

### 5.4 Compound Inequalities

A Compound Inequality consists of two inequalities connected by and or or.

Examples:  
 (a) all real numbers that are between 0 and 4 can be written as  $0 < x < 4$

Oct 18-11:03 AM

Examples:  
 (b) All real numbers that are less than -1 or greater than 2.

$x < -1$  or  $x > 2$

(c) all real numbers between 0 and 4, inclusive

$0 \leq x \leq 4$

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Graph the following:

$x$  is greater than 3 or less than 2  $x > 3$  or  $x < 2$

$x$  is less than 4 and is at least -5  $-5 \leq x < 4$

$-2 < x \leq 5$

$x > 4$  or  $x < -2$

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**Interval Notation:** a way to describe a portion of the number line without the use of inequalities.

**Parentheses:** Use ( or ) when < or > or when you have  $\infty$  or  $-\infty$

**Brackets:** Use [ or ] when  $\leq$  or  $\geq$

$x > -3$  is the same as  $(-3, \infty)$

$x \leq -5$  is the same as  $(-\infty, -5]$

$-2 < x \leq 4$  is the same as  $(-2, 4]$

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Write as an inequality and graph the following:

$[-2, 5)$   $-2 \leq x < 5$

$[0, 4]$   $0 \leq x \leq 4$

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Write as an inequality and graph the following:

$(-3, \infty)$   $x > -3$

$(-\infty, 3]$   $x \leq 3$

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Write each inequality in interval notation and graph.

$x > -2$   
 $(-2, \infty)$

$x < -2$   
 $(-\infty, -2)$

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Write each inequality in interval notation and graph.

$-2 \leq x < 3$   
 $[-2, 3)$

$x \geq 3$   
 $[3, \infty)$

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**Solving "And" Compound Inequalities:**

- Get x by itself in the middle
- Do inverse operations on both sides

$$-2 \leq 3x - 8 \leq 10$$

$$\begin{matrix} +8 & & +8 \\ -2 & \leq & 3x - 8 & \leq & 10 \\ & & +8 & & +8 \end{matrix}$$

$$\frac{6}{3} \leq \frac{3x}{3} \leq \frac{18}{3}$$

$$2 \leq x \leq 6$$

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$$\frac{-9}{-3} < \frac{-3x}{-3} < \frac{6}{-3}$$

$$3 > x > -2$$

$$-2 < x < 3$$

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$$\frac{-9}{-5} < \frac{5}{-5} - x < \frac{6}{-5}$$

$$\frac{-14}{-1} < \frac{-x}{-1} < \frac{1}{-1}$$

$$14 > x > -1$$

$$-1 < x < 14$$

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$$11 \leq -3(4x - 1) \leq 17$$

$$\frac{11}{-3} \leq \frac{-12x + 3}{-3} \leq \frac{17}{-3}$$

$$\frac{8}{-12} \leq \frac{-12x}{-12} \leq \frac{14}{-12}$$

$$-\frac{2}{3} \geq x \geq -\frac{7}{6}$$

$$-\frac{7}{6} \leq x \leq -\frac{2}{3}$$

Mar 23-4:32 PM

**Solving "or" Compound Inequalities:**

- Solve each part

$$3x + 1 < 4 \quad \text{or} \quad 2x - 5 > 7$$

$$\begin{array}{l} -1 \quad -1 \\ \hline 3x < 3 \\ \hline x < 1 \end{array} \quad \text{or} \quad \begin{array}{l} +5 \quad +5 \\ \hline 2x > 12 \\ \hline x > 6 \end{array}$$

↓

$$x < 1 \quad \text{or} \quad x > 6$$

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$$-7 > 6x - 1 \quad \text{or} \quad \frac{1}{2}(2x + 8) > 5$$

$$\begin{array}{l} +1 \quad +1 \\ \hline -6 > 6x \\ \hline -1 > x \\ x < -1 \end{array} \quad \text{or} \quad \begin{array}{l} 1x + 4 > 5 \\ -4 \quad -4 \\ \hline 1x > 1 \\ x > 1 \end{array}$$

$$x < -1 \quad \text{or} \quad x > 1$$

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**Classwork: p.326 #2 - 22 even,38,40**

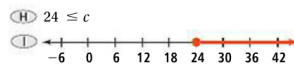
**Copy questions.**

**Show work.**

**Final Five**

A student must earn at least 24 credits in high school in order to graduate. Which inequality or graph does NOT describe this situation?

- F  $c \leq 24$
- G  $c \geq 24$



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