transpose	$bx-ax$	\geq	$10b$
Factor	$x(b-a)$	\geq	$10b$
Divide by $(b-a)$	x	\leq See NOTE below	$\frac{10b}{b-a}$

NOTE: Since $a > b$, the expression $(b-a)$ must be a negative number. When dividing an inequality by a negative number, the direction of the inequality sign must be reversed.

PTS: 2 NAT: A.REI.B.3 TOP: Solving Linear Inequalities

140) ANS: 4

$$3x+2 \leq 5(x-4)$$

$$3x+2 \leq 5x-20$$

$$2+20 \leq 5x-3x$$

$$22 \leq 2x$$

$$11 \leq x$$

$$x \geq 11$$

PTS: 2 NAT: A.REI.B.3 TOP: Solving Linear Inequalities

141) ANS: 1

$$2h+8 > 3h-6$$

$$2h+14 > 3h$$

$$14 > h$$

PTS: 2 NAT: A.REI.B.3

142) ANS:

$$y \geq \frac{1}{4}$$

Given	$1.8-0.4y$	\geq	$2.2-2y$
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Add (2y)	+2y		+2y
Simplify	$1.8 + 1.6y$	\geq	2.2
Subtract (1.8)	-1.8		-1.8
Simplify	$1.6y$	\geq	0.4
Divide (1.6)	$\frac{1.6y}{1.6}$	\geq	$\frac{0.4}{1.6}$
Simplify	y	\geq	$\frac{1}{4}$

$$1.8 - 0.4y \geq 2.2 - 2y$$

$$1.6y \geq 0.4$$

$$y \geq 0.25$$

PTS: 2

NAT: A.REI.B.3

TOP: Solving Linear Inequalities

143) ANS: 1

$$2 + \frac{4}{9}x \geq 4 + x$$

$$18 + 4x \geq 36 + 9x$$

$$-5x \geq 18$$

$$x \leq \frac{18}{-5}$$

$$x \leq -\frac{18}{5}$$

Remember to change the direction of the inequality sign when multiplying or dividing by a negative number.

PTS: 2

NAT: A.REI.B.3

TOP: Solving Linear Inequalities

144) ANS: 4

Strategy: Use order of operations.

Notes	Left Expression	Sign	Right Expression
Given	$4p + 2$	<	$2(p + 5)$
Divide by 2	$2p + 1$	<	$p + 5$
Subtract p	$p + 1$	<	5
Subtract 1	p	<	4

PTS: 2

NAT: A.REI.B.3

TOP: Solving Linear Inequalities