2.5 Solving Compound Inequalities

Lesson Objectives

1. **N.Q.3** I will use inequality rules and their meaning to get appropriate answers
2. **A.CED.1** I will write a compound inequality from a number line
3. **A.CED.3** I will interpret the solution to a compound inequality and visually show the answer on a number line
4. **A.REI.3** I will organize data from a number line into a compound inequality
5. **A.REI.1** I will explain how to solve various compound inequality problems
6. **A.REI.3** I will solve a compound inequality

Standards

Press the tabs to view details.
2.5 Solving Compound Inequalities

Lesson Objectives

A.CED.1 Create equations and inequalities in one variable and use them to solve problems.
A.CED.3 Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context.
N.Q.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.
A.REI.1 Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.
A.REI.3 Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.

Standards

Press the tabs to view details.

Lesson Notes

**Compound Inequality:**
Two or more inequalities that are connected with the words "and" or "or".

2 inequalities solved separately in 1 problem

Examples:

\[ 2 < 4x < 10 \] \quad 2x \geq 6 \text{ or } x < -9

**AND Intersection \( \cap \)**
True if and only if both inequalities are true. Every solution of the "and" intersection must be a solution of both inequalities.
The OVERLAP part of the graph

Typically in the middle
\[ x > 1 \text{ and } x \leq 3 \]

Can have a "no solution"

**OR Union \( \cup \)**
True if ONE or both inequalities are true. Either NOT necessarily a solution for both.
The EXTREMES part of the graph

Typically go away from each other
\[ x \geq 2 \text{ or } x < -3 \]

Can have an "all reals" solution

Numerical example:

\[ A = \{2, 4, 6, 8, 10\} \quad B = \{1, 2, 3, 4, 5\} \]

"AND" \( A \cap B = \{2, 4\} \)

"OR" \( A \cup B = \{1, 2, 3, 4, 5, 6, 8, 10\} \)
1. \( x > -3 \) and \( x \leq 4 \)  
   \( \text{NO Solution} \)

2. \(-3 < d \) and \( d < 2 \)  
   \( \text{Overlap} \)

3. \( x > 3 \) and \( x \leq 2 \)  
   \( \text{No Solution} \)

4. \( y \leq -4 \) or \( y > 0 \)

5. \( 3 \geq q \) or \( q \leq 1 \)

6. \(-3 < d \) or \( d < 2 \)  
   \( \text{All Real Numbers} \)

7. \( y - 5 < -4 \) or \( y - 5 \geq 1 \)
   \( y < 1 \) or \( y \geq 6 \)

Graph the solution set of each compound inequality.
Solve each compound inequality by showing all work. Then graph the solution set.

8. $4 < f + 6 \quad \text{and} \quad f + 6 < 5$
   
   
   $-6 < f < 6$
   
   $f < -2$
   
   $f > -4$

9. $5 < 3h + 2 \leq 11$
   
   
   $\frac{3}{2} < h \leq \frac{9}{3}$
   
   $1 < h \leq 3$

10. $2n + 1 < 11$ or $n > 3n + 2$
    
    
    $n < 5$ or $n > -2$

Solve each compound inequality by showing all work. Then graph the solution set.

7. $y - 5 < 4 \quad \text{or} \quad y - 5 > 1$

   $y < 9$ or $y > 6$

9. $5 < 3h + 2 \leq 11$

   $3 < h \leq \frac{9}{3}$

10. $2n + 1 < 11$ or $n > 3n + 2$
    
    $n < 5$ or $n > -2$
On Your Whiteboards

Identify each compound inequality as an "and - together" or an "or - split apart"

1.
and - together or - split apart

2.
and - together or - split apart

3. No Solution
and - together or - split apart

4. All Reals
and - together or - split apart

Please move the appropriate graph under each inequality.

a) $-1 < x + 2 < 3$

b) $m + 3 \geq 5$ and $m + 3 < 7$

Please erase under each problem to check.
c) \( p - 2 \leq -2 \) or \( p - 2 > 1 \)

On the Worksheet

Homework

Graph the solution set of each compound inequality.

1. \( b > 1 \) or \( b \leq -4 \)
2. \( 2 \geq q \) or \( q \leq 4 \)
2.5 Solving Compound Inequalities 2017 ink.notebook

October 03, 2017

3. \( y \leq -2 \) or \( y > 3 \)

4. \( b > -2 \) and \( b \leq 4 \)

5. \( -4 < q \leq 0 \)

6. \( x > -1 \) and \( x \leq 1 \)

7. \( f - 6 < 5 \) and \( f - 4 \geq 2 \)

8. \( n + 2 \leq -5 \) and \( n + 6 \geq -6 \)

9. \( y - 1 \geq 7 \) or \( y + 3 < -1 \)

10. \( t + 14 \geq 15 \) or \( t - 9 < -10 \)

Solve each compound inequality. Then graph the solution set.
11. $-5 < 3p + 7 \leq 22$
12. $-3 \leq 7c + 4 < 18$

13. $5h + 4 \geq 6$ and $7h + 11 < 32$

14. $-y + 5 \geq 9$ or $3y + 4 < -5$

15. Manny is going to a dance. He has to pay $7 at the door and drinks cost $2.00 each. Write an expression for Manny's total cost, based on the number of drinks he buys.
16. Translate to an algebraic expression and solve showing work:
Three times the sum of x and five is the same as twenty four.

17. 

18. 

19. 

20. 

21. Find the final price of the item. Show your proportions.

shirt: $18.99
discount: 20%
tax: 8.5%

Discount: ____
Subtotal: ____
Total = ____

Tax: ____
Answers:

1) -4, -3, -2, -1, 0, 1, 2, 3, 4
3) -5, -4, -3, -2, -1, 0, 1, 2, 3
5) -5, -4, -3, -2, -1, 0, 1, 2
7) f < 11 and f ≥ 6
9) y ≥ 8 or y ≤ -4
11) -4 < p ≤ 5
13) h ≥ 2 and h < 3

15) 7 + 2d
17) 12 and 2
19) 6 and 3
21) 3.80, 15.19, 1.29, 16.48