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

INEQUALITIES

Solving Linear Inequalities

|  |  |
| --- | --- |
| **Common Core Standard**  **A-REI.B.3** Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters. | **Next Generation Standard**  **AI-A.REI.3** Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.  **Note: Algebra I tasks do not involve solving compound inequalities**. |

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**  **Overview of Lesson**  **- activate students’ prior knowledge**  **- vocabulary**  **- learning objective(s)**  **- big ideas: direct instruction**  **- modeling** | **Student Centered Activities**  **guided practice Teacher: anticipates, monitors, selects, sequences, and connects student work**  **- 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:**



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: 

|  |  |  |  |
| --- | --- | --- | --- |
| Notes | Left Hand Expression | Sign | Right Hand Expression |
| Given |  | > | 3+x |
| Multiply by 5 |  | > |  |
| Subtract 2x | 20 | > | 15+3x |
| Subtract 15 | *5* | > | 3x |
| Divide by 3 |  | > | x |
| Check | Select, which is less than*,* to test the solution. | | |

**REGENTS EXAM QUESTIONS (through June 2018)**

A.REI.B.3: Solving Linear Inequalities

138) The inequality  is equivalent to

|  |  |  |  |
| --- | --- | --- | --- |
| 1) |  | 3) |  |
| 2) |  | 4) |  |

139) Given that , solve for *x* in terms of *a* and *b*:



140) When  is solved for *x*, the solution is

|  |  |  |  |
| --- | --- | --- | --- |
| 1) |  | 3) |  |
| 2) |  | 4) |  |

141) What is the solution to ?

|  |  |  |  |
| --- | --- | --- | --- |
| 1) |  | 3) |  |
| 2) |  | 4) |  |

142) Solve the inequality below:



143) What is the solution to the inequality ?

|  |  |  |  |
| --- | --- | --- | --- |
| 1) |  | 3) |  |
| 2) |  | 4) |  |

144) The solution to  is

|  |  |  |  |
| --- | --- | --- | --- |
| 1) |  | 3) |  |
| 2) |  | 4) |  |

**SOLUTIONS**

138) ANS: 1

Strategy: Use the four column method for solving and documenting an equation or inequality.

|  |  |  |  |
| --- | --- | --- | --- |
| Notes | Left Expression | Sign | Right Expression |
| Given: |  | < |  |
| Add +8 to both expressions  (Addition property of equality) |  | < |  |
| Add  to both expressions  (Addition property of equality) |  | < |  |
| Simplify |  | < |  |
| Divide both expressions by  (Division property of equality) |  | < |  |
| Simplify |  | < |  |
| Rewrite | x | > | 9 |

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

139) ANS:



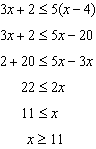
Strategy: Use the four column method. Remember that .

|  |  |  |  |
| --- | --- | --- | --- |
| Notes | Left Expression | Sign | Right Expression |
| Given |  |  |  |
| Distributive Property |  |  |  |
| Transpose |  |  |  |
| Factor |  |  |  |
| Divide by | *x* | See NOTE below |  |

NOTE: Since , the expression  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



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

141) ANS: 1

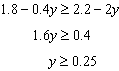


PTS: 2 NAT: A.REI.B.3

142) ANS:

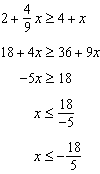


|  |  |  |  |
| --- | --- | --- | --- |
| Given |  |  |  |
| Add (2y) | + |  | + |
| Simplify |  |  | 2.2 |
| Subtract (1.8) | - |  | - |
| Simplify |  |  |  |
| Divide (1.6) |  |  |  |
| Simplify | *y* |  |  |



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

143) ANS: 1



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 |  | < |  |
| Divide by 2 |  | < |  |
| Subtract p |  | < | 5 |
| Subtract 1 |  | < | 4 |

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