Objective

- **Solve linear inequalities** and listen to a justification of a solution from a partner and critique the solution using properties of inequality and counterexamples.
- Success Criteria
  - Define linear inequality
  - Turn verbal phrases into mathematical inequalities
  - Graph inequalities
  - Compare inequalities to equations
- **Vocabulary:** decreased, increased, quotient, product

Linear Inequality in x

A **linear inequality in x** is one that can be written in the form $ax + b < 0$, $ax + b \le 0$, $ax + b > 0$, or $ax + b \ge 0$, where a and b are real numbers with $a \neq 0$.

not equal

AM OBJ: Translate Word Phrases to Inequalities

1. Which inequality matches the sentence?
When a number is decreased by 4, the result is more than 4.

$[A]\ x - 4 > 4$

$[B]\ x + 4 < 4$

$[C]\ x - 4 < 4$

$[D]\ x + 4 > 4$

AM OBJ: Translate Word Phrases to Inequalities

2. Which inequality matches the sentence?
When a number is divided by 2, and the quotient is increased by 3, the result is more than 10.

$[A]\ \dfrac{x+3}{2} < 10$ $\quad [B]\ \dfrac{x+3}{2} > 10$

$[C]\ \dfrac{x}{2} + 3 > 10$ $\quad [D]\ \dfrac{x}{2} + 3 < 10$

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AM OBJ: Translate Word Phrases to Inequalities

3. Which inequality matches the sentence?
When a number is increased by 3 and the quantity is divided by 5. The quotient is less then or equal to 10.

$[A]\ \dfrac{x+3}{5} \le 10$ $[B]\ \dfrac{x+3}{5} < 10$

$[C]\ \dfrac{x}{5} + 3 \ge 10$ $[D]\ \dfrac{x}{5} + 3 \le 10$

4

When a number is decreased by 7 and the quanitity is multiplied by 3, the product is less than 25.

$(x-7)3<25$

AM: Solve Linear Inequalities

2. If the replacement set is the set of integers, find the solution set for the inequality $x + 11 \geq 12$.

[A] $\{1, 2, 3, \ldots\}$ [B] $\{1\}$ [C] $\{23, 24, 25, \ldots\}$ [D] $\{-1, 0, 1, \ldots\}$

$x + 11 \geq 12$

$-11 \quad -11$

$x \geq 1$

$x > 1$ $\{2, 3, 4, \ldots\}$

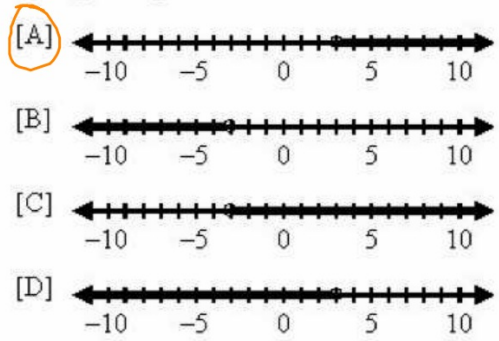
AM: Graph Inequalities (number line)

Graph:

LCD = 24

LCD
Isolate
Simplify

1. $\frac{x}{8} - \frac{x}{3} < \frac{x-8}{8}$



$24\left(\frac{x}{8}\right) - 24\left(\frac{x}{3}\right) < \frac{24(x-8)}{8}$

$3x - 8x < 3x - 24$

$-5x < 3x - 24$

$-3x \quad -3x$

$-8x < -24$

$\frac{-8x}{-8} < \frac{-24}{-8}$

$x > 3$

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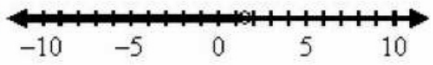
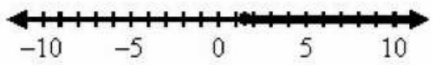
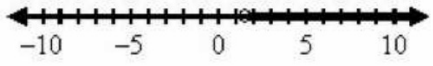
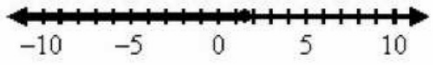
AM: Graph Inequalities (number line)

2. $5x+3 < 3(x+2)$

[A] 

[B] 

[C] 

[D] 

LCD
Isolate
Simplify

$5x+3 < 3x+6$

$-3x \quad -3 \quad -3x \quad -3$

$\frac{2x}{2} < \frac{3}{2}$

$x < \frac{3}{2}$

Objective

- **Solve and graph different compound inequalities and** orally differentiate the steps necessary for each using comparison words in a group.
- Success Criteria
  - Discuss the values included in 'and' statements and 'or' statement
  - Describe the graphical differences between 'and' & 'or' inequalities
- Vocabulary: compound, 'and', 'or'

Compound Inequalities involve mathematical logic statements which use the everyday words [and] and [or] in highly refined way.

