**F – Inequalities, Lesson 2, Interpreting Solutions (r. 2018)**

INEQUALITIES

Interpreting Solutions

|  |  |
| --- | --- |
| **Common Core Standard**  **A-REI.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**. |

**LEARNING OBJECTIVES**

Students will be able to:

1. Identify solutions to inequalities as sets of solutions that can be plotted on a number line.
2. Use proper notation to define solution sets.
3. Identify integer values within solution sets.
4. Determine if a specified integer value is within a solution set.

**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**

integer

solution set

open dot

closed dot

curved parentheses

square parentheses

number line

**BIG IDEAS**

**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.

**Open Dots v Closed Dots**

**Square vs Curved Parentheses**

|  |  |
| --- | --- |
| When the inequality sign does not contain an equality bar beneath it, the dot is open. | When the inequality sign contains includes an equality bar beneath it, the dot is closed, or shaded in. |
| or (1...  means 1 *is not* included in the solution set. | or [1...  means 1 *is* included in the solution set |
| or ...1)  means 1 *is* *not* included in the solution set | or ...1]  means 1 *is* included in the solution set |
|  | |

**DEVELOPING ESSENTIAL SKILLS**

Solve for the smallest integer value of *x*: 

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Notes | Left Hand Expression | Sign | | Right Hand Expression |
| Given |  |  | |  |
| Add 6x | 3+7x |  | | 4 |
| Subtract 3 | 7x |  | | 1 |
| Divide by 7 | x |  | |  |
| Answer | 1 is the smallest integer that is in the solution set. | | | |
| Check | 0 is less than  and should *not* be in the solution set. | | 1 is greater than or equal to and *should* be in the solution set. | |

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

A.REI.B.3: Interpreting Solutions

145) Given , determine the largest integer value of *a* when .

146) Solve the inequality below to determine and state the smallest possible value for *x* in the solution set.



147) Determine the smallest integer that makes  true.

148) Solve for *x* algebraically: 

If *x* is a number in the interval , state all integers that satisfy the given inequality. Explain how you determined these values.

149) Which value would be a solution for *x* in the inequality ?

|  |  |  |  |
| --- | --- | --- | --- |
| 1) | -13 | 3) | 10 |
| 2) | -10 | 4) | 11 |

150) Given the set , what is the solution of ?

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

**SOLUTIONS**

145) ANS:

The largest integer value for *a* is 2.

Strategy: Use the four column method.

|  |  |  |  |
| --- | --- | --- | --- |
| Notes | Left Expression | Sign | Right Expression |
| Given |  | > |  |
| Substitute -1 for *x* |  | > |  |
| Simplify |  | > |  |
| Combine like terms |  | > |  |
| Add +9 to both expressions  (Addition property of equality) |  | > |  |
| Divide both expressions by  and reverse the sign | a | < | 3 |

The largest integer value that is less the 3 is 2.

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146) ANS:

6 is the smallest possible value for *x* in the solution set.

Strategy: Use the four column method.

|  |  |  |  |
| --- | --- | --- | --- |
| Notes | Left Expression | Sign | Right Expression |
| Given |  |  |  |
| Subtract 3x from both expressions  (Subtraction property of equality) | 9 |  |  |
| Add +3 to both expressions  (Addition Property of equality) | 12 |  |  |
| Divide both expressions by 2  (Division property of equality) | 6 |  |  |
| Rewrite | x |  | 6 |

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147) ANS:

0 is the smallest integer in the solution set.

.

Strategy: Use the four column method to solve the inequality, then interpret the solution.

STEP 1: Solve the inequality.

|  |  |  |  |
| --- | --- | --- | --- |
| Notes | Left Expression | Sign | Right Expression |
| Given |  | < |  |
| Simplify (Combine like terms) |  | < | 15 |
| Add +8x to both expressions  (Addition Property of Equality) | 7 | < | 8x+15 |
| Subtract 15 from both expressions  (Subtraction Property of Equality) |  | < | 8x |
| Divide both expressions by +8  (Division property of equality) |  | < | x |
| Rewrite | x | > |  |

STEP 2: Interpret the solution set for the smallest integer.

The smallest integer greater than -1 is 0.

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148) ANS:

6, 7, 8 are the numbers greater than or equal to 6 in the interval.

Strategy: Use the four column method to solve the inequality, then interpret the solution.

STEP 1: Solve the inequality.

|  |  |  |  |
| --- | --- | --- | --- |
| Notes | Left Expression | Sign | Right Expression |
| Given |  |  |  |
| Clear parentheses  (Distributive property) |  |  |  |
| Simplify  (Combine like terms) |  |  |  |
| Add 5x to both expressions  (Addition property of equality) | 24 |  |  |
| Subtract 12 from both expressions  (Subtraction property of equality) | 12 |  | 2x |
| Divide both expressions by 2  (Division property of equality) | 6 |  | x |
| Rewrite | x |  | 6 |

STEP 2: Interpret the solution set for the interval .

The interval  contains the integers 4, 5, 6, 7, and 8.

If , then the solution set of integers is .

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149) ANS: 4



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

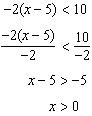


11 is the only answer choice that is greater than 10.

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150) ANS: 2

STEP 1: Solve the inequality 



STEP 2: Select integers from the interval  that satisfy the inequality. The integers in the interval are: {-2, -1, 0, 1, 2}.

-2 is not greater than 0

-1 is not greater than 0

0 is not greater than 0

1 is greater than 0

2 is greater than zero.



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