Which sentence is less restrictive, meaning that more people can participate in the game?

A. To play high school team soccer at the recreation center a player must be at least 16 years old [or] at least five feet tall.

B. To play high school team soccer at the recreation center a player must be at least 16 years old [and] at least five feet tall.

AM OBJ: Solve Compound Inequalities

1. Solve: $x + 1 \le 5$ and $-x < 5$

$-1 \quad -1 \qquad -1 \quad -1$

$x \le 4 \qquad x > -5$

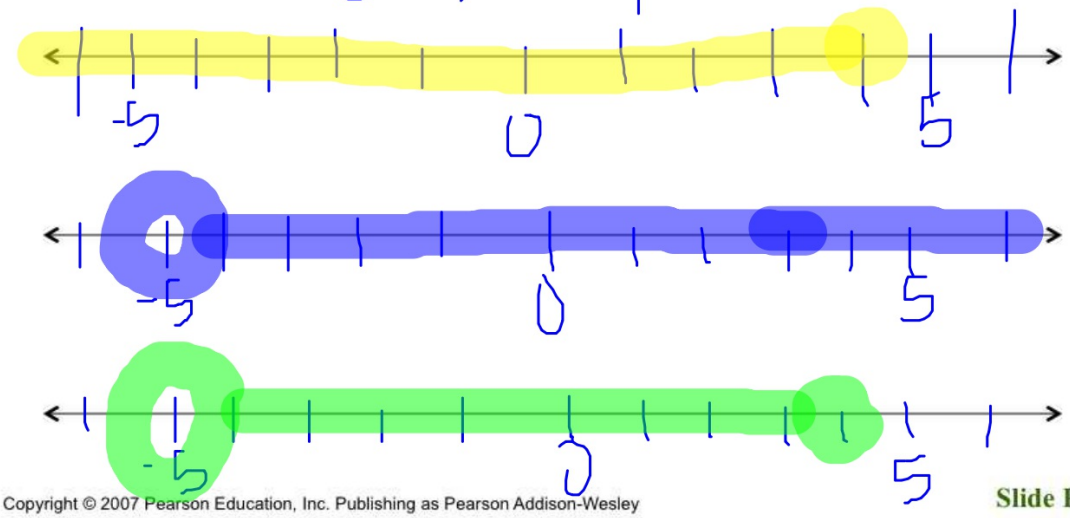
[A] $-5 < x \le 4$ [B] $-1 \le x < 4$

[C] $-1 < x \le 4$ [D] $-5 \le x < 4$

Using a graph to solve

$x \leq 4$ and $x > -5$

$-5 < x \leq 4$



AM OBJ: Solve Compound Inequalities

1. Solve: $x + 3 \leq 5$ or $-x < 2$

$-3 \quad -3 \qquad -1 \quad -1$

$x \leq 2 \qquad x > -2$

[A] $-5 < x \leq 4$ [B] $-1 \leq x < 4$

[C] $-1 < x \leq 4$ [D] $-5 \leq x < 4$

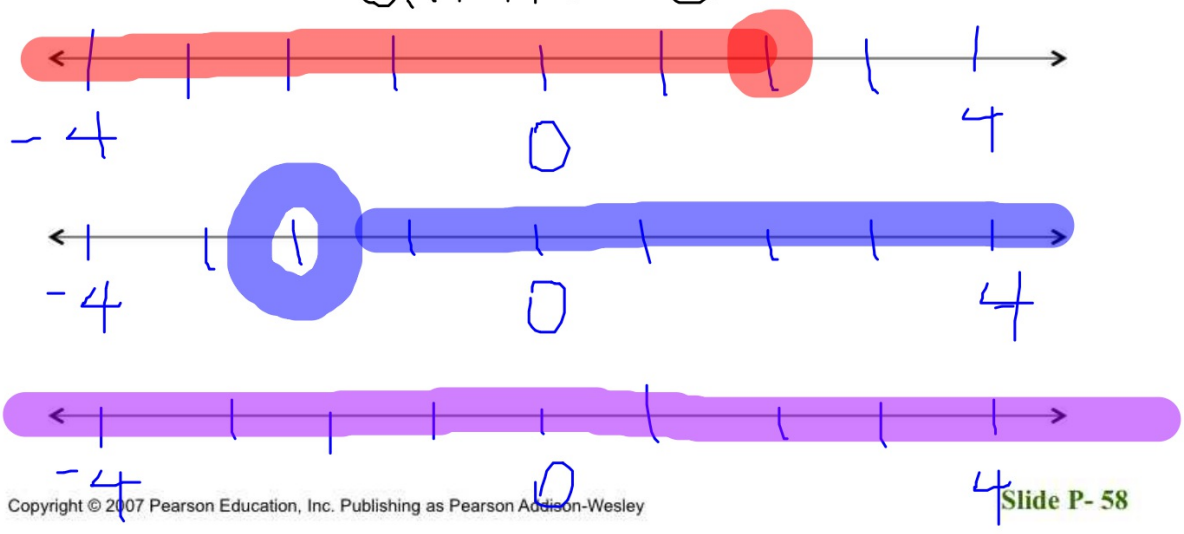
8

ℝ = real

Using a graph to solve

$x \leq 2$ OR $x > -2$

all ℝ #s



AM OBJ: Solve Compound Inequalities

2. Solve:

$$x + 2 > -2 \text{ and } -x + 2 < -4$$

[A] $-4 < x < 6$ [B] $x < 6$

[C] $6 < x$ [D] no solution

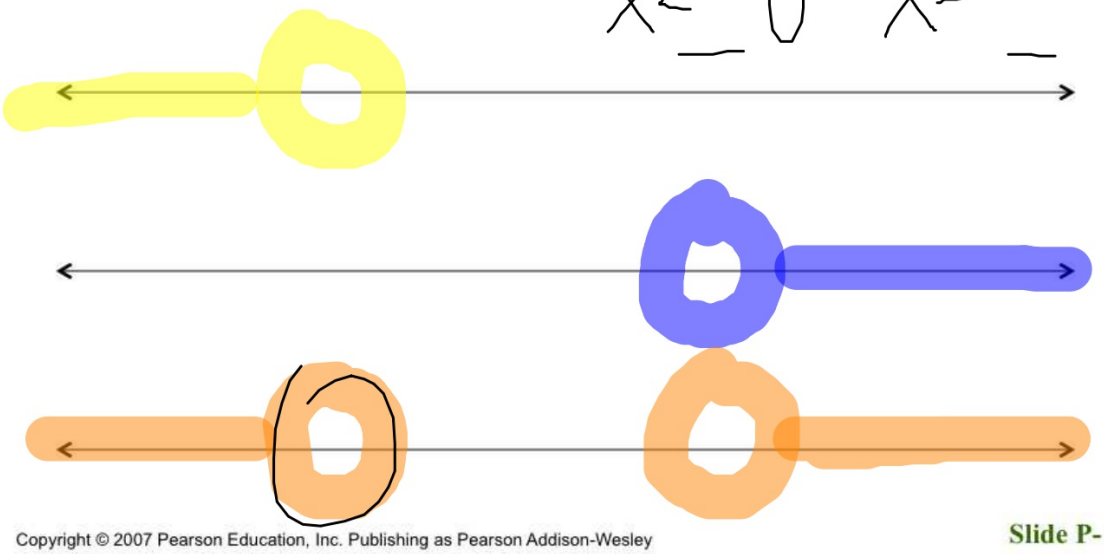
8

Using a graph to solve

and = ∅

or

$x < \_ \cup x > \_$



AM OBJ: Solve Compound Inequalities

4. Solve:

$$-7 \le -4x - 6 \le 12$$

$+6 \qquad +6 \qquad +6$

$$-1 \le -4x \le 18$$

$\frac{}{-4} \qquad \frac{}{-4} \qquad \frac{}{-4}$

$$\frac{1}{4} \ge x \ge -4\frac{1}{2}$$

$$-4\frac{1}{2} \le x \le \frac{1}{4}$$

